



Sunnyvale

SUNNYVALE CIVIC CENTER - PHASE 1

CITY OF SUNNYVALE, CALIFORNIA
465 WEST OLIVE AVENUE
SUNNYVALE, CA 94086

SPECIFICATIONS, VOLUME ONE ISSUED FOR CONSTRUCTION

OCTOBER 27, 2020

SMITHGROUP

301 BATTERY STREET 7TH FLOOR
SAN FRANCISCO, CA 94111
415.227.0100
smithgroup.com

SECTION 000103 – PROJECT DIRECTORY

PART 1 - GENERAL PROJECT INFORMATION

- | | |
|--|---|
| 1.1. Project Name: | Civic Center Modernization Phase 1 |
| 1.2. Project Number: | PW20-16 |
| 1.3. Project Location: | City of Sunnyvale California
465 West Olive Avenue
Sunnyvale, CA 94086 |
| 1.4. Project Owner: | City of Sunnyvale, Public Works Department
650 West Olive Avenue
Sunnyvale, CA 94086 |
| 1.5 City's Purchasing Officer: | Gregory Card
Tel: (408) 730 - 7657
gcard@sunnyvale.ca.gov |
| 1.6 Design Professional: | SmithGroup Inc.
301 Battery Street, 7 th Floor
San Francisco, CA 94111
ATT: Marianne O'Brien
Tel: (415) 365 – 3565 |
| 1.7 Address for Stop Notices: | Public Works Department, City Hall Annex
465 West Olive Avenue
Sunnyvale, California 94086 |
| 1.8 Address for Demand of Arbitration: | Purchasing Division, City Hall Annex
650 West Olive Avenue
Sunnyvale, California 94086 |
| 1.9 Address for Filing Bid Protests: | Purchasing Division, City Hall Annex
650 West Olive Avenue
Sunnyvale, California 94086 |

END OF SECTION

SECTION 000105 – PROJECT CONSULTANTS



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END OF SECTION

DOCUMENT 000107 - SEALS PAGE

1.1 DESIGN PROFESSIONALS OF RECORD

		NA	Architect	Landscape Arch	Civil Engineer	Structural Engineer	Mechanical Engineer	Electrical Engineer	Plumbing Engineer	Fire Protection Engineer	Building Maintenance Engineering
DIVISION 00 – PROCUREMENT AND CONTRACT REQUIREMENTS											
000101	Title Page	X									
000103	Project Directory	X									
000105	Project Consultants	X									
000107	Seals Page	X									
000110	Table of Content	X									
001116	Notice Inviting Bids	X									
002113	Instructions to Bidders	X									
003100	Available Project Information	X									
003124	Environmental Mitigation and Monitoring Requirements	X									
004100	Bid Forms	X									
004113	Bidder Submission Requirements	X									
004513	Bidder Qualifications & References	X									
004519	Non-Collusion Affidavit	X									
005213	General Construction Agreement	X									
006113	Performance Bond	X									
006114	Payment Bond	X									
006536	Guarantee Form	X									
007213	General Provisions	X									
007300	Supplementary Provisions	X									
007316	Insurance Requirements	X									
007319	Health and Safety Requirements	X									
009113	Acknowledgment of Addendum Forms	X									
DIVISION 01 – GENERAL REQUIREMENTS											
011100	Summary of Work		X								
012513	Substitutions		X								
012600	Contract Modification Procedures		X								
012900	Payment Procedures		X								
013100	Project Management and Coordination		X								

		NA	Architect	Landscape Arch	Civil Engineer	Structural Engineer	Mechanical Engineer	Electrical Engineer	Plumbing Engineer	Fire Protection Engineer	Building Maintenance Engineering
013216	Construction Progress		X								
013219	Submittal Schedules/Daily Reports/Field Reports		X								
013233	Photographic Documentation		X								
013300	Submittal Procedures		X								
013325	Delegated Design		X								
013500	Special Procedures		X								
013591	Historic Treatment Procedures		X								
014000	Quality Requirements		X								
014200	References		X								
014500	Quality Control		X								
014541	Mockup Requirements		X								
014543	Exterior Wall Mockups		X								
014546	Field Quality Control Procedures		X								
015000	Temporary Facilities and Controls		X								
015639	Temporary Tree and Plant Protection		X								
015650	Protection of Nesting Birds		X								
015700	Traffic Control System		X								
016000	Product Requirements		X								
016400	Owner-Furnished Items		X								
017113	Mobilization		X								
017300	Execution Requirements		X								
017329	Cutting and Patching		X								
017419	Construction and Demolition Waste Management and Disposal		X								
017700	Closeout Procedures		X								
017823	Operation and Maintenance Data		X								
017836	Warranties		X								
017839	Project Record Documents		X								
017900	Demonstration and Training		X								
018113	Sustainable Design Requirements		X								
018119	Construction Indoor Air Quality Management		X								
019100	General Commissioning Requirements	X									
DIVISION 02 – EXISTING CONDITIONS											
024113	Selective Site Demolition				X						

		NA	Architect	Landscape Arch	Civil Engineer	Structural Engineer	Mechanical Engineer	Electrical Engineer	Plumbing Engineer	Fire Protection Engineer	Building Maintenance Engineering
024116	Structure Demolition		X								
024119	Selective Demolition		X								
028400	ACM, LBP & Universal Waste Remediation – not included in this issuance Sunnyvale	X									
DIVISION 03 – CONCRETE											
031113	Concrete Forming and Accessories					X					
032100	Concrete Reinforcing					X					
032300	Stressing Tendons					X					
033100	Cast-in-Place Concrete					X					
033500	Concrete Finishing					X					
033713	Shotcrete					X					
033713	Shotcrete					X					
034500	Precast Architectural Concrete										
035416	Cement Underlayment		X								
DIVISION 04 – MASONRY											
042200	Concrete Unit Masonry					X					
044000	Stone Assemblies		X								
044200	Exterior Stone Cladding		X								
DIVISION 05 – METALS											
051200	Structural Steel Framing					X					
051250	Buckling Restrained Braces					X					
051519	Stainless Steel Wire Rope Assemblies					X					
051600	Metal Backed Gypsum Board					X					
053100	Steel Decking					X					
054000	Cold-Formed Metal Framing					X					
054300	Slotted Channel Framing					X					
055000	Metal Fabrications					X					
055050	Metal Fabrications		X								
055113	Metal Stairs		X								
055213	Pipe and Tube Railings		X								
057000	Decorative Metal		X								
057100	Decorative Metal Stairs					X					
057313	Decorative Metal and Glazed Railings					X					
DIVISION 06 – WOOD, PLASTICS, AND COMPOSITES											
061000	Rough Carpentry		X								

		NA	Architect	Landscape Arch	Civil Engineer	Structural Engineer	Mechanical Engineer	Electrical Engineer	Plumbing Engineer	Fire Protection Engineer	Building Maintenance Engineering
061600	Sheathing		X								
062013	Exterior Finish Carpentry		X								
062023	Interior Finish Carpentry		X								
064023	Interior Architectural Woodwork		X								
064116	Plastic-Laminate-Clad Architectural Cabinets		X								
066000	Plastic Fabrications		X								
066116	Solid Surface Fabrications		X								
DIVISION 07 – THERMAL AND MOISTURE PROTECTION											
071300	Below-Grade Sheet Waterproofing		X								
071413	Hot Fluid-Applied Waterproofing		X								
072100	Building Insulation		X								
072616	Below Grade Vapor Retarders		X								
072700	Air Barriers		X								
073011	High Temperature Roofing Underlayment		X								
074113	Standing-Seam Metal Roof Panels		X								
074213	Metal Composite Wall Panels		X								
074229	Terracotta Wall Panels		X								
075419	PVC Membrane Roofing		X								
076200	Sheet Metal Flashing and Trim		X								
077100	Roof Specialties		X								
077618	Pedestal-Mounted Roof Pavers		X								
078100	Applied Fireproofing		X								
078413	Penetration Firestopping		X								
078443	Joint Firestopping		X								
079200	Interior Joint Sealants		X								
079213	Exterior Joint Sealants		X								
079500	Expansion Control		X								
DIVISION 08 – OPENINGS											
081113	Hollow Metal Doors and Frames		X								
081216	Interior Aluminum Frames		X								
081416	Flush Wood Doors		X								
081713	Integrated Door Assemblies		X								
083113	Access Doors and Frames		X								
083323	Overhead Coiling Doors		X								
083326	Overhead Coiling Grilles		X								

		NA	Architect	Landscape Arch	Civil Engineer	Structural Engineer	Mechanical Engineer	Electrical Engineer	Plumbing Engineer	Fire Protection Engineer	Building Maintenance Engineering
084113	Interior Glass Entrances and Storefronts		X								
084213	Aluminum-Framed Exterior Entrances		X								
084413	Structural-Sealant-Glazed Curtain Walls		X								
084422	Timber Curtain Wall		X								
085600	Laminated Polycarbonate Glazing		X								
086200	Unit Skylights		X								
087100	Door Hardware		X								
087113	Automatic Door Operators		X								
088000	Glazing		X								
088300	Mirrors		X								
088778	Glazing Film		X								
088823	Glass Mounting System		X								
089119	Wall Louvers		X								
DIVISION 09 – FINISHES											
092116	Gypsum Board Shaft Wall Assemblies		X								
092216	Non-Structural Metal Framing		X								
092313	Acoustical Plastering		X								
092900	Gypsum Board		X								
093000	Tiling		X								
095123	Acoustical Tile Ceilings		X								
095426	Suspended Wood Ceilings		X								
096500	Resilient Flooring		X								
096513	Resilient Base and Accessories		X								
096519	Resilient Tile Flooring		X								
096566	Resilient Athletic Flooring		X								
096623	Resinous Matrix Terrazzo		X								
096813	Tile Carpeting		X								
097200	Wall Coverings		X								
097700	Fiberglass Reinforced Paneling		X								
098300	Fabric-Wrapped Panels		X								
099100	Painting and Coating		X								
099120	Pavement Marking		X								
099600	High Performance Coatings		X								

		NA	Architect	Landscape Arch	Civil Engineer	Structural Engineer	Mechanical Engineer	Electrical Engineer	Plumbing Engineer	Fire Protection Engineer	Building Maintenance Engineering
DIVISION 10 – SPECIALTIES											
100000	Miscellaneous Specialties		X								
101400	Signage		X								
102113	Phenolic Core Toilet Compartments		X								
102123	Cubicle Curtains and Tracks		X								
102233	Vertical Lift Partitions		X								
102213	Wire Mesh Partitions		X								
102240	Folding Glass Panel Partitions		X								
102600	Wall and Door Protection		X								
102641	Bullet-Resistant Composite Panels		X								
102800	Toilet Accessories		X								
105010	Personnel Lockers		X								
105114	Evidence Lockers		X								
105118	Solid Phenolic Lockers		X								
107000	Exterior Specialties		X								
107500	Flagpoles			X							
DIVISION 11 – EQUIPMENT CONSULTANT											
112423	Exterior Building Maintenance System										X
113100	Pantry Appliances		X								
114500	Equipment		X								
116000	Evidence Processing Equipment		X								
DIVISION 12 – FURNISHINGS											
122413	Roller Window Shades		X								
124813	Entrance Mats and Frames		X								
125190	Salvaged Tree Preparation and Custom Furniture		X								
126100	Fixed Audience Seating		X								
DIVISION 14 – CONVEYING EQUIPMENT CONSULTANT											
142100	Electric Traction Elevators		X								
DIVISION 21 – FIRE SUPPRESSION CONSULTANT											
210500	Common Work Results for Fire Suppression									X	
211000	Water Based Fire Suppression Systems									X	
211120	Fire Suppression Pumps									X	

		NA	Architect	Landscape Arch	Civil Engineer	Structural Engineer	Mechanical Engineer	Electrical Engineer	Plumbing Engineer	Fire Protection Engineer	Building Maintenance Engineering
211319	Pre-action Controls									X	
212200	Clean Agent Systems									X	
DIVISION 22 – PLUMBING CONSULTANT											
220500	Common Work Results for Plumbing								X		
220514	Variable Frequency Drives for Plumbing Equipment								X		
220517	Garage Equipment								X		
220519	Meters and Gauges for Plumbing								X		
220523	General Duty Valves and Specialties for Plumbing								X		
220529	Hangers, Supports, and Anchors for Plumbing								X		
220548	Vibration and Seismic Controls for Plumbing Piping and Equipment								X		
220553	Identification for Plumbing Piping and Equipment								X		
220590	Pressure Testing for Plumbing Systems								X		
220593	Testing, Adjusting, and Balancing for Plumbing								X		
220700	Insulation for Plumbing								X		
222113	Pipe and Pipe Fittings Plumbing								X		
222123	Pumps for Plumbing								X		
222500	Plumbing Water Treatment								X		
223000	Plumbing Equipment								X		
224000	Plumbing Fixtures								X		
DIVISION 23 – HEATING, VENTILATING AND AIR CONDITIONING (HVAC) CONSULTANT											
230500	Common Work Results for HVAC						X				
230514	Variable Frequency Drives for HVAC Equipment						X				
230518	HVAC Expansion Compensation						X				
230519	Meters and Gauges for HVAC						X				
230523	General Duty Valves and Specialties for HVAC						X				
230529	Hangers and Supports for HVAC						X				
230548	Vibration and Seismic Controls for HVAC Piping and Equipment						X				
230553	Identification for HVAC Piping and Equipment						X				
230590	Pressure Testing for HVAC Systems						X				
230593	Testing, Adjusting, and Balancing for HVAC						X				

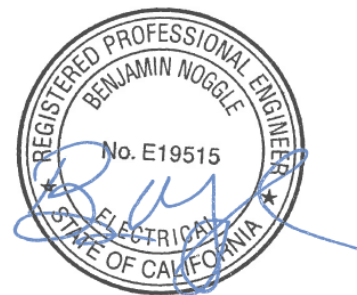
		NA	Architect	Landscape Arch	Civil Engineer	Structural Engineer	Mechanical Engineer	Electrical Engineer	Plumbing Engineer	Fire Protection Engineer	Building Maintenance Engineering
230594	Cleaning of HVAC Existing Ductwork						X				
230700	Insulation for HVAC						X				
230900	Instrumentation and Controls for HVAC						X				
232014	Prefabricated Piping Systems for HVAC						X				
232113	Pipe and Pipe Fittings HVAC						X				
232123	Pumps for HVAC Systems						X				
232500	HVAC Water Treatment						X				
233101	HVAC Ducts and Casing-Low Pressure						X				
233102	HVAC Ducts and Casing-Medium Pressure						X				
233103	HVAC Ducts and Casing-High Pressure						X				
233300	Air Duct Accessories						X				
233319	Duct Silencers						X				
233400	HVAC Fans						X				
233516	Engine Exhaust System						X				
233600	Air Terminal Units						X				
233700	Air Outlets and Inlets						X				
235700	Heat Exchangers						X				
236400	Packaged Water Chillers						X				
237000	Central HVAC Equipment						X				
238000	Commissioning for HVAC						X				
238100	Decentralized Unitary HVAC Equipment						X				
DIVISION 26 – ELECTRICAL CONSULTANT											
260500	Common Work Results for Electrical							X			
260519	Low Voltage Electrical Power Conductors and Cables							X			
260526	Grounding and Bonding for Electrical Systems							X			
260529	Hangers and Supports for Electrical Systems							X			
260533	Raceways and Boxes for Electrical Systems							X			
260536	Cable Trays for Electrical Systems							X			
260540	Surface Metallic Raceways for Electrical Systems							X			
260543	Underground Ducts and Raceways for Electrical Systems							X			

		NA	Architect	Landscape Arch	Civil Engineer	Structural Engineer	Mechanical Engineer	Electrical Engineer	Plumbing Engineer	Fire Protection Engineer	Building Maintenance Engineering
260545	Seismic Restraints for Raceways and Electrical Equipment							X			
260548	Vibration and Seismic Controls for Electrical Systems SFMI							X			
260553	Identification for Electrical Systems							X			
260573	Overcurrent Protective Device Coordination Study							X			
260580	Electrical Testing							X			
260630.10	Photovoltaic System							X			
260800	Commissioning for Electrical							X			
260913	Electrical Power Monitoring and Control							X			
260923	Lighting Control Devices							X			
260933	Central Dimming Controls							X			
260943	Network Lighting Controls							X			
260993	Sequence of Operations for Lighting Controls							X			
262200	Low Voltage Transformers							X			
262413	Switchboards							X			
262416	Panelboards							X			
262500	Enclosed Bus Assemblies							X			
262600	Power Distribution Units							X			
262726	Wiring Devices							X			
262900	Motor Controllers							X			
263213.01	Engine Generators EOC							X			
263213.02	Engine Generators City Hall							X			
263236.01	Resistive Load Banks EOC							X			
263236.02	Resistive Load Banks City Hall							X			
263343	Vehicle Charging Equipment							X			
263353.01	Static Uninterruptible Power Supply System City Hall							X			
263353.02	Static Uninterruptible Power Supply System EOC							X			
263623	Automatic Transfer Switches							X			
264313	Surge Protective Devices							X			
265000	Lighting							X			
DIVISION 22 – COMMUNICATIONS											
270500	Common Work Results for Communications	X									

		NA	Architect	Landscape Arch	Civil Engineer	Structural Engineer	Mechanical Engineer	Electrical Engineer	Plumbing Engineer	Fire Protection Engineer	Building Maintenance Engineering
270526	Grounding and Bonding for Communications Systems	X									
270529	Hangers and Supports for Communications Systems	X									
270533	Conduits and Backboxes for Communications Systems	X									
270536	Cable Trays for Communications Systems	X									
270543	Underground Ducts and Raceways for Communications Systems	X									
270548	Noise and Vibration for Communications Systems	X									
270553	Identification for Communications Systems	X									
271000	Structured Cabling, Basic Materials and Methods	X									
271113	Communications Entrance Protection	X									
271116	Communications Cabinets, Racks, Frames and Enclosures	X									
271119	Communications Termination Blocks and Patch Panels	X									
271123	Communications Cable Management	X									
271300	Communications Indoor Backbone Cabling	X									
271400	Communications Outside Plant Backbone Cabling	X									
271500	Communications Horizontal Cabling	X									
273226	Ring-Down Emergency Telephones	X									
274116	Integrated Audio-Video Systems and Equipment	X									
274123	Communication Broadband Systems	X									

		NA	Architect	Landscape Arch	Civil Engineer	Structural Engineer	Mechanical Engineer	Electrical Engineer	Plumbing Engineer	Fire Protection Engineer	Building Maintenance Engineering
275116	Public Address and Mass Notification Systems	X									
DIVISION 28 – ELECTRONIC SAFETY AND SECURITY CONSULTANT											
280500	Common Work Results for Electronic Safety and Security	X									
280510	Common Work Results for Electronic Security	X									
280512	Conductors and Cables for Electronic Safety and Security	X									
280513	Conductors and Cables for Electronic Safety and Security	X									
280526	Grounding and Bonding for Electronic Safety and Security	X									
280528	Pathways for Electronic Safety and Security	X									
280537	Security Voice Communications – DAS	X									
280800	Commissioning for Fire Alarm and Security									X	
281300	Access Control and Alarm Systems	X									
282300	Visual Surveillance	X									
283000	Fire Detection and Alarm EOC							X			
283000	Fire Detection and Alarm DPS							X			
283001	Fire Detection and Communications City Hall							X			
284611	Air Sampling System Smoke Detection							X			
DIVISION 31 – EARTHWORK CONSULTANT											
311000	Site Clearing				X						
312000	Earth Moving				X						
312317	Trenching				X						
DIVISION 32 – LANDSCAPE CONSULTANT											
320190	Landscape Maintenance			X							
321216	Asphalt Paving				X						
321313	Vehicular Concrete Paving				X						
321313.33	Landscape Concrete Paving			X							
321400	Unit Paving			X							
321500	Aggregate Surfacing			X							
321713	Precast Concrete Parking Bumpers			X							
321723	Pavement Markings				X						
321726	Tactile Warning Surfacing			X							

		NA	Architect	Landscape Arch	Civil Engineer	Structural Engineer	Mechanical Engineer	Electrical Engineer	Plumbing Engineer	Fire Protection Engineer	Building Maintenance Engineering
323120	Metal Screen Fencing and Gates			X							
323300	Site Furnishings			X							
323345	Granite Site Furnishings			X							
328400	Planting Irrigation Brinkerhoff	X									
329113	Soil Preparation			X							
329123	Structural Soil			X							
329200	Turf and Grasses			X							
329219	Hydroseeding			X							
329300	Shrubs, Ornamental Grasses and Groundcover			X							
329400	Planting Accessories			X							
329640	Tree Transplanting			X							
DIVISION 33 – UTILITIES											
331116	Water Systems				X						
333100	Sanitary Sewer Systems				X						
334100	Storm Drainage Systems				X						
334600	Subdrainage				X						
334623	Modular Buried Stormwater Storage Units				X						





END
OF

DOCUMENT

01SECTION 000110 - TABLE OF CONTENTSVOLUME ONE**DIVISION 00 – PROCUREMENT AND CONTRACT REQUIREMENTS**

000101	Title Page
000103	Project Directory
000105	Project Consultants
000107	Seals Page
000110	Table of Contents
001116	Notice Inviting Bids
002113	Instruction to Bidders
003100	Available Project Information
003124	Environmental Mitigation and Monitoring Requirements
004100	Bid Forms
004113	Bidder Submission Requirements
004513	Bidder Qualifications & References
004519	Non-Collusion Affidavit
005213	General Construction Agreement
006113	Performance Bond
006114	Payment Bond
006536	Guarantee Form
007213	General Provisions
007300	Supplementary Provisions
007316	Insurance Requirements
007319	Health and Safety Requirements
009113	Acknowledgement of Addendum Form

DIVISION 01 – GENERAL REQUIREMENTS

011100	Summary of Work
012513	Substitutions
012600	Contract Modification Procedures
012700	Unit Prices
012900	Payment Procedures
013100	Project Management and Coordination
013216	Construction Progress
013219	Submittal Schedules/Daily Reports/Field Reports
013233	Photographic Documentation

013300	Submittal Procedures
013325	Delegated Design
013500	Special Procedures
013591	Historic Treatment Procedures
014000	Quality Requirements
014200	References
014500	Quality Control
014533	Code Required Special Inspections and Procedures
014541	Mockup Requirements
014543	Exterior Wall Mockups
014546	Field Quality Control Procedures
015000	Temporary Facilities and Controls
015639	Temporary Tree and Plant Protection
015650	Protection of Nesting Birds
015700	Traffic Control System
016000	Product Requirements
016400	Owner-Furnished Items
017113	Mobilization
017300	Execution Requirements
017329	Cutting and Patching
017419	Construction and Demolition Waste Management and Disposal
017700	Closeout Procedures
017823	Operation and Maintenance Data
017836	Warranties
017839	Project Record Documents
017900	Demonstration and Training
018113	Sustainable Design Requirements
018119	Construction Indoor Air Quality Management
019100	General Commissioning Requirements

DIVISION 02 – EXISTING CONDITIONS

024113	Selective Site Demolition
024116	Structure Demolition
024119	Selective Structure Demolition
028400	ACM, LBP & Universal Waste Remediation

DIVISION 03 – CONCRETE

031113	Concrete Forming and Accessories
032100	Concrete Reinforcing

032300	Stressing Tendons
033100	Cast-in-Place Concrete
033500	Concrete Finishing
033713	Shotcrete
034600	Glass Fiber Reinforced Concrete (GFRC)
035416	Cement Underlayment

DIVISION 04 – MASONRY

042200	Concrete Unit Masonry
044000	Stone Assemblies
044200	Exterior Stone Cladding

DIVISION 05 – METALS

051200	Structural Steel Framing
051250	Buckling Restrained Braces
051519	Stainless Steel Wire Rope Assemblies
051600	Metal Backed Gypsum Board
053100	Steel Decking
054000	Cold-Formed Metal Framing
054300	Slotted Channel Framing
055050	Metal Fabrications
055113	Metal Stairs
055213	Pipe and Tube Railings
057000	Decorative Metal
057100	Decorative Metal Stairs
057313	Decorative Metal and Glazed Railings

DIVISION 06 – WOOD, PLASTICS, AND COMPOSITES

061000	Rough Carpentry
061600	Sheathing
062013	Exterior Finish Carpentry
062023	Interior Finish Carpentry
064023	Interior Architectural Woodwork
064116	Plastic-Laminate-Clad Architectural Cabinets
066000	Plastic Fabrications
066116	Solid Surface Fabrications

VOLUME TWO

DIVISION 07 – THERMAL AND MOISTURE PROTECTION

071300	Below-Grade Sheet Waterproofing
071413	Hot Fluid-Applied Waterproofing
072100	Building Insulation
072129	Spray-On Cellulose Thermal Insulation
072616	Below Grade Vapor Retarders
072700	Air Barriers
073011	High Temperature Roofing Underlayment
074113	Standing-Seam Metal Roof Panels
074213	Metal Composite Wall Panels
074229	Terracotta Wall Panels
075419	PVC Membrane Roofing
076200	Sheet Metal Flashing and Trim
077100	Roof Specialties
077618	Pedestal-Mounted Roof Pavers
078100	Applied Fireproofing
078413	Penetration Firestopping
078443	Joint Firestopping
079200	Interior Joint Sealants
079213	Exterior Joint Sealants
079500	Expansion Control

DIVISION 08 – OPENINGS

081113	Hollow Metal Doors and Frames
081216	Interior Aluminum Frames
081416	Flush Wood Doors
081713	Integrated Door Assemblies
083113	Access Doors and Frames
083326	Overhead Coiling Grilles
084113	Interior Glass Entrances and Storefronts
084213	Aluminum-Framed Exterior Entrances
084300	Pass Through Windows
084413	Structural-Sealant-Glazed Curtain Walls
084422	Timber Curtain Wall
085600	Laminated Polycarbonate Glazing
086300	Metal-Framed Skylights
087100	Door Hardware
087113	Automatic Door Operators

088000	Glazing
088300	Mirrors
088778	Glazing Film
088823	Glass Mounting System
089100	Wall Louvers

DIVISION 09 – FINISHES

090561.13	Moisture Vapor Emission Control
092116	Gypsum Board Shaft Wall Assemblies
092216	Non-Structural Metal Framing
092313	Acoustical Plastering
092513.13	Acrylic Plaster Finish
092900	Gypsum Board
093000	Tiling
095123	Acoustical Tile Ceilings
095426	Suspended Wood Ceilings
096500	Resilient Flooring
096513	Resilient Base and Accessories
096519	Resilient Tile Flooring
096566	Resilient Athletic Flooring
096623	Resinous Matrix Terrazzo
096813	Tile Carpeting
097200	Wall Coverings
097700	Fiberglass Reinforced Paneling
098300	Fabric-Wrapped Panels
099100	Painting and Coating
099120	Pavement Marking
099600	High Performance Coatings

DIVISION 10 – SPECIALTIES

100000	Miscellaneous Specialties
101400	Signage
102113	Phenolic Core Toilet Compartments
102123	Cubicle Curtains and Tracks
102213	Wire Mesh Partitions
102233	Vertical Lift Partitions
102240	Folding Glass Panel Partitions
102600	Wall and Door Protection
102641	Bullet-Resistant Composite Panels

102800	Toilet Accessories
105010	Personnel Lockers
105114	Evidence Lockers
105118	Solid Phenolic Lockers
107000	Exterior Specialties
107500	Flagpoles

DIVISION 11 – EQUIPMENT

112423	Exterior Building Maintenance System
113100	Pantry Appliances
114500	Equipment
116000	Evidence Processing Equipment

DIVISION 12 – FURNISHINGS

122413	Roller Window Shades
124813	Entrance Mats and Frames
125190	Salvaged Tree Preparation and Custom Furniture
126100	Fixed Audience Seating

DIVISION 14 – CONVEYING EQUIPMENT

142100	Electric Traction Elevators
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VOLUME THREE

DIVISION 21 – FIRE SUPPRESSION

210500	Common Work Results for Fire Suppression
211000	Water Based Fire Suppression Systems
211120	Fire Suppression Pumps
211319	Preaction Controls
212200	Clean Agent Systems

DIVISION 22 – PLUMBING

205000	Common Work Results for Plumbing
220514	Variable Frequency Drives for Plumbing Equipment
220517	Garage Equipment
220519	Meters and Gauges for Plumbing
220523	General Duty Valves and Specialties for Plumbing
220529	Hangers, Supports, and Anchors for Plumbing
220548	Vibration and Seismic Controls for Plumbing Piping and Equipment
220553	Identification for Plumbing Piping and Equipment

220590	Pressure Testing for Plumbing Systems
220593	Testing, Adjusting, and Balancing for Plumbing
220700	Insulation for Plumbing
220800	Commissioning for Plumbing
222113	Pipe and Pipe Fittings Plumbing
222123	Pumps for Plumbing
222500	Plumbing Water Treatment
223000	Plumbing Equipment
224000	Plumbing Fixtures

DIVISION 23 – HEATING, VENTILATION, AND AIR CONDITIONING (HVAC)

230500	Common Work Results for HVAC
230514	Variable Frequency Drives for HVAC Equipment
230518	HVAC Expansion Compensation
230519	Meters and Gauges for HVAC
230523	General Duty Valves and Specialties for HVAC
230529	Hangers and Supports for HVAC
230548	Vibration and Seismic Controls for HVAC Piping and Equipment
230553	Identification for HVAC Piping and Equipment
230590	Pressure Testing for HVAC Systems
230593	Testing, Adjusting, and Balancing for HVAC
230594	Cleaning of HVAC Existing Ductwork
230700	Insulation for HVAC
230900	Instrumentation and Controls for HVAC
232014	Prefabricated Piping Systems for HVAC
232113	Pipe and Pipe Fittings HVAC
232123	Pumps for HVAC Systems
232500	HVAC Water Treatment
233101	HVAC Ducts and Casing-Low Pressure
233102	HVAC Ducts and Casing-Medium Pressure
233103	HVAC Ducts and Casing-High Pressure
233300	Air Duct Accessories
233319	Duct Silencers
233400	HVAC Fans
233516	Engine Exhaust System
233600	Air Terminal Units
233700	Air Outlets and Inlets
235700	Heat Exchangers

236400	Air to Water Heat Pump
237000	Central HVAC Equipment
230800	Commissioning for HVAC
238100	Decentralized Unitary HVAC Equipment

DIVISION 26 – ELECTRICAL

260500	Common Work Results for Electrical
260519	Low Voltage Electrical Power Conductors and Cables
260526	Grounding and Bonding for Electrical Systems
260529	Hangers and Supports for Electrical Systems
260533	Raceways and Boxes for Electrical Systems
260536	Cable Trays for Electrical Systems
260540	Surface Metallic Raceways for Electrical Systems
260543	Underground Ducts and Raceways for Electrical Systems
260545	Seismic Restraints for Raceways and Electrical Equipment
260548	Vibration and Seismic Controls for Electrical Systems
260553	Identification for Electrical Systems
260573	Overcurrent Protective Device Coordination Study
260580	Electrical Testing
260630.10	Photovoltaic System
260800	Commissioning for Electrical
260913	Electrical Power Monitoring and Control
260923	Lighting Control Devices
260933	Central Dimming Controls
260940	Automated Window Control System
260943	Network Lighting Controls
260993	Sequence of Operations for Lighting Controls
262200	Low Voltage Transformers
262313	Paralleling Low Voltage Switchgear
262413	Switchboards
262416	Panelboards
262500	Enclosed Bus Assemblies
262600	Power Distribution Units
262726	Wiring Devices
262900	Motor Controllers
263213.01	Engine Generators City Hall
263213.02	Engine Generators EOC

263236.01	Resistive Load Banks City Hall
263236.02	Resistive Load Banks EOC
263343	Vehicle Charging Equipment
263353	Static Uninterruptible Power Supply System City Hall
263353	Static Uninterruptible Power Supply System EOC
263363	Battery Energy Storage System
263623	Automatic Transfer Switches
263713	Microgrid Energy Management System
264113	Lightning Protection for Structures
264313	Surge Protective Devices
265000	Lighting

VOLUME FOURDIVISION 27 – COMMUNICATIONS

270500	Common Work Results for Communications
270526	Grounding and Bonding for Communications Systems
270529	Hangers and Supports for Communications Systems
270533	Conduits and Backboxes for Communications Systems
270536	Cable Trays for Communications Systems
270543	Underground Ducts and Raceways for Communications Systems
270548	Noise and Vibration for Communications Systems
270553	Identification for Communications Systems
271000	Structured Cabling, Basic Materials and Methods
271113	Communications Entrance Protection
271116	Communications Cabinets, Racks, Frames and Enclosures
271119	Communications Termination Blocks and Patch Panels
271123	Communications Cable Management
271300	Communications Indoor Backbone Cabling
271400	Communications Outside Plant Backbone Cabling
271500	Communications Horizontal Cabling
273226	Ring-Down Emergency Telephones
274116	Integrated Audio-Video Systems and Equipment
274123	Communication Broadband Systems
275116	Public Address and Mass Notification Systems

DIVISION 28 – ELECTRONIC SAFETY AND SECURITY

280500	Common Work Results for Electronic Safety and Security
280510	Common Work Results for Electronic Security

280512	Conductors and Cables for Electronic Safety and Security
280513	Conductors and Cables for Electronic Safety and Security
280526	Grounding and Bonding for Electronic Safety and Security
280528	Pathways for Electronic Safety and Security
280537	Security Voice Communications – DAS
280800	Commissioning for Fire Alarm and Security
281300	Access Control and Alarm Systems
282300	Visual Surveillance
283000	Fire Detection and Alarm EOC
283000	Fire Detection and Alarm DPS
283001	Fire Detection and Communications City Hall
284611	Air Sampling System Smoke Detection

DIVISION 31 – EARTHWORK

311000	Site Clearing
312000	Earth Moving
312317	Trenching
316329	Drilled Concrete Piers

DIVISION 32 – LANDSCAPE

320190	Landscape Maintenance
321216	Asphalt Paving
321313	Vehicular Concrete Paving
321313.33	Landscape Concrete Paving
321400	Unit Paving
321500	Aggregate Surfacing
321713	Precast Concrete Parking Bumpers
321723	Pavement Markings
321726	Tactile Warning Surfacing
323120	Metal Screen Fencing and Gates
323300	Site Furnishings
323345	Granite Site Furnishings
328400	Planting Irrigation
329113	Soil Preparation
329123	Structural Soil
329200	Turf and Grasses
329219	Hydroseeding
329300	Trees, Shrubs, Ornamental Grasses and Groundcover
329400	Planting Accessories

329643 Tree Transplanting

DIVISION 33 – UTILITIES

331116 Water Systems

333100 Sanitary Sewer Systems

334100 Storm Drainage Systems

334600 Sub drainage

334623 Modular Buried Stormwater Storage Units

END OF TABLE OF CONTENTS



Sunnyvale

CITY OF SUNNYVALE, CALIFORNIA

**INVITATION FOR BIDS No. PW20-16
FOR
CIVIC CENTER MODERNIZATION PHASE 1**

PUBLIC WORKS PROJECT NO. PR-19-06

Date of Ad Publication

August 14, 2020

BIDS DUE:

WEDNESDAY, SEPTEMBER 30, 2020 BY 3:00 PM

**At the Office of the Purchasing Division
Sunnyvale City Hall Annex
650 West Olive Avenue
Sunnyvale, CA 94086**

Contact Person During Bidding Period:

**Lisa Vo, Purchasing Officer
(408) 730-7608**

lvo@sunnyvale.ca.gov

MANDATORY PRE-BID CONFERENCE

Date, Time and Location:

**Thursday, August 20, 2020 at 9:00 AM PST
Microsoft Teams**

SECTION 001116 – INVITATION FOR BIDS

INVITATION FOR BIDS

**Invitation for Bids No. PW20-16
Civic Center Modernization Phase 1
Public Works Project No. (PR-19-06)**

SEALED BIDS will be received by the City of Sunnyvale at the Purchasing Division, 650 West Olive Avenue, Sunnyvale, California 94086, until 3 p.m., Wednesday, September 30, 2020 at which time they will be publicly opened in the City Hall Annex, 650 West Olive Avenue, Sunnyvale, California, and read for performing work as follows:

Furnishing all labor, materials, and equipment and performing all work necessary and incidental to the completion of the project known as "CIVIC CENTER MODERNIZATION PHASE 1, PW20-16" consisting of demolition, site improvements, construction of a new 119,000 square feet City Hall, modernization and expansion of the existing Department of Safety and other miscellaneous works and systems all according to plan, specifications and contract documents prepared by the City of Sunnyvale. The new City hall will be LEED Platinum and a Net Zero building.

A MANDATORY pre-bid conference –Via Online
Thursday, August 20, 2020, 9:00 AM – Via Microsoft TEAM Meeting

1. Meeting Link – Mandatory Pre-Bid Conference
2. To Join by phone - +1-408-404-0943, Conference ID: 579 135 93#

The entire Project is to be completed within a total maximum of Twenty-Eight (28) Months and equivalent to Eight Hundred Fifty-Four (854) consecutive calendar days including but not limited to rain days and public holidays.

Bid documents are available online at Sunnyvale.ca.gov. All Questions related to this bid should be directed to Lisa Vo, Purchasing Officer, (408) 730-7608, lvo@sunnyvale.ca.gov. Upon request and execution of Architect's electronic File Transfer Agreement, a 3D digital model will be made available for bidder use. See attachment 1 for electronic File Transfer Agreement.

Bid Security in an amount not less than ten percent (10%) of the total bid dollar amount and conforming to the prescribed bidding procedures is required to be submitted with each bid.

Pursuant to the provisions of the California Labor Code Section 6707, if applicable to this job, each bid submitted in response to this Notice Inviting Bids shall contain, as a bid item, adequate sheeting, shoring, and bracing, or equivalent method, for the protection of life and limb in trenches and open excavation, which shall conform to applicable safety orders.

Pursuant to Public Contract Code Section 22300, for monies earned by the Contractor and withheld by the City of Sunnyvale to ensure the performance of the contract, the Contractor may choose to substitute securities, meeting the requirements of Section 22300.

To be considered, all bidders shall:

- Be licensed under the provisions of Chapter 9, Division 3 of the Business and Professions Code of the State of California to do the type of work contemplated in the project. The general class or type of work called for under the Contract requires a class "TYPE B" license.
- The City has established voluntary goal for Contractor self-perform work of a minimum of fifteen percent (15%) of the total Bid Price excluding specialty items listed in Division 10 of the specifications. The successful contractor is encouraged to self-perform work throughout

every phase of the construction and is encouraged to meet the goals of the self-perform percentage

- Have completed within the last five (5) years a minimum of three (3) projects involving work of similar type and complexity, each project valued at not less than \$150,000,000.00
- Meet the experience requirements specified in Section 004513 – Bidder Qualifications
- Other mandatory bid requirements set forth in the bid documents

END OF SECTION

SECTION 002113 – INSTRUCTION TO BIDDERS

Table of Contents

Table of Contents	1
PART 1 - GENERAL	2
1.1 Preparation of Bid	2
1.2 Mandatory Qualifications	2
1.3 Mandatory Pre-Bid Conference -	2
1.4 Examination of Bid Documents	2
1.5 Inspection of Site	2
1.6 Interpretation of Bid Documents and Addenda	3
1.7 Bid Security	3
1.8 Bonds and Insurance	3
1.9 Employment of Apprentices	3
1.10 Wage Rates	3
1.11 Contractor Registration with the State of California	4
1.12 Joint Venture	4
1.13 Utilization of Local Workforce in Construction Projects	4
1.14 Sheeting, Shoring and Bracing	4
1.15 Subcontractors	4
1.16 Bidders Interested in More Than One Bid	5
1.17 Bid Price	5
1.18 Submission of Bid	5
1.19 Modification or Withdrawal of Bids	5
1.20 Postponement of Opening; Extensions	6
1.21 Late Bids	6
1.22 Public Opening of Bids	6
1.23 Bid to Remain Open	6
1.24 Bid Evaluation	6
1.25 Mandatory Post Bid-opening Information	6
1.26 Discrepancies in Bid Forms	7
1.27 Rejection of Bids	7
1.28 Tie Bids	7
1.29 Sunnyvale Business License	7
1.30 Contract Award	7
1.31 Bid Protest	7
1.32 Post-Notice of Award Requirements	8
1.33 Failure to Execute and Deliver Documents	8
1.34 Execution of Contract	8

PART 1 - GENERAL

- 1.1 **Preparation of Bid** – Bids shall be made on Bid Forms contained in sections noted below. Bidder shall enter all requested information in the appropriate spaces on the Bid Forms. All additional documentation required by the apparent low bidder shall be submitted to the city within Two (2) working days post bid opening. Due to the current Shelter-In-Place (SIP) Order issued by Santa Clara County only electronic bids in PDF file format sent directly to the buyer named on the cover sheet will be accepted. No oral, telephone or facsimile bids will be accepted. All costs of bid preparation shall be borne by the bidder. All Questions related to this bid should be directed to Lisa Vo, Principal Buyer, (408) 730-7608, lvo@sunnyvale.ca.gov
- a. **Forms to be filled and provided by bidders with bid:**
1. Bid Form & Certificates – Refer to Section 004100 _____
 2. Bid Schedule – Refer to Section 004113 _____
 3. Sub-Contractor List – Refer to Section 004113 _____
 4. Bidders Information – Refer to Section 004113 _____
 5. Site Visit Declaration – Refer to Section 004113 _____
 6. Statement of Compliance – Refer to Section 004113 _____
 7. Utilization of Local Work Force – Refer to Section 004113 _____
 8. Non-Collusion Affidavit – Refer to Section 004519 _____
 9. Affidavit of Safety Compliance – Refer to Section 007319 _____
 10. Acknowledgement of Addendums – Refer to Section 009113 _____
- b. **Additional Forms to be filled and provided by apparent low bidder within Two (2) working days post bid opening**
1. Statement of Qualifications & References – Refer to Section 004513 _____
 2. Contractor HSE Data Form – Refer to Exhibit 1, Specification Section 007319 Health and Safety Requirement _____
- 1.2 **Mandatory Qualifications** – In order for a bid to be considered responsive to this “Invitation for Bids”, the minimum experience of the bidder shall be the completion of three (3) projects of similar type and complexity, and value not less than, \$150,000,000.00 in the last five (5) years. Documentation of mandatory qualifications shall be made on the document entitled “Bidder’s Information” included in the Bid forms.
- 1.3 **Mandatory Pre-Bid Conference** – A Mandatory pre-bid conference will be held however, a date, and location has not been finalized. A future announcement with further instructions via Addendum will be made by the City.
- 1.4 **Examination of Bid Documents** – The Bid Documents consist of this Invitation for Bids, each and every document listed in the Table of Contents of the invitation, and any addenda which may have been issued. Bidder shall thoroughly examine and be familiar with all Bid Documents, including legal and procedural aspects. Submission of a bid shall constitute bidder’s acknowledgment upon which the City may rely that bidder has thoroughly examined and is familiar with the Bid Documents. Failure or neglect of bidder to receive or examine all or part of the Bid Documents shall in no way relieve the bidder from any obligations with respect to this bid

invitation or any resultant contract. No claim for additional compensation will be allowed which is based upon a lack of knowledge of any part of the Bid Documents.

- 1.5 **Inspection of Site** – Bidder must examine and judge for itself the location of the proposed work and the nature and extent of the work to be done. The technical specifications, including drawings, plans, maps, diagrams and/or other graphic representations of the project, show conditions as they are supposed or believed by City to exist at the site, but the conditions shown do not constitute a representation by City that they actually exist. Utilities (underground or above-ground), buildings, structures and other improvements may be within or adjacent to the project site. These may or may not be included in the project's technical specifications. Bidder is required to inspect the project location to satisfy itself, by examination or other appropriate means, of the actual conditions at the site.

Submission of a bid shall constitute a representation by bidder that it has visited and examined the project site and is relying on its own examination and knowledge of the site in making its bid, and not on any representation by City. No claim for additional compensation shall be allowed that is based upon a failure to examine, or lack of knowledge of, the work site.

- 1.6 **Interpretation of Bid Documents and Addenda** – Should a bidder discover conflicts or ambiguity in the bid documents that require a decision or explanation, bidder shall request an interpretation. Such a request shall be made in writing and delivered to the person identified on the cover page of this bid invitation no later than five (5) working days before the deadline for receipt of bids. Every interpretation made to bidders will be in the form of an Addendum issued by the City. Addenda, if issued, will be sent as promptly as possible to all parties that have been issued bid documents. All such Addenda will become part of the bid documents and shall be binding in the same way as if originally written in the bid documents. Only properly issued addenda shall be binding upon City, any oral and/or other form of interpretation or clarification will have no legal or contractual effect. Bidders shall acknowledge the receipt of Addenda on the Bid Forms.

- 1.7 **Bid Security** – Bidder shall submit bid security with the bid in an amount equal to at least ten percent (10%) of the total bid amount (Base Bid plus Alternates, if any) and in the form of a certified check, cashier's check or surety bond issued by an admitted surety insurer authorized to conduct business in the State of California. The total amount of the successful bidder's bid security shall be forfeited to the City if the bidder fails to execute the contract and furnish bonds and insurance as required by the bid documents within ten (10) calendar days after being notified in writing by City that the contract award has been made.

- 1.8 **Bonds and Insurance** – The successful bidder shall furnish performance and payment (labor and materials) bonds, each in an amount equal to One Hundred percent (100%) of the total contract price (Base Bid plus Alternates, if any) and issued by an admitted surety insurer authorized to operate in the State of California. The only bonds acceptable to the City shall be those included with the bid documents. The successful bidder shall also maintain throughout performance of the work the insurance coverage specified in the bid documents. **As of May 1, 2019, the City of Sunnyvale is now using the online insurance program PINS Advantage <https://www.pinsadvantage.com/>. You will receive an email from the City's online insurance program requesting you forward the email to your insurance provider(s).**

- 1.9 **Employment of Apprentices** – The provisions of Sections 1777.5, 1777.6 and 1777.7 of the California Labor Code concerning the employment of apprentices are applicable during the performance of the work described in the bid documents.

- 1.10 **Wage Rates** – Pursuant to Sections 1770, 1771 and 1774 of the California Labor Code, the successful bidder shall pay not less than the prevailing rate of per diem wages as determined by the Director of the State of California Department of Industrial Relations. Copies of such prevailing

wage rates are available for review at the office of City's Director of Public Works, 456 West Olive Avenue, Sunnyvale, California 94086. Wage rates can also be obtained through the California Department of Industrial Relations website at:

<http://www.dir.ca.gov/OPRL/DPreWageDetermination.htm>.

Bidders shall promptly notify the person identified on the cover page of this bid invitation, in writing, about all labor classifications not listed in the prevailing wage determinations but necessary for the performance of the work described in the bid documents.

The successful bidder/contractor, and each subcontractor shall keep accurate payroll records, and comply in all respects with Labor Code section 1776, including the timely response to written notices requiring copies of such records, as provided for in such section. In the event the contractor or subcontractor fails to comply within the ten-day period, that contractor or subcontractor shall forfeit one hundred dollars (\$100.00) for each calendar day, or portion thereof, for each worker, until strict compliance is effectuated, as provided by Labor Code section 1776(h).

- 1.11 **Contractor Registration with the State of California** – In order to be considered for contract award, Contractor and all applicable Subcontractors must be registered with the State of California, Department of Industrial Relations (DIR) through the Public Works Contractor Registration Program (PWC Registration). Registration must remain current throughout the project's entirety. It is the Contractor's responsibility to not allow their PWC Registration to lapse during the project and to ensure all Subcontractor's registrations remain current. If any penalties are issued to the City for unregistered Subcontractors or for a lapse in a Contractor/Subcontractor's PWC Registration, these penalties will be passed onto the Contractor. Contractors shall list all applicable PWC registration numbers on the Bid Form.
- 1.12 **Joint Venture** – Joint Venture Bidders bidding this project shall possess a valid joint venture license at the time of bid submittal. The Bid shall contain details of the Joint Venture company including but not limited to JV Contractor's license number, date of expiration, and signature to a statement that represents the bid with respect to the bidder's license that are made under penalty of perjury. The bid shall also include details of each individual bidder within the joint venture submitting the Bid per the the above requirements with respect to Contractor's individual licensure. Refer to forms included in Specification Section 004100 – "Bid Forms" for submission requirements.
- 1.13 **Utilization of Local Workforce in Construction Projects** – The Sunnyvale City Council has adopted a policy which encourages utilization of local workforces, including State-certified apprentices, as a means of supporting economic opportunities for all members of the community. Local workforce is defined as workers residing in Santa Clara County. In order to enter into a contract with the City, the lowest responsive and responsible bidder must provide a projection of locally-hired workers at the time of contract award.
- 1.14 **Sheeting, Shoring and Bracing (As Applicable)** – In accordance with the provisions of Section 6707 of the California Labor Code, when bidding on a project that calls for trenches or open excavations, bidder shall specify on the Bid Forms that the item price for such work includes adequate sheeting, shoring and bracing, or equivalent method, to protect its employees and others from injury to life or limb, in conformance with applicable California Construction Safety Orders. This section shall not be construed to impose tort liability on the City or any of its employees or agents.
- 1.15 **Subcontractors** – Bidder shall complete the "List of Subcontractors" included in the Bid Forms. Bidder shall include all requested information for each subcontractor who will perform work or render service to the bidder during the performance of the work described in the bid documents and any subcontractor licensed by the State who, under subcontract to the bidder, specially fabricates and installs a portion of the work or improvements described in the bid documents.

Bidder shall complete the List in each instance where the amount of the subcontractor's work is in excess of one-half of one percent (0.5%) of the bidder's total bid, or, in the case of bids or offers for the construction of streets or highways, including bridges, in excess of one-half of one percent (0.5%) of the total bid or ten thousand dollars (\$10,000), whichever is greater.

The apparent successful bidder will be required to establish, to the City's satisfaction, the responsibility and reliability of the subcontractors it has listed. Prior to the award of the contract, the Purchasing Officer will notify the apparent successful bidder, in writing, if City, after due investigation, has a reasonable objection to any proposed subcontractor. If, after notification of such objection, bidder is unable to address City's concern with the subcontractor, City shall give bidder the opportunity to submit an acceptable substitute. In the event bidder is unable to provide such a substitute, its bid will be deemed non-responsive.

A bidder whose bid is accepted may not substitute a different subcontractor in place of the subcontractor listed in the original bid, except with the prior written consent of the City and in accordance with the procedures set forth in Section 4107 of the Public Contract Code.

- 1.16 **Bidders Interested in More Than One Bid** – A bidder submitting a bid as a prime contractor may submit only one bid as a prime contractor and may not also submit one or more bids as a subcontractor to competing prime contractors. Failure to comply with this requirement will result in the rejection of all bids from the non-complying bidder. A bidder who is not submitting a bid as prime contractor may submit any number of bids as a subcontractor to competing prime contractors.

- 1.17 **Bid Price** – Bid price shall include all costs for:

- a. Furnishing all tools, equipment, materials, apparatus, facilities, labor, transportation, supervision and management necessary to perform the work described in the bid documents;
- b. Providing for both the new construction and facilitating public in/out of existing city the necessary safety precautions for the protection of the public, such as barricades and warning signs;
- c. Establishing and implementing an injury and illness prevention program (IIPP) including a COVID-19 specific Infection prevention program.
- d. Cleanup activities to restore the work site to a satisfactory condition;
- e. Federal, state and local taxes; and
- f. All permits and licenses required to perform the work described in the bid documents.
- g. LEED credit support compliance for all construction related credits;
- h. Security screening, background checks and badging as a prerequisite to work in the Department of Public Safety (DPS);
- i. Any items shown in the technical specifications and not specifically listed in the bid price are to be considered included; and no additional or special compensation will be allowed.

If a project includes any "Allowance" Unit Price Bid items, the amount in the "Total" column will be entered by the City and shall not be altered.

- 1.18 **Submission of Bid** – Bidder shall submit the completed Bid Forms and the required bid security no later than the time and date set for receiving bids as stated in the Notice Inviting Bids or any modifying Addenda. Bid shall be delivered in a sealed envelope clearly marked with the applicable bid number addressed to:

City of Sunnyvale
Purchasing Division
City Hall Annex

650 West Olive Avenue
Sunnyvale, CA 94086**1.19 Modification or Withdrawal of Bids**

- a. **Before Date and Time for Receipt of Bids** - Bids that contain mistakes discovered by a bidder before the date and time for receipt of bids may be modified or withdrawn by written notice to City's Purchasing Officer received prior to the deadline. Any modification shall be clearly identified as such and shall be made in writing, executed and submitted in the same form and manner as the original bid.
- b. **After Date and Time for Receipt of Bids** - A bidder may not change its bid after the date and time set for receipt of bids except that the bidder may seek the City's consent to the substitution of a subcontractor where the bidder can demonstrate, under the provisions of state law, that the name of the substituted subcontractor was listed as the result of an inadvertent clerical error. A bidder alleging a mistake in a bid may be permitted to withdraw its bid in conformance with state law (see Public Contract Code Sections 5101, 5103 and 5105).

1.20 Postponement of Opening; Extensions – The City reserves the right to postpone the date and time for receipt of bids at any time prior to the date and time announced in the Notice Inviting Bids. The date and time shall be extended by at least 72 hours in the event the City issues any material changes, additions or deletions to the bid documents within 72 hours prior to the bid closing.**1.21 Late Bids** – Bidder shall be responsible for the timely delivery of bid. Bids received after the deadline for receipt of bids shall not be accepted and shall be returned to bidder unopened unless necessary for identification purposes.**1.22 Public Opening of Bids** – Each bid, irrespective of any defects or irregularities, that has been received by the deadline for receipt of bids, except those that have been properly withdrawn, will be publicly opened by a representative of the Purchasing Division at the date and time announced for such opening. If one or more members of the public are present, the name and address of each bidder, the total amount of each bid, and the nature and amount of the bid security furnished with each bid will be read aloud at or shortly following the deadline for receipt of bids.**1.23 Bid to Remain Open** – The bidder shall guarantee its bid for a period of One Hundred and Twenty (120) calendar days from the date of bid opening.**1.24 Bid Evaluation** – City's Purchasing Officer will evaluate all bids received to determine if the bidder is responsive and responsible. A Bidder will be deemed to be responsive if it has submitted a bid that conforms in all material respects to the requirements of the bid documents and demonstrates compliance with the mandatory experience as described in Section 004513 - "Bidder Qualifications". A Bidder will be deemed to be responsible if the Bidder:

- a. Has the ability, capacity, experience and skill to perform the work in accordance with the bid specifications;
- b. Has the ability to perform the work promptly or within the time specified, without delay;
- c. Has equipment, facilities and resources of such capacity and location to enable it to perform the work;
- d. Has a record of satisfactory or better performance under prior contracts with the City or others; and
- e. Has complied with laws, regulations, guidelines and orders governing prior or existing

contracts.

- 1.25 **Mandatory Post Bid-opening Information** – In order to assist in the bid evaluation, the apparent low bidder will be required to complete and submit, the form entitled "Statement of Qualifications" and References included in the Bid forms, the self-performance calculation described in invitation to bid, and form titled "Contractor HSE Data Form" Exhibit 1, Specification Section 007319 – Health and Safety Requirements, within Two (2) working days of notification by City that it is the apparent low bidder. Notice may be given orally, by telephone, or by facsimile sent to the number supplied by bidder. Failure to submit the Statement of Qualifications by 5:00 p.m. of the second day may result in the bid being deemed non-responsive, and the City will then determine the next apparent low bidder."
- 1.26 **Discrepancies in Bid Forms** – The City may waive minor defects of irregularities in any bid, provided that the discrepancy does not materially affect the bid amount or give the bidder an advantage over others. For instance, if there are unit price bid items in a bid schedule, and the amount indicated for a unit price bid item does not equal the product of the unit price and quantity listed, the unit price shall govern. Likewise, if there is more than one bid item in a bid schedule, and the total of the schedule does not equal the sum of the bid items, the individual amounts of the bid items shall govern. The Total Base Bid Amount shall be written in numbers. For Lump Sum Bid Items (LS), only an amount in the "Total" column is required and only the amount in the "Total" column will be considered
- The City may make any investigations deemed necessary to determine if a bidder is responsive and responsible.
- 1.27 **Rejection of Bids** – The City reserves the right to reject any and all bids; and further reserves the right to reject any bids that are found to be non-responsive or submitted by a bidder that is not responsible.
- 1.28 **Tie Bids** – In the event that an identical price is received from two or more responsive and responsible bidders, the City may re-advertise for bids or the successful bidder may be determined by the casting of lots with the tie bidders in public at a date and time set by City's Purchasing Officer.
- 1.29 **Sunnyvale Business License** – The successful bidder must either possess a current, valid Sunnyvale business license or must have submitted a Sunnyvale business license application and fee at the time of contract execution.
- 1.30 **Contract Award** – Contract award will be made to the lowest responsive and responsible bidder. In the event that bids are required on a Base Bid and Additive Alternates, contract award will be based solely on the Base Bid. The acceptance of a bid will be evidenced by a written Notice of Award delivered to the successful bidder.
- 1.31 **Bid Protest** – The City will issue a Notice of Intent to Award prior to the actual award. Any Bid protest must be submitted in writing to the Purchasing Division, City Hall Annex, 650 West Olive Avenue, Sunnyvale, California 94086, before 5:00 p.m. of the fifth (5th) calendar day following posting of a Notice of Intent to Award for Construction in the Lobby of the City Hall Annex. City will use reasonable efforts to deliver by electronic means a copy of the Notice of Intent to Award to all Bidders who submitted Bids and provided an email address or other forms of electronic communication no later than the working day after issuance, although any delay or failure to do so will not extend the Bid protest deadline described above. The following conditions will apply to all protests.
- The initial protest document must contain a complete statement of the basis for the protest;
 - The protest must refer to the specific portion of the document that forms the basis for the

protest;

- c. The protest must include the name, address and telephone number of the person representing the protesting party. If a fax number is available, it should also be included;
- d. The party filing the protest must concurrently transmit a copy of the initial protest document and any attached documentation to all other parties with a direct financial interest that may be adversely affected by the outcome of the protest. Such parties shall include all other Bidders who appear to have a reasonable prospect of receiving an award depending upon the outcome of the protest.

The procedure and time limits set forth in this paragraph are mandatory and are Bidder's sole and exclusive remedy in the event of Bid protest. Bidder's failure to comply with these procedures shall constitute a waiver of any right to further pursue the Bid protest, including filing a Government Code Claim or legal proceedings. A Bidder may not rely on a protest submitted by another Bidder, but must timely pursue its own protest.

1.32 **Post-Notice of Award Requirements**

- a. Within ten (10) calendar days of Notice of Award, the successful bidder shall submit to the person identified on the cover of this bid invitation the following:
 1. The General Construction Contract executed in duplicate by the successful bidder;
 2. Performance and Payment Bonds;
 3. Evidence of the required insurance coverage in the PINS Advantage online insurance system;
 4. A Sunnyvale business license tax and fee if bidder does not already possess such license; and
 5. A completed Internal Revenue Service Form W-9.
- b. Successful Bidder's failure to submit the documents required herein, in a proper and timely manner, entitles City to rescind its award, and to cause Bidder's Bid Security to be forfeited as provided in paragraph 31.
- c. City may elect in its sole discretion to extend the time to receive any of the documents listed herein.

1.33 **Failure to Execute and Deliver Documents** – If Bidder to whom Notice of Award is issued shall, for 10 days after such award, fail or neglect to execute and deliver all required contract documents, bonds, insurance certificates and other documents, City may, in its sole discretion, deposit Bidder's surety bond, cashier's check or certified check for collection, and retain the proceeds thereof as liquidated damages for Bidder's failure to perform. Bidder agrees that calculating the damages City may suffer as a result of Bidder's failure to execute and deliver all documents would be extremely difficult and impractical, and that the amount of Bidder's required Bid security shall be the agreed and presumed amount of City's damages. City may then turn to the next Apparent Low Bidder and proceed as if this Apparent Low Bidder were the original Apparent Low Bidder.

1.34 **Execution of Contract** – Subsequent to the Notice of Intent to Award, and within ten (10) calendar days after the prescribed Form of Agreement is presented to the Awardee for signature, the Awardee shall execute and deliver the Agreement to the City through, in such number of counterparts as City may require. The City may deem as a default the failure of the Awardee to execute the Contract and to supply the required bonds when the Agreement is presented for signature within the period of time allowed. Unless otherwise indicated in the Procurement and Contracting Documents or the executed Agreement, the date of commencement of the Work

shall be the date of the executed Agreement. In the event of a default, the City may declare the amount of the Bid security forfeited and elect to either award the Contract to the next responsible bidder or re-advertise for bids.

END OF SECTION

SECTION 003100 - AVAILABLE PROJECT INFORMATION

1.0 Evaluations, and Reports

- 1.01 Final Program Environmental Impact Report – dated August 2018
<https://sunnyvale.ca.gov/civicax/filebank/blobdload.aspx?BlobID=25846>
- 1.02 American Trash Management Plan – dated April 29, 2019
- 1.03 Elevator Pressurization Report – dated December 9, 2019
- 1.04 CPP City Hall Interim Canopy Report – dated September 23, 2019
- 1.05 CPP Façade & Cladding Wind Study – dated August 29, 2019
- 1.06 CCP Generator & Air Quality Report – dated September 2019
- 1.07 Hort Science Tree Assessment report – dated August 2019
- 1.08 Langan Geotechnical Investigation Report - dated September 30, 2019
- 1.09 Panorama Environmental Historic District Documentation – dated February 2020
- 1.10 Sherwood Storm Management Report – dated February 20, 2020
- 1.11 Sherwood Preliminary Storm Water Pollution Prevention Plan (SWPPP) dated February 20, 2020
- 1.12 RPS Phase II Investigation Report – dated October 14, 2019
- 1.13 Pre-Demolition Asbestos Survey dated March 30, 2020
- 1.14 Pre-Demolition Lead Survey dated March 30, 2020
- 1.15 Soil Management Plan dated April 9, 2020
- 1.16 Reports are available for download at following link: (<https://sunnyvale.ca.gov/>)
- 1.17 These above reports (1.01 – 1.14) are being made available to Bidders for information only and to assist with bidding. They are not intended for use during construction. The City disclaims any responsibility for the Bidder's interpretation of the provided data as the reports were developed by the City for design purposes only and may not include necessary information for, any or all, construction related activities including, but not limited to, excavations, sheeting, shoring, bracing, dewatering, demolition, abatement of hazardous materials, tree protection and management, and storm water protection. The successful Bidder shall at his own expense conduct any additional evaluations that he may deem required for successful completion of the construction scope as outlined and described in the contract document plans and specifications

2.0 Site Access During Bid Period

- 2.01 Bidders may access the site(s) for investigations to assist in the developing their bid. Access to the Department of Public Safety (DPS) is restricted and shall be coordinated with the City. Instructions on access requirements would be detailed by the City during the pre-bid conference and/or via Addendum.

END OF SECTION

SECTION 003124 – ENVIRONMENTAL MITIGATION AND MONITORING REQUIREMENTS

PART 1 – GENERAL

1.01 SUMMARY

- A. Section includes: Mitigation and monitoring requirements relating to environmental impacts.

1.02 REFERENCE

Not Used

1.03 SUBMITTALS

- A. General:

- 1. Submit data as specified in Section 013300

- B. Dust abatement program:

- 1. Certifications that construction equipment is maintained and properly tuned.

- C. Qualifications of qualified Avian Biologist, qualified Arborist, Professional Archaeologist, qualified Paleontologist, or other scientist performing work to implement the Mitigation Monitoring and Reporting Program for the project.

- D. Preconstruction survey for nesting bird reports.

- E. Daily monitoring reports from biologists, arborists, archaeologists, paleontologists or other scientists that inspect the site.

- F. Tree Protection Plan

- G. Treatment plan for archaeological resources, in the event resources are encountered.

- H. Lead compliance plan

- I. Temporary Traffic Control Plan

PART 2 – PRODUCTS

Not Used.

PART 3 – EXECUTION

3.01 GENERAL

- A. The following environmental mitigation measures have been designed to ensure compliance during implementation of the City of Sunnyvale Civic Center Modernization Master Plan. The measures are incorporated into the technical specifications as a condition of project approval. The Construction Contractor shall comply with all required conditions of permits and all mitigation measures shall be implemented to fulfill the project's environmental requirements.

3.02 AESTHETICS

- A. The Construction Contractor shall implement the following mitigation measures to shield night lighting during construction:
1. Construction lighting shall not be used except when necessary such as for utility connections in roadways or when natural light during regular construction hours (Monday through Friday from 7:00 am to 6:00 pm and on Saturday from 8:00 am and 5:00 pm) is limited.
 2. Stationary lighting used during construction shall be shielded and directed downward or oriented such that the light source is not directed toward residential areas or into streets where glare could impact motorists or pedestrians.

3.03 AIR QUALITY AND GREENHOUSE GAS EMISSIONS

- A. The Construction Contractor shall implement the following dust control measures during construction.
1. When moisture content is low enough to create dust, all exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered a minimum of two times per day, and as often as needed to control dust emissions.
 2. All haul trucks transporting soil, sand, or other loose material off-site shall be covered.
 3. All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited.
 4. All vehicle speeds on unpaved roads shall be limited to 15 mph.
 5. All roadways, driveways, and sidewalks to be paved shall be completed as soon as possible. Building pads shall be laid as soon as possible after grading unless seeding or soil binders are used.
 6. A publicly visible sign with the telephone number and person to contact at the City of Sunnyvale regarding dust complaints shall be posted. The Bay Area Air Quality Management District's phone number shall be made visible on this sign to ensure compliance with applicable regulations.

7. Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes (as required by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations [CCR]). Clear signage shall be provided for construction workers at all access points.
 8. Construction equipment shall be properly maintained by a certified mechanic.
- B. The Construction Contractor shall implement the following exhaust control standards during construction.
1. All construction equipment used during construction shall be fitted with Level 3 Diesel Particulate Filters (DPF) and engines shall meet or exceed the U.S. Environmental Protection Agency Certified Tier 3 emission standards.
 2. The Construction Contractor shall maintain a list of all operating equipment in use on the project site for verification by the City of Sunnyvale Building Division official or their designee. The construction equipment list shall state the makes, models, and number of construction equipment onsite to verify compliance with the requirement for equipment to have Level 3 DPF and Tier 3 or higher emission standards.

3.04 BIOLOGICAL RESOURCES

- A. Nesting Birds. Prior to construction, the Construction Contractor shall engage a qualified Avian Biologist to assist the Construction Contractor in implementing the following measures:
1. Resume(s) of candidate staff to be provided by the Construction Contractor to the City of Sunnyvale and/or the Construction Manager for review and approval prior to staff engagement for this project. At a minimum, the qualified Avian Biologist shall have at least a Bachelor's Degree in Wildlife Biology or equivalent, plus at least two years' experience monitoring nesting birds
 2. The Construction Contractor shall avoid use of heavy equipment as well as grading, demolition, construction, and/or tree removal activity during the bird nesting season to the greatest extent feasible.
 3. If construction activities occur during the nesting season, a preconstruction survey for active bird nests in the project site area shall be conducted on the project site and within 500 feet of the project site by the Construction Contractor's qualified Avian Biologist within 3 days prior to construction start.
 - If no nesting or breeding behavior is observed, construction may proceed.
 - If an active nest is detected, a determination shall be made by the qualified Avian Biologist as to whether construction work could affect the active nest. If it is determined that construction would not affect an active nest, work may proceed.
 - If it is determined that construction activities are likely to impair the successful rearing of the young, a "no-disturbance buffer" in the form of orange mesh Environmentally Sensitive Area (ESA) fencing shall be established and maintained by the Construction Contractor around occupied nests to prevent destruction of the nest and to prevent disruption of breeding or rearing behavior.

4. The extent of the “no-disturbance buffer” shall be determined by the qualified Avian Biologist in consultation with the City of Sunnyvale and the California Department of Fish and Wildlife (CDFW) and shall depend on the level of noise or disturbance, line of sight between the nest and the disturbance area, the type of bird, ambient levels of noise and other disturbances, and other topographic or artificial barriers.
 5. “No-disturbance buffers” shall be maintained by the Construction Contractor until the end of the breeding season or until the qualified Avian Biologist has determined that the nestlings have fledged.
 6. The qualified Avian Biologist shall inspect the active nest to determine whether construction activities are disturbing to the nesting birds or nestlings. If the qualified Avian Biologist determines that construction activities pose a disturbance to nesting, the Construction Contractor shall stop work in the area of the nest, and the ‘no-disturbance buffer’ expanded.
 7. The Construction Contractor shall require its personnel including construction workers to conduct daily inspections for nests. If a nest is discovered by workers on the project site during daily inspections, work shall stop and the qualified Avian Biologist shall be called to the site, who shall determine whether construction activities could affect nesting and establish a “no-disturbance buffer,” if necessary, as described above.
- B. Lighting. The Construction Contractor shall limit lighting to areas required for operations or safety. Lighting shall be directed on-site to avoid backscatter and shall be shielded from public view to the extent practical. Lighting that is not required to be on during nighttime hours shall be controlled with sensors or switches operated such that lighting shall be on only when needed.
- C. Protected Trees. Prior to construction, the Construction Contractor shall engage a qualified Arborist to assist the Construction Contractor in implementing the following measures.
1. Resume(s) of candidate staff to be provided by the Construction Contractor to the City of Sunnyvale and/or Construction Manager for review and approval prior to staff engagement for this project. At a minimum, the qualified Arborist shall be certified by the International Society of Arboriculture.
 2. Prior to construction, the Construction Contractor shall prepare a Tree Protection Plan for review and approval by the City of Sunnyvale. During construction, the Construction Contractor shall implement tree protection restrictions developed in the Tree Protection Plan and plant trees in accordance with the approved replacement ratio outlined below. The Tree Protection Plan shall be prepared by the Construction Contractor’s qualified Arborist in accordance with City of Sunnyvale Municipal Code § 19.94.110 and incorporate the techniques identified in § 19.94.120.
 3. Ground-disturbing activities shall be conducted outside of the dripline of protected trees. When ground-disturbing activities (i.e., trenching, excavating) encounters roots smaller than two inches occurs outside of the dripline of protected trees, the roots shall be hand trimmed, making clear, clean cuts. All damaged, torn, and cut roots shall be given a clean cut to remove ragged edges, which promote decay. Trenches shall be filled within 24 hours, but, where, this is not possible, the side of the trench/excavation area adjacent to the protected trees shall be shaded with four layers of dampened, untreated burlap, wetted as frequently as necessary to keep the burlap wet. Roots two inches or larger, when encountered, shall be reported

immediately to the qualified Arborist, who shall decide whether the Construction Contractor may cut the roots as mentioned above or shall excavate by hand or with compressed air under the root. The root shall be protected with dampened burlap. In addition, the top two feet of the foundation closest to the protected trees shall be air spaded or hand dug under supervision of the qualified Arborist to locate and evaluate any significant roots prior to mechanical excavation. The qualified Arborist shall be required to submit a report to the City of Sunnyvale regarding the findings of the excavation and recommend any additional actions needed to protect the roots to preserve the health and structure of both the redwood and oak trees.

4. **Underground Utilities.** To avoid conflict with roots, underground utilities shall be routed by the Construction Contractor outside of an area ten times the diameter of a protected tree. In addition, where it is not possible to reroute pipes or trenches, the utility shall be routed beneath the dripline of the tree. The boring shall take place not less than three feet below the surface of the soil in order to avoid encountering feeder roots.
5. **Protected Tree Replacement.** Protected trees removed during construction shall be replaced by the Construction Contractor using a ratio of between 1:1 and 1:4, depending on the size of the protected tree removed and the size of the replacement tree, in accordance with the City of Sunnyvale Community Development Department Tree Replacement Standards.
6. **Monitoring.** The planted replacement trees shall be monitored by the City of Sunnyvale to ensure that the trees have survived and shall replace any trees that die. The Construction Contractor shall maintain responsibility for all activity associated with re-installation of failed replacement trees for a period of three (3) years after construction.

3.05 CULTURAL AND TRIBAL CULTURAL RESOURCES

- A. **Archaeological Resources.** Prior to construction, the Construction Contractor shall engage a qualified Professional Archaeologist to assist the Construction Contractor in implementing the following measures.
 1. Resume(s) of candidate staff to be provided by the Construction Contractor to the City of Sunnyvale and/or the Construction Manager for review and approval prior to staff engagement for this project. At a minimum, the Professional Archaeologist shall meet the Secretary of the Interior's minimum qualifications for Archeology.
 2. The Professional Archaeologist shall provide sensitivity training to supervisory staff prior to initiation of site preparation and/or construction, to alert construction workers to the possibility of exposing significant historic and/or prehistoric archaeological resources within the proposed project area. The training shall include a discussion of the types of prehistoric or historic objects that could be exposed and how to recognize them, the need to stop excavation at a discovery and within 50 feet of a discovery, and the procedures to follow regarding discovery protection and notification.
 3. An "Alert Sheet" shall be prepared by the Project Archaeologist and posted by the Construction Contractor in staging areas, such as in construction trailers, to alert personnel to the procedures and protocols to follow for the discovery of a potentially significant historic and/or prehistoric archaeological resource, or tribal cultural resource.

4. In the event that an archaeological resource is discovered, ground disturbing work shall be halted. within 50 feet of the find, and the Professional Archaeologist shall be brought to the site. The Professional Archaeologist shall evaluate the resource and determine whether it is (1) eligible for the California Register of Historic Resources (CRHR), and thus a historic resource for purposes of the California Environmental Quality Act (CEQA) and/or (2) a unique archaeological resource as defined by CEQA. If the resource is determined to be neither a unique archaeological nor a historical resource, work may commence in the area. If the resource meets the criteria for either a historical or unique archaeological resource, work shall remain halted within 50 feet of the find, and the qualified cultural resources specialist/archaeologist shall evaluate the resource and determine whether it is (1) eligible for the CRHR (and thus a historic resource for purposes of CEQA) and/or (2) a unique archaeological resource as defined by CEQA. If the resource meets the criteria for either a historical or unique archaeological resource, work shall remain halted within 50 feet of the area of the find and the qualified cultural resource specialist shall consult with City of Sunnyvale staff regarding methods to ensure that no substantial adverse change would occur to the significance of the resource pursuant to CEQA Guidelines Section 15064.5(b). Preservation-in-place (i.e., avoidance) is the preferred method of mitigation for impacts on cultural resources. If preservation-in-place and avoidance is not possible, data recovery shall be undertaken. The methods and results of data recovery work at an archaeological find shall be documented by the Construction Contractor's Professional Archaeologist in a professional-level technical report to be filed with the California Historical Resources Information System (CHRIS). Work in the area may commence upon completion of treatment, upon approval by the City of Sunnyvale.
5. The Professional Archaeologist shall also evaluate the resource to determine whether it is of special importance to a California Native American Tribe. If the resource is determined to not be of importance to the tribe, work may commence in the area. If the resource meets the criteria for an important tribal resource, work shall remain halted within 50 feet of the find, and the qualified cultural resources specialist/archaeologist shall evaluate the resource and determine whether it is an important resource to the local Native American Tribe. If the resource is important to the tribe, work shall remain halted within 50 feet of the area of the find and the qualified cultural resource specialist shall consult with City of Sunnyvale staff regarding methods to ensure that no substantial adverse change would occur to the significance of the tribal cultural resource pursuant to PRC Section 21084.3. Methods may include the following:
 - Preservation-in-place (i.e., avoidance) is the preferred method of mitigation for impacts on tribal cultural resources.
 - Treating the resource with culturally appropriate dignity taking into account the tribal cultural values and meaning of the resource, including, but not limited to, the following:
 - Protecting the cultural character and integrity of the resource
 - Protecting the traditional use of the resource
 - Protecting the confidentiality of the resource
 - Permanent conservation easements or other interests in real property, with

culturally appropriate management criteria for the purposes of preserving or utilizing the resources or places.

- Work in the area may commence upon completion of treatment as approved by the City of Sunnyvale.
- B. Paleontological Resources. Prior to construction, the Construction Contractor shall engage a qualified Paleontologist to assist the Construction Contractor in implementing the following measures.
1. Resume(s) of candidate staff to be provided by the Construction Contractor to the City of Sunnyvale and/or the Construction Manager for review and approval prior to staff engagement for this project. At a minimum, the qualified Paleontologist shall have two years' experience performing paleontological resources monitoring and hold current membership in the Society of Vertebrate Paleontology.
 2. The qualified Paleontologist shall provide sensitivity training to supervisory staff to alert construction workers to the possibility of exposing significant paleontological resources within the proposed project area. The training shall be conducted as defined by the Society of Vertebrate Paleontology's Conformable Impact Mitigation Guidelines Committee (1995), to recognize fossil materials in the event that any are uncovered during construction.
 3. In the event that a paleontological resource is uncovered during project implementation, all ground-disturbing work within a 50-foot radius shall be halted. The qualified Paleontologist shall inspect the discovery and determine whether further investigation is required. If the discovery can be avoided and no further impacts shall occur, no further effort shall be required. If the resource cannot be avoided and may be subject to further impact, the qualified Paleontologist shall evaluate the resource and determine whether it is "unique" under CEQA, Appendix G, part V. If the resource is determined not to be unique, work may commence in the area. If the resource is determined to be a unique paleontological resource, work shall remain halted, and the qualified Paleontologist shall consult with City of Sunnyvale staff regarding methods to ensure that no substantial adverse change would occur to the significance of the resource pursuant to CEQA. Preservation-in-place (i.e., avoidance) is the preferred method of mitigation for impacts to paleontological resources. If preservation-in-place is not feasible and avoidance is not possible, the fossils shall be recovered, prepared, identified, catalogued, and analyzed according to current professional standards under the direction of the qualified Paleontologist. All recovered fossils shall be curated at an accredited and permanent scientific institution according to Society of Vertebrate Paleontology (SVP) standard guidelines. Work may commence upon completion of treatment.
- C. Human Remains. During construction, the Construction Contractor shall halt within 50 feet of any area where human remains, or suspected human remains, are encountered in compliance with California law (Health and Safety Code section 7050.5; PRC sections 5097.94, 5097.98, and 5097.99). The Construction Contractor shall immediately notify the City of Sunnyvale, who in turn will contact the Medical Examiner at the county coroner's office. The Medical Examiner has two (2) working days to examine the remains after being notified by the City of Sunnyvale. When the remains are determined to be Native American, the Medical Examiner has 24 hours to notify the Native American Heritage Commission (NAHC). If human remains are discovered at the site, the Construction Contractor shall not re-commence work at the site without the prior

written approval of the City of Sunnyvale.

3.06 HAZARDS AND HAZARDOUS MATERIALS

- A. Hazardous Building Materials Removal and Disposal. The City of Sunnyvale has completed surveys for lead-based paint and asbestos in the project area and shall make these survey reports available to the Construction Contractor. During construction, the Construction Contractor shall dispose of contaminated waste in compliance with applicable regulations.
1. Asbestos Notification. USEPA and BAAQMD shall be notified using the Asbestos National Emission Standards for Hazardous Air Pollutants (NESHAP) Notification Form by the Construction Contractor, at least ten working days prior to the start of building demolition and demolition shall comply with 40 CFR 61, Subpart M (National Emission Standard for Asbestos), under the Health & Safety Code § 39658(b)(I). Disposal of asbestos-containing materials shall comply with applicable regulations including BAAQMD Regulation 11 Hazardous Pollutants, Rule 2 Asbestos Demolition, Renovation, and Manufacturing.
 2. Lead-based Paint. The Construction Contractor shall comply with Cal OSHA Lead Construction Standard, Title 8 California Code of Regulations 1532, which requires development and implementation of a lead compliance plan when materials from structures built prior to 1978 that contain lead would be disturbed or disposed during construction.
- B. Soil Management Plan. The City of Sunnyvale has prepared a Soil Management Plan for the project which will be made available to the Construction Contractor. The Construction Contractor shall implement all aspects of the Soil Management Plan during construction.
- C. Spill Prevention and Response. During construction the Construction Contractor shall implement the following best management practices that address the following procedures related to the use of hazardous materials during construction:
1. Proper disposal or management of contaminated soils and materials (i.e., clean up materials)
 2. Daily inspection of vehicles and equipment for leaks and spill containment procedures
 3. Emergency response and reporting procedures to address hazardous material releases
 4. Fuels and lubricating oils for vehicles and heavy equipment shall not be stored or transferred within 100 feet of any storm drains
 5. Emergency spill supplies and equipment shall be available to respond in a timely manner if an incident should occur
 6. Response materials such as oil-absorbent material, tarps, and storage drums shall be available in the plan area at all times during management activities and shall be used as needed to contain and control any minor releases. The absorbent material shall be removed promptly and disposed of properly
 7. Placement of as needed, minor amounts of fuel, lubricants, and hydraulic fluid for

equipment operation in appropriate storage tanks on the bed of fueling vehicles

8. Use of secondary containment and spill rags when fueling
9. Discourage “topping-off” fuel tanks
10. Spill kits for all fuel trucks and fueling areas
11. All workers shall be trained on the specific procedures for hazardous materials and emergency response as an element of the required worker environmental training prior to working in the plan area.

3.07 HYDROLOGY AND WATER QUALITY

- A. Construction Stormwater Management. If construction occurs during the rainy season (i.e., November to April), the Construction Contractor shall install temporary detention basins to ensure that stormwater flows from the project site into the stormwater collection system do not increase during construction.

3.08 NOISE

- A. Noise Management Plan. The City of Sunnyvale is currently working with an acoustical consultant to prepare a Noise Management Plan. During construction, the Noise Management Plan shall be implemented by the Construction Contractor. At a minimum, the plan will include, and the Construction Contractor shall be required to implement the following best management practices.
 1. Equip all internal combustion engine-driven equipment with intake and exhaust mufflers that are in good condition and appropriate for the equipment.
 2. Construct solid plywood fences (minimum 8 feet in height) or erect noise control blanket barriers between on-site demolition/construction sites and receptors (e.g., residences and library) as identified in the plan. Noise barriers shall also be installed around the perimeter of all staging areas to reduce noise impacts on receptors (e.g., residences, library, and Little Tree Montessori International School of Sunnyvale).
 3. Position stationary noise-generating equipment as far as possible from receptors (preschool, residences and the library).
 4. Schedule major noise generating construction activities in accordance with Noise Management Plan restrictions. This may include coordination with adjacent noise-sensitive land uses, including residences, Little Tree Montessori International School of Sunnyvale, and the Sunnyvale Library, so that construction activities can be scheduled to minimize noise disturbance during noise-sensitive periods (nighttime, preschool nap times, library events, etc.).
 5. Perform construction work consistent with notices prepared and distributed by the City of Sunnyvale to nearby receptors.
 6. Alert the City of Sunnyvale with at least 14 days' prior notice to perform nighttime work to allow the City of Sunnyvale to make timely notification to nearby receptors.

7. Immediately refer all noise complaints to the City of Sunnyvale's Community Liaison.

3.0.9 TRAFFIC AND TRANSPORTATION

- A. Temporary Traffic Control Plan. The Construction Contractor shall prepare and implement a Temporary Traffic Control Plan prior to and during construction to include the following measures.

1. Road and Lane Closures

- The Construction Contractor shall time road and lane closures to avoid peak (AM and PM) commuting hours.
- Road closures along West Olive Avenue shall be prohibited during construction. Two lanes of traffic shall be retained at all times on West Olive Avenue.

2. Construction Traffic and Safety

- The Construction Contractor shall time construction worker commute and haul truck trips to avoid peak (AM and PM) commuting hours.
- Construction traffic routes shall avoid the intersection of Mary Avenue/West Olive Avenue
- The Construction Contractor shall post Flaggers to control the traffic into and out of the construction site.

3. Notification

- The plan shall indicate that the City of Sunnyvale will notify local emergency personnel (i.e., fire departments, police departments, ambulance, and paramedic services), employees at the Civic Center Campus, and residents within 300 feet at least 7 days prior to road or land closures. The notice shall include location(s) and duration of closure(s), and a contact number for the Construction Contractor.

END OF SECTION

SECTION 004100 – BID FORMS

BID FORM

**Invitation for Bids No. PW20-16
Civic Center Modernization Phase 1
Public Works Project No. PR-19-06**

(Refer to Section 002113 Instructions to Bidders for Bid submission dates.)

DELIVER TO:

City of Sunnyvale, Purchasing Division
City Hall Annex
650 West Olive Avenue
Sunnyvale, CA 94086

FOR:

Civic Center Modernization Phase 1
Sunnyvale, California

Plainly mark bid with "Bid To": Invitation for Bids No. PW20-16
Civic Center Modernization Phase 1
Public Works Project No. PR-19-06

The undersigned hereby proposes and agrees to furnish all labor, materials, and equipment, and to perform all work required for the above-named Project in the manner and time prescribed in the Project Plans, Specifications and Contract Documents and such addenda thereto as may be provided prior to the opening date and in accordance with prevailing wage rates ascertained by the Department of Industrial Relations, Division of Labor Statistics & Research for the Bid Price set forth in the space provided herein.

The undersigned certifies Bidder has familiarized itself with the nature and extent of the Contract Documents, the Work, the Site, the locality where the Work is to be performed, the legal requirements (federal, state, and local laws, ordinances, rules, and regulations), and the conditions affecting cost, progress or performance of the Work and has made such independent investigations as Bidder deems necessary.

The undersigned certifies that in preparation of this bid, no bid was received by the Bidder from a bid depository, which depository (as to any portion of the work) prohibits or imposes sanctions for the obtaining by Bidder, or the submission to Bidder by any subcontractor or vendor or supplier of goods and services, of a bid outside the bid depository. This certification shall constitute a warranty, the falsity of which shall entitle the City to pursue any remedy authorized by law, and shall include the right, at the option of the City, of declaring any contract made as a result thereof to be void.

By signature hereof, Bidder swears under penalty of perjury that representations of the bid with respect to Bidder's license are true and that no more than one final unappealable finding of contempt of court by a Federal Court has been issued against the Bidder within the immediately preceding two-year period because of the Bidder's failure to comply with an order of a Federal Court which orders the Bidder to comply with an order of the National Labor Relations Board.

Bidder accepts all the terms and conditions of the Contract Documents, including without limitation those in the Notice Inviting Bids and Instructions to Bidders, dealing with the disposition of the Bid Security. Attached hereto is a cashier's check, certified check or bid bond in the amount of \$ _____ as required in the Notice Inviting Bids.

This bid will remain open for the period stated in the instruction to bidders and if awarded the Agreement, the undersigned agrees to sign the Agreement, to furnish the bonds and Certificate of Liability Insurance called for, and to start the work when notified. Bidder's security of a bidder's bond, cashier's check, or certified check in the amount equal to ten percent (10%) of the total proposal amount accompanies this proposal.

In conformance with current statutory requirements of California Labor Code Section 1860, et seq., the undersigned confirm the following as its certification:

I am aware of the provisions of Section 3700 of the Labor Code which require every employer to be insured against liability for worker's compensation or to undertake self-insurance in accordance with the provisions before commencing the performance of the work of this contract.

Bidder agrees to complete the Work required under the Contract Documents (including all Bid Schedules, Subcontractor List, Bidder's General Information, and Non-Collusion Affidavit contained in these Bid Forms) within the Contract Time specified, and to accept in full payment the Contract Price based on the Lump Sum or Unit Bid Price(s) listed in the Bid Schedule(s).

Dated:

Bidder: _____

By: _____
(Signature)

Title: _____

BID CERTIFICATES. The following applicable Bid Certificates shall be attached to the Bid Form and submitted with the bid.

- A. Bids by corporations must be executed in the corporate name by the president, a vice-president, or other corporate officer. Such Bid shall be accompanied by the enclosed Certificate of Authority to sign, attested by the secretary or assistant secretary. The corporate address and state of incorporation must appear below the signature.
- B. Bids by partnerships must be executed in the partnership name and be signed by a managing partner, accompanied by the enclosed Certificate of Authority to sign, and his/her title must appear under the signature and the official address of the partnership must appear below the signature.
- C. Bids by joint venture must be executed in the joint venture name and be signed by a joint venture managing partner, accompanied by the enclosed Certificate of Authority to sign, and his/her title must appear under the signature and the official address of the joint venture must appear below the signature. Additionally, the Bid shall bind the joint venture.
- D. If the Bid is made by an individual, bidder's name, signature, and post office address must be shown

Name of Bidder _____

BID CERTIFICATE
(if Corporation)STATE OF CALIFORNIA)
) ss
COUNTY OF)

I HEREBY CERTIFY that I am authorized by the Board of Directors of the _____
 _____ (Name of corporation and post office address), a corporation existing under the laws of the
 State of _____, held on _____, 20 _____,
 the following resolution was duly passed and adopted:

“RESOLVED, that _____, as _____
 _____ (Officer Title) of the Corporation,
 is hereby authorized to execute the Bid Proposal dated _____, 20 _____
 for Civic Center Modernization Phase 1, Public Works Project
 No. PR-19-06, for the City of Sunnyvale, and that their execution thereof,
 attested by the _____

 (Secretary or title of Person who signs on behalf of the Corporation),
 and with the Corporate Seal affixed, shall be the official act and deed of this
 Corporation.”

I further certify that said resolution is now in full force and effect.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the official seal
 of the corporation this _____, day of _____, 20 _____.

 (Title of Person who signs on behalf of Corporation)

1 Include a certified copy of the bylaws or resolution of the Board of Directors of the corporation
 showing authority of the officer signing the Bid to execute contracts on behalf of the corporation.

Name of Bidder _____

BID CERTIFICATE
(if Partnership)

STATE OF CALIFORNIA)
) ss
COUNTY OF)

I HEREBY CERTIFY that a meeting of the Partners _____
_____, a
Partnership existing under the laws of the State of _____, held on
_____, 20 _____, the following resolution was duly passed and adopted:

“RESOLVED, that _____, as the
General Partner of the Partnership, is hereby authorized to execute the Bid
Proposal dated _____, 20_____, for the Civic Center Modernization
Phase 1, Public Works Project No. PR-19-06, for the City of Sunnyvale, and that
their execution thereof, attested by the _____, shall be the official
act and deed of this Partnership, Public Works Project

I further certify that said resolution is now in full force and effect.

IN WITNESS WHEREOF, I have hereunto set my hand this _____, day
of _____, 20 ____.

Signature of General Partner

List all Partners

BID CERTIFICATE
(if Joint Venture)

STATE OF CALIFORNIA)
) ss
COUNTY OF)

I HEREBY CERTIFY that a meeting of the Principals of the _____

_____ a

Joint Venture existing under the laws of the State of _____, held on
_____, 20 _____, the following resolution was duly passed and adopted:

“RESOLVED, that _____, as
_____ (Office Title) of the joint venture, is hereby
authorized to execute the Bid Proposal dated _____, 20_____, for
the Civic Center Modernization Phase 1, Public Works Project No. PR-19-06, for
the City of Sunnyvale, and that their execution thereof, attested by the
_____, shall be the official act and deed of this Joint Venture and
shall bind the Joint Venture.”

I further certify that said resolution is now in full force and effect.

IN WITNESS WHEREOF, I have hereunto set my hand this _____, day
of _____, 20 ____.

(Representative of one of the Joint Venture Firms)

END OF SECTION

SECTION 004113 – BIDDER SUBMISSION REQUIREMENTS

BID SCHEDULE

No.	Description	QTY	Unit	Unit Cost	Total Cost				
1	Mobilization & Demobilization (Shall Not Exceed 5% of Total Base Bid)	1	LS*		\$				
2	New City Hall	1	LS*		\$				
3	EOC Addition	1	LS*		\$				
4	DPS Tenant Improvements	1	LS*		\$				
5	DPS Temporary Facilities	1	LS*		\$				
6	Site Improvements	1	LS*		\$				
7	COVID 19 Requirements	28	Month	\$	\$				
8	Unforeseen Conditions	Allowance			\$ 140,000.00				
9	Off Haul of Hazardous Soils	Allowance			\$ 250,000.00				
TOTAL BASE BID AMOUNT				\$ _____					
1) Total Base Bid Amount shall be written in numbers. 2) *For Lump Sum Bid Items (LS), only an amount in the "Total" column is required and only the amount in the "Total" column will be considered.									
Name of Bidder: _____ By: (signature): _____									

PART 1 – DESCRIPTION OF BID ITEMS

- A. Unless otherwise noted, all lump sum bid items shall include full compensation for furnishing all material, tools, equipment and incidentals, and for doing all the Work related to or complying with Bid documents.

1. Bid Schedule Item 1 – Mobilization and Demobilization

The lump sum bid price for this work shall comply with Specification Section 017113- Mobilization and Demobilization and consist of preparatory work and operations, including, but not limited to, those necessary for the movement of personnel, equipment, supplies and incidentals to the project site; for the establishment of temporary site offices, preparation of schedule of values, public notification, temporary access/utility service, and other facilities necessary for work on the project for the entire duration of the contract; and for all other work and operations which must be performed on the Project Site. The Contractor shall maintain a clean neat and orderly work area free of litter, trash and waste material throughout the construction period. Upon completion of the work the Contractor shall demobilize all employees, equipment, temporary facilities, and materials and remove all rubbish from any area that has been occupied during Work, including the City's right-of-way and any other areas outside of the City right-of-way used as a construction yard or other facility, and return all contracted areas of Work to their pre-construction condition to the satisfaction of the City and Construction Manager. The Contractor shall also provide Owner with any releases from private parties that the contractor may have entered into agreement for use on Project.

2. Bid Schedule Item 2 - New City Hall

The lump sum bid price for this work shall comply with project plans and specifications and consists of general demo, landscaping, utility relocation, new building construction and site improvements, including, but not limited to:

- a. Demolition of existing City Hall and West Olive Avenue parking lots, including walkways, site furniture and site elements,
- b. Landscaping including, but not limited to removal, relocation and replanting of existing trees,
- c. Removal and rerouting of existing underground utilities,
- d. Removal and relocation of existing Chiller Tower and Emergency Generator;
- e. Construction of New 4-story City Hall building with underground parking (89 stalls) and two exterior terraces, including, but not limited to, shoring, PV array and back up battery system, and an Exterior Building Maintenance (EBM) system, and
- f. Site improvements including, but not limited to, paved walkways, elevated plaza, and other site elements

3. Bid Schedule Item 3 – Emergency Operations Center (EOC)

The lump sum bid price for this work shall comply with project plans and specifications and consists of general demo, landscaping, Utility relocation, new building constructions and site improvements, including, but not limited to:

- a. Partial demolition of existing Department of Public Safety Building (DPS) parking lots, including walkways, site furniture and site elements;
- b. Landscaping including, but not limited to removal, relocation and replanting of existing trees,
- c. Removal and rerouting of existing underground utilities,

- d. Complete Construction of a New 2-story EOC building adjacent to existing DPS, and
 - e. Site improvements including but not limited to paved walkways and other site elements.
4. Bid Schedule Item 4 – DPS Tenant Improvements
- The lump sum bid price for this work shall comply with project plans and specifications and consists of:
- a. Selective abatement and demolition of existing DPS locker rooms, shower facilities, gym, evidence storage, CSI Lab, and briefing rooms to accommodate new tenant improvement construction, and
 - b. Construction of new DPS tenant improvement consisting of new locker rooms, shower facilities, briefing room, offices, evidence storage, and CSI lab facilities.
5. Bid Schedule Item 5 – DPS Temporary Facilities
- The lump sum bid price for this work shall comply with Specification Section 015000 and project plans and specifications and consists of:
- a. Assist existing DPS Departments with relocation to new EOC Addition.
 - b. Construction of temporary locker room facilities, restrooms, and showers in existing secure DPS vehicle yard,
 - c. Connection of Temporary facilities to existing site utilities, and
 - d. Upon completion of the DPS tenant improvement portion of the work, remove The temporary locker and bathroom facility and return the area to its pre-construction condition.
6. Bid Schedule Item 6 – Site Improvements
- The lump sum bid price for this work shall comply with project plans and specifications and consists of:
- a. Demolition and abatement of existing facilities including, City Hall, City Hall Annex, City Hall South Annex, and Sunnyvale Office Complex (SOC),
 - b. Construction of new Civic Plazas and an Outdoor Amphitheater,
 - c. Pedestrian & Bicycle enhancements to Olive & Mathilda Avenues
 - d. Improved accessible paths and landscape features,
 - e. New utilities to support new buildings and site features, and
 - f. Olive Avenue Improvements, including but not limited to grading, tree removal and protection, irrigation and landscape, raised plaza, hardscape, granite paved concrete banded pathways, and street lighting.
7. Bid Schedule Item 7 – COVID 19 Requirements
- The monthly bid rate for this Work shall comply with Specification Section 007319-Health and Safety Requirements including the development and implementation, as part of the Contractor's overall Injury and Illness Prevention Program (IIPP), a COVID 19 specific infection prevention program that is at a minimum in compliance with the most recent

guidelines and recommendations set by the State of California, City of Sunnyvale and Cal OSHA.

8. Bid Schedule Item 8 – Allowance for Unforeseen Conditions

Allowance for relocation of utilities as directed by the City and/or Construction Manager that are not shown on record drawings, unknown or not included. This item excludes any utility pot holing and/or relocation of utilities known/shown or incidental to the construction work. City's and/or Construction Manager's written approval shall be obtained before using any allowance.

9. Bid Schedule Item 9 – Allowance for Off Haul of Hazardous Soils

Allowance for Off-site disposal of additional quantities of hazardous soils, including but not limited to, excavation, characterization, transportation and disposal to an accepting landfill or qualified facility in accordance with the approved Soil Management Plan. City's and/or Construction Manager written approval shall be obtained before using any allowance.

SUBCONTRACTOR LIST
(Public Contract Code 4100 et seq)

Name of Subcontractor	Address of Subcontractor and License Number (PWC Registration Numbers shall be included in Part E under 'Statement of Qualifications'")	Work to be Performed	Value of Work to be performed by Subcontractor (\$)
1.	(License No.)		
2.	(License No.)		
3.	(License No.)		
4.	(License No.)		
5.	(License No.)		
6.	(License No.)		
7.	(License No.)		
8.	(License No.)		
9.	(License No.)		
10.	(License No.)		
11.	(License No.)		
12.	(License No.)		
Name of Bidder: _____			
By: (signature): _____			

(Bidder to add additional pages for Subcontractor list as required)

BIDDER'S INFORMATION

The Bidder shall furnish the following information. Additional sheets shall be attached as required.

1. BIDDER'S name and street address:

Name: _____

Address: _____

(Street and/or P.O. Box)

(City)

(State)

(Zip)

2. BIDDER'S Telephone Number: _____ Facsimile Number: _____

BIDDER's E-mail Address: _____

3. BIDDER'S Sunnyvale Business License No.: _____ BIDDER'S Tax ID No.: _____

4. TYPE OF BUSINESS

If you are an individual, partnership or joint venture, so state. If you are a partnership or joint venture, list the names of all general partners composing the partnership or joint venture. If a corporation, list the names of president, secretary, treasurer, and manager.

Individual _____ Name(s): _____

Partnership _____

Corporation _____ Names of Corporate Officers

State of Incorporation _____ President _____

Secretary _____

Treasurer _____

Manager _____

Joint Venture _____

Other _____

(Describe)

5. CONTRACTOR'S license: Primary Classification

State License No.: _____ Expiration Date: _____

Supplemental license classifications: _____

6. NAME of person who inspected the site of the proposed Work for the Bidder:

Name: _____ Date of inspection: _____

7. BIDDER'S EXPERIENCE

1. Bidder has been doing business under its present name for __ years.

2. Bidder has experience in work comparable in type and complexity with that required under the proposed contract for ____ years as a General Contractor.

Bidder shall sign under penalty of perjury that all the information provided in this information sheet is true and correct.

Signature

Title

NOTE: If Bidding as a joint venture, each person submitting the Bid shall provide the information required below with respect to his or her licensure.

IMPORTANT - READ BEFORE SIGNING: Bid must be executed in same name-style in which the Bidder is licensed and pre-qualified. Bidder bidding jointly as a combination of several business organizations are specially cautioned that such Bid must be jointly licensed and pre-qualified in the same form and style in which the bid is executed. The undersigned Bidder certifies and agrees to provide the information and comply with the requirements contained in this Bid, Section 00 41 00, Bidder Submission Requirements.

Legal Name of Bidder: _____

Federal I.D. Number: _____

Bidder's License No.: _____ License Classification: _____

Expiration Date of Bidder's License: _____

SIGN HERE: _____
(Signature of Bidder) (Title) (Date)

Name of Bidder: _____

SITE VISIT DECLARATION
(To Accompany Bid)

The party making the foregoing Bid, has visited the Project site as described in the Contract Documents and has examined and familiarized themselves with the existing conditions, as well as all other conditions relating to the construction which will be performed. The submitting of a Bid shall be considered an acknowledgment on the part of the Bidder of familiarity with conditions at the site of the Work and that the site examination has provided adequate and sufficient information related to existing conditions which may affect cost, progress, or performance of the Work.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct.

Signature of Authorized Representative

Type/Print Name of Bidder

Type/Print Representative's Name

Type/Print Title

Date

STATEMENT OF COMPLIANCE – NON-DISCRIMINATION

Bidder, in submitting this bid, hereby certifies, unless specifically exempted, compliance with Government Code Section 12990 (a-f), and CCR, Title 2, Division 4, Chapter 5, Section 8103, in matters relating to reporting requirements and the development, implementation and maintenance of a Non-discrimination Program; as set forth in the Non-discrimination Standards, of the Contract Documents. Prospective Proposer agrees not to unlawfully discriminate, harass or allow harassment against any employee or applicants for employment because of sex, race, color, ancestry, religious creed, national origin, physical disability (including HIV and AIDS), medical disability (cancer), age (over 40), marital status, and denial of family care leave.

QUESTIONNAIRE

In accordance with Public Contract Code Section 10162, the Bidder shall complete the following questionnaire:

Has the Bidder, any officer of the Bidder, or any employee of the Bidder who has a proprietary interest in the Bidder, ever been disqualified, removed, or otherwise prevented from bidding on, or completing a Federal, State or Local government project because of a violation of law or a safety regulation? If the answer is yes, explain the circumstances in an attachment.

☐ Yes ☐ No

Has the Bidder, any officer of the Bidder, or any employee of the Bidder who has a proprietary interest in the Bidder, ever received a safety violation or failed to file notifications to the Cal-OSHA, Federal OSHA, or EPA Agencies for employee records as required by CCR, Title 8, Section 5208 and CFR 40, Part 51?

☐ Yes ☐ No

CALIFORNIA CIVIL RIGHTS LAWS

Pursuant to Public Contract Code section 2010, a person that submits a bid or proposal to, or otherwise proposes to enter into or renew a contract with, a state agency with respect to any contract in the amount of \$100,000.00 or above shall certify, under penalty of perjury, at the time the bid or proposal is submitted or the contract is renewed, all of the following:

1. **CALIFORNIA CIVIL RIGHTS LAWS:** For contracts executed or renewed after January 1, 2017, the Contractor certifies compliance with the Unruh Civil Rights Act (Section 51 of the Civil Code) and the Fair Employment and Housing Act (Section 12960 of the Government Code); and
2. **EMPLOYER DISCRIMINATORY POLICIES:** For contracts executed or renewed after January 1, 2017, if a Contractor has an internal policy against a sovereign nation or peoples recognized by the United States government, the Contractor certifies that such policies are not used in violation of the Unruh Civil Rights Act (Section 51 of the Civil Code) or the Fair Employment and Housing Act (Section 12960 of the Government Code).

CERTIFICATION

I, the official named below, certify under penalty of perjury under the laws of the State of California that the foregoing is true and correct.

 Proposer/Bidder Firm Name (Printed)

 Federal ID Number

 By (Authorized Signature)

 Printed Name and Title of Person Signing

 Executed in the County of

 Executed in the State of

 Date Executed

UTILIZATION OF LOCAL WORKFORCE IN CONSTRUCTION PROJECTS

The Sunnyvale City Council has adopted a policy which encourages utilization of local workforces, including State-certified apprentices, as a means of supporting economic opportunities for all members of the community. Local workforce is defined as workers residing in Santa Clara County. The lowest responsive and responsible bidder must provide a projection of locally-hired workers utilized for this contract.

Contractor	Projected Number of Locally Hired Workers _____ Projected Percent of Locally Hired Workers _____%
Subcontractor(s)	Projected Number of Locally Hired Workers _____ Projected Percent of Locally Hired Workers _____%

END OF SECTION

SECTION 004513 – BIDDER QUALIFICATIONS & REFERENCES

STATEMENT OF QUALIFICATIONS

Apparent low bidder shall complete this entire Statement of Qualifications questionnaire and submit it to City upon notification, in accordance with Section 002113 – Instructions to Bidders. Failure to complete the questionnaire or inclusion of any false statement is grounds for immediate disqualification. The City reserves the right to waive minor irregularities, inconsequential deviations and to make all final determinations. The City will evaluate the information contained in each applicant's questionnaire and responses received in reference checks. The sole and discretionary judgment of the City will determine if the Contractor is deemed qualified.

CONTACT INFORMATION

Company Name: _____

Form of Company: _____ Sole Proprietor _____ Partnership/Joint Venture _____
_____ Corporation _____ Other (please attach explanation)

Owner of Company: _____

Contact Person: _____

Street Address: _____

Mailing Address: _____

Phone: _____ Fax: _____

Federal Tax I.D. No.: _____

PART A: GENERAL INFORMATION

Complete Part A before proceeding to Part B.

1. Contractor possesses a valid and current California General Contractor's Type B license for the work proposed. Yes ____ No ____
2. Contractor has a minimum of \$2,000,000.00 Commercial General liability insurance coverage with limits of no less than \$2,000,000.00 on account of any one occurrence for bodily injury, personal injury, and property damage; and an annual general aggregate limit of not less than \$4,000,000.00; and \$2,000,000 products and completed operations aggregate, combined single limit. Yes ____ No ____
3. Contractor's license has been revoked at any time in the last five (5) years. Yes ____ No ____

4. Contractor has been “default terminated” by an owner (not for convenience), or a Surety has completed a contract for Contractor within the last five (5) years. Yes ____ No ____
5. Contractor has been cited more than twice for failure to pay prevailing wages in the last five (5) years. Yes ____ No ____

Contractor will be immediately disqualified if any answer to questions 1 or 2 is No, Contractor will be immediately disqualified if any answer to question 3 is Yes. Contractor may be immediately disqualified if the answer to questions 4 or 5 is Yes. At a minimum to avoid such disqualification, Contractor must include with this Questionnaire a full description of the applicable circumstance and sufficient information to permit City to evaluate Contractor’s overall qualifications to perform the Work. City retains sole discretion to disqualify any Contractor who answers yes to either question 4 or 5

PART B: SAFETY, PREVAILING WAGE, DISPUTES AND BONDS

Safety

- Has CAL OSHA, Federal OSHA, the EPA or any Air Quality Management District cited your firm in the past five (5) years? Yes____ No____ If yes, attach description of each citation.
- How often do you require documented safety meetings be held for:

Field Supervisor	Weekly____	Bi-weekly____	Monthly____	Less than monthly____
Employees	Weekly____	Bi-weekly____	Monthly____	Less than monthly____
New Hires	Weekly____	Bi-weekly____	Monthly____	Less than monthly____
Subcontractors	Weekly____	Bi-weekly____	Monthly____	Less than monthly____
- How often do you conduct documented safety inspections?
Quarterly____ Semi-annually____ Annually____
- Do you have home office safety representatives who visit/audit the job site?
Quarterly____ Semi-annually____ Annually____
- Experience Modification Rate (EMR) - Three (3) year Average Rate: _____
- Recordable Incident Rate (RIR): _____
- Lost Time Incident Rate (LTIR): _____

Prevailing Wage Provisions

- Has your firm been fined, penalized or otherwise found to have violated any prevailing wage or labor code provision? If yes, attach description of each fine/penalty.
Yes____ No____

License Provisions

- Has your company changed names or license numbers in the past 10 years? If so, please state reason for change. Yes____ No____ Reason _____

Disputes

10. Has your firm had any claims, litigation, or disputes ending in mediation or arbitration, or termination for cause associated with any project in the past five (5) years? If yes, attach description of each such instance including details of total claim amount, settlement amount, and owner's name and phone number. Yes _____ No _____

PART C: PROJECT EXPERIENCE

The unique nature of this project requires prior similar project experience of the firm. Summarize your similar project experience below and provide the detailed project information requested:

General Contractor - List at least three (3) projects of similar size and scope with a construction cost not less than \$150,000,000.00 completed in the past five (5) years.

Project name	Const. Cost (\$)	Date Completed (year)	Name, address and telephone number of Owner's representative

Most Recently Completed Project.

In order to be considered responsive, Contractor must provide information about its most recently completed project. Names and references must be current and verifiable. If a separate sheet is used, it must contain all of the following information:

1. Project Name: _____
2. Location: _____
3. Owner: _____
4. Owner Contact (name and phone number): _____
5. Architect: _____
6. Architect Contact (name and phone number): _____
7. Const. Mgr. or Project Mgr. (name and phone number): _____

8. Description of Project, Scope of Work Performed: _____

9. Value of Construction Contract: _____
10. Value of Change Orders: _____
11. Original Scheduled Date of Completion: _____
12. Time Extensions Granted (number of days): _____
13. Actual Date of Completion: _____
14. Number of Stop Notices filed by subcontractors or suppliers: _____

PART D: FINANCIAL AND OTHER INFORMATION

1. Has your firm ever reorganized under the protection of the bankruptcy laws? Yes ____ No ____
2. Have you ever had insurance terminated by a carrier? Yes ____ No ____

If yes, explain on separate signed sheet.

Contractor shall sign under penalty of perjury that all the information provided in this questionnaire is true and correct. Contractor's signature authorizes the City and its agents and representatives, to obtain a credit report and/or verify any of the above information

Signature

Title

PART E: CONTRACTOR REGISTRATION WITH STATE OF CALIFORNIA

Please list your Public Works Contractor (PWC) Registration number(s) and Email Addresses:

		Name	PWC Registration Number	Email Address (Please Print)
1.	General Contractor			
2.	Subcontractors			

CLIENT REFERENCES

Please provide three (3) client references.

1. Name of Client Representative: _____
Firm/Company/Agency: _____
Address: _____
Telephone No.: _____
Project associated with: _____

2. Name of Client Representative: _____
Firm/Company/Agency: _____
Address: _____
Telephone No.: _____
Project associated with: _____

3. Name of Client Representative: _____
Firm/Company/Agency: _____
Address: _____
Telephone No.: _____
Project associated with: _____

END OF SECTION

SECTION 004519 – NON-COLLUSION AFFIDAVIT

NON-COLLUSION AFFIDAVIT

State of California)
)
 County of _____)

I, _____, being first duly sworn, deposes and says that he or she is _____ of _____ the party making the foregoing bid that the bid is not made in the interest of, or on behalf of, an undisclosed person, partnership, company, association, organization, or corporation; that the bid is genuine and not collusive or sham; and that the bidder has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid, and has not directly or indirectly colluded, conspired, connived, or agreed with any bidder or anyone else to put in a sham bid, or that anyone shall refrain from bidding; that the bidder has not in any manner, directly or indirectly sought by agreement, communication, or conference with anyone to fix the bid price of the bidder or any other bidder, or to fix any overhead, profit, or cost element of the bid price, or of that of any other bidder, or to secure any advantage against the public body awarding the contract of anyone interested in the proposed contract; that all statements contained in the bid are true; and, further, that the bidder has not, directly or indirectly, submitted his or her bid price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, or paid, and will not pay, any fee to any corporation, partnership, company association, organization, bid depository, or to any member or agent thereof to effectuate a collusive or sham bid.

 Name of Bidder

 By (Signature)

Title: _____

Date: _____

**Seal and Notary Acknowledgement
 subscribed and sworn to me this**

_____ of _____,

END OF SECTION

SECTION 005213 – GENERAL CONSTRUCTION AGREEMENT

GENERAL CONSTRUCTION CONTRACT

THIS CONTRACT dated _____ is by and between the CITY OF SUNNYVALE, a municipal corporation of the State of California ("Owner") and {CONTRACTOR'S NAME}, a {Type of Company} ("Contractor").

RECITALS:

The parties to this Contract have mutually covenanted and agreed, as follows:

1. The Contract Documents. The complete Contract consists of the following documents: Notice Inviting Bids; Instructions to Bidders; Performance Bond and Payment Bond; Guaranty; City of Sunnyvale Standard Specifications for Public Works Construction, 2006 Edition; City of Sunnyvale Standard Details for Public Works Construction, 2006 Edition; Plans and Specifications, "Sunnyvale Civic Center – Phase 1, Project No. PR-19-06 Invitation for Bids No PW20-06", including {Number of Addenda}; OSHA, and other standards and codes as outlined in the Specifications. These documents are all incorporated by reference. The documents comprising the complete contract are collectively referred to as the Contract Documents.

Any and all obligations of the Owner and the Contractor are fully set forth and described therein.

All of the above documents are intended to work together so that any work called for in one and not mentioned in the other or vice versa is to be executed the same as if mentioned in all documents.

2. The Work. Contractor agrees to furnish all tools, equipment, apparatus, facilities, labor, transportation, and material necessary to perform and complete the project in a good and workmanlike manner. The work consist(s) of Complete project as outlined in the Contract Documents and as outlined in Section 011100 Summary of Work, as called for, and in the manner designated in, and in strict conformity with, the Plans and Specifications prepared by SmithGroup and adopted by the Owner. These Plans and Specifications are entitled respectively, Sunnyvale Civic Center – Phase 1, Project No. PR-19-06.

It is understood and agreed that the work will be performed and completed as required in the Plans and Specifications under the sole direction and control of the Contractor, and subject to inspection and approval of the Owner, or its representatives. The Owner hereby designates as its representative for the purpose of this contract the Senior Civil Engineer for Construction or an employee of the Owner who will be designated in writing by the Director of Public Works.

3. Contract Price. The Owner agrees to pay and the Contractor agrees to accept, in full payment for the work above agreed to be done, the sum of {AMOUNT IN WORDS} ({AMOUNT IN NUMBERS}) subject to final determination of the work performed and materials furnished at unit prices per "Exhibit A" attached hereto and incorporated by this reference, and subject to additions and deductions in accordance, as provided in the Documents and in accordance with Contract Documents. The sum includes base bid and accepted Additive Alternate(s) No. Number(s). All other Additive Alternate(s) are rejected by Owner, and are not included in this contract.

4. Permits other than City Building Permit; Compliance with Law. Contractor shall, at its expense, obtain all necessary permits and licenses, easements, demolition, registration with green halo system, etc., for the construction of the project give all necessary notices, pay all fees required by law, and comply with all laws, ordinances, rules and regulations relating to the work and to the preservation of the public health and safety.

5. Inspection by Owner. Contractor shall at all times maintain proper facilities and provide safe access for inspection by the Owner to all parts of the work, and to the shops wherein the work is in preparation. Where the Specifications require work to be specially tested or approved, it shall not be tested or covered up without timely notice to the Owner of its readiness for inspection and without the approval

thereof or consent thereto by the latter. Should any such work be covered up without such notice, approval, or consent, it must, if required by Owner, be uncovered for examination at the Contractor's expense.

6. Extra or Additional Work and Changes. Should Owner at any time during the progress of the work request any alterations, deviations, additions or omissions from the Specifications or Plans or other Contract Documents it shall be at liberty to do so, and the same shall in no way affect or make void the Contract, but will be added to or deducted from the amount of the contract price, as the case may be, by a fair and reasonable valuation, agreed to in writing between the parties hereto. No extra work shall be performed or change be made unless in pursuance of a written order from the Director of Public Works or authorized representative, stating that the extra work or change is authorized and no claim for an addition to the contract sum shall be valid unless so ordered.

7. Time for Completion. All work under this contract shall be completed before the expiration Eight Hundred Fifty-Four (854) calendar days from the date specified in the Notice to Proceed.

If Contractor shall be delayed in the work by the acts or neglect of Owner, or its employees or those under it by contract or otherwise, or by changes ordered in the work, or by strikes, lockouts by others, fire, unusual delay in transportation, unavoidable casualties or any causes beyond the Contractor's control, or by delay authorized by the Owner, or by any cause which the Owner shall decide to justify the delay, then the time of completion shall be extended for such reasonable time as the Owner may decide.

This provision does not exclude the recovery of damages for delay by either party under other provisions.

8. Inspection and Testing of Materials. Contractor shall notify Owner a sufficient time in advance of the manufacture or production of materials, to be supplied under this contract, in order that the Owner may arrange for mill or factory inspection and testing of same, if Owner requests such notice from Contractor.

9. Termination. If Contractor should file a bankruptcy petition and/or be judged bankrupt, or if Contractor should make a general assignment for the benefit of creditors, or if a receiver should be appointed on account of insolvency, or if Contractor or any subcontractors should violate any of the provisions of the Contract, Owner may serve written notice upon Contractor and its surety of Owner's intention to terminate the Contract. The notice shall contain the reasons for such intention to terminate the Contract, and, unless within ten (10) days after serving such notice, such violation shall cease and satisfactory arrangements for correction thereof be made, upon the expiration of the ten (10) days, the Contract shall cease and terminate. In the event of any such termination, Owner shall immediately serve written notice thereof upon the surety and the Contractor, and the surety shall have the right to take over and perform the Contract; provided, however that, if the surety within fifteen (15) days after the serving upon it of notice of termination does not give Owner written notice of its intention to take over and perform the Contract or does not commence performance thereof within thirty (30) days from the date of the serving of such notice, Owner may take over the work and prosecute the same to completion by contract or by any other method it may deem advisable, for the account and at the expense of Contractor, and Contractor and its surety shall be liable to Owner for any excess cost occasioned Owner thereby, and in such event Owner may without liability for so doing take possession of and utilize in completing the work, such materials, appliances, plant and other property belonging to Contractor as may be on the site of the work and necessary therefor.

10. Owner's Right to Withhold Certain Amounts and Make Application Thereof. In addition to the amount which Owner may retain under Paragraph 21 until the final completion and acceptance of all work covered by the Contract, Owner may withhold from payment to Contractor such amount or amounts as in its judgment may be necessary to pay just claims against Contractor or any subcontractors for labor and services rendered and materials furnished in and about the work. Owner may apply such withheld amount or amounts to the payment of such claims in its discretion. In so doing Owner shall be

deemed the agent of Contractor and any payment so made by Owner shall be considered as a payment made under the Contract by Owner to the Contractor and Owner shall not be liable to Contractor for any such payment made in good faith. Such payment may be made without prior judicial determination of the claim or claims.

11. Notice and Service Thereof. All notices required pursuant to this Contract shall be communicated in writing, and shall be delivered in person, by commercial courier or by first class or priority mail delivered by the United States Postal Service. Nothing in this provision shall be construed to prohibit communication by more expedient means, such as by email or fax, to accomplish timely communication. Each party may change the address by written notice in accordance with this paragraph. Notices delivered personally shall be deemed communicated as of actual receipt; mailed notices shall be deemed communicated as of three (3) business days after mailing. All notices sent pursuant to this Contract shall be addressed as follows:

Owner: City of Sunnyvale
Department of Public Works
Construction Contract Administrator
P. O. Box 3707
Sunnyvale, CA 94088-3707

Contractor: _____

12. Assignment of Contract. Neither the Contract, nor any part thereof, nor moneys due or to become due thereunder may be assigned by Contractor without the prior written approval of Owner.

13. Compliance with Specifications of Materials. Whenever in the Specifications, any material or process is indicated or specified by patent or proprietary name, or by name of manufacturer, such Specifications must be met by Contractor, unless Owner agrees in writing to some other material, process or article offered by Contractor which is equal in all respects to the one specified.

14. Contract Security. Contractor shall furnish a surety bond in an amount at least equal to 100 percent of the contract price as security for the faithful performance of this Contract. Contractor shall also furnish a separate surety bond in an amount at least equal to 100 percent of the contract price as security for the payment of all persons for furnishing materials, provisions, provender, or other supplies, or teams, used in, upon, for or about the performance of the work contracted to be done, or for performing any work or labor thereon of any kind, and for the payment of amounts due under the Unemployment Insurance Code with respect to such work or labor in connection with this Contract, and for the payment of a reasonable attorney's fee to be fixed by the court in case suit is brought upon the bond. Bonds shall be issued by an admitted surety insurer authorized to operate in the state of California.

15. Insurance. Contractor shall not commence work under this Contract until all insurance required under this paragraph has been obtained and such insurance has been approved by the Owner, nor shall Contractor allow any subcontractor to commence work on a subcontract until all similar insurance required of the subcontractor has been so obtained and approved. Contractor shall furnish the Owner with satisfactory proof of the carriage of insurance required, and there shall be a specific contractual liability endorsement extending the Contractor's coverage to include the contractual liability assumed by the Contractor pursuant to this Contract and particularly Paragraph 16 hereof. Any policy of insurance required of the Contractor under this Contract shall also contain an endorsement providing that thirty (30) days' notice must be given in writing to the Owner of any pending change in the limits of liability or of any cancellation or modification of the policy. Insurance carrier shall be California-admitted.

(a) Compensation Insurance and Employer's Liability Insurance. Contractor shall take out and maintain during the life of this Contract Workers' Compensation Insurance and Employer's Liability Insurance for all of employees employed at the site of the project and, in case any work is sublet, Contractor shall require the subcontractor similarly to provide Workers' Compensation Insurance and Employer's Liability Insurance for all of the latter's employees unless such employees are covered by the protection afforded by Contractor.

In signing this Contract, Contractor makes the following certification, required by Section 1861 of the Labor Code:

"I am aware of the provision of Section 3700 of the Labor Code which requires every employer to be insured against liability for workers' compensation or to undertake self-insurance in accordance with the provisions of that code, and I will comply with such provisions before commencing the performance of the work of this contract."

(b) General and Automobile Liability Insurance. Contractor, at its own cost and expense, shall maintain personal injury liability and property damage insurance for the period covered by the Contract in the amount of Five Million Dollars (\$5,000,000.00) per occurrence and \$10,000,000 annual aggregate combined single limit coverage, Two Million Dollars (\$2,000,000) for Pollution Liability, and Five million (\$5,000,000) for Automobile Liability. Such coverage shall include, but shall not be limited to, protection against claims arising therefrom, and damage to property resulting from activities contemplated under this Contract, use of owned automobiles, products and completed operations, including U, C and X. Such insurance shall be with insurers and under forms of policies satisfactory in all respects to the Owner and shall provide that notice must be given to Owner at least thirty (30) days prior to cancellation or material change. The following endorsements shall be attached to the policy:

Policy shall cover on an "occurrence" basis. Policy must cover personal injuries as well as bodily injuries. Exclusion of contractual liability must be eliminated from personal injury endorsement. Broad form property damage endorsement must be attached. Owner is to be named as an additional insured on any contracts of insurance under this paragraph (b). Coverage shall not extend to any indemnity coverage for the active negligence of the additional insured in any case where an agreement to indemnify the additional insured would be invalid under Subdivision (b) of Section 2782 of the Civil Code. The policies of insurance shall be considered primary insurance before any policies of insurance maintained by Owner.

16. Indemnification and Hold Harmless. Contractor agrees to defend, save, indemnify and hold harmless Owner and all its officers, employees, and agents, against any and all liability, claims, judgments, or demands, including demands arising from injuries or death of persons (Contractor's employees included) and damage to property, arising directly or indirectly out of the obligations herein undertaken or out of the operations conducted by Contractor, save and except claims or litigation arising through the active negligence or willful misconduct of Owner, or of Owner's officials, agents, employees, servants, or independent contractors who are directly responsible to Owner. Contractor shall make good and reimburse Owner for any expenditures, including reasonable attorneys' fees, Owner may make by reason of such claim or litigation, and, if requested by Owner, Contractor shall defend any such suits at the sole cost and expense of Contractor.

17. Hours of Work. Eight hours of labor during any one calendar day and forty hours of labor during any one calendar week shall constitute the maximum hours of service upon all work done hereunder, and it is expressly stipulated that no laborer, worker, or mechanic employed at any time by the Contractor or by any subcontractor or subcontractors under this Contract, upon the work or upon any part of the work contemplated by this Contract, shall be required or permitted to work thereon more than eight hours during any one calendar day and forty hours during any one calendar week, except, as provided by Section 1815 of the Labor Code of the State of California, work performed by employees of contractors in excess of eight

hours per day and forty hours during any one week shall be permitted upon public work upon compensation for all hours worked in excess of eight hours per day at not less than one and one-half times the basic rate of pay. It is further expressly stipulated that for each and every violation of Sections 1811-1815, inclusive, of the Labor Code of the State of California, all the provisions whereof are deemed to be incorporated herein, Contractor shall forfeit, as a penalty to Owner, twenty-five dollars (\$25.00) for each laborer, worker, or mechanic employed in the execution of this Contract by Contractor, or by any subcontractor under this Contract, for each calendar day during which the laborer, worker, or mechanic is required or permitted to work more than eight hours in any one calendar day and forty hours in any one calendar week in violation of the provisions of the Sections of the Labor Code.

Contractor, and each subcontractor, shall, in accordance with California Labor Code Section 1776 or as the same may be later amended, keep accurate payroll records showing the name, address, social security number, work classification, straight time and overtime hours worked each day and week, and the actual per diem wages paid to each journeyman, apprentice, worker, or other employee employed by him or her in connection with work under this agreement. Each payroll record shall contain or be verified by a written declaration under penalty of perjury, in accordance with Labor Code Section 1776(a). Such payroll records shall be made available at all reasonable times at the Contractor's principal office to the persons authorized to inspect such records pursuant to Labor Code Section 1776. A certified copy of all payroll records shall be made available for inspection or furnished upon request to a representative of the Division of Labor Standards Enforcement, and the Division of Apprenticeship Standards of the Department of Industrial Relations, as well as to the Owner's representative. In the event the Contractor or a Subcontractor fails to comply in a timely manner within ten (10) days to a written notice requesting the records, such contractor or subcontractor shall forfeit one hundred dollars (\$100.00) for each calendar day, or portion thereof, for each worker, until strict compliance is effectuated, in accordance with Labor Code Section 1776(h).

18. Wage Rates. Pursuant to the Labor Code of the State of California, or any applicable local law, Owner has ascertained the general prevailing rate per diem wages and rates for holidays, and overtime work in the city, for each craft, classification or type of laborer, worker, or mechanic needed to execute this Contract. Owner has adopted, by reference, the general prevailing rate of wages applicable to the work to be done under the Contract, as adopted and published by the Division of Labor Standards Enforcement and Labor Statistics and Research of the State of California, Department of Industrial Relations, to which reference is hereby made for a full and detailed description. A copy of the prevailing wage rates may be reviewed in the office of the Director of Public Works, City of Sunnyvale, 456 West Olive Avenue, Sunnyvale, California. Wage rates can also be obtained through the California Department of Industrial Relations website at: <http://www.dir.ca.gov/OPRL/DPreWageDetermination.htm>

Neither the notice inviting bids, nor this Contract shall constitute a representation of fact as to the prevailing wage rates upon which the Contractor or any subcontractor may base any claim against Owner.

It shall be mandatory upon Contractor and upon any subcontractor to pay not less than the specified rates to all laborers, workers, and mechanics employed in the execution of the Contract. It is further expressly stipulated that Contractor shall, as a penalty to Owner, forfeit two hundred dollars (\$200.00) for each calendar day, or portion thereof, for each laborer, worker, or mechanic paid less than the stipulated prevailing rates for any work done under this Contract by Contractor or by any subcontractor; and Contractor agrees to comply with all provisions of Section 1775 of the Labor Code.

In case it becomes necessary for Contractor or any subcontractor to employ on the project under this Contract any person in a trade or occupation (except executives, supervisory, administrative, clerical, or other non-manual workers as such) for which no minimum wage rate is herein specified, Contractor shall immediately notify Owner who will promptly thereafter determine the prevailing rate for such additional trade or occupation and shall furnish Contractor with the minimum rate based thereon. The minimum rate thus furnished shall be applicable as a minimum for such trade or occupation from the time of the initial employment of the person affected and during the continuance of such employment.

19. Accident Prevention. Precaution shall be exercised at all times for the protection of persons (including employees) and property. The safety provisions of applicable laws, building and construction

codes shall be observed. Machinery, equipment, and other hazards shall be guarded or eliminated in accordance with the safety provisions of the Construction Safety Orders issued by the Industrial Accident Commission of the State of California.

20. Contractor's Guarantee. Owner shall not, in any way or manner, be answerable or suffer loss, damage, expense or liability for any loss or damage that may happen to the building, work, or equipment or any part thereof, or in, on, or about the same during its construction and before acceptance. Contractor unqualifiedly guarantees the first-class quality of all workmanship and of all materials, apparatus, and equipment used or installed by Contractor or by any subcontractor or supplier in the project which is the subject of this Contract, unless a lesser quality is expressly authorized in the Plans and Specifications, in which event Contractor unqualifiedly guarantees such lesser quality; and that the work as performed by Contractor will conform with the Plans and Specifications or any written authorized deviations therefrom. In case of any defect in work, materials, apparatus or equipment, whether latent or patent, revealed to Owner within one year of the date of acceptance of completion of this Contract by Owner, Contractor will forthwith remedy such defect or defects without cost to Owner.

21. Liquidated Damages. Time shall be the essence of this Contract. If Contractor fails to complete, within the time fixed for such completion, the entire work mentioned and described and contracted to be done and performed, Contractor shall become liable to Owner for liquidated damages in the sum of Seven Thousand Five Hundred (\$7,500) for each and every calendar day during which work on the Emergency Operation Center (EOC) shall remain uncompleted beyond such time fixed for completion or any lawful extension thereof for the, the sum of Ten Thousand (\$12,500) for each and every calendar day during which work on the City Hall building shall remain uncompleted beyond such time fixed for completion or any lawful extension thereof and the sum of Fifteen Thousand (\$15,000) for each and every calendar day during which work on the Department of Public Safety (DPS) shall remain uncompleted beyond such time fixed for completion or any lawful extension thereof. The amount specified as liquidated damages is presumed to be the amount of damage sustained by Owner since it would be impracticable or extremely difficult to fix the actual damage; and the amount of liquidated damages may be deducted by Owner from moneys due Contractor hereunder, or its assigns and successors at the time of completion, and Contractor, or its assigns and successors at the time of completion, and its sureties shall be liable to Owner for any excess.

22. Governing Law, Jurisdiction and Venue. This Agreement shall be governed by and construed in accordance with the laws of the State of California, without regard to conflict of law or choice of law principles. Proper venue for legal actions will be exclusively vested in a state court in the County of Santa Clara. The parties agree that subject matter and personal jurisdiction are proper in state court in the County of Santa Clara, and waive all venue objections.

23. Severability Clause. In case any one or more of the provisions contained herein shall, for any reason, be held invalid, illegal or unenforceable in any respect, it shall not affect the validity of the other provisions which shall remain in full force and effect.

24. Entire Agreement; Amendment. This writing constitutes the entire agreement between the parties relating to the services to be performed or materials to be furnished hereunder. No modification of this Agreement shall be effective unless and until such modification is evidenced by writing signed by all parties.

25. Execution and Counterparts. This Agreement may be executed in multiple counterparts and/or with the signatures of the Parties set forth on different signature sheets and all such counterparts, when taken together, shall be deemed one original.

CITY OF SUNNYVALE
a Municipal Corporation, Owner

Title _____ / _____ / _____
Date _____

EXHIBIT A

BID SCHEDULE

No.	Description	QTY	Unit	Unit Cost	Total Cost
1	Mobilization & Demobilization (Shall Not Exceed 5% of Total Base Bid)	1	LS*		\$
2	New City Hall	1	LS*		\$
3	EOC Addition	1	LS*		\$
4	DPS Tenant Improvements	1	LS*		\$
5	DPS Temporary Facilities	1	LS*		\$
6	Site Improvements	1	LS*		\$
7	COVID 19 Requirements	28	Month	\$	\$
8	Unforeseen Conditions	Allowance			\$ 140,000.00
9	Off Haul of Hazardous Soils	Allowance			\$ 250,000.00
TOTAL BASE BID AMOUNT				\$ _____	
1) Total Base Bid Amount shall be written in numbers. 2) *For Lump Sum Bid Items (LS), only an amount in the "Total" column is required and only the amount in the "Total" column will be considered.					
Name of Bidder: _____					
By: (signature): _____					

EXHIBIT B

Utilization of Local Workforce in Construction Projects – The Sunnyvale City Council has adopted a policy which encourages utilization of local workforces, including State-certified apprentices, as a means of supporting economic opportunities for all members of the community. Local workforce is defined as workers residing in Santa Clara County. The lowest responsive and responsible bidder must provide a projection of locally-hired workers utilized for this contract.

Contractor	Projected Number of Locally Hired Workers _____ Projected Percent of Locally Hired Workers _____%
Subcontractor(s)	Projected Number of Locally Hired Workers _____ Projected Percent of Locally Hired Workers _____%

SECTION 006113 – PERFORMANCE BOND

**PERFORMANCE BOND TO ACCOMPANY
CONSTRUCTION CONTRACT**

KNOWN BY ALL PRESENT:

THAT WHEREAS, the City of Sunnyvale ("City") has awarded to {Contractor's Name} as principal ("Contractor"), a contract for the public work described as follows:

The project entitled Sunnyvale Civic Center Modernization Phase 1, Project No. PR-19-06 pursuant to the award made to said Principal by the Council of the City of Sunnyvale to do and perform the following work, to wit: furnish all tools, equipment, apparatus, facilities, labor, transportation, and material necessary to perform and complete in a good and workmanlike manner, the Construction and Completion of a new City Hall, the Modernization and Expansion of the existing Department of Public Safety Headquarters (DPS), and Site Improvements, as called for, and in the manner designated in, and in strict conformity with, the Plans and Specifications (the "work").

It is acknowledged that the contract provides for a one-year warranty period during which time this Bond remains in full force and effect. The contract and all its terms and conditions are incorporated into this Bond by reference.

AND WHEREAS, the Contractor is required to furnish a bond in connection with the contract guaranteeing its faithful performance.

AND THEREFORE, we the undersigned Contractor as principal and _____ a _____, admitted and duly authorized to transact business under the laws of the State of California as surety, are held and firmly bound unto the City as obligee in the sum of {Amount in Words} {\$Amount in Numbers} (which amount is not less than 100% of the contract price) to be paid to the City or its successors and assigns; and for which payment, well and truly to be made, we bind ourselves, our heirs, executors and administrators, successors or assigns, jointly and severally, firmly by these presents.

THE CONDITION of the obligation is such:

That if the Contractor, (or the Contractor's heirs, executors, administrators, successors or assigns) shall in all respects abide by, and well and truly keep and perform all of the covenants, conditions and

agreements in the contract (and any alteration made as provided in the contract) at the time and in the manner specified and in all respects according to their true intent and meaning; and if the contractor shall indemnify and save harmless the City, its officers, employees and agents, as stipulated in the contract, then this obligation shall become and be null and void; otherwise this obligation shall be and remain in full force and effect.

As a condition precedent to the satisfactory completion of the contract, the obligation of the Contractor and surety under this Bond shall remain in effect for a period of one (1) year after the completion and acceptance of the work. During that time, if the Contractor (or the Contractor's heirs, executors, administrators, successors or assigns) fails to make full, complete and satisfactory repair and replacement or totally protect the City from any loss or damage made evident during that year which results from or is caused by either defective materials or faulty workmanship in the prosecution of the work, then the obligation shall remain in full force and effect. However, anything in this paragraph to the contrary notwithstanding, the obligation of the Surety shall continue so long as any obligation of the Contractor remains.

No prepayment or delay in payments, and no change, extension, addition or alteration of any provision of the contract or in the specifications agreed to between the Contractor and the City, or any forbearance on the part of the City shall operate to relieve the surety. The surety hereby waives the provisions of Section 2819 of the California Civil Code. The surety waives all rights of subrogation against the City or any person employed by the City. If the contract price increases by the issuance of change orders, the amount specified in this bond shall increase by the same amount.

IN WITNESS WHEREOF, we have hereunto set our hands and seals on this

_____ day of _____, 20__.

SURETY {Name}:

CONTRACTOR {Name}:

{Address of Principal Place of Business}

{Address}

Telephone No.: _____

By: _____

Facsimile No.: _____

(Name: print or type)

Title: _____

By: _____

Attorney in Fact

By: _____

(Name: print or type)

Title: _____

(Notice: The signatures of the Surety
and Contractor on this bond must be
acknowledged before a notary.)

END OF SECTION

SECTION 006114 – PAYMENT BOND

**PAYMENT BOND
SUNNYVALE CIVIC CENTER MODERNIZATION PHASE 1
PROJECT NUMBER PR-19-06**

KNOW ALL MEN BY THESE PRESENTS:

THAT WHEREAS, the City of Sunnyvale ("City") has awarded to {Contractor's Name} as principal ("Contractor"), a contract for the public work described as follows:

The project entitled Sunnyvale Civic Center Modernization Phase 1, Project No. PR-19-06 pursuant to the award made to said Principal by the Council of the City of Sunnyvale to do and perform the following work, to wit: furnish all tools, equipment, apparatus, facilities, labor, transportation, and material necessary to perform and complete in a good and workmanlike manner, the Construction and Completion of a new City Hall, the Modernization and Expansion of the existing Department of Public Safety Headquarters (DPS), and Site Improvements, as called for, and in the manner designated in, and in strict conformity with, the Plans and Specifications (the "work").

It is acknowledged that the contract provides for a one (1) year warranty period during which time this Bond remains in full force and effect. The contract and all of its terms and conditions are incorporated into this Bond by reference.

AND WHEREAS, the Contractor is required to furnish a bond in connection with the contract guaranteeing its faithful performance.

AND THEREFORE, we the undersigned Contractor as principal and _____ a _____, admitted and duly authorized to transact business under the laws of the State of California as surety, are held and firmly bound unto the City or its successors and assigns as obligee in the sum of _____; (which amount is not less than 100% of the contract price) and for which payment, well and truly to be made, we bind ourselves, our heirs, executors and administrators, successors or assigns, jointly and severally, firmly by these presents.

THE CONDITION of the obligation is such:

That if the Contractor, (or the Contractor's subcontractors, heirs, executors, administrators, successors or assigns) fails to pay any of the persons named in Section 3181 of the Civil Code of the State of California, or the amounts due under the Unemployment Insurance Code of the State of California with respect to work or labor performed under the Contract, or for any amounts required to be deducted, withheld, and paid over

to the Employment Development Department from the wages of employees of the contractor and subcontractors pursuant to Section 13020 of the Unemployment Insurance Code of the State of California, with respect to such work and labor, that the surety will pay for the same, in an amount not exceeding the sum specified in this bond, and also, in case suit is brought upon the bond, shall pay reasonable attorney's fees, to be fixed by the Court.

This bond shall insure to the benefit of any and all persons, companies, and corporations named in Section 3181 of the Civil Code of the State of California, to give a right of action to them or their assigns in any suit brought upon this bond.

No prepayment or delay in payments, and no change, extension, addition or alteration of any provision of the contract or in the specifications agreed to between the Contractor and the City, or any forbearance on the part of the City shall operate to relieve the surety. The surety hereby waives the provisions of Section 2819 of the California Civil Code. The surety waives all rights of subrogation against the City or any person employed by the City. If the contract price increases by the issuance of change orders, the amount specified in this bond shall increase by the same amount.

IN WITNESS WHEREOF, we have hereunto set our hands and seals on this

_____ day of _____, 20__.

SURETY {Name}:

CONTRACTOR {Name}:

{Address of Principal Place of Business}

{Address}

Telephone No.: _____

By: _____

Facsimile No.: _____

(Name: print or type)

Title: _____

By: _____

Attorney in Fact

By: _____

(Name: print or type)

Title: _____

(Notice: The signatures of the Surety
and Contractor on this bond must be

SmithGroup – 11244.00

Sunnyvale Civic Center – Phase 1
Issued for Construction – October 27, 2020

acknowledged before a notary.)

END OF SECTION

SECTION 006536 – GUARANTEE FORM

GUARANTEE FORM

TO THE CITY OF SUNNYVALE, for construction of

Sunnyvale Civic Center Modernization Phase 1

Project Number: PR-19-06

The undersigned guarantees all construction performed on this project and also guarantees all material and equipment incorporated therein.

Contractor hereby grants to City for a period of one (1) year following the date of Final Acceptance of the Work, or such longer period specified in the Contract Documents, its unconditional warranty of the quality and adequacy of all of the Work and its compliance with the Contract Documents including, without limitation, all labor, materials and equipment provided by Contractor and its Subcontractors of all tiers in connection with the Work.

Neither final payment nor use or occupancy of the Work performed by the Contractor shall constitute an acceptance of work not done in accordance with this Guaranty or relieve Contractor of liability in respect to any express warranties or responsibilities for faulty materials or workmanship. Contractor shall remedy any defects in the Work and pay for any damage resulting therefrom which shall appear within one (1) year, or longer if specified, from the date of Final Acceptance.

If within one (1) year after the date of Final Acceptance, or such longer period of time as noted in Specification Section 007300-11.1 and as may be prescribed by laws or regulations, or by the terms of Contract Documents, any Work is found to be defective, Contractor shall promptly, without cost to City and in accordance with City's written instructions, correct such defective Work. Contractor shall remove any defective Work rejected by City and replace it with Work that is not defective, and satisfactorily correct or remove and replace any damage to other Work or the work of others resulting therefrom. If Contractor fails to promptly comply with the terms of such instructions, or in an emergency where delay would cause serious risk of loss or damage, City may have the defective Work corrected or the rejected Work removed and replaced. Contractor shall pay for all claims, costs, losses and damages caused by or resulting from such removal and replacement. Where Contractor fails to correct defective work, or defects are discovered outside the correction period, City shall have all rights and remedies granted by law.

Inspection of the work shall not relieve Contractor of any of its obligations under the Contract Documents. Even though equipment, materials, or work required to be provided under the Contract Documents have been inspected, accepted, and estimated for payment, Contractor shall, at its own expense, replace or repair any such equipment, material, or work found to be defective or otherwise not to comply with the requirements of the Contract Documents up to the end of the guaranty period.

All abbreviations and definitions of terms used in this Agreement shall have the meanings set forth in the Contract Documents, including, without means of limitation, Supplemental General Provisions, Definition of Works and Terms.

The foregoing Guaranty is in addition to any other warranties of Contractor contained in the Contract Documents, and not in lieu of, any and all other liability imposed on Contractor under the Contract Documents and at law with respect to Contractor's duties, obligations, and performance under the Contract Documents. In the event of any conflict or inconsistency between the terms of this Guaranty and any warranty or obligation of the Contractor under the Contract Documents or at law, such inconsistency or

conflict shall be resolved in favor of the higher level of obligation of the Contractor.

_____ (Contractor Name)

_____ (Contractor Address)

Contractor Signature

Date

END OF SECTION

SECTION 007213 – GENERAL PROVISIONS

**GENERAL PROVISIONS
TABLE OF CONTENTS**

SECTION 1 – TERMS AND DEFINITIONS

SECTION 1 – TERMS AND DEFINITIONS	6
1.01 Terms	6
1.02 Definitions	6

SECTION 2 – Bid REQUIREMENTS AND CONDITIONS	10
2.01 General	10
2.02 Bid Prices to Cover Entire Work	10
2.03 Listing of Proposed Subcontractors	10
2.04 Proposal Guarantee	10
2.05 Withdrawal of Bids	10
2.06 Rejection of Bids	10
2.07 Contract Agreement	11

SECTION 3 – SCOPE AND CONTROL OF WORK	11
3.01 Work to be Done	11
3.02 Plans and Specifications	12
3.03 References to Standards and Codes	12
3.04 Authority of the Construction Manager	12
3.05 Contract Documents and Precedence	12
3.06 Record Documents	13
3.07 Record Drawings	13
3.08 Reuse of Documents	14
3.09 Subsurface Data	14
3.10 Right-of-Way	14
3.11 Removal of Defective Work	14
3.12 Acceptance of Defective Work	14
3.13 Submittals	14
3.14 Substitutions	16
3.15 Survey	18
3.16 Construction Staking Lines and Grades	18
3.17 City's Construction Inspector's Work Hours	19
3.18 Inspection of the Work	19
3.19 Special Inspections	19
3.20 Sampling and Testing	19

SECTION 4 – CHANGES IN WORK	19
4.01 Limited City Authority to Approve Change Orders	20
4.02 Contractor Liability for Unapproved Change Orders	20
4.03 Non-Material Change Requests by the Contractor	20
4.04 Directives	20
4.05 Requests for Information, Inconsistencies and Changed Conditions	20

4.06 Extra Work	21
4.07 Change Orders	21
4.08 Resolution of Disputes	24
4.08.1 Notice	24
4.08.2 Response by Engineer	25
4.08.3 Appeals to the Assistant Director of Public Works/City Engineer	25
4.08.4 Dispute Meetings	25
4.08.5 Submission of Potential Claim Costs	25
4.09 Resolution of Claims Under Public Contract Code Section 20104	26
4.09.1 Disputes for \$375,000 or Less	26
4.09.2 Disputes Exceeding \$375,000	26
4.09.3 Civil Action Proceedings	27
4.10 Resolution of Claims under Public Contract Code Section 9204	27
4.10.1 Claim Definition	27
4.10.2 Claim Process	27
4.10.3 Disputed Claims	28
 SECTION 5 – CONTROL OF MATERIALS	 30
5.01 Materials and Workmanship	30
5.02 Protection of Work and Materials	30
5.03 Trade Names or Approved Equals	30
5.04 Inspection of Materials by City	31
5.05 Inspection of Materials by Others	31
5.06 Certification	31
5.07 Weighing and Metering Equipment	32
5.08 Calibration of Testing Equipment	32
 SECTION 6 – UTILITIES	 33
6.01 Contractor's Obligation to Identify and Protect Subsurface Infrastructure	33
6.02 Location	33
6.03 Protection	33
6.04 Shut Down Notification	34
6.05 Removal	34
6.06 Relocation	34
6.07 Delays	35
6.08 Cooperation	35
 SECTION 7 – PROSECUTION AND PROGRESS	 36
7.01 Notice to Proceed	36
7.02 Commencement of Work	36
7.03 Administrative Duties	36
7.04 Construction Schedule	36
7.05 Three Week Look Ahead Schedule	37
7.06 Construction Sequence	37
7.07 Recording Existing Conditions	37
7.08 Preconstruction Conference	38
7.09 Progress Meeting	38
7.10 Hours of Construction	38
7.11 Prosecution of Work	39
7.12 Suspension of Work	39
7.13 Default by the Contractor and Termination of Control	39

7.14 City's Right to Terminate Contract	40
7.15 Time of Completion and Days Charged	41
7.16 Liquidated Damages	42
7.17 Delays and Extensions of Time	42
7.18 Substantial Completion	44
7.19 Project Completion and Closeout	44
7.20 Acceptance	45
7.21 Protection and Cleanup	45
7.22 Risk of Loss	45
7.23 Use of Improvements During Construction	45
SECTION 8 – RESPONSIBILITIES OF THE CONTRACTOR	46
8.01 Contractor's Responsibility for the Work	46
8.02 Contractor's Responsibility for Subcontracted Work	46
8.03 Project Staff	46
8.04 Character of Employees	47
8.05 Laws to be Observed	47
8.06 Special Permits, Licenses and Fees	49
8.07 Coordination and Cooperation	49
8.08 Use of Premises	50
8.09 Construction Staging and Field Office	50
8.10 Site Security	51
8.11 Construction Water	51
8.12 Project Site Maintenance	51
8.13 Climate Preservation	54
8.14 Preservation of Property	54
8.15 Protection of Traffic Signal Facilities	55
8.16 Restoration of Adjacent and Existing Improvements	55
8.17 Archeological Remains	56
8.18 Access to Private Property	56
8.19 Notification and Relations with Property Owners	56
8.20 Traffic Control and Public Convenience	56
8.21 Safety	59
8.22 Patent Fees or Royalties	60
8.23 Advertising	60
8.24 Antitrust Claims	60
8.25 Audit and Examination of Records	60
8.26 Web-Based Construction Document Management	60
SECTION 9 – MEASUREMENT AND PAYMENT	62
9.01 Measurement of Quantities for Unit Price Work	62
9.02 Bid Items	62
9.03 Bid Quantities	63
9.04 Progress Payments	63
9.05 Final Payment	65
SECTION 10 – GUARANTEE	67
10.01 Warranties	67
10.02 Contractor's Guarantee	68
10.03 Correction of Defective Work During the Guarantee Period	68
APPENDIX A – CONTENTS	69

Three Week Look Ahead Schedule69
Daily Extra Work Report (SAMPLE)69

SECTION 1 – TERMS AND DEFINITIONS

1.01 Terms

Unless otherwise stated, the words directed, required, permitted, ordered, instructed, designated, considered necessary, prescribed, approved, acceptable, satisfactory, or words of like meaning, refer to actions, expressions, and prerogatives of the City, Construction Manager and Architect of Record.

1.02 Definitions

Except as amended or supplemented, whenever in the Contract Documents the following terms are used, the intent and meaning shall be interpreted as follows:

ASTM – American Society for Testing and Materials specifications.

AWWA – American Water Works Association and its Standard Specifications.

Addenda – Written or graphic instruments issued prior to the opening of bids which clarify, correct or change the bidding documents or the Contract Documents.

Bid – The offer or proposal of the bidder submitted on the prescribed forms setting forth the prices for the work to be performed.

Bid Forms – Includes the Bid Schedule, Designation of Subcontractors, Bidders Statement of Responsibility, Bidder's Non-Collusion Affidavit, Bid Security, and all other information requested by the Bid Proposal Documents.

Bidder – Any individual, firm, partnership, corporation, or other legal entity submitting a bid for the work, acting directly or through a duly authorized representative. After the City awards the Contract, the term "Bidder" shall be equivalent to the term "Contractor" for the purpose of identifying the Contractor's rights and obligations under the Contract Documents.

Bidding Documents – The Notice Inviting Bids, Instruction to Bidders, Bid Proposal forms and Bidders Bond.

Bonds – Bid, performance, labor and material, and warrantee bonds and other instruments of security.

Calendar Day – A 24-hour period beginning at 12:00 AM and ending at 11:59 PM.

Change Order – A document recommended by the Construction Manager which is signed by the Contractor and City authorizing an addition, deletion or revision in the work, with possible adjustment in the contract price or the contract time, issued on or after the effective date of the Agreement.

City – City of Sunnyvale, California, as City, a political subdivision of the State of California, acting through the City Council as the Governing Body or duly authorized agents.

City's Representative – The Director of Public Works or the Director's authorized representative, acting on behalf of the City, designated by the City to act as its agent on specified matters relating to this contract.

City Regulations – All written laws, rules, and policies established by the City, including those set forth in the General Plan, Sunnyvale Municipal Code, ordinances, resolutions, policies, procedures, and City Design Documents (including the Standard Plan, Standard Specifications, Design Standards, and relevant Public Facility Master Plans).

Code – The terms Government Code, Labor Code, etc., refer to codes of the State of California.

Completion – The point at which work has been completed in accordance with the contract plans and specifications to the satisfaction of the Engineer and there are no items of work remaining to be completed. See General Provisions, Section 7.19, “Project Completion and Closeout”.

Consulting Engineer/Architect – One of several consulting firms or their designated representatives having a contractual relationship with the City to perform certain duties.

Contract – The entire written agreement covering the performance of the work as more fully described in Section 3.05: “Contract Documents and Precedence”.

Contract Time – Number of days, calendar or working, stated in the contract as the duration for the completion of the various parts of the Work (defined as Milestones) and the whole of the Work.

Contract Unit Price – The Contractor's original bid for a single unit of an item of work in the bid.

Contractor – An individual, partnership, corporation or other legal entity entering into a contract with the City to perform the work. After the City awards the Contract, the term “Contractor” shall be equivalent to the term “Bidder” for the purpose of identifying the Contractor's rights and obligations under the Contract Documents.

Construction Manager – Professional consulting firm that serves as the City's onsite representative and provides management and oversight of Contractor day to day activities including project's schedule, cost, quality, safety, scope and function.

Council – The City Council of the City of Sunnyvale.

Days – Days shall mean calendar days unless otherwise specified.

Defective Work – Work that is unsatisfactory, faulty, omitted, incomplete, deficient, or does not conform to the requirements of the Contract Documents, directives of the Engineer, or requirements of any inspection, reference standard, test, or approval specified in the Contract Documents, or has been damaged prior to the Engineer's recommendation of final acceptance.

Directive – Any written instruction to the Contractor pertaining to the completion of a project objective including, but not limited to Field Orders, responses to Requests for Information, Clarifications and the Notice to Proceed.

Engineer – The City and/or his/her designee.

Final Acceptance – Determination by the Director of Public Works that the entire contract has been completed in all respects in accordance with the Contract Documents and any modifications previously approved, evidenced by a Certificate of Final Acceptance signed by the Director of Public Works.

Float – The number of days between early and late completion. The float will be assigned to the project and will be available to both the City and the Contractor as needed to complete the work in accordance with the agreement.

Force Majeure Event – Refers to any event that is beyond the reasonable control of the City and Contractor and cannot be prevented with reasonable care, including but not limited to natural disasters, infectious disease pandemics, and war, provided that, any shortage of credit, capital or finance shall not be regarded as an event beyond the reasonable control.

Greenbook – The Standard Specifications promulgated by Public Works Standards, Inc., entitled “Standard Specifications for Public Works Construction” (SSPWC), and current editions.

Laboratory – The laboratory approved by the Engineer to test materials and work involved in the contract.

Liquidated Damages – The amount prescribed in the contract documents to be paid to the City or to be deducted from any payments due or to become due to the Contractor for each contract day's delay in completing the whole of the Work and/or any of the Milestones.

Losses – Any and all losses, costs, liabilities, claims, damages, and expenses, including reasonable attorneys' fees and expenses.

Milestone – An event specified in the Contract Documents relating to an intermediate completion date or time prior to completion of all the work.

Notice of Intent to Award – Indicates the intent of the City to present a contract to Council for award at the council meeting indicated.

Notice to Proceed – A written notice by the City to the Contractor authorizing the start of work and fixing the date on which the contract time will start.

Owner – The City of Sunnyvale.

Plans – The contract drawings approved by the Engineer which show the location, character, dimensions and details of the work.

Project – The work performed under the Contract Documents.

Punchlist – A list generated by the City or the City's Representative of any work to be completed or corrected by the Contractor before the contract work will be recommended for acceptance by the Director of Public Works.

Record Documents - Contract drawings, Contractor shop drawings, and equipment manuals revised by the Contractor to reflect actual installation where it deviates from the original document, or to show features constructed or found that do not show on the original document.

Reference Specifications – Those standards, rules, method of tests or analysis, codes, and specifications of other agencies, engineering societies, or industrial associations referred to in the Contract Documents. These refer to the current edition or amendments in effect at the time of advertising the project unless specifically referred to by edition, volume or date.

Revocable Bid Items – Bid items noted as "revocable items" may be deleted entirely or in part from the Work at the option of the City. The provisions in Section 4.07(b) and 4.07(c), "Unit Price Adjustments", shall not apply to such deletion, and no compensation will be allowed the Contractor by reason of such deletion.

Shop Drawings – All drawings, diagrams, illustrations, schedules and other data which are specifically prepared by or for the Contractor to illustrate some portion of the work and all illustrations, brochures, standard schedules, performance charts, instructions, diagrams and other information prepared by a supplier and submitted by the Contractor to illustrate material or equipment for some portion of the work.

Supplementary Provisions – Any provisions which supplement or modify these General Provisions.

Specifications – General Provisions, Special Provisions, Technical Specifications and Standard Specifications incorporated by reference.

Standard Details – The City of Sunnyvale Standard Details for Public Works Construction, 2006 Edition and subsequent updates.

Standard Specifications – The City of Sunnyvale Standard Specifications for Public Works Construction, current edition.

State – State of California.

State Standard Plans – The Standard Plans of the Department of Transportation of the State of California (Caltrans), entitled “Standard Plans”, current edition.

State Standard Specifications – The Standard Specifications of the Department of Transportation of the State of California (Caltrans), entitled “Standard Specifications”, current edition.

Subcontractor – Any individual, firm or corporation having a direct contract with the Contractor or with any other Subcontractor for the performance of a part of the work at the site.

Submittal – Any document or material required to be submitted to the City for the City's review or information.

Substantial Completion – When the work (or a specified part thereof) has progressed to the point where it is sufficiently complete and in accordance with the Contract Documents.

Surety – Any individual, firm or corporation, bound with and for the Contractor for the acceptable performance and completion of the work, and the satisfaction of all obligations incurred.

Surveyor – A land surveyor licensed in the State of California.

Work – The construction services required by the Contract Documents.

Working Day – Any day except Saturday, Sunday or Holidays observed by the City.

SECTION 2 – Bid REQUIREMENTS AND CONDITIONS

2.01 General

Bidders may obtain complete sets of the Contract Documents, including the bid forms to be used for bidding, at the location designated in the Notice to Bidders. Bidders shall use complete sets of Contract Documents in the preparation of bids. The City makes copies of the Contract Documents available, on the above terms, for the sole purpose of obtaining Bids for the work and does not confer a license or grant permission for any other use of the Contract Documents.

2.02 Bid Prices to Cover Entire Work

The quantities listed in the Bid Schedule do not govern final payment, as payments to the Contractor will only be made for the actual quantities constructed in accordance with the plans and specifications as measured by the appropriate unit of measurement indicated in the Bid Schedule, complete in place to the satisfaction of the Engineer. Such payment shall constitute the full compensation for furnishing all materials, labor, tools and equipment for performing the work, and for all other incidentals necessary to complete the work as shown on the plans and described in these specifications.

No separate payment will be made for incidentals or any items delineated on the plans or called for in the specifications to be supplied or installed which are not specifically listed as bid items but are required to complete the project. Full compensation for such items shall be considered as included in the prices paid for the various contract items of work involved and no additional compensation will be allowed.

2.03 Listing of Proposed Subcontractors

The Bidder shall not list any Subcontractor who is ineligible pursuant to Labor Code, Sections 1777.1 and 1777.7, and Public Contract Code, Section 6109.

If, after the execution of the Agreement, the successful Bidder subcontracts except as provided for in the Subcontracting Act, or if the Bidder lists in his bid another Contractor who will in turn sublet portions constituting the majority of work covered by the prime contract, the Contractor shall be subject to the penalties set forth in the Subcontracting Act. If the Contractor violates any provisions of the Subcontracting Act, the Contractor violates the Agreement and the City may either terminate the Agreement or assess a penalty to the Contractor in accordance with the terms of the Subcontracting Act.

2.04 Proposal Guarantee

In accordance with the Public Contract Code, Section 20170, each Bid shall be accompanied by a Bid Security, in the amount of ten percent (10%) of the Bid Amount.

2.05 Withdrawal of Bids

After the time fixed in the Notice to Bidders for the opening of bids, no bid may be withdrawn for a period of at least one hundred and twenty (120) calendar days without consent of the awarding authority that the Bidder has established all of the following occurrences identified in California Public Contract Code, Section 5103.

2.06 Rejection of Bids

More than one proposal from an individual, firm, partnership, corporation, or combination thereof under the same or different names will not be considered. Reasonable grounds for believing that any individual, firm, partnership, corporation or combination thereof is interested in more than one proposal for the work contemplated may cause the rejection of all proposals in which that individual, firm, partnership, corporation or combination thereof is interested. If there is reason for believing that collusion exists among the bidders, any or all proposals may be rejected.

2.07 Contract Agreement

A bidder to whom award is made shall execute a written Contract Agreement and required supplementary documents and submit them to the Owner within the time frame specified in Section 001116 INVITATION FOR BIDS after the Notice of Award has been mailed to the bidder at the address given in Section 004100, BID FORMS. The Agreement shall be made in the form adopted by the Owner and incorporated in the Section 005213, GENERAL CONSTRUCTION CONTRACT.

If the lowest responsive, responsible bidder to whom award is made fails to enter into the Agreement, as herein provided, the Bidder's Bond will become the property of the Owner, and an award may be made to the next lowest responsive, responsible bidder, and such bidder shall fulfill every stipulation embraced herein as if it were the party to whom the first award was made. A corporation, partnership, or joint venture to which an award is made will be required, before the Agreement is finally executed, to furnish evidence of its corporate existence and evidence that the officer signing the Agreement and bonds for the corporation is duly authorized to do so in the form of a Bid Certificate as included in Section 004100, BID FORMS.

In the event the Contractor is a joint venture of two or more contractors, the grants, covenants, provisos and claims, rights, power, privileges and liabilities of the Contract shall be construed and held to be several as well as joint. Any notice, order, direct request, or any communication required to be or that may be given by the Owner or the Construction Manager to the Contractor under this Contract, shall be well and sufficiently given to all persons being the Contractor if given to any one or more of such persons. Any notice, request, or other communication given by any one of such persons to the Owner or the Construction Manager under this Contract shall be deemed to have been given by and shall bind all persons being the Contractor.

If any part of the work to be done under this Contract is subcontracted, the subcontract shall be in writing and shall provide that all work to be performed thereunder shall be performed in accordance with the terms of the Contract Documents. The subcontracting of any or all of the work to be done will in no way relieve the Contractor of any part of its responsibility under the Contract. Certified copies of subcontract agreements will be provided by the Contractor to the Owner upon request.

The Contractor shall not assign, transfer, convey, or otherwise dispose of the Contract in whole or in part, or its right, title, or interest therein, or its power to execute such Contract, to any other person, firm, or corporation without previous consent in writing of the Owner. Any proposed assignment, transfer, conveys and or other disposition without such written consent of this owner will be void.

Equipment and materials supplied under this Contract shall be furnished in accordance with a written agreement, and such agreement shall provide that any equipment and materials supplied shall be performed in accordance with the terms of the Contract Documents. Copies of executed

SECTION 3 – SCOPE AND CONTROL OF WORK**3.01 Work to be Done**

It is the intent of this contract to obtain a finished, workmanlike job, complete and in place, with all equipment properly installed and operating. The work to be done consists of furnishing all labor, materials, tools, equipment and services necessary to complete the project, as further described in these Specifications, and as necessary to leave the site in a neat and finished condition with all equipment properly installed and working.

While the City has endeavored to accurately represent in the plans and specifications the physical conditions which may affect the cost of the proposed work, the City does not warrant the completeness or accuracy of such information. It is the Contractor's responsibility to ascertain the existence of any such

conditions affecting the cost of the work, which would have been disclosed by reasonable examination of the site.

Conclusions pertaining to any test, investigation, statement or estimate of fact incorporated in the plans and specifications shall be considered by the Contractor to be a recommendation only. The Contractor may request equal access to the underlying or background information to arrive at his own opinion thereon, including his determination of how reliable might be any conclusion appearing in (or inferred from) the information. The Contractor may not rely upon “record drawings” or similar final or accepted drawings or maps constructed on public or private property. Such information may be used for reference only. Actual locations and depths shall be determined by field investigations by the Contractor.

No oral or telephonic agreement or conversation with any officer, agent, or employee of the City or the Engineer, either before or after execution of the contract, shall affect or modify any of the terms or obligations contained in any of the contract documents.

3.02 Plans and Specifications

It is the intent of the Plans and Specifications to describe a functionally complete project (or part thereof) to be constructed in accordance with the Contract Documents. For convenience, the Specifications are arranged in several sections, but such separation shall not be considered as the limits of the work required by any separate trade. The terms and conditions of such limitations are wholly between the Contractor and his subcontractors. In general, the Special Provisions, General Provisions, and other sections of the specifications indicate the responsibilities of the Contractor and the quality of material and methods of workmanship. The plans indicate dimensions, quantities, positions, and various other details of construction.

Any work, materials or equipment that may be reasonably inferred from the Contract Documents as being required to produce the intended result shall be supplied whether or not specifically called for. When words, which have a well-known technical or trade meaning, are used to describe the work, materials or equipment, such words shall be interpreted in accordance with that meaning.

3.03 References to Standards and Codes

Reference to standard specifications, manuals or codes of any technical society, organization or association, or to the laws or regulations of any governmental authority, whether such reference be specific or by implication, shall mean the latest standard specification, manual, code or laws or regulations in effect at the time of the opening of bids except as may be otherwise specifically stated.

3.04 Authority of the Construction Manager

The City has the final authority in all matters affecting the work. Within the scope of the Agreement, the Construction Manager has the authority to enforce compliance with the Plans and Specifications and the Contractor shall promptly comply with instructions from the Construction Manager. The decision of the Construction Manager is final and binding on all questions relating to: quantities; acceptability of materials furnished, and work performed; equipment; work execution, rate of progress or sequence of work; and interpretation of the Plans, Specifications, or other drawings. This shall be precedent to any payment under the Agreement, unless otherwise ordered by the City.

3.05 Contract Documents and Precedence

The Contract Documents consist of the documents listed below, in order of precedence. If there is a conflict between component parts of the Contract Documents, the document highest in precedence controls.

- a. Change Orders.
- b. Directives.
- c. Permits in the following order: those issued by other agencies, those issued by the City.

- d. Project Specifications, in the following order – Supplemental Provisions, Addenda, General Construction Contract, Instructions to Bidders, Notice Inviting Bids, Special Provisions, General Provisions and Technical Specifications.
- e. Project Plans and Drawings. Figure dimensions on drawings shall govern over scale dimensions. Details shall govern over general arrangements.
- f. City Standard Specifications.
- g. City Standard Plans and Details.

All of the individual components of the Contract Documents are intended to be complementary and what is required by one shall be binding as if required by all. Interpretation of a disputed meaning or intent of the plans and specifications shall be made initially by the Engineer in accordance with the application of the order of precedence. Any final decision required regarding precedence and the clarification of discrepancies in the Contract Documents shall be made by the Architect of Record.

Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the contractor in dividing the work among subcontractors or establishing the extent of Work to be performed by any trade.

Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meaning are used in the Contract Documents in accordance with such recognized meanings.

3.06 Record Documents

The Contractor shall keep at the worksite a record copy of all Drawings, Specifications, Addenda, Change Orders, Work Directives, Field Orders and written interpretations and clarifications. These record documents together with all approved submittals, samples and shop drawings will be available to the Engineer as a reference at all times.

3.07 Record Drawings

- a. The Contractor shall maintain a "job site" print of contract drawings and favorably reviewed shop drawings and "design/build" design drawings on the construction site at all times. These "job site" drawings are to be marked up daily with red ink or pencil to record:
 - 1. where actual installation differs from that shown on the original drawings,
 - 2. where underground or concealed features are uncovered during the work, whether unforeseen or not,
 - 3. field changes or deletions to the work,
 - 4. additional work, whether by Contract Change Order or not.

Underground features and features that are concealed during construction, or work that is added or changed, shall be recorded by both scaling and dimensioning. Elevation shall be recorded accurately to 0.1' and plan dimensions to 0.25'.

Maintaining "job site" record drawings up to date on a daily basis will be subject to specific inspection by the City. Progress payment requests will not be processed unless appropriately certified as to the currency of record drawing updating.

Each "job site" record drawing print shall be stamped "Contractor's Record Drawing" and signed and dated by the Contractor's Representative.

When a portion of the work is "design/build," the Contractor shall transfer all changes to the original (or a reproducible) of the design drawings. Drafting standards shall be in accordance with currently acceptable engineering standards, and they shall be clearly marked "RECORD DRAWINGS".

- b. Record Drawing Submittal – Organize record drawing sheets into a manageable set, bind with

durable paper cover sheets, and print suitable titles, dates and other identification on the cover. Upon completion of work, the Contractor shall submit to the City there (3) full sized hard copy sets of the complete and up to date "job site" record drawings along with one (1) reproducible set in both pdf and AutoCAD format.

3.08 Reuse of Documents

Neither the Contractor nor any Subcontractor or supplier or other person or organization performing or furnishing any of the work under a direct or indirect agreement with the City shall have any title or rights to any of the Drawings, Specifications or other documents (or copies thereof) which bear the seal of the design engineer. Such documents shall not be reused on extensions of the project or for any other project without written consent of the City and the design engineer.

3.09 Subsurface Data

All soil and soil test data, water table elevations, and soil analyses included or referred to in the Contract Documents apply only at the location of the test holes and to the depths indicated. Soil test reports for test holes which have been drilled are available for inspection at the office of the Engineer. Any additional subsurface exploration shall be done by the Contractor at their own expense.

The elevation of the water table indicated by soil test reports is that which existed on the date the test hole was drilled. It is the Contractor's responsibility to determine and allow for the possibility of differing ground water elevations on the date of the project's construction. A difference in elevation between ground water shown in soil boring logs and ground water actually encountered during construction will not be considered as a basis for extra work.

3.10 Right-of-Way

Acquisition of right-of-way or permanent easements necessary for the improvements as shown on the plans will be provided by the City. Unless otherwise provided, the Contractor shall make his own arrangements, pay for, and assume all responsibility for acquiring, using, and disposing of additional work areas, easements, and temporary facilities required. Contractor shall identify and hold the City harmless from all claims for damages resulting from such actions.

3.11 Removal of Defective Work

Any work which does not conform to the requirements of these specifications and contract documents in their entirety shall be considered as defective, and all such work or materials, whether in place or not, shall be rejected by the Owner and, unless otherwise permitted by the Owner, shall be rectified/removed immediately from the site of the work. Rejected work shall be rectified/replaced by the Contractor at the Contractor's expense. No rejected work, the defects of which have been subsequently corrected, shall be used until accepted in writing by the Owner.

3.12 Acceptance of Defective Work

The City shall have the option, at its sole discretion and by notice to the Contractor, to accept defective work instead of requiring its removal or correction, in which case the contract sum shall be reduced by an amount equal to the difference between the value to the City such work would have were it complete, correct, and in conformity with the Contract Documents and the value to the City of such defective work. Such option shall be exercised solely by notice to the Contractor and shall not be implied from any act or omission by the City or the Engineer. If the remaining payments and retention are insufficient to cover the amount of the reduction of the contract sum, the Contractor shall promptly pay to the City the amount of any such deficiency.

3.13 Submittals

Within fourteen (14) Calendar days following the Notice to Proceed, the Contractor shall provide a detailed list of all individual submittals required to be submitted under the contract. The list shall reference the specification section and paragraph that requires the submittal along with the date the Contractor plans to transmit the submittal to the City for review.

Unless otherwise requested by the City and/or Construction Manager, submittals shall be provided electronically in .pdf format at least 28 calendar days prior to the approval being necessary for the work. Submittals shall be transmitted via e-Builder submittal module. Large submittals consisting of reports, oversized or colored pages, full sized shop drawings, manuals contained in binders, or submittals in other forms not easily reproduced shall be provided in hard copy format.

When requested by the Construction Manager, the Contractor shall provide the number of hard copies for all submittals requiring building review. No electronic copies will be accepted.

For items requiring shop drawings, no materials shall be furnished, and no work shall be performed, until the drawings have been favorably reviewed. Shop drawings shall be of a size and scale to clearly show all necessary details.

After review by the Architect of Record (AOR) of each of the Contractor's submittals, submittals will be marked with actions defined as follows:

- a. NO EXCEPTIONS TAKEN – Accepted subject to its compatibility with future submissions and additional partial submissions for portions of the work not covered in this submission. Does not constitute acceptance of deletion of specified or required items not shown in a partial submission.
- b. MAKE CORRECTIONS NOTED – The same as item (a), except that minor corrections as noted by the City shall be made by the Contractor. No resubmission is required.
- c. AMEND AND RESUBMIT – Rejected because of major inconsistencies or errors which shall be resolved or corrected by the Contractor prior to subsequent review by the City.
- d. REJECTED – Submitted material does not conform to plans and Specifications in major respects. This material is not expected to be resubmitted.
- e. ACCEPTED FOR RECORD – Submittals not reviewed by the City but accepted for record purposes.
- f. All submittals (shop drawings and supporting data, catalogs, schedules, etc.), shall be submitted as the instruments of the Contractor, who shall be responsible for their accuracy and completeness. These submittals may be prepared by the Contractor, subcontractors, or suppliers, but the Contractor shall ascertain that submittals meet all of the requirements of the Contract Documents, while conforming to structural, space, and access conditions at the point of installation. The Contractor shall check all submittals before submitting them to the City.
- g. By submitting the bid, the Contractor agrees that the City has no duty to the Contractor or any of its subcontractors or suppliers for the accuracy, completeness, or sufficiency of the City's review of submittals. The Contractor further agrees to incorporate this requirement in all of its subcontracts or purchase agreements.
- h. Each submittal shall relate only to one item or groups of items logically related.
- i. Allow the number of Twenty-Eight (28) calendar days as stated in the Supplemental Provisions for

the City's review of submittals and resubmittals. Note that there are some different requirements for Construction Schedule submittals. No extension of time will be allowed through failure of the Contractor to either transmit submittals sufficiently in advance of the work or on account of resubmittals.

- j. Incomplete submittals will not be accepted.
- k. If the City's review of a submittal requires cross reference to, or coordination with, another submittal not yet transmitted to the City for review, it will be returned to the Contractor for resubmittal at a more appropriate time.

Alternatively, and at the City's discretion, the City may elect to advise the Contractor that the submittal review will be deferred for review. In such circumstances the City's review time will correspondingly be increased so the effective review time allowed is not reduced.

- l. If the City's review of a submittal reveals that supplemental information is necessary to complete the review, it will be returned to the Contractor for augmentation and resubmittal.

Alternatively, and at the City's discretion the Contractor may be requested to provide supplemental information to enable a review to be completed, in which case the City's review time will correspondingly be increased so the effective review time allowed is not reduced.

- m. The City shall review schedules, shop drawings, etc., submitted by the Contractor only for general design conformance with the concept of the project and compliance with the information given in the Contract Documents. Acceptance by the City of any drawings, method of work, or any information regarding materials and equipment the Contractor proposes to furnish shall not relieve the Contractor of its responsibility for any errors therein and shall not be regarded as an assumption of risks or liability by the City, or any officer or employee thereof, and the Contractor shall have no claim under the Contract on account of the failure or partial failure or inefficiency or insufficiency of any plan or method of work or material and equipment so accepted. Such acceptance shall be considered to mean merely that the City has no objection to the Contractor using, upon its own full responsibility, the plan or method of work proposed, or furnishing the materials and equipment proposed.
- n. Submittals shall be reviewed as a complete package and will not be returned marked with more than one of the actions noted above. Any submittal that requires further review shall be resubmitted in its entirety until the full submittal has been favorably reviewed.
- o. The Contractor shall not proceed with the fabrication, delivery, construction or installation of items requiring a submittal without favorable review of the submittal by the City. No site construction shall commence without a favorable review of the Baseline Construction Schedule, and the Submittal List. Items (a) and (b) above (no resubmittal required) are considered "favorable review". Items (c) and (d) above (correction and resubmittal required) are considered "unfavorable review". Favorable review shall not relieve the Contractor of its obligation to meet safety requirements and all other requirements of Law, nor constitute a Contract Change Order.

Favorable review of the shop drawings by the Architect of Record (AOR) is interpreted to mean that there is substantial and acceptable conformance with the contract plans, but details of design may not necessarily be checked for adequacy or accuracy. Such acceptance shall not relieve the Contractor from the responsibility for errors or omissions in the shop drawings or from deviations from the contract documents unless such errors, omissions, or deviations were specifically called to the attention of the Engineer in writing. The Contractor shall be responsible for the correctness of the shop drawings, for shop fits and field corrections, and for the results obtained by the use of such plans.

3.14 Substitutions

Refer to Specification Section 012513 for any substitution requests during bid period. A request for substitution post bid period will be considered if received within Thirty (30) calendar days from the date of Award, or within fifteen (15) calendar days from the date the Notice to Proceed is issued, whichever is the later. Within 10 calendar days of receipt of the request for substitution, the City may request additional information necessary for evaluation. Within 21 calendar days from receipt of the request for substitution, or 14 calendar days from receipt of additional information, whichever is later, the City will respond to the request for substitution. If a decision on use of a substitute cannot be made within these time limits, the product specified shall be used.

Proposed requests by the Contractor for changes in products, materials, equipment, and methods of construction required under the Contract Documents after the award of contract are considered "requests for substitutions". For proposed "or equal" substitutions, attention is directed to Section 5.03, "Trade Names or Approved Equals" of these General Provisions. The following are not considered substitutions:

- a. Revisions to Contract Documents requested by the City.
- b. Specified options of products and construction methods included in Contract Documents.
- c. Compliance with governing regulations and orders issued by governing authorities.

Each request for substitution shall be prepared and presented to the City in accordance with the procedures for submittals, except that the following additional information shall be provided.

- a. An explanation of the advantages to the City for accepting the substitution.
- b. A comparison of significant qualities of the proposed substitution with those specified.
- c. A list of changes or modifications needed to other parts of the work and to construction performed by the City and separate Contractors that will be necessary to accommodate the proposed substitution.
- d. A statement indicating the substitution's effect on the Construction Schedule compared to the Construction Schedule without acceptance of the substitution. Indicate the effect of the proposed substitution on overall contract time.
- e. Cost information, including a proposal of the net change, if any, in the Contract Sum.
- f. Certification that the substitution is equal to or better in every respect to that required by Contract Documents and that it will perform adequately in application indicated including LEED compliance and/or red list free properties as referenced in specification section 018113-Sustainable Design Requirements. Include Contractor's waiver of rights to additional payment or time extensions that may be necessary because of the substitution's failure to perform adequately.

The Contractor's substitution request will be considered by the City when the following conditions are satisfied, as determined by the City; otherwise, requests will be returned without action except to record noncompliance with these requirements:

- a. Extensive revisions to Contract Documents are not required.
- b. Proposed changes are in keeping with the general intent of Contract Documents.
- c. The request is timely, fully documented and properly submitted.

- d. The specified product or method of construction cannot be provided within the Contract Time. The request may not be considered if the product or method cannot be provided as a result of failure of the Contractor to pursue the work promptly or coordinate activities properly, unless the product proposed is at least equal or better.
- e. A substantial advantage is offered the City, in terms of cost, time, energy conservation or other considerations of merit, after deducting offsetting responsibilities the City may be required to bear. Additional responsibilities for the City may include additional compensation to the Consulting Engineer/Architect for redesign and evaluation services, increased cost of other construction by the City or separate contractors, and similar considerations.
- f. The specified product or method of construction cannot receive necessary approval by a regulatory agency, and the requested substitution can be approved.
- g. The specified product or method of construction cannot be provided in a manner that is compatible with other materials, and where the Contractor certifies that the substitution will overcome the compatibility.
- h. The specified product or method of construction cannot be coordinated with other materials, and where the Contractor certifies that the proposed substitution can be coordinated.
- i. The specified product or method of construction cannot provide a warranty required by the Contract Documents and where the Contractor certifies that the proposed substitution can provide the required warranty.

The Contractor's submittal and City's acceptance of Shop Drawings, Product Data or Samples that do not comply with the Contract Documents does not constitute a valid request for substitution, nor does it constitute acceptance of a substitution.

No extension of time will be allowed through failure of the Contractor to either transmit requests for substitution sufficiently in advance of the work, or on account of processing time outside the time limits noted.

3.15 Survey

The Contractor shall provide all Land surveys required by an independent land surveyor licensed in the State of California.

3.16 Construction Staking Lines and Grades

Unless otherwise stated in the Supplemental Provisions, the Contractor shall provide, preserve, and replace if necessary, all of the necessary construction stakes required for the construction of the project. Grades for underground conduits will be set on the ground surface and shall then be transferred to the bottom of the trench by the Contractor.

Stakes or marks will be set by a California Licensed Surveyor or a California Registered Civil Engineer to establish the lines and grades required for the completion of the work as specified in the Contract Documents. It shall be the Contractor's responsibility to notify the Engineer of any discrepancies found between field grades and notes shown within the Contract Documents.

Contractor shall furnish horizontal control and cut sheets to the Engineer immediately upon the setting of construction or boundary markers. Upon completion, all work shall conform to the lines, elevations, and grades shown on the plans.

3.17 City's Construction Inspector's Work Hours

The Contractor shall give the City and/or Construction Manager three (3) working days' notice (72 hours) before beginning work so the City's inspection of the work can be arranged. Regular working hours for City Construction Inspectors are between 7:30 a.m. and 4:00 p.m., Monday through Friday, excluding City holidays. If the Contractor works outside these times, the Contractor may be charged for additional inspection.

3.18 Inspection of the Work

All work is subject to inspection and approval of the Engineer. Unless otherwise stated in the specifications, the City shall perform all required inspections. The Contractor shall notify the Engineer before noon of the working day before inspection is required. Unless otherwise authorized, work shall be done only in the presence of the Engineer. Any work done without proper inspection will be subject to rejection. The Engineer shall at all times have access to the work during its construction at shops and yards as well as the project site. The Contractor shall provide every reasonable facility for ascertaining that the materials and workmanship are in accordance with the Contract Documents. Inspection of the work shall not relieve the Contractor of the obligation to fulfill all conditions of the contract.

If a portion of the work is covered contrary to the Engineer's request or direction, or contrary to the requirements of the Contract Documents, it must, if required in writing by the Engineer, be uncovered for the Engineer's observation and be replaced at Contractor's expense without adjustment of the contract time or the contract sum.

If a portion of the work has been covered, which is not required by the Contract Documents to be observed or inspected prior to it being covered and which the Engineer has not specifically requested to observe prior to its being covered, the Engineer may request to see such work and it shall be uncovered and replaced by Contractor. If such work is in accordance with the Contract Documents, the costs of uncovering and replacing the work shall be added to the contract sum by change order; and if the uncovering and replacing of the work extends the contract time, an appropriate adjustment of the contract time shall be made by change order. If such work is not in accordance with the Contract Documents, the Contractor shall pay such costs and shall not be entitled to an adjustment of the contract time or the contract sum.

3.19 Special Inspections

Unless otherwise indicated in the Contract Documents, all special inspections are required to be provided by an independent company, properly certified, coordinated and paid for by the City

3.20 Sampling and Testing

All sampling and testing are to be performed in order to meet the standard expressly described in the specification and in the City's Quality Assurance Program. Unless otherwise stated in the Contract Documents, all required sampling and testing will be performed directly by an independent laboratory, coordinated and paid for by the Contractor. Contractor shall cooperate with the City in coordinating the necessary testing. The coordination of testing is the responsibility of Contractor. The coordination of testing shall be the responsibility of the contractor. The frequency and location of tests shall be as indicated in the Special Provisions and the Technical Specifications. All compaction test sites deeper than five (5') feet below grade shall be properly shored by the Contractor to protect testing personnel.

The cost for performing re-tests due to failures, or additional call-outs if work is not ready to test, will be paid for by the Contractor. The City shall require retesting until all required tests are successfully passed.

SECTION 4 – CHANGES IN WORK

4.01 Limited City Authority to Approve Change Orders

The Contractor recognizes that the City is a public agency and that it can only act through its duly authorized agents. In this regard, the Contractor agrees that only written change orders, executed by the City, shall be valid.

4.02 Contractor Liability for Unapproved Change Orders

Unless a valid change order is issued, all changes in the work performed by the Contractor shall be at the Contractor's own risk, and shall not be entitled to any additional compensation. Furthermore, the Contractor may be required to make the work conform to the plans and specifications. No act or series of acts by the City during the course of the contract shall be deemed to constitute a waiver of the City's rights to rely upon this provision.

4.03 Non-Material Change Requests by the Contractor

Changes in the plans and specifications requested in writing by the Contractor, which do not materially affect the work, and which are not detrimental to the work or to the interests of the City, may be granted to facilitate the work, when approved in writing by the Engineer. If such changes are granted, they shall be made at a reduction in cost or at no additional cost to the City. Nothing herein shall be construed as granting a right to the Contractor to demand acceptance of such changes or to increase the contract sum or contract time as a result of the proposed change.

4.04 Directives

The Engineer may issue Directives in the form of Field Orders, Clarifications, responses to Requests for Information, or any other document which makes interpretations or clarifications to the Contract Documents. Directives shall be binding upon the Contractor, and the Contractor shall promptly carry out the requirements of such Directives.

4.05 Requests for Information, Inconsistencies and Changed Conditions

Before undertaking each part of the work, the Contractor shall carefully study all pertinent figures shown in the Contract Documents and verify that all applicable field measurements are free of conflicts, errors, discrepancies, inconsistencies and omissions. If such conditions are discovered, the Contractor shall notify the Construction Manager by writing a Request for Information, and await direction from the Engineer before proceeding.

The means of seeking this clarification shall be via e-Builder Request for Information process.

If the Contractor encounters a changed condition, as defined by one or more of the conditions below, the Contractor shall notify the Construction Manager by submitting a Request for Information before proceeding.

- a. Material differing from that represented in the Contract which the Contractor believes may be hazardous waste, as defined by Health and Safety Code, Section 25117 that is required to be removed to a Class I, Class II, or Class III disposal site in accordance with provision of existing law; and
- b. Subsurface or latent physical conditions at the site differing materially from those represented in the Contract Documents; and
- c. Unknown physical conditions at the site of any unusual nature, which differ materially from those ordinarily encountered and generally recognized as inherent in the work and of the character provided for in the Contract Documents.

No extension of Contract time shall be made by the City due to the Contractor's failure to provide a timely written notice of any inconsistency or changed condition requiring direction. The Architect of Record will respond to the Contractor's Request for Information within seven (7) calendar days, providing an interpretation, clarification or change order for an appropriate adjustment in contract time and cost pursuant to General Provisions, Section 4.07, "Change Orders". Contractor shall wait for the Engineer's written response to a Request for Information before proceeding with any work.

The Contractor shall not be liable to the City for failure to report any conflict, error, or discrepancy in the Contract Documents, unless the Contractor had actual knowledge or could foresee such conditions as may be discovered by a reasonable examination of the work site or materials. If the Contractor performs any construction activity in which he knows or should know involves an error, inconsistency, ambiguity, or omission referred to in this Section, without notifying and obtaining the written consent of the Engineer, Contractor shall be responsible for the resultant costs, including, without limitation, the costs of correcting defective work. However, in an emergency affecting the safety of persons or property, the Contractor shall take all reasonably necessary precautions to prevent or minimize damage, injury, or loss.

4.06 Extra Work

New or unforeseen work may be classified as "Extra Work" when the Engineer determines that the work is not covered by contract unit prices, not stipulated in the scope of work, represents work that is substantially different from what the Contractor bid upon, or falls under the category of a changed condition. The General and Special Provisions shall apply to all of the work, including extra work authorized. Payment for extra work will be made on the basis of General Provisions, Section 4.07, "Change Orders".

The Contractor shall maintain records sufficient to distinguish the direct cost of extra work from the cost of other operations. The Engineer will compare his records with the Contractor's reports, to make the necessary adjustments and compile the costs associated with the extra work.

When extra work reports are agreed upon and signed by both parties, they shall become the basis of payment. When extra work is still under negotiation or has not been agreed upon, the Contractor shall keep daily detailed and accurate records itemizing each element of cost and shall provide certified payroll, invoices, and other substantiating records and documentation.

When extra work is to be paid on a force account basis, the labor, materials and equipment used in the performance of that work shall be paid in accordance with the following. To the total of the direct costs computed, there will be an added markup of 35% to the cost of labor, 15% to the cost of materials and 15% to the cost of equipment. These markups shall constitute full compensation for any and all overhead costs, profit, or other costs not specifically designated as a cost of labor, material or equipment. When subcontractors perform force account work, an additional 5% markup shall be added to the total cost of the extra work to reimburse the Contractor for additional administrative costs. No markup for any subcontractor beyond the first tier shall be paid.

During the performance of extra work by force account, and as a condition to the Contractor's right to an adjustment of the contract sum, the Contractor shall prepare daily reports itemizing all costs for labor, materials, and equipment rental. For labor costs, the reports shall include names, job classifications, hours worked and rates of pay. For equipment costs, the reports shall include size, type, identification number and hours of operation. All records and reports shall be submitted to the Engineer for approval on a daily basis. Reports shall be made on the City of Sunnyvale Daily Extra Work Report form.

4.07 Change Orders

At any time during the progress of the work, and without in any way rendering void the Contract, the City may order alterations, additions or deductions from the work by change order, without notice to sureties. When so ordered in writing, the Contractor shall proceed with work as directed by the change order.

The change order shall describe the change in the work, the adjustment of the contract sum (if any), and the adjustment of the contract time (if any). The Contractor shall not be entitled to any extension of time for the completion of the work by virtue of any change order unless the change order specifically affects the controlling operation and provides for this. If, after receiving a change order, the Contractor feels that they are entitled to an extension of time, the Contractor may, within seven (7) calendar days file a written request for consideration by the Engineer.

The process of submitting a proposed change, a cost proposal, negotiating an agreed upon change order, or any failure to reach an agreement as to an adjustment in the contract sum or the contract time, shall not relieve the Contractor of their obligation to perform in accordance with the Contract Documents.

Change orders may be Unilateral Change Orders or Agreed Upon Change Orders. Upon the receipt of either form of change order, the Contractor shall proceed promptly and diligently with the extra work.

- a. *Unilateral Change Orders* – A Unilateral Change Order may be issued by the City without the Contractor's signature where the City determines that it is in the City's best interest to proceed with the work, and the change does not materially alter the character of the work. The Contractor shall be deemed to have accepted the terms of any Unilateral Change Order unless the Contractor submits a written protest with respect to the change order, no later than fourteen (14) calendar days following the Contractor's receipt of the change order. See General Provisions, Section 4.08, "Disputed Work".
- b. *Agreed Upon Change Orders* – Within Seven (7) calendar days after receiving a request from the City for a written proposal for an Agreed Upon Change Order, the Contractor shall provide the Engineer with a cost proposal in a form satisfactory to the Engineer, setting forth the Contractor's proposed adjustments to the contract sum and contract time for performing the extra work.

Compensation for Agreed Upon Change Orders shall be calculated based upon the bid item unit prices stated in the Bid Schedule and no additional markup for overhead or profit will be provided. If there are no unit prices for the extra work, the Contractor and the City may agree upon unit prices or lump sum prices, which shall be used to increase or decrease the contract sum. When extra work changes the scope of bid item work, payment can be made by paying an agreed upon unit price adjustment or lump sum price adjustment of compensation. In the absence of price agreement, the contract sum shall be adjusted by force account.

The City pays for change order work based on one or a combination of the following:

1. Bid item unit prices
2. Agreed upon unit prices
3. Agreed upon lump sum price
4. Force account
5. Adjustment of compensation

Changed Quantity Payment Adjustments:

- a. *Increases of More Than 25 Percent* – If the total bid item quantity exceeds 125 percent of the quantity shown on the Bid Item List and if no approved Change Order addresses payment for the quantity exceeding 125 percent, the Engineer may adjust the unit price for the excess quantity under the 2018 State Standard Specification, Section 9-1.04 (force account) or the following:
 1. The adjustment is the difference between the unit price and the unit cost of the total item pay quantity.
 2. In determining the unit cost, the Engineer excludes the item's fixed costs. The Contractor will have recovered the fixed costs in the payment for 125 percent shown on the Bid Item List.

3. After excluding fixed costs, the Engineer determines the item unit cost under the 2018 State Standard Specification, Section 9-1.04 (force account).
 4. If the payment for the number of units of a bid item in excess of 125 percent of the Bid Item List is less than \$5,000 at the unit price, the Engineer may not adjust the unit price unless the Contractor requests it.
- b. Decreases of More Than 25 Percent – If the total item pay quantity is less than 75 percent of the quantity shown on the Bid Item List and if no approved Change Order addresses payment for the quantity less than 75 percent, you may request a unit price adjustment. The Engineer may adjust the unit price for the decreased quantity under the 2018 State Standard Specification, Section 9-1.04 (force account) or the following:
1. The adjustment is the difference between the unit price and the unit cost of the total pay quantity.
 2. In determining the unit cost, the Engineer includes the item's fixed costs.
 3. After including fixed costs, the Engineer determines the item unit cost under the 2018 State Standard Specification, Section 9-1.04 (force account).
 4. The City does not pay more than 75 percent of the item total in the Bid Item List.
- c. Eliminated Items
1. If the Engineer eliminates an item, the City pays the Contractor's costs incurred before the Engineer's elimination notification date.
 2. If the Contractor orders authorized material for an eliminated item before the notification date and the order cannot be canceled, either of the following occurs:
 3. If the material is returnable to the vendor, the Engineer orders the Contractor to return the material and the Department pays the Contractor's handling costs and vendor charges.
 4. The City pays the Contractor's cost for the material and its handling and becomes the material owner.
 5. The Engineer determines the payment for the eliminated bid item under the 2018 State Standard Specification, Section 9-1.04 (force account).

Agreed Upon Price Adjustments – If there are no unit prices for proposed extra work, the Contractor and the City may agree upon unit prices or lump sum costs, by written change order, prior to commencing work. In the absence of any such agreement, the contract sum shall be adjusted by force account.

Force Account – When extra work is to be paid on a force account basis, the labor, materials and equipment used in the performance of that work shall be paid in accordance with the 2018 State Standard Specification, Section 9-1.04 (force account) and as provided for below. To the total of the direct costs computed, there will be an added markup of 35% to the cost of labor, 15% to the cost of materials and 15% to the cost of equipment. These markups shall constitute full compensation for any and all overhead costs, profit, or other costs not specifically designated as a cost of labor, material or equipment. When subcontractors perform force account work, an additional 5% markup shall be added to the total cost of the extra work to reimburse the Contractor for additional administrative costs. No markup for any subcontractor beyond the first tier shall be paid.

- a. **Labor** – Labor costs shall be based on the prevailing wage scale for each craft or type of work. Employer payments for payroll taxes and insurance, health and welfare, pension, vacation, and other direct labor costs shall be included and will be calculated as the Labor Surcharge stipulated in the State of California, Labor Surcharge and Equipment Rental Rates book.
- b. **Materials** – Materials cost shall be the cost of all materials purchased by the Contractor and used in the extra work and shall be the actual cost of such materials, including sales taxes, freight and delivery charges. The City reserves the right to approve materials to be furnished by the Contractor,

sources of supply or, if necessary, to furnish the materials to the Contractor. No compensation will be paid to the Contractor for any material furnished by the City or for materials not used.

- c. *Equipment Rental* – The Contractor will be allowed the actual rental rate of equipment, prorated over the time the machinery or equipment is required. For Contractor owned equipment, this rate shall be as stipulated in the State of California, Labor Surcharge and Equipment Rental Rates book. In addition, the Contractor will be allowed reasonable move-in and move-out charges, if applicable. All equipment shall, in the opinion of the Engineer, be in good working order, good condition, and suitable for its purpose. Equipment or tools having a replacement value of \$200.00 or less, whether or not consumed by use, shall be considered small tools and no payment will be made therefore.
- d. *Other Services or Expenditures* – The City may authorize and approve payment for work performed by special forces or necessary services and expenditures other than labor, materials, and equipment rental.

During the performance of extra work by force account, and as a condition to the Contractor's right to an adjustment of the contract sum, the Contractor shall prepare daily reports itemizing all costs for labor, materials, and equipment rental. For labor costs, the reports shall include names, job classifications, hours worked and rates of pay. For equipment costs, the reports shall include size, type, identification number and hours of operation. All records and reports shall be submitted to the Engineer for approval on a daily basis. Reports shall be made on the City of Sunnyvale Daily Extra Work Report Form.

4.08 Resolution of Disputes

It is the intent of this Contract that disputes regarding the Contract be resolved promptly and fairly between the City and the Contractor. However, it is recognized that some disputes will require detailed investigation and review by one or both parties before a determination and resolution can be reached. For the protection of the rights of both the Contractor and the City, the following is required to initiate review, determination and resolution.

4.08.1 Notice - Contractor shall provide a written notice of disputed work to the Engineer's attention prior to the commencement of and sufficiently in advance of performing the disputed work to allow the Engineer initial review of the disputed work. The notice shall be submitted in accordance with General Provisions, Section 4.05, "Requests for Information, Inconsistencies and Changed Conditions". If the Contractor disagrees with the Engineer's decision, or in any case where the Contractor deems additional compensation or a time extension to the Contract time is due the Contractor for work or materials not covered in the Contract or which the Engineer has not recognized as extra work, the Contractor shall notify the Engineer, in writing, of its intention to dispute the Engineer's decision.

Timely notice of potential claim is of great importance to the Engineer and the City, and is not merely a formality. Such notice allows the City to consider preventative action, to monitor the Contractor's increased costs resulting from the situation, to marshal facts, and to plan its affairs. Such notice by the Contractor, and the fact that the Engineer has kept account of the work in question, shall not in any way be construed as proving the validity of the dispute.

Notice pertaining to decisions provided in General Provisions, Section 4.05, "Requests for Information, Inconsistencies and Changed Conditions", or such other determinations by the Engineer shall be filed in writing to the Engineer within ten (10) days of receipt of such decision and prior to the commencement of such work. Written notice shall be clearly titled "Notice of Potential Claim" and shall be numbered starting with Number 1.

Such notice of potential claim must be stated with specificity, including identification of the event giving rise to potential claim, the date of the event, and the asserted effect on contract sum and contract time. The notice of potential claim shall include adequate supporting data. Adequate supporting data for a

potential claim for an adjustment of the contract time shall include scheduling data demonstrating the impact of the event on the completion of the work. Adequate supporting data for a potential claim for an adjustment of the contract sum shall include a detailed cost breakdown of the items allowed, isolating labor, material, and equipment costs, and providing detailed quantities and unit prices for changed work. If the exact amount of a potential claim is not ascertainable at the time such potential claim is made, the supporting data currently available shall be submitted. Supplemental data supporting the exact amount of the potential claim shall be submitted as soon as available.

In proceeding with a disputed portion of the Work, the Contractor shall keep accurate records of all costs, including a summary of the hours and classification of equipment and labor utilized on the disputed work, as well as a summary of any materials or any specialized services which are used. Such information shall be submitted to the Engineer daily, receipt of which shall not be construed as an authorization for or acceptance of the disputed work.

No claim for additional compensation or extension of time for a delay will be considered unless the provisions of General Provisions, Section 7.17, "Delays and Extensions of Time" are complied with. No claim filed after the date of final payment will be considered.

Unless notice is properly given, the Contractor shall not recover costs or any damages incurred by it because of the alleged extra work, changed work or other situation which had required notice been given, would have given rise to a right for additional compensation.

4.08.2 Response by Engineer - The Engineer shall review the "Notice of Potential Claim" and within ten (10) days of receipt of the notice shall respond to the Contractor in writing with its determination, or if it is necessary to extend this period, the Engineer shall notify the Contractor in writing as to when a decision will be provided.

4.08.3 Appeals to the Assistant Director of Public Works/City Engineer - In the event the Contractor disagrees with the Engineer's determination provided in accordance with Section 4.08.2, "Response by Engineer", the Contractor may, within ten (10) days of receipt of such determination, appeal the determination to the Assistant Director of Public Works/City Engineer for review. The Assistant Director of Public Works/City Engineer shall review the appeal and transmit the decision in writing to the Contractor within 30 days from the date of receipt of the appeal.

In the event the Contractor disagrees with the determination of the Assistant Director of Public Works/City Engineer, the Contractor shall notify the Engineer, in writing within ten (10) days of receipt of such determination, of its intention to file a claim in accordance with General Provisions, Section 4.09, "Resolution of Claims Under Public Contract Code Section 20101" and Section 4.10. "Resolution of Claims under Public Contract Code Section 9204". Failure of the Contractor to appeal the determination of the Engineer within said ten (10) day period shall constitute a waiver of the Contractor's right to file a claim resulting from such determination or decision.

4.08.4 Dispute Meetings - From time to time the Contractor may request or the Engineer may call a special meeting to discuss outstanding disputes should it deem this a means of possible help in the resolution of the dispute. The Contractor shall cooperate and attend prepared to discuss its dispute and make available the personnel, subcontractors and suppliers necessary for resolution, and all documents which may reasonably be requested by the Engineer.

4.08.5 Submission of Potential Claim Costs – Potential claim costs must be submitted within thirty (30) days after the last cost of work for which the Contractor contends it is due additional compensation. But if costs are incurred over a span of more than thirty (30) days, then within fifteen (15) days after the thirtieth day and every month thereafter, the Contractor shall submit to the Engineer, as best the Contractor is able, its costs incurred for the claimed matter.

Potential claims shall be made in itemized detail and should the Engineer be dissatisfied with the format or detail of presentation, upon request for more or different information, the Contractor will promptly comply, to the satisfaction of the Engineer. If the additional costs are in any respect not knowable with certainty, they shall be estimated as best can be done. The Engineer shall have the right as provided in Section 4, "Changes in Work" to review the Contractor's records pertaining to a submitted claim. In case the claim is found to be just, it shall be allowed and paid for as provided in Section 4, "Changes in Work".

4.09 Resolution of Claims Under Public Contract Code Section 20104

Disputes pertaining to this Agreement for three hundred and seventy-five thousand dollars (\$375,000) or less which cannot be resolved between the parties pursuant to Section 4.08, "Resolution of Disputes", shall be resolved pursuant to the provisions of Public Contract Code commencing at Section 20104.

4.09.1 Disputes for \$375,000 or Less – Said Code sections provide in part that:

Under the law (starting at Public Contract Code Section 20104.2) construction claims of over fifty thousand dollars (\$50,000) and less than or equal to 375,000.00 the local public agency construction contracts must be in writing and include the documents necessary to substantiate the claim. Claims must be filed on or before the date of final payment.

The City must respond in writing to any written claim of three hundred seventy-five thousand dollars (\$375,000) or less within 60 days (or, in the case of claims of less than \$50,000, within 45 days) of receipt of claim, or may request, in writing, within 30 days of receipt of the claim, any additional documentation supporting the claim or relating to defenses to the claim the City may have against the claimant.

If additional information is thereafter required, it shall be requested and provided, pursuant to Public Contract Code Section 20104.2, upon mutual agreement of the City and the claimant. The City's written response to the claim, as further documented, shall be submitted to the claimant within 30 days (or, for claims of less than \$50,000, within 15 days) after receipt of the further documentation, or within a period of time no greater than that taken by the claimant in producing the additional information or requested documentation, whichever is greater.

If the claimant disputes the City's written response (or if the City fails to respond within the time periods prescribed above) the claimant may notify the City, in writing, within 15 days of receipt of the City's response or within 15 days of the City's failure to respond within the times prescribed, respectively, and demand an informal settlement conference. The City must then schedule a settlement conference within 30 days.

Following the settlement conference, if the claim or any portion remains in dispute, the claimant may file a claim as required by the claims statute commencing at California Government Code Section 910 and in accordance with the Sunnyvale Municipal Code. The time within which a Government Code claim must be filed is tolled from the time the claimant submits the Public Contract Code claim until the time when the claim is denied. Pursuant to Sunnyvale Municipal Code Section 2.04.030, the claim must be filed with the City Clerk.

4.09.2 Disputes Exceeding \$375,000 – Unless this Contract provides otherwise, all claims between the City and the Contractor that are not resolved between the parties and are not governed by Public Contract Code Section 20104 shall be resolved per the procedures established in Public Contract Code Section 9204 and per Section 4.10, "Resolution of Claims under Public Contract Code Section 9204" below.

4.09.3 Civil Action Proceedings – If a civil action is filed to resolve the claim, then between 30 and 60 days after the filing of responsive pleadings, the court shall submit the matter to nonbinding mediation unless waived by the parties. The parties are given 15 days to select a disinterested third person as mediator. Mediation must commence within 30 days of submittal and conclude within 15 days of commencement unless the time is extended for good cause by the court.

If the matter remains in dispute, the case must be submitted to judicial arbitration pursuant to procedures set forth in the Code of Civil Procedure commencing at Section 1141.10. Discovery is permitted consistent with the rules pertaining to judicial arbitration.

Arbitrators shall be experienced in construction law.

A party who appeals an arbitration award and does not obtain a more favorable judgment shall pay the attorney's fees on appeal of the other party. The City must pay interest at the legal rate on any arbitration award or judgment, commencing on the date when suit was filed. Except as otherwise provided in the Contract, the City must pay the undisputed portions of any claims.

Should either party to this Contract bring legal action against the other, the case shall be handled either by the Superior Court of the State of California in the County of Santa Clara, or the United States District Court, Northern District of California. The Agreement shall be construed and its performance enforced under California Law.

4.10 Resolution of Claims under Public Contract Code Section 9204

The provisions of this section are provided pursuant to Public Contract Code Section 9204. These provisions are applicable only until May 1, 2023 and then are repealed and not applicable to this Contract unless another State statute extends the date of these provisions.

4.10.1 Claim Definition - "Claim" means a separate demand by the Contractor sent by registered mail or certified mail with return receipt requested, for one or more of the following:

- a. A time extension, including, without limitation, for relief from damages or penalties for delay assessed by the City.
- b. Payment by the City of money or damages arising from work done by, or on behalf of, the Contractor pursuant to the Contract and payment for which is not otherwise expressly provided or to which the Contractor is not otherwise entitled.
- c. Payment of an amount that is disputed by the City.

4.10.2 Claim Process - Upon receipt of a claim pursuant to this Section, the City shall conduct a reasonable review of the claim and, within a period not to exceed 45 days, shall provide the Contractor a written statement identifying what portion of the claim is disputed and what portion is undisputed. Upon receipt of a claim, the City and Contractor may, by mutual agreement, extend the time period provided in this subsection.

The Contractor shall furnish reasonable documentation to support the claim.

If the City needs approval from the City Council to provide the Contractor a written statement identifying the disputed portion and the undisputed portion of the claim, and the City Council does not meet within the 45 days or within the mutually agreed to extension of time following receipt of a claim sent by registered mail or certified mail, return receipt requested, the City shall have up to 3 days following the next duly publicly noticed meeting of the City Council after the 45-day period, or extension, expires to provide the Contractor a written statement identifying the disputed portion and the undisputed portion.

Any payment due on an undisputed portion of the claim shall be processed and made within 60 days after the City issues its written statement. If the City fails to issue a written statement, provision of General Provisions, Section 4.10.3.1, "City's Failure to Respond", shall apply.

4.10.3 Disputed Claims - If the Contractor disputes the City's written response, or if the City fails to respond to a claim issued pursuant to this section within the time prescribed, the Contractor may demand in writing an informal conference to meet and confer for settlement of the issues in dispute. Upon receipt of a demand in writing sent by registered mail or certified mail, return receipt requested, the City shall schedule a meet and confer conference within 30 days for settlement of the dispute.

Within Fourteen (14) calendar days following the conclusion of the meet and confer conference, if the claim or any portion of the claim remains in dispute, the City shall provide the Contractor a written statement identifying the portion of the claim that remains in dispute and the portion that is undisputed. Any payment due on an undisputed portion of the claim shall be processed and made within 60 days after the City issues its written statement. Any disputed portion of the claim, as identified by the Contractor in writing, shall be submitted to nonbinding mediation, with the City and the Contractor sharing the associated costs equally. The City and Contractor shall mutually agree to a mediator within Fourteen (14) Calendar days after the disputed portion of the claim has been identified in writing. If the parties cannot agree upon a mediator, each party shall select a mediator and those mediators shall select a qualified neutral third party to mediate with regard to the disputed portion of the claim. Each party shall bear the fees and costs charged by its respective mediator in connection with the selection of the neutral mediator.

For purposes of this section, mediation includes any nonbinding process, including, but not limited to, neutral evaluation or a dispute review board, in which an independent third party or board assists the parties in dispute resolution through negotiation or by issuance of an evaluation. Any mediation utilized shall conform to the timeframes in this section.

Unless otherwise agreed to by the City and the Contractor in writing, the mediation conducted pursuant to this section shall excuse any further obligation under Public Contract Code Section 20104.4 to mediate after litigation has been commenced.

4.10.3.1 City's Failure to Respond - Failure by the City to respond to a claim from the Contractor within the time periods described in this subsection or to otherwise meet the time requirements of this section shall result in the claim being deemed rejected in its entirety. A claim that is denied because of the City's failure to have responded to a claim, or its failure to otherwise meet the time requirements of this section, shall not constitute an adverse finding with regard to the merits of the claim or the responsibility or qualifications of the Contractor.

4.10.3.2 Interest - Amounts not paid in a timely manner as required by this section shall bear interest at 7 percent per annum.

4.10.3.3 Subcontractor Claims - If a subcontractor or a lower tier subcontractor lacks legal standing to assert a claim against the City because privity of contract does not exist, the Contractor may present to the City a claim on behalf of a subcontractor or lower tier subcontractor. A subcontractor may request in writing, either on his or her own behalf or on behalf of a lower tier subcontractor, that the Contractor present a claim for work which was performed by the subcontractor or by a lower tier subcontractor on behalf of the subcontractor. The subcontractor requesting that the claim be presented to the City shall furnish reasonable documentation to support the claim. Within 45 days of receipt of this written request, the Contractor shall notify the subcontractor in writing as to whether the Contractor presented the claim to the City and, if the Contractor did not present the claim, provide the subcontractor with a statement of the reasons for not having done so.

4.10.3.4 Waiver of Provisions - A waiver of the rights granted by this section is void and contrary to public policy, provided, however, that (1) upon receipt of a claim, the parties may mutually agree to waive, in writing, mediation and proceed directly to the commencement of a civil action or binding arbitration, as applicable; and (2) the City may prescribe reasonable change order, claim, and dispute resolution procedures and requirements in addition to the provisions of this section, so long as the contractual provisions do not conflict with or otherwise impair the timeframes and procedures set forth in this section.

SECTION 5 – CONTROL OF MATERIALS

5.01 Materials and Workmanship

All materials, parts and equipment furnished by the Contractor in the work shall be new, high grade, and free from defects. Workmanship shall be in accordance with generally accepted standards. Materials and workmanship shall be subject to the Engineer's approval.

Materials and workmanship not conforming to the requirements of these specifications shall be considered defective and will be subject to rejection. Defective work or material, whether in place or not, shall be removed immediately from the site by the Contractor, at the Contractor's expense, when so directed by the Engineer.

If the Contractor fails to replace any defective or damaged work or material after notice from the Engineer, the Engineer may cause such work or materials to be replaced. The replacement expense shall be deducted from the amount to be paid to the Contractor.

Used or secondhand materials, parts and equipment is permissible only if permitted by the Special Provisions.

Submittals for specialized material or equipment to be used in the work that is not readily available from material suppliers (such as electroliers, luminaries, signal poles, heads, cable, controllers, pumps, etc.) shall be submitted within Seven (7) calendar days after Notice to Proceed. Time extensions will not be granted for project delays due to the unavailability of such specialized material and equipment unless the Contractor furnishes the Engineer with documentation of purchase order dates, acceptable reason for delay of delivery, or proof of diligent efforts to obtain said items from alternate sources.

The Contractor shall provide the Engineer with periodic reports to inform the Engineer of any changes in the projected material or equipment delivery dates.

5.02 Protection of Work and Materials

The Contractor shall provide and maintain storage facilities and employ such measures as will preserve the specified quality and fitness of materials to be used in the work. Stored materials shall be reasonably accessible for inspection. The Contractor shall also adequately protect new and existing work and equipment for the duration of the contract.

The Contractor shall not, without the City's consent, assign, sell, mortgage or remove equipment or materials which have been installed or delivered and which may be necessary for the completion of the contract.

5.03 Trade Names or Approved Equals

Whenever any particular material, process, or equipment is indicated by patent, proprietary or brand name, or by name of a manufacturer, such wording is used for the purpose of facilitating its description and shall be deemed to be followed by the words "or approved equal". Because products specified may have a uniqueness that can't be matched, the Contractor must "bid" the work based upon the products specified. If, during the submittal process, an equivalent product is proposed by the contractor, the contractor must provide data to show that the product is considered equal. Contractor shall also identify any price differences, which shall be considered as part of the substitution and if accepted, shall result in an appropriate credit or cost to the City by change order should the substitution be made.

Wherever catalog numbers and specific brands of trade names followed by the designation "or approved equal" are used in conjunction with a designated material, product, item, or service mentioned in these

specifications, they are used to establish the standards of quality and utility required. "Or approved equal" proposals will be subject to acceptance by the City.

Unless otherwise authorized by the Engineer, the proposed substitution must be submitted in sufficient time, before the normal use or installation of the material, process or equipment, for the Engineer to determine the equivalency and for the Contractor to make any required purchases (including delivery).

At the Contractor's expense, shall furnish data concerning items offered by the Contractor as equivalent to those specified. The Contractor shall have the material tested as required by the Engineer to determine that the quality, strength, physical, chemical, or other characteristics, including durability, finish, efficiency, dimensions, service, and suitability are such that the item will fulfill its intended function. Installation and use of a proposed item shall not occur until after approval by the Engineer.

Test methods shall be submitted for approval by the Engineer prior to the test being performed on an item proposed for substitution. Test results shall be reported promptly to the Engineer, who will evaluate the results and determine if the proposed item is equivalent. The Engineer shall determine whether the material offered is equivalent to that specified, and the Engineer's findings shall be final. If a substitute offered by the Contractor is found to be not equal to the specified material, the Contractor shall furnish and install the specified material.

The specified contract completion time shall not be affected by any circumstances developing from the provisions of this Section.

5.04 Inspection of Materials by City

Unless otherwise specified, inspection may be required at the source for such typical materials and fabricated items as bituminous paving mixtures, structural concrete, metal fabrication, metal casting, welding, concrete pipe manufacture, protective coating application, and similar shop or plant operations.

Standard items of equipment such as electric motors, conveyers, elevators, plumbing fixtures, etc., are subject to inspection at the job site. Special items of equipment such as designed electrical panel boards, large pumps, sewage plant equipment, etc., are subject to inspection at the source, normally only for performance testing. The Special Provisions may specify additional inspection requirements.

5.05 Inspection of Materials by Others

When the City does not elect to make its own inspection at the source, the Contractor shall, at its expense, engage an inspector or accredited testing laboratory to inspect the materials, equipment or process. The inspector or representative of the testing laboratory shall judge the materials by the requirements of the plans and specifications. No materials or equipment shall be shipped, nor any processing, fabrication or treatment of such materials shall be done without a favorable inspection. These materials shall be subject to re-inspection at the job-site.

5.06 Certification

The Engineer may waive material testing requirements of the Specifications and accept the manufacturer's written Certificate of Compliance or test data demonstrating that the materials to be supplied meet the requirements of the Specifications. A Certificate of Compliance is acceptable for authorizing the use of steel pipe in sizes less than 18 inches and vitrified clay, cast iron or ductile iron pipe in all sizes. The City may request any materials used on the basis of a Certificate of Compliance to be sampled or tested at any time. The fact that material is used on the basis of a Certificate of Compliance shall not relieve the Contractor of the responsibility for incorporating materials in the work which conform to the requirements of the Contract Documents.

5.07 Weighing and Metering Equipment

All scales and metering equipment used for proportioning materials shall be inspected for accuracy and certified within the past 12 months by the State of California Bureau of Weights and Measures, by the County Director or Sealer of Weights and Measures, or by a scale mechanic registered with or licensed by the County.

The accuracy of the work by a scale service agency, except as stated herein, shall meet the standards of the California Business and Professions Code and the California Code of Regulations pertaining to weighing devices. A certificate of compliance shall be presented to the Engineer for approval prior to operation, and shall be renewed whenever required by the Engineer at no cost to the City.

All scales shall be arranged so they may be read easily from the operator's platform or area. They shall indicate the true net weight without the application of any factor. The figures of the scales shall be clearly legible. Scales shall be accurate to within 1 percent when tested with the plant shut down. Weighing equipment shall be so insulated against vibration or moving of other operating equipment in the plant area such that the error in weighing with the entire plant running will not exceed 2 percent for any setting nor 1.5 percent for any batch.

5.08 Calibration of Testing Equipment

Testing equipment, such as but not limited to, pressure gages, metering devices, hydraulic systems, force (load) measuring instruments, and strain-measuring devices shall be calibrated by a testing agency acceptable to the Engineer at intervals not to exceed 12 months, and following repairs, modification, or relocation of the equipment. Calibration certificates shall be provided when requested by the Engineer.

SECTION 6 – UTILITIES

6.01 Contractor's Obligation to Identify and Protect Subsurface Infrastructure

The Contractor shall locate and protect service laterals, conduits, and appurtenances of any underground facility, the presence of which could be reasonably inferred from the Contract Documents or from the presence of visible facilities such as buildings, meters, and junction boxes, prior to doing any work that may damage any such facilities, or interfere with their service. Where underground main distribution conduits, such as water, gas, sewer, electric power, telephone, or cable television are shown on the plans, the Contractor shall assume that every parcel will be served by a service connection for each type of utility. The Contractor shall comply with all requirements for the protection of underground infrastructure.

It shall be the Contractor's responsibility to complete all work in a manner that satisfies utility company standards, providing if requested, detailed plans prepared by a California Registered Civil Engineer showing necessary temporary support of utilities during coordinated construction work. The Contractor is directed to contact these agencies before submitting bids and to be familiar with their requirements.

The Contractor agrees to assume liability and to hold the City of Sunnyvale, its officers, and employees harmless from any damages resulting from the existence of underground utilities and structures not reported to the Engineer, not indicated on the public records examined, or located at variance with that reported or shown on records examined.

6.02 Location

The City will search known records and indicate on the plans those utilities, except service connections, which may affect the work. All available information regarding removal, relocation, or disconnection of utilities, or installation of new utilities, will be furnished to prospective bidders before the receipt of bids. The Contractor shall immediately report to the Engineer those utilities omitted from the plans or found substantially at variance with the location shown.

Existing and proposed utilities and improvements are shown in their approximate locations. Locations may not have been field verified and no guarantee is made as to the accuracy and completeness of the information shown. The fact that any facility is not shown on the plans shall not relieve the Contractor of responsibility under this Section. It shall be the Contractor's responsibility to determine the existence and location of utilities shown on the plans, indicated by field locating services, or evidenced by facilities visible in the field. No additional compensation will be allowed for delays incurred as a result of the Contractor's failure to field verify and/or pothole existing utilities prior to beginning construction. Potholing shall be considered as part of the various contract bid items and no additional compensation will be allowed.

At least two (2) working days prior to commencing work, the Contractor shall request utility owners to mark or otherwise indicate the location of their substructures. Contractor shall contact Underground Service Alert (USA) at (800) 642-2444 and the Engineer at least 48 hours prior to excavation. The locations of utilities as shown on the plans are approximate and are not to be construed as certainty. It shall be the Contractor's responsibility to determine the true location and depth of all utilities and service connections affecting or conflicting with the work, prior to the performance of the work. As necessary, the Contractor shall pothole these utilities prior to working in the area to avoid damage to them. Potholing shall be considered as part of the contract bid items, and no separate payment will be made. Contractor shall familiarize himself with the type, material, age and condition of any utility which may be affected by the work.

6.03 Protection

As necessary or as directed by the Engineer, the Contractor shall field adjust proposed improvements to avoid conflicts with existing improvements. The Contractor shall not interrupt the service function or disturb the supporting base of any utility, without authority from the utility owner or order from the City.

Where protection is required to insure support of existing underground, overhead and at-grade utilities (including their associated structures and service connections) as shown on the plans, the Contractor shall furnish and place the necessary protection at Contractor's expense. In case of damage, the Contractor, without additional compensation, shall restore utilities to as good of a condition as they were found.

Upon learning of the existence and location of any utility omitted from or shown incorrectly on the plans, the Contractor shall notify the City and be fully responsible for protecting such utility. When authorized by the Engineer, additional protection may be paid by change order, for utilities other than a service connection.

The Contractor shall immediately notify the Engineer and the utility owner if the Contractor disturbs, disconnects or damages any utility. If the utility is located substantially as indicated on the plans, the Contractor shall bear the costs of repair or replacement.

When placing concrete around or contiguous to any utility, at the Contractor's expense, shall furnish and install a cushion of expansion joint material, clear opening, sleeve, or other suitable material approved by the Engineer so as to prevent embedment or bonding of the utility with the concrete.

6.04 Shut Down Notification

Contractor shall coordinate all shut downs with the City's Public Works Department, and follow all of their requirements for exercising and shutting off water valves on main lines. The Contractor shall have all materials required for the work at the job site prior to requesting a shut off.

Shut down of water or sewer services shall be done only after the Contractor has coordinated the shut down with the Engineer and the property owners. When a water main, sewer main, or service lateral is to be shut down, the Contractor shall coordinate with and notify the Engineer in writing, at least seventy-two (72) hours in advance of the shut down. Except for scheduled shutdowns and in cases of emergency, the Contractor shall notify all customers and effected parties of a shut down at least forty-eight (48) hours in advance by writing and four (4) hours in advance by person to allow adequate draw time. Once shut down, the Contractor shall proceed with the work in an expedient manner until the water lines or sewer lines are back in service.

6.05 Removal

Unless otherwise specified, the Contractor shall remove all portions of interfering utilities shown on the plans as 'abandoned' or "to be abandoned in place". Before starting removal operations, the Contractor shall ascertain from the utility owner whether abandonment is complete. The costs involved in the removal and disposal of utilities to be abandoned shall be considered as part of the contract bid items, and no separate payment will be made.

6.06 Relocation

When feasible, the owners of utilities within the area affected by the work will complete their necessary installations, relocations, repairs, or replacements before commencement of work by the Contractor. When the Contract Documents or plans indicate that a utility is to be relocated, altered or constructed by others, the City will conduct all negotiations with the owners and the work will be done at no cost to the Contractor.

Utilities interfering with the permanent project work, discovered after the award of the contract, shall either be relocated, altered, or reconstructed by the utility owners, or the Engineer may order changes in the work to avoid interference. Such changes will be addressed in accordance with General Provisions, Section 4, "Changes in Work".

When the plans or Specifications provide for the Contractor to alter, relocate, or reconstruct a utility, all costs for such work shall be absorbed in the contract bid items. Temporary or permanent relocation or alteration of utilities by and for the Contractor's convenience shall be the Contractor's responsibility, and the Contractor shall make all arrangements, obtain all approvals, and bear all costs. The Contractor may, agree with the owner of any utility to disconnect and reconnect interfering service connections for the Contractor's own convenience or to expedite the work. The City shall not be involved in any such agreement.

6.07 Delays

The Contractor is responsible for notifying utility owners in time to prevent delays attributable to utility relocations or alterations as called for in the Contract Documents. The Contractor shall not be entitled to damages or additional payment if such delay does occur. The Engineer will determine the extent of the delay on the project as a whole, and any commensurate extension of time.

6.08 Cooperation

When necessary, the Contractor shall conduct operations so as to permit access to the worksite and provide time for utility work to be accomplished during the progress of the contract work.

SECTION 7 – PROSECUTION AND PROGRESS

7.01 Notice to Proceed

Following contract execution, the City shall issue the Contractor a Notice to Proceed provided that the documents are acceptable to the City. Unless stated otherwise, the contract time shall commence upon the receipt date on the Notice to Proceed.

7.02 Commencement of Work

Work shall commence within fifteen (15) calendar days following the receipt date on the Notice to Proceed, and shall be diligently prosecuted to completion within the time provided in the Notice to Bidders.

7.03 Administrative Duties

The Contractor shall coordinate the scheduling and timing of administrative duties with other activities to avoid conflicts and to ensure orderly project progress. Such activities include, but shall not be limited to, the preparation of construction schedules, preparation and processing of submittals, requests for information and responding to requests for quotations, attending and preparing for progress meetings and coordinating project closeout activities.

7.04 Construction Schedule

The Contractor shall submit to the City and/or Construction Manager an acceptable Critical Path Method (CPM) progress schedule showing the critical path for completing the various items of work within the number of contract days specified. The schedule shall show the order in which the Contractor proposes to carry out the major items of work and the dates on which the Contractor will start and finish the various items (including procurement of materials and equipment when required by the Special Provisions). The schedule shall include activities (appropriately identified), critical activities, durations, dependencies, early and late start and finish dates, and total and free floats. Activity deviations shall not exceed 14 calendar days except for certain non-labor activities, such as curing concrete, paint drying, procurement, or delivery of materials. The schedule shall clearly identify the completion date and any specified milestones.

If requested, the schedule shall reflect person/crew hours and equipment loading for various construction activities in order for the City to better evaluate the proposed schedule.

If the Contractor's schedule shows completion prior to the contract time this creates float at the end of the schedule that will be considered as a mutual resource. The City will not charge liquidated damages in case the actual completion of work goes beyond the contractor's proposed completion date as long as the contract time is not exceeded. Similarly, the Contractor cannot charge any extended overhead if the Contractor's proposed completion date is not met for any reason as long as the completion is not delayed beyond the contract time. Contract time is the specified contract duration plus any additional days provided by contract change orders.

Preliminary Construction Schedule

A preliminary construction schedule shall be submitted at least three (3) days prior to the Preconstruction Conference. The Preconstruction Conference may be postponed if the Preliminary Construction Schedule is not received prior to the meeting. The Preliminary Construction Schedule shall be prepared in any time-scaled graphical form the Contractor chooses, and shall show or allow for the following;

1. The time scale shall be in days (not dates) and the work shall be shown as finishing on, or before, the number of days specified as the Contract Duration.
2. Specified Milestones shall be identified and shall conform to specification requirements.
3. Time for Contractor's preparation of and City's review of submittals, particularly in the early

- phases of the work, and for procurement activities.
4. Time for final inspection and completion of punchlist correction work at the end of the project.
 5. The activities shall follow a logical progressive sequence to completion of the project.

The City will review the Preliminary Construction Schedule within (5) days after the Preconstruction Conference.

Baseline Construction Schedule

The Contractor shall submit the Baseline Construction Schedule with 14 days of receiving the City's comments on the Preliminary Construction Schedule. The City will review the Baseline Construction Schedule within fourteen (14) days of receiving the schedule Provisions.

No progress payments will be made until the Baseline Construction Schedule has been favorably reviewed by the City. No construction work shall commence at the site until the Baseline Construction Schedule has been favorably reviewed by the City.

With each monthly progress payment request, the Contractor shall submit an Updated Construction Schedule showing actual progress of activities to date, and the remaining activities to completion. Progress payment requests will not be actioned if not accompanied by an Updated Baseline Schedule. Upon acceptance, the Baseline Construction Schedule shall become the working construction schedule unless replaced by a Revised Construction Schedule.

If at any time the Updated Baseline Construction Schedule indicates that the completion date has fallen behind the current due date by more than either thirty 30 days or 20% of the remaining duration, whichever is less, or the activity logic has become unfeasible for any reason, the Baseline Construction Schedule shall be revised by the Contractor. The Revised Construction Schedule shall incorporate any revised activity logic and additional or changed work to date identified by Contract Change Order number or Request for Quote number but not both. Requirements for submittal of the Baseline Construction Schedule shall apply to the Revised Construction Schedule.

Revised Construction Schedules shall be identified by sequential number and a revision date. Upon acceptance, the Revised Construction Schedule shall become the working construction schedule unless replaced by a subsequent Revised Construction Schedule.

7.05 Three Week Look Ahead Schedule

The Contractor is required to furnish to the Engineer, on a weekly basis at the project's progress meetings, a 3-week look ahead schedule. The schedule must show planned activities in sufficient detail to allow proper monitoring of the planned construction activities.

7.06 Construction Sequence

When required by the Special Provisions or plans, the Contractor shall follow the sequence of operations as set forth therein. The Contractor shall prepare and submit at the pre-construction meeting a staging or phasing plan identifying the sequence of construction work and traffic control needed to complete the project. The staging plan shall be subject to review and approval by the Engineer, prior to the start of construction. The goal of the phasing plan will be to minimize impacts to surrounding businesses and residents in the project areas.

7.07 Recording Existing Conditions

Existing conditions throughout the project site shall be photographed and video recorded by the Contractor. Recordings shall be submitted to the Engineer five (5) days before start of construction. Recording shall include and show every detail of existing improvements, including the current condition of the curb, gutter,

sidewalk, signs, landscaping, streetlights, structures near the project including face of buildings, canopies, shades, fences and any other features within the limits of work.

7.08 Preconstruction Conference

The City shall designate a date and time for the pre-construction conference once the contract has been fully executed. The meeting shall be attended by responsible representatives of the Contractor, including the designated Contractor's Representative and Job Superintendent. At the pre-construction conference, the City shall discuss various administrative procedures and project coordination issues. The City will provide one (1) full size set of reproducible contract drawings, and one unbound set of project specifications and addenda to the Contractor at the Preconstruction Conference, or shortly thereafter. The Contractor shall be responsible for conforming the drawings and specifications to incorporate the addenda, and for printing sufficient copies of drawings and specifications for the use of the Contractor, subcontractors and suppliers.

At a minimum, the Contractor should be prepared to furnish and discuss the following:

1. Letter designating the Superintendent.
2. A list of key personnel and emergency contact information including telephone numbers to be used in case of emergency.
3. Preliminary schedule and project phasing plans.
4. Utility company coordination and/or permit issues.

7.09 Progress Meeting

The Contractor, Job Superintendent and Subcontractors, if requested by the City, shall attend weekly progress meetings to be scheduled by the Engineer at a time agreeable to both the Engineer and the Contractor. Contractor shall also attend special meetings in addition to regular progress meetings if necessary and directed by the Engineer.

7.10 Hours of Construction

Construction activities shall be limited to the hours of 7:00 a.m. to 4:00 p.m., unless otherwise noted or further restricted in the Contract Documents, or as directed by the Construction Manager. No work shall be done on weekends, holidays or outside these specified hours, unless otherwise approved by the Construction Manager. The Contractor shall take into consideration and coordinate time constraints for special events or activities organized by the City or other agencies. No mechanical equipment, including hauling or deliveries by trucks, shall start before 7:00 a.m. and all equipment must shut down before 4:00 p.m. unless approved by the Construction Manager.

Exceptions to working days or hours will be considered only when, in the opinion of the Construction Manager, construction during the specified work days/hours would inconvenience the public and neighboring residents more than working at other hours or on weekends or holidays, or is deemed to be in the best interest of the City. Exceptions will not be granted merely to expedite the construction work or for the Contractor's convenience. If these exceptions are granted, Contractor shall comply with Sunnyvale Municipal Code Section 16.08.030, which restricts hours of construction noise Monday - Friday between 7:00 a.m. and 4:00 p.m. Saturday hours of operation shall be between 8:00 a.m. – 5:00 p.m.

No work shall be performed on Sundays and City Holidays. City Holidays are:

- New Year's Eve and New Year's Day
 - If the 1st of January falls on a Saturday, the holiday will be observed on the Thursday and Friday prior to New Year's Day. If the 1st of January falls on a Sunday or Monday, the holiday will be

- observed on Friday and Monday.
- Martin Luther King, Jr. Day
 - Presidents Day
 - Memorial Day
 - Independence Day
 - If the 4th of July falls on a Saturday, the holiday will be observed on the Friday prior to Independence Day. If the 4th of July falls on a Sunday, the holiday will be observed on the following Monday.
 - Labor Day
 - Thanksgiving Day
 - Day after Thanksgiving
 - Christmas Eve and Christmas Day
 - If the 25th of December falls on a Saturday, the holiday will be observed on the Thursday and Friday prior to Christmas Day. If the 25th of December falls on a Sunday or Monday, the holiday will be observed on Friday and Monday.

7.11 Prosecution of Work

To minimize public inconvenience and possible hazards and to restore the streets and other work areas to their original condition and former state of usefulness as soon as practicable, the Contractor shall diligently prosecute the work to completion. If, in the Engineer's opinion the Contractor fails to prosecute the work to the extent that the above purposes are not being accomplished, the Contractor shall, upon orders from the Engineer, immediately take the steps necessary to fully accomplish said purposes. All costs for prosecuting the work as described herein shall be absorbed in the Contractor's bid. Should the Contractor fail to take the necessary steps to fully accomplish said purposes, after orders of the Engineer to do so, the Engineer may suspend the work in whole or in part, until the Contractor takes said steps. With or without such suspension, the Engineer may cause such steps to be taken by force account or by other means at the Contractor's expense.

7.12 Suspension of Work

Work may be stopped or suspended in whole or in part when, in the Engineer's opinion, the suspension is necessary and in the interest of the City. The Contractor shall immediately comply with any written order of the Engineer suspending work. Suspended work shall be resumed upon written order of the Engineer. An extension of contract time shall be issued to the Contractor by change order. Any claim by the Contractor for an adjustment of the contract sum or the contract time shall be made within ten (10) working days after the start of suspension of the work.

If work is suspended through no fault of the City, all expenses and losses incurred by the Contractor during such suspensions shall be borne by the Contractor. If the Contractor fails to properly provide for public safety, traffic, and protection of the work during periods of suspension, the City may elect to do so, and shall deduct the cost thereof from monies due the Contractor. Such action will not relieve the Contractor from any liability.

7.13 Default by the Contractor and Termination of Control

As a result of any of the following events, the Contractor shall be deemed to be in default:

- a. If the Contractor is in bankruptcy or makes a general assignment for the benefit of creditors, or
- b. If the Contractor fails to make prompt payment to subcontractors for labor or materials, or
- c. If a receiver is appointed on account of the Contractor's insolvency, or
- d. If the Contractor fails to provide enough properly skilled workers or enough materials to insure compliance with the construction time schedule, or
- e. If the Contractor fails to perform any portion of the work within the timing requirements of the Contract Documents, or abandons the project site, or

- f. If the Contractor disregards instructions from the Engineer or violates any provision of the contract, or
- g. If the Contractor fails to replace or repair any damage caused by the Contractor or its agents, representatives, contractors, subcontractors, or employees in connection with the performance of the work, or
- h. If the Contractor violates any legal requirement related to the work.

In case of default, the City may give written notice to the Contractor and the Contractor's bonding agent that if the default is not remedied within ten (10) calendar days or the Contractor does not provide adequate written assurance to the satisfaction of the Engineer that the cure will be forthcoming, the Contractor's control over the work may be terminated as of the date specified in the written notice.

Upon such termination of control, the City may enter upon and take possession of the entire work and may also take possession, for the purpose of completing the work, of all the Contractor's tools, equipment and appliances upon the work, and all materials on the site or stored off-site for incorporation into the work. The City may, at its sole option and without further notice to anyone, complete the work by day labor, by contract entered into by negotiations, by competitive bidding, by calling upon the performance of the performance bond surety, or by other means as the City, in its discretion, shall elect.

After termination of the Contractor's control over the work as herein provided, the Contractor shall not be entitled to any further payments under the contract until the entire work thereunder has been fully completed and finally accepted by the City. After such completion and acceptance, if the "unpaid balance of the contract price" (as defined in the next paragraph) exceeds the sum of the amounts expended by the City in taking over and completing the work, including all managerial and administrative expense incurred by the City on account thereof and the amount of all damages incurred by the City by reason of the Contractor's default, such excess shall be paid to the Contractor. If the said amount expended exceeds the unpaid balance, the Contractor and the Contractor's surety shall be liable to the City for the difference. At the Contractor's request, the expense incurred by the City in taking over and completing the work, and the amount of any damage incurred by the City by reason of the Contractor's default shall be audited and certified by an independent third party, whose certificate thereof shall be binding and conclusive upon the parties.

For the purposes of the computations required by the paragraph above, the "unpaid balance of the contract price" shall be the original contract price as adjusted by any change orders issued prior to termination of the Contractor's control, less all payments made on account thereof prior to such termination, and less any and all amounts withheld or paid pursuant to stop notices filed with the City upon claims of subcontractors or others from equipment, labor or materials furnished to the work on behalf of the Contractor.

Upon completion and acceptance of the work, the Contractor shall be entitled to the return of all materials not used in the work, but without claim against the City for loss or damage with respect thereto, and shall be entitled to the return of all the Contractor's equipment, tools and appliances taken possession of by the City, but without claim against the City for any charge for the use thereof or for usual and ordinary depreciation and wear and tear.

The exercise of remedies provided for in this sub-section, for default by the Contractor, shall be in addition to, and shall not be deemed a waiver by the City of any other rights or remedies due the City under the contract provisions, for default by the Contractor.

7.14 City's Right to Terminate Contract

The City may, at its option, terminate the Agreement, in whole or from time to time in part, at any time by giving notice to the Contractor. Upon such termination, the Contractor agrees to waive any claims for damages, including loss of anticipated profits, on account thereof; and, as the sole right and remedy of the

Contractor, the City shall pay the Contractor in accordance with this sub-section. Upon termination, the obligations of the Contractor for portions of the work already performed shall continue.

- a. Upon receipt of a Notice of Termination, the Contractor shall, unless the notice directs otherwise, do the following:
 1. Immediately discontinue the work to the extent specified in the notice.
 2. Place no further orders or subcontracts for materials, equipment, services, or facilities, except as may be necessary to complete such portion of the work that are not to be discontinued.
 3. Promptly cancel, on the most favorable terms reasonably possible, all subcontracts to the extent that they relate to the performance of the discontinued portion of the work.
 4. Thereafter do only such work as may be necessary to preserve and protect the work already in progress and to protect materials, plants, and equipment on the project site or in transit thereto.
- b. Upon such termination, the City shall pay to the Contractor as a sole and exclusive remedy for the termination, the sum of the following, and the Contractor will be entitled to no other compensation or damages, and expressly waives same:
 1. The amount of the contract amount allocated to the portion of the work properly performed by the Contractor as of the date of termination, less sums previously paid to the Contractor, plus
 2. Previously unpaid costs of any items delivered to the project site which were fabricated for subsequent incorporation in the work, plus
 3. Any proven losses with respect to materials and equipment directly resulting from such termination, plus
 4. Reasonable demobilization costs in excess of what would have been incurred if work were not terminated, plus
 5. Reasonable costs for preparing a statement of the aforesaid costs, expenses, and losses in connection with such termination.

The City may terminate the Agreement at its own discretion or when conditions encountered during the work make it impossible or impracticable to proceed, or when the City is prevented from proceeding with the Agreement by act of God, by law, or by official action of a public authority.

7.15 Time of Completion and Days Charged

The Contractor shall diligently prosecute and fully complete the work within the number of calendar days set forth in the Notice to Bidders or shall be subject to liquidated damages. Full liquidated damages will be assessed for delays beyond the required substantial completion date. Reduced liquidated damages will be assessed for delays after the substantial completion date. LDs Time is of the essence in the performance of all obligations under the Contract Documents, and all timing requirements shall be strictly adhered to unless otherwise modified by the City. See General Provisions, Sections 7.11, "Prosecution of Work", and 7.16, "Liquidated Damages".

Under a calendar day contract, City observed holidays and inclement weather delays are to be anticipated and unless there is a deviation from what is customary for the time of year the project is under construction,

no additional days will be granted. Every day, including holidays, Saturdays and Sundays shall be counted as a day charged under a calendar day contract.

7.16 Liquidated Damages

The City and the Contractor, by execution of the agreement, each agree that time is of the essence in the performance of the work, and that actual damages for inconvenience and loss from any delay in completion of the contract beyond the date provided in the Notice to Bidders is extremely difficult or impossible to determine.

The City and the Contractor further agree, as specified in the Notice to Bidders, that liquidated damages shall be assessed for each and every calendar or working day required to complete the contract in excess of the contract time established for the project, and that the amount stated therein is a reasonable estimate of the amount of such damages. The Engineer may deduct any liquidated damages owed to the City, as determined by the Engineer from any payments otherwise payable to the Contractor under this agreement.

Nothing contained herein shall limit the City's rights or remedies against Contractor for any default other than failure to complete the work within the contract time. This provision for liquidated damages shall not be applicable nor act as a limitation upon the City if the Contractor abandons the work. In such event, the Contractor shall be liable to the City for all losses incurred.

The date of the Engineer's Certificate of Substantial Completion shall be the termination date, if applicable, of full liquidated damages. The completion date of the project shall be the termination date, if applicable, of reduced liquidated damages, after substantial completion. Tiered liquidated damages shall be more fully detailed in the Special Provisions.

Separate from the above-mentioned liquidated damages, the Contractor may be responsible for paying all damages incurred by third parties due to non-completion of the project by the date specified.

7.17 Delays and Extensions of Time

- a. *Excusable Delays* – shall mean delays in the prosecution or completion of the work which result from causes beyond the control of the Contractor and City and which could not have been avoided by the exercise of care, prudence, foresight, and diligence on the part of the Contractor, suppliers, or any tier of the Contractor's subcontractors. Excusable Delays fall into the following categories:
 1. *Abnormal Delays* – Excusable Delays caused by acts of God, fire, unusual storms, floods, tidal waves, earthquakes, strikes, labor disputes, freight embargoes, and shortages of materials insofar as they prevent the Contractor from proceeding with at least seventy-five (75) percent of the normal labor and equipment force for at least five (5) hours per calendar day toward completion of the current critical path activity.
 2. *Weather Delays* – Excusable Delays due to inclement weather conditions or the conditions resulting from weather prevent the Contractor from proceeding with seventy-five (75) percent of the normal labor and equipment force engaged in the current critical activity item for a period of at least five (5) hours per calendar? day toward completion of the current critical path activity.
 3. *Material Shortage Delays* – Excusable Delays due to shortages of material, provided that the Contractor submits satisfactory proof to the Engineer. For the proof to be satisfactory, the Contractor must demonstrate that every effort to obtain the materials from all known sources within reasonable reach of the proposed work. Only the physical shortage of material, caused by unusual circumstances, will be considered under these provisions as an excusable delay, and no consideration will be given to any claim that material could not be obtained at a reasonable, practical, or economical price, unless it is shown to the satisfaction of the Engineer

that such material was only available at exorbitant prices. A material shortage delay will not be considered for material ordered or delivered late or for material whose availability is affected by virtue of mishandled procurement. The above provisions shall apply equally to equipment to be installed in the work.

- b. **Compensable Delays** – shall include delays that occur in the prosecution or completion of the work, through no fault of the Contractor which prevent the Contractor from proceeding with at least seventy-five (75) percent of the normal labor and equipment force for at least five (5) hours per calendar day toward completion of the current critical activity item(s) on the latest favorably reviewed progress schedule due to the following causes:
 - 1. Delays due solely to the actions and/or inactions of the City.
 - 2. Delays due to changed conditions as defined in General Provisions, Section 4.05, “Requests for Information, Inconsistencies and Changed Conditions”.
 - 3. Delays due to other Contractors employed by the City who interfere with the Contractor's prosecution of the work as defined above.
- c. **Inexcusable Delay** – means any delay in the completion of the work beyond the expiration of the contract time resulting from causes other than Excusable Delays or Compensable Delays. An Inexcusable Delay shall not entitle the Contractor to an extension of the contract time or an adjustment of the contract sum.
- d. **Concurrent Delays** – those periods of delay when the prosecution of the work is delayed during the same period of time due to causes from a combination of the delays defined as Excusable, Compensable or Inexcusable.

If the Contractor desires an extension of time, the Contractor shall file a written request based upon the delays reported. The Engineer will ascertain the facts, the extent of the delays, and the effect upon the entire project, and the City will grant an extension of time equivalent to verified time lost. The request for an extension of time must be made no later than Fourteen (14) calendar days after the start of the condition that purportedly caused the delay, and no later than twenty-one (21) calendar days after the date on which performance on the condition purportedly causing the delay has ended.

Contractor may make a delay claim for an extension of the contract time for an Excusable Delay or a Compensable Delay. If an Excusable Delay and a Compensable Delay occur concurrently, the maximum extension of the contract time shall be the number of calendar days from the commencement of the first delay to the cessation of the delay which ends last. If an Inexcusable Delay occurs concurrently with either an Excusable Delay or a Compensable Delay, the maximum extension of the contract time shall be the number of calendar or working days, if any, by which the Excusable Delay or the Compensable Delay exceeds the Inexcusable Delay.

For a Compensable Delay, the Contractor may make a delay claim for an adjustment in the contract sum in an amount equal to the sum of the actual and unavoidable additional costs of labor, material, and equipment furnished at the site by the Contractor or subcontractors.

Extensions of time, when granted, will be based upon the effect of delays to the project as a whole and will not be granted for non-controlling delays to minor portions of the work unless it can be shown that such delays did, in fact, delay the progress of the project as a whole. For purposes of determining delays, all float associated with the project schedule shall belong to the project. See General Provisions, Section 7.04, “Construction Schedule”.

If delays are caused by unforeseen events beyond the control of either the Contractor or the City, such delays will entitle the Contractor to an extension of time as provided herein, but the Contractor shall not be entitled to damages or additional payment due to these delays. War, governmental regulations, labor disputes, strikes, fires, floods, adverse weather necessitating cessation of work, other similar action of the elements, inability to obtain materials, equipment, or labor because of Federal Government restrictions arising out of National Defense, required extra work, action or inaction by the City, or other specific reasons as may be further described in the specifications may constitute such a delay. If delays beyond the Contractor's control are caused by reasons other than those mentioned above, but are substantially equal in gravity to those enumerated, an extension of time may be granted, if deemed by the Engineer to be in the best interests of the City.

For Compensable Delay periods resulting in indirect overhead expenses, the Contractor shall be reimbursed as provided for in General Provisions, Section 4, "Changes in Work".

7.18 Substantial Completion

When work in accordance with the Contract Documents has progressed to a stage of one-hundred percent (100%) complete, as determined by the Engineer, except for the completion of minor punch list items of deficiencies or omissions in the work which require correction in order to satisfy the agreement, yet do not impair the City's ability to occupy and fully utilize the work for its intended purpose, the project shall be deemed "Substantially Complete". Portions of the work may also be designated by the City as substantially complete if the Contract Documents require separate delivery.

When the Engineer determines that the work or such designated portions of the work are substantially complete, the Engineer will prepare and sign a Certificate of Substantial Completion. The date of substantial completion shall establish the date of occupancy by the City and the transfer of responsibility from the Contractor to the City for such items as security, maintenance, heat, utilities, insurance, and damage to the work from causes other than that of the Contractor. Unless otherwise indicated in the Certificate of Substantial Completion, the Contractor's guarantee for the Work shall commence upon the date of substantial completion.

7.19 Project Completion and Closeout

After the Contractor has received the Certificate of Substantial Completion and has only minor work remaining, project closeout may begin. The following items and procedures are required as part of the project close out process.

- a. Within 14 days from the issuance of the Certificate of Completion, a pre-final inspection will be scheduled and conducted by the City. As a result of the inspection, the City will advise the Contractor of any work that must be completed, in the form of a punch list.
- b. Following the completion of punch list items, the Contractor shall make a written request to the city to conduct a final inspection. The written request shall be accompanied by a Certification that the work has been performed in accordance with the Contract Documents, and shall be on the Contractor's Certification of Completion form submitted online via e-Builder.
- c. Upon satisfactory completion of the punch list items, the City will consider the construction work complete and issue a completion letter establishing the completion date and detailing required closeout items for the contract.
- d. The contractor shall provide a final payment request with lien releases (if applicable) in a format acceptable to the City.

Should it become necessary, due to developed conditions, for the City to occupy any portion of the work, or any part of any structure or equipment, before the contract is completed or accepted, such occupancy shall not constitute an acceptance of any part of the work, unless so stated in writing by the City.

7.20 Acceptance

Acceptance by the Director of Public Works will be recommended after the work has been fully completed and when all the requirements for Acceptance are met as set forth in the Contract Documents. Following acceptance, a Notice of Completion will be filed with the County Recorder. Remaining contract retention will be released within 35 days of recording of the Notice of Completion with the County Recorder or within 60 calendar days, whichever is shorter.

7.21 Protection and Cleanup

The scope of this project includes the protection of all work until completion of all the work and removal of all excess construction equipment, materials and debris from the site, in accordance with these specifications.

The Contractor shall be responsible for repair or replacement of work damaged due to any vandalism prior to completion of the work.

7.22 Risk of Loss

The Contractor shall be responsible for the charge, care and protection of the project and shall bear all risks of injury or damage to the work, materials or equipment delivered to the site, by any means including fire, earthquake, wind, storm or other action of the elements, vandalism, or loss by theft, from the date of commencement of construction to the date of formal acceptance by the City Council. The Contractor shall rebuild, repair, restore and make good all injuries or damage to any portion of the work, and shall bear the entire expense thereof, except such injuries or damages that are caused by riot, insurrection, acts of the Federal or State Government, or a public enemy in time of war.

7.23 Use of Improvements During Construction

The City reserves the right to take over and utilize all or part of any completed facility or appurtenance. Such action by the City will not relieve the Contractor of responsibility for injury or damage to said completed portions of the improvement resulting from use by public traffic, from the action of the elements or from any other cause attributable to the Contractor's operations or negligence. The Contractor will be required to restore such portions of the improvement before final acceptance. Nothing in this Section shall be construed as relieving the Contractor from full responsibility for correcting defective work or materials.

SECTION 8 – RESPONSIBILITIES OF THE CONTRACTOR**8.01 Contractor's Responsibility for the Work**

The Contractor shall supervise, coordinate, and direct the work using Contractor's best skill and attention. Contractor shall have control over and be solely responsible for construction means, methods, techniques, sequences, procedures, and the coordination of all portions of the work in accordance with the terms of the Contract Documents.

The Contractor shall be responsible for assuring that all portions of the work, including those portions already performed under the Contract, conform to the requirements of the Contract Document and are ready to receive subsequent work.

The Contractor shall furnish and maintain in good condition all equipment and facilities as required for the proper execution and inspection of the work. Such equipment and facilities shall meet all requirements of applicable ordinances and laws.

8.02 Contractor's Responsibility for Subcontracted Work

The City will deal directly with, and make all payments to the Contractor only. The Contractor shall be responsible for the coordination of all trades, subcontractors, and suppliers engaged upon the work. Neither the City nor the Engineer will undertake to settle any differences between the Contractor and the Contractor's subcontractors.

All persons engaged in the work, including subcontractors, will be considered as employees of the Contractor. The Contractor will be held responsible for their work and shall be responsible to the City for acts and omissions including those by their respective agents and employees.

When subcontracted work is not prosecuted in a manner satisfactory to the Engineer, the Contractor shall be notified to take corrective action within a specified time. If timely correction is not made, then upon receipt by the Contractor of written instructions from the Engineer, the Subcontractor shall be removed immediately from the work and shall not be re-employed.

8.03 Project Staff

The Contractor shall assign to the Project, a full time Project Manager, approved by the City, throughout the duration of the project. The Project Manager shall have a minimum of fifteen years (15) years of experience as a Project Manager on construction projects comparable to in size, scope and complexity to construction "Scope of Work" described in the bid plans and specifications. A bachelor's degree in any basic science, or an equivalent combination of education and experience is required.

In addition to the Project Manager, the Contractor shall employ a competent on-site project team including, but not limited to, a full-time Superintendent. The Project Manager and Superintendent shall be supported by a QA/QC Manager, Project Scheduler, Safety Officer and necessary assistants who shall be in attendance at the Project site as necessary. The Project Manager shall represent the Contractor, and communications given to the Project Manager shall be as binding as if given directly to the Contractor. The Contractor shall confirm all communications in writing. At any other time when the Project Manager is absent from the Project site, the Project Manager shall nevertheless keep the State advised of the Project Manager's whereabouts so that the Project Manager may readily be reached and available for consultation at the Project site at any time.

The Contractor shall submit the résumé(s) of the proposed Project Manager and Superintendent including all proposed support staff to the City and/or Construction Manager for review and acceptance. The resumes shall include but not limited to, work experience, education, training completed, memberships in professional associations, professional certifications and registrations. Documentation confirming the

qualifications and personal references or contacts for verification are required. The Owner may reject the person(s) proposed for failure to have adequate qualifications, past performance or other reasonable and lawful causes. The Approval of the Owner is required, if at any time the Contractor seeks to remove, discharge or replace any of the approved contractor staff.

8.04 Character of Employees

Only competent supervisors and workers shall be employed on the work, and, if required by the Owner, the Contractor shall discharge any person who commits trespass or is, in the opinion of the Owner, disorderly, dangerous, insubordinate, incompetent, or otherwise objectionable. Such discharge shall not be the basis of any claim for compensation or damages against the City of Sunnyvale or any of its officers, employees or agents.

8.05 Laws to be Observed

The Contractor shall fully observe and comply with all State and Federal laws including those of CAL-OSHA and municipal ordinances and regulations which in any manner affect those engaged or employed in the work, or the materials used in the work, or which in any way affect the conduct of the work, and of all such orders and decrees of bodies or tribunals having jurisdiction or authority over the same. The Contractor shall also cause all agents and employees engaged on the project to observe and comply with all such laws, ordinances, regulations, orders and decrees of bodies or tribunals having any jurisdiction or authority over the work; and shall protect and indemnify the City of Sunnyvale and all officers, employees, and agents thereof connected with the work against any claim or liability arising from or based on the violation of any such law, ordinance, regulation, order, or decree, whether by the Contractor or its employees, or subcontractors. If any discrepancy or inconsistency is discovered in the plans, drawings, specifications or contract for the work in relation to any such law, ordinance, regulation, order or decree, whether by the Contractor or its employees, or subcontractors, the Contractor shall forthwith report the same to the Owner in writing.

- a. *Non-Discrimination* – Contractor shall abide by all federal and state laws preventing discrimination in the employment of persons upon public works and shall ensure by appropriate contract provisions that all subcontractors are similarly obligated to comply with all such laws. These laws include, but are not limited to the following California Labor Code Section 1735 which provides that “No discrimination shall be made in the employment of persons upon public works because of the race, religious creed, color, national origin, ancestry, physical disability, mental disability, medical condition, marital status, or sex of such persons, except as provided in Section 12940 of the Government Code, and every contractor for public works violating this section is subject to all the penalties imposed for a violation of this chapter”. Likewise, Contractor and all of its subcontractors shall abide by the provisions of California Labor Code Section 1777.6 prohibiting discrimination in the acceptance of otherwise qualified apprentices; and California Labor Code Section 3095 which declares unlawful the discrimination in any recruitment or apprenticeship program on stated grounds. City shall be entitled to retain and withhold all penalties as authorized pursuant to California Labor code, Division 2, Part 7, Chapter 1, commencing with Section 1720 and following, in accordance with the provisions of that Chapter, and the regulations established by the Director of Industrial Relations pursuant to the statutory authority of such chapter.
- b. *Hours of Labor* – Pursuant to Labor Code, Sections 1810, eight (8) hours labor shall constitute a legal day's work and as such, the Contractor shall not permit any worker to labor more than eight (8) hours during any one (1) calendar day or more than forty (40) hours during any one (1) calendar week, except as permitted by law and in such cases only upon such conditions as are provided by law. Pursuant to Labor Code, Sections 1813, Contractor shall forfeit to the City, as a penalty, twenty-five dollars (\$25.00) for each worker employed in the execution of this Agreement by Contractor, or any Subcontractor, for each calendar day during which such worker is required or permitted to work more than eight (8) hours in any one (1) calendar day or more than forty (40) hours in any one (1) calendar week in violation of the terms of this Section or in violation of the

provision of any law of the State of California. Such forfeiture amounts may be deducted from the contract sum. Contractor and each Subcontractor shall keep, or cause to be kept, an accurate record showing the actual hours worked each calendar day and each calendar week by each worker employed on the project, which record shall be kept open at all reasonable hours to the inspection of the City, its officers and agents, and to the inspection of the appropriate enforcement agency of the State of California.

- c. *Prevailing Wage* – As identified in the Notice to Bidders, the work contemplated by this agreement is a public work subject to prevailing wages under California Labor Code, Sections 1720 et. seq. The State of California Department of Industrial Relations has ascertained the general prevailing per diem wage rates in the locality in which the work is to be performed for each craft, classification, or type of worker required to perform the work. A schedule of the most recent general prevailing per diem wage rates made available to the City will be on file at the City's principal facility office and will be made available to any interested party upon request. This prevailing wage rate schedule is provided by the City for Bidder's information only and is not guaranteed by the City to be current. Contractor is obligated to verify all appropriate prevailing wage rates and pay those rates as required. By this reference the verified current schedule of prevailing wage rates is made part of the Contract Documents. Contractor shall pay not less than the prevailing per diem wage rates, as specified in the schedule and any amendments thereto, to all workers employed by Contractor in the execution of the work. Contractor shall cause all subcontracts to include the provision that all Subcontractors shall pay not less than the specified prevailing per diem wage rates to all workers employed by such Subcontractors in the execution of the work.

Contractor shall forfeit to the City, as a penalty, no more than fifty dollars (\$50.00) for each calendar day or portion thereof for each worker that is paid less than the specified prevailing per diem wage rates for the work or craft in which the worker is employed for any portion of the work done by Contractor or any Subcontractor in violation of the provisions of the Labor Code, and in particular Sections 1770 to 1781 thereof, inclusive. Such forfeiture amounts may be deducted from the contract sum. Contractor shall also pay to any worker who was paid less than the specified prevailing per diem wage rate for the work or craft for which the worker was employed for any portion of the work, for each calendar day, or portion thereof, for which the worker was paid less than the specified prevailing per diem wage rate, an amount equal to the difference between the specified prevailing per diem wage rate and the amount which was paid to the worker.

The City will not recognize any claim for additional compensation because of the payment by the Contractor for any wage rate in excess of prevailing wage rates set forth in the Agreement, including payment in excess of the prevailing wage for extra work paid by force account. The possibility of wage increases is one of the elements to be considered by the Contractor in determining the Contractor's bid and will not, under any circumstances be considered as the basis of a claim against the City under the Agreement.

- d. *Certified Payroll Records* – Pursuant to Labor Code, Sections 1776, Contractor and all Subcontractors shall keep an accurate payroll record, showing the name, address, social security number, job classification, straight time and overtime hours worked each day and week, and the actual per diem wages paid to each journeyman, apprentice, worker, or other employee employed in connection with the work. All payroll records shall be certified as being true and correct by Contractor or Subcontractors keeping such records; and the payroll records shall be provided to the City no later than three weeks after closing of payroll for City-funded projects, and no later than one week for federal aid projects. Certified payroll shall also be made available for inspection upon request by the State of California Division of Labor Standards Enforcement, or the Division of Apprenticeship Standards of the State of California Division of Industrial Relations.

Each Contractor and every lower-tier Subcontractor will be required to submit certified payrolls and labor compliance documentations electronically via the software LCPTracker. Contractor shall

cause all subcontracts to include the provision that all Subcontractors submit certified payrolls and labor compliance documentation electronically via LCPtracker. Electronic submission will be a web-based system, accessed on the World Wide Web by a web browser. Each Contractor user will be given a Log-On identification and password to access the City's reporting system. Access will be coordinated by a City representative.

- e. *Apprentice Program* – Attention is directed to State of California Labor Code, Sections 3095, 1777.5, 1777.6, and 1777.7 and Title 8, California Code of Regulations, Section 200, and the applicable Sections that follow. Responsibility for compliance with these requirements lies with the Contractor. To ensure compliance and complete understanding of the law requiring apprentices, and specifically the required ratio thereunder, Contractor or Subcontractors should, where some question exists, contact the Division of Apprenticeship Standards, 525 Golden Gate Avenue, San Francisco, California, or one of its branch offices prior to commencement of the work. In the event Contractor willfully fails to comply with this Section, it will be considered in violation of the requirements of the Contract.

Contractor and all of its subcontractors shall abide by the provisions of California Labor Code Section 1777.6 prohibiting discrimination in the acceptance of otherwise qualified apprentices; and California Labor Code Section 3095 which declares unlawful the discrimination in any recruitment or apprenticeship program on stated grounds. City shall be entitled to retain and withhold all penalties as authorized pursuant to California Labor code, Division 2, Part 7, Chapter 1, commencing with Section 1720 and following, in accordance with the provisions of that Chapter, and the regulations established by the Director of Industrial Relations pursuant to the statutory authority of such chapter.

Nothing contained herein shall be considered or interpreted as prohibiting or preventing the hiring by Contractor or Subcontractors of journeyworker trainees who may receive on-the-job training to enable them to achieve journeyworker status in any craft or trade under standards other than those set forth for apprentices.

8.06 Special Permits, Licenses and Fees

Unless otherwise stated in the Supplemental Provisions, the Contractor shall procure all permits and licenses, pay all charges and fees, including, a City business license tax, and give all notices necessary for lawful prosecution of the work. All permits, licenses, and other authorizations shall be secured in sufficient time to prevent delays to the work. The Contractor shall comply with the provisions of said permits, licenses and other authorizations.

In the event that the City has obtained permits, licenses, or other authorization applicable to the work in conformance with the requirements of California Environmental Quality Act (CEQA) (Public Resources Code, Sections 21000 and following), the Contractor shall comply with the provisions of these permits, licenses, and other authorizations.

For City Capital Improvement Construction Projects, the Contractor shall obtain a "No Fee" encroachment and/or building permit. Contractor shall coordinate through the Engineer and the City's Building Division to ensure that all appropriate construction inspections occur. Contractor shall be responsible to obtain all signatures required for the work.

8.07 Coordination and Cooperation

Construction work by utility companies or other contractors may be needed or may be occurring simultaneously within or adjacent to the limits of work for this project. The Contractor shall coordinate and cooperate with all other contractors and utility companies throughout the duration of this project to avoid delays and minimize interference and conflicts. Cooperation will be required in the arrangement for the storage of materials, and in the detailed execution of the work. It is the Contractor's responsibility to ascertain the nature

of work by others, coordinate the work, and install, modify, and maintain traffic control as necessary to avoid interferences and delays on the construction activities. Failure of the Contractor to keep informed of the work progressing on the site and failure to give written notice of lack of progress or defective workmanship by others shall be construed as acceptance by the Contractor of the status of the work as being satisfactory for proper coordination with Contractor's own work.

The City reserves the right to perform work or allow others to perform work, as necessary, within or adjacent to the limits of this project, at any time. If the Contractor or any of the Contractor's Subcontractors or employees cause loss or damage to any separate contractor on the work, the Contractor, by agreement or arbitration will settle any claim for such loss or damage if the Contractor deems it necessary. If such separate contractor shall sue the City, on account of any loss so sustained, the City shall notify the Contractor, who shall indemnify and save harmless the City against any loss or damage arising therefrom, including the cost and expense of defending any such suit.

The Contractor's bid shall absorb all costs involved in coordinating the work with others. The Contractor will not be entitled to additional compensation from the City for damages resulting from such simultaneous, collateral and essential work.

8.08 Use of Premises

The Contractor shall confine construction activities to the project limits; which shall consist of right-of-way, easements and/or property owned by the City of Sunnyvale, without exception, unless otherwise authorized in writing by the City. With prior approval of the Engineer, adjacent street right-of-way may also be utilized for day-to-day operations. Unless approved by the Engineer, no storage of materials and equipment will be allowed to remain within the right-of-way during non-working hours, on the weekends, or during holidays.

Each day, after the completion of construction operations, unless otherwise approved by the Engineer, the project limits shall be secured and made accessible to the public. All excess materials and equipment not protected by approved traffic control devices (such as k-rails) shall be relocated to a staging area or demobilized. Trench spoils shall be off-hauled daily and open excavations shall be protected with steel plates.

Personnel of Contractor and Subcontractors shall not occupy, live upon, or otherwise make use of the project site during any time that work is not being performed at the project site, except as otherwise provided for in the Contract Documents for issues such as site security.

8.09 Construction Staging and Field Office

If additional space beyond the construction limits is necessary for staging, the Contractor shall make special arrangements with neighboring property owner(s) to secure a staging area for a field office and/or material and equipment storage at the Contractor's own cost and initiative. The staging area must be fenced, with screening, and shall be operated in a manner that minimizes the inconvenience to neighbors.

Areas used to store materials, supplies or equipment overnight shall be defined as a staging area. City streets shall not be used as staging areas unless specifically authorized in writing by the City Representative. Vacant and/or city-controlled land may be used as staging area only with written permission of the City Representative. Privately owned lots shall not be used as staging areas without specific written consent of the property owner. A copy of such private property owner consent shall be submitted to the City Representative prior to use of private property as a staging area. No equipment shall be left on residential streets on Saturday, Sunday or holidays unless work is active on the day.

The Contractor is encouraged to negotiate side agreements with the property owner of such sites prior to submitting bids. In addition to approval from the property owner, the Contractor may also need to secure a Use Permit from the City's Planning Division.

8.10 Site Security

Contractor shall be responsible for the care and custody of work and the site, including all necessary security provisions, on a 24-hour per day basis throughout the entire term of the Agreement. The Contractor shall provide and maintain storage facilities and employ such measures as will preserve the specified quality and fitness of materials to be used in the work.

8.11 Construction Water

Construction water is available at cost to the Contractor. The Contractor is responsible for obtaining the required hydrant meter from the City at the City Hall Annex, located at 650 West Olive Avenue, Sunnyvale, CA 94086.

8.12 Project Site Maintenance

- a. *Disposal of Material* – Unless otherwise shown on the plans or specified herein, all excess materials and materials removed from existing improvements shall become the property of, and be disposed by the Contractor. The Contractor shall be responsible for all costs associated with disposing all excess materials in a safe and legal manner. No material shall be placed on private or public property without prior approval from the City and the property owner. The Contractor shall not allow any refuse, excavated material, surplus concrete or mortar, or any associated washings, to be disposed upon paved streets, into manholes or into the City's storm drain system.

Contractor shall establish a system for daily collection and disposal of waste materials from construction areas and elsewhere on the site. Contractor shall handle waste materials that are hazardous, dangerous, or unsanitary separately from inert waste by containerizing appropriately. Burning or burying of waste materials on site will not be permitted.

All materials removed from the existing improvements identified in the project plans to be salvaged, shall be delivered to the City Corporation Yard at 221 Commercial Street or at any other site designated by the Engineer within the City, at no additional cost.

- b. *Cleanup and Dust Control* – At all times during construction, including weekends and holidays, and throughout all phases of construction, including work suspensions and until final acceptance of the project, the Contractor shall keep the work site clean and free from rubbish, debris, and prevent the formation of an airborne dust nuisance.

Materials and equipment shall be removed from the site as soon as they are no longer necessary. Upon completion of the work and before final inspection, the entire site shall be cleared of equipment, unused materials, and rubbish so as to present a satisfactory clean and neat appearance. All cleanup costs shall be absorbed in the Contractor's bid.

The Contractor shall abate dust nuisance by cleaning, sweeping, and sprinkling with water, those excavated areas of dirt or other materials which are prone to causing dust, within both the project site and the storage or staging area. If required or directed by the Engineer, the Contractor shall provide an approved water truck of large capacity with spraying capability.

Contractor shall perform thorough daily street sweeping as deemed necessary by the City Representative. The contractor shall have on-site or readily available, street sweeping equipment capable of performing sweeping with mechanical brooms and with either regenerative air vacuum filter technology. Mechanical brooms shall be used for wet soil, or soils that are ground into the texture of the pavement. Regenerative air or vacuum filter equipment shall be used for dry soils to minimize dust disturbance. If in the opinion of the City Representative, sweeping is not performed in an adequate manner, the City reserves the right to perform the necessary work with City or other forces and back-charge the contractor for the cost.

The Contractor shall be required to apply water for dust control immediately during construction efforts and within one (1) hour after notification by the Engineer that an airborne nuisance exists. If dust control is not adequate in the opinion of the Engineer, the Engineer will have this work done by others and will deduct such cost from the total contract price.

All hauling trucks or other construction vehicles leaving the site shall be cleaned of mud or dirt clinging to exterior body surfaces or wheel rims before traveling on City streets outside the work limits. All trucks coming to or leaving the site with materials or loose debris shall be loaded in a manner, which will prevent the dropping of materials or debris on City streets. Spillage resulting from hauling operations along or across any public traveled way shall be removed immediately at the Contractor's expense.

When construction operations cause dirt to be deposited on public streets, the Contractor shall immediately remove such material. Streets shall be cleaned by street sweeping, rather than flushing, so as to prevent mud from entering the storm drain system.

Excess excavated material shall be removed from the site immediately. Sufficient material may remain for use as backfill if permitted by the specifications. Forms and form lumber shall be removed from the site as soon as practicable after stripping.

Failure of the Contractor to comply with the Engineer's cleanup orders may result in an order to suspend work until the condition is corrected. No additional compensation will be allowed as a result of such suspension.

- c. *Air Pollution Control* – The Contractor shall not discharge smoke, dust, or any other air contaminants into the atmosphere in such quantity as will violate the regulations of any legally constituted authority.
- d. *Noise Control* – The Contractor shall make every reasonable effort to control noise generated as a result of construction to the satisfaction of the Engineer. Use of an air compressor, jackhammer or other loud, vibrating sound generating device shall be limited to operations between the hours of 8:00 a.m. and 4:00 p.m. unless otherwise authorized by the Engineer.
- e. *Pest Control* – At the time of acceptance, structures entirely constructed under the contract shall be free of rodents, insects, vermin and pests. Necessary extermination work shall be arranged and paid for by the Contractor as part of the contract work within the contract time and shall be performed by a licensed exterminator in accordance with requirements of governing authorities. The Contractor may be liable for injury to persons or property and responsible for the elimination of offensive odors resulting from extermination operations.
- f. *Sanitation* – The Contractor shall provide and maintain enclosed toilets and hand washing stations for the use of employees engaged in the work. These accommodations shall be maintained in a neat and sanitary condition. They shall also comply with all applicable laws, ordinances and regulations pertaining to the public health and sanitation of dwellings and camps.
- g. *Wastewater* – Wastewater systems shall not be interrupted. Should the Contractor disrupt existing sewer facilities, the Contractor shall immediately notify the Engineer, and the Contractor shall establish a plan, subject to the approval of the City, to convey the sewage in closed conduits and disposed of it back into the sanitary sewer system. Sewage shall not be permitted to flow in trenches or be covered by backfill.
- h. *Temporary Light, Power and Water* – The Contractor shall furnish, install, maintain, and remove all temporary light, power, and water, including piping, wiring, lamps, and other equipment, necessary

for the work at the Contractor's own expense. The Contractor shall not draw water from any City water source, except to extinguish a fire, without first obtaining a hydrant meter from the City. Temporary wiring and electrical facilities shall be in accordance with applicable provisions of Electrical Safety Orders of the State of California. The Contractor shall provide, maintain, and remove upon completion of work, temporary utilities and construction required for performance of the work, and safety of personnel.

For permanent utility connections, the Contractor shall coordinate with the proper agencies, any utility connections required. Contractor shall be responsible for distribution of power or water to points of use.

- i. *Storm Water Pollution Control* – Storm Water Pollution Control work shall consist of following Best Management Practices (BMP) for storm water pollution prevention, submitting a Storm Water Pollution Prevention Plan (SWPPP) in compliance with all NPDES requirements, and constructing those facilities which may be required to provide prevention, control, and abatement of water pollution. SWPPP shall address how the Contractor will prevent materials specified above from being rinsed or washed into the storm drain system and which BMPs will be implemented for preventing sediment and pollutant discharges into the stormwater system.

In compliance with State and Federal regulations on construction storm water management and non-point source pollution control, no pollutants will be allowed to enter the storm drainage system. The Contractor shall be responsible for containing and removing any waste from the Contractor's construction operations using the appropriate BMP. The Contractor shall be responsible for cleaning catch basins of solid or liquid waste materials originating from the Contractor's operation before this material migrates further into the storm drain system. Violation of this provision shall cause the City to issue a stop-work notice and take necessary action to require the Contractor to correct and comply with regulations. All costs related to the stop-work action and corrective work to come into compliance shall be fully borne by the Contractor.

All construction efforts shall be conducted in a manner which prevents the release of hazardous material or hazardous waste into the soil or groundwater, and minimizes the discharge of pollutants into the storm drain system. The Contractor shall comply with guidelines to prevent pollutants from entering the public storm drain system that would otherwise allow pollutants to flow into creeks and then directly into San Francisco Bay.

The Contractor is prohibited from rinsing or washing any of the following materials into the streets, shoulder areas, inlets, catch basins, or gutters:

- | | |
|-------------------------------------|--|
| — Concrete | — Paints (water and oil based) and paint chips |
| — Grout | — Gasoline |
| — Mortar | — Diesel Fuel |
| — Drywall compound | — Oil |
| — Cement and stucco | — Sawdust |
| — Solvents and adhesives | — Asphalt and concrete sawcut slurry |
| — Thinners | — Fertilizer or pesticides |
| — Sediment/dirt | — Sand blast grit and material |
| — Cleared vegetation/plant material | — Other construction materials or wastes |

In addition, the Contractor shall implement appropriate measures to reduce sediment and pollutants in storm water discharges from construction sites on jobs within the City of Sunnyvale. Information on Best Management Practices (BMPs) is available from a variety of sources, including (but not limited to) the following references:

Blueprint for a Clean Bay - Best Management Practices for the Construction Industry to prevent Stormwater Pollution from Construction-Related Activities; City of Sunnyvale latest revision at <https://sunnyvale.ca.gov/civicax/filebank/blobdload.aspx?blobid=25269>

California State Best Management Practices (BMP) Handbooks (Construction, New Development and Redevelopment, Municipal, and Industrial) Revised. California Storm Water Quality Association, 2003.

https://www.casqa.org/sites/default/files/BMPHandbooks/BMP_Municipal_Complete.pdf

Erosion and Sediment Control Field Manual, Third Edition. California Regional Water Quality Control Board San Francisco Bay Region, 2009.

https://www.waterboards.ca.gov/sanfranciscobay/board_info/agendas/2009/may/6_Appendix_A1.pdf

The Contractor shall refer to the Technical Specifications for any additional requirements related to discharges to storm sewers. The City will monitor the construction site to ensure that the Contractor complies with all contract requirements. The Contractor shall submit for review a Storm Water Pollution Prevention Plan that addresses:

1. How the Contractor will prevent materials specified above from being rinsed or washed into the storm drain system, and
2. Which BMPs will be implemented for preventing sediment and pollutant discharges into stormwater discharges.

The Contractor shall not proceed with any site work which potentially creates any material that could enter the storm drain system, until the accepted Storm Water Pollution Prevention Plan is in place.

The first progress payment will not be made until the Storm Water Pollution Prevention Plan has been submitted and favorably reviewed.

8.13 Climate Preservation

Idling times will be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes (as required by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations [CCR]), or less. Clear signage will be provided at all access points to remind construction workers of idling restrictions.

8.14 Preservation of Property

The Contractor shall be responsible for the protection of public and private property adjacent to the work.

Due care shall be exercised to avoid damage to existing roadway improvements and facilities, adjacent property, roadside trees, lawn and shrubbery not designated for removal, pole lines, fences, signs, survey markers and monuments, buildings and structures, conduits, pipe lines under or above ground, sewer and water laterals, and any other improvements or facilities within or outside the limits of construction. As ordered and approved by the Engineer, the Contractor shall provide and install suitable safeguards to protect such objects from injury or damage. If such objects are injured or damaged by reason of the Contractor's operations, they shall be replaced or restored, at the Contractor's expense, to a condition as good as when the Contractor entered upon the work, or as good as required by the Contract Documents.

Existing striping damaged during construction within and adjacent to the project site shall be replaced in kind. Partially damaged striping (such as what might occur trenching through a pavement legend), shall be replaced in their entirety.

Any survey monuments that are damaged or removed as part of the construction shall be replaced by the Contractor and a Record of Survey, as required by State law, shall be filed by a licensed Land Surveyor at the Contractor's expense, or as specified above.

The fact that any such improvement or facility is not shown upon the plans shall not relieve the Contractor's responsibility under this Section. It shall be the Contractor's responsibility to ascertain the existence of any underground improvements or facilities indicated on the plans, indicated by locating services, or as evidenced by facilities visible in the field.

8.15 Protection of Traffic Signal Facilities

The Contractor shall give at least 72 hours advance notice to the Engineer before commencing any street work (such as pavement grinding or trenching) that may potentially damage any traffic signal detection loop wires or any other signal facility. This requirement is in addition to any Underground Services Alert notifications. The City will then mark the underground traffic signal facilities.

The Contractor shall not proceed with any grinding, trenching or other underground work until it has been verified with the City Representative that signal facilities have been marked. The Contractor shall be responsible for all damage to traffic signal facilities arising from failure to properly comply with these provisions.

In the event that the Contractor's construction activities cause any failure of a traffic facility, it shall be repaired and be made fully operable within 24 hours of the damage occurring. In the event that such repair is not undertaken within this time limit, the City may repair the facility at the Contractor's expense. In the event that such repair is not undertaken within this time limit, the City will repair the facility and deduct the cost from monies due to the Contractor. The amount deducted will include actual expenses incurred.

8.16 Restoration of Adjacent and Existing Improvements

Contractor shall do all cutting, fitting, or patching of the work required to make all parts of the work come together properly with existing and adjacent conditions.

Unless otherwise provided, the Contractor shall repair or replace all existing improvements (e.g., curbs, sidewalks, driveways, fences, signs, utilities, street surfaces, structures, etc.) damaged or removed as a result of the Contractor's operations. Repairs and replacements shall be at least equal to existing improvements, and shall match in terms of condition, finish and dimension.

All Underground Services Alert (USA) markings on concrete or asphaltic pavement or other structures shall be removed when they are no longer required. Acceptable means of removal include sand blasting or high pressure washing.

All traffic signs and street signs within the limit of work necessarily removed during the various phases of operations shall be temporarily reset by the Contractor at or near the original location upon completion of each phase of construction operations. Prior to removal of all traffic control signs, the Contractor shall take photographs of the site which show the existing location of these signs so that upon completion the photographs will aid in resetting the signs at or near their original location. Traffic control signs and street signs will be replaced upon completion of the work and the cost of removal and replacement will be included in various bid items and no separate payment will be made.

Rural type mail boxes shall be maintained by the Contractor in a manner satisfactory to the property owner and postal service, and the Contractor shall relocate the same as soon as possible to a permanent location in accordance with postal regulations and in a location acceptable to the property owner.

Any object to be removed and reused at other locations shall be removed with due care and delivered or stored at the project's construction storage area, or if approved by the Engineer, at any other site designated by the Engineer within the City. Such objects may consist of street light poles, signal mast arms and other objects directed by the Engineer. Items not approved by the Engineer for reuse purposes, and without salvage value, shall become the property of the Contractor, to be disposed of at Contractor expense, in an acceptable manner.

8.17 Archeological Remains

If archeological remains are uncovered during excavation, earthwork within 100 feet of these materials will be stopped until a professional archeologist registered by the Society for California Archeology (SCA) and/or the Society of Professional Archeology (SOPA) has had an opportunity to evaluate the significance of the find and suggest appropriate mitigation measures.

8.18 Access to Private Property

The Contractor shall schedule and perform operations so as to minimize disruption of access to private property. Prior to blocking access to any private driveway or parking lot entrance, the Contractor shall notify the resident, business owner or tenant of pending closure and allow residents to remove vehicles. During non-working hours no driveway, house or parking lot shall be denied access to a public roadway.

The Contractor shall coordinate with the adjacent property owners and businesses and maintain vehicle and pedestrian access to their properties at all times. Temporary access ramps, fencing, or other measures shall be provided as needed.

8.19 Notification and Relations with Property Owners

A two-week and a **72-hour** prior to construction public notification is required. Two weeks prior to beginning any work on the project, the Contractor shall deliver written notice to all adjoining residents, businesses, tenants and other applicable parties. Notice shall be given for general construction activity as well as specific activities that will inconvenience residents/property owners/tenants or, in any way, affect their operations or access to their property. Such notices shall include the expected date for start of construction, a general description of the construction activity to take place, expected duration, and the name, address, and an approved emergency contact number for the public to reference during the construction. A follow up notice shall be distributed 72-hours prior to the construction activity. Copies of all notices shall be submitted to the Engineer for review and approval prior to public distribution.

All costs involved in providing notification and access shall be included in the amount bid for the various bid items and no additional compensation will be allowed.

8.20 Traffic Control and Public Convenience

The Contractor shall provide for safe movement of all vehicular, bicycle and pedestrian traffic through and around the construction operations with as little inconvenience and delay as possible. The Contractor shall have no amount of work under construction other than what the Contractor can properly prosecute with due regard to the rights and convenience of the public.

Proper conveyance of vehicular traffic and pedestrians through the work area depends upon navigating under unexpected situations. The means of clarifying such conditions to the public include the Contractor's use of signs, flagmen, pavement markings, barricades, lights, cones and delineators. No one standard sequence of signs or control devices will suit all conditions which may result from construction operations. Even for the same work, the conditions may vary from hour to hour, requiring adjustment and revisions of the traffic control in effect. The traffic control requirements specified herein are therefore intended to establish general principles to be observed in the control and regulation of traffic through and around the construction operations anticipated for this project. The requirements set forth in this Section represent the minimum traffic control requirements imposed and the Contractor shall be solely responsible for providing

the full extent of traffic control measures that are necessary. Only individuals trained in the principles of implementing traffic control and/or traffic control flagging shall be assigned that responsibility at the work site.

The Contractor shall maintain sufficient safeguards against occurrence of accidents, injuries, or damage to any person or property and shall be responsible for same if such occurs. The Contractor shall also maintain adequate protection of its work and materials from destruction and loss and shall protect the City's property from damage arising in connection with this contract, and shall make good any such damage, destruction or loss.

- a. *Traffic Control Plan* – The Contractor shall submit a Traffic Control Plan to clearly describe proposed traffic control measures. The plan shall be generally in accordance with the Temporary Traffic Control (TTC) Guidelines of the City's Division of Transportation and Traffic.
- b. *Traffic Control Devices* - Traffic control devices shall be provided in sufficient quantities and types as required to provide safe and adequate traffic control. During hours of darkness, approved lights and/or flares shall be included, in proper working order, to illuminate signs and hazards and alert approaching traffic. Barricades shall be furnished and maintained along all open trenches in contact with traffic. No work may begin on any day or at any time before traffic control devices have been placed, test driven and, if required, adjusted and revised. All traffic control devices shall be placed in accordance with the Manual of Uniform Traffic Control Devices and the Contractor's favorably reviewed traffic control plans. Locations of devices shall be adjusted to suit the conditions and circumstances of each detour situation. In all cases, signs shall be placed to most effectively convey their messages to approaching traffic.

The Contractor shall maintain all traffic control devices, at proper locations and in proper working order, at all times during construction operations and whenever a hazard resulting from Contractor's operations exists. The Contractor shall adjust and revise traffic control devices, placement, etc., to suit changing conditions around construction operations. Traffic control devices shall remain in place at all times, as required to alert approaching traffic of upcoming hazards. After hazards have been removed, all traffic control devices shall be removed. Temporary signs shall be removed, or their messages covered.

Daily traffic control measures shall continue until cleanup activities have been satisfactorily completed and all of the Contractor's equipment has been removed from the traveled way.

- c. *Traffic Control Detours* - The Contractor shall direct, divert and detour traffic through, around and adjacent to construction operations in accordance with the traffic control plans specified in the Contract Documents or in accordance with the Contractor's favorably reviewed traffic control plans.
 1. *Field Review of Detours* - Immediately after traffic control devices have been placed, the detour shall be test driven by the Engineer and the Contractor's Superintendent. The test drive shall include approaches to the detour from each possible direction, and traverse the full length of each detour route. The Contractor shall adjust and revise all traffic control devices as determined to be required by the test drive and the test drive shall be repeated, if determined necessary by the Engineer. The Contractor shall provide additional traffic control devices as required to maintain the flow of traffic throughout construction operation.
 2. *Diverting Bicycle and Pedestrian Traffic* – Whenever construction operations obstruct the flow of bicycle and pedestrian traffic or present a hazard to bicycles and pedestrians, the Contractor shall take appropriate action to protect and separate bicycles and pedestrians from the work area. Such action may include placement of barricades between bicycles and pedestrians and the work areas, placement of warning signs, and provisions utilizing personnel as required to protect and maintain access for bicycles and pedestrians as conditions warrant.

3. **Diverting Vehicular Traffic** - Whenever construction operations obstruct the flow of vehicular traffic or present a hazard to vehicles operating in the vicinity of construction operations, the Contractor shall take appropriate action to warn, detour and otherwise protect approaching drivers and vehicles.
 4. **Flagmen** - The Contractor shall employ flagmen as required for each specific detour and at all locations where barricades and warning signs cannot control the movement of traffic. A warning sign shall be placed ahead of the flagman reading: "Flagman Ahead." The distance between the sign and the flagman should be based on the average traffic speed, allowing approximately 50 feet for each 10 miles per hour. During hours of darkness, flagman stations shall be illuminated such that the flagman will be clearly visible to approaching traffic. Lights for illuminating the flagman station shall receive favorable review by the Engineer. The flagman shall wear a red or orange warning garment when flagging. Flagmen shall be provided with approved red flags or STOP/SLOW hand paddles, and two-way radios for communication. When flagging during hours of darkness, the flagman shall signal with a red light or flare and shall have a belt and suspender harness fitted with reflectors or made from reflectorized cloth on the outside of the garment, unless the garment is well reflectorized in one of these ways.
 5. **Notice to Agencies** - The Contractor shall notify the Engineer and all agencies having jurisdiction over the work, in writing, at least seventy-two (72) hours, excluding holidays and weekends, prior to instituting any lane closure or detour. At the end of each workday, the Contractor shall inform the Engineer, Police Department and Fire Departments of the status of all detours, lane restrictions, or road closures. The Contractor shall cooperate and coordinate with the various parties involved in the collection and removal of trash and garbage, the transit providers, the U.S. Postal Service, and others, as necessary, in order to maintain existing schedules and services.
 6. **Emergency Vehicle Access Through Detours** - During all detours and/or street closures the Contractor shall provide for the movement of emergency vehicles through the work area. It is essential that the Contractor's work and equipment does not impede emergency access.
 7. **Night Detours** - The Contractor shall not be permitted to maintain any lane closure or road closure during non-working hours without first obtaining written approval from the Engineer. During non-working hours the Contractor shall restore travel lanes to their original alignment and configuration by means of placing temporary asphalt pavement or bridging with steel plates. The Contractor shall place "ROUGH ROAD" signs conforming to the Manual of Uniform Traffic Control Devices at uneven temporary pavement or bridging locations. See General Provisions, Section 9.18 (b), "Trench Safety Requirements".
 8. **Temporary Traffic Lanes** – Temporary traffic lanes shall be at least 10 feet wide, or 11 feet wide around curves. Provide an additional two (2) feet of clearance from curbs. The length of temporary lanes should be limited to the area under construction and the distance necessary to divert traffic.
- d. **Lane Closure Restrictions** - No lane closure will be permitted along any of the major commute streets during commute hours. Major commute streets are: North/ South Streets Mathilda Avenue, Saratoga-Sunnyvale Road, Wolfe Road, Fair Oaks Avenue, Mary Avenue and Remington Drive (between Saratoga-Sunnyvale and El Camino Real).

East/West Streets Homestead Road, Duane Avenue, Fremont Avenue, Arques Avenue and Maude Avenue.

Commute hours are defined as: "northbound" between 6:00 am and 10:00 am; "southbound" between 3:30 pm and 7:30 pm; "eastbound" Between 6:00 am and 9:30 am; "Westbound" Between 3:30 pm and 7:30 pm.

Additional lane closure restrictions may be imposed if there is evidence that excessive inconvenience to the public is observed during construction.

- e. *Parking Restrictions* - The Contractor shall post approved "No Parking" signs at all locations necessary to establish work areas and detour traffic. Signs shall read: "NO PARKING - CONSTRUCTION TOW - AWAY ZONE," show the actual day and hours of parking restriction and indicate the telephone number of the City's Police Department or agency having jurisdiction. Signs shall be placed at least forty hours (48) hours in advance of the restriction. The Engineer shall approve the location and duration of no parking limits and verify their placement. "No Parking" signs shall be removed when no work is under construction and must be reposted forty-eight (48) hours before the resumption of construction activities.

For any violation of "No Parking" signs by motorists, the Contractor shall contact and coordinate directly with the City's Police Department for removal of vehicles in accordance with the California Vehicle Code. The Contractor shall also coordinate with the Police Department directly for enforcement and towing of parked vehicles.

8.21 Safety

In accordance with generally accepted construction practices and State Law, the Contractor shall be solely and completely responsible for conditions on the job site, including safety of all persons and property during performance of the work. This requirement shall apply continuously and not be limited to normal working hours, and shall encompass all persons, including City Staff and its Consultants.

The services of the Owner in conducting inspection or construction review of the Contractor's performance is not intended to include review of the adequacy of the Contractor's work methods, equipment, bracing, shoring or scaffolding, or safety measures, in, on, or near the construction site.

Safety vests shall be worn by the Contractor, all subcontractors and other personnel when working or present on the site. Hard hats shall be worn when working around earthmoving or any heavy construction equipment or during any overhead construction work.

The Contractor shall carefully instruct all personnel working in potentially hazardous work areas as to potential dangers and shall provide such necessary safety equipment and instructions as are necessary to prevent injury to personnel and damage to property. Special care shall be exercised relative to work underground.

All work and materials shall be in strict accordance with all applicable, City, County, State and Federal Rules, Regulations, and Codes, and attention is drawn to the requirements of CAL/OSHA. The Contractor shall be solely responsible for compliance with all City, County and State blasting requirements and for any damages caused by its operations. The Contractor shall be responsible for obtaining permits required by Section 6500 of the State Labor Code and Section 341 of Title 8 of the California Code of Regulations.

In accordance with Section 6705 of the State Labor Code, the Contractor shall submit to the Owner specific plans to show details of provisions for worker protection from caving ground. This in no way relieves the Contractor from the requirement of maintaining safety in all operations it or its subcontractor's performance. The detailed plan showing design of shoring, bracing, sloping or other provisions shall be prepared by a Civil or Structural Engineer registered in the State of California as required. Acceptance by the Owner only constitutes acknowledgment of the submission and does not constitute review or acceptance of the designs,

design assumptions or criteria, completeness of submissions, applicability to areas of intended use, nor implementation of the plans, which are solely the responsibility of the Contractor and its registered engineer.

Notwithstanding any classifications relative to the Tunnel Safety Orders, work within confined spaces on this project is subject to the definitions and applicable provisions of Title 8, California Code of Regulations, Section 5156 et seq.

The Contractor shall so perform its work as not to expose personnel to, or to discharge into the atmosphere from any source whatever, smoke, dust, asbestos, toxic chemicals or other air contaminants in violation of the laws, rules, and regulations of the regulatory agencies having jurisdiction. All work involving exposure to hazardous materials shall be performed with protection of personnel in compliance with all applicable regulations and safety requirements.

Nothing in these Specifications is to be construed to permit work not conforming to governing codes. When Contract Documents differ from governing codes, the Contractor shall furnish and install the higher standards called for without extra charge.

8.22 Patent Fees or Royalties

The patent fees or royalties on any patented article or process which may be furnished or used in the work shall be absorbed in the Contractor's bid. The Contractor shall indemnify, defend and hold the City harmless from any legal action that may be brought for infringement of patents.

8.23 Advertising

The names of the Contractor or Subcontractors, with their addresses and the designation of their particular specialties, may be displayed at the job site on removable signs only if written approval is received from the Engineer. Commercial advertising material shall not be attached to, or painted on the surfaces of, any buildings, fences, canopies, or barricades.

8.24 Antitrust Claims

Attention is directed to Public Contract Code, Section 7103.5 which provides: "In entering into a public works contract or a subcontract to supply goods, services, or materials pursuant to a public works contract, the Contractor or Subcontractor offers and agrees to assign to the City all rights, title, and interest in and to all causes of action it may have under Section 4 of the Clayton Act (15 U.S.C. Sec 15) or the Cartwright Act (Chapter 2, commencing with Section 16700, of Part 2 of Division 7 of the Business and Professions Code), arising from purchases of goods, services, or materials pursuant to the public works contract or subcontract. The assignment shall be made and become effective at the time the City tenders final payment to the Contractor, without further acknowledgement by the parties".

8.25 Audit and Examination of Records

The City and entities and agencies designated by the City, shall have access to, and the right to audit and examine at no additional cost, all of the Contractor's project related data including but not limited to, books, estimates, records, contracts, bid cost data, Subcontractor and supplier job cost data, change orders, correspondence, instructions, drawings, receipts, vouchers, purchase orders, notes, computations, daily logs, and memoranda relating to the work. Pursuant to Government Code, Section 8546.7, the Contractor shall preserve all such records and will be subject to examination and audit by the State Auditor, at the request of the City, for a period of three (3) years after final payment under the Agreement.

8.26 Web-Based Construction Document Management

The Contractor shall utilize e-Builder for submission of data and documents throughout the duration of the Contract, unless specified otherwise in the Contract Documents. e-Builder is a web-based construction management application hosted by e-Builder. It shall be the primary means of project information

submission and management or as otherwise agreed upon with the Engineer. The City will establish the Contractor's access to e-Builder by providing one license to Contractor personnel at City's cost. The contractor and users will be required to set up their computers/systems to use e-Builder in accordance to the e-Builder User Training Guide. The City will provide one classroom training or a web-based seminar. A training session is 1 - 2 hours.

e-Builder is a web-based environment and therefore it is subject to the inherent speed and connectivity limitations of the Internet. The Contractor is responsible for its own connectivity to the Internet. e-Builder response time is dependent on the Contractor's equipment, including processor speed, Internet access speed, etc. and current traffic on the Internet. The City will not be liable for any delays associated from the usage of e-Builder including, but not limited to: slow response time, down time periods, connectivity problems, or loss of information. The Contractor shall ensure connectivity to the e-Builder system whether at the home office or job site. Under no circumstances will usage of e-Builder be grounds for a time extension or cost adjustment to the Contract.

Data entered in a collaborative mode (entered with the intent to share as determined by permissions and workflows within the e-Builder system) by the Engineer and the Contractor will be jointly owned.

The Contractor is responsible for managing, tracking, and documenting the Work to comply with the requirements of the Contract Documents. The City's acceptance via automated system notifications or audit logs extends only to the face value of the submitted documentation and does not constitute validation of the Contractor's submitted information.

While regular email will still be used for communication, e-Builder shall be utilized as much as possible in connection with all document and information management required by these Contract Documents. Contractor shall be responsible for scanning or otherwise converting to electronic format all project submittals and Contractor correspondence, drawings, sketches, etc., and uploading them to the e-Builder web site and shall be responsible for the validity of its information placed in e-Builder. The Contractor shall utilize the existing forms and processes in e-Builder to the maximum extent possible. If a required form does not exist in e-Builder, the Contractor shall include a form of its own or one provided by the Engineer (if available) as an attachment to a submittal or process. Documents and information to be submitted electronically include, but are not limited to:

1. Submittals using the Submittal Module
2. Requests for Information using the RFI process
3. Change Order Requests using RFQ and CCO processes
4. Progress payments requests using Pay Application process
5. Construction Closeout process
6. Compliance documentation (test reports, QA/QC reports, certifications)
7. Schedules and associated updates

The term "Copy" or "Copies" shall refer to electronic copies unless a hard copy is specified. Where a hard copy is specified, both electronic and paper versions shall be submitted.

Related Sections: Article 3.13, Submittals, General Provisions

SECTION 9 – MEASUREMENT AND PAYMENT

9.01 Measurement of Quantities for Unit Price Work

Materials and items of work which are to be paid for on the basis of measurement shall be measured in accordance with the methods stipulated in the particular sections of the Contract Documents involved.

Unless otherwise specified, quantities of work shall be determined from measurements or dimensions in the horizontal planes. Stationing shall be along the street centerline, lengths of sanitary sewers, storm drains and water lines shall be measured as the horizontal distances from center to center of structures, rounded to the nearest foot, and lengths of all return radii and curb data shall be measured along the face of curb.

Unless otherwise provided in the Contract Documents, volumetric quantities shall be the product of the mean area of vertical or horizontal sections and the intervening horizontal or vertical dimensions. Measurements shall be in accordance with U.S. Standard Measures. A pound is an avoirdupois pound. A ton is 2,000 pounds avoirdupois. The unit of liquid measure is the U.S. gallon.

When payment is to be made on the basis of weight, the weighing shall be done on certified platform scales or, when approved by the Engineer, on a completely automated weighing and recording system. The Contractor shall furnish the Engineer with duplicate licensed weighmaster's certificates showing the actual net weights. The City will accept the certificates as evidence of the weights delivered.

9.02 Bid Items

Progress Payments for unit price bid items will be based on the estimated quantity of work performed during the month. The Engineer may request the contractor to submit a Schedule of Values for certain lump sum bid items.

The estimated value of work performed for lump sum bids or for lump sum bid items will be determined from the Schedule of Values. No progress payment will be made until a Schedule of Values has been submitted by the Contractor and accepted by the City. If the Schedule of Values is not accepted by the City, another Schedule of Values shall be submitted that is acceptable to the City. The Schedule of Values shall be submitted by the Contractor within 14 days of Notice to Proceed.

Elements of work in the Schedule of Values shall be separated into groupings appropriate for the project. The Technical Specifications may be used as a guide for establishing these groupings. Within each grouping, work shall be itemized by readily measurable quantities of work complete in place.

Overhead and profit shall not be allowed as Schedule of Values line items but shall be prorated over other items of work.

Move-on costs, bond and insurance costs, and submittal preparation costs can be included in the Schedule of Values under a separate mobilization line item. This Mobilization line item shall not exceed 5% of the total contract amount. Mobilization amount beyond 5% shall be paid in the final progress payment.

Payments for mobilization will be made as follows:

- a. When the monthly partial payment estimate of the amount earned, not including the amount of mobilization, is less than 5 percent of the original contract amount, 25 percent of the contract item price for mobilization will be included in the estimate for payment.
- b. When the monthly partial payment estimate of the amount earned, not including the amount of mobilization, is 5 percent or more of the original contract amount, 50 percent of the contract item price for mobilization will be included in the estimate for payment.

- c. When the monthly partial payment estimate of the amount earned, not including the amount of mobilization, is 10 percent or more of the original contract amount, 75 percent of the contract item price for mobilization will be included in the estimate for payment.
- d. When the monthly partial payment estimate of the amount earned, not including the amount of mobilization, is 20 percent or more of the original contract amount, 95 percent of the contract item price for mobilization will be included in the estimate payment.
- e. When the monthly partial payment estimate of the amount earned, not including the amount of mobilization, is 50 percent or more of the original contract amount, 100 percent of the contract item price for mobilization will be included in the estimate for payment.

Should any bid item be eliminated in its entirety, payment will be made to the Contractor for actual costs incurred, in connection with such eliminated contract work, and for costs incurred prior to the date of the Engineer's written notification eliminating such work. The actual costs to be paid to the Contractor shall be computed in the same manner as if the work were to be paid on a force account basis. No compensation will be made to the Contractor, in any case, for loss of anticipated profits. Increased or decreased scope involving a change order will be paid as stipulated in the change order.

9.03 Bid Quantities

Payments to the Contractor will be made only for the actual quantities of contract items constructed in accordance with the plans and specifications. Payment will not be made for materials wasted or disposed of in a manner not called for under the contract. This includes rejected material not unloaded from vehicles, material rejected after it has been placed and material placed outside of the plan lines. Unless otherwise provided, no payment will be made for materials delivered to the site but not incorporated in the work. Such quantities will not be included in the final pay quantities. No compensation will be allowed for the disposal of rejected or excess material.

When the estimated quantity for a specific portion of work is designated on the Bid Schedule as a "Final Pay Quantity", the estimated quantity specified shall be the final quantity for which payment for such specified portion of the work will be made, regardless of the actual quantity constructed, unless the dimensions of said portions of the work shown on the plans are revised by the Engineer. If such dimensions are revised and such revisions result in an increase or decrease in the quantity of such work, the final quantity for payment will be revised by the amount represented by the change. The estimated quantity for any portion of the work designated as a Final Pay Quantity shall be considered as approximate only and no guarantee is made that the quantity, which can be determined by computations, based upon the details and dimensions shown on the plans, will equal the estimated quantity. No allowance will be made in the event that the quantities based upon computations do not equal the estimated quantities. Final pay quantities will be designated on the Bid Schedule with the letter (F) and shall only apply to the corresponding portions of work specifically designated on the plans. Any portion of work not designated as a final pay quantity will be measured and paid for as specified under other provisions of the Contract Documents.

9.04 Progress Payments

On or about the 25th day of each month may be designated as the date which would terminate each working month for valuing progress payments. The Contractor shall, on the date established, submit a progress estimate to the City for work accomplished during the previous working month, based on the various contract bid items and the unit bid prices. Invoices shall include amounts previously paid, itemized retention and any deductions or additions authorized by change order. Consultation with the Engineer may be necessary to determine the amount of work accomplished. If a progress estimate cannot be mutually agreed upon, the City will determine the value for progress payment purposes.

The Contractor's requests for progress payments shall be submitted via e-Builder's Construction Progress Payment process (CPP).

The first progress payment will not be made until the following submittals have been provided and approved: list of submittals, baseline construction schedule, schedule of values (if applicable), and SWPPP. Subsequent progress payment requests will not be accepted or processed until submittal of an updated baseline or revised baseline schedule has been submitted, and after certification that the record drawings have been updated and reviewed by the City's Public Works Inspector.

Upon receipt of a progress payment request, the City shall, within seven (7) calendar days, determine if the request is proper. If the City finds the request non-compliant, the City will reject the project payment and request the Contractor to make the necessary corrections. Following receipt of an undisputed progress payment, the City shall make payment within thirty (30) calendar days.

Contractor may request partial payment for materials delivered to the site but not yet incorporated into the work (materials on hand). To receive consideration for payment of materials on hand, the Contractor shall provide the Engineer with a list of such materials at least five (5) working days prior to submitting the monthly estimate of amount earned for work completed. At the Engineer's sole discretion, up to seventy-five percent (75%) of the estimated value of materials on hand may be considered for payment, subject to the following:

- a. Only materials which have received favorable review of shop drawings will qualify.
- b. Eligible materials must be delivered and properly stored, protected, and maintained in a manner favorably reviewed by the Engineer, at the job site or at a bonded warehouse.
- c. The Contractor's actual net cost for the materials must be supported by paid invoices to suppliers or other documentation requested by the Engineer.
- d. Materials delivered to the site less than thirty (30) days prior to their scheduled incorporation in the work shall not qualify.
- e. Partial payments for materials on hand shall not be deemed to be final payment for the material nor relieve the Contractor's obligations under the Contract.
- f. Partial payments for materials on hand shall be subject to retention.
- g. City reserves and shall have the right to withhold payment for any equipment and/or specifically fabricated materials that, in the sole judgment of City, is not adequately and properly protected against weather and/or damage, prior to or following incorporation into the Work.

From each progress estimate, five percent (5%) will be deducted and retained by the City, and the remainder of the amount due, less the amount of all previous payment will be paid to the Contractor provided all work invoiced has been completed and approved by the Engineer.

The Engineer may withhold or nullify, the whole or any part of any payment to such extent as may be necessary to protect the City from loss on account of any of the following:

- a. Defective or vandalized work not remedied,
- b. Damage to the City or another Contractor,
- c. Stop notices, or failure of the Contractor to make payments properly to subcontractors or laborers or suppliers, in which case one hundred-twenty-five percent 125% of the stop notice amount shall be withheld until a release form is received,
- d. Failure of Contractor to maintain, update and submit record documents, schedules or other submittals as required by the Contract Documents,

- e. Any other failure of Contractor to perform its obligations under the Contract Documents.

The Contractor may elect to receive one hundred percent (100%) of payments due under the contract from time to time, without retention of any portion of the payment by the City, by depositing and maintaining securities of a value equivalent to the retention amount with the City in accordance with the provisions of Public Contract Code, Section 22300. Such securities, if deposited by the Contractor, shall be valued by the City's Finance Director, whose decision on valuation of the securities shall be final.

Contractor warrants that, upon submittal of an application for payment, all work for which payment has been previously issued by the City and received by the Contractor, shall be free and clear of all claims, stop notices, security interests, and encumbrances in favor of Contractor, Subcontractors, or other persons or firms entitled to make claims by reason of having provided labor, materials, or equipment relating to work.

The payment of progress payments by the City shall not be construed as an absolute acceptance of the work done up to the time of such payments and shall not constitute acceptance of defective work.

9.05 Final Payment

The City shall, prior to final acceptance, provide the Contractor with a copy of the final quantities for the various contract bid items and a summary of contract change orders for the Contractor's review. All prior payments shall be subject to correction in determining the total contract sum. The Contractor shall reply promptly in writing, to indicate either the Contractor's concurrence or an explanation of possible discrepancies in the total contract sum.

The project will not be submitted to the Director of Public Works for acceptance until the Engineer and the Contractor concur with the totals of all quantities, costs, contract change orders and the total contract sum. Following concurrence, a semi-final payment will be made to the Contractor after deducting all previous payments and all amounts to be retained under the provisions of the contract. The retention payment shall be due and payable as a final payment after the expiration of thirty-five (35) days following the date of recording at the County after final acceptance of the work.

If within the time fixed by law, a properly executed notice to stop payment is filed with the City, due to Contractor's failure to pay for labor or materials used in the work, all money due for such labor or materials will be withheld from payment to the Contractor in accordance with applicable laws.

If releases are required, the Contractor shall pay or cause to be paid to Subcontractors the amount stated in the conditional releases within five (5) days after receipt of the semi-final payment, and shall promptly thereafter furnish evidence of such payment to the City.

The securities deposited by the Contractor will be released, providing that the following requirements of the contract have been fulfilled:

- a. Satisfactory completion of all construction work and written acceptance of said work by the City;
- b. The submission by the Contractor to the Engineer of all required stop notice releases, submittals, written guarantees, warranties, operating manuals, and other project related documentation;
- c. The return to the Engineer of all drawings and written specifications loaned to the Contractor during the construction period.
- d. The submission by the Contractor to the Engineer of record documents and a set of red-lined drawings showing the revisions to the original set of drawings which reflect the actual construction of the project for preparation of "Record Drawings".

The Contractor agrees that the payment of the final amount due under the contract shall release the City of Sunnyvale from any and all claims or liability on account of all work performed under the contract, except those items previously made in writing and identified by the Contractor as unsettled. Release of the final payment by the City shall not be construed as an acceptance of any defective work or acceptance of improper materials.

SECTION 10 – GUARANTEE**10.01 Warranties**

The Contractor shall be held responsible for and shall make good any defects through faulty or improper workmanship or through defective materials, arising or discovered, in any part of this work within the time specified (stated in the Special Provisions) after the completion and acceptance of the entire project.

- a. *Warranty Form* – Contractor warranties shall be on the Contractor's own letterhead, addressed to the City, and shall in all cases be furnished to the City in duplicate. In addition, furnish City with original copies of all manufacturer's warranties.
- b. *Standard Product Warranties* – are pre-printed written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the City. Contractor shall provide to the City the Manufacturer's Standard written warranties of all the equipment installed for the project.
- c. *Special Warranties* – are written warranties required by or incorporated in Contract Documents, to extend time limits provided by standard warranties or to provide greater rights for the City. Special warranties for products and installations that are specified to be warranted, shall be provided. When a special warranty is to be executed by the Contractor, or the Contractor and a Subcontractor, or the Contractor and a Supplier or Manufacturer, the Contractor shall prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the City, for approval, prior to final execution.
- d. *Disclaimers and Limitations* – Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor from providing the specified warranty on the work that incorporates the products. Nor does it relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor, from meeting specified warranty obligations.
- e. *Rejection of Warranties* – The City reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the Contract Documents. The City reserves the right to refuse to accept work where a special warranty, or similar commitment is required, until evidence is presented that entities required to countersign commitments are willing to do so.
- f. *Related Damages and Losses* – When correcting warranted work that has failed, the contractor shall remove and replace other work that has been damaged as a result of such failure, or that which must be removed and replaced to provide access for correction of the warranted work.
- g. *Reinstatement of Warranty* – When work covered by a warranty has failed and been corrected, the warranty shall be reinstated by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for time.
- h. *Replacement Cost* – On determination that work covered by a warranty has failed, the contractor shall replace or rebuild the work to an acceptable condition complying with requirements of the Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective work regardless of whether the City has benefited from use of the work through part of its useful service life.
- i. *City's Recourse* – Written warranties made to the City are in addition to implied warranties, and shall not limit duties, obligations, rights and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the City can enforce such other

duties, obligations, rights, or remedies.

- j. *Notice to Perform Warranty Work* – The Contractor is required to repair or replace warranted work within 10 days of receiving written notice from the City of a failure of warranted work. If the required repair or replacement work has not been performed by the Contractor within the time allowed, the City may, at its sole discretion, undertake appropriate warranty work without further notice to the Contractor.

In the event that the nature of the failed warranted work is such that further damage will occur, or there is a danger to life or property, the City may undertake immediate repair or replacement without notice to the Contractor.

The cost of repair work undertaken by the City under these provisions shall be recoverable from the Contractor.

10.02 Contractor's Guarantee

Prior to final acceptance, the Contractor shall warrant and guarantee to the City that all work is in accordance with the Contract Documents and is not defective.

The guarantee shall be accompanied by a warranty bond for ten percent (10%) of the final contract sum, which shall warrant the quality of the work for a period of one (1) year after acceptance. The guarantee and warranty bond shall be in accordance with the Agreement Forms furnished in the Contract Documents.

10.03 Correction of Defective Work During the Guarantee Period

If within one (1) year after the date of acceptance, or such longer period of time as may be prescribed by laws or regulations or by the terms of any applicable special guarantee required by the Contract Documents, any work is found to be defective, the Contractor shall promptly without cost to the City and in accordance with the City's written instructions, either correct such defective work or if it has been rejected by the City, remove it from the site and replace it with non-defective work.

If the Contractor does not promptly comply with the terms of such instructions within ten (10) working days after written demand by the City, the City may have the defective work corrected. The City may also correct defective work immediately in cases of emergency where delay would cause serious risk of loss or damage. All direct, indirect and consequential costs of correcting defective work (including but not limited to fees and charges of engineers, architects, attorneys and other professionals) shall be absorbed by the Contractor.

The Contractor shall remove from the Project site portions of the work and materials which are not in accordance with the Contract Documents and which are neither corrected by the Contractor nor accepted by the City.

APPENDIX A – CONTENTS

Form Title	Form Number	General Provisions Reference Section
Three Week Look Ahead Schedule		7.05
Daily Extra Work Report (SAMPLE)	PAS Form 005	4.06



City of Sunnyvale, 3-Week Look Ahead Schedule
Project's Title,
Contractor's Name



Task No.	Work To Be Performed	Comments	Month																														Mo	
			5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	1	2				
			M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S				
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No.

RFQ

Project

Project No.

Date of Work / /

Work Performed

Contractor's Job No. _____

Date of Report / /

Description of W

Code.	Equipment (ans I.D. No.)	Hours	Hrly. Ratew	Ext. Amounts	Labor	Class	Hours	Hrly. Rate	Ext. Amounts
Material and/or Work done by Specialists (provide invoices)									
Description	No.	Unit Cost	Ext. Amounts		Labor Surcharge (REG)	_____ %			
					Labor Surcharge (OT)	_____ %			
Sub-Total Cost of Equipment, Materiala and Specialist Work					Sub-Total Cost of Labor		A		
							B		
					Mark up on Labor Cost _____ %		(A)		
					Mark up on Equipment, Material & Work _____ %		(B)		
							TOTAL		

CONTRACTOR'S REPRESENTATIVE

 Hours and Quantities accepted as correct

TOTAL

SECTION 007300 – SUPPLEMENTARY PROVISIONS

**TABLE OF CONTENTS
SUPPLEMENTARY PROVISIONS**

1.	Description and Location.....	6
2.	Contractor's License.....	7
3.	Mandatory Pre-Bid Conference.....	7
4.	Preconstruction Conference.....	7
5.	Time for Completion.....	7
6.	Submittals	8
7.	Preliminary Construction Schedule	9
8.	Liquidated Damages	9
9.	Bid Items	9
10.	Warranty Duration	9
11.	Special Requirements	11
12.	Disposal Fees	12
13.	Materials Supplied by City.....	12
14.	Testing	12
15.	Water.....	12
16.	Hazardous Materials/Conditions	12
17.	Work to be Performed by Contractor	13
18.	Traffic Control.....	13
19.	Revocable Contract Items	13
20.	Progress Payment Retention	13
21.	Working Hours	13
22.	Staging Areas.....	14
23.	Relations with Specialty Solid Waste and Recycling	14
24.	Protection and Restoration of Existing Improvements	14
25.	CEQA Document Declaration	14
26.	Smoking	14

SECTION 007300 – SUPPLEMENTARY PROVISIONS

1. Description and Location

- 1.1. The project is located at 465 West Olive Avenue in the City of Sunnyvale, California. The project consists of furnishing all tools, equipment, apparatus, facilities, labor, transportation and material necessary for demolition works, site improvements, construction of a new 119,000 square feet City Hall, modernization, expansion and addition of the existing Department of Public Safety (DPS), and other miscellaneous works and systems all in accordance to plans, specifications and contract documents as prepared by the City of Sunnyvale.
 - 1.1.1. **City Hall:** A new 119,000 gross square feet, four-story City Hall building near the corner of west Olive and south Mathilda Avenue will be constructed on the campus. The building will be Type IB construction and have one level of underground parking totaling 55,300 gross square feet and two outdoor terraces above the first floor. The new City Hall will be LEED Platinum and a Net Zero building
 - 1.1.2. **Department of Public Safety Headquarters and EOC Addition:** A new 12,000 gross square feet, two story Emergency Operations Center (EOC) shall be constructed northerly adjacent to the existing Department of Public Safety (DPS) Headquarters' Building and mechanically independent of the existing building. The existing Department Public Safety (DPS) building will be renovated with some tenant improvements. The new two-story Emergency Operations Center (EOC) will need to be constructed and have occupancy before the existing Department of Public Safety (DPS) tenant improvements are started.
 - 1.1.3. **Site Improvements:** The existing City Hall, City Hall Annex, City Hall South Annex and Sunnyvale Office Center Building will be abated and demolished once the New City Hall has been constructed and occupied. From the demolition of these buildings, there will be roughly six acres of open space created that include an improved pedestrian-oriented Olive Avenue, frontage improvements along Mathilda Avenue, a new Civic Plaza, an outdoor Amphitheatre, improved accessible paths, and landscape features. In addition to the open space created, utilities will be run to support the new buildings and throughout for site features.

2. Contractor's License

- 2.1. Contractor shall be licensed under the provisions of chapter 9, Division 3 of the Business and Profession Code of the State of California to do the type of work contemplated in the project. The general class or type of work called for under the contract requires a class Type B General Contractor license. Contractor shall maintain this license for the duration of the work.

3. Mandatory Pre-Bid Conference

- 3.1. A virtual mandatory Pre-Bid meeting is scheduled for Thursday, August 20th at 9:00 AM via Microsoft Teams.

4. Preconstruction Conference

- 4.1. The City will schedule with the Awarded Contractor a preconstruction conference within ten (10) calendar days of the date specified in the Notice to Proceed.

5. Time for Completion

- 5.1. In accordance with the provisions of Section 007213-7.15 "Time of Completion", Substantial Completion of all works related to this Project shall be completed within Eight Hundred Fifty-Four (854) consecutive calendar days from the date established in the Notice to Proceed for the commencement of Contract Time. In addition, the following milestones shall be met by the Contractor

MS	Facility	Substantially Complete and Ready for Move in
A	Emergency Operations Center (EOC) Addition	Five hundred and sixty (560) calendar days from NTP
B	New City Hall	Seven hundred twenty-eight (728) calendar days from NTP
C	Department of Public safety (DPS) Tennant Improvements	Eight hundred thirty-three (833) calendar days from NTP

6. Submittals

- 6.1. The Contractor shall provide submittals for the following.

Submittal Type	Number of copies/units
List and Schedule of Submittals	1- Via e-Builder
Proposed Substitutions List	1 - Via e-Builder
Schedule of Values	1 - Via e-Builder
Construction Schedules (Preliminary, Baseline & Revised)	1 - Via e-Builder and hard copy, if requested.
Other Submittals (If required by the Technical Specifications)	1 - Via e-Builder and hard copy, if requested.
Samples	1 (unless required otherwise in the Technical Specifications)
Shop Drawings	1 Via e-Builder and hard copy, if requested.

Manuals and Instructions		3 - word searchable digital files (unless the number specified in the Technical Specifications is greater)
Warranties/Guaranties		1 Via e-Builder
Record Drawings	Updated original contract drawings including "Design Build" design drawings	Three (3) hard copy sets of the "Job Site" drawings with all changes and mark ups and One (1) reproducible set in both PDF and AutoCAD format.

- 6.2. Detailed requirements for specific submittals (other than the number to be provided and review times) are contained in other parts of these Specifications.
- 6.3. The List of Submittals shall be provided within 10 working days from the date the Notice to Proceed is issued.
- 6.4. The submittals are anticipated to include, but are not limited to the following:
- 6.4.1. Preliminary construction schedule
 - 6.4.2. Shoring design and calculations
 - 6.4.3. Concrete mix design
 - 6.4.4. Asphalt
 - 6.4.5. Base Rock
 - 6.4.6. SWPPP
 - 6.4.7. Clean Water Act
 - 6.4.8. Traffic Control Plan
 - 6.4.9. Site specific safety plan
 - 6.4.10. Contractor QA/QC plan
 - 6.4.11. Contractor HSE plan
 - 6.4.12. Exterior Building Maintenance (EBM) design & calculations
 - 6.4.13. Shop drawings as required by plans and specifications
 - 6.4.14. Other submittals as required
- 6.5. The Owner shall review submittals (other than Construction Schedule submittals for which there are different requirements) within twenty-eight (28) days of receipt and shall review each resubmittal within twenty-one (21) days of receipt. For "design/build" designs and drawings that require issuance of a building permit from the Building Division of the Community Development Department of the City, 30 days shall be allowed for review of submittals, and 10 days for each resubmittal.

7. Preliminary Construction Schedule

- 7.1. Contractor shall submit a Preliminary CPM construction Schedule seven (7) working days after receiving "Notice to Proceed" and at least three (3) days prior to Preconstruction Conference. The Preliminary Schedule shall define all major activities for the Project and incorporate critical path milestones and critical activities (at a summary level) known to the Contractor, as well as a preliminary phasing plan and the date of contract completion. Further, the Contractor shall also provide a written narrative identifying all critical elements, means and methods required to accomplish the work.

8. Liquidated Damages

- 8.1. In accordance with the provisions of Section 007213-7.16, Liquidated Damages, for the period of time that any portion of the work remains unfinished after the time fixed for an interim milestone and/or Substantial Completion in Section 007300-5, Time Allowed for Completion, as modified by extensions of time granted by the Owner, it is understood and agreed by the Contractor and the Owner that the Contractor shall pay the Owner the damages listed below:

	Dollar Per Day Liquidated Damages (Amount in Dollars)
Milestone A: Emergency Operations Center	\$ 7,500.00
Milestone B: City Hall	\$ 12,500.00
Milestone C: Public Safety Tenant Improvements	\$ 15,000.00

9. Bid Items

- 9.1 Mobilization & Demobilization
- 9.2 New City Hall
- 9.3 Emergency Department Addition (EOC)
- 9.4 Department of Public Safety (DPS) Tenant Improvements
- 9.5 Department of Public Safety (DPS) Temporary Facilities
- 9.6 Site Improvements
- 9.7 COVID 19 Requirements
- 9.8 Allowances for Unforeseen Conditions
- 9.9 Allowances for Off Haul of Hazardous Materials

10. Warranty Duration

- 10.1. The warranty duration unless otherwise noted shall be a period of one (1) year from date of final acceptance of the work. Refer to table below and Technical Specifications for additional warranty requirements. This list is indicative and to assist contractor and may not include all warranty periods exceeding the one (1) year standard period. It shall be the responsibility of the contractor to verify list and include any missed items as required. **All warranties unless otherwise specified shall be from date of substantial completeness.**

Technical Section No.	Section Title	Page No.	Description of Requirements, Duration and Time Frame
06 60 00	PLASTIC FABRICATIONS	066000-2	Two (2) years from date of

			substantial completeness
07 14 13	HOT FLUID APPLIED WATERPROOFING	071413-4	Manufacturer warranty period: For water tightness warranty; includes labor and material, twenty (20) years from date of substantial completeness
07 26 16	BELOW GRADE VAPOR RETARDERS	072616-4	Manufacturer written warranty to repair or replace non-compliant material for period of ten (10) years from date of substantial completeness
07 54 19	PVC MEMBRANE ROOFING	075419-5	Manufacturer written warranty to include membrane roofing, base flashes, cover boards, and roofing accessories and other components of membrane roofing system for a period of twenty (20) years from date of substantial completeness
07 62 00	SHEET METAL FLASHING AND TRIM	076200-2	Two (2) years from date of substantial completeness
07 71 00	ROOF SPECIALITIES	077100-3	Sheet metal flashing and trim for Three (3) years from date of substantial completeness
07 92 13	EXTERIOR JOINT SEALANTS	079213-4	Twenty (20) years from date of substantial completeness
08 87 78	GLAZING FILM	088778-2	Ten (10) years from date of substantial completeness
09 65 13	RESILIENT BASE AND ACCESSORIES	096513-2	Two (2) years from date of substantial completeness
09 72 00	WALL COVERINGS	097200-2	Two (2) years from date of substantial completeness
10 26 41	BULLET RESISTANT COMPOSITE PANELS	102641-1	Two (2) years from date of substantial completeness
10 51 14	EVIDENCE LOCKERS	105114-1	Limited Lifetime Warranty. Moving parts free from defects in materials and workmanship for five (5) years from substantial completeness. Electrical components will be free from defects in materials and workmanship for 4 years from date of substantial completeness
10 51 18	SOLID PHENOLIC LOCKERS	105118-2	Repair or replace phenolic lockers or components that fail in materials or workmanship for period of ten (10) years from substantial completeness
23 05 14	VARIABLE FREQUENCY DRIVES FOR HVAC EQUIPMENT	230514-1	Two (2) year (24-month) warranty to include full replacement covering parts and labor
23 35 16	ENGINE EXHAUST SYSTEMS	233516-1	Provide fifteen (15) year warranty from date of substantial completeness.
26 06 30	PHOTOVOLTAIC SYSTEM	260630.10-	From date of substantial completion

		6	<p>to provide warranty as follows:</p> <ul style="list-style-type: none">a) Installation: Two (2) year warranty of complete system of installed components, equipment and laborb) PV Modules: minimum ten (10) year warranty against defects in material and labor. Power output @ 90% after 10 years and @ 80% after 25 yearsc) PV Inverter: Minimum 10 years warranty against defects in material and labord) Electronics & Balance of System Components: Minimum 10 years warranty against defects in material and labore) PV Module Racking: Minimum 10 years warranty against defects in material and labor
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11. Special Requirements

- 11.1. Special Permits: The Contractor is responsible to secure and comply with any state and local authority special permitting and licensure requirements for specific activities including but not limited to, heavy lifts, asbestos/lead abatement, air emission generation, water discharge permits, and hazardous waste disposal. Cost of these permits shall be the sole responsibility of the Contractor.
- 11.2. Staff Identification and Badging: Contractor shall provide, at his own expense, a photo identification badge to be worn at all times while on the Owner's campus to each of his staff allocated to the project including but not limited to, office staff, field staff, subcontractor staff, vendors and visitors. Refer to section 11.3 this specification section for additional requirements for Contractor Staff and Vendors working in high security areas.
- 11.3. Background Investigation: A portion of the contracted 'Scope of Work' will be performed within high security areas in the Department of Public Safety (DPS) building. The Contractor and/or his subcontractor staff performing within these areas will be required to undergo and pass, to the satisfaction of the City and DPS, a DPS conducted background investigation as a condition of beginning and/or continuing work in these areas. DPS shall use its discretion in determining the method of background investigation to be used, which may include, but not be limited to, criminal conviction information obtained through fingerprints submitted to the California Department of Justice and drug screening. Fees associated with obtaining these background investigations, regardless of whether such staff passes or fails the background investigation, shall be at a rate of Fifty Dollars (\$50) per background investigation payable directly to DPS by the Contractor. Lead time on returns is within one to two weeks and Contractor shall plan accordingly.

If a member of The Contractor and/or his Subcontractor staff does not pass the background investigation, the Owner, if it so determines, may request that such staff be immediately removed from site and banned from accessing the construction site. The Owner will not provide to Contractor or to such staff any information obtained through the Owner conducted background investigation. Further, the Owner, at its sole discretion, may immediately terminate facility access to any Contractor and/or his Subcontractor staff, who have passed such background investigation(s) but whose while performing the work is incompatible with the facility's code of conduct.

Disqualification, if any, of Contractor and/or his Subcontractor, pursuant to this Section 12, shall not relieve the Contractor of its obligation to complete all Work in accordance with the terms and conditions of the contract.

- 11.4. Safety and Health Guidance for COVID-19: Establish and implement an Injury and illness Prevention Program (IIPP) to protect employees from all worksite hazards, including infectious diseases. At a minimum, the Contractor shall, provide training that is readily understandable by all employees, establish and implement procedures to help prevent the spread of COVID-19, practice physical distancing at all times, ensure toilets and handwashing facilities are readily accessible to all employees, implement safe work practices, regular screening of employees and immediately send any employee testing positive and/or showing acute respiratory illness symptoms. The Contractor shall provide a comprehensive IIPP for Owner review fifteen calendar days from Notice to proceed.
- 11.5. Contractor is responsible for applicable demo permits required by the building department including:
- a. Removal and abatement of PCB containing materials
 - b. Registration with Green Halo System for Off-Haul waste Tracking
- 11.6. Prior to start of work, the Contractor shall be responsible to provide high resolution electronic photographs to document existing conditions. Photographs shall have a date and time stamp and include a brief narrative to identify location and condition. Photographs shall be organized

and uploaded into e-builder weekly. Contractor shall also provide an external hard drive with all photos organized chronologically and provided to the City at the completion of the project.

- 11.7 The Contractor shall be responsible to coordinate with other contractors performing work on other concurrent City projects. The contractor shall also be responsible to report back to the City and/or Construction Manager any coordination issues that may arise.

12. Disposal Fees

- 12.1. With the exception of asphalt and concrete and subject to the contingencies noted (detailed below), the Contractor shall be responsible to pay all applicable disposal fees.
- 12.2. The Contractor may dispose of asphalt and concrete, for no fee, at the recycling plant at the East Hill to the east of the Sunnyvale Materials Recovery and Transfer (SMaRT) Station at 301 Carl Road. This no fee disposal arrangement is contingent upon both the materials being acceptable to the recycling contractor, and the recycling contractor accepting the material at the time the Contractor may wish to make use of this facility. The City does not guarantee that the recycling plant will be accepting material at the time the Contractor may wish to use it, and at such times the Contractor shall make other disposal arrangements.
- 12.3. To obtain these no fee disposal privileges (if they are available at the time desired), the Contractor shall use the Waiver of Disposal Fee form Exhibit A attached as a part of these Special Provisions, and obtain a validating signature of the Owner (Inspector or other authorized staff member).

The current recycling contractor is Stevens Creek Quarry at telephone number (408) 253-2512.
<http://www.scqinc.com/>

13. Materials Supplied by City

None.

14. Testing

- 14.1. Except as stated otherwise in the specifications, the Contractor shall perform sampling and testing to demonstrate compliance with contract requirements. Testing shall be undertaken by an independent testing laboratory qualified to perform sampling and testing required by this contract.
- 14.2. Test results shall be provided showing actual results and include a statement that the item tested or analyzed conforms or fails to conform to specified requirements. Test results shall cite applicable specification references and required tests or analytical procedures used. Test results shall be certified by a testing laboratory representative authorized to do so. Reports shall have the cover sheet conspicuously stamped in large red letters "CONFORMS" or "DOES NOT CONFORM". If the items fail to conform, notify the Engineer.

15. Water

- 15.1. The Contractor shall pay for and shall construct all facilities necessary to furnish water for its use during construction, including potable water service. Water used for human consumption shall be kept free from contamination and shall conform to the requirements of the State and local authorities for potable water. The Contractor will pay for all water used for their operations on site.

The purchase of potable water for construction purposes requires obtaining a Hydrant Permit from the Utility Division, 650 West Olive Avenue, Sunnyvale, CA 94086.

At this time, the City does not provide recycled water for dust control and other construction purposes.

16. Hazardous Materials/Conditions

- 16.1. Contractor to implement hazardous material abatement mitigation measures in alignment with following reports provided by the City of Sunnyvale. Prior to start of any abatement work, Contractor shall provide Owner and/or Owner Representative with a completed abatement mitigation plan for review and acceptance.
 - 16.1.1. Pre-Demolition Lead Survey Report issued by RPS and dated March 30, 2010
 - 16.1.2. Pre-Demolition Asbestos Survey Report issued by RPS and dated March 30, 2020
 - 16.1.3. Removal of any contaminated soil as identified in Soil Management Plan issued by RPS and dated April 9, 2020

17. Work to be Performed by Contractor

- 17.1. The Contractor is encouraged to perform, with its own organization, Contract work amounting to fifteen percent (15%) of the Contract price, except that any designated "Specialty Items" may be performed by subcontract, and the amount of any such "Specialty Items" so performed may be excluded from the computation. The City and Construction Manager will monitor the Contractor's efforts to meet the voluntary goals throughout the performance of the contract.

18. Traffic Control

- 18.1. The contractor is required to provide and maintain throughout the duration of the project adequate traffic control for all modes of traffic, including vehicles, pedestrians, and bicycles. This may include creation of temporary pathways for pedestrians utilizing physical barriers such as water-filled k-rail.

Per the requirements, the contractor is responsible for downloading, reviewing, submitting traffic control plans which comply with the City's "Temporary Traffic Control (TTC) Checklist" document revised 11/5/2019, located on the City's website at:

<https://sunnyvale.ca.gov/civicax/filebank/blobdload.aspx?BlobID=23792>

The contractor shall be held accountable for compliance with the City-approved traffic control plans.

19. Revocable Contract Items

- 19.1. Items stated as “Revocable” in the proposal may be deleted entirely or in part or added to at the sole discretion of the City. All provisions of Section 9-1.06 “Change Quantity Payment Adjustments” of the 2015 Caltrans Standards Specifications, shall not apply to entire or partial deletion of or addition to Revocable items.

20. Progress Payment Retention

- 20.1. Retention shall be Ten percent (10%) for the estimated value of work.

21. Working Hours

- 21.1. The Normal Work Hours for this project are an 8-hour period 7:00 a.m. to 4:00 p.m. Monday through Friday, excluding City Holidays. Normal Work Hours include any time to access the Project Work Site. Construction work shall not start before 7:00 a.m. and shall be completed before 4:00 p.m. The Contractor may work on Saturdays with prior approval of the Owner. The Contractor will however not be allowed to work on Sundays.
- 21.2. City of Sunnyvale Holidays are as follows:
- 21.2.1. New Year’s Day
 - 21.2.2. Martin Luther King Jr.
 - 21.2.3. President’s Day
 - 21.2.4. Memorial Day
 - 21.2.5. Independence Day
 - 21.2.6. Labor Day
 - 21.2.7. Thanksgiving Day
 - 21.2.8. Day after Thanksgiving
 - 21.2.9. Christmas Eve
 - 21.2.10. Christmas Day
 - 21.2.11. New Year’s Eve

22. Staging Areas

- 22.1. Areas used to store materials, supplies or equipment overnight shall be defined as a staging area. City streets shall not be used as staging areas unless specifically authorized in writing by the City Representative. Vacant and/or city-controlled land may be used as staging area only with written permission of the City Representative. Privately owned lots shall not be used as staging areas without specific written consent of the property owner. A copy of such private property owner consent shall be submitted to the City Representative prior to use of private property as a staging area. No equipment shall be left on residential streets on Saturday, Sunday or holidays unless work is active on the day.

23. Relations with Specialty Solid Waste and Recycling

- 23.1. Contractor shall notify Specialty Solid Waste and Recycling, Inc.
<https://sswr.com/commercial-garbage-collection/> at (408) 565-9900 forty-eight (48) hours in advance of beginning construction so that Specialty can make adjustments in its pickup route to avoid interference with construction **work**.

24. Protection and Restoration of Existing Improvements

- 24.1. Contractor shall protect in place, or remove and replace, existing improvements which may be damaged by Contractor's operations. Existing improvements may include, but are not limited to, irrigation lines, irrigation control wiring, landscaping, trees, pavement, drainage devices, lighting, roads and roadway markings, and pedestrian walkways. Any damage to existing facilities, landscape, or irrigation shall be corrected by the Contractor to original condition at no cost to the **City**.

Contractor shall ensure resurfacing materials do not enter the storm drain system.

25. CEQA Document Declaration

- 25.1. Contractor is responsible to comply with all measures stated in the project's CEQA Document Declaration which can be downloaded at following link:
<https://ceqanet.opr.ca.gov/2017092075/4>

26. Smoking

- 26.1. Pursuant to Title 9, Chapter 9.28 of Sunnyvale's Municipal Code, the promotion of a healthy and safe environment and to protect the general public from the risks associated from second-hand smoke, the City of Sunnyvale is a smoke free city. Smoking in most outdoor areas and multi-family housing is prohibited.
- 26.2. Smoking Includes but not limited to the following:
- 26.2.1. Cigarettes, cigars, cigarillos, hookahs and pipes
 - 26.2.2. Electronic smoking devices, such as e-cigarettes or vape pens
- 26.3. Areas Where Smoking is Prohibited
- 26.3.1. In places where food or drink is consumed
 - 26.3.2. Within 25 feet of any operable doorway, window, opening or vent of buildings
 - 26.3.3. Within 25 feet of "service areas," such as transit stops or ATMs
 - 26.3.4. At public events
 - 26.3.5. Anywhere on S. Murphy Avenue between Washington and Evelyn avenues
 - 26.3.6. At public parks, including golf courses
- 26.4. Areas Where Smoking is Permitted
- 26.4.1. In outdoor areas that are farther than 25 feet from a place where smoking is prohibited
 - 26.4.2. In a private residence (unless it is in multi-family housing)
 - 26.4.3. In smoking-designated hotel or motel guest rooms
 - 26.4.4. In retail or wholesale tobacco shops
- 26.5. The Contractor shall ensure the guidelines provided in this Section 27 are adhered to by his and/or Subcontractor staff. The Contractor may at his discretion may establish designated smoking area(s) for his and that of his Subcontractors in strict adherence to City's regulation. Any Contractor and/or Subcontractor staff not abiding by these rules set forth shall be immediately removed from the site and further subject to fines and/or prosecution.

END OF SECTION

SmithGroup – 11244.00

Sunnyvale Civic Center – Phase 1
Issued for Construction – October 27, 2020

EXHIBIT A – WAIVER OF DISPOSAL FEE

CITY OF SUNNYVALE

PROJECT ADMINISTRATION SECTION
Post Office Box 3707
Sunnyvale, CA 94088-3707

WAIVER OF DISPOSAL FEE

Project _____ Project No. _____ Date ____ / ____ / ____

To: _____

The following Contractor(s) _____

are authorized to dispose of asphaltic concrete and reinforced concrete at the recycle facility (NOT THE SMaRT STATION) free of charge, during the following period:

From: ____ / ____ / ____

To: ____ / ____ / ____

The asphaltic concrete and reinforced concrete are from the City of Sunnyvale Capital Improvement Project noted above and are subject to normal acceptance criteria by the recycle facility contractor.

Authorized City Signature _____

Title _____

(Fax a copy to the Recycling Contractor)

SECTION 007316 – INSURANCE REQUIREMENTS

1. **LIABILITY AND INSURANCE**1.1. **Insurance**

As provided for in Section 002113-1.32 **Post-Notice of Award Requirements**, the Contractor shall promptly obtain, at its own expense, all the insurance required by Section 007316-Insurance Requirements and submit coverage verification for approval by the Owner prior to the Owner's execution of the Contract.

The Notice to Proceed with the Work under this Contract will not be issued, and the Contractor shall not commence work, until such insurance has been approved by the Owner. Such insurance shall remain in full force and effect at all times during the prosecution of the Work and until the final completion and acceptance thereof. In addition, the Commercial General Liability insurance shall be maintained through the statute of repose after final completion and acceptance of the Work. The Notice to Proceed does not relieve the Contractor of the duty to obtain such insurance as required herein.

The Contractor shall not allow any subcontractor to commence work on its subcontract until all similar insurance required of the subcontractor, except Builder's Risk Insurance, has been obtained and verified by the Contractor. Subcontractors shall furnish original certificates and required endorsements as verification of insurance coverage to the Contractor. The Contractor is responsible for confirming that the proper insurance is provided. The Contractor shall make such documents available for the Construction Manager's and/or Owner's review upon such request. The insurance liability limits specified in Section 00800-2.1.1. b (2), **LIABILITY AND INSURANCE**, shall apply for all subcontractors listed in Section 004113, **SUBCONTRACTOR LIST**. The Contractor shall designate the required insurance liability limits for all other subcontractors.

Companies writing the insurance under this article shall be licensed to do business in the State of California or be permitted to do business under the Surplus Line Law of the State of California. Insurance is to be placed with insurers with a current A.M. Best's rating of no less than A:VII, unless otherwise acceptable to the City.

Each insurance policy required by this contract shall be endorsed to state that the certificate holder shall be provided 30 days written notice in the event of suspension, voidance, cancellation, or reduction in coverage or limits, except for reason of non-payment, in which case at least 10-days written notice shall be provided.

Contractor shall include all costs for insurance in its bids.

Nothing contained in these insurance requirements is to be construed as limiting the extent of the Contractor's responsibility for payment of damages resulting from its operations under this Contract. For any claims related to this project, the Contractor's insurance coverage shall be primary insurance as respects the City of Sunnyvale, the Design Consultant and Construction Manager, and their officers, officials, partners, employees' agents, and volunteers. Any insurance or self-insurance maintained by the Owner, its officers, officials, employees, agents or volunteers shall be in excess of the Contractor's insurance and shall not contribute with it.

Any failure of the Contractor to comply with reporting or other provisions of the policies including breaches of warranties shall not affect coverage provided to the City, the Design Consultant and the Construction Manager and their officers, officials, employees, agents or volunteers.

The Contractor shall take out, pay for, and maintain throughout the duration of this Contract and for such additional periods as more specifically required herein the following insurance against claims for injuries to persons or damages to property which may arise from or in connection with the performance of the work hereunder by the Contractor, the Contractor's agents, representatives' employees or subcontractors

1.1.1. Commercial General Liability and Automobile Liability Insurance – This insurance shall protect the Contractor from claims for bodily injury, personal injury and property damage which arise out of or relate to the Project.

- a. Additional Insureds – The Commercial General Liability and Automobile Policies of insurance shall include as additional insureds or be endorsed to contain the City, the Design Consultant and Construction Manager, and their officers, officials, partners, employees agents and volunteers (collectively, "Additional Insureds") and such are to be covered as additional insureds as respects: to liability arising out of activities performed by or on behalf of the Contractor; products and completed operations of the Contractor; premises owned, occupied or used by the Contractor and or automobiles owned, leased, hired or borrowed by the Contractor.

The commercial general liability additional insureds endorsement shall use the standard ISO form CG 2010 with an edition date prior to 2004. Additional insureds shall also be covered for completed operations, either in the additional insured endorsement or through a separate endorsement such as CG 2037.

The coverage shall contain no special limitation on the scope of protection afforded to the City, its officers, officials, employees, agents or volunteers; the Design Consultant, the Construction Manager and each of their partners, officers, officials, employees, agents and volunteers and coverage provided to such additional insured. This policy shall provide coverage to each of the Additional Insureds with respect to said Work. Both bodily injury and property damage insurance must be on an occurrence basis.

Policy shall be endorsed to provide that the coverage afforded thereby shall be primary coverage and that if the Additional Insureds have other insurance against the loss covered by said policy, the other insurance shall be excess insurance only. Any insurance or self-insurance maintained by the Additional Insureds shall be excess of the Contractor's insurance and shall not contribute with it.

- b. Scope of Coverage – The policy shall provide coverage at least as broad as:
 - 1. Insurance Services Office Commercial General Liability coverage (occurrence Form) CG 00 01 and
 - 2. Insurance Services Office Form Number CA 00 01 covering Auto Liability, Code 1 (any auto).
- c. Amount of Coverage – The Commercial General Liability insurance policy shall provide coverage with limits of no less than \$2,000,000.00 on account of any one occurrence for bodily injury, personal injury, and property damage; and an annual general aggregate limit of not less than \$4,000,000; and \$2,000,000.00 products and completed operations aggregate, combined single limit.

The Automobile Liability insurance policy shall provide minimum limits of \$1,000,000.000 per accident and \$5,000,000 policy aggregate for bodily injury and property damage arising out of the ownership, maintenance, or use of any owned or non-owned vehicles.

For all listed Subcontractors in Section 004113, **SUBCONTRACTOR LIST**, the amount of coverage shall be as follows:

The Commercial General Liability insurance policy shall provide coverage with limits of no less than \$2,000,000 on account of any one occurrence for bodily injury, personal injury, and property damage; and an annual general aggregate limit of not less than \$4,000,000.00.

The Automobile Liability insurance policy shall provide minimum limits of \$1,000,000 per

accident and \$5,000,000 policy aggregate for bodily injury and property damage arising out of the ownership, maintenance, or use of any owned or non-owned vehicles.

- d. Subcontractors – The bodily injury and property damage liability insurance shall not be deemed to require the Contractor to have its subcontractors named as insureds in the Contractor's policy, but the policy shall protect the Contractor from contingent liability which may arise from operations of its subcontractors.
- e. Included Coverage - The above Commercial General Liability insurance shall also include, but is not necessarily limited to, the following coverages:

Premises - Operations

Owner's/Independent Contractors and Contractors Protective

Products - Completed Operations

Personal Injury - (False Arrest, Libel, Wrongful Eviction, etc.)

Advertising Injury

Broad Form Property Damage, Including, Completed Operations

Separation of Insureds/Cross-Liability Provision

Duty to Defend all Insureds

Deletion of any Limitation on Coverage for Bodily Injury or Property Damage Arising out of Subsidence or Soil or Earth Movement

XCU - (Explosion, Collapse, Underground Damage) XCU may be deleted when not applicable to operations performed by the Contractor or its subcontractors.

Limited Contractual Liability including the Indemnification Agreement

- f. Umbrella Policy – At the option of the Contractor, primary limits may be less than required with an Umbrella Policy providing the additional limits needed. This form of insurance will be acceptable provided that the Primary and Umbrella Policies both provide the insurance coverages herein required, including all additional insured requirements. The Umbrella Policy shall be provided on a “following form” basis, with coverage at least as broad as provided on the underlying Commercial General Liability insurance. Any such umbrella/excess policy must be approved by the Owner and maintain a A.M. Best Rating of no less than A:VII.
- g. Employer's Liability – The policy shall provide for \$1,000,000 per accident for bodily injury or disease.
- h. Waiver of Subrogation – Evidence of coverage shall be accompanied by an endorsement from the insurer agreeing to waive all rights of subrogation against the Owner, its officers, officials, employees, agents or volunteers; the Design Consultant, the Construction Manager and each of their partners, officers, officials, employees, agents and volunteers which might arise by reason of any payment under the policy in connection with the Work performed by Contractor.
- i. Deductibles – Insurance deductibles or self-insured retentions must be declared by the Contractor, and such deductibles and retentions shall have the prior written consent from the Owner. At the election of the Owner, the Contractor shall either 1) reduce or eliminate such deductibles or self-insured retentions, or 2) procure a bond which guarantees payment of losses and related investigations, claims administration, and defense costs and expenses.

1.2 Workers' Compensation Insurance

In accordance with the provisions of Article 5, Chapter 1, Part 7, Division 2 (commencing with Section 1860) and Chapter 4, Part 1, Division 4 (commencing with Section 3700) of the Labor Code of the State of California, the Contractor is required to secure the payment of compensation to its employees and for that purpose obtain and keep in effect adequate Workers' Compensation Insurance. If the Contractor, in the sole discretion of the Owner, satisfies the Owner of the responsibility and capacity under the applicable Workers' Compensation Laws, if any, to act as self-insurer, the Contractor may so act, and in such case, the insurance required by this paragraph need not be provided.

The Contractor is advised of the provisions of Section 3700 of the Labor Code, which require every employer to be insured against liability for Workers' Compensation or to undertake self-insurance in accordance with the provisions of that code, and shall comply with such provisions and have Employer's Liability limits of \$1,000,000 per accident for bodily injury or disease before commencing the performance of the Work of this Contract.

Before the Notice to Proceed with the Work under this Contract is issued, the Contractor shall submit written evidence that the Contractor has obtained for the period of the Contract full Workers' Compensation Insurance coverage for all persons whom it employs or may employ in carrying out the work under this Contract. Such evidence of coverage shall be accompanied by an endorsement from the insurer agreeing to waive all rights of subrogation against the City, the Design Consultant and Construction Manager, and their officers, officials, partners, employees agents and volunteers from all claims, loss, damage, injury, and liability of every kind, nature, and description brought by any person employed or used by Contractor, or any subcontractor, to perform the Work under this contract regardless of responsibility or negligence. This insurance shall be in accordance with the requirements of the most current and applicable State Workers' Compensation Insurance Laws.

1.3 Builder's Risk Insurance

The Contractor shall furnish "All Risk or Special Form" Builder's Risk Insurance on the replacement cost basis, in an amount equal to the full replacement cost on a completed value basis. Such insurance shall be obtained, paid for, and maintained by the Contractor and shall cover, but shall not be limited to, fire, lightning, windstorm, hail, explosion, riot, riot attending a strike, civil commotion, smoke damage, damage by aircraft or vehicles, vandalism and malicious mischief, theft, collapse, earthquake, and water damage other than flood. This insurance shall meet the Design Consultant and Construction Manager, and their officers, officials, partners, employees agents and volunteers and the Contractor as insureds, as their interests may appear and shall include coverage, but not by way of limitation, for all damages of loss to the Work and to appurtenances, to materials and equipment to be incorporated into the Project while the same are in transit, stored on or off the Project site, to construction plant and temporary structures.

(a) Coverage for "Acts of God", as defined in Public Contract Code Section 7105, in excess of five(5) percent of the Contract amount shall be included in Builders Risk Insurance.

(b) The Contractor and insurance carrier are advised that a portion of the work site is located within the 100-year flood plain as defined by the Federal Emergency Management Authority (FEMA) and shall include Builders Risk Insurance for Flood.

Builder's Risk Insurance policies shall contain the following provisions:

- (1) The City of Sunnyvale shall be named as loss payee.
- (2) The insurer shall waive all rights of subrogation against all insureds.

Builder's Risk Insurance may have a deductible clause not to exceed the following limits:

- (1) If, pursuant to Section 7105 of the Public Contract Code, the Owner requires coverage for any

damage to the work caused by an “Act of God”, as defined by Section 7105(b)(2) of that Code, and has set forth the amount of the work to be covered and the insurance premium for such coverage as a separate bid alternative, the deductible for such coverage shall not exceed five (5) percent of the value at risk at the time of the loss. The City shall be named as an insured.

(2) All Other Perils: \$25,000

The Contractor shall be responsible for paying any and all deductible costs. The policy shall provide the City the right to occupy the premises without termination of the policy until acceptance of the Project.

1.4 Contractor’s Pollution Legal Liability

A Contractor’s Pollution Legal Liability shall provide for \$2,000,000 coverage for each occurrence and a \$4,000,000 policy aggregate for the Contractor’s Pollution legal liability arising out of the Contractor’ obligation on the project. Insurance shall be maintained for five (5) years after final completion and shall provide coverage on an occurrence basis. If the services involve mold identification/remediation, the Contractor’s Pollution Liability policy shall not contain a mold exclusion, and the definition of Pollution shall include microbial matter, including mold. The City of Sunnyvale, Design Consultant, and Construction Manager shall be named as additional insureds and the insurer shall waive all rights of subrogation against the City. The deductible clause shall not exceed \$25,000.

1.5 Proof of Coverage

Before the Notice to Proceed with the Work under this Contract is issued, the Contractor shall furnish the Owner with certificate(s) evidencing issuance of all insurance mentioned herein, copies of the policy declaration or information page(s) and additional insured endorsements. The certificate(s) and endorsements for each insurance policy are to be signed by a person authorized by that insurer to bind coverage on its behalf. The endorsements are to be on forms specified, or if not specified, forms acceptable to the Owner. The certificate(s), policy declaration or information page(s), and endorsements are to be received and approved by the Owner before Work commences. Such certificates of insurance shall provide that the insurance policy shall be endorsed to state that coverage not be suspended, voided, canceled by either party, reduced in coverage or limits except after thirty (30) days prior written notice by certified mail, return receipt requested, has been given to the Owner. Contractor shall also provide certificate(s) evidencing renewals of all insurance required herein, at least thirty (30) days prior to the expiration date of any such insurance.

Any deductibles or self-insured retentions must be declared to and approved by the Owner. At the option of the Owner, either: the insurer shall reduce or eliminate such deductibles or self- insured retentions as respects the Owner, the Design Consultant and the Construction Manager and their officers, officials, employees, agents and volunteers; or the Contractor shall procure a bond guaranteeing payment of losses and related investigations, claim administration and defense expenses.

Notwithstanding any other provision of this section, Contractor shall not be required to insure Design Consultant against claims, etc. arising from the performance of professional services.

In the event of the breach of any provision of this paragraph, or in the event of any notices received which indicates any required insurance coverage will be diminished or canceled, Owner, at its option, may, notwithstanding any other provisions of this Agreement to the contrary, immediately declare a material breach of this Agreement and suspend all further Work pursuant to this Agreement.

1.6 Indemnification

- A. Contractor shall indemnify, defend with counsel acceptable to City and hold harmless to the full extent permitted by law, the City, Design Consultant and Construction Manager, and their officers, officials, partners, employees agents and volunteers and their consultants for the Project, as insureds, (collectively "the Indemnified Parties"), from and against any and all liability, loss, damage, claims, expenses and costs (including, without limitation, attorney fees and costs and fees of litigation) (collectively, "Liability") of every nature arising out of or in connection with Contractor's performance of Work or its failure to comply with any of its obligations contained in this Agreement. Such obligation shall not be construed to negate, abridge, or otherwise reduce any other right or obligation of indemnity which would otherwise exist. Such indemnification by Contractor shall include, but not be limited to, the following:
1. Liability or claims resulting directly or indirectly from the negligence or carelessness of the Contractor, its subcontractors, employees, or agents in the performance of the Work, or in guarding or maintaining the same, or from any improper materials, implements, or appliances used in its construction, or by or on account of any act or omission of the Contractor, its employees, or agents;
 2. Liability or claims arising directly or indirectly from bodily injury, occupational sickness or disease, or death of the Contractor's, or Supplier's own employees, or agents engaged in the Work resulting in actions brought against the Indemnified Parties;
 3. Liability or claims arising directly or indirectly from or based on the violation of any Laws or Regulations, whether by Contractor, its subcontractors, employees, or agents;
 4. Liability or claims arising directly or indirectly from use or manufacture by Contractor, its subcontractors, employees, or agents in the performance of this Agreement of any copyrighted or uncopyrighted composition, secret process, patented or unpatented invention, article, or appliance, unless otherwise specified stipulated in this Agreement.
 5. Liability or claims arising directly or indirectly from the breach of any warranties, whether express or implied, made to the Owner or any other parties by the Contractor, its subcontractors, employees, or agents;
 6. Liability or claims arising directly or indirectly from the willful misconduct of the Contractor, its subcontractors, employees, or agents;
 7. Liability or claims arising directly or indirectly from any breach of the obligations assumed in this Agreement by the Contractor;
 8. Liability or claims arising directly or indirectly from, relating to, or resulting from a hazardous condition created by the Contractor, Subcontractors, Suppliers, or any of their employees or agents, and;
 9. Liability or claims arising directly, or indirectly, or consequentially out of any action, legal or equitable, brought against Indemnified Parties, their consultants, subconsultants, and officers, directors, employees, agents and volunteers of each or any of them, to the extent caused by Contractor's use of any premise acquired by permits, rights of way, or easements, Site, or any land or area contiguous hereto or its performance of the Work thereon.
 10. Liability arising directly or indirectly from exposure to hazards in violation of California Labor Code that may be asserted by any person or entity, including, but not limited to, Contractor, arising out of or in connection with the negligent activities of Contractor, its agents, employees or privies pursuant to this Contract, whether or not there is concurrent negligence on the part of the Indemnified Parties.
- B. The Contractor shall reimburse the Indemnified Parties for all costs and expenses, (including but not limited to fees and charges of engineers, architects, attorneys, and other professionals and court costs of appeal) incurred by said Indemnified Parties in enforcing the provisions of this Paragraph.

- C. The indemnification obligation under this Section 00800-2.1.6 shall not be limited in any way by any limitation on the amount or type of insurance carried by Contractor or by the amount or type of damages, compensation, or benefits payable by or for the Contractor or any Subcontractor or other person or organization under workers' compensation acts, disability benefit acts, or other employee benefit acts.
- D. Pursuant to California Public Contract Code Section 9201, Owner shall timely notify Contractor of receipt of any third-party claim relating to this Agreement.
- E. The Contractor's obligations pursuant to this provision will survive the expiration or earlier termination of this Contract.

The Contractor's duty to indemnify and save harmless shall include the duty to defend as set forth in California Civil Code Section 2778; provided, that nothing herein contained shall be construed to require Contractor to indemnify the Indemnified Party against any responsibility or liability in contravention of California Civil Code Section 2782. The duty to defend and indemnify hereunder is not limited by the insurance coverage required under the Contract Documents and is separate and apart from such coverage.

1.7 Professional Liability Insurance (Errors & Omissions)

In the event the Contract Documents require that professional services be provided, such as but not limited to, engineering, surveying, design (including shoring and sheet pile design), etc., a certificate of insurance must be submitted to the Construction Manager prior to commencing such work evidencing professional liability coverage with a limit of not less than \$1,000,000 per claim, \$2,000,000 aggregate. Any material changes in limits, coverage, or loss of aggregate limit due to outstanding claims must be reported to the Construction Manager within 30 Days of any such event.

1.8 Injury or Illness Reports

The Contractor shall furnish the Construction Manager with a copy of the Employer's Report of Injury immediately following any incident requiring the listing of said report on the OSHA Log during the prosecution of the work under this Contract. The Contractor shall also furnish the Construction Manager with a copy of the Employer's Report of injury involving any subcontractor on this project.

1.9 Notification of Insurance Companies

The Contractor shall advise all insurance companies to familiarize themselves with all of the Conditions and provisions of this Contract, and they shall waive the right of special notification of any change or modification of this Contract or of extension of time, or of decreased or increased work, or of the cancellation of the Contract, or of any other act or acts by the Indemnified Parties, under the terms of this Contract, and failure to so notify the aforesaid insurance companies of changes shall in no way relieve the insurance companies of their obligation under this Contract.

2. INSURANCE DURING GUARANTEE PERIOD

For all work the Contractor or its subcontractors perform during the guarantee period, worker's compensation, and commercial general liability insurance and insurance in the amounts and format required herein, shall remain in force and be maintained through the statute of repos after final completion.

SECTION 007319 -HEALTH AND SAFETY REQUIREMENTS

GENERAL

1.1. RELATED DOCUMENTS

- A. City of Sunnyvale Contract, other Division 00 and 01 Specification Sections, and the Construction Documents apply to this Section.
- B. Requirements included in this Section are the minimum acceptable and are in addition to the City of Sunnyvale municipal code, as well as all State, Local and Federal health, safety, and environmental requirements. Where conflicts or discrepancies exist between requirements, the more stringent requirement shall govern.

1.2. DEFINITIONS

- | | | |
|----|---|--|
| A. | The Owner | The City of Sunnyvale (The Client) and its representatives, |
| B. | Construction Manager | Jacobs or the Jacobs operating group or subsidiary company named in this contract. |
| C. | The Contractor | Low Bidder General Contractor awarded construction contract and responsible for development and implementation of project HSE plan. The Contractor's HSE requirements shall extend to govern the Contractor's subcontractors, vendors, employees, and others under its direction or control. |
| D. | Accident/Incident | An unplanned, undesirable event that disrupts work activity |
| E. | HSE Professional | This is a generic term that may be used to include a worker with whose full-time job is the execution of HSE related tasks, e.g., HSE Manager, HSE Supervisor, Safety Manager, Safety Supervisor, etc. |
| F. | Safe Plan of Action (SPA) /
Pre-Task Risk Assessment | A task-specific planning document used to identify steps to execute the task, the hazards associated with each step and the mitigation measures to eliminate or minimize the hazard. Also referred to as a Job Safety Analysis (JSA) in some locations. |
| G. | Safety Observation Report
(SOR) | The SOR is a proactive process designed to identify and document HSE-related acts and conditions in the work environment. |
| H. | Task Safety Awareness (TSA) | A review of the SPA among the crew and supervisor to discuss and resolve any HSE issues before work is continued, when there has been a break in the work schedule, change in work conditions, change in crew, etc. |
| I. | Work | The total of the Contractor's responsibilities as set forth in the contract documents. |
| J. | HSE | Health, Safety & Environment |

1.3 SUMMARY

- A. The Contractor shall be required to develop and implement a project specific health and safety execution plan and procedures that promotes safe and healthful working conditions that complies with

contract terms and conditions, City of Sunnyvale requirements, State, Local and Federal regulations and recommendations pursuant to but not limited to, California state labor code 6400 and Cal OSHA Code of Regulations, title 8, section 3202. <https://www.dir.ca.gov/title8/3203.html> - (Exhibit 12)

- B. Prior to the start of and during the course of the Work (above and below ground) the Contractor shall make a thorough survey of the work site to determine all potential hazards. The Contractor employees and workmen shall be made aware of those hazards and shall be instructed in procedures and the use of equipment for their protection. The Contractor shall verify the location and condition ("live" or "dead") of all utilities on and near each work site and take precautions to protect his employees, the general public, and the property.
- C. The Contractor shall be wholly responsible for any accidents (including death) occurring at any time during the progress of the work, and until the final acceptance of the work by the Owner and/or Construction Manager, which may happen to any of his workmen or those of any Subcontractor employed, or for any damage or injuries (including death) which his work and operations may cause to the work being constructed, or to existing buildings, or to any tenants and occupants of the property, or of the adjoining properties, or to the public, or to any public or private property.
- D. The Contractor shall immediately advise the Owner and/or the Construction Manager of inspections conducted by CAL-OSHA at the work site, and shall transmit copies of citations and violations to the Owner.
- E. The Contractor shall be issued a 'Non-Compliance Notice' (NCN) and work stopped whenever a work procedure or condition is noncompliant with site HSE plan and safety regulations as deemed unsafe by the Owner and/or Construction Manager.
- F. If the project is shut down due to the Contractor's failure to comply with the project's safety requirements and regulations or other state and local applicable safety requirements including but not limited to OSHA/Cal OSHA, no part of the time loss due to any such suspension of operations or stop orders shall be made the subject of a claim for extension of time for increased cost or damage by the Contractor.
- G. The Contractor shall be required to conduct daily site safety inspections and regular scheduled meetings including but not limited to, inspection of work procedures, daily tool box meetings and weekly safety update meetings with Contractor staff, labor force and subcontractors. The purpose of these safety inspections and meetings is to, ensure work is safely performed, safety procedures are adhered to, and to promote safety awareness.
- H. The Contractor shall provide to the Construction Manager its safety plan, including its safety incentive program, all meeting minutes from job site safety meetings, job site safety reports, and any reports concerning safety violations or injuries/accidents at the job site. The Contractor and its Subcontractors shall cooperate with the Owner's Construction Manager and provide safe access for the Owner's Construction Manager to review the work.
- I. The Contractor shall erect and maintain, as required by existing conditions and progress of the Work, all reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations and notifying end users of adjacent utilities
- J. The Contractor shall be responsible to obtain any permits required by the City to store, handle, or use any hazardous material, including but not limited to fuels for equipment, and specialty construction chemicals and paints
- K. Contractor to develop and implement an Infection Control Risk Assessment plan (ICRA) including but not limited to Interim Life Safety Measure procedures (ILSM).
- L. As part of the Contractor's Injury and Illness Prevention Program (IIPP) for the project, the Contractor shall also be required to develop and implement a COVID 19 specific infection prevention program that is at a minimum in compliance with the most recent guidelines and recommendations set by the State of California and City of Sunnyvale. Refer to Exhibit 14, this specification section, which outlines

CAL OSHA recommendations and guidelines.

1.4 PROPOSED HSE PROFESSIONALS

- A. The Contractor shall appoint for the duration of the project the services of a full-time on-site Safety Manager to oversee and manage the implementation of the Contractor's overall HSE plan as required for the safe execution of the project. The Contractor shall also provide the services of additional full-time Safety supervisors to assist the Safety Manager; one (1) Safety Supervisor per each additional 50 workers over 100. The Contractor shall provide administrative support personnel to implement the HSE program.
- B. The Contractor proposed HSE/Safety Manager shall have a minimum of five (5) to ten (10) years of experience as an HSE/Safety Manager on construction projects comparable to in size, scope and complexity to construction "Scope of Work" described in the bid plans and specifications. A bachelor's degree in any basic science, an associate degree in occupational health and safety, or an equivalent combination of education and experience is required. A Certified Safety Professional (CSP) or Certified Safety Manager (CSM) is preferred. The HSE/Safety Manager shall be an OSHA authorized Outreach Trainer having passed the OSHA 500 Training Course in Occupational Safety and Health Standards for the Construction Industry including any and all update training required to maintain a current active certification, and shall have a current Red Cross First Aid Certificate and a CPR Certification.
- C. The proposed Contractor Safety Supervisor shall have a minimum of three (3) to five (5) years of experience as a Safety Supervisor on construction programs construction projects comparable to in size, scope and complexity to construction "Scope of Work" described in the bid plans and specifications. An associate degree in occupational health and safety, or an equivalent combination of education and experience is required and shall have, at a minimum, a certificate of completion of a 30-hour OSHA Training Course in the following areas; Hazardous Materials, Respiratory Protection and Permit-Required Confined Space Entry. Training shall be conducted by an instructor accredited to perform such instruction by the Occupational Safety and Health Administration. The Safety Supervisor must also possess current Red Cross First Aid and CPR Certification.
- D. The Contractor shall submit the résumé(s) of proposed HSE/Safety Manager and Safety Supervisor to the Owner and/or Construction Manager for review and acceptance. The resumes shall include but not limited to, work experience, education, safety and health training completed, memberships in professional associations, professional certifications and registrations. Documentation confirming the qualifications and personal references or contacts for verification are required. The Owner may reject the person(s) proposed for failure to have adequate qualifications, past performance or other reasonable and lawful causes. The Approval of the Owner is required, if at any time the Contractor seeks to remove or discharge or replace the Safety Manager or Safety supervisor.

1.5 WRITTEN HSE PROGRAM

- A. The Contractor shall submit fourteen (14) calendar after issue of 'Notice to Proceed' a copy of proposed project-specific HSE Program including but not limited to:
 - 1. Filled out Contractor HSE Data Form (Exhibit 1)
 - 2. Project Hazard Assessment Safety Action Plan (HASAP) Exhibit 11
 - 3. Safety procedures
 - 4. Personnel training certificates/records
 - 5. Construction permit
 - 6. Annual crane certifications and operator qualification

7. Case management
8. Emergency preparedness, planning and response plan
9. Risk and Control measures
10. Infection Control Risk Analysis (ICRA)
11. Hazardous Waste Operations

1.6 BASIC HSE REQUIREMENTS

The following HSE rules list The Contractor's fundamental requirements for the project's HSE. When there are multiple rules that may apply, the most stringent, Owner, State, or Federal HSE regulations that govern the work shall be followed. The hierarchy of risk control shall emphasize the first priority is hazard elimination and the use of PPE is the option of last resort.

A. Personal Protective Equipment (PPE) and Personal Attire

1. Hard hats (ANSI Z89.1 or equivalent) shall be worn at all times where overhead hazards exist (e.g. construction, environmental operations, operations or maintenance environment), regardless of the workers activities. This includes welders when using welding hoods. Metal hard hats, cowboy style hard hats, and bump caps are prohibited.
2. Shirts with at least four-inch sleeves shall be worn at all times. No tank tops are allowed. Loose or frayed clothing, loose or hanging long hair, ties, rings, body jewelry, etc. shall not be worn around moving machinery or other areas where they may become tangled. Nylon, polyester or other fabrics that melt are prohibited where there is a hazard of fire or excessive heat.
3. Personal work attire of employees shall fit their work assignments and be in adequate condition. Long pants shall be worn by all field personnel.
4. Neck ties; hair below the top of shoulders; facial piercing; finger rings (except wedding bands unless prohibited by the owner or project); dangling necklaces; bracelets; or earrings shall not be worn on the Project site. These restrictions do not apply to administrative areas.
5. Hearing protection shall be worn when exposures exceed 85 dBA. A copy of the sub-contractor's Hearing Conservation Program shall be forwarded to the Contractor Site/Project Management prior to the start of work.
6. Hard-toe footwear (ASTM F2413, or equivalent) shall be worn by all workers when in the construction environment or in areas where there is a danger of foot injuries due to falling, rolling, or piercing objects or when employee's feet are exposed to electrical hazards. All hard-toe footwear, except footwear designed specifically for chemical or water resistance (including rubber and PVC boots), shall be constructed of leather, and have a combined welting/upper height, which meets or exceeds 2" above the wearer's ankle, and have a defined heel. It is preferred that boots with lace up design be used to provide additional ankle support.
7. Safety glasses (ANSI Z87.1, or equivalent) shall be worn at all times when in the construction environment and in any area where eye hazards exist. This includes under welding hoods and when using a face shield. For workers with prescription safety eye wear, glasses must have rigid side shields. Safety goggles may be worn over non-safety prescription eyewear.
8. Face shields (ANSI Z87.1, compliant) must be worn in addition to safety glasses when grinding, chipping, jack hammering, and power sawing or when conducting other tasks that involve flying particulate and debris hazards. Face shields must also be worn in addition to safety glasses or chemical goggles for chemical splash hazards.
9. Gloves, appropriate for the task, shall be worn 100% of the time when in the field and other designated project locations like the warehouse. This includes visitors and while walking on a field site. Specific glove types required for the task will be listed on the SPA.

B. Respiratory Protection

1. Contractors, who plan to use respirators as a part of their work operations, are required to forward to Owner and Construction Manager a copy of their written Respiratory Protection Program for review prior to start of work.

C. Work Alone

1. Whenever personnel are engaged in activities such as work in remote locations, work over water, confined space entry, work at elevation requiring fall arrest/restraint, potentially energized electrical work, derelict building/structure demolition, or line breaking they shall not work alone.

D. Fatigue Risk Management

1. Contractor shall submit a Fatigue Risk Management plan outlining assessment and mitigation measures to minimize accidents due to employee fatigue prior to performing any work, which increases fatigue potential such as: extended work shift, call outs, extended work schedules or exhaustion from demanding work.

E. Extreme Work Environments

- 1.0 Contractors working in unusually cold or hot environments or high-altitude locations shall submit an extreme conditions safe work plan that addresses worker training, PPE, engineering and administrative controls, at a minimum.

F. Fire Protection

1. The Contractor shall be responsible for fire protection in connection with their work activities.
2. Hot work permits shall be required in potentially hazardous areas to control flame and spark producing work tasks. The Contractor is responsible for providing trained fire watch attendants as necessary.
3. The Contractor is responsible for maintaining and cleaning its work areas. Debris, scrap, or other waste materials shall be placed in appropriate containers or waste areas as soon as practicable after they are generated.
4. Flammable liquids shall be kept in UL approved safety containers and shall be properly labeled.
5. Smoking is allowed only in designated smoking areas that have been approved by the Owner and/or Construction Manager.
6. Only UL and NFPA approved petroleum or electrically fired heating devices will be authorized for use.
7. All mobile equipment shall have a working fire extinguisher.
8. Exit routes shall be clearly marked throughout all phases of construction

G. Tools and Equipment

1. It's critical that all tools and equipment be used according to applicable safety requirements and manufacturer instructions, guidelines, and capacities.
2. Equipment and tools shall not be altered in any way to adapt it for a job for which the manufacturer does not intend it. The manufacturer of the equipment must approve any such adaptations or alterations to equipment in writing. Only trained and authorized persons shall operate machinery or equipment.
3. Only the use of knives and cutting tools with automatic self-retracting blades are allowed for work tasks. In rare instances where an alternative type of cutting tool is required, a proper hazard risk

assessment (and a AHA – Activity Hazard Analysis) must be developed, reviewed and approved in writing by the Construction Manager. The use of a “pocket knife” as a cutting tool while performing any work activity or task is prohibited. Specialized tools are required for cable cutting and stripping operations; the use of a lineman’s “stripping knife” is prohibited.

4. All hand-held power tools must be equipped with constant pressure switches that will automatically shut off power when the pressure (worker’s hand) is removed. Hand-held power tools with on/off or lock-on switches are not allowed.
5. The Contractor is responsible for performing pre-use inspections and safety checks and for maintaining records on equipment and tools.
6. The frame or case of welding machines, generators, and light plants shall be grounded under the conditions and methods described in the National Electric code and by the manufacturer.
7. Alternate means to using powder actuated tools shall not be used unless approved by the Construction Manager.

H. Barricades

1. Barricades shall be erected to warn of a potentially hazardous condition or provide physical protection from the hazard.
2. The Contractor’s employees shall be trained to understand and respect various types of barricades.
3. A sign/tag shall be used to provide communication to personnel outside the barricaded area of the identified hazards, company name, person who is responsible for the barricade and the current date.
4. Caution barricades are erected with yellow and black ribbon but offer no physical protection
5. Danger areas shall be barricaded using red and black danger ribbon or utilize protective barricades.
6. Protective barricades provide warning and physical protection from the hazard. They are generally made from scaffold components or wooden material capable of supporting 200lb lateral force.
7. Barricade ribbon shall be complete on all sides of the work and should be tied to properly constructed stanchions and not to instruments lines, valves, etc. The project HASAP may require flashing lights for protective barricades left overnight. Barricades shall be removed promptly after task is complete.

I. Hygiene and Potable Water

1. The Contractor shall be responsible for properly organizing activities to the extent possible to ensure ample refuse and trash containers are provided and frequently emptied.
2. Eating is not permitted in construction areas or existing operating plant process areas.
3. Drinking water shall be from labeled potable outlets or authorized containers. Containers shall be in sanitary condition, sealed, labeled, and dated before transporting to work areas.
4. The Contractor is responsible for providing designated break areas equipped with wash facilities and climate-controlled areas for cold and hot environments.
5. The Contractor shall provide adequate number toilet facilities. A separate facility shall be provided for female workers.

J. Cameras and Phones

1. Personal mobile phones, electronic pads, cameras, etc. are not allowed while working inside the Department of Public Safety (DPS) and Emergency Operations Center (EOC) buildings unless

specifically authorized by the City and/or Construction Manager for use in work related tasks.

1.7 PRE-TASK PLANNING AND OBSERVATION PROCEDURES

- A. In order to achieve the Owner's goal of Zero Incidents, the following safe work plan activities shall be implemented by The Contractor.
 - 1. The SPA, the TSA, and the SOR process require each worker to receive on-the-job training from their direct Supervisor. Subcontractor employees shall also be trained and educated on their individual responsibilities contained in these tools by the Contractor after mobilization.
 - 2. The Contractor employees are required to participate in documented, daily task-specific Safe Plans of Action (Exhibit 6) and regular Safety Observation Reports (Exhibit 7).
- B. Safe Plan of Action
 - 1. The Safe Plan of Action (SPA) identifies steps to execute the task, the hazards associated with each step and mitigation measures to eliminate or minimize the hazard. This helps ensure that every task receives proper HSE assessment and planning. The SPA is developed by the crew assigned to perform the work with guidance from their Supervisor. (See Exhibit 6.)
 - 2. The Contractor Supervisor identifies the work area and task to be performed and then leads the crew in developing a Safe Plan of Action.
 - 3. Creating the SPA requires The Contractor Supervisor to solicit crew participation in identifying hazards and hazard control measures such as PPE, training requirement, permits, procedures, etc.
 - 4. Members of The Contractor team are required to sign the SPA document to indicate their participation, their understanding of the plan, and their agreement to follow the plan.
- C. Task Safety Awareness or Pre-Start Meeting
 - 1. The Task Safety Awareness (TSA) meeting is a daily HSE briefing associated with the task(s) that are scheduled for the crew during the work shift.
 - 2. These meetings address the HSE measures specific to the tasks.
 - 3. TSA meetings shall be conducted at least daily and whenever a task presents a change of hazards from the previous tasks.
- D. Safety Observation Reports
 - 1. The Safety Observation Report (SOR), Exhibit 7, is a proactive process designed to identify, address and document HSE-related acts and conditions in the work environment.
 - 2. All Contractor's supervisors are required to participate in the SOR process by generating written SORs and submitting a weekly report illustrating results and trends to the Owner/Construction Management Team.
 - 3. The SOR allows any site worker to record observed safe or at risk HSE practices and identifies the cause of any deficiencies so that corrective action can be taken.

1.8 HSE TRAINING/COMMUNICATION REQUIREMENTS

- 1. The Contractor's employees shall complete HSE training as required by the Owner, local, State, and Federal HSE requirements. Such training may include, but is not limited to, a site-specific orientation and quiz provided by The Contractor, OSHA 10-Hour Construction Safety & Health Outreach Program, Safety Leadership Training for Supervisory Personnel, ergonomics training, and crane and rigging training. Documentation of all HSE training shall be maintained at the project

site by the Contractor and provided to the Construction Manager upon request.

2. The Contractor shall instruct each employee or tier subcontractor in the recognition of hazards and unsafe behaviors and the process to correct these acts or conditions related to the work environment to control or eliminate hazards or exposures to illness or injury.
3. The Contractors must establish a prompt and effective method of providing HSE communications such as HSE alerts, advisories, bulletins, notification boards, regulatory updates, etc., to all site employees. Daily pre-start/tool box meetings emphasize directives, trends, and corrective actions.

1.9 CERTIFICATION, INSPECTIONS, AND REGULATORY AGENCY PERMITS

- A. Certain operations may require an Owner permit. Such activities may include but are not limited to hot work, confined space/vessel entry, excavations, asbestos abatement, lead abatement, PCB demolition & remediation, etc.
 1. The Contractor's Safety Manager shall verify/confirm with Owner and/or Construction Manager whether any parts of The Contractor's activities require a City/Owner permit.
 2. Some states and local authorities require permits and licensure for specific activities such as excavations, heavy lifts, asbestos/lead abatement, air emission generation, water discharge permits, hazardous waste disposal, etc. The Contractor is responsible to secure and comply with these permits and licensure requirements, unless The Owner and/or Construction Manager has delegated this responsibility to others in writing.

1.10 HSE SURVEYS

- A. The Owner and/or Construction Manager HSE Department shall conduct periodic HSE surveys of the site, which will often be conducted jointly with representatives from The Contractor(s). Any HSE discrepancy observed will be reported to The Contractor so that appropriate actions (up to and including work stoppage) will be taken by The Contractor.
- B. These HSE surveys do not relieve The Contractor of their responsibility to self-inspect their work and equipment and to conduct their work in a safe and environmentally compliant manner.

1.11 ACCIDENT/INCIDENT INVESTIGATION

- A. In the event of a workplace accident, injury, or illness, the most important immediate actions are to provide medical assistance to those who may need it and to ensure the safety of others that may be affected or acting as emergency responders.
- B. Reporting
 1. The Contractor must immediately report all potentially work-related incidents (including Near Miss incidents regardless of severity), injuries, or illnesses to the Construction Manager Site HSE Representative, after the appropriate level of medical assistance has been arranged.
 2. The Contractor shall complete the Weekly Contractor's Accident Statistics Report (Exhibit 2) for each week in which they conduct work on the project. These reports are due to the Construction Manager by the first business day of the week for the preceding week.
 3. The Contractor is responsible for maintaining a First Aid Register (Exhibit 10) for all employee injuries and illness reported on the project.
 4. The Contractor employees must promptly report all potentially work-related incidents (including Near Miss incidents regardless of severity), injuries, or illnesses to their Supervisor or their Site HSE Representative.
 5. Injuries, illnesses, or any incident involving a third-party or a member of the general public must

be promptly reported to the Site/Project Management.

6. Incidents involving potential exposures to hazardous materials and releases or spills of such materials must be promptly reported to the Construction Manager.
7. The Contractor must immediately inform the Construction Manager of any OSHA, EPA, or other HSE regulatory agencies' inspections or other actions involving the Contractor's work.

C. Investigations

1. Securing the accident scene is essential to ensure an effective accident investigation. No materials or equipment shall be moved until a review of the accident is completed, except when securing equipment or materials that could result in further injury.
2. Obtain witnesses' names, permanent addresses, and signed statements of their complete factual observations. (See Exhibit 9.)
3. All accident, illness investigations must be documented using an Accident Investigation Report accepted by the Owner and/or Construction Manager. Investigation reports for all Contractor accidents, injuries, and work-related illnesses shall be forwarded the Owner and/or Construction Manager within twenty-four hours of the occurrence.

1.12 DRUGS, ALCOHOL, AND CONTRABAND

- A. The City of Sunnyvale strictly prohibits the use, sale, attempted sale, manufacture, possession, distribution, cultivation, transfer, or dispensing of any illicit substance. This includes the use or possession of prescription medications without a valid prescription.
- B. The Contractor shall implement a Drug, Alcohol, and Contraband Policy, including post incident testing, which meets the requirements of the City's policy. Key elements of the City's policy, except where prohibited by law, are:

- 1.0 Pre-access/Pre-assignment testing current to within six months prior to initial assignment to work on the Contractor's project.
- 2.0 Post-incident testing of any worker involved in a project-related workplace incident that results, or could have resulted, in:
 - a. injury to any person requiring medical treatment beyond first aid,
 - b. any type of medical attention given by a third-party medical services provider (hospital, clinic, doctor, etc.),
 - c. a motor vehicle incident, or
 - d. property damage.

Post-incident testing must be conducted as soon as possible after the incident occurs.

- C. Reasonable suspicion testing upon reasonable suspicion by Construction Manager that a worker is under the influence of a prohibited substance. In such cases, worker(s) shall be immediately removed from the project and surrender their project credentials. Personnel so removed may only be allowed to return with a negative test result and written permission of the Owner and/or .
- D. Periodic random or unannounced testing for workers randomly selected or chosen by job classification or worksite. The percentage of the workforce, or the number of workers selected for testing shall be specified on a project specific basis and stated in the project's Safety Plan.
- E. Possession or use of alcohol in a Contractor, or subcontractor provided vehicle is prohibited.
- F. Any worker whose drug or alcohol test is positive will be removed from the project and required to surrender their project credentials.

- G. Refusal to submit to drug or alcohol testing, or attempts to tamper with, adulterate, dilute, or otherwise tamper with a test sample will be treated the same as a positive test result.
- H. The Contractor shall adopt collection, chain-of-custody, and other related procedures consistent with standard industry practice.
- I. The City's drug and alcohol testing requirements may be more stringent than the Contractor's minimums. If so, the Owner's requirements shall be enforced.
- J. If the Construction Manager suspects that a worker is in possession of illegal drugs, alcohol, or contraband, the Construction Manager may request the individual to submit to a search of his or her person, personal effects, vehicles, lockers, and baggage. The Construction Manager may also request The Contractor conduct random checks of individuals entering or leaving the work site. Illegal substances will be confiscated and turned over to law enforcement, as appropriate. If an individual is asked to submit to a check and refuses, that individual will be considered insubordinate, will surrender their project credentials, will be escorted off the job, and will not be allowed to return.
- K. The Construction Manager shall have the right to review The Contractor's Drug, Alcohol, and Contraband Policy and to audit the Contractor's implementation of their program at the jobsite.
- L. The Contractor shall comply with all applicable federal, state, and local alcohol and drug-related laws and regulations.

1.13 PERSONAL CONDUCT

- A. Horseplay, fighting, bullying, gambling, possession of firearms, theft, vandalism, sabotage and distribution of unauthorized literature shall be cause to bar those involved from the site.

1.14 MEDICAL AND EXPOSURE MONITORING

- A. Work involving hazardous waste, asbestos or lead abatement, certain carcinogenic compounds, etc., shall be described by the Contractor in their HSE Action Plan or HSP including but not limited to outlining medical and exposure monitoring procedures and their proposed compliance methods.
- B. Contractor employees involved in these operations shall have met, prior to any fieldwork activity or exposure, the medical requirements of applicable regulations or standards, including, but not limited to, a baseline medical exam and periodic update exams, as required.
- C. The Contractor's employee medical requirements and limitations shall be considered prior to the use of certain types of PPE, such as respirators.
- D. Contractor is responsible for providing necessary PPE that complies with the City and State's direction to protect essential workers from COVID-19. Refer to CAL OSHA Safety and Health Guidance Exhibit 14.

1.15 IMMINENT DANGER SITUATIONS AND STOP WORK INTERVENTION

- A. Upon discovery of any situation that may, in the opinion of the Owner and/or Construction Manager, reasonably be expected to cause serious physical harm, illness, death, or significant environmental damage, the Contractor HSE representative shall suspend the related work immediately, workers removed from the hazard, the hazard abated, and a thorough investigation conducted.
- B. Work may resume only after the HSE concern(s) have been corrected, to the satisfaction of the Owner and/or Construction Manager. Examples of "imminent danger" situations may include, but are not limited to the following:
 - 1. Falls from elevations
 - 2. Excavations not properly sloped or shored

3. Electrocution hazards
 4. Work activities posing injury hazards to the general public
 5. Operation of vehicles, machinery or heavy equipment in an unsafe manner
 6. Improper Lock Out/Tag Out procedures
 7. Improper line or equipment opening
- C. In addition to the immediate suspension of work, the procedure for correction of imminent danger situations follows the “HSE Adherence Policy” set forth below.
- D. The Contractor shall immediately remove from the site and from participation in any aspect of the work its employees or agents that Owner and/or Construction Manager determines, in its sole discretion, fails to comply with laws, regulations, site procedures, or is otherwise unacceptable at the site. The removal of any individual under this clause shall be at the expense of the Contractor.
- E. All personnel at all levels have the responsibility to actively participate in the HSE process and authority to stop any task or operation, or bring to the attention of management, any unsafe acts, conditions or practices potentially harmful to the environment.

1.16 HSE ADHERENCE POLICY

- A. The Contractor is required to comply with the applicable HSE requirements and regulations. The procedures below outline a three-step, progressively administered system to correct compliance problems. However, if in the opinion of the Owner and or/Construction Manager, non-compliance issues are considered to be severe, The Contractor’s contract may be terminated at any time.
1. Action Level One
 - a. If a Contractor fails to comply with an applicable HSE standard, the Owner and or/Construction Manager will issue a written “Notice of HSE Non-Compliance” (Exhibit 3) to the Contractor’s site representative. The Owner and or/Construction Manager will also forward a “Warning Letter for HSE Non-Compliance” (Exhibit 4) and a copy of the Notice of HSE Non-Compliance to the Contractor’s President or Operations Manager. Copies of these documents shall also be forwarded to the Jacobs Operations and HSE Managers.
 2. Action Level Two
 - a. If item(s) of HSE non-compliance are not corrected by Action Level One, or if the Contractor repeatedly fails to comply with the applicable HSE regulations, the Owner and or/Construction Manager will issue a “Written Notice of Temporary Job Suspension” (Exhibit 5) to the Contractor.
 - b. The Contractor’s work may not resume until the Construction Manager and the Contractor’s Division Manager or equivalent have met, and the Contractor has proposed corrective actions that are acceptable to the Construction Manager
 - c. Actions that may be considered include, but are not limited to:
 1. Removal of certain Contractor personnel from the project,
 2. Alteration of the Contractor’s job procedures, or
 3. Implementation of corrective action by the Construction Manager with back charges to the Contractor.
 - d. The Contractor shall not resume work until the Construction Manager accepts the proposed corrective actions. The Construction Manager will document and keep on file the meeting results in the form of meeting minutes.
 3. Action Level Three

- a. If Action Levels One and Two do not result in the Contractor's HSE performance being brought into compliance, contract termination may result.
- b. The Owner may terminate the Contract after verifying with the Construction Manager that the HSE adherence procedure has been followed and after giving the Contractor applicable notice.
- c. Contractors that have a contract terminated in accordance with this procedure are ineligible to participate in future City of Sunnyvale projects until they have implemented and demonstrated corrective actions to improve their deficiencies.
- d. Only written approval from the City of Sunnyvale can reinstate a Contractor's eligibility.

1.17 EXHIBITS

- A. Exhibit 1 - Contractor HSE Data Form
- B. Exhibit 2 – Weekly Contractor HSE Statistics Report
- C. Exhibit 3 – Notice of HSE Non-Compliance
- D. Exhibit 4 – Warning Letter for HSE Non-Compliance
- E. Exhibit 5 – Written Notice of Temporary Job Suspension
- F. Exhibit 6 – Safe Plan of Action
- G. Exhibit 7 – Safety Observation Report
- H. Exhibit 8 – Injured Employee's Statement
- I. Exhibit 9 – Witness Statement
- J. Exhibit 10 – First Aid Register
- K. Exhibit 11 – Hazard Assessment Safety Action Plan
- L. Exhibit 12 – CAL OSHA General Contractor and Subcontractor Duties
- M. Exhibit 13 – Affidavit of Safety Compliance
- N. Exhibit 14 - CAL OSHA Safety & Health Guidance

END OF SECTION

Exhibit 1 — Contractor HSE Data Form**A. Provide HSE Performance History for Last Three Full Years**

Enter Year		20__	20__	20__
Workers Compensation Experience Modification Rate (EMR)				
If self-insured, provide employee work hours per claim				
Number of employee hours worked				
North American Industrial Classification (NAICS)	NAICS Code:			
Copies of corresponding OSHA logs must be attached				
Number of fatalities (Column G on OSHA Form 300; provide explanation on separate sheet for each fatality)				
Number of cases involving days away from work (Column H on OSHA Form 300)				
Number of job transfer or restricted duty cases (Column I on OSHA Form 300)				
Number of “other recordable cases” (Column J on OSHA Form 300)				
Total of all cases above (fatalities, days away from work, transfers or restricted duty, and other recordable cases, i.e., the total of Columns G, H, I, and J)				
OSHA Incidence Rate (total recordable cases x 200,000/total work hours)				
OSHA Incident Rate Lost Work Day				
OSHA Incident Rate Job Transfer/Restricted				
Number of regulatory citations by OSHA, MSHA, EPA, etc. (provide details including settlement documentation for each on a separate sheet)				
If citations have been issued, have all findings been resolved with the regulatory agency?				
Number of miles driven on company business				
Number of motor vehicle accidents				
Miles driven divided by number of vehicle accidents				

Rate = $\frac{\# \text{ of cases} \times 200,000}{\# \text{ of work hours}}$

NOTES:

All performance rates shall be per OSHA Recordkeeping standards and definitions.

B. HSE Program

You may be asked to provide copies of programs and certifications	Yes	No	N/A
Do you have a written hazard communication program?			
Do you have a written HSE program? (Injury and Illness Prevention Program – IIPP required in California only)			
Do you have a written respiratory protection program?			
Does your company have a written Asbestos MGMT/Maintenance Work program?			
Does your company have a written Benzene/Chemical Exposure program?			
Does your company have a written Bloodborne Pathogens program?			
Does your company have a written H ₂ S Specific Program?			
Does your company have a Hexavalent Chrome program?			
Does your company have a written HAZWOPER/RCRA program?			
Does your company have a written Emergency Response Plan?			
Does your company have a written Lead Exposure program?			
Does your company have a written behavioral based program?			
Does your company have a written Heat Illness Prevention Plan?			
Do you have a new employee orientation program? If yes, does it contain instructions on:			
▪ Company HSE Policy			
▪ Company HSE Record			
▪ Company HSE Rules			
▪ Driving Safety			
▪ Electrical Safety			
▪ Fall Protection			
▪ Fire Protection			
▪ First Aid / CPR			
▪ Hazard Recognition			
▪ Hazard Reporting			
▪ Hearing Conservation			
▪ Housekeeping			
▪ HSE Meeting Attendance			
▪ Injury Reporting			
▪ Ladders and Stairway Safety			
▪ Lock-out/Tag-out			
▪ Personnel Protective Equipment			

You may be asked to provide copies of programs and certifications	Yes	No	N/A
▪ Toxic Substances			
▪ Trenching and Excavation			
Do you have a specialized training and certification program? ? If yes, does it contain instructions on:			
▪ First Aid/CPR Procedures			
▪ Cranes/Hoist Operation			
▪ Emergency Procedures			
▪ Accident Investigation			
▪ Hazard Recognition			
▪ Asbestos Abatement			
▪ Welding			
▪ Incident Reporting			
▪ Safe Work Practices			
▪ Heavy Equipment Operation			
▪ Tailgate/Toolbox HSE Meetings			
▪ Forklift Operation			
▪ Respirators: Air Supply; Air Purifying			
▪ Scaffolding			
▪ Flagging			
▪ Powder Actuated Tool use			
▪ Confined Space Operations & rescue			
▪ Traffic Control			
Supervisor HSE meetings are conducted:			
▪ Weekly			
▪ Bi-weekly			
▪ Monthly			
▪ Less often, as needed			
Do you conduct field HSE inspections of work in progress?			
If yes, who conducts the inspections? _____			
How often? _____			
Are accident reports circulated to your management? What frequency?			
Is HSE a (documented) weighted factor in evaluating in the performance of:			
▪ Foreman			

You may be asked to provide copies of programs and certifications	Yes	No	N/A
▪ Supervisor			
▪ Management			
Does your firm hold "Toolbox" HSE Meetings? If yes, how often:			
▪ Weekly			
▪ Bi-weekly			
▪ Monthly			
▪ Less often, as needed			
Are all documents pertaining to this questionnaire available for auditing?			
Does your company require routine employee driver's license record checks?			
▪ Does your company have a policy to conduct background checks on employees?			
▪ Does your company have a substance abuse program?			
▪ Does it include pre-employment testing?			
▪ Does it include random testing?			
▪ Does it include testing for cause?			
▪ Does it include DOT testing			
▪ If you do not currently perform drug screening are you willing to conduct drug screening if so, directed by the contract?			
Does your company perform medical examinations for Pre-employment?			
Does your company conduct initial and annual medical exams in accordance with 29CFR1910.120(f)(HAZWOPER)			
Submit information how you will provide first aid and other medical services, case management, rehabilitation, modified duty, Contractor representative to accompany injured off-site, etc.			

C. Safety Equipment – Identify what safety equipment will be available and used for this project

Type	Description Comments
<input type="checkbox"/> Gas detectors	
<input type="checkbox"/> Ventilation equipment	
<input type="checkbox"/> Approved harness and lanyards	
<input type="checkbox"/> Mechanical hoists	
<input type="checkbox"/> First aid kits	
<input type="checkbox"/> Respirators	

<input type="checkbox"/> Hard hats	
<input type="checkbox"/> Hearing protectors	
<input type="checkbox"/> Hand protection	
<input type="checkbox"/> Safety goggles	
<input type="checkbox"/> Steel toe footwear	
<input type="checkbox"/> Fall protection	
<input type="checkbox"/> Confined space rescue equipment	
<input type="checkbox"/>	
<input type="checkbox"/>	
<input type="checkbox"/>	
<input type="checkbox"/>	

D. HSE Staff

	Number
How many full-time HSE professionals do you have on staff?	
How many full-time industrial hygienists do you have on staff?	
How many full-time physician assistants and EMTs do you have on staff?	

Who is the most senior staff HSE professional at your company?		
Name:	Title:	Phone:
Who should we contact to discuss the details of the information contained in this document?		
Name:	Title:	Phone:

Exhibit 2 - Weekly Contractor HSE Statistics Report

- Contractor to use own form otherwise may coordinate with the Construction Manager development of a new form for project use.
- Leading indicator metrics from SOR data shall be maintained, trends analyzed and communicated to Contractor on a weekly basis

Exhibit 3 — Notice of HSE Non-Compliance

To:

Site Representative for:

Your company has been found to be in non-compliance with one or more Federal, State, or Contractor HSE requirement(s), as specified below. This HSE non-compliance must be corrected immediately for your company to meet the requirements of your subcontract.

Item No.	Description of Non-compliance	Applicable HSE Requirement

Issued By (Project Manager or Site Manager Issuing Notice):

Name Printed:	Title:
Signature:	Date:

Received By (Contractor Representative Receiving Notice):

Name Printed:	Title:
Signature:	Date:

cc: Contractor Operations Manager
HSE Representative

Exhibit 4 — Warning Letter for HSE Non-Compliance

Project Name:

Project Number:

-

Your firm, _____,

has been found to be in violation of your contract by non-compliance with applicable Federal, State, or Owner HSE requirements.

On _____ (date),

in accordance with the Owner HSE Adherence Policy, your representative, _____,

was given a Notice of HSE Non-Compliance (copy attached). This notice specifies areas where your company does not comply with Federal, State, or Contractor HSE requirements, and requests that these items be corrected immediately.

If they are not corrected, more stringent measures will be taken in accordance with the project's HSE Adherence Policy.

Your prompt attention to this matter will be appreciated.

Issued By (Project Manager or Construction Manager Issuing Warning Letter):

Name Printed:	Title:
Signature:	Date:

Received By (Contractor Representative Receiving Warning Letter):

Name Printed:	Title:
Signature:	Date:

cc: Contractor Operations Manager
HSE Manager

Exhibit 5 — Written Notice of Temporary Job Suspension

Your company, _____

while working on the _____

project has been notified of HSE performance deficiencies in accordance with the project's HSE Adherence Policy.

Despite these written notifications requesting that immediate corrective action be taken to improve your HSE performance, improvement has not occurred.

Therefore, in accordance with Action Level Two of the Project's HSE Adherence Policy, we are hereby notifying you that after securing your equipment, all job activities on the project named above are to cease.

Activities on this project may be resumed only after your company meets requirements set forth in the project's HSE Adherence Policy.

Issued By:

Name Printed:	Title:
Signature:	Date:

cc: Group Vice President
Operations Manager
HSE Manager

Exhibit 6 – Safe Plan of Action
Safe Plan of Action

Project No. _____

Activity/Task _____ Work Area _____ Date _____

Steps of Activity/Task	Hazard/Reaction to Change	Safe Plan	Resources

Signatures of Persons Involved in Development of SPA

_____	_____	_____	_____
_____	_____	_____	_____

Supervisors Signature: _____ Date _____

Review checklist while completing front page of SPA. Check all that apply.		
A new SPA is required if the job scope or work conditions change.		
Required Permits	Hazards	Safe Plan
<input type="checkbox"/> Confined Space	<input type="checkbox"/> Overhead Utilities	<input type="checkbox"/> Power de-energization required <input type="checkbox"/> Insulation blankets required <input type="checkbox"/> Wire watcher required
<input type="checkbox"/> Critical Lift		<input type="checkbox"/> Required clearance distance = _____ Ft. <input type="checkbox"/> Safe work zone marked
<input type="checkbox"/> Hot Work	<input type="checkbox"/> Crane or other	<input type="checkbox"/> Signalman assigned <input type="checkbox"/> Tag lines in use <input type="checkbox"/> Area around crane barricaded
<input type="checkbox"/> Lock Out/Tag Out	<input type="checkbox"/> Lifting Equipment	<input type="checkbox"/> Lifting equipment inspected <input type="checkbox"/> Personnel protected from overhead load
<input type="checkbox"/> Soil Disturbance (Over 12")	<input type="checkbox"/> Underground Utilities	<input type="checkbox"/> Reviewed as-builts <input type="checkbox"/> Subsurface surveys <input type="checkbox"/> Received dig permit
<input type="checkbox"/> Utility Clearance		<input type="checkbox"/> Required clearance distance = _____ Ft. <input type="checkbox"/> Safe work zone Marked
Required PPE	<input type="checkbox"/> Electrical	<input type="checkbox"/> Lock Out/Tag Out/Try Out <input type="checkbox"/> Permit required? <input type="checkbox"/> Confirm that equipment is de-energized
<input type="checkbox"/> Hard Hat, Class C		<input type="checkbox"/> Reviewed electrical safety procedures
<input type="checkbox"/> Hard Hat, Class E (<i>Elect. Protect</i>)	<input type="checkbox"/> Excavations	<input type="checkbox"/> Permits <input type="checkbox"/> Inspected prior to entering <input type="checkbox"/> Proper sloping/shoring
<input type="checkbox"/> Ear Plugs/Ear Muffs		<input type="checkbox"/> Barricades provided <input type="checkbox"/> Access/egress provided <input type="checkbox"/> Protection from accumulated water
Eye Protection:	<input type="checkbox"/> Fire Hazard	<input type="checkbox"/> Hot Work Permit <input type="checkbox"/> Fire Extinguishers <input type="checkbox"/> Fire watch
<input type="checkbox"/> Safety Glasses		<input type="checkbox"/> Adjacent area protected <input type="checkbox"/> Unnecessary flammable material removed
<input type="checkbox"/> Face Shield	<input type="checkbox"/> Vehicular Traffic or Heavy Equipment	<input type="checkbox"/> Traffic Barricades <input type="checkbox"/> Cones <input type="checkbox"/> Signs <input type="checkbox"/> Flagmen <input type="checkbox"/> Lane closure
<input type="checkbox"/> Chemical Goggles		<input type="checkbox"/> Communication with equipment operator
<input type="checkbox"/> Welding Hood	<input type="checkbox"/> Noise >85 dB	Hearing protection is required: <input type="checkbox"/> Ear plugs <input type="checkbox"/> Ear Muffs <input type="checkbox"/> Both
Hand Protection: (<i>Specific Glove for Task</i>)	<input type="checkbox"/> Hand & Power Tools:	<input type="checkbox"/> Inspect general cond. <input type="checkbox"/> GFCI in use <input type="checkbox"/> Identified PPE required for each tool
1		<input type="checkbox"/> Reviewed safety requirements in operator's manual(s) <input type="checkbox"/> Guarding OK
2	<input type="checkbox"/> Hand Hazards	List sharp tools, material, equipment:
3		<input type="checkbox"/> PPE gloves, etc. <input type="checkbox"/> Protected sharp edges as necessary
4	<input type="checkbox"/> Manual Lifting	<input type="checkbox"/> Reviewed proper lifting tech. <input type="checkbox"/> Identified material requiring lifting equipment
5		<input type="checkbox"/> Hand protection required <input type="checkbox"/> Back support belts
6	<input type="checkbox"/> Ladders	<input type="checkbox"/> Inspect general cond. before use <input type="checkbox"/> Ladder inspected with in last quarter
7		<input type="checkbox"/> Ladder tied off or held <input type="checkbox"/> Proper angle and placement <input type="checkbox"/> Reviewed ladder safety
Foot Protection:	<input type="checkbox"/> Scaffolds	<input type="checkbox"/> Inspect general condition before use <input type="checkbox"/> Tags in place <input type="checkbox"/> Properly secured
<input type="checkbox"/> Sturdy Work Boots		<input type="checkbox"/> Toe boards used <input type="checkbox"/> Footings adequate <input type="checkbox"/> Materials properly stored on scaffold
<input type="checkbox"/> Safety Toe Boots	<input type="checkbox"/> Slips, Trips Falls	<input type="checkbox"/> Inspect for trip hazards <input type="checkbox"/> Hazards marked <input type="checkbox"/> Tools & material properly stored
<input type="checkbox"/> Rubber Boots		<input type="checkbox"/> Extension cords properly secured <input type="checkbox"/> Work zone free of debris
<input type="checkbox"/> Rubber Boot Covers	<input type="checkbox"/> Pinch Points	List potential pinch points:
<input type="checkbox"/> Dielectric Footwear		<input type="checkbox"/> Working near operating equipment <input type="checkbox"/> Hand/Body positioning
Respiratory Protection:	<input type="checkbox"/> Working w/ Chemicals	<input type="checkbox"/> List specific chemicals involved and list hazards and precaution on front side.
<input type="checkbox"/> Dust Mask		<input type="checkbox"/> Reviewed MSDS <input type="checkbox"/> Exposure Monitoring required <input type="checkbox"/> Have proper containers and labels.
<input type="checkbox"/> Air Purifying Respirator	<input type="checkbox"/> Asbestos or Lead Paint Potential	<input type="checkbox"/> Identified proper PPE (respirators, clothing, gloves, etc.)
<input type="checkbox"/> Supplied Air Respirator		<input type="checkbox"/> Areas to be worked may contain asbestos or lead paint <input type="checkbox"/> Asbestos controls incorporated
<input type="checkbox"/> SCBA	<input type="checkbox"/> Heat Stress Potential	<input type="checkbox"/> Lead based point controls in place <input type="checkbox"/> Exposure monitoring conducted.
<input type="checkbox"/> Emergency Escape Respirator		<input type="checkbox"/> Heat stress monitoring (>85°) <input type="checkbox"/> Liquids available <input type="checkbox"/> Cool down periods
Special Clothing:	<input type="checkbox"/> Cold Stress Potential	<input type="checkbox"/> Sun Screen <input type="checkbox"/> Reviewed Heat Stress symptoms
<input type="checkbox"/> Tyvek ®		<input type="checkbox"/> Proper clothing (i.e. gloves, coat, coveralls) <input type="checkbox"/> Wind chill <32°
<input type="checkbox"/> Poly Coated Tyvek ®	<input type="checkbox"/> Environmental	<input type="checkbox"/> Reviewed Cold Stress symptoms <input type="checkbox"/> Warm up periods
<input type="checkbox"/> Fire Resistant Coveralls		<input type="checkbox"/> Air emissions <input type="checkbox"/> Water discharge <input type="checkbox"/> Hazardous wastes <input type="checkbox"/> Other wastes
<input type="checkbox"/> Rain Suit	<input type="checkbox"/> Natural or Site Hazards	<input type="checkbox"/> Pollution prevention <input type="checkbox"/> Waste minimization
<input type="checkbox"/> Safety Vest		<input type="checkbox"/> Weather <input type="checkbox"/> Terrain <input type="checkbox"/> Adjacent operations or processes <input type="checkbox"/> Biological hazards
Fall Protection:	<input type="checkbox"/> Adjacent Work/Processes	<input type="checkbox"/> Animals/reptiles/insects hazards
<input type="checkbox"/> Harness		<input type="checkbox"/> Notified them of our presence <input type="checkbox"/> Other workers adjacent, above, or below.
<input type="checkbox"/> Double Lanyard Required	<input type="checkbox"/> Barricades/covers	<input type="checkbox"/> Coordinated with adjacent supervisor/customer/operator <input type="checkbox"/> Need barriers between.
<input type="checkbox"/> Anchorage Point Available		<input type="checkbox"/> Caution barricade tape required <input type="checkbox"/> Danger barricade tape required <input type="checkbox"/> Rigid railing required
<input type="checkbox"/> Additional Anchorage Connector Needed e.g. Cross Arm Strap, etc.		<input type="checkbox"/> Covers over opening <input type="checkbox"/> Warning signs required
<input type="checkbox"/> Retractable Device Needed		Additional Information:
<input type="checkbox"/> Horizontal Life Line System Req'd.		
<input type="checkbox"/> Fall Clearance Distance Adequate		

Exhibit 7 - Safety Observation Report

Date:

Time:

Supervisor of Observer:

Observation:

Was immediate corrective action taken? Yes ☐ No ☐

Describe Immediate Corrective Action:

Describe Action to Prevent Recurrence:

Describe Indirect Cause:

- Lack of Training ☐ Lack of Belief ☐ Lack of Resources ☐

Describe Suggested/Recommended Corrective Action for Indirect Cause:

Observers

Name Printed:

Signature:

Name Printed:

Signature:

Name Printed:

Signature:

Description and Verification of Corrective Action Taken to Address Indirect Cause:

Supervisor/Manager

Name Printed:

Signature:

Date Completed:

Exhibit 8 - Injured Employee's Statement

Date: _____

Name: _____ Title: _____

Address: _____ Phone No: _____

Location At Time Of Accident: _____

Describe How The Incident Happened (provide a **detailed** account of incident)

Signature

Please Print or type.

Describe., to the best of your knowledge, what happened just before, during, and just after the accident:

[illegible]

007319 - 26

Company: _____ Project Name/Number: _____

Location: _____ Month/Year: _____

Site or Office Manager: _____ Page: _____ of _____

[illegible]

FAV – First aid visit
E-1 – Injury or illness treated by a doctor or medical provider (see definition)
OSHA – OSHA recordable injury or illness
Other – Other than above

Exhibit 11 – Outline for Hazard Assessment Safety Action Plan Development

(This is a guide to assist the Contractor in developing the HASP. Contractor may use its own format provided all information outlined below is communicated)

- 1.0 INTRODUCTION
 - 1.1. Project Description
 - 1.2. HSE Policy
 - 1.3. Objectives
- 2.0 PROJECT SCOPE AND SCHEDULE
 - 2.1. Description of Work
 - 2.2. Work Environment
 - 2.3. Schedule
 - 2.4. Project Manpower
- 3.0 CONTRACT AND REGULATORY HSE REQUIREMENTS
 - 3.1. Client/owner Requirements
 - 3.2. HSE Roles and Responsibilities
 - 3.3. Contract Indemnification
 - 3.4. Regulatory Inspections
- 4.0 HSE MANAGEMENT AND STAFFING
 - 4.1. Project Management
 - 4.2. HSE Roles and Responsibilities
 - 4.3. Leadership Engagement
 - 4.4. HSE Staffing
 - 4.5. Key Client Contacts
- 5.0 PERSONNEL AND CONTRACTOR MANAGEMENT
 - 5.1. Selection of Contractors and Suppliers
 - 5.2. Medical Services
 - 5.3. Drug Screening and Alcohol Testing
 - 5.4. Training and Certification
 - 5.5. Signs and Communication
- 6.0 HSE PROGRAM
 - 6.1. HSE Program Implementation
 - 6.2. Work Control

- 6.3. Safety Committee
- 6.4. Safety Meetings
- 6.5. Project PPE and Dress Code Requirements
- 6.6. Environmental Program
- 6.7. Recognition Programs
- 6.8. Incident Reporting and Investigation
- 6.9. HSE Reports
- 7.0 HAZARD ANALYSIS
 - 7.1. Hazard Identification and Risk Assessment
 - 7.2. Health Hazard Evaluation
 - 7.3. Highest Risk Hazards
 - 7.4. Occupied Facility Location
- 8.0 SITE ACCESS AND CONTROL, VEHICLE SAFETY, AND SECURITY
 - 8.1. Access and Control
 - 8.2. Security Measures
 - 8.3. Traffic Plan and Vehicular Safety
 - 8.4. Facilities
- 9.0 EMERGENCY RESPONSE PLAN
 - 9.1. Emergency Notification List
 - 9.2. General Emergency Response
 - 9.3. Fire Emergency Response
 - 9.4. Medical Emergency Response
 - 9.5. Environmental Spill or Response Procedure
- 10.0 HSE RECORDS
- 11.0 HASAP REVIEW AND APPROVAL FORM

Exhibit 12 – CAL OSHA General Contractor and Subcontractor Duties



General Contractor and Subcontractor Duties

Injury and Illness Prevention Requirements

Every employer subject to Cal/OSHA jurisdiction is required to have a written, effective Injury and Illness Prevention Program (IIPP) that includes procedures to identify health and safety hazards in the workplace and methods to correct those hazards. IIPP requirements include the following:

1. Identification of the person responsible for implementing the program.
2. A system for effectively communicating with employees about safety and health matters.
3. A system for ensuring that employees comply with safe and healthy work practices. This should include providing positive reinforcement for employees who follow the rules and appropriate action for employees who violate the rules.
4. Procedures for conducting workplace inspections to identify and evaluate hazards. The written IIPP should explain how often inspections are conducted and who does the inspections.
5. A procedure for conducting an investigation if an employee is injured on the job or has an occupational illness.
6. Methods for correcting unsafe conditions quickly.
7. Training and instruction for employees and their supervisors.
8. Records of employee training and workplace inspections (with certain exceptions for employers with fewer than 10 employees). These records should be on file and available for review.

General contractors and subcontractors must implement all requirements of the Injury and Illness Prevention Program regulation, unless they can demonstrate that they are exempt from certain specific provisions in the regulation. Please review the full text of the regulation, found in California Code of Regulations, title 8, section 3203: <https://www.dir.ca.gov/title8/3203.html>.

Multi-Employer Liability

At multi-employer worksites, where the employees of more than one employer are performing work, Cal/OSHA holds the following employers responsible for ensuring the health and safety of employees, including other employers' employees:

1. Employers who directly employ workers exposed to a hazard.

December 29, 2017



1



2. Employers who create a hazard.
3. Employers who are responsible for controlling worksite safety and health conditions, and who have the authority to ensure that a hazard is corrected.
4. Employers who have the responsibility to correct a hazard.

Multi-employer liability is authorized under California Code of Regulations, title 8, section 336.10: https://www.dir.ca.gov/title8/336_10.html

Investigations, Citations and Penalties

Employers must notify Cal/OSHA right away (or within eight hours) of a fatality or serious injury or illness in the workplace. Cal/OSHA investigates these incidents and may issue citations if violations are identified during an investigation. Cal/OSHA also conducts investigations after receiving a complaint of a health or safety hazard. At worksites involving multiple employers, Cal/OSHA can open investigations of one or more of the employers.

Every citation includes a monetary penalty and indicates the date by which the violation must be corrected. Penalty amounts depend in part on the classification of the violation as regulatory, general, serious, repeat, or willful. Other factors considered are whether the violation caused an employee's serious injury or illness, and whether the employer failed to correct a previous violation involving the same hazardous condition.

Base penalty amounts, minimum and maximum penalty amounts, and penalty adjustment factors are set forth in California Code of Regulations, title 8, section 336: www.dir.ca.gov/title8/336.html.

Note: Cal/OSHA is required to refer certain violations to a local or state authority for possible criminal prosecution. Criminal conviction can result in:

- A fine of up to \$250,000 and/or imprisonment up to three years.
- A fine of up to \$1.5 million if the employer is a corporation or limited liability company and/or imprisonment up to three years.

EXHIBIT 13 – AFFIDAVIT OF SAFETY COMPLIANCE

Name of Bidder _____

**SECTION 007319
AFFIDAVIT OF SAFETY COMPLIANCE
(To Accompany Bid)****Civic Center Modernization Phase 1
Public Works Project No. PR-19-06**

The Contractor agrees in accordance with the requirements of Section 007319 – Health & Safety Requirements, that for purposes of California Labor Code Section 6400 and related provisions of law the Contractor, the Contractor's privities and any other entities acting pursuant to this Contract will be "employers" responsible for furnishing employment and a place of employment that is safe and healthful for the employees, if any, of such entities acting pursuant to this Contract and that the Owner will not be responsible for having hazards corrected and/or removed at the location where the work under the Contract is to be performed.

The Contractor hereby acknowledges the Contractor's safety obligations at the Project worksite. The Contractor shall conduct its operations to eliminate or reduce hazards and risks associated with Contractor's activities, to prevent accidents and injuries, and to prevent property damage. Therefore, the Contractor is fully responsible for and shall be in compliance with all of the most current safety, health, and environmental regulations (federal, state and local). Non-compliance with these regulations may result in suspension or termination of work in progress.

The Contractor's Safety Programs must accomplish the foregoing objectives. The Contractor certifies that its Safety Programs comply with and will satisfy these requirements. The Contractor also certifies that each Subcontractor at any tier and other parties engaged in the performance of work on the Project worksite will also comply with and will satisfy these requirements.

Apparent low Bidder must complete and submit Parts A, B, C, and D of the attached Contractor HSE Data Form prior to Award by the City. The completed forms shall be submitted for the City's review with the Contractor's Safety Program prior to award of contract on the Project as required in Section 007319 – Health & Safety Requirements. The Contractor certifies that it can furnish satisfactory evidence of compliance with the elements identified in the attached Contractor Safety Operations Requirements and the Contractor's Safety Program. The Contractor further acknowledges that its Subcontractors at any tier will provide all Safety Compliance documents to Contractor in accordance with Specification Sections 007213-8.21 and 007319 prior to commencing work at the site.

Executed On _____, _____

_____,	_____
Signature	Name of Bidder
_____,	_____
Name (Print)	Title

Attach a Certificate of Acknowledgement for the Notary to the Affidavit

Name of Bidder _____

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

CERTIFICATE OF ACKNOWLEDGMENTState of California }
County of }

ss

On _____ before me _____,

a Notary Public, personally appeared _____
Name(s) of Signer(s)

Who proved to me on basis of satisfactory evidence to be the person(s) whose names(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies) and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Signature of Notary

Exhibit 14 – CAL OSHA Safety and Health Guidance

California Department of Industrial Relations
Division of Occupational Safety & Health
Publications Unit



SAFETY AND HEALTH GUIDANCE

COVID-19 Infection Prevention in Construction

April 27, 2020

California employers are required to establish and implement an Injury and Illness Prevention Program (IIPP) to protect employees from all worksite hazards, including infectious diseases. This guidance does not impose any new legal obligations. It contains information for construction employers on ways to update their IIPPs to include information on employee training and preventing the spread of coronavirus (SARS-CoV-2), the virus that causes COVID-19, at construction sites. This is mandatory in most California workplaces since COVID-19 is widespread in the community.



Train Employees on COVID-19

Provide training in a form that is readily understandable by all employees on the following topics:

- Information related to COVID-19 from the Centers for Disease Control and Prevention (CDC) – check for updates frequently - including:
 - **What COVID-19 is and how it is spread.**
 - **Preventing the spread of COVID-19 if you are sick.**
 - **Symptoms of COVID-19 and when to seek medical attention.**
 - How an infected person can spread COVID-19 to others even when they don't feel sick.
- Additional helpful information is on **California's COVID-19 Response** webpage.
- The importance of frequent hand-washing with soap and water (or using hand sanitizer as a last resort where employees cannot feasibly get to a sink or hand washing station), including:
 - Following CDC guidelines to scrub for at least 20 seconds.
 - When employees arrive at work and before they leave work.
 - Before and after eating or using the toilet.
 - After close interaction with other persons.

- After contacting shared surfaces, equipment or tools.
- Before and after wearing masks or gloves.
- After blowing nose or sneezing.

NOTE: Hand sanitizers must have at least 60% alcohol. They are less effective than hand-washing in preventing the spread of COVID-19 but can be used as an interim measure if a hand-washing station is not immediately available.

- Maintaining more than six feet of separation with others and eliminating close contact with others (see Physical Distancing information on next page).
- Methods to avoid touching eyes, nose and mouth.
- The use of cloth face coverings, including:
 - Cloth face coverings are not personal protective equipment (PPE) and do not protect the person wearing the face covering.
 - **CDC has issued guidelines** that everyone should **use cloth face coverings** when around other persons. Employers should provide these coverings for their employees or at least encourage them to use their own.
 - Cloth face coverings can help protect people near the wearer, but do not replace the need for physical distancing and frequent hand washing.

(continued on next page)

- Employees should wash or sanitize hands before and after using or adjusting face coverings.
- Face coverings should be washed after each shift and should be discarded if they no longer cover the nose and mouth, have stretched out or damaged ties or straps, cannot stay on the face, or have holes or tears.
- Coughing and sneezing etiquette, including covering a cough or sneeze with a tissue or a sleeve instead of a hand.
- Safely using cleaners and disinfectants, which includes:
 - The hazards of the cleaners and disinfectants used at the worksite.
 - Wearing personal protective equipment (such as gloves).
 - Ensuring cleaners and disinfectants are used in a manner that does not endanger employees.
- The importance of not coming to work if they have a frequent cough, fever, difficulty breathing or if they or someone they live with has been diagnosed with COVID-19.
- Use repeated safety stand-downs or toolbox/tailgates – while maintaining physical distancing - to re-emphasize the training.
- Designate a site-specific COVID-19 officer at every job site to observe and ensure site workers are implementing what they have been trained to do.
- Using disinfectants that are **EPA-approved** for use against the virus that causes COVID-19.
- Providing EPA-registered disposable wipes for employees to wipe down commonly used surfaces before and after use.
- Following the manufacturer's instructions for all cleaning and disinfection products (e.g., safety requirements, protective equipment, proper dilution, contact time).
- Following safe work practices such as never mixing products together and using adequate ventilation.
- Cleaning visibly dirty surfaces first before disinfection. Disinfectants are less effective if used on soiled surfaces.
- Ensuring there are adequate supplies to support cleaning and disinfection practices, including cleaning products and tools and chemical resistant gloves. Make sure disinfectants are available to workers throughout the worksite.
- Cleaning and disinfecting vehicles between shifts and between workers.

Increase Physical Distancing

Physical distancing, also referred to as social distancing, is an infection control measure that can stop or slow down the spread of an infectious disease by limiting contact between people. Use the following distancing measures:

- Practice physical distancing at all times, including during work, breaks and in vehicles.
- Plan for office staff to have the ability to work from home.
- Stagger break and lunch times and spread out where employees spend their breaks by providing additional seating and shade areas.
- Limit crew size by staggering or increasing the number of work shifts.
- Maintain separation of six feet or more during work:
 - Limit the number of employees gathered at the start of a shift, in break areas or during trainings and other meetings to allow employees to spread out.
 - Limit the number of personnel riding construction passenger elevators at one time.

Increase Cleaning and Disinfection

Establish and implement the following procedures to help prevent the spread of COVID-19:

- Make hand-washing stations more readily available and encourage their use.
- Employers should change productivity expectations to allow extra time for employees to wash their hands thoroughly and frequently.
- Establish procedures to routinely clean and disinfect commonly touched surfaces and objects (e.g., door handles, steering wheels, touch screens, mobile equipment controls, carts, shared power tools) throughout the workday, including:

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- Ensure employees allow for at least 6 feet of clearance between each other when lining up for the lunch truck and restrooms.
 - Hold meetings electronically rather than in person whenever possible.
 - Perform job interviews and orientations over the phone or using video conferencing.
 - Identify choke points where workers are forced to stand together (e.g. hallways, hoists, buses) and control them.
 - Provide additional seating and shade structures.
 - If employees are dispatched from a hiring hall, encourage the hiring hall to implement physical distancing measures, such as using additional locations for dispatch.
 - Limit interaction with other contractors.
 - Where possible, limit the number of trades in the same area at the same time.
 - Maintain distance during interactions and deliveries.
 - Encourage employees to avoid large gatherings and practice physical distancing during non-work hours.
 - Create specific instructions for deliveries to your worksites.
 - Establish a drop-off location and all the procedures to be used at the drop-off point.
 - Create signage to easily identify drop-off points. Include contact information on the signs to assist with questions leading up to delivery and upon arrival.
 - Create procedures to disinfect deliveries, such as wiping down boxes and delivered items.
 - Provide alternative methods to reduce the spread of infection when physical distancing is not possible. Engineering controls such as physical barriers between workers and face coverings like bandanas, scarfs, buffs, neck gaiters or homemade masks can help reduce community spread of the virus.
 - In addition to physical distancing, provide face coverings or encourage employees to use their own face covers. Ensure they are used in accordance with CDC guidelines.
- Employers should adjust productivity expectations to allow extra time for employees to thoroughly and frequently wash their hands.
- Restrooms must be clean and sanitary.
 - Handwashing facilities must be located at or near the restrooms.
 - Soap or other suitable cleansing agent and single-use towels must be provided.
 - Additional handwashing supplies should be placed as close to work areas and break areas as possible to allow for frequent handwashing.
 - Encourage more frequent hand-washing.
 - Encourage more thorough hand-washing. Hands should be washed with soap and water for at least 20 seconds.
 - For delivery drivers, normally accessible restrooms on routes (e.g., restaurants, coffee shops) may be closed. Employers should provide employees alternative restroom locations and allow time for employees to use them.
 - If employees have limited access to hand-washing or hand sanitizing, employees as a last resort can use disposable gloves to limit hand contact with potentially contaminated surfaces. Employers should encourage employees to change gloves frequently and before touching their face, smoking, eating or using the restroom. In addition, provide an adequate supply of gloves and make them readily available. Employees should wash or sanitize hands as soon as possible after removing gloves.
 - Provide hand sanitizer throughout worksites and to delivery drivers for times when access to soap and water may be limited.
 - If respirators and other PPE is worn to protect against other hazards at work, hands should be washed before putting on PPE and after taking it off. Reusable PPE should be cleaned and sanitized per manufacturers' instructions.

At this time, health experts do not recommend the use of respirators by the general public for protection against COVID-19. However, if available, employers must provide them to workers in the construction industry when needed to protect against other respiratory hazards.

Ensure Good Hygiene Practices

Ensure toilets and hand-washing facilities are readily accessible to all employees at all times.

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Implement Safe Work Practices

- Limit the sharing of tools as much as possible. If tools must be shared try to group them to be used by people who reside together or travel to work together.
- If fans or other means of ventilation are used on the job, place them to avoid blowing air from one worker or group of workers to another.
- Encourage workers to drive to worksites or parking areas by themselves. They should avoid having passengers or carpooling together unless they are already sheltering in place together. If carpooling cannot be avoided riders should sit as far apart as possible, wear face coverings and wash hands after the trip.
- Discourage shaking hands.
- Discourage the sharing of food and water. Provide single use bottles rather than using shared water stations or dispensers.

What to do with Workers Who Might Be Sick with COVID-19

- Immediately send employees with acute respiratory illness symptoms home or to medical care as needed.
- Actively encourage sick employees to stay home.
- Ensure employees who are out ill with fever or acute respiratory symptoms do not return to work until both of the following occur:
 - At least three full days pass with no fever (without the use of fever-reducing medications) and improvement in respiratory symptoms.
 - At least seven full days pass since symptoms first appeared.
- Ensure employees who return to work following an illness promptly report any recurrence of symptoms.
- Employees who are well but who have a sick family member at home with COVID-19 should notify their supervisor and follow **CDC-recommended precautions**.
- Encourage sick workers to stay home by implementing work policies that do not penalize workers for missing work because they have been diagnosed with COVID-19. Consider paid sick leave benefits to help prevent the spread

among workers who might otherwise work out of economic necessity. Educate eligible employees on other benefits they can access if symptoms, illness or caring for an ill family member prevents them from working.

- The **Families First Coronavirus Response Act** requires certain employers to provide employees with paid sick leave or expanded family and medical leave for specified reasons related to COVID-19.
- If someone goes home because they are sick, the area where the person worked and the tools and equipment they used should be disinfected prior to use by others.
- Establish procedures to notify local health officials upon learning that someone has a COVID-19 infection. These officials will help employers determine a course of action.
- Employers can implement health screening programs to ensure that employees showing up to work are healthy. Employers may choose to prohibit employees with a high temperature (e.g., above 100.4 degrees F) from entering the worksite. Train employees on self-screening before they come to work. If conducting workplace screening, provide employees performing screening with appropriate personal protective equipment. In light of personal protective equipment shortages, use gloves, eye protection and a face covering. Have screened employees wear a face covering or cover their nose and mouth with cloth or other material during screening. If possible, use touchless thermometers. Disinfect contact-thermometers between employees. Ensure screeners maximize their distance from the employee being screened.
- Immediately send employees with acute respiratory illness symptoms home or to medical care as needed. Establish procedures to notify local health officials upon learning that someone has a COVID-19 infection. These officials will help employers determine a course of action.

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Additional COVID-19 Resources for Construction

- **California Coronavirus (COVID-19) Response**
- California Division of Occupational Safety and Health. **Cal/OSHA Interim Guidelines for General Industry on 2019 Novel Coronavirus Disease (COVID-19)**
 - **Cal/OSH Injury and Illness Prevention Program**
 - **Log 300 recordkeeping requirements**
 - Reporting Work-Connected Injuries - **Section 342**
- California Department of Public Health. **Face Coverings Guidance**
- California Labor and Workforce Development Agency. **Coronavirus 2019 (COVID-19) Resources for Employers and Workers**
- Centers for Disease Control and Prevention. **Coronavirus Disease (COVID-19)**
 - Centers for Disease Control and Prevention. Coronavirus Disease (COVID-19): **How It Spreads**
 - Centers for Disease Control and Prevention. Coronavirus Disease (COVID-19): **Interim Guidance for Businesses and Employers**
 - Centers for Disease Control and Prevention. Coronavirus Disease (COVID-19): **Recommendation Regarding the Use of Cloth Face Coverings**
 - Centers for Disease Control and Prevention. Coronavirus Disease (COVID-19): **Steps to help prevent the spread of COVID-19 if you are sick**
 - Centers for Disease Control and Prevention. Coronavirus Disease (COVID-19): **Symptoms**
 - Centers for Disease Control and Prevention. Coronavirus Disease. **Discontinuation of Isolation for Persons with COVID-19 Not in Healthcare Settings (Interim Guidance)**
 - Centers for Disease Control and Prevention. Coronavirus Disease (COVID-19): **Cleaning and Disinfecting Your Facility**
- Federal OSHA: **COVID-19**
- Los Angeles County: **COVID-19: What you need to know about cloth face coverings**
- New York Times: **How to Stop Touching Your Face**
- Ohio Department of Health. COVID-19 Information for Businesses and Employers: **Screening Employees for COVID-19**
- The Center for Construction Research and Training (CPWR): COVID-19 Resources (**English**), (**Spanish**)
- U.S. Environmental Protection Agency. **Disinfectants for Use Against SARS-CoV-2** (the virus that causes COVID-19)
- U.S. Department of Labor. **Families First Coronavirus Response Act: Employee Paid Leave Rights**



This document is available with active links at www.dir.ca.gov/COVID19CONST
For assistance regarding this subject matter, employers may contact
Cal/OSHA Consultation Services at: 1-800-963-9424 or InfoCons@dir.ca.gov
www.dir.ca.gov/dosh/consultation.html



2. Employers who create a hazard.
3. Employers who are responsible for controlling worksite safety and health conditions, and who have the authority to ensure that a hazard is corrected.
4. Employers who have the responsibility to correct a hazard.

Multi-employer liability is authorized under California Code of Regulations, title 8, section 336.10: https://www.dir.ca.gov/title8/336_10.html

Investigations, Citations and Penalties

Employers must notify Cal/OSHA right away (or within eight hours) of a fatality or serious injury or illness in the workplace. Cal/OSHA investigates these incidents and may issue citations if violations are identified during an investigation. Cal/OSHA also conducts investigations after receiving a complaint of a health or safety hazard. At worksites involving multiple employers, Cal/OSHA can open investigations of one or more of the employers.

Every citation includes a monetary penalty and indicates the date by which the violation must be corrected. Penalty amounts depend in part on the classification of the violation as regulatory, general, serious, repeat, or willful. Other factors considered are whether the violation caused an employee's serious injury or illness, and whether the employer failed to correct a previous violation involving the same hazardous condition.

Base penalty amounts, minimum and maximum penalty amounts, and penalty adjustment factors are set forth in California Code of Regulations, title 8, section 336: www.dir.ca.gov/title8/336.html.

Note: Cal/OSHA is required to refer certain violations to a local or state authority for possible criminal prosecution. Criminal conviction can result in:

- A fine of up to \$250,000 and/or imprisonment up to three years.
- A fine of up to \$1.5 million if the employer is a corporation or limited liability company and/or imprisonment up to three years.

December 29, 2017



2

SECTION 009113 – ACKNOWLEDGEMENT of ADDENDUM FORM

ACKNOWLEDGEMENT of ADDENDUM FORM

In submitting this Bid, the Bidder represents that the Bidder has examined copies of all the Contract Documents and acknowledges receipt of the following addendums:

Addendum No.: _____ Date: _____ Addendum No.: _____ Date: _____

Addendum No.: _____ Date: _____ Addendum No.: _____ Date: _____

Addendum No.: _____ Date: _____ Addendum No.: _____ Date: _____

Addendum No.: _____ Date: _____ Addendum No.: _____ Date: _____

Addendum No.: _____ Date: _____ Addendum No.: _____ Date: _____

Failure to acknowledge on the Bid Form receipt of an addendum shall not in itself be cause for withdrawal or rejection of bids, if it can be shown that Bidder did, in fact, receive such addendum prior to opening of Proposals.

END OF SECTION

SECTION 011100 - SUMMARY OF WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Contract, including General Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

- A. Project consists of the construction of a new City Hall, Emergency Operations Addition to the Department of Public Safety Building (DPS) constructed to critical facility standards, renovations within the existing Public Safety Building, hazardous material abatement within the Existing City Hall, demolition of the existing City Hall, and site improvements. Construction includes all required components for fully functional buildings including the work as represented by the Drawings and Specifications issued for construction along with subsequent approved revisions.
- B. Work shall be constructed under a single prime contract
- C. The Owner's Representative will collect "clearance" air samples at the conclusion of the asbestos abatement activities for each of the containment areas for this project. Unless otherwise directed by Owner, PCM analysis will be used for all areas where removal will occur. The Owner's Representative will determine the number and placement of samples. If the results of air sample cassette analysis indicate the Contractor failed final clearance by PCM analysis, the air sample cassettes that failed by PCM analysis will be analyzed by TEM AHERA. If air sample cassettes fail clearance criteria by TEM AHERA analysis, the Owner's Representative will require the Contractor to re-clean the containment area prior to re-sampling. This activity shall be performed by the Contractor, at its sole cost and shall not be cause for change order. The Owner may also require the collection of perimeter air samples in conjunction with removal activities. This activity will also be performed by the Contractor, at its sole cost and shall not be cause for change order.
- D. Costs associated with additional TEM AHERA analysis and re-sampling due to failed clearance samples will be the responsibility of the Contractor at its sole cost, and will not be cause for a change order. Active demolition work will not occur for the buildings until all asbestos abatement activities are completed. If, at a later date, it is established that active demolition work will occur in conjunction with asbestos abatement activities to expedite the project schedule TEM analysis may need to be used for all air samples collected.
- E. Unless otherwise provided for in the Contract Documents, provide and pay for all labor, materials equipment, tools, construction equipment and machinery, trash service, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated in the Work.
 - 1. Project Location: The project is located at 456 W. Olive Avenue, in the City of Sunnyvale. Refer to location map included in contract documents.
 - 2. Owner: City of Sunnyvale.
 - 3. Owner's Representative: Jacobs.
 - 4. Architect of Record: SmithGroup.
 - 5. Environment Engineer of Record: RPS.

1.3 PERMITS AND AUTHORITIES HAVING JURISDICTION

- A. The project site falls under the jurisdiction of the City of Sunnyvale.
- B. Construction operations within the property lines are subject to the requirements of the, City of Sunnyvale Building Department, issues affecting site access and emergency service are subject to the requirements of the City of Sunnyvale's Police and Fire Department.
- C. Secure and pay all permits required for the Work as described in Section 00700 Article 4.7 of the General Conditions except for:
 - 1. Building Permit
 - 2. Grading & Demo Permit
 - 3. Other related City of Sunnyvale Encroachment Permits
- D. All pertaining statutes, ordinances, laws, codes and standards, and the lawful order of all public authorities having jurisdiction of the Work are hereby incorporated into these Contract Documents. The following codes are known to be applicable to the Work, including California amendments:
 - 1. 2019 California Building Code & City Amendments
 - 2. 2019 California Plumbing Code & City Amendments
 - 3. 2019 California Mechanical Code & City Amendments
 - 4. 2019 California Electrical Code & City Amendments
 - 5. 2019 California Fire Code & City Amendments
 - 6. 2019 California Energy Code
 - 7. 2019 California Green Building Standards
 - 8. This is not intended to be a complete listing of all applicable codes. The Contractor is responsible for determining the applicable codes to work unless otherwise noted by the Architect/Engineer of Record. Information relating to existing conditions is given as being the best information available but without guarantee of accuracy. Bidder should have verified all existing conditions at the site prior to bidding. Report discrepancies discovered during construction period to the Owner's Representative.

1.4 CONSTRUCTION WORK

- A. The Construction Work under this contract shall be conducted in single phase with the following Substantial and Final Completion dates:
 - 1. Substantial Completion within 854 Calendar Days after Issuance of Notice to Proceed. Final completion shall be achieved 60 Calendar Days following date of Substantial Completion.
 - 2. All work associated with _____ shall have final paint and temperature control (90) days prior to Substantial Completion.

1.5 WORK UNDER OTHER CONTRACTS

- A. Contractor shall cooperate fully with separate contractors working in the area so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract. Coordinate the Work of this Contract with work performed under separate contracts.
- B. Concurrent Work by the Owner: The Owner will award separate contract(s) for the following construction operations at the Project site. Those operations may / will be conducted simultaneously with work under this Contract.

1. Furniture Installation: A separate contract will be awarded for the installation of moveable furniture.
2. Telephone/Data Equipment Installation: A separate contract has been awarded for the installation of telephone/data equipment including telephone/data cabling, telephone/data switches and network equipment.

1.6 USE OF PREMISES

- A. Contractor shall have full use of premises for construction operations, including use of Project site, during construction period. Contractor's use of premises is limited only by Owner's right to perform work or to retain other contractors on portions of Project.
- B. Parking is limited in the Project area and will be allocated by the Construction Manager. Haul routes are subject to regulation and limitation. Contractor will be required to prepare and submit for review and acceptance traffic control plans, anticipated haul routes, and construction working parking plans.

1.7 HOURS OF WORK

- A. Hours of operation for work on the site shall be as stated in the General Conditions, unless otherwise noted or further restricted in the Contract Documents, or as directed by the Engineer. No work shall be done on weekends, holidays or outside these specified hours, unless otherwise approved by the Engineer. Such authorization shall not be unreasonably withheld.

1.8 CONSTRUCTION BARRICADES OR TEMPORARY PROTECTION

- A. The Contractor at Contractor's sole cost and expense shall provide or cause to be provided temporary barricades or other measure to protect the work. Such temporary measures shall remain in place for the entire duration of the Work. Contractor shall coordinate the removal temporary barricades or other means of protection with the Owner. Refer to Section 015000, "Temporary Facilities and Controls", for specific Project requirements.

1.9 SITE SECURITY

- A. Site security shall be the Contractor's responsibility at all times.

1.10 PROJECT SAFETY

- A. Safety shall be the Contractor's responsibility at all times.

1.11 SPECIFICATION FORMATS AND CONVENTIONS

- A. Specification Format: The Specifications are organized into Divisions and Sections using the CSI/CSC's "MasterFormat" numbering system.
- B. Section Identification: The Specifications use section numbers and titles to help cross-referencing in the Contract Documents. Sections in the Specifications are in numeric sequence; however, the sequence is incomplete. Consult the Table of Contents at the beginning of the Specifications to determine numbers and names of sections in the Contract Documents.
- C. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred, as the sense requires. Singular words shall be interpreted as plural and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.
2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.
3. The words "shall", shall be," or "shall comply with", depending on the context, are implied where a colon (:) is used within a sentence or phrase.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 012513 - SUBSTITUTIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General Conditions and Supplemental General Conditions and other Division 01 General Requirements, apply to this Section.

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for handling requests for Substitutions.
- B. Substitution requests will be considered by City of Sunnyvale post bid.
- C. Procedural requirements governing the Contractor's selection of products and product options are included under General Requirements - Product Requirements.

1.3 DEFINITIONS

- A. Definitions used in this Section are not intended to change or modify the meaning of other terms used in the Contract Documents.
- B. Substitutions: Requests for changes in products, materials, equipment, and methods of construction required by Contract Documents are considered requests for "substitutions." Where phrases such as "or equal" or "or equal as approved by the Architect" occurs in the Contract Documents, do not assume that materials or equipment will be approved as equal unless the item has been specifically approved for this work by the Architect or as otherwise allowed in these Contract Documents.

The following are not considered substitutions:

- 1. Revisions to Contract Documents requested by the Owner or Architect.
- 2. Specified options of products and construction methods included in Contract Documents.
- 3. The Contractor's determination of and compliance with governing regulations and orders issued by governing authorities.

1.4 SUBMITTALS:

- A. If the Contractor desires to use material or equipment other than that specified, they shall submit a request for approval of such substitution, in writing, to the Construction Manager. Product Substitutions for all Specification Sections must be requested must be requested within the time period specified in the general conditions. Substitution Request Form: Use CSI Form 13.1A.
- B. Submit Substitution Request packages in electronic format using the form provided for review and acceptance to be returned to the Contractor.
- C. Identify the product, or the fabrication or installation method to be replaced in each request. Include related Specification Section and Drawing numbers. Provide complete documentation showing compliance with the requirements for substitutions, and the following information, as appropriate:

1. Product Data, including Drawings and descriptions of products, fabrication and installation procedures.
2. Samples where applicable or requested.
3. A detailed, side-by-side comparison of the significant qualities of the proposed substitution with those of the Work specified. Significant qualities may include but is not necessarily limited to elements such as size, weight, durability, performance, visual effect, LEED, and red-list free compliance (as appropriate).
4. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by the Owner and separate Contractors will become necessary to accommodate the proposed substitution.
5. A statement indicating the substitution's effect on the Contractor's Construction Schedule compared to the schedule without approval of the substitution. Indicate the effect of the proposed substitution on overall Contract Time.
6. Cost information, including a proposal of the net change, if any, in the Contract Sum.
7. Certification by the Contractor that the substitution proposed is equal-to or better in every significant respect to that required by the Contract Documents, and that it will perform adequately in the application indicated. Include the Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of the failure of the substitution to perform adequately.
8. The Contractor warrants that they have investigated the proposed product and determined that it is equal to or superior in all respects to that indicated or specified.
9. The Contractor waives claim for additional costs and time associated with the proposed product, which may subsequently become apparent.
10. The Contractor shall provide a signed statement that the proposed product is in full compliance with the Contract Documents, and applicable regulatory requirements, requires no changes to specified controls and monitoring systems that may be specified in other Sections, and Certify that the Contractor will be responsible for coordination at no additional expense to the Owner
11. The Contractor shall provide information on availability of maintenance service, and source of replacement materials, and provide a sample of Manufacturer's standard form of guarantee or warranty for proposed product.

1.5 CONSTRUCTION MANAGER'S ACTION

- A. Refer to 007213 for timing of Substitution requests.
- B. No consideration will be given to a substitute product unless, in the Architect's judgment, it complies with the following conditions.
 1. Substitution Request is complete.
 2. It is equal in quality, performance and serviceability.
 3. Its use does not entail changes in details or related construction.
 4. It is acceptable in regards to design and aesthetic effect.
 5. There is a cost and/or time advantage to the Owner.
- C. Acceptance of a product shall not relieve the Contractor from responsibility for the proper execution of the Work and any other requirements of the Contract Documents.
- D. If a proposed product is not accepted, use the product originally specified or indicated in the Contract Documents.
- E. No products other than those indicated or specified in the Contract Documents shall be purchased or incorporated in the Work without the Architect's prior written acceptance.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

- A. Conditions: The Contractor's substitution request will be received and considered by the Architect when one (1) or more of the following conditions are satisfied, as determined by the Architect; otherwise requests will be returned without action except to record noncompliance with these requirements.
1. Extensive revisions to Contract Documents are not required.
 2. Proposed changes are in keeping with the general intent of the Contract Documents.
 3. The request is timely, fully documented and properly submitted.
 4. The request is directly related to an "or equal" clause or similar language in the Contract Documents.
 5. The Specified product or method of construction cannot be provided within the Contract Time. The request will not be considered if the product or method cannot be provided as a result of failure to pursue the Work promptly or coordinate activities properly.
 6. The specified product or method of construction cannot receive necessary approval by a governing authority, and the requested substitution can be approved.
 7. A substantial advantage is offered the Owner, in terms of cost, time, energy conservation or other considerations of merit, after deducting offsetting responsibilities the Owner may be required to bear. Additional responsibilities for the Owner may include additional compensation to the Architect for redesign and evaluation services, increased cost of other construction by the Owner or Separate Contractors, and similar considerations.
 8. The specified product or method of construction cannot be provided in a manner that is compatible with other materials, and where the Contractor certifies that the substitution will overcome the incompatibility.
 9. The specified product or method of construction cannot be coordinated with other materials, and where the Contractor certifies that the proposed substitution can be coordinated.
 10. The specified product or method of construction cannot provide a warranty required by the Contract Documents and where the Contractor certifies that the proposed substitution provides the required warranty.
- B. The Contractor's submittal and Architect's acceptance of Shop Drawings, Product Data or Samples that relate to construction activities not complying with the Contract Documents, does not constitute an acceptable or valid request for substitution, nor does it constitute approval.

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for handling and processing changes to the Contract. Refer to General Conditions for definitions and contractual requirements.

1.3 SUBMITTALS

- A. Submit the name of the individual authorized to coordinate changes in the Contract and responsible for informing others in the Contractor's employ of changes in the Work.
- B. Within fifteen (15) calendar days of the Notice to Proceed, submit in form acceptable to the Owner a breakdown of labor rates for each labor classification employed on the job site by the Contractor and all subcontractors. Breakdown shall show base rate, amounts for each union benefit where applicable, and amounts for all payroll taxes and insurance. Do not include any cost item in the labor rate not specifically allowed in the General Conditions. This labor rate breakdown shall be used to evaluate the Contractor's cost proposals.

1.4 DOCUMENTATION

- A. Each cost proposal submitted to the Owner must include complete and detailed information and back-up documentation for evaluation and substantiation of proposed changes. Back-up quantitative and pricing documentation shall be provided for in a format and level of detail acceptable to the Owner, and consistent with pricing criteria set forth in Article 12.1.3 of the General Conditions.
- B. If the Contractor and Owner fail to agree on cost or emergency changes are necessary, maintain detailed records of the work completed in accordance with the General Conditions.
- C. If requested by the Owner, Contractor shall provide the following additional data to support calculations:
 - 1. Taxes, insurance, and bonds.
 - 2. Justification for any change in Contract Time per Article 12 of the General Conditions.
 - 3. Credit for deletions from the Contract and similar documentation.

1.5 CHANGE INITIATION

- A. The Owner or the Architect through Owner can initiate a revision to the Contract documents. Change initiation must be submitted via the eBuilder process. Contractor can also initiate a change by notifying the Owner of any potential changes to the Contract. The Owner as required may submit a Proposal Request (PR) to the Contractor, which includes a description of the change and may include supplementary or revised drawings and specifications and projected time for execution.

- B. The Contractor shall then submit a response to the Owner request within fourteen (14) calendar days, which describes changes in Contract Sum and Contract Time with full documentation, including a statement on the effects of the change on the work of separate contractors, if any.

1.6 AUTHORIZATION

- A. After receipt of the Contractor's response to the Proposal Request, the Owner shall evaluate and either request additional information, reject Contractor's request as unfounded, issue a directive for the work to proceed for the price and time stated, or negotiate change to the price or time. Directives to the Contractor shall be issued by the Owner via a Construction Change Authorization (CCA) or another form required by the Owner accomplishing a similar purpose.

1.7 PROCESSING

- A. Following final agreement on a Contract change, issued under a CCO or otherwise negotiated and accepted cost proposal, the Owner shall prepare and issue a Change Order in three (3) duplicate originals, and forward them to the Contractor who shall in turn sign all four and forward to Owner for final processing and final distribution. The Owner may combine a number of CCO's or other changes and issue them under a single Change Order.
- B. The Contractor's staff required to coordinate, administer, process, estimate, negotiate, and post the anticipated number of Change Orders, including all related effort for the anticipated number of Change Orders, will be included in the Contractor's Total Lump Sum Bid. Due to the nature of the Project, the Contractor shall include in project management approximately 25 Change Orders. At Owner's sole discretion, each Change Order may include up to twenty-five (25) separate PR's, CCA's or similar items of additions, deletions, or revisions in the Work.

1.8 CORRELATION

- A. Following the execution of each Change Order by the Owner, Contractor shall, on a monthly basis incorporate such cost on the Application for Payment by indicating each authorized Change Order as a separate line item and adjusting the Contract Sum as shown on the Change Order.
- B. Contractor shall promptly revise the Construction Schedule and Schedule of Values to reflect any changes in the Contract Time and resubmit in accordance with Specification Section 01 3216, "Construction Progress".
- C. Contractor shall promptly enter changes in the Project Record Documents.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 012700 - UNIT PRICES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for unit prices.

1.2 DEFINITIONS

- A. Unit price. An amount proposed by bidders, stated on the Bid Form, as a price per unit of measurement for materials or services added to or deducted from the Contract Sum by appropriate modification, if estimated quantities of Work required by the Contract Documents are increased or decreased.

1.3 PROCEDURES

- A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead and profit.
- B. Measurement and Payment: Refer to individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.
- C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.
- D. List of Unit Prices: A list of unit prices is included in Part 3. Specification Sections referenced in the schedule contain requirements for materials described under each unit price.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 LIST OF UNIT PRICES

ASBESTOS

Item	Task	Unit of Measure	Unit Price
1	Abate Floor Tile & Mastic	SF	
2	Abate Floor Tile, mastic & Sub-Floor	SF	
3	Abate roofing material including mastic	SF	

4	Abate Drywall Board System (Sheetrock, Tape & Mud) Walls and/or Ceilings	SF	
5	Abate Plaster Walls and/or Ceilings	SF	
6	Abate Asbestos Cement Panels (Walls and/or Ceilings)	SF	
7	Abate Thermal System Insulation - Pipe Fitting Insulation	LF	
8	Abate Doors, Door frames and caulking	SF	

TOTAL
ASBESTOS

LEAD

Item	Task	Unit of Measure	Unit Price
1	Small Containment <200 SF	EA	
2	Removal all layers Paint to Bare Wood Substrate	SF	
3	Removal all layers Paint to Bare Metal Substrate	SF	
4	Remove wood components	SF	
5	Remove metal components	SF	

TOTAL LEAD

MISCELLANEOUS

Item	Task	Unit of Measure	Unit Price
1	Remove and dispose of PCB containing Fluorescent light fixture ballast's	EA	
2	Remove and dispose of Mercury containing fluorescent light bulbs/tubes (standard 48" tubes)	EA	
3	Recover, manifest and dispose of refrigerant gas and HVAC unit	EA	
4	Remove and dispose of smoke detectors	EA	
5	Remove and dispose exit signs	EA	

SOILS

Item	Task	Unit of Measure	Unit Price
1	Off-haul clean soil	Tons	
2	Off-haul Class I hazardous	Tons	
3	Off-haul Class II hazardous soil	Tons	
4	Off-haul Class III hazardous soil	Tons	
5	Import clean fill to backfill hazardous removed soils as needed	Tons	

Notes

- a. Contractor shall include all soil removal necessary to complete the project as part of the base bid.

- b. Items 2 through 4 shall only include the premium adjustment from clean soil removal to hazardous soil removal (as classified).

END OF SECTION

SECTION 012900 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Contract, including General Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes schedule of values and procedures for preparation and submittal of Progress Payment Requests.

1.3 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule.
 - 1. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including the following:
 - a. Application for Payment forms with Continuation Sheets.
 - b. Submittals Schedule. Submit the Schedule of Values to the Construction Manager at earliest possible date but within twenty-one (21) days after the Notice to Proceed, provide an accurate and realistic Schedule of Values (cost breakdown) organized by Definable Feature of Work (DFOW) and signed by the same person who will sign payment applications. The Schedule of Values must total the lump sum price, including additive or alternate bid items, if any, of the contract award. Each item of the Schedule of Values shall include its proper share of overhead and profit. The prices in the Schedule of Values shall be used only for determining the amount of each progress payment. A Schedule of Values may be rejected if, in Owner's opinion, any item is Unbalanced.
 - 2. Sub-schedules: Where the Work is separated into phases requiring separately phased payments, provide subschedules showing values correlated with each phase of payment.
 - 3. Arrange the Schedule of Values in tabular form with separate columns to indicate the following for each item listed:
 - a. Related Specification Section or Division.
 - b. Description of the Work.
 - c. Name of subcontractor.
 - d. Name of manufacturer or fabricator.
 - e. Name of supplier.
 - f. Change Orders (numbers) that affect value.
 - g. Dollar value.
 - 1) Percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.
 - 4. Provide a breakdown of the Contract Sum acceptable to Owner in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Provide several line items for principal subcontract amounts, where appropriate. Provide similar breakdowns for Contract Change Orders.
 - 5. Round amounts to nearest whole dollar; total will equal the Contract Sum.
 - 6. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
 - a. Differentiate between items stored on-site and items stored off-site. Include evidence of insurance or bonded warehousing if required.

7. Provide separate line items in the Schedule of Values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work. Provide separate line items in the Schedule of Values for punch list, mockups, close out and O&M's for each spec section and/or trade.
8. No individual line item in the Schedule of Values is to exceed \$250,000.00.
9. Each item in the Schedule of Values and Applications for Payment will be complete. Include total cost and proportionate share of general overhead and profit for each item.
 - a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense, at Contractor's option.
10. Schedule Updating: Update and resubmit the Schedule of Values before the next Applications for Payment when Change Orders result in a change in the Contract Sum.

1.4 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment will be consistent with previous applications and payments as certified by Architect and paid for by Owner.
- B. Payment Application Times: The date for each progress payment is indicated in the General Conditions. The period of construction Work covered by each Application for Payment is the period indicated in the Owner-Contractor Agreement.
- C. Payment Application Forms: Use AIA Document G702 and AIA Document G703 Continuation Sheets or equivalent forms as approved by Owner
- D. Preparation: Complete every entry on form. Execute by a person authorized to sign legal documents on behalf of Contractor. Owner will return incomplete applications without action.
 1. Entries will match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions were made.
 2. Include amounts of Change Orders issued before last day of construction period covered by application.
- E. Transmittal: Submit 2 signed original copies of each Application for Payment to Owner by a method ensuring receipt within 24 hours. All copies will include waivers of lien and similar attachments if required.
- F. Affidavits of Payment: With each Application for Payment, submit waivers of Affidavits of Payment from subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.
 1. Submit partial affidavits of payment on each item for amount requested, before deduction for retainage, on each item.
 2. When an application shows completion of an item, submit final or full affidavits of payment.
 3. Owner reserves the right to designate which entities involved in the Work must submit affidavits.
 4. Affidavit of Payment Delays: Submit each Application for Payment with Contractor's affidavit of payment for construction period covered by the application.
 - a. Submit final Application for Payment with or preceded by final affidavit of payment from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
 5. Affidavit of Payment Forms: Submit affidavit of payment on forms, executed in a manner acceptable to Owner.
 6. Certified payroll reporting through LCP tracker will be required for labor compliance.

- G. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment will include but not be limited to, the following:
1. Current List of subcontractors.
 2. Accepted Schedule of Values.
 3. Contractor's Construction Schedule.
 4. Submittals Schedule.
 5. Products list.
 6. Sustainable design action plans, including preliminary project material cost date.
 7. Schedule of unit prices.
 8. List of Contractor's staff assignments.
 9. List of Contractor's principal consultants.
 10. Copies of building permits.
 11. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
 12. Initial progress report.
 13. Report of preconstruction conference.
 14. Certificates of insurance and insurance policies.
 15. Performance and payment bonds.
 16. Data needed to acquire Owner's insurance.
- H. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted in accordance with General Conditions Article 9.10, including, but not limited to, the following:
1. Evidence of completion of Project closeout requirements.
 2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
 3. Updated final statement, accounting for final changes to the Contract Sum.
 4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims".
 5. AIA Document G706A, "Contractor's Affidavit of Release of Liens".
 6. AIA Document G707, "Consent of Surety to Final Payment".
 7. Evidence that claims have been settled.
 8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
 9. Final liquidated damages settlement statement.
- I. Payments for stored materials: Payments for stored materials shall be made in accordance with Article 9.3.6 of the General Conditions. All material and work covered by payments made will thereupon become the sole property of the Owner.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. Coordination Drawings.
 - 2. Project meetings.
 - 3. Requests for Interpretation (RFIs).
 - 4. Project Web based Document Management software e-Builder.
- B. See Section 01 7300 "Execution Requirements" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.

1.2 DEFINITIONS

- A. RFI: Request For Information from Contractor seeking interpretation or clarification of the Contract Documents.

1.3 PROJECT MANAGEMENT SOFTWARE

- A. Software: E-BUILDER and or similar software package will be utilized to manage the following processes:
 - Requests for Interpretation
 - Submittals
 - Change Management Documentation
 - Daily Report Management
 - Meeting Notes
 - Photographic Documentation
 - Document Management
- B. The Contractor will be required to utilize E-BUILDER and or similar software package for all of the above processes. The Contractor may, at their option, utilize their own software for their own management purposes, but data must still be entered into the E-BUILDER web based software. Data entered into other management systems will not be recognized by the project team.

1.4 COORDINATION

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections that depend on each other for proper installation, connection, and operation.
 - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
 - 2. Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
 - 3. Make adequate provisions to accommodate items scheduled for later installation.
 - 4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair of all components, including mechanical and electrical.

- B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
 - 1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
 - 1. Preparation of Contractor's Construction Schedule.
 - 2. Preparation of the Schedule of Values.
 - 3. Installation and removal of temporary facilities and controls.
 - 4. Delivery and processing of submittals.
 - 5. Progress meetings.
 - 6. Pre-installation conferences.
 - 7. Project closeout activities.
 - 8. Startup and adjustment of systems.
 - 9. Project closeout activities.

1.5 SUBMITTALS

- A. Coordination Drawings: Prepare Coordination Drawings if limited space availability necessitates maximum utilization of space for efficient installation of different components or if coordination is required for installation of products and materials fabricated by separate entities.
 - 1. Content: Project-specific information, drawn accurately to scale. Do not base Coordination Drawings on reproductions of the Contract Documents or standard printed data. Include the following information, as applicable:
 - a. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
 - b. Indicate dimensions shown on the Contract Drawings and make specific note of dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect for resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
- B. Submit one electronic (pdf) copy of Coordination Drawings.

1.6 PROJECT MEETINGS

- A. General: Schedule and conduct meetings and conferences at Project site, unless otherwise indicated.
 - 1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner, Construction Manager and Architect of scheduled meeting dates and times.
 - 2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
 - 3. Notes: Record significant discussions and agreements achieved. Distribute the meeting notes to everyone concerned, including Owner, Construction Manager and Architect, within three (3) business days of the meeting.
- B. Preconstruction Conference: Schedule a preconstruction conference before starting construction, at a time convenient to Owner, Building Trades Council, and Construction Manager, but no later than fourteen (14) calendar days after execution of the Agreement. Hold the conference at Project site or another convenient location. Conduct the meeting to review responsibilities and personnel assignments.

1. Attendees: Authorized representatives of Owner, Construction Manager, Building Trades Council, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 2. Agenda: Discuss items of significance that could affect progress, including the following:
 - a. Tentative construction schedule.
 - b. Phasing.
 - c. Critical work sequencing and long-lead items.
 - d. Designation of key personnel and their duties.
 - e. Procedures for processing field decisions and Change Orders.
 - f. Procedures for RFIs.
 - g. Procedures for testing and inspecting.
 - h. Procedures for processing Applications for Payment.
 - i. Distribution of the Contract Documents.
 - j. Submittal procedures.
 - k. Preparation of Record Documents.
 - l. Use of the premises and existing buildings.
 - m. Work restrictions.
 - n. Owner's occupancy requirements.
 - o. Responsibility for temporary facilities and controls.
 - p. Construction waste management and recycling.
 - q. Parking availability.
 - r. Office, work, and storage areas.
 - s. Equipment deliveries and priorities.
 - t. First aid.
 - u. Security.
 - v. Progress cleaning.
 - w. Working hours.
 3. Notes: Architect will record and distribute meeting notes.
- C. Progress Meetings: Construction Manager will conduct progress meetings at weekly intervals. Coordinate dates of meetings with preparation of payment requests.
1. Attendees: In addition to representatives of Owner, Construction Manager and Architect, each subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. General Contractor's designated Project Manager and Superintendent must attend all Progress Meetings in addition to all other project related meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 2. Agenda: Review and correct or approve Notes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - 1) Review schedule for next period. Contractor to provide detailed 3-week look ahead.
 - b. Review present and future needs of each entity present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Status of submittals.
 - 4) Deliveries.

- 5) Off-site fabrication.
 - 6) Access.
 - 7) Site utilization.
 - 8) Temporary facilities and controls.
 - 9) Work hours.
 - 10) Hazards and risks.
 - 11) Progress cleaning.
 - 12) Quality and work standards.
 - 13) Status of correction of deficient items.
 - 14) Field observations.
 - 15) Status of RFIs.
 - 16) Status of proposal requests.
 - 17) Pending changes.
 - 18) Status of Change Orders.
 - 19) Pending claims and disputes.
 - 20) Documentation of information for payment requests.
3. Notes: Construction Manager will conduct the meeting will record and distribute meeting notes to Owner, Architect and Contractor.
 4. Reporting: Distribute notes of the meeting to each party present and to parties who should have been present.
 - a. Schedule Updating: Contractor shall update the Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized.

1.7 REQUESTS FOR INTERPRETATION (RFIs)

- A. Procedure: Immediately on discovery of the need for interpretation of the Contract Documents, and if not possible to request interpretation at Project meeting, prepare and submit an RFI in the form specified.
 1. RFIs shall originate with Contractor. RFIs submitted by entities other than Contractor will be returned with no response.
 2. RFIs shall be submitted to the Construction Manager in the specified format.
 3. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing interpretation and the following:
 1. Project name.
 2. Project number
 3. Date.
 4. Name of Contractor.
 5. Name of Architect and Construction Manager.
 6. RFI number, numbered sequentially.
 7. Specification Section number and title and related paragraphs, as appropriate.
 8. Drawing number and detail references, as appropriate.
 9. Field dimensions and conditions, as appropriate.
 10. Contractor's suggested solution(s). If Contractor's solution(s) impact the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 11. Contractor's signature.
 12. Attachments: Include drawings, descriptions, measurements, photos, Product Data, Shop Drawings, and other information necessary to fully describe items needing interpretation.
- C. RFI Format.
 1. Electronic Submission required in a format where send/receipt dates can be tracked. RFIs to be submitted in E-BUILDER.

2. RFI Form provided by Construction Manager, although the Contractor's format may be acceptable upon review.
 3. Identify each page of attachments with the RFI number and sequential page number.
- D. Architect's Action: Architect will review each RFI, determine action required, and return it. Allow fourteen (14) calendar days for Architect's response for each RFI. RFIs received after 1:00 p.m. will be considered as received the following working day.
1. The following RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for coordination information already indicated in the Contract Documents.
 - d. Requests for adjustments in the Contract Time or the Contract Sum.
 - e. Requests for interpretation of Architect's actions on submittals.
 - f. Incomplete RFIs or RFIs with numerous errors.
 2. Architect's action may include a request for additional information, in which case Architect's time for response will start again.
 3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Division 01 Section 01 2600 "Contract Modification Procedures."
 - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Construction Manager in writing within ten (10) calendar days of receipt of the RFI response.
- E. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within five (5) calendar days if Contractor disagrees with response.
- F. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log (CSI Log Form 13.2B) weekly. Include the following:
1. Project name.
 2. Name and address of Contractor.
 3. Name and address of Architect.
 4. RFI number including RFIs that were dropped and not submitted.
 5. RFI description.
 6. Date the RFI was submitted.
 7. Date Architect's response was received.
 8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
 9. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

1.8 NOISE MANAGEMENT

- A. Noise Management Plan: Prepare a Noise Management Plan that includes the following elements at a minimum:
1. Best Management Practices. The plan shall identify noise best management practices to be implemented during construction, including but not limited to:
 - a. Equip all internal combustion engine-driven equipment with intake and exhaust mufflers that are in good condition and appropriate for the equipment.
 - b. Construct solid plywood fences (minimum 8 feet in height) or erect noise control blanket barriers between on-site demolition/construction sites and receptors (e.g., residences and library) as defined below. Noise barriers shall also be installed around the perimeter of all staging areas to reduce noise impacts on receptors (e.g., residences, library, and Little Tree Montessori International School of

Sunnyvale). Receptor Distances within which Noise Blanket or Barrier is Required:

	<u>Demolitions & Site Preparation</u>	<u>Foundation Construction</u>	<u>Building Construction & Finishing</u>
Residence	80 feet	60 feet	N/A
Library	200 feet	140 feet	80 feet

- c. Position stationary noise-generating equipment as far as possible from receptors (preschool, residences and the library).
2. Construction Schedule. The plan shall include a detailed construction plan identifying the schedule for major noise-generating construction activities. The construction plan shall identify a procedure for coordination with adjacent noise-sensitive land uses, including residences, Little Tree Montessori International School of Sunnyvale, and the Sunnyvale Library, so that construction activities can be scheduled to minimize noise disturbance during noise-sensitive periods (nighttime, preschool nap times, library events, etc.). The schedule shall identify noise-sensitive periods and define noise reduction techniques.
3. Community Liaison. The City or Construction Manager shall designate a “Community Liaison” to ensure coordination between construction staff and neighbors to minimize disruptions due to construction noise and vibration.
4. Notices. The plan shall identify receptors within 400 feet of the project that will receive construction notices. Construction notice details are identified below:
 - a. A notice with the name and phone number of the Community Liaison shall be posted on the fencing surrounding the construction work site on the project site.
 - b. Residents and schools shall be sent a notice at least 7 days prior to the start of construction.
 - c. Residences within 500 feet of nighttime construction shall receive additional notice 7 days prior to each occurrence of nighttime construction.
 - d. Notices shall include details regarding the construction schedule and the phone number for the Community Liaison, in addition to tips for reducing noise.
5. Noise Complaints. The Community Liaison shall respond to any local complaints regarding construction noise and vibration. The Community Liaison shall determine the cause of the noise or vibration complaint and implement reasonable measures to correct the problem. Reasonable measures could include the following:
 - a. Installation of temporary sound absorption barriers (i.e., sound walls, noise control blankets)
 - b. Use of mufflers on heavy equipment.
 - c. Locating of stationary noise sources (i.e., generators) as far as feasible from existing residences and Little Tree Montessori International School of Sunnyvale.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 013216 - CONSTRUCTION PROGRESS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Special Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
 - 1. Preliminary Construction Schedule.
 - 2. Contractor's Construction Schedule.
 - 3. Submittals Schedule.
 - 4. Three-Week look Ahead Schedule.
 - 5. Field condition reports.
- B. Related Sections include but are not limited to the following:
 - 1. SECTION 01 2900 - PAYMENT PROCEDURES for submitting the Schedule of Values.
 - 2. SECTION 01 3100 - PROJECT MANAGEMENT AND COORDINATION for submitting and distributing meeting and conference minutes.
 - 3. SECTION 01 3300 - SUBMITTAL PROCEDURES for submitting schedules and reports.
 - 4. SECTION 01 4000 - QUALITY REQUIREMENTS for submitting a schedule of tests and inspections.
 - 6. SECTION 01 7913 - GENERAL COMMISSIONING REQUIREMENTS

1.3 CONSTRUCTION SCHEDULE/SUBMITTALS

- A. Scheduler Qualifications: Designate, in writing and within five (5) calendar days after Notice of Award, person responsible for preparation, maintenance, updating, and revision of all schedules.
 - 1. Qualifications of Responsible Scheduler:
 - a. Authority to act on behalf of Contractor
 - b. Minimum five (5) years verifiable experience in preparation of complex construction schedules of projects of similar value, size, and complexity.
 - c. Knowledge of PM scheduling utilizing Primavera P6.
 - d. The Owner through its Construction Manager (CM) reserves the right to disapprove scheduler when submitted by Contractor if not qualified. CM reserves the right to remove scheduler from the Project if found to be incompetent.
- B. Submittals Schedule: The Contractor will be responsible to enter the list of anticipated submittals into the Owner established web-based Contract Management system. The submittal schedule will be a version of the Submittal Log generated from the System.

1. Scheduled date for first submittal.
2. Specification Section number and title.
3. Submittal category (action or informational).
4. Name of subcontractor.
5. Description of the Work covered.
6. Scheduled date for Architect's and Construction Manager's final release or approval.

C. Construction Schedule:

1. Schedule Orientation Meeting: Refer to timeframe established in the General Conditions for Owner's Project Manager to conduct a Schedule Orientation Meeting to review the requirements of the Contract Documents for preparing, submitting, updating, and revising the various Project schedules. This is a separate meeting from the Preconstruction Conference and is dedicated exclusively to discussions about the scheduling requirements for the Project.
2. Preliminary Construction Schedule.
2. Contractor's Construction Schedule.
3. Software: Primavera P6
4. Format: Submit an electronic copy of schedule in XER format (as well as PDF) on USB (thumb drive) to comply with requirements for submittals. Include type of schedule (Initial or Updated) and date on label. Include XER data in excel format as well, with columns as defined by the Construction Manager. Email may be accepted as a form of submission for progress updates upon approval of the baseline schedule.

D. Critical Path Method (CPM) Reports: Concurrent with CPM schedule, submit in PDF format each of the following computer-generated reports. Format for each activity in reports shall contain activity number, activity description, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float.

1. Activity Report: List of all activities sorted by activity number and then early start date, or actual start date if known.
2. Logic Report: List of preceding and succeeding activities for all activities, sorted in ascending order by activity number and then early start date, or actual start date if known.
3. Total Float Report: List of all activities sorted in ascending order of total float.
4. "Claim Digger" report generated from P6 software depicting 10 agreed upon schedule characteristics.

E. Field Condition Reports: Submit one hard copy and electronically in PDF format at time of discovery of differing conditions.

1.4 QUALITY ASSURANCE

- A. Scheduling Consultant Qualifications: An experienced specialist in (PM) scheduling and reporting, with capability of producing (PM) reports and diagrams within 24 hours of Construction Manager's request.
- B. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to the Preliminary Construction Schedule and Contractor's Construction Schedule, including, but not limited to, the following:

1. Review content and format for reports.
2. Verify availability of qualified personnel needed to develop and update schedule.
3. Discuss constraints, including phasing, work stages, area separations, interim milestones, and partial Cities occupancy.
4. Review delivery dates for Owner-furnished products and move-in.
5. Review schedule for work of Cities separate contracts.
6. Review time required for review of submittals and resubmittals.
7. Review requirements for tests and inspections by independent testing and inspecting agencies.
8. Review time required for completion, startup, commissioning and certifying procedures.
9. Review and finalize list of construction activities to be included in schedule.
10. Review submittal requirements and procedures.
11. Review procedures for updating schedule.

1.5 COORDINATION

- A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.
- B. Coordinate Contractor's Construction Schedule with the Schedule of Values, list of subcontracts, Submittals Schedule, progress reports, payment requests, and other required schedules and reports.
 1. Secure time commitments for performing critical elements of the Work from parties involved.
 2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 SUBMITTAL SCHEDULE

- A. Preparation: Submittal activities (Submit, Review, Accept) are to be integrated in and logically tied to the construction activities - from the complete schedule a final layout/report will provide Schedule arranged in chronological order by dates required by construction schedule.
 1. Coordinate Submittals Schedule with list of subcontracts, the Schedule of Values, and Contractor's Construction Schedule.
 2. Initial Submittal: Submit concurrently with preliminary Construction Schedule. List those required to maintain orderly progress of the Work and those required early because of long lead-time for manufacture or fabrication.
 3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's Construction Schedule.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. Submit within time frame specified in General Conditions, Article 4.12 and section 3.1.C of this specification section.
- B. Submit schedule in XER format readable in Primavera P6 as well as PDF (with columns visible as required by Construction Manager).

- C. Duration of Schedule: Extend schedule from date established for the Notice to Proceed to date of Substantial Completion and Final Completion, including all weather days.
1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- D. Activities: Treat each story or separate area as a separate numbered activity for each principal element of the Work. Comply with the following:
1. Activity Duration: Define activities so no activity other than administrative activities is longer than 15 calendar days, unless specifically allowed by Construction Manager.
 2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 30 calendar days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
 3. Include submittals and mock-up fabrication.
 3. Submittal Review Time: Include review and resubmittal times indicated in Division 01 Section "Submittal Procedures" in schedule. Coordinate and integrate submittal review times in Contractor's Construction Schedule.
 4. Startup, Testing, Commissioning and Certifying Time: Include not less than 28 calendar days for startup and testing.
 5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect and Construction Manager's administrative procedures necessary for certification of Substantial Completion.
- E. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
1. Phasing: Arrange list of activities on schedule by phase.
 2. Work by Owner: Include a separate activity for each portion of the Work performed by Owner. This shall include, but not be limited to the following:
 - a. Furniture
 - b. This list may be added to during the course of the project.
 3. Products Ordered in Advance: Include a separate activity for each product.
 4. Owner-Furnished Products: Include a separate activity for each product.
 5. Work Restrictions: Show the effect of the following items on the schedule:
 - a. Coordination with existing construction.
 - b. Limitations of continued occupancies.
 - c. Uninterruptible services.
 - d. Partial occupancy before Substantial Completion. Include the partial occupancy of the Data Center and its effect on the completion of the project.
 - e. Use of premises restrictions.
 - f. Provisions for future construction.
 - g. Seasonal variations.
 - h. Environmental control

6. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
 - a. Submittals.
 - b. Purchases.
 - c. Mockups.
 - d. Fabrication.
 - e. Sample testing.
 - f. Deliveries.
 - g. Installation.
 - h. Tests and inspections.
 - i. Adjusting.
 - j. Curing.
 - k. Startup, commissioning, certifying and placement into final use and operation.
7. Area Separations: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
 - a. Structural Completion
 - b. Permanent Enclosure
 - c. Data Center Ready for Owner Equipment
 - d. Call Center Ready for Owner Consoles
 - e. Substantial Completion.
 - f. Final Completion

F. Milestones: Include milestones indicated in the Contract Documents in Schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, anticipated Owner installed equipment and Final Completion.

G. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using fragnets to demonstrate the effect of the proposed change on the overall project schedule.

2.3 PRELIMINARY CONSTRUCTION SCHEDULE

A. Preparation: Indicate each significant construction activity separately. Include all construction activities for duration of Work based on included activities.

2.4 CONTRACTOR'S CONSTRUCTION SCHEDULE (CPM SCHEDULE)

A. General: Prepare CPM schedule in PDM (precedence diagram method) format.

B. CPM Schedule: Prepare Contractor's Construction Schedule using a computerized time-scaled CPM diagram for the Work.

1. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all work within applicable completion dates, regardless of Construction Manager's approval of the schedule.
2. Establish procedures for monitoring and updating (CPM) schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.

3. Use "one workday" as the unit of time. Include list of nonworking days and holidays incorporated into the schedule.
- C. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work.
1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:
 - a. Preparation and processing of submittals including resubmittals.
 - b. Mobilization and demobilization.
 - c. Purchase of materials.
 - d. Delivery.
 - e. Fabrication.
 - f. Utility interruptions.
 - g. Installation.
 - h. Work by Owner that may affect or be affected by Contractor's activities.
 - i. Testing and commissioning.
 2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
 3. Weather Days Allowance: Adjustments to Contract Time(s) due to weather will be allowed only for usually severe weather or resulting site conditions that affect the progress of activities on the Critical Path of the Official Progress Schedule.
 - a. No Contract Time extension for rain will be allowed for any month until the number of Days of rain for that month as indicated below has been exceeded. Rainfall will be considered unusually severe only when the Days of rain (defined as more than one-tenth (1/10") of an inch of rain per Day per local NOAA /Weather Underground weather station readings) in any month exceeded the following number of Days of rain per month

Month	No. Of Days
January	5
February	4
March	4
April	2
May	1
June	0
July	0
August	0
September	2
October	4
November	4
December	5
 - b. Contractor must exercise due diligence in protecting the Work and the Work site from adverse impacts of weather by:

- 1) Taking appropriate preventative actions before anticipated inclement weather to protect the Work and Work site from potential adverse effects of the weather;
- 2) Taking corrective action during the inclement weather to protect the Work and Work site from the actual and potential adverse effects of the inclement weather; and
- 3) Taking corrective action after the inclement weather to remedy, prevent, and/or mitigate the negative impacts of the adverse weather on the Work and Work Site.

c. Weather Delays

- 1) Except for rain, if weather conditions are the basis for delays in the continuance or completion of the Work or any designated portion of the Work, Contractor must substantiate the weather conditions were abnormal, based on the climatologically data for the immediately proceeding 10-year period. For all weather related delays, the Contractor must establish that the adverse weather conditions could not have been reasonably anticipated.
- 2) Rain will not be considered abnormal unless it results in precipitation that exceeds the maximum daily precipitation for the cumulative number of Days per month indicated on 3.a above.
- 3) When the amount of rain is considered to be abnormal, extensions to the Contract Time(s) will be granted where the condition of the site, as determined by the Owner, is such that Contractor can perform no Work identified as Critical Path Work on the current version of the Official Progress Schedule in effect at the time the delay occurred.
- 4) Include as a separate identifiable activity on the critical path, an activity labeled "Weather Days Allowance". Insert this activity at the end of the schedule.
- 5) Insert an activity in critical path to reflect weather day occurrences when weather days are experienced and accepted by the Construction Manager. Identify this activity as a weather delay.
- 6) Reduce duration of weather Days Allowance activity as weather delays are experienced, accepted and inserted into the schedule. Remaining weather days in weather allowance at completion of project is considered float.

d. Within twenty-four (24) hours from the beginning of any Critical Path delay to the Official Progress Schedule, Contractor must notify Owner in writing of the causes of delay.

e. Within fourteen (14) days from the end of any Critical Path delay to the Official Progress Schedule, Contractor must submit two (2) hard copies and electronic data files on USB thumb drive, of all supporting information to validate the impact of the delay on the Contract Time.

f. Owner will ascertain the facts and the extent of the delay and adjust the Contract Time(s) for completing the Work when, in Owner's judgment, the facts justify an adjustment. Owner's determination is final and conclusive.

D. Initial Issue of Schedule: Prepare initial time-scaled diagram from a list of straight "early start-early finish-total float" sort. Identify critical activities. Prepare tabulated reports showing the following:

1. Contractor or subcontractor and the Work or activity.
 2. Description of activity.
 3. Principal events of activity.
 4. Immediate preceding and succeeding activities.
 5. Early and late start dates.
 6. Early and late finish dates.
 7. Activity duration in workdays.
 8. Total float or slack time.
 9. Average size of workforce.
- E. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:
1. Identification of activities that have changed.
 2. Changes in early and late start dates.
 3. Changes in early and late finish dates.
 4. Changes in activity durations in workdays.
 5. Changes in the critical path.
 6. Changes in total float or slack time.
 7. Changes in the Contract Time.

2.5 THREE-WEEK LOOK AHEAD SCHEDULE

- A. Prepare weekly, for the weekly Project meeting, a computer-generated Three-week look ahead schedule (bar chart) which is consistent with the CPM schedule and depicts daily labor activities.
- B. Schedule must include description as well as activity ID for each task that aligns with the project schedule. Schedule must include name of subcontractor responsible for the work.
- C. The schedule will consist of the prior week, current week, and the following three (3) weeks.
- D. Lookahead schedule is to be submitted electronically before noon on the day prior to the weekly Project meeting.

2.6 REPORTS

- A. Field Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Scheduling Consultant: Not Used
- B. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities

1. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, all actual starts and finishes, and activity durations.
 2. As the Work progresses, indicate Actual Completion percentage for each activity.
- C. Review and Acceptance of Schedules: Construction Manager will review Preliminary Schedule, Schedule Updates, Schedule Revisions, and Time Impact Analyses to ascertain compliance with specified project constraints, compliance with milestone dates, reasonableness of durations and sequence, accurate inter-relationships and completeness.
1. Contractor to submit preliminary schedule reflecting activities for the first 180 days within 21 calendar days following Notice to Proceed. A revised full/complete preliminary schedule shall be submitted within 60 calendar days following Notice to Proceed.
 2. Construction Manager and Owner will issue written comments following completion of review of Preliminary Schedule within fourteen (14) calendar days after receipt. Construction Manager will return written comments on review of Schedule Updates and Schedule Revisions and Time Impact Analyses to Contractor within fourteen (14) calendar days after receipt.
 2. Revise and resubmit schedule in accordance with Construction Manager's comments within seven (7) calendar days after receipt of such comments, or request joint meeting to resolve objections. If a meeting is requested, the Contractor and all major subcontractors will participate in the meeting with Construction Manager. Revise and Resubmit schedule within seven (7) calendar days after meeting.
 3. When Schedule reflects Cities and Contractor's agreement of project approach and sequence, schedule will be accepted by Owner. Use accepted schedule for planning, organizing, and directing the work and for reporting progress.
- D. Distribution:
1. Transmit 3 copies and 1 (USB thumb drive) containing native format and pdf file, minimum size of 24" x 36" of approved schedule to Construction Manager for distribution. Electronic copies to be uploaded to e-Builder in an appropriate location.
 2. When revisions are made, transmit updated schedules to the Construction Manager for distribution.
- E. Adjustment of Contract Time: If the Contractor believes that the Owner has impacted its work, such that the project completion date will be delayed, the Contractor must submit proof demonstrating the delay to the critical path. This proof, in the form of a Time Impact Analysis, may entitle the Contractor to an adjustment of contract time.
1. The Time Impact Analysis:
 - a. The Time Impact Analysis submitted by the Contractor shall utilize the accepted schedule update that is current relative to the time frame of the delay event (change order or other Owner-caused delay). The Contractor shall represent the delay event in the schedule by:
 - 1) Inserting new activities associated with the delay event into the schedule;
 - 2) Revising activity logic; or
 - 3) Revising activity durations.
 - b. If the project schedule's critical path and completion date are impacted as a result of adding this delay event to the schedule, a time extension

equal to the magnitude of the impact may be warranted. Contractor to incorporate into the Master Project schedule if it is agreed to by the Owner.

- c. The Time Impact Analysis submittal shall consist of:
- 1) A fragment of the portion of the schedule affected by the delay event;
 - 2) A narrative explanation of the delay issue and how it impacted the schedule; and
 - 3) A (USB thumb drive) containing the schedule file used to perform the Time Impact Analysis.

F. Impacts/Delay to Schedule.

1. If requested by the Owner, the Contractor shall submit, with its updates to the Approved Construction Schedule, a narrative statement including a description of current and anticipated problem areas of the Work, delaying factors and their impact, and an explanation of corrective action taken or proposed by the Contractor. If the progress of the Work is behind the Approved Construction Schedule, the Contractor shall indicate what measures will be taken by the Contractor to place the Work back on schedule. The Owner may, from time to time, and in the Owner's sole and exclusive discretion, transmit to the Contractor's Performance Bond Surety the Approved Construction Schedule, any updates thereof and the narrative statement described hereinabove. The Owner's election to transmit, or not to transmit such information, to the Contractor's Performance Bond Surety shall not limit the Contractor's obligations under the Contract Documents.
2. When a delay to the project as a whole can be avoided by revising preferential sequencing or logic, and the Contractor chooses not to implement the revisions, the Contractor will not be entitled to a time extension or compensation for extended overhead.
3. Indicate clearly that the Contractor has used, in full, all project float available for the work involved in the request, including any float that may exist between the Contractor's planned completion date and the Contract completion date. Utilize the latest version of the Schedule Update accepted at the time of the alleged delay, and all other relevant information, to determine the adjustment of the contract time.
4. Float shall be for the mutual benefit of the Owner and the Contractor. Adjustment of the Contract Times will be granted only when the Contract Float has been fully utilized and only when the revised date of completion of the Work has been pushed beyond the contract completion date. Adjustment of the Contract Times will be made only for the number of days that the planned completion of the work has been extended.
5. Actual delays in activities which do not affect the critical path work or which do not move the Contractor's planned completion date beyond the Contract completion date will not be the basis for an adjustment to the contract time.
6. The Contractor shall not be entitled to job-site or home office overhead beyond the Contractor's originally planned occupancy of the site if completion of the project occurs within the specified contract time.
7. Notify Construction Manager of a request for contract time adjustment. Submit request in accordance with the General Conditions. In cases where the Contractor does not submit a request for contract time adjustment for a specific change order, delay, or Contractor request within the specified period of time, then it is mutually agreed that the particular change order, delay, or Contractor request has no time impact on the Contract completion date and no time extension is required.

8. The Construction Manager will, within twenty-one (21) calendar days after receipt of a contract time adjustment, request any supporting evidence, review the facts and advise the Contractor in writing.
9. The new Progress Schedule data, if accepted by the City, shall be included in the next monthly Schedule Update.

3.2 FINAL SCHEDULE SUBMITTAL

- A. As a condition precedent to the release of retention, the final Schedule Update shall be identified by the Contractor as the As-Built Schedule.
- B. The As-Built Schedule shall reflect the exact manner in which the project was constructed by reflecting actual start and completion dates for all activities accomplished on the project.
- C. The As-Built Schedule shall be signed and certified by the Contractor's Project Manager and scheduler as being an accurate record of the way in which the project was actually constructed.

3.3 FORMS

- A. Submittals Schedule Form: Will be generated from the Contractor's schedule file as a filtered layout/report.

END OF SECTION

SECTION 013219 - SUBMITTAL SCHEDULES / DAILY REPORTS / FIELD REPORTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
 - 1. Submittals Schedule.
 - 2. Daily construction reports.
 - 3. Field condition reports.
- B. See Section 012900 "Payment Procedures" for submitting the Schedule of Values.
- C. See Section 013233 "Photographic Documentation" for submitting construction photographs.

1.2 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
 - 1. Critical activities are activities on the critical path. They must start and finish on the planned early start and finish times.
 - 2. Predecessor Activity: An activity that precedes another activity in the network.
 - 3. Successor Activity: An activity that follows another activity in the network.
- B. Fragnet: A partial or fragmentary network that breaks down activities into smaller activities for greater detail.
- C. Major Area: A story of construction, a separate building, or a similar significant construction element.

1.3 SUBMITTALS

- A. Submittals Schedule: See Section 013300.
- B. Daily Construction Reports: Submit PDF copy to e-Builder on a daily basis by end of business the same day.
- C. Field Condition Reports: Submit PDF copy of report at time of discovery of differing conditions.

1.4 COORDINATION

- A. Coordinate preparation and processing of reports with performance of construction activities and with scheduling and reporting of separate contractors.

PART 2 - PRODUCTS

2.1 SUBMITTALS SCHEDULE

- A. Preparation: Submit a schedule of submittals, as outlined in Section 013300, arranged in chronological order by dates required by construction schedule. Include time required for review, re-submittal, ordering, manufacturing, fabrication, and delivery when establishing dates.
 - 1. Coordinate Submittals Schedule with list of subcontracts, the Schedule of Values, and Contractor's Construction Schedule.
 - 2. Submit concurrently with the first complete submittal of Contractor's Construction Schedule.

2.2 REPORTS

- A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
 - 1. List of subcontractors and quantity of workforce for each at Project site (including for General Contractor).
 - 2. Ongoing tasks, with all Activity IDs aligning with project schedule activity.
 - 3. Equipment at Project site.
 - 4. Material deliveries.
 - 5. High and low temperatures and general weather conditions.
 - 6. Accidents.
 - 7. Stoppages, delays, shortages, and losses.
 - 8. Meter readings and similar recordings.
 - 9. Orders and requests of authorities having jurisdiction.
 - 10. Services connected and disconnected.
 - 11. Equipment or system tests and startups.
- B. Field Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare and submit a detailed report. Submit with a request for interpretation on CSI Form 13.2A. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

PART 3 - EXECUTION – (Not Used)

END OF SECTION

SECTION 013233 - PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section describes the requirements for furnishing photographs depicting work progress.

1.2 DESCRIPTION

- A. Furnish photographs of the site construction throughout the progress of the Work.
- B. Take additional photographs on cutoff date for each Application for Payment to document extent of all work complete.
- C. Take additional photographs of specific items as requested by the Construction Manager, Owner, Architect or Inspector.
- D. In addition, take photographs at beginning and completion of the following elements:
 - 1. Pre-mobilization (prior to construction)
 - a. Contractor to conduct a photographic and or video record of existing conditions surrounding subject property including streets.
 - 2. Site clearing.
 - 3. Excavation
 - 4. Utility Trenching
 - 5. Foundations
 - 6. Structural Framing
 - 7. Steel Erections
 - 8. Enclosure of Building
 - 9. Interior
 - 9. Landscaping
 - 10. Final Completion.

1.3 PRINTS

- A. NOT USED

1.4 ELECTRONIC FILES

- A. Deliver pictures on USB thumb drive, indexed and in chronological order, to Construction Manager as part of Record Documents Catalog. All pictures to have a date and time stamp.
- B. All photos to be in a JPEG format.
- C. Upload photos on a weekly basis to the project management software organized in folders separated by date. Upload photos related to each Application for Payment under a separate folder.

- D. Make photos available to Owner at any time in electronic format.
- E. Quantity and locations of pictures
 - a. Contractor to take a minimum of 15-20 pictures daily for each work shift (as applicable) to document work performed that day.
 - b. Photographic documentation to be clear and show the work. Blurred photos will not be accepted.
 - c. Photos to show the date, time, image, and location.

1.5 TECHNIQUE

- A. Factual presentation, with correct exposure and focus, high resolution and sharpness, maximum depth of field, and minimum distortion.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

END OF SECTION

SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for submitting Submittal Schedule, Shop Drawings, Calculations, Product Data, Samples, and other miscellaneous submittals as required by the Specifications.

1.2 DEFINITIONS

- A. Action Submittals: Written and graphic information that requires Architect's responsive action.
- B. Informational Submittals: Written information that does not require Architect's approval. Submittals may be rejected for not complying with requirements.
- C. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

1.3 SUBMITTAL PROCEDURES

- A. General: Electronic copies of CAD Drawings of the Contract Drawings are available from the Architect for Contractor's use in preparing submittals on a controlled basis. See Release Form at the end of this Section that will be required to obtain CAD documents.
- B. Architect's Digital Data Files:
 - 1. With the Owner's concurrence, Architect's CAD drawing digital data files used to create the Contract Drawings will be provided by Architect for Contractor's use in preparing submittals, subject to the Architect's electronic file transfer agreement. The Contractor shall expect, and shall so agree, to execute and deliver the Architect's agreement before the transfer of such Instruments of Service.
 - 2. Request the Architect's electronic file transfer agreement form. Submit the request for file transfer directly to the Architect. Include the executed agreement to SmithGroup, Inc., and a list of documents requested, as identified in the Contract Documents.
 - 3. The files will not be identical to the Contract Drawings. Prior to requesting files, discuss with the Architect how the files will differ from the Contract Documents, and related limitations, such as which Drawings will not be represented, the file format, what information will be included, and method of transmittal.
- C. Contractor shall prepare within thirty (30) calendar days after the award of the Contract, unless otherwise specified, a preliminary Submittals Schedule for Shop Drawings, Product Data, Samples and other items required by the Contract Documents. The Submittals Schedule shall take into consideration the relationship between submittals required such that all related submittals can be reviewed at the same time.
- D. At the time of submission of the complete Project Construction Schedule, submit to the Construction Manager a comprehensive and complete submittal schedule identifying all the submittals required by the Contract Documents. Break larger submittals such as structural steel or reinforcing steel shop drawings into groups representing the manner in which they will be submitted.
- E. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architect and Construction Manager reserve the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- F. Submittals Schedule: See Section 013219.
- G. Submittal Routing: Send submittals directly to Architect and send one separate copy to the Construction Manager. Architect will return reviewed submittals directly to the Construction Manager and Contractor for distribution by the Contractor to subcontractors.
- H. Transmit submittals with all transportation charges prepaid.
- I. Avoidable Resubmittals: The first two reviews of each specified submittal will be processed without cost to the Contractor. After the second review, the Owner may charge the Contractor for the cost of such additional processing, unless the processing results from approved Change Orders causing revision to the previously approved submittals.
- J. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal.
1. Architect's Review: Refer to General Conditions for timeline established for review of each submittal and resubmittal. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. Architect or Construction Manager will advise Contractor when a submittal being processed must be delayed for coordination.
 2. If intermediate submittal is necessary, process it in same manner as initial submittal.
 3. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing.
- K. Identification: Place a permanent label or title block on each submittal for identification.
1. Indicate name of firm or entity that prepared each submittal on label or title block.
 2. Provide a space approximately 4 x 5 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect or Construction Manager.
 3. Include the following information on label for processing and recording action taken:
 - a. Project name.
 - b. Date.
 - c. Name and address of Architect.
 - d. Name and address of Contractor.
 - e. Name and address of subcontractor.
 - f. Name and address of supplier.
 - g. Name of manufacturer.
 - h. Unique identifier, including revision number.
 - i. Number and title of appropriate Specification Section.
 - j. Drawing number and detail references, as appropriate.
 - k. Other necessary identification.
- L. Deviations: Highlight, encircle, or otherwise identify deviations from the Contract Documents on submittals. Clearly, indicate if submittal includes alternative or equal items or substitutions.
- M. MSDS: Do not submit Material Safety Data Sheets. If MSDS are required by the Contract Documents, request clarification of instructions from the Architect.

- N. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect or Construction Manager will return submittals, without review, received from sources other than Contractor.
1. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect Construction Manager on previous submittals, and deviations from requirements of the Contract Documents, including minor variations and limitations. Include the same label information as the related submittal.
 2. Include Contractor's certification stating that information submitted complies with requirements of the Contract Documents.
 3. Transmittal Form: Use AIA Document G810 or alternative form approved by Owner.
 4. Transmittal Form: Provide locations on form for the following information:
 - a. Project name.
 - b. Date.
 - c. Destination (To:).
 - d. Source (From:).
 - e. Names of subcontractor, manufacturer, and supplier.
 - f. Category and type of submittal.
 - g. Submittal purpose and description.
 - h. Submittal and transmittal distribution record.
 - i. Remarks.
 - j. Signature of transmitter.
 - k. Indication of alternative or equal products and substitutions.
 - l. Indication if submittal is informational only.
- O. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, and installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- P. Use for Construction: Use only final submittals with mark indicating action taken by Architect in connection with construction.
- Q. Maintain at the Project Site ready access to the latest reviewed Shop Drawings and Product Data, and one set of samples.

1.4 ACTION SUBMITTALS

- A. General: Prepare and submit Action Submittals required by individual Specification Sections. To avoid excessive submittals, aggregate submittals into comprehensive packages covering the scope of the work type. Architect may require concurrent submissions of related work for comprehensive review, e.g. doors and hardware.
1. Number of Copies: Submit one electronic (pdf) copy of each submittal. Mark up and retain one returned copy as a Project Record Document.
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
1. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
 2. Mark each copy of each submittal to show which products and options are applicable.
 3. Include the following information, as applicable:
 - a. Manufacturer's written recommendations.
 - b. Manufacturer's product specifications.
 - c. Manufacturer's installation instructions.
 - d. Standard color charts.
 - e. Manufacturer's catalog cuts.
 - f. Wiring diagrams showing factory-installed wiring.

- g. Printed performance curves.
 - h. Operational range diagrams.
 - i. Mill reports.
 - j. Standard product operating and maintenance manuals.
 - k. Compliance with recognized trade association standards.
 - l. Compliance with recognized testing agency standards.
 - m. Application of testing agency labels and seals.
 - n. Notation of coordination requirements.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
 - 1. Preparation: Include the following information, as applicable:
 - a. Dimensions.
 - b. Identification of products.
 - c. Fabrication and installation drawings.
 - d. Roughing-in and setting diagrams.
 - e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
 - f. Shopwork manufacturing instructions.
 - g. Templates and patterns.
 - h. Schedules.
 - i. Design calculations.
 - j. Compliance with specified standards.
 - k. Notation of coordination requirements.
 - l. Notation of dimensions established by field measurement.
 - 2. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.
 - 3. Number of Copies: Submit one electronic (pdf) copy of each Shop Drawing.
- D. Coordination Drawings: Comply with requirements in Section 013100.
- E. Samples: Prepare physical units of materials or products, including the following:
 - 1. Comply with requirements in Division 1 014000 Section "Quality Requirements" for mockups.
 - 2. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
 - 3. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from the same material to be used for the Work, cured, and finished in manner specified, and physically identical with the product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
 - 4. Preparation: Mount, display, or package Samples in manner specified to facilitate review of qualities indicated. Prepare Samples to match Architect's sample where so indicated. Attach label on unexposed side that includes the following:
 - a. Generic description of Sample.
 - b. Product name or name of manufacturer.
 - c. Sample source.
 - 5. Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, provide the following:
 - a. Size limitations.
 - b. Compliance with recognized standards.
 - c. Availability.
 - d. Delivery time.

6. Submit Samples for review of kind, color, pattern, and texture for a final check of these characteristics with other elements and for a comparison of these characteristics between final submittal and actual component as delivered and installed.
 - a. If variation in color, pattern, texture, or other characteristic is inherent in the product represented by a Sample, submit at least three sets of paired units that show approximate limits of the variations.
 - b. Refer to individual Specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, and details of assembly, connections, operation, and similar construction characteristics.
 7. Number of Samples for Initial Selection: Submit Three full sets of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.
 8. Number of Samples for Verification: Submit Three sets of Samples. Architect will retain one Sample set; remainder will be returned. Mark up and retain one returned Sample set as a Project Record Sample.
 - a. Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
 9. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
 - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
- F. Product Schedule or List: Prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
1. Type of product. Include unique identifier for each product.
 2. Manufacturer and product name, and model number if applicable.
 3. Number and name of room or space.
 4. Location within room or space.
- G. Delegated-Design Submittal: Comply with requirements in Section 013325.
- H. Contractor's Construction Schedule: Comply with requirements in Section 013216 for Architect or Construction Manager's action.
- I. Submittals Schedule: Comply with requirements in Section 013216.
- J. Application for Payment: Comply with requirements in Section 012900.
- K. Schedule of Values: Comply with requirements in Section 012900.
- L. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Use CSI Form 1.5A. Include the following information in tabular form:
1. Name, address, and telephone number of entity performing subcontract, sub-subcontract, or supplying products.
 2. Number and title of related Specification Section(s) covered by subcontract.
 3. Drawing number and detail references, as appropriate, covered by subcontract.

1.5 INFORMATIONAL SUBMITTALS

- A. General: Prepare and submit Informational Submittals required by other Specification Sections. Clearly identify informational submittals on transmittal form
 - 1. Number of Copies: Submit four copies of each submittal, unless otherwise indicated. Architect or Construction Manager will not return copies.
 - 2. Certificates and Certifications: Provide a statement that includes signature of Contractor, testing agency, or design professional responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of the company.
 - 3. Test and Inspection Reports: Comply with requirements in Section 014000.
- B. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of architects and Clients, and other information specified.
- C. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements.
- D. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.
- E. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements and, where required, is authorized for this specific Project.
- F. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements. Include evidence of manufacturing experience where required.
- G. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements.
- H. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating, and interpreting test results of material for compliance with requirements.
- I. Preconstruction Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating, and interpreting results of tests performed before installation of product, for compliance with performance requirements.
- J. Compatibility Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating, and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- K. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements.
- L. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

- M. Research/Evaluation Reports: Prepare written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
1. Name of evaluation organization.
 2. Date of evaluation.
 3. Time period when report is in effect.
 4. Product and manufacturers' names.
 5. Description of product.
 6. Test procedures and results.
 7. Limitations of use.
- N. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements in Section 017823.
- O. Design Data: Prepare written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes, regulations, and calculations. Include list of assumptions, other performance and design criteria, and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.
- P. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer. Include the following, as applicable:
1. Preparation of substrates.
 2. Required substrate tolerances.
 3. Sequence of installation or erection.
 4. Required installation tolerances.
 5. Required adjustments.
 6. Recommendations for cleaning and protection.
- Q. Manufacturer's Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:
1. Name, address, and telephone number of factory-authorized service representative making report.
 2. Statement on condition of substrates and their acceptability for installation of product.
 3. Statement that products at Project site comply with requirements.
 4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 6. Statement whether conditions, products, and installation will affect warranty.
 7. Other required items indicated in individual Specification Sections.

1.6 CONTRACTOR'S REVIEW

- A. Review each submittal and check for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
- B. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

1.7 CONSTRUCTION MANAGER AND ARCHITECT'S ACTION

- A. General: Approval of Contractor's submittals does not constitute a complete check, but indicates only that the design, general method of construction and detailing is satisfactory. The Contractor shall not be relieved of responsibility for any deviation from the requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data or Samples unless the Contractor has specifically informed the Architect in writing of such deviation in accordance with the General Conditions and written approval has been received for the specific deviation. The Contractor shall not be relieved from responsibility for errors or omissions in the Shop Drawings, Product Data, or Samples by the Contractor's forwarding or the Architect's approval thereof. Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.
- B. Review Code meanings are as follows:
1. Action Codes Permitting Use:
 - a. When an action code permitting use is assigned to a submittal, it does not authorize work that does not comply with the requirements of the Contract Documents. Acceptance of the Work will depend on compliance.
 - b. Code AP - Approved: The Work covered by the submittal item may proceed, provided it complies with Contract Document requirements.
 - c. Code AN - Approved as Noted: The Work covered by the submittal item may proceed, provided it complies with the Architect's notations and Contract Document requirements.
 - d. Code AN-R - Approved as Noted - Resubmit: Do not deliver or install the related work until the resubmittal has received Code AP or AN. However, fabrication and other off-site work covered by the submittal item may proceed, at the Contractor's risk, provided it complies with the Architect's notations and Contract Document requirements.
 2. Action Code Prohibiting Use:
 - a. Action Code REJ - Not Approved: The Work covered by the submittal item, including purchasing, fabrication, delivery, and other activity, shall not proceed. Revise the submittal item or prepare a new item in accordance with the Architect's notations. Resubmit the corrected or new item without delay; do not permit submittal items marked "Not Approved" to be used. Work incorporating such items will be rejected.
 3. Action Code for Items Not Required:
 - a. Action Code X - Not Requested by Contract Documents: The submittal item is not called for by the Contract Documents and is being returned unreviewed by the Architect except to the extent necessary to determine its status.
- C. Informational Submittals: For Architect's information only. Architect and Construction Manager will review each submittal and will not return it, or will reject and return it if it does not comply with requirements. Architect and Construction Manager will forward each submittal to appropriate party.
1. Action Code for Information Only:
 - a. Action Code INF – Information Only – Received: The submittal item is not called for a return with a reviewed action code by the Contract Documents and is being returned un-reviewed by the Architect except to the extent necessary to determine its status.
- D. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect and Construction Manager.
- E. Incomplete submittals are not acceptable, will be considered non-responsive, and will be returned without review.

- F. Architect and Construction Manager will return without review or discard submittals received from sources other than the Contractor.
- G. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

1.8 FORMS

- A. Release Form: As included on the following page.

(Remainder of this Page is Blank)

CONTRACTOR ELECTRONIC/DATA/DIGITAL FILES AGREEMENT**SG Project Title:****SG Project Location:****SG Project Number:**

The Contractor has requested that SmithGroup, Inc. (SmithGroup) provide certain electronic/data/digital files (Files) from SmithGroup's Instruments of Service, and/or Work Product, as the case may be, for the Project identified above. The Files are requested for the purpose of providing convenience in the preparation of the Contractor's bid.

Contractor covenants and agrees that: 1) the Files are Instruments of Service of SmithGroup, the author, and/or Work Product of SmithGroup, as the case may be; 2) in providing the Files, SmithGroup does not transfer common law, statutory law, or other rights, including copyrights; 3) the Files are not Contract Documents, in whole or in part; and 4) the Files are not As-Built files.

Contractor acknowledges that the Files as being provided in an "as-is" condition that SmithGroup does not guarantee the accuracy, completeness or integrity of the data, and that the Contractor will hold SmithGroup harmless for any data or file clean-up required to make these Files usable.

Contractor understands that the Files have been prepared to SmithGroup criteria and may not conform to Contractor's drafting or other documentation standards. The Contractor further agrees that they are using the Files at their own risk, and that SmithGroup does not warrant the accuracy of these Files.

Contractor understands that even though SmithGroup may have computer virus scanning software to detect the presence of computer viruses, there is no guarantee that computer viruses are not present in the Files, and that Contractor will hold SmithGroup harmless for such viruses and their consequences, as well as any and all liability or damage caused by the presence of a computer virus in the Files.

Contractor agrees that the use of the Files is for the Contractor's convenience only and does not reduce nor modify the Contractor's responsibilities for submitting a complete and coordinated bid.

Contractor agrees, to the fullest extent permitted by law, to indemnify and hold SmithGroup harmless from any and all damage, liability, or cost (including protection from loss due to attorney's fees and costs of defense), arising from or in any way connected with and changes made to the Files by Contractor or Contractor's failure to coordinate the electronic Files with modifications to the Contract Documents.

Under no circumstances shall transfer of Files to Contractor be deemed a sale by SmithGroup. SmithGroup makes no warranties, express or implied, of merchantability or fitness for any particular purpose.

Accepted for the Contractor:

	Company
By	Title
Signature	Date

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 013325 - DELEGATED DESIGN**1.1 SUMMARY**

- A. Section Includes: Requirements of Contractor for delegated design work on the Project including professional engineering design and obtaining necessary approvals of regulatory agencies.
- B. Components of the Work to which Delegated Design Requirements Apply: As required in individual technical Sections of the Specifications, noted on the Drawings, and where referred to as "Design-Build."

1.2 DEFINITIONS

- A. Delegated Design Work: Design services and certifications provided by a professional or engineer in responsible charge registered in California related to systems, materials, and equipment required for the Work to satisfy design and performance criteria established by the Contract Documents. Delegated Design does not include professional services required of the Contractor to fulfill their responsibilities under the Contract including, but not limited to, construction means, methods and sequence.
- B. Seal: Certification that delegated design drawings, computations and specifications were designed and prepared under the direct supervision of the architect or engineer in responsible charge and whose name appears thereon.

1.3 CONTRACTOR'S RESPONSIBILITY

- A. The Contractor shall be responsible for the design, calculations, submittals, and permits, for these Delegated design components.
- B. The Contractor is responsible to submit all delegated design documents required for approval by regulatory agencies for each delegated design item. The documents shall be submitted to the Design Team for conformance with the contract documents prior to submitting to the AHJ.
- C. Each delegated design item requiring review by the governing authorities shall be provided by the Contractor and all fees and costs associated therewith shall be the Contractor's responsibility except for fees from the City of Sunnyvale and or unless otherwise mutually agreed.
- D. Delegated design elements are the responsibility of the Contractor. Delegated design elements assumed to be designed by the Contractor include:
 - 1. PREFABRICATED METAL STAIRS, GUARDRAILS, AND HANDRAILS: Engineering for standard metal exit stairs, handrails, and guardrails must be done by the fabricator as each utilizes members, welding, and fabrication techniques specific to the proprietary system. Utilizing prefabrication and manufacturer's standard processes provides best value and a reliable product for the project. Shop drawings for these stairs and railings is required to be certified by a licensed Structural engineer in the State of California.
 - 2. ENGINEERING AND ANCHORAGE OF METAL FABRICATIONS: This includes support framing for Toilet Partitions and the construction and anchorage of Electronic Displays (Level 1 Lobby). The support framing cannot be engineered as part of the base package due to the competitive bidding process, the need for multiple product specifications, and the variance in product weight, mounting type, and spacing required for the component being supported. Support framing can only be engineered after the manufacturer of the product is known. Shop drawings for these metal support fabrications are required to be certified by a licensed Structural engineer in the State of California.
 - 3. METAL FRAMING FOR PARTITIONS, SHAFT BOTTOMS, AND MISC SUPPORT AND BRACING FRAMING: Contractors often prefer proprietary header systems, king studs, backing, and other components in partition framing. Allowing the contractor to utilize the system that they are most familiar with that provides best value and a reliable product for

- the project. Shop drawings for these metal framing systems are required to be certified by a licensed Structural engineer in the State of California.
4. CURTAINWALL ENGINEERING: Engineering for wood curtainwall must be done by the curtainwall fabricator due to unique component sizing, fabrication techniques, and wood grades. Engineering is required to be certified by a licensed Structural engineer in the State of California.
 5. CONTROL AND INDICATOR PANEL FOR FIRE ALARM SYSTEM: Control panels are proprietary systems that will be impacted by the competitive bidding process. Generally, the Fire Marshal likes to review and approve the layout and features of the control panel, therefore it is listed as a deferred submittal.
 6. PHOTOVOLTAIC SYSTEM ANCHORAGE: The primary support structure carrying the photovoltaic panels is engineered as part of the Base Building. This deferred submittal includes only the connection of the proprietary panels to the base building structure. It is not possible to engineer the precise anchorage because it is specific to each manufacturer. Engineering is required to be certified by a licensed Structural engineer in the State of California.
 7. BUILDING EXTERIOR MAINTENANCE SYSTEM: Engineering for the building maintenance systems is unique to each manufacturer. Each manufacturer will only share limited information due to the competitive and proprietary nature of the systems. Shop drawings for the exterior maintenance system are required to be certified by a licensed Structural engineer in the State of California.
 8. EXTERIOR FACADE CLADDING SYSTEMS AND THEIR FRAMING AND ATTACHMENT, INCLUDING METAL PANELS, STONE PANELS: Engineering for each system varies by manufacturer. Due to the competitive bidding of the project, the manufacturers and their specific fabrication techniques and anchorage are unknown at this time. Shop drawings for these systems are required to be certified by a licensed Structural engineer in the State of California.
 9. SUNSHADES AND THEIR ATTACHMENTS: Engineering for each system varies by manufacturer. Due to the competitive bidding of the project, the manufacturer and their specific fabrication techniques and anchorage are unknown at this time. Shop drawings for these systems are required to be certified by a licensed Structural engineer in the State of California.
 10. EMERGENCY RADIO RESPONDER COVERAGE SYSTEM (ERRCS): Engineering for each system varies by manufacturer. Due to the competitive bidding of the project, the manufacturer and their specific fabrication techniques and anchorage are unknown at this time.
 11. CELLULAR DISTRIBUTED ANTENNA SYSTEM (DAS): A cellular distributed antenna system may not be needed. The need for this system is not able to be determined until the building is constructed and the amount of cellular interference is known. In the event the system becomes necessary it will be a deferred submittal.
 12. TEMPORARY TRAILERS AT DPS TENANT IMPROVEMENT, INCLUDING STAIRS, RAMPS, AND ANY OTHER ITEMS ATTACHED TO THE TRAILERS AND/OR REQUIRED FOR THE FUNCTIONING OF THE TRAILERS: Trailers are a premanufactured and pre-engineered item. The exact type and configuration will be dependent on the availability to the Contractor. Shop drawings for temporary site trailers is therefore a deferred submittal, required to be certified by a licensed Structural engineer in the State of California.
 13. ACCESSIBLE ROUTES/ACCESSIBLE PARKING LAYOUT during construction.
 14. EXIT/EXIT ROUTES during construction

1.4 COORDINATION

- A. The City will not be responsible to pay for costs or damages due to failure by the Contractor to coordinate delegated design work with the work of the Project.

- B. The Contractor is responsible to coordinate and submit all material required by governing authorities so review and processing of submittals and permits will not adversely affect the Construction Schedule.

1.5 DESIGN AND PERFORMANCE CRITERIA

- A. As required in individual technical Sections of the Specifications.

1.6 SUBMITTALS

- A. General:
 - 1. Procedures: In accordance with Section 01 3300, "Submittal Procedures."
 - 2. Review of submittals will be for compliance with design intent and shall neither lessen nor shift the responsibility from the Contractor or its subcontractors to the City or the City's consultants.
 - 3. Submittals shall be prepared under the control of the professional or engineer in responsible charge shall bear the professional stamped and signature of the responsible design professional.
 - 4. Submittals not stamped and signed by the architect or engineer in responsible charge, are incomplete, and submittals that have not been reviewed by the Contractor will be rejected.
 - 5. Submittals shall include necessary documentation to verify compliance with design and performance requirements including calculations, details, fabrication and assembly information, and shall demonstrate coordination by Contractor with supporting work and other components to be integrated into delegated design assemblies.
- B. Delegated Design Summary Sheet: List entities who the Contractor has assigned delegated design responsibilities and the registered engineers' name and contact information.
- C. Delegated Design Documents:
 - 1. Show members, dimensions, connections, materials used. Indicate how the component or assembly is attached to the Building structural system and reactions associated with those connections.
 - 2. Shop drawings and erection drawings are not acceptable as delegated design drawings. The Contractor may, however, request drawings/backgrounds from the Architect to use in its preparation of shop drawings. If acceptable to the Architect, the Architect will send drawings, via e-mail, only after the following is completed:
 - a. Contractor to complete the "CAD Release & Indemnity Agreement" to be provided by Architect; sign and return to the Architect.
 - b. Consultants shall make their CAD files available to the Contractor.
 - 3. Calculations including criteria, design assumptions, substantiating computations and such additional data sufficient to show the correctness of the documentation and compliance with the applicable codes and regulations.
- D. Record Documents: Final delegated design documents representing as-built conditions shall be prepared by the Contractor and provided to the City as specified in Section 01 7839, "Project Record Documents."

1.7 QUALITY ASSURANCE

- A. Delegated design submittals shall be approved by regulatory authorities and the Architect prior to starting fabrication of the work regardless of whether a building permit has been previously issued.
- B. Where the Contractor is required to provide services of a licensed design professional, comply with the specified design and performance criteria.
- C. Except for field quality assurance testing specified to be performed by the City, provide laboratory and field tests to establish performance characteristics of the delegated design work at no additional cost to the City.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 013500 – SPECIAL PROCEDURES

Part 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section

1.2 SUMMARY

- A. This section includes the requirements for the following sections:

1. Project Management System
2. Construction Procedures Plan.
3. Contractor's Safety Plan
4. Environmental Protection Plan.
5. Welding and Burning.
6. Smoke/Odor Control.
7. Disposal Operations.
8. Cultural Resources.
9. Environmental Impact Report/Log etc.

1.3 PROJECT MANAGEMENT SYSTEM

- A. The City has elected to manage this project utilizing-Builder project management system. The City will establish the Contractor's access to e-Builder by providing one license to Contractor personnel at City's cost.
- B. The Contractor shall utilize e-Builder for submission of data and documents throughout the duration of the Contract including but not limited to:
 1. RFI logs and submittals
 2. Submittal log and transmittals
 3. Meeting reports
 4. Issues management
 5. Document transmittal and management
 6. Daily Construction Reports
 7. Progress Pay applications
 8. Announcements
 9. Project communications, memos, etc.
 10. Punch List
 11. Progress Photos
- C. e-Builder is a web-based construction management application hosted by e-Builder. It shall be the

primary means of project information submission and management or as otherwise agreed upon with the Engineer. The contractor and users will be required to set up their computers/systems to use e-Builder in accordance to the e-Builder User Training Guider-2015. The City will provide one 1-hour classroom training or a web-based seminar.

1.4 CONSTRUCTION PROCEDURES PLAN

- A. Within fifteen (15) calendar days of established 'Notice to Proceed', submit to the City and/or the Construction Manager, the Construction Procedures Plan demonstrating how the provisions of this Section and of all other requirements of the Contract Documents are to be implemented so as to provide the minimum possible disturbance to existing ongoing facilities and nearby residents from noise, traffic, and vibration to adjacent structures. The plan must be approved before work is started, and shall include, but not be limited to, the following:
1. Sequence of operations;
 2. Environmental Protection Plan;
 3. Noise control procedures including a list of proposed construction equipment for review by the City and/or Construction Manager;
 4. Dust and dirt control procedures;
 5. Smoke/odor control plan;
 6. Site Plan showing public protection such as pedestrian covered walkways, barriers, flagman locations, truck access, and similar items;
 7. Excavated material, trash and construction debris removal procedures;
 8. Trucking plan describing traffic routes and procedures;
 9. Street cleanup plan;
 10. MSDS Safety Data Sheets for any chemicals proposed to be used.
 11. Utility shut off and capping plan;
 12. Vibration control plan.
- B. Refer to other specification sections and construction documents for specific requirements concerning some of the items that are noted to be included in the Construction Procedures Plan.

1.5 CONTRACTOR'S SAFETY PLAN

- A. Comply with all requirements of Specification Section 007319 – Health & Safety Requirements
- B. The Contractor shall be the "Controlling Employer", throughout the duration of the construction of the Project. As the "Controlling Employer", the Contractor is responsible for the following:
1. All health and safety conditions at the Project;
 2. Correcting any and all hazards which may endanger any person's health or safety while rightfully working on the Project;
 3. Initiating, maintaining, and supervising all health and safety programs in connection with the Work including;
 4. Conducting daily safety inspections of the site to ensure that its subcontractors and any other employees working on the Project, are not in violation of any CAL/OSHA regulations;
 5. Providing written notice demanding immediate correction of any safety violation to each and

every subcontractor or employee working on the Project who is either responsible for exposing employees to the hazard, creating the hazard, or correcting the hazard;

6. Notifying and complying with all applicable laws, ordinances, rules, regulations and orders of any public authority bearing on the safety of persons rightfully on the Project.

1.6 ENVIRONMENTAL PROTECTION PLAN

- A. Requirements: All operations shall comply with all federal, state and local regulations pertaining to water, air, solid waste and noise pollution.
- B. Adhere to the requirements of the Mitigation Monitoring and Reporting Program (MMRP) adopted by the City of Sunnyvale. The MMRP was adopted as part of the City's certification of the Final Program Environmental Impact Report (EIR). The MMRP is attached to Volume 1, General Requirements of the Technical Specifications.
- C. During the progress of the work, keep the premises occupied in a neat and clean condition and protect the environment both on site and off site, throughout and upon completion of the construction project.
- D. Develop an Environmental Protection Plan in detail and submit to the City and/or Construction Manager within thirty (30) calendar days from the date of commencement specified in the Notice to Proceed. Distribute the approved plan to all employees and subcontractors and their employees. The Environmental Protection Plan shall include, but not be limited to, the following items:
 1. Copies of required permits.
 2. Proposed sanitary landfill site.
 3. Other proposed disposal sites
 4. Conditions associated with the use construction lighting as stipulated in the MMRP at Shield Night Lighting (MM Aesthetics 1)
 5. Implement noise control requirements as stipulated in the MMRP including
 - a. Compliance with the City-developed Noise Management Plan (MM Noise 1) that includes BMPs such as muffler maintenance, baffling and noise shielding, construction scheduling, community outreach, noticing, and noise compliant management.
 - b. Compliance with Mechanical Equipment (MM Noise 2)
 - c. Support of the City's implementation of MM Noise 3 to include limiting Construction Impacts on the Library (MM Noise 3), and
 - d. Support of the City's implementation of MM Noise 4 to include limiting Noise at Schools (MM Noise 4).
 6. Implement air quality requirements stipulated in the MMRP, including
 - a. Fugitive Dust Control (MM Air Quality 1)
 - b. Exhaust Controls (MM Air Quality 2).
 - 7.
 8. Implement biological resources measures stipulated in the MMRP, including Nesting Bird Measures (MM Biology 1) which require preconstruction surveys for nesting birds, daily inspections for nests, and lighting restrictions
 9. Implement cultural resources measures stipulated in the MMRP including
 - a. Human Remains (MM Cultural 7)
 - b. Tribal Cultural Resources Inadvertent Discovery (MM Cultural 8)
 10. Develop and implement a Traffic Control Plan to include measures stipulated in the MMRP

- including
- a. Temporary Traffic Control Plan Measures (MM Traffic 1) to govern road and lane closures, construction traffic and safety, and notification
 - b. Maintain Line of Sight (MM Traffic 2)
 - c. Public Transit, Bicycle, and Pedestrian Facilities (MM Traffic 3)
11. Develop and implement a Tree Protection Plan (MM Biology 3) as stipulated in the MMRP that includes requirements governing Project Arborist, Ground-Disturbing Activities, Routing of Underground Utilities, Protected Tree Replacement. The Tree Protection Plan shall also incorporate MMRP requirements for New Trees (MM Biology 2).
 12. Erosion controls requirements.
 13. Remove hazardous materials identified in the Asbestos Material and Lead Based Paint surveys (MM Hazards 1).
- E. Definitions of Contaminants:
1. Sediment: Soil and other debris that have been eroded and transported by runoff water.
 2. Solid Waste: Rubbish, debris, garbage and other discarded solid materials resulting from construction activities, including a variety of combustible and non-combustible wastes, such as ashes, waste materials that result from construction or maintenance and repair work, leaves and tree trimmings.
 3. Chemical Waste: Includes petroleum products, bituminous materials, salts, acids, alkalis, herbicides, pesticides, disinfectants, organic chemicals and inorganic wastes. Some of the above may be classified as "hazardous."
 4. Sanitary Wastes:
 - a. Sewage: Domestic sanitary sewage.
 - b. Garbage: Refuse and scraps resulting from preparation, cooking, dispensing and consumption of food
 5. Hazardous Materials: Any item or agent (biological, chemical, radiological, and/or physical), which has the potential to cause harm to humans, animals, or the environment, either by itself or through interaction with other factors including contaminated soils and construction waste containing lead, asbestos, or other hazardous substances.
- F. Site Protection:
1. General: It is intended that the natural resources within the project boundaries and outside the limits of permanent work performed under this Contract be preserved in their existing condition or be restored to an equivalent or improved condition upon completion of the work. Confine construction activities to areas defined by the public roads, easements, and work area limits shown on the Drawings. Return construction areas to their pre-construction elevations except where surface elevations are otherwise noted to be changed. Maintain natural drainage patterns. Conduct construction activities such that ponding of stagnant water conducive to mosquito breeding habitat will not occur at any time.
 2. Land Resources: Do not remove, cut, deface, injure, or destroy trees or shrubs or their root systems outside the work area limits. Refer to Specification Section 015639-Temporary Tree and Plant Protection for requirements.
 - a. Repair or Restoration: Repair landscape features scarred or damaged by equipment or construction operations. The repair and restoration plan shall be reviewed and accepted by the City and/or Construction Manager prior to its initiation.
 - b. Temporary Construction: Remove all signs of temporary construction facilities such as haul roads, work areas, structures, foundations of temporary structures, stockpiles of excess

or waste materials, or any other vestiges of construction as directed by the City and/or Construction Manager. Level all temporary roads, parking areas, and any other areas that have become compacted or shaped. Any unpaved areas where vehicles are operated shall receive a suitable surface treatment or shall be periodically wetted down to prevent construction operations from producing dust damage and nuisance to persons and property, at no additional cost to the City. Keep haul roads clear at all times of any object that creates an unsafe condition. Promptly remove any contaminants or construction material dropped from construction vehicles. Do not drop mud and debris from construction equipment on public streets. Sweep clean turning areas and pavement entrances as necessary.

3. Water Resources: Investigate and comply with all applicable federal, state and local regulations concerning the discharge (directly or indirectly) of pollutants to the underground and natural waters. Perform all work under this Contract in such a manner that any adverse environmental impacts are reduced to a level that is acceptable to the City, regulatory agencies and approved Storm Water Pollution Plan (SWPPP). If construction occurs during the rainy season (i.e., November to April), install temporary detention basins if needed (MM Hydrology 1).
4. Develop and implement a spill plan that includes all measures stipulated in the MMRP at Spill Prevention and Response (MM Hazards 4). : Any soil or water that is contaminated with oily substances due to CM Contractor's operations shall be disposed of in accordance with applicable regulations.
5. Non-Storm Water Discharge Management: In general, discharge of material other than storm water to the combination storm sewer system is prohibited, and discharge of such material to the industrial sewer system must be in compliance with the California State NPDES General Permit. Any illicit connections shall be immediately disconnected when discovered. Certain non-storm water discharges may be allowed if they are related to construction activity, are necessary for the performance and completion of the construction project and are in compliance with the SWPPP.

1.7 WELDING AND BURNING

- A. Eliminate welding and burning of steel as much as possible. Where unavoidable, perform welding and burning with all possible precaution to avoid fire hazard. Provide a fire watch for minimum of 30 minutes after burning stops. Provide protection for all adjacent surfaces.

1.8 SMOKE/ODOR CONTROL

- A. Primary fresh air intakes to buildings must be protected from exhaust from internal combustion engines, paint and solvent fumes and other noxious fumes and vapors.
- B. Control methods such as snorkels from engines exhausts to 50 feet away from air intakes must be implemented by the Contractor.
- C. All other activities generating fumes must be limited to a distance of at least 50 feet from the air intake grille.
- D. If fume generating procedures must occur within 50 feet of an air intake the Contractor shall be responsible for the following:
 1. Notify the City at least 14 days in advance.
 2. Complete the work when it least impacts the City normal operations (evenings, weekends, or particularly windy days).
 3. Provide carbon filter media, plastic barriers, or other control methods to assure fresh air only enters the building ventilation system.

1.9 DISPOSAL OPERATIONS

- A. Solid Waste Management: Supply solid waste transfer containers. Daily remove all debris such as spent air filters, oil cartridges, cans, bottles, combustibles and litter. Take care to prevent trash and papers from blowing onto adjacent property. Encourage personnel to use refuse containers. Convey contents to a sanitary landfill.
- B. Washing of concrete containers or trucks will not be permitted. Approved concrete washout areas or washout bins will be required. Remove any excess concrete to the sanitary landfill.
- C. Chemical Waste and Hazardous Materials Management: Furnish containers for storage of spent chemicals used during construction operations. Dispose of chemicals and hazardous materials in accordance with applicable regulations. Disposal of hazardous material and non-hazardous waste should include an approved hazardous material profile and manifest as per regulatory requirements. Hazardous material bins shall be clearly labeled to indicate the type of hazardous material or non-hazardous material waste stored for disposal, in compliance with applicable regulations (MM Hazards 1),
- D. Garbage: Store garbage in covered containers, pick up daily and dispose of in a sanitary landfill.
- E. Dispose of vegetation, weeds, rubble, and other materials removed by the clearing, stripping and grubbing operations off site at a suitable disposal site in accordance with applicable regulations.
- F. Excavated Materials:
 - 1. Develop and implement a Soil Management Plan (MM Hazards 3) in accordance with the MMRP.
 - 2. Native soil complying with the requirements of Earthwork Section (Division 31), may be used for backfill, fill and embankments as allowed by that section.
 - 3. Spoil Material: Remove all material which is excavated in excess of that required for backfill, and such excavated material which is unsuitable for backfill, from the site.
 - a. Excess suitable backfill material shall be hauled off site and managed in accordance with the approved SMP. No additional compensation will be paid to the CM Contractor for such off haul. Include all such costs in the lump sum prices bid for the project.
 - b. Unsuitable backfill material will be disposed of off-site in accordance with applicable regulations, the approved SMP, in a disposal site indicated in the Environmental Protection Plan (see Section 1.6, D, 3 of these Special Procedures). Remove rubbish and materials unsuitable for backfill immediately following excavation. Remove material in excess of that required for backfill immediately following backfill operations.
- G. Rubbish shall consist of all materials not classified as suitable materials or rubble and shall include shrubbery, trees, timber, trash, and garbage.

1.10 CULTURAL RESOURCES

- A. The project does not pass through any known archaeological, Tribal, or paleontological sites. However, it is conceivable that unrecorded sites could be discovered during construction.
- B. A professional archaeologist and paleontologist shall provide sensitivity training to supervisory staff prior to initiation of site preparation and/or construction to alert construction workers to the possibility of exposing significant resources within the proposed project area. The training shall include a discussion of the types of objects that could be exposed and how to recognize them (MM Cultural 5, MM Cultural 6).

- C. An “Alert Sheet” shall be posted in staging areas, such as in construction trailers, to alert personnel to the procedures and protocols to follow for the discovery of a potentially significant historic or prehistoric archaeological resource, Tribal resource, or paleontological resource (MM Cultural 8).
- D. In the event that artifacts, fossils, human remains, or other cultural resources are discovered during subsurface excavations at locations of the Work, CM Contractor shall protect the discovered items, cease work for a distance of 50 feet radius in the area, notify the City and comply with applicable law (MM Cultural 8).
- E. The City may retain a qualified resource specialist to monitor ground disturbing activities. If artifacts or objects are unexpectedly encountered, the City shall retain a qualified resource specialist appropriate to the resource to recover data and artifacts during the period work has ceased and prepare a professional-level technical report to document the recovery activities
- F. All resources of significance that are found during excavations at locations of the Work shall be curated at a facility specific to the resource type and approved by the City. Tribal resources of significance require special treatment and approvals by the City.
- G. Detailed archaeological, Tribal, and Paleontological resources mitigation measures have been attached to Volume 1, General Requirements of the Technical Specifications.

PART 2 NOT USED.

PART 3 NOT USED

END OF SECTION

SECTION 013591 – HISTORIC TREATMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 HISTORIC TREATMENT PROCEDURES

- A. Cultural Resources; Sensitivity Training and Inadvertent Discovery.

1. A professional archaeologist shall provide sensitivity training to supervisory staff prior to initiation of site preparation and/or construction, to alert construction workers to the possibility of exposing significant historic and/or prehistoric archaeological resources within the proposed project area. The training shall include a discussion of the types of prehistoric or historic objects that could be exposed and how to recognize them, the need to stop excavation at a discovery and within 50 feet of a discovery, and the procedures to follow regarding discovery protection and notification. An "Alert Sheet" shall be posted in staging areas, such as in construction trailers, to alert personnel to the procedures and protocols to follow for the discovery of a potentially significant historic and/or prehistoric archaeological resource.
2. In the event that an archaeological resource is discovered, ground disturbing work shall be halted within 50 feet of the find, and a qualified cultural resources specialist/archaeologist shall be brought to the site. The qualified cultural resources specialist/archaeologist shall evaluate the resource and determine whether it is (1) eligible for the CRHR (and thus a historic resource for purposes of CEQA) and/or (2) a unique archaeological resource as defined by CEQA. If the resource is determined to be neither a unique archaeological nor a historical resource, work may commence in the area.
3. If the resource meets the criteria for either a historical or unique archaeological resource, work shall remain halted within 50 feet of the find, and the qualified cultural resources specialist/archaeologist shall evaluate the resource and determine whether it is (1) eligible for the CRHR (and thus a historic resource for purposes of CEQA) and/or (2) a unique archaeological resource as defined by CEQA. If the resource meets the criteria for either a historical or unique archaeological resource, work shall remain halted within 50 feet of the area of the find and the qualified cultural resource specialist shall consult with City staff regarding methods to ensure that no substantial adverse change would occur to the significance of the resource pursuant to CEQA Guidelines Section 15064.5(b).
4. Preservation-in-place (i.e., avoidance) is the preferred method of mitigation for impacts on cultural resources. If preservation-in-place and avoidance is not possible, data recovery shall be undertaken. The methods and results of data recovery work at an archaeological find shall be documented in a professional-level technical report to be filed with the California Historical Resources Information System (CHRIS). Work in the area may commence upon completion of treatment, as approved by the City.

- B. Paleontological Resources Sensitivity Training and Inadvertent Discovery:

1. A professional paleontologist shall provide sensitivity training to supervisory staff to alert construction workers to the possibility of exposing significant paleontological resources

within the proposed project area. The training shall be conducted as defined by the Society of Vertebrate Paleontology's Conformable Impact Mitigation Guidelines Committee (1995), to recognize fossil materials in the event that any are uncovered during construction.

2. In the event that a paleontological resource is uncovered during project implementation, all ground-disturbing work within a 50-foot radius shall be halted. A qualified paleontologist shall inspect the discovery and determine whether further investigation is required. If the discovery can be avoided and no further impacts shall occur, no further effort shall be required. If the resource cannot be avoided and may be subject to further impact, a qualified paleontologist shall evaluate the resource and determine whether it is "unique" b under CEQA, Appendix G, part V. If the resource is determined not to be unique, work may commence in the area. If the resource is determined to be a unique paleontological resource, work shall remain halted, and the paleontologist shall consult with City staff regarding methods to ensure that no substantial adverse change would occur to the significance of the resource pursuant to CEQA. Preservation-in-place (i.e., avoidance) is the preferred method of mitigation for impacts to paleontological resources.
3. If preservation-in-place is not feasible and avoidance is not possible, the fossils shall be recovered, prepared, identified, catalogued, and analyzed according to current professional standards under the direction of a qualified paleontologist. All recovered fossils shall be curated at an accredited and permanent scientific institution according to Society of Vertebrate Paleontology (SVP) standard guidelines. Work may commence upon completion of treatment.

C. Impact Cultural - Human Remains

1. If human remains are encountered during construction, ground disturbing work shall halt within 50 feet of any area where human remains, or suspected human remains, are encountered in compliance with California law (Health and Safety Code section 7050.5; PRC sections 5097.94, 5097.98, and 5097.99). The City shall contact the Medical Examiner at the county coroner's office. The Medical Examiner has two (2) working days to examine the remains after being notified by the City. When the remains are determined to be Native American, the Medical Examiner has 24 hours to notify the Native American Heritage Commission (NAHC).
2. The NAHC shall immediately notify the identified Most Likely Descendant (MLD), and the MLD has 48 hours, from the time that access to the project site is granted, to make recommendations to the landowner or representative for the respectful treatment or disposition of the remains and grave goods. If the MLD does not make recommendations within 24 hours, the area of the property must be secured from further disturbance. If there are disputes between the landowner and the MLD, the NAHC shall mediate the dispute to attempt to find a resolution. If mediation fails to provide measures acceptable to the landowner, the landowner or his/her authorized representative shall reinter the human remains and items associated with Native American burials with appropriate dignity on the property in a location not subject to further subsurface disturbance.

D. Tribal Cultural Resources Inadvertent Discovery

1. The training and Alert Sheet identified under MM Cultural-1 shall encompass tribal cultural resources as well.
2. In the event that an archaeological resource is discovered, ground disturbing work shall be halted within 50 feet of the find, and a qualified cultural resources specialist/archaeologist shall be brought to the site. The qualified cultural resources specialist/archaeologist shall evaluate the resource and determine whether it is of special

- importance to a California Native American Tribe. If the resource is determined to not be of importance to the tribe, work may commence in the area.
3. If the resource meets the criteria for an important tribal resource, work shall remain halted within 50 feet of the find, and the qualified cultural resources specialist/archaeologist shall evaluate the resource and determine whether it is an important resource to the local Native American Tribe. If the resource is important to the tribe, work shall remain halted within 50 feet of the area of the find and the qualified cultural resource specialist shall consult with City staff regarding methods to ensure that no substantial adverse change would occur to the significance of the tribal cultural resource pursuant to PRC section 21084.3. Methods may include the following:
Preservation-in-place (i.e., avoidance) is the preferred method of mitigation for impacts on tribal cultural resources.
- a. Treating the resource with culturally appropriate dignity taking into account the tribal cultural values and meaning of the resource, including, but not limited to, the following:
 - 1) Protecting the cultural character and integrity of the resource
 - 2) Protecting the traditional use of the resource
 - 3) Protecting the confidentiality of the resource
 - b. Permanent conservation easements or other interests in real property, with culturally appropriate management criteria for the purposes of preserving or utilizing the resources or places.
 - c. Protecting the resource.
 - d. Work in the area may commence upon completion of treatment, as approved by the City.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and control procedures that facilitate compliance with the Contract Document requirements.
 - 2. Requirements for Contractor to provide quality-assurance and control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
 - 3. Specific test and inspection requirements are not specified in this Section.

1.2 DEFINITIONS

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.
- C. Mockups: Full-size, physical assemblies that are constructed on-site. Mockups are used to verify selections made under sample submittals, to demonstrate aesthetic effects and, where indicated, qualities of materials and execution, and to review construction, coordination, testing, or operation; they are not Samples. Approved mockups establish the standard by which the Work will be judged.
- D. Laboratory Mockups: Full-size, physical assemblies that are constructed at testing facility to verify performance characteristics.
- E. Preconstruction Testing: Tests and inspections that are performed specifically for the Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.
- F. Product Testing: Tests and inspections that are performed a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with industry standards.
- G. Source Quality-Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.
- H. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

- I. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- J. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
 - 1. Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to Tradespeople of the corresponding generic name.
- K. Experienced: When used with an entity, "experienced" means having successfully completed a minimum of three previous projects similar in size and scope to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction. See specific specification sections for additional experience requirements.

1.3 CONFLICTING REQUIREMENTS

- A. General: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement as defined in the General Conditions. Refer uncertainties and requirements that are different, but apparently equal, to Architect for a decision before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.4 SUBMITTALS

- A. Qualification Data: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- B. Reports: Prepare and submit certified written reports that include the following:
 - 1. Date of issue.
 - 2. Project title and number.
 - 3. Name, address, and telephone number of testing agency.
 - 4. Dates and locations of samples and tests or inspections.
 - 5. Names of individuals making tests and inspections.
 - 6. Description of the Work and test and inspection method.
 - 7. Identification of product and Specification Section.
 - 8. Complete test or inspection data.
 - 9. Test and inspection results and an interpretation of test results.
 - 10. Record of temperature and weather conditions at time of sample taking, testing, and inspecting.
 - 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
 - 12. Name and signature of laboratory inspector.
 - 13. Recommendations on retesting and re-inspecting.

- C. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.5 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this Article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- C. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or products that are similar to those indicated for this Project in material, design, and extent.
- F. Specialists: Certain sections of the Specifications require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
 - 1. Requirement for specialists shall not supersede building codes and regulations governing the Work.
- G. Testing Agency Qualifications: An independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 548; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.
- H. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- I. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
 - 1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect.
 - 2. Notify Construction Manager seven (7) calendar days in advance of dates and times when mockups will be constructed.
 - 3. Demonstrate the proposed range of aesthetic effects and workmanship.
 - 4. Obtain Architect's approval of mockups before starting work, fabrication, or construction.
 - 5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.

6. Demolish and remove mockups when directed, unless otherwise indicated.

1.6 QUALITY CONTROL

- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
 1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
 2. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor (contract sum adjusted through change order procedures).
- B. Tests and inspections not explicitly assigned to Owner in this specification are Contractor's responsibility. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
 1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
 - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
 2. Notify testing agencies at least 48 hours in advance of time when Work that requires testing or inspecting will be performed.
 3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
 4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Division 01 Section "Submittal Procedures."
- D. Retesting/Re-inspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- E. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
 1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
 3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
 4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
 5. Does not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
 6. Do not perform any duties of Contractor.
- F. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify

agency in writing sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspecting equipment at Project site.

- G. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

1.7 SPECIAL TESTS AND INSPECTIONS

- A. Special Tests and Inspections: Owner will engage a qualified testing agency, special inspector and/or Essential Services Inspector to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, and as follows:

1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.
2. Notifying Architect and Contractor promptly in writing of irregularities and deficiencies observed in the Work during performance of its services.
3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect with copy to Contractor and to authorities having jurisdiction.
4. Submitting a final report of special tests and inspections at Substantial Completion, this includes a list of unresolved deficiencies.
5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
6. Retesting and reinspecting corrected work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

- A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:

1. Date test or inspection was conducted.
2. Description of the Work tested or inspected.
3. Date test or inspection results were transmitted to Architect.
4. Identification of testing agency or special inspector conducting test or inspection.

- B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect and Construction Manager's reference during normal working hours. This log shall be reviewed during each pay application review period and shall be complete/up to date prior to monthly payments.

3.2 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
 - 1. Provide materials and comply with installation requirements specified in other Specification Sections. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.
 - 2. Comply with the Contract Document requirements for Section 017329 "Cutting and Patching."
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION

SECTION 014200 - REFERENCES

PART 1 - GENERAL

1.1 DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.
- C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."
- D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."
- E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
- H. "Provide": Furnish and install, complete and ready for the intended use.
- I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.2 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.
- C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
 - 1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.3 ABBREVIATIONS AND ACRONYMS

- A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.

AA	Aluminum Association, Inc. (The)
AAADM	American Association of Automatic Door Manufacturers
AABC	Associated Air Balance Council
AAMA	American Architectural Manufacturers Association
AASHTO	American Association of State Highway and Transportation Officials
AATCC	American Association of Textile Chemists and Colorists (The)
ABAA	Air Barrier Association of America
ABMA	American Bearing Manufacturers Association
ACI	ACI International (American Concrete Institute)
ACPA	American Concrete Pipe Association
AEIC	Association of Edison Illuminating Companies, Inc. (The)
AF&PA	American Forest & Paper Association
AGA	American Gas Association
AGC	Associated General Contractors of America (The)
AHA	American Hardboard Association (Now part of CPA)
AHAM	Association of Home Appliance Manufacturers
AI	Asphalt Institute
AIA	American Institute of Architects (The)
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
ALCA	Associated Landscape Contractors of America (Now PLANET - Professional Landcare Network)
ALSC	American Lumber Standard Committee, Incorporated
AMCA	Air Movement and Control Association International, Inc.
ANSI	American National Standards Institute
AOSA	Association of Official Seed Analysts, Inc.
APA	Architectural Precast Association
APA	APA - The Engineered Wood Association
APA EWS	APA - The Engineered Wood Association; Engineered Wood Systems
API	American Petroleum Institute
ARI	Air-Conditioning & Refrigeration Institute
ARMA	Asphalt Roofing Manufacturers Association
ASCE	American Society of Civil Engineers
ASCE/SEI	American Society of Civil Engineers/Structural Engineering Institute (See ASCE)
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
ASME	ASME International
ASSE	American Society of Sanitary Engineering
ASTM	ASTM International (American Society for Testing and Materials International)
AWCI	AWCI International (Association of the Wall and Ceiling Industry International)
AWCMA	American Window Covering Manufacturers Association (Now WCSC)
AWI	Architectural Woodwork Institute
AWPA	American Wood-Preservers' Association
AWS	American Welding Society
AWWA	American Water Works Association
BHMA	Builders Hardware Manufacturers Association

BIA	Brick Industry Association (The)
BICSI	BICSI
BIFMA	BIFMA International (Business and Institutional Furniture Manufacturer's Association International)
BISSC	Baking Industry Sanitation Standards Committee
CCC	Carpet Cushion Council
CDA	Copper Development Association
CEA	Canadian Electricity Association
CFFA	Chemical Fabrics & Film Association, Inc.
CGA	Compressed Gas Association
CIMA	Cellulose Insulation Manufacturers Association
CISCA	Ceilings & Interior Systems Construction Association
CISPI	Cast Iron Soil Pipe Institute
CLFMI	Chain Link Fence Manufacturers Institute
CRRC	Cool Roof Rating Council
CPA	Composite Panel Association
CPPA	Corrugated Polyethylene Pipe Association
CRI	Carpet & Rug Institute (The)
CRSI	Concrete Reinforcing Steel Institute
CSA	Canadian Standards Association
CSA	CSA International (Formerly: IAS - International Approval Services)
CSI	Cast Stone Institute
CSI	Construction Specifications Institute (The)
CSSB	Cedar Shake & Shingle Bureau
CTI	Cooling Technology Institute (Formerly: Cooling Tower Institute)
DHI	Door and Hardware Institute
EIA	Electronic Industries Alliance
EIMA	EIFS Industry Members Association
EJCDC	Engineers Joint Contract Documents Committee
EJMA	Expansion Joint Manufacturers Association, Inc.
ESD	ESD Association
FIBA	Federation Internationale de Basketball (The International Basketball Federation)
FIVB	Federation Internationale de Volleyball (The International Volleyball Federation)
FM Approvals	FM Approvals
FM Global	FM Global (Formerly: FMG - FM Global)
FMRC	Factory Mutual Research (Now FM Global)
FRSA	Florida Roofing, Sheet Metal & Air Conditioning Contractors Association, Inc.
FSA	Fluid Sealing Association
FSC	Forest Stewardship Council
GA	Gypsum Association
GANA	Glass Association of North America
GRI	(Now GSI)
GS	Green Seal
GSI	Geosynthetic Institute
HI	Hydraulic Institute
HI	Hydronics Institute
HMMA	Hollow Metal Manufacturers Association (Part of NAAMM)
HPVA	Hardwood Plywood & Veneer Association
HPW	H. P. White Laboratory, Inc.

IAS	International Approval Services (Now CSA International)
IBF	International Badminton Federation
ICEA	Insulated Cable Engineers Association, Inc.
ICRI	International Concrete Repair Institute, Inc.
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers, Inc. (The)
IESNA	Illuminating Engineering Society of North America
IEST	Institute of Environmental Sciences and Technology
IGCC	Insulating Glass Certification Council
IGMA	Insulating Glass Manufacturers Alliance
ILI	Indiana Limestone Institute of America, Inc.
ISO	International Organization for Standardization
ISSFA	International Solid Surface Fabricators Association
ITS	Intertek Testing Service NA
ITU	International Telecommunication Union
KCMA	Kitchen Cabinet Manufacturers Association
LMA	Laminating Materials Association (Now part of CPA)
LPI	Lightning Protection Institute
MBMA	Metal Building Manufacturers Association
MFMA	Maple Flooring Manufacturers Association, Inc.
MFMA	Metal Framing Manufacturers Association, Inc.
MH	Material Handling
MHIA	Material Handling Industry of America
MIA	Marble Institute of America
MPI	Master Painters Institute
MSS	Manufacturers Standardization Society of The Valve and Fittings Industry Inc.
NAAMM	National Association of Architectural Metal Manufacturers
NACE	NACE International (National Association of Corrosion Engineers International)
NADCA	National Air Duct Cleaners Association
NAGWS	National Association for Girls and Women in Sport
NAIMA	North American Insulation Manufacturers Association
NBGQA	National Building Granite Quarries Association, Inc.
NCAA	National Collegiate Athletic Association (The)
NCMA	National Concrete Masonry Association
NCPI	National Clay Pipe Institute
NCTA	National Cable & Telecommunications Association
NEBB	National Environmental Balancing Bureau
NECA	National Electrical Contractors Association
NeLMA	Northeastern Lumber Manufacturers' Association
NEMA	National Electrical Manufacturers Association
NETA	InterNational Electrical Testing Association
NFHS	National Federation of State High School Associations
NFPA	NFPA (National Fire Protection Association)
NFRC	National Fenestration Rating Council
NGA	National Glass Association
NHLA	National Hardwood Lumber Association
NLGA	National Lumber Grades Authority
NOFMA	NOFMA: The Wood Flooring Manufacturers Association (Formerly: National Oak Flooring Manufacturers Association)
NRCA	National Roofing Contractors Association
NRMCA	National Ready Mixed Concrete Association
NSF	NSF International

	(National Sanitation Foundation International)
NSSGA	National Stone, Sand & Gravel Association
NTMA	National Terrazzo & Mosaic Association, Inc. (The)
NTRMA	National Tile Roofing Manufacturers Association (Now TRI)
NWWDA	National Wood Window and Door Association (Now WDMA)
OPL	Omega Point Laboratories, Inc. (Now ITS)
PCI	Precast/Prestressed Concrete Institute
PDCA	Painting & Decorating Contractors of America
PDI	Plumbing & Drainage Institute
PGI	PVC Geomembrane Institute
PLANET	Professional Landcare Network (Formerly: ACLA - Associated Landscape Contractors of America)
PTI	Post-Tensioning Institute
RCSC	Research Council on Structural Connections
RFCI	Resilient Floor Covering Institute
RIS	Redwood Inspection Service
SAE	SAE International
SDI	Steel Deck Institute
SDI	Steel Door Institute
SEFA	Scientific Equipment and Furniture Association
SEI/ASCE	Structural Engineering Institute/American Society of Civil Engineers (See ASCE)
SGCC	Safety Glazing Certification Council
SIA	Security Industry Association
SIGMA	Sealed Insulating Glass Manufacturers Association (Now IGMA)
SJI	Steel Joist Institute
SMA	Screen Manufacturers Association
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association
SMPTE	Society of Motion Picture and Television Engineers
SPFA	Spray Polyurethane Foam Alliance (Formerly: SPI/SPFD - The Society of the Plastics Industry, Inc.; Spray Polyurethane Foam Division)
SPIB	Southern Pine Inspection Bureau (The)
SPRI	Single Ply Roofing Industry
SSINA	Specialty Steel Industry of North America
SSPC	SSPC: The Society for Protective Coatings
STI	Steel Tank Institute
SWI	Steel Window Institute
SWRI	Sealant, Waterproofing, & Restoration Institute
TCA	Tile Council of America, Inc.
TIA/EIA	Telecommunications Industry Association/Electronic Industries Alliance
TMS	The Masonry Society
TPI	Truss Plate Institute, Inc.
TPI	Turfgrass Producers International
TRI	Tile Roofing Institute
UL	Underwriters Laboratories Inc.
UNI	Uni-Bell PVC Pipe Association
USAV	USA Volleyball
USGBC	U.S. Green Building Council
USITT	United States Institute for Theatre Technology, Inc.
WASTEC	Waste Equipment Technology Association
WCLIB	West Coast Lumber Inspection Bureau

WCMA	Window Covering Manufacturers Association (Now WCSC)
WCSC	Window Covering Safety Council (Formerly: WCMA - Window Covering Manufacturers Association)
WDMA	Window & Door Manufacturers Association (Formerly: NWWDA - National Wood Window and Door Association)
WI	Woodwork Institute (Formerly: WIC - Woodwork Institute of California)
WIC	Woodwork Institute of California (Now WI)
WMMPA	Wood Moulding & Millwork Producers Association
WSRCA	Western States Roofing Contractors Association
WWPA	Western Wood Products Association

- B. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.

BOCA	BOCA International, Inc. (See ICC)
CBC	California Building Code
IAPMO	International Association of Plumbing and Mechanical Officials
ICBO	International Conference of Building Officials (See ICC)
ICBO ES	ICBO Evaluation Service, Inc. (See ICC-ES)
ICC	International Code Council
ICC-ES	ICC Evaluation Service, Inc.
SBCCI	Southern Building Code Congress International, Inc. (See ICC)
UBC	Uniform Building Code (See ICC)

- C. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.

CE	Army Corps of Engineers
CPS	Consumer Product Safety Commission
C	
DOC	Department of Commerce
DOD	Department of Defense
DOE	Department of Energy
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FCC	Federal Communications Commission
FDA	Food and Drug Administration
GSA	General Services Administration
HUD	Department of Housing and Urban Development
LBL	Lawrence Berkeley National Laboratory
NCH	National Cooperative Highway Research Program
RP	
	(See TRB)
NIST	National Institute of Standards and Technology
OSH	Occupational Safety & Health Administration
A	

PBS	Public Building Service (See GSA)
PHS	Office of Public Health and Science
RUS	Rural Utilities Service (See USDA)
SD	State Department
TRB	Transportation Research Board
USD	Department of Agriculture
A	
USPS	Postal Service

- D. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list.

ADAAG	Americans with Disabilities Act (ADA) Architectural Barriers Act (ABA)
CFR	Code of Federal Regulations
DOD	Department of Defense Military Specifications and Standards
DSCC	Defense Supply Center Columbus (See FS)
FED-STD	Federal Standard (See FS)
FS	Federal Specification
FTMS	Federal Test Method Standard (See FS)
MIL	(See MILSPEC)
MIL-STD	(See MILSPEC)
MILSPEC	Military Specification and Standards
UFAS	Uniform Federal Accessibility Standards

- E. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.

CBHF	State of California, Department of Consumer Affairs Bureau of Home Furnishings and Thermal Insulation
CCR	California Code of Regulations
CPUC	California Public Utilities Commission

Forest Resource Development

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 014500 - QUALITY CONTROL

PART 1 - GENERAL

1.1 SUMMARY

- A. Included in this Section: General requirements for tests and inspections.
- B. Included in other Sections:
 - 1. Requirements for specific tests and inspections.
 - 2. Designation of work to be tested and inspected.

- C. Not in Contract: Costs of testing and inspecting unless otherwise noted.

1.2 QUALITY ASSURANCE/CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.
- B. Comply fully with manufacturers' instructions, including each step in sequence.
- C. Should manufacturers' instructions conflict with Contract Documents, request clarification from City's Representative before proceeding. In general, the more stringent standards shall apply.
- D. Comply with specified standards as a minimum quality for the Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or workmanship that is more precise.
- E. Perform work by persons qualified to produce workmanship of specified quality.
- F. Secure Products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.
- G. Multiple Tests and Inspections: Certain portions of the Work will be tested and inspected at various stages, sometimes off the site, between their inception and final positioning in the completed work. Nothing in any prior approval or satisfactory test result shall govern if at any subsequent time the Work or portion thereof, is found not to conform to the Contract Documents.
- H. If City's Representative is to observe tests, inspections, or make acceptances required by the Contract Documents, City's Representative will do so promptly and, where practicable, at the normal place of testing.
- I. Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

1.3 REFERENCES

- A. Conform to reference standard by date of issue current on date specified in product Sections.
- B. Should specified reference standards conflict with Contract Documents, request clarification from City's Representative before proceeding. In general, the more stringent standards shall apply.

1.4 INSPECTION AND TESTING LABORATORY SERVICES

- A. City's Testing Laboratory:
 - 1. City will retain and pay for services of an independent firm for purpose of reviewing material and product reports and performing other services as determined by City.
 - 2. City's Testing Laboratory is not authorized to:
 - a. Release, revoke, alter, or enlarge on the requirements of the Contract Documents.
 - b. Approve or accept any portion of the Work, or;

- c. Perform any duties of CM.
 - 3. City's Testing Laboratory will:
 - a. Perform tests and inspections as required by applicable regulation as indicated in the specification Sections, and as directed by City's Representative.
Prepare, cure, store, and transport samples to the laboratory.
 - B. City's Inspector: City will retain and pay for services of qualified inspector at the construction site working under City's general direction, to observe progress of the work and to report to City' or City's designee any non-conformance with the Contract Documents.
 - C. City's Geotechnical Engineer:
 - 1. City will retain and pay for services of Geotechnical Engineer for performing certain inspections and testing functions required in the Contract Documents.
 - 2. City's Geotechnical Engineer will communicate only with City and City's Representative. City's Representative will then give notice to CM, with a copy to City, of any action required of CM.
 - D. City's Commissioning Agent: Refer to Section 019100 – Commissioning for responsibilities of commissioning agent.
 - E. Contractor's Testing Laboratory: Testing laboratory retained and paid for by the CM to perform testing services required by the Contract Documents. CM's Testing Laboratory shall be an independent organization other than City's Testing Laboratory and acceptable to City's Representative. It may be a commercial testing organization, the testing laboratory of a trade association, the certified laboratory of a supplier, the CM's own forces, or other nationally recognized testing organization. CM's Testing Laboratory shall have performed testing of the type specified for at least 5 years.
 - F. Contractor's Surveyor: Surveyor retained and paid for by the CM to perform survey services required by the Contract Documents. CM's Surveyor shall be an independent organization, registered or licensed in California, and acceptable to City's Representative.
 - G. Failure of Materials and Equipment Tested or Inspected:
 - 1. Contractor shall bear all costs for retesting and reinspection resulting from CM's noncompliance with the Contract as evidenced by tests and inspections by City's Testing Laboratory.
 - 2. Previous acceptance may be withdrawn and material of which tested Samples are representative or equipment may be subject to removal and replacement by the CM at CM's expense with material or equipment meeting specification requirements.
 - 3. City's Representative may refuse consideration of further Samples of same brand or make for testing.
 - 4. At City's discretion, defective material and equipment may be permitted to remain in place subject to adjustment of Target Cost.
- 1.5 CONTRACTOR'S RESPONSIBILITIES
- A. Cooperate with testing and inspection personnel and provide access to the Work, including off-site manufacturer's and fabricator's operations.
 - B. Secure and deliver to City's Testing Laboratory adequate quantities of representative samples of materials proposed for use as specified. Samples will be selected and taken by representative of City's Testing Laboratory.
 - C. Submit to City's Testing Laboratory the preliminary design mixes proposed to be used for concrete and other materials that require review by City's Testing Laboratory.
 - D. Submit copies of product test reports as specified.

E. Furnish incidental labor and facilities:

1. To provide City's Testing Laboratory access to Work to be tested;
2. To obtain and handle samples at the Project site or source of products to be tested;
3. To facilitate tests and inspections, and;
4. For storage and curing of test samples at the Project site.

F. Provide notice to City's Representative sufficiently in advance, but in no case less than 48 hours in advance, of operations to allow for City's Testing Laboratory assignment of personnel and scheduling of tests.

G. When tests or inspections are not performed after such notice due to delay caused by CM, CM shall reimburse City for City's Testing Laboratory for the cost of personnel and travel expenses incurred.

H. Pay for additional samples and tests required for CM's use.

I. Contractor shall be responsible for the premium costs for required inspections of materials being fabricated more than 75 miles from the Project Site. These costs shall include additional travel time as well as per diem, travel expenses, and lodging expenses where applicable.

1.6 ADDITIONAL TESTING AND INSPECTIONS

A. If initial tests or inspections made by City's Testing Laboratory or City's Geotechnical Engineer reveal that any portion of the Work does not comply with the Contract Documents, or if City's Representative determines that any portion of the Work requires additional testing or inspection, perform additional testing and inspections as directed.

B. If such additional tests or inspections establish that such portion of the Work complies with Contract Documents, all costs of such additional testing will be paid for by City.

C. If such additional tests or inspections establish that such portion of the Work fails to comply with the Contract Documents, all costs of such additional tests and inspections, and all other costs resulting from such failure, including compensation for City's Representative, shall be deducted from Target Cost.

1.7 TEST AND INSPECTION REPORTS

A. City's Testing Laboratory and CM's Testing Laboratory shall after each inspection and test, promptly submit copies of reports which include:

1. Date issued,
2. Project title and number,
3. Name of Inspector from inspection or testing Laboratory,
4. Date and time of sampling or inspection,
5. Identification of product and specification section,
6. Type of inspection or test,
7. Date of test,
8. Results of tests,
9. Compliance or non-compliance with Contract Documents,
10. Whether original test or re-test.

B. Distribution of Reports: Distribute copies of all reports, indicating observations and results of tests and indicating compliance or noncompliance with the Contract Documents, as follows.

1. City's Representative: One copy.
2. City's Construction Manager, if applicable: One copy.
3. City: Three copies.
4. City's Representative's Consultants, as appropriate: One copy each.

5. City's Inspector: One copy.
6. Local Jurisdiction where applicable.
7. Those affected by the report: One copy each.
8. The number of copies for CM and Supplier being tested will be determined upon commencement of the Agreement.

- C. City's Inspector will submit one copy of all inspection reports to City of observations and results and indicating compliance or non-compliance with the Contract Documents.

1.8 DELEGATED-DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project. Subject to compliance with these requirements, a qualified engineer employed by the manufacturer of the product is acceptable.
1. Jurisdiction: State of California.

1.9 JOB CONDITIONS

- A. When CM's methods of operation result in excessive test and inspection costs to City and if after warning, costs remain excessive, CM shall defray costs attributable to his methods of operation.
- B. Scheduling:
1. Make tests and inspections conducted pursuant to the Contract Documents promptly to avoid unreasonable delay in the Work.
 2. Make tests, inspections, and approvals of portions of the Work required by the Contract Documents or by applicable code requirements at appropriate times. Except for testing provided by the City's Testing Laboratory, arrange for such tests, inspections, and approvals with the CM's Testing Laboratory. Give City's Representative written notice within 7 calendar days of when and where tests and inspections are to be made.
 3. Cooperate with testing program as necessary to avoid delays. When material or work is not ready at times scheduled for tests and inspections, be responsible for costs of additional tests and inspections occasioned by delays.
 4. Premium time fees for testing performed after regular working hours or on Saturday, Sunday, or on legal holidays shall be reimbursed by CM except when testing is required for City- requested overtime work.
- C. Completed Work: Should City's Representative require tests and inspections for work completed before final acceptance of entire work, furnish necessary facilities, labor, and materials to uncover or remove work in question to extent necessary.
1. If such work is found defective due to fault of CM, CM shall pay all expenses associated with removal, tests, and inspections, and satisfactory reconstruction. Time extension may not be granted.

2. If such work is found to conform with requirements of the Agreement, CM shall be reimbursed by City for facilities, labor, and materials required for removal, and costs of satisfactory reconstruction in accordance with the Contract amounts for extra work. Reasonable time extension shall be granted.

1.10 REPAIR AND PROTECTION

- A. Upon completion of testing, inspecting, sample-taking, and similar services performed on the work, repair damaged work and restore substrates and finishes to eliminate deficiencies, including deficiencies in the visual qualities of exposed finishes.
- B. Protect work exposed by or for quality control services activities, and protect repair work.
- C. Repair and protection is CM's responsibility, regardless of the assignment of responsibility for testing, inspecting, or similar services.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 014533 - CODE-REQUIRED SPECIAL INSPECTIONS AND PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS (Not Used)

1.2 SUMMARY

- A. The Construction Manager shall employ a Special Inspector on behalf of the Owner to oversee and administer, and an independent Testing Agency(s) to perform, a Program of Structural Tests and Special Inspections for compliance with Chapter 17 of the California Building Code – 2019 Edition. The Structural Engineer of Record (SER) and Architect of Record (AOR) shall prepare statement of special inspections, specifying the tests and inspections to be performed throughout the construction of this project. Submission and approval of this statement must be complete prior to beginning construction.
1. The Special Inspector will organize and direct the testing and special inspection program. All inspection and test reports shall be submitted to the Construction Manager, and the Registered Design Professional. The Construction Manager and the Contractor shall be responsible for understanding the testing and inspection program and notify the Testing Agency and the Special Inspector when work is ready for tests and/or inspections. The Construction Manager in concert with the Contractor will provide access to the Testing Agency, Special Inspector and the Registered Design Professional. Inspections and tests of the Structural Tests and Special Inspection Program will not relieve the Construction Manager of responsibility for supervision, testing, and inspection for quality control of the Work.
 2. The Construction Manager will provide testing and inspection reports to the local building official when requested by the local building official. Upon completion of the construction, the independent Special Inspector will make a final report on the satisfactory completion of the Program for Structural Tests and Special Inspection to the building official and to the Owner's Representative.

1.3 RESPONSIBILITIES

- A. Special Inspector:
1. The Statement Special Inspections is submitted as a condition of permit issuance in accordance with the Structural Tests and Special Inspections requirements of the applicable Building Code. It includes a Schedule of Structural Tests and Special Inspections applicable to this Project as well as the name of the Special Inspector who will oversee and administer the program and the identity of other agencies intended to be retained for conducting these inspections.
 2. Keep records of inspections, and shall see that inspection reports are furnished to the Owner, Architect of Record, Structural Engineer of Record, Geotechnical Engineer of Record (for Earthwork only), and Construction Manager.
 3. A Final Report of inspections documenting satisfactory completion of all required Structural Tests and Special Inspections and correction of any discrepancies noted in the inspections shall be furnished to the building official.

B. Testing Agency:

1. The scope of work of the testing agency(s) is defined in the attached "Statement of Special Inspections".
2. The testing agency shall be certified, licensed by the State in which the Project is located, and have at least one professional engineer registered by the State in which the Project is located on staff. The testing agency and its personnel shall maintain in good standing the certifications, licensing, and registrations required by the various agencies noted herein and the State in which the Project is located for the duration of the Project.
3. The testing agency shall have at their immediate disposal, all personnel and sampling, testing, field and laboratory equipment (maintained in good working order and properly calibrated) necessary to perform the work defined herein.
4. Earthwork, Driven Pile, and Drilled Pier inspectors shall be professional geotechnical engineers registered in the State in which the Project is located. Non-registered "assistant" inspectors may perform certain sampling, testing, and inspection functions, but only under the direct supervision of the testing agency's registered geotechnical engineer.
5. Concrete inspectors shall be certified in accordance with ACI's Certification Program and licensed by the State in which the Project is located. Non-certified "assistant" inspectors may perform certain sampling, testing, and inspection functions, but only under the direct supervision of the testing agency's certified inspector.
6. Inspectors for welded fabrications and connections shall be AWS Certified Welding Inspectors (CWI) in accordance with the provision of AWS QC1, "Standard and Guide for Qualification and Certification of Welding Inspectors." Assistant inspectors may perform certain sampling, testing, and inspection functions, but only under the direct supervision of the testing agency's certified inspector.
7. Inspectors for bolted connections shall be well versed in the "Specification for Structural Joints Using ASTM A325 or A490 Bolts" and "Commentary" as published by the American Institute of Steel Construction (AISC).
8. Inspectors for sprayed fire-resistive materials shall be ICC Certified "Spray-Applied Fireproofing Special Inspectors".
9. Sampling, testing, and inspections for compliance shall be checked against the Contract Documents (i.e., Drawings, Specifications, and Referenced Standards) and the approved Shop Drawings. Perform sampling, testing, and inspections in coordination with the Contractor and Construction Manager and in a timely manner so as to provide the Contractor and Construction Manager with sufficient time to repair or replace non-conforming materials or work. Notify the Construction Manager immediately when non-conforming materials or work are discovered. Non-conforming materials or work that are not corrected before the inspector leaves the site for the day shall be recorded in the inspection report and issued as required herein.
10. Re-sample, re-test, and re-inspect all materials and work found not to conform to the requirements of the Contract Documents or Shop Drawings. Testing agency(s) to note in its reports when re-sampling, re-tests, and re-inspections were performed.
11. The testing agency shall be responsible for sending copies of all sampling, testing and inspection reports, within 48 hours of performance, to the Owner, Special Inspector, Architect of Record, Structural Engineer of Record, Geotechnical Engineer of Record (for Earthwork only), and Construction Manager.

C. General Contractor and Sub-Contractors:

1. Cooperate with the testing agency(s), Special Inspector, Building Official, Architect of Record and the Structural Engineer of Record, and provide safe access to the work areas.
2. Provide incidental labor, equipment, materials and facilities to obtain, handle, store and cure samples at the site or at the source of products to be sampled, tested, and inspected.
3. Notify the appropriate Testing Agency at least 24 hours prior to expected times of operations that require sampling, testing, and inspections.

4. Testing, inspection and sampling in the shop or field shall not relieve the General Contractor or Sub-Contractors of their responsibilities to furnish materials and workmanship that comply with the requirements of the Contract Documents and the Shop Drawings.
5. The Contractor is responsibility for supervision, testing, and inspection as required for quality control of the work.

1.4 CONFLICTING REQUIREMENTS

- A. General: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Architect for a decision before proceeding.

1.5 STATEMENT OF STRUCTURAL TESTS AND SPECIAL INSPECTIONS

- A. The Statement(s) of Special Inspections are attached at the end of this Section.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 014541 - MOCKUP REQUIREMENTS**PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes: General requirements for mockups as required by individual Sections of the Specifications.
- B. Testing and inspections on mockups shall be performed as indicated
- C. Related Sections
 - 1. Section 014500 "Quality Control" for general quality control procedures and Contractor's responsibilities regarding the Work.
 - 2. Section 014543 "Exterior Wall Mockups" for performance mockup requirements.
 - 3. Section 014516 "Field Quality Control Procedures" for City-engaged field testing and inspection agency procedures.

1.2 DEFINITIONS

- A. Performance Mockup (PMU): Specific requirements for laboratory mockup testing to verify selections made under Sample submittals, to demonstrate aesthetic effects, set quality standards for fabrication and installation, and to test compliance with performance requirements. Refer to Section 014543 "Exterior Wall Mockups."
- B. Visual Mockup (VMU): Specific requirements for a stand-alone, on-site, field-built, full size component mockup to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.
- C. First-in-Place Mockup: Specific requirements for a portion of the final installation to be reviewed and approved by Architect prior to commencement of remaining Work of that Section.

1.3 SYSTEM DESCRIPTION

- A. Performance Requirements:
 - 1. Prepare and submit complete mock-up drawings and structural calculations stamped by a licensed California engineer. Construct mock-ups in strict accordance with approved mock-up shop drawings. Any deviation from or additions to details shown on drawings are subject to approval from City's Representative. Do not use excessive amounts of sealant, nor other special measures or techniques, which are not representative of those to be used on the building.
 - 2. Tests specified below shall be performed on the mock-up and paid for by CM. Any additional or retesting costs, including any costs or expenses incurred by the CM, City's Representative or their Consultants, shall be paid for by the CM.
 - 3. Mock-ups are subject to observation by CM and the City's Representative throughout mock-up construction and testing. Provide minimum three weeks' notice before beginning construction of mock-up. Provide materials and personnel for prompt continuous construction of mock-ups. Delays in mock-up construction due to lack of materials or personnel could result in CM being charged for fees and travel expenses of observers.
 - 4. If failures occur, revise and retest mock-up. Modifications must be realistic in terms of job conditions, must maintain standards of quality and durability, and are subject to approval by the City's Representative.
 - 5. In general, performance requirements specified for test mock-ups and samples also apply to the actual building, and vice versa. Variations in criteria over the surface of the building are taken into account in testing of mock-ups and samples. Where certain performance is required for specific test conditions of mock-ups and samples, that same performance is also required of the actual building, for natural conditions equivalent to or less severe than the test conditions.

6. Prior to mock-up installation or fabrication, provide to sealant manufacturer samples of all relevant substrates, including finished aluminum, coated glass, gaskets, stone, backers and any other substrates which will require sealant contact. Samples shall be labeled and identified for this project. Perform tests to verify adhesion, staining and chemical compatibility. Use sealants and substrates only in combinations for which favorable adhesion and compatibility results have been obtained. Submit for record sealant manufacturer's written test reports, and recommendations regarding cleaning and priming required to obtain acceptable adhesion to the City's Representative.

1.4 SUBMITTALS

- A. Shop Drawings: Submit shop drawings showing inclusion of components. Clearly identify materials to be integrated into mock-up assembly.
- B. Samples: Prior to construction of mock-up, provide samples of colors and finishes as required under applicable Specifications Sections.

1.5 QUALITY ASSURANCE

- A. Construction of Mock-Up
 1. Work shall be performed by same personnel who will be employed for this purpose on the Work, including supervision.
 2. Work shall be governed by requirements applicable to work of like kind required for final construction to be left in place and shall serve as the standard for final work to be left in place.
 3. Be prepared to make as many modifications necessary to achieve mock-up which is satisfactory to the City's Representative and of sufficient quality to serve as standard for the complete Project.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store and handle components and materials in same manner as will be done for components and materials to be integrated into the Work at the Project site except that other special measure may be required for transport of components and materials to Site.

1.7 SEQUENCING AND SCHEDULING

- A. Construct mock-ups in timely manner to permit review and modifications such that work is not delayed.
- B. Do not proceed with ordering of components or construction of mock-up components until after approval of mock-ups have been obtained.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Provide required materials as shown and specified, and representative of items to be used in the Work.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Locate field mock-ups in location on site approved by the City's Representative.
- B. Perform work in accordance with requirements specified in the governing Sections and as indicated.
- C. Remove mock-up in the Work at completion of the exterior of the building as directed by Architect.

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Sunnyvale Civic Center – Phase 1
Issued for Construction – October 27, 2020

END OF SECTION

SECTION 014543 - EXTERIOR WALL MOCKUPS**PART 1 - GENERAL****1.1 SUMMARY**

- A. Section includes administrative and procedural requirements for laboratory performance mockups.
- B. Mockups, testing, and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specific mockup and testing requirements for individual elements of the Work are specified in the Sections that specify that Work. Requirements in those Sections may also cover production of standard products.
 - 2. Specified mockups, tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
 - 3. Requirements for Contractor to provide mockup construction and testing, including those required by authorities having jurisdiction, are not limited by provisions of this Section.
- C. Related Requirements:
 - 1. Section 003121 "Available Project Information" for energy design requirements affecting this Section.
 - 2. Section 014500 "Quality Control" for quality control requirements for the Project, which apply to each Section.
 - 3. Section 014541 "Mockup Requirements" for general information regarding mockup requirements, which apply to the Work of this Section
 - 4. Section 014546 "Field Quality Control Procedures" for field testing and inspections.
 - 5. Section 019100 "Commissioning" for review of conformance to requirements.

1.2 DEFINITIONS

- A. Mockups: Full-size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between adjacent materials and systems; and to demonstrate compliance with specified installation tolerances. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.
 - 1. Laboratory Mockups: Full-size physical assemblies constructed at testing facility to verify performance characteristics.
 - a. Also known as "performance mockups" (PMU).
 - 2. Standalone Exterior Mockups: Mockups of the exterior envelope erected separately from the building but on Project site, consisting of multiple products, assemblies, and subassemblies.
 - a. Also known as "visual mockups" (VMU).
 - 3. Building Integrated Exterior Mockups: Mockups of the exterior envelope erected into the building fabric. These mockups, if successful, may be left in place as part of the completed work at the sole discretion of the Architect and City.
 - a. Also known as "first-in-place" mockups.
- B. Preconstruction Testing: Tests and inspections performed specifically for Project before products and material are incorporated into the Work, to verify performance or compliance with specified criteria.

- C. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- D. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.
- E. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- F. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- G. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
 - 1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).

1.3 ACTION SUBMITTALS

- A. Shop Drawings: For each type of exterior mockup, provide plans, sections, and elevations, indicating materials and size of mockup construction.
 - 1. Indicate manufacturer and model number of individual components.
 - 2. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.
- B. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, finish and color designations, source of supply, and other information as required to identify materials used. Include mix proportions for mortar and grout and source of aggregates.
- C. Sample Construction: Process submittal for field samples as specified for product submittal, for documentation.
- D. Design-Build Engineering Submittal: For mockups to comply with structural requirements, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified professional engineer and testing agency.
- B. Installation Instructions:
 - 1. Include instructions specific to the use and conditions, including:
 - a. Sequence of component/assembly
 - b. Direction of operations for installation, unitized systems erection.
 - c. Surface preparation requirements.
 - d. All components of the system.
 - e. Coordination requirements for adjacent systems where appropriate.
 - 2. Provide 3 dimensional and "exploded views" to address components not easily expressed in orthographic drawings.
 - 3. Maintain mockup installation instructions for mockup erection on location and make available to all parties throughout mockup construction, testing, and reference.
- C. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities developed specifically for Project, including fabrication and installation, according to recommendations in ASTM C 1401. Include periodic quality-control reports.

- D. Qualification Data: For Contractor's quality-control personnel.
 - E. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
 - F. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
 - 1. Specification Section number and title.
 - 2. Entity responsible for performing tests.
 - 3. Description of test.
 - 4. Identification of applicable standards.
 - 5. Identification of test methods.
 - 6. Number of tests required.
 - 7. Time schedule or time span for tests.
 - 8. Requirements for obtaining samples.
 - 9. Unique characteristics of each quality-control service.
 - G. Mock-up Completion: Process submittal for documentation when mock-up is complete.
- 1.5 CONTRACTOR'S MOCKUP AND TESTING PLAN
- A. Mockup and Testing Plan, General: Submit plan for mockup fabrication, construction, and testing before proceeding with Project submittals for associated exterior envelope Work.
 - 1. Include the following information in this plan, at a minimum:
 - a. Mockup shop drawing and submittals schedule.
 - b. Lead time for obtaining required mockup materials.
 - c. Times for testing, and if necessary, retesting of mockups.
- 1.6 REPORTS (CERTIFICATION)
- A. The Testing Agency shall submit one copy of each set of reports of tests, inspections, and certifications to the Contractor and City, as required.
 - B. After tests or inspections have been made, the Testing Agency shall distribute copies of all tests and inspection reports in standard outline form to include the following:
 - 1. Issue date.
 - 2. Project title and number.
 - 3. Testing agency name and address.
 - 4. Name of technician.
 - 5. Date of testing.
 - 6. Significant meteorological conditions.
 - 7. Report number.
 - 8. Mockup Test number.
 - 9. Observations regarding compliance with contract documents.
- 1.7 QUALITY ASSURANCE
- A. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.
 - 1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
 - 2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

3. Independent Agency: Qualified according to ASTM E 699 for testing indicated and accredited by IAS or ILAC Mutual Recognition Arrangement as complying with ISO/IEC 17025.
- B. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
1. Contractor responsibilities include the following:
 - a. Provide test specimens representative of proposed products and construction.
 - b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
 - c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups as indicated to adequately demonstrate capability of products to comply with performance requirements.
 - d. Where size and configuration are not indicated by documents, provide sizes and configurations of test assemblies, mockups, and laboratory mockups to replicate project conditions at full scale.
 - e. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
 - f. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
 - g. When testing is complete, remove and dispose test specimens, assemblies, and mockups unless otherwise indicated; do not reuse products on Project.
 2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect and Commissioning Authority, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.
- C. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect.
 2. Notify Architect 14 days in advance of dates and times when mockups will be constructed.
 3. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed during the construction at Project.
 4. Demonstrate the proposed range of aesthetic effects and workmanship.
 5. Obtain Architect's, City's approval of mockups before starting work, fabrication, or construction.
 - a. Allow seven days for initial review and each re-review of each mockup.
 6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 7. Notify Architect 14 days prior to proposed date of mockup removals. Proceed with demolition only upon written agreement by Architect.
 8. Demolish and remove mockups only when directed by Architect or City unless otherwise indicated.
- D. Standalone Exterior Mockups: Prior to commencing exterior construction, build freestanding mockup of exterior assemblies according to approved Shop Drawings. Coordinate installation of exterior envelope materials and products for which mockups are required in individual Specification Sections, along with supporting materials.

1. Mockup will be used for final selection of materials and visual grading, and for review of quality of workmanship, and matters affecting aesthetic characteristics of the Work.
- E. Building Integrated Exterior Mockups: Prior to commencing exterior construction, build freestanding mockup of exterior assemblies according to approved Shop Drawings. Coordinate installation of exterior envelope materials and products for which mockups are required in individual Specification Sections, along with supporting materials.
1. Construct first-in-place mockup as indicated and provide field quality control testing indicated.
- F. Laboratory Mockups: Comply with requirements of preconstruction testing as specified in individual Specification Sections, and as follows:
1. Laboratory Tests on Mockups:
 - a. Laboratory tests on full-scale mockups shall be conducted using the following test sequence, procedures, and referenced test standards.
 - 1) Sequence #1: Rain screen areas shall be tested first (Steps 1 through 3, skipping Step 4, and then Steps 5 through 13) with cladding removed (air barrier, sub-girts, etc. in place).
 - 2) Sequence #2: Step 4 through step 15 onward with insulation and rain screen cladding installed.
 - 3) If the specimen is damaged during first M7 displacement to an extent that it may not successfully pass a subsequent static water penetration test following second M6 displacement, the specimen may be evaluated using criteria identified in 2015 NEHRP Commentary for immediate occupancy and per AAMA 501.4.09, Section 11.2.3.1 and Specification Section 014543. 1.F.1.b.(13).
 - b. Testing sequence shall be:
 - 1) Preload at 50 percent of inward design criteria pressure (10.5 psf) per ASTM E330
 - 2) Air infiltration under static inward design criteria pressure (ASTM E 283-04), pressure shall be 6.24 psf.
 - 3) Water infiltration under ASTM E 331: pressure shall be 12 psf. Water applied at a rate of five gallons per hour per square foot of wall frontal area applied in such a way as to completely and continuously cover exterior face of specimen.
 - 4) Water infiltration under dynamic inward design criteria pressure, at an equivalent pressure of 12 psf pressure per AAMA 501.1-05.
 - 5) Structural deflection test at 50 percent and 100 percent of inward and outward design pressure (ASTM E 330). Maximum outward pressure of -24 psf, and maximum inward pressure of +21 psf, as determined by 4 January 2018 CPP Wind Tunnel Cladding Analysis.
 - 6) Repeat static water penetration test (Step 3).
 - 7) Perform vertical displacement test by jacking the intermediate level up and down a maximum of 1/2-inch for a minimum of three complete cycles. Upon completion of the third cycle the test specimen shall be left in the maximum open position (1/2-inch, as determined by the SEOR as the maximum live load deflection of perimeter slab at curtain wall areas) during remainder of all testing.
 - 8) Repeat static water penetration test (Step 3).
 - 9) For Elastic Drift (M6) and recovery to Operational level perform lateral displacement according to AAMA 501.4-09 and the following procedure:

- a) Displace intermediate level of mock-up structure 0.35% of floor height (0.60 inches) parallel to the main elevation of the test specimen. Simultaneously displace the upper level of mock-up structure 0.63% of floor height (1.36 inches) relative to the displaced position of intermediate level. Each cycle shall include deflection in one direction held in place for 10 seconds and then returned to zero, and then deflected in the opposite direction held in place for 10 seconds and then returned to zero. This shall be conducted for a minimum of three cycles.
 - b) Lock the test specimen support structure in place then repeat the same displacements perpendicular to the wall. This shall be repeated for a total of three cycles.
- 10) Repeat static water penetration test (Step 3).
- 11) Structural deflection test at 150 percent of inward and outward design pressure (ASTM E 330). Repeat isolation procedure in Step 7 and test "Increased Wind Pressure Test Zone" at +31.5 psf inward and -36 psf outward as determined by 4 January 2018 CPP Wind Tunnel Cladding Analysis.
- 12) For Elastic Drift at Design Displacement (M7) and recovery of Immediate Occupancy level, perform lateral displacement according to AAMA 501.4-09 and the following procedure:
- a) Displace intermediate level of mock-up structure 1.13% of floor height (1.94 inches) parallel to the main elevation of the test specimen. Simultaneously displace the upper level of mock-up structure 1.85% of floor height (4.00 inches) relative to the displaced position of intermediate level. Each cycle shall include deflection in one direction held in place for 10 seconds and then returned to zero, and then deflected in the opposite direction held in place for 10 seconds and then returned to zero. This shall be conducted for a minimum of three cycles.
 - b) Lock the test specimen support structure in place then repeat the same displacements perpendicular to the wall. This shall be repeated for a total of three cycles.
- 13) Repeat static water penetration test (Step 3) and evaluate using criteria established in 2015 NEHRP Commentary for immediate occupancy and per AAMA 501.4-09, Section 11.2.3.1. The curtain wall shall remain generally water tight. Some nominal/limited amount of damage to the structural sealant may occur but it must be of a nature that repairs are minor and can occur at the building City's convenience. No class fallout may occur. Record results for refinement of field testing program and make any necessary repairs for second sequence of testing with rain screen cladding attached.
- 14) For inelastic drift and recovery (M8) to "Life Safety level", perform lateral displacement according to AAMA 501.4-09 and the following procedure:

- a) Displace intermediate level of mock-up structure 1.49% of floor height (2.56 inches) parallel to the main elevation of the test specimen. Simultaneously displace the upper level of mock-up structure 2.78% of floor height (6.00 inches) relative to the displaced position of intermediate level. Each cycle shall include deflection in one direction held in place for 10 seconds and then returned to zero, and then deflected in the opposite direction held in place for 10 seconds and then returned to zero. This shall be conducted for a minimum of three cycles. Observations will be made and results recorded by testing agency.
 - b) Lock the test specimen support structure in place then repeat the same displacements perpendicular to the wall. This shall be repeated for a total of three cycles. Observations will be made and results recorded by testing agency.
- 15) Upon successful completion of all test steps, test specimen under negative pressure or two times design negative load (48 psf).
- c. Air infiltration test shall conform to ASTM E 283. Differential static test pressure shall be 6.24 psf. Chamber leakage shall be accurately determined, not estimated. Air leakage of test specimen fixed wall area shall not exceed 0.06 cfm per square foot of exterior surface plane of wall, not including projecting areas of mullions and panel or 0.005 cfm per foot of crack length on operable windows or vents.
 - d. The occurrence of condensation during water infiltration tests is acceptable. Other water leakage is acceptable only if all the following conditions are satisfied.
 - 1) The water is contained and drained to exterior.
 - 2) There is no wetting of a surface (uncontrolled water leakage) on any portion of the interior area of the wall system where it is visible to personnel that are witnessing the test.
 - 3) There would be no staining or other damage to any part of the completed building or its furnishings, nor shall there be any wetting of any insulation materials should they be present.
 - 4) This definition of water leakage shall govern over other definitions that may appear in the reference documents.
 - e. Where the test sequence or test failure requires successive water infiltration tests, the only means used to drain water from internal cavities shall be gravity drainage through the weep system for a minimum of 15 minutes. Air pressure, removal of parts, or other means of draining water shall not be used. When water infiltration tests have failed after structural tests or differential movement tests, repeat structural tests must be executed prior to repeating water infiltration test. Determination of leak sources shall not be accomplished by “soaping” or by using smoke.
 - f. Seismic Tests:
 - 1) M6 Drift Test (Operational Level): No glass breakage or glass fallout is allowed, all functions remain unimpaired with no visible damage or loss of weather-tightness; post-design (elastic) displacement performance shall remain within specified allowable limits without adjustments or repair (Step 9, above), no wall components may fall off or disengage.

- 2) M7 Drift Test (Immediate Occupancy Level): Up to 10 percent of total number of glass lites may break, but must be retained completely in the glazed opening with no glass fallout; any damage shall be readily repairable/adjustable on site; post-design-displacement performance can be attained with minor adjustments (broken glass may be replaced in order to conduct subsequent performance tests; visible seals or gaskets may be repaired or reset; no wall components may fall off, trim may be visibly disengaged; trim elements may require replacement.
- 3) M8 Drift Test (Life Safety Occupancy Level): Deformation or damage of framing members, and/or breakage of glass and metal panels, where defined only as cracking or spalling, may occur to the test specimen. Glass shall remain retained completely in glazed opening with no glass fallout nor any wall components falling off. System anchorage may deform, but catastrophic failure cannot occur, nor shall any damaged or broken materials fall from the system.

- g. Structural Overload Test per ASTM E 330 using 1.5 times the design load pressure. Deflections to be measured and record. No permanent set of more than L/1000 is allowed. No permanent set in anchors of more than 1/16-inch is allowed.

1.8 QUALITY CONTROL

- A. City Responsibilities: Where quality-control services are indicated as City's responsibility, City will engage a qualified testing agency to perform these services.
 1. City will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
 2. Payment for these services will be made from testing and inspecting allowances, as authorized by Change Orders.
 3. Costs for retesting and reinspection of construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.
- B. Contractor Responsibilities: Tests and inspections not explicitly assigned to City are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.
 1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
 2. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
 - a. Contractor shall not employ same entity engaged by City, unless agreed to in writing by City.
 3. Schedule testing agencies functions sufficiently in advance of testing or inspecting to allow Architect observations.
 4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

- C. Manufacturer's/Fabricator's Technical Services: Engage manufacturer's technical representatives to observe and inspect the mockups. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed mockups, witnessing testing, and submittal of written reports.
- D. Retesting/Reinspection: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspection, for construction that replaced Work that failed to comply with the Contract Documents.
- E. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
 - 1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 - 2. Coordinate the location from which test samples will be taken and in which in-situ tests are conducted.
 - 3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
 - 4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
 - 5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
 - 6. Do not perform any duties of Contractor.
- F. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
 - 1. Access to the Work.
 - 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 - 3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
- G. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
 - 1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- H. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents as a component of Contractor's quality-control plan. Coordinate and submit concurrently with Contractor's construction schedule. Update as the Work progresses.
 - 1. Distribution: Distribute schedule to City, Architect, testing agencies, and each party involved in performance of portions of the mockups and testing.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TRACKING AND RELOGGING

- A. Tracking: Prepare plan and elevations indicating locations and results of testing for integrated exterior mockups. Update testing completion as work proceeds.
- B. Submit: With record documents.

1. Provide updated copies of documents to Architect and Construction Manager upon completion of mockups and testing by type and location.

3.2 REPAIR AND PROTECTION

A. General:

1. Protect standalone mockups until released for demolition or removal from Site by Architect and City.

END OF SECTION

SECTION **014546** - FIELD QUALITY CONTROL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. General Field Quality Control requirements and procedures.
2. Specific Field Quality Control requirements and procedures for individual components outlined below.

B. Related Requirements:

1. Section 013119 "Project Meetings" for preinstallation meeting requirements relating to Mockups and Quality Control procedures.
2. Section 014500 "Quality Control" for project quality control procedures.
3. Section 014541 "Mockup Requirements" for general mockup requirements.
4. Section 014543 "Exterior Wall Mock-Ups" for laboratory performance testing.
5. Section 019100 "Commissioning."
6. Each Section indicated below with reference to specific requirements.

1.2 QUALITY CONTROL PLAN

- A. The applicable requirements for the Quality Control Plan as specified in Section 014500 "Quality Control," apply to the Work of this Section.

1.3 GENERAL CONTRACTOR'S RESPONSIBILITIES FOR TESTING AND INSPECTION

- A. Follow the approved quality control procedures at all times through the Construction Work.
- B. Submit copies of product test reports to the City's Representative, and to Architect as indicated.
- C. Furnish incidental labor and facilities to provide Architect and City's Representative access to Work to be tested, obtain and handle samples at the Project site or at the source of the product to be tested, facilitate inspections and tests, and for storage and curing of test samples.
- D. Provide written notice to Architect and City's Representative 7 days in advance of operations of testing and inspection to allow for Architect and City's Representative the opportunity to observe the testing and inspection.
- E. Where indicated to obtain Architect's approval prior to commencement of remaining Work of the Section, allowing 72 hours for review.
- F. If the Work and the associated testing and inspection is not performed when scheduled, Contractor shall reimburse Architect and City for personnel and travel expenses incurred.
- G. Contractor shall supervise Work and inspect all materials as they arrive for compliance with the Contract Documents, and shall reject defective work and material without waiting for such rejection from others in authority. In addition, as Work progresses, Contractor shall provide supervision for their portion of the Work, and shall inspect materials as they arrive for compliance with the Contract Documents and with their own construction documents and Shop Drawings.

1.4 TESTS AND INSPECTIONS BY CITY

- A. City's Representative may make periodic on-site observations of construction as it progresses and upon completion, and may make off-site reviews of fabricated materials and equipment when such off-site reviews are specified in the Contract Documents at City Expense. Opportunity for observation, testing, and inspection by City' Representative shall be afforded by the Contractor throughout the progress of the Work.

1.5 ADDITIONAL TESTING AND INSPECTION

- A. If the Architect, City or public authorities having jurisdiction determine that portions of the Construction Work require additional testing, inspection or approval beyond that required in the Construction Documents, such additional testing and inspection shall be carried out by the Contractor, or by entity directed by City. Contractor shall make arrangements for such inspections and testing; and shall give the Architect and City's Representative timely notice of when and where tests and inspections are to be made so that Architect and City may observe such procedures. If such additional tests and/or inspections reveal Defective Work, the cost of such test and/or inspection and correction shall be considered as part of the Target Cost; otherwise the Target Cost will be adjusted by Change Order for cost of testing and/or inspection.

1.6 MANUFACTURER' FIELD SERVICES AND REPORTS

- A. When specified in individual Specification Sections, the Contractor shall require material suppliers, product suppliers, and manufacturers to provide qualified representatives to observe site conditions and installation procedures as specified and as required for warranties and other requirements.
- B. Report observations and direction made by representatives that are supplemental or contrary to manufacturer's written instructions, Contract Documents, or other requirements.

1.7 TEST REPORTS

- A. City's Testing Laboratory and Contractor's Testing Laboratory shall distribute copies of reports as follows, unless otherwise indicated:
 - 1. City's Representative: Four (4) copies.
 - 2. Architect: As indicated in individual Sections of the Specifications.
 - 3. The quantity of copies for Contractor and their Subcontractors shall be determined by Contractor based on similar requirements of the Contract.

1.8 WORK COVERED PRIOR TO INSPECTION

- A. If a portion of the Work is covered contrary to Architect's request or direction, or contrary to the requirements of the Contract Documents, it shall, if required in writing by Architect, shall be uncovered for Architect's and City's Representative's observation and shall be replaced at Contractor's expense without adjustment of the Contract Time or the Target Cost.

- B. If a portion of the Work has been covered, which is not required by the Contract Documents to be observed or inspected prior to it being covered and which Architect has not specifically requested to observe prior to its being covered, Architect may request to see such Work and it shall be uncovered and replaced by Contractor. If such Work is found to be in accordance with the Contract Documents, and additional cost and/or time have been incurred by Contractor, such cost and/or time shall be added to the Target Cost and/or Contract Time by Change Order. Where the Contractor requests adjustment to either the Contract Time or Target Cost, Contractor shall document and show that such change is necessary per the requirements of the Contract Documents.

1.9 TOLERANCES

- A. Comply with manufacturer's quality tolerances. Manufacturer's tolerances which conflict with Contract Documents shall be brought to the attention of the Architect for clarification and direction prior to proceeding with the Work.

1.10 CONNECTIONS TO EXISTING CONDITIONS

- A. Field verify conditions which may affect requirements of the Work. Prior to Shop Drawings submittals, field verify items such as utility rough-ins and structural support. Immediately notify the Architect in writing of any discrepancy between the Contract Documents and field conditions. Should materials or products be ordered without following the above procedure, no extra charge or compensation will be allowed.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL

- A. General: The following outlines general requirements for field-quality-control of individual components for a portion of the Work. The list is intended as a general guideline for requirements and procedures and is not meant to be exhaustive. Refer to each individual Specification Section for further information not indicated herein. Together, along with the Drawings and other pertinent requirements, the information indicated below and in each Section make the complete Contract requirements for field-quality-control procedures.
- B. Testing Agency: City will engage a qualified testing agency to perform tests and inspections, unless otherwise indicated.
- C. Work will be considered defective if it does not pass tests and inspections.
- D. Remove and replace Work where tests and inspections indicate the Work does not comply with specified requirements.
- E. Additional tests and inspections will be performed at Contractor's expense to determine compliance with specified requirements of replaced or additional Work.

3.2 STONE MASONRY VENEER

- A. General: Refer to Section 044313 "Stone Masonry Veneer" for testing criteria.
 - 1. Testing on Sample Panel Mockups:

- a. Sealant Compatibility and Adhesion Testing: Field test performed on sample panel mockups by joint sealant manufacturer.
- b. Masonry Adherence Tests: City's testing agency will test masonry shear strength adherence to substrate.

3.3 STRUCTURAL STEEL FRAMING

- A. General: Refer to Section 051200 "Structural Steel Framing" for testing and inspection criteria.
 - 1. Field Tests: City's testing agency will test field welds and bolted connections.

3.4 ARCHITECTURALLY EXPOSED STRUCTURAL STEEL (AESS) FRAMING

- A. General: Refer to Section 051213 "Architecturally Exposed Structural Steel Framing" for testing and inspection criteria.
 - 1. Field Tests: City's testing agency will test field welds and bolted connections.

3.5 COLD-FORMED METAL FRAMING

- A. Laboratory Testing: Refer to Section 014339 "Exterior Wall Mockups" for performance testing of cold-formed metal framing and sheathing installed with other assemblies.
- B. General: Refer to Section 055400 "Cold-Formed Metal Framing" for testing and inspection criteria.
 - 1. Field Tests: City's testing agency will test field welds.

3.6 GLAZED DECORATIVE METAL RAILINGS

- A. General: Refer to Section 057313 "Glazed Decorative Metal Railings" for testing and inspection criteria.
 - 1. Field Tests: City's testing agency will test for compliance with performance requirements.

3.7 HOT FLUID-APPLIED RUBBERIZED ASPHALT WATERPROOFING

- A. General: Refer to Section 071413 "Hot Fluid-Applied Rubberized Asphalt Waterproofing" for testing and inspection sequence and criteria.
 - 1. Field Inspections: Contractor's inspection agency will conduct inspections of substrate conditions, surface preparation, waterproofing application, protection, and drainage components.
 - 2. Field Tests: City's testing agency will conduct flood testing and EFVM moisture testing.
 - 3. Preconstruction Sealant Testing: Compatibility and adhesion test performed on representative waterproofing sample by joint sealant manufacturer.
 - 4. Manufacturer's Field Service: Engage a factory-authorized technical representative to provide periodic and final inspections.

3.8 FLUID-APPLIED MEMBRANE AIR BARRIER

- A. Laboratory Testing: Refer to Section 014339 "Exterior Wall Mockups" for performance testing of air barriers installed with other assemblies.
- B. General: Refer to Section 072726 "Fluid-Applied Membrane Air Barriers" for testing and inspection sequence and criteria.
 - 1. Preconstruction Sealant Testing: Compatibility and adhesion test performed on representative air barrier sample by joint sealant manufacturer.
 - 2. ABAA Audits: Materials and installation subject to industry audits as indicated.
 - 3. Field Tests:
 - a. Water-Spray Test: City's testing agency will test assembly for water penetration according to AAMA 501.2.
 - b. Air Barrier Adhesion Test: City's testing agency will test air barrier material for adhesion to substrate according to ASTM D 4541.
 - 4. Manufacturer's Field Service: Engage a factory-authorized technical representative to provide periodic and final inspections.

3.9 FORMED METAL WALL PANELS

- A. General: Install metal panel brackets sub-framing, anchorage clips, fasteners and washers over completed air barrier and repeat tests for Paragraph 3.2 prior to installation of metal panels on sub-framing.
 - 1. Water-Spray Test: After installation of wall panel brackets, City's testing agency will test area of assembly as directed by Architect for water penetration according to AAMA 501.2.
 - 2. Manufacturer's Field Service: Engage a factory-authorized technical representative to inspect completed metal wall panel installation, including accessories.

3.10 METAL-COMPOSITE-MATERIAL WALL PANELS

- A. Laboratory Testing: Refer to Section 014339 "Exterior Wall Mockups" for performance testing of metal-composite-material wall panels.
- B. General: Install metal panel brackets, sub-framing, anchorage clips, fasteners and washers over completed air barrier and repeat tests for Paragraph 3.2 prior to installation of metal panel on sub-framing.
 - 1. Water-Spray Test: After installation of wall panel brackets, City's testing agency will test area of assembly as directed by Architect for water penetration according to AAMA 501.2.
 - 2. Manufacturer's Field Service: Engage a factory-authorized technical representative to inspect completed metal wall panel installation, including accessories.

3.11 METAL SOFFIT PANELS

- A. General: Refer to Section 074213.53 "Metal Soffit Panels" for testing and inspection criteria.

1. Field Tests: City's testing agency will conduct suspended hanger and anchor strength and pull-out tests.
2. Manufacturer's Field Service: Engage a factory-authorized technical representative to provide periodic and final inspections.

3.12 PVC MEMBRANE ROOFING

- A. General: Refer to Section 075419 "PVC Membrane Roofing" for testing and inspection criteria.
1. Concrete Moisture Testing: Installer shall test roof deck internal relative humidity prior to installation of any roof products.
 2. Field Tests: City's testing agency will conduct inspection and testing of installation of roof membranes, insulation, cover boards, associated sheet metal, flashings, roof specialties and accessories in accordance with Field Quality Control requirements of Section 075419 "PVC Membrane Roofing".
 3. EFVM moisture testing of temporary roof membrane prior to installation of permanent roof system.
 - a. EFVM moisture testing after installation of completed permanent roof system.
 - b. Test cuts.
 4. Manufacturer's and Installer Field Service: Engage a factory-authorized technical representative and representative of Installer to inspect and certify condition of vapor retarder used as temporary roof membrane.
 5. Manufacturer's Field Service: Engage a factory-authorized technical representative to provide periodic and final inspections.

3.13 SHEET METAL FLASHING AND TRIM

- A. Laboratory Testing: Refer to Section 014339 "Exterior Wall Mockups" for performance testing of sheet metal flashing installed with other assemblies.

3.14 JOINT SEALANTS

- A. Laboratory Testing: Refer to Section 014339 "Exterior Wall Mockups" for performance testing of joint sealants installed with other assemblies.
- B. Field Mockup Testing: Include with assemblies required by other Sections.
- C. General: Refer to Section 079200 "Joint Sealants" for testing and inspection criteria.
1. Preconstruction Testing:
 - a. Compatibility and Adhesion Testing: Laboratory test performed by joint sealant manufacturer.
 - b. Field-Adhesion Testing: Performed by Installer with sealant manufacturer present or performed by sealant manufacturer.
 2. Field Testing: City's testing agency will perform adhesion pull-testing of joint sealants for each condition in accordance with Field Quality Control requirements of Section 079200 "Joint Sealants."

3.15 ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

- A. General: Refer to Section 084113 "Aluminum-Framed Entrances and Storefronts" for testing and inspection sequence and criteria.
 - 1. Field Testing: City's testing agency will perform testing on representative areas of aluminum-framed entrances and storefronts in accordance with Field Quality Control requirements of Section 084113 "Aluminum-Framed Entrances and Storefronts," including entrances as indicated.
 - a. Tests include:
 - 1) Air infiltration prior to 10% and 65% complete, and again at 100% complete in three areas designated by Architect.
 - 2) Uniform/cyclic water infiltration prior to 10% and 65% complete, and again at 100% complete in three areas designated by Architect.
 - 3) Water spray test on all curtain walls at 100% complete.
 - 4) Air infiltration on entrances.

3.16 STRUCTURAL-SEALANT-GLAZED CURTAIN WALLS

- A. Laboratory Testing: Refer to Section 014339 "Exterior Wall Mockups" for performance testing of glazed curtain walls.
- B. General: Refer to Section 084423 "Structural-Sealant-Glazed Curtain Walls" for testing and inspection sequence and criteria.
 - 1. Preconstruction Sealant Testing:
 - a. Compatibility and Adhesion Testing: Laboratory test performed by joint sealant manufacturer for each type of structural and weatherseal sealant.
 - 2. Field Testing: City's testing agency will perform testing on representative areas of curtain wall assemblies in accordance with Field Quality Control requirements of Section 084423 "Structural-Sealant-Glazed Curtain Walls."
 - a. Tests include:
 - 1) Air infiltration prior to 10% and 65% complete, and again at 100% complete in three areas designated by Architect.
 - 2) Uniform/cyclic water infiltration prior to 10% and 65% complete, and again at 100% complete in three areas designated by Architect.
 - 3) Water spray test on all curtain walls at 100% complete.
 - 4) Weatherseal-sealant and structural-sealant adhesion tests.

3.17 METAL FRAMED SKYLIGHTS

- A. General: Refer to Section 086300 "Metal Framed Skylights" for testing and inspection sequence and criteria.
 - 1. Field Testing: City's testing agency will perform testing on representative areas of skylight assemblies in accordance with Field Quality Control requirements of Section 086300 "Metal Framed Skylights."
 - a. Tests include:

- 1) Water spray test on all skylights at 100% complete.
- 2) Weatherseal-sealant and structural-sealant adhesion test.

3.18 GLAZING

- A. Laboratory Testing: Refer to Section 014339 "Exterior Wall Mockups" for performance testing of glazing installed with other assemblies.
- B. Field Mockup Testing: Include with assemblies required by other Sections.
- C. General: Refer to Section 088000 "Glazing" for testing and inspection sequence and criteria.
 1. Preconstruction Testing:
 - a. Sealant Compatibility and Adhesion Testing: Laboratory test performed by joint sealant manufacturer.

3.19 WINDOW WASHING EQUIPMENT

- A. General: Refer to Section 112423 "Exterior Building maintenance" for testing and inspection criteria.
 1. Field Tests: City's testing agency will conduct pull-out load testing.
- B. Manufacturer's Field Service: Engage a factory-authorized technical representative to provide periodic and final inspections.

END OF SECTION

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Requirements for temporary fencing, utilities, support facilities, and security and protection facilities.
- B. Related Sections:
 - 1. Section 007300 "Supplementary Conditions" for Environmental Tobacco Smoke (ETS) Control.
 - 2. Section 010000 "General Requirements" for noise mitigation compliance.
 - 3. Section 013100 "Project Management and Coordination" for noise mitigation plan.
 - 4. Section 015639 "Temporary Tree and Plant Protection" for additional requirements not addressed in this Section.
 - 5. Section 015650 "Protection Measures for Nesting Birds".
 - 6. Section 017300 "Execution Requirements" for progress cleaning requirements.
 - 7. Divisions 02 through 49 Sections for temporary heat, ventilation, and humidity requirements for products in those Sections.

1.2 DEFINITIONS

- A. Permanent Enclosure: As determined by Architect, permanent or temporary roofing is complete, insulated, and weather tight; exterior walls are insulated and weather tight; and all openings are closed with permanent construction or substantial temporary closures.

1.3 USE CHARGES

- A. General: Cost or use charges for temporary facilities shall be included in the Contract Sum. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Construction Manager, Architect, occupants of Project, testing agencies, and authorities having jurisdiction.
- B. Water Service: Water from Owner's existing water system is not available for use without metering and without payment of use charges. Contractor is responsible for coordination of this activity with the City of Sunnyvale Public Works Department. Upon substantial completion, Owner will be responsible for usage charges.
- C. Electric Power Service: Owner's existing electrical system has been disconnected and removed and is not available for use. Contractor to provide connections and extensions of services as required for construction operations. Contractor will be responsible to coordinate and make arrangements with PG&E to provide temporary power to the construction site. Contractor will be responsible for all costs associated with the installation of temporary power and any and all use charges for the duration of the contract. Upon substantial completion, Owner will be responsible for usage charges.
- D. Temporary Fencing: Contractor to provide and maintain screened temporary fencing at the perimeter of the project site (and elsewhere as required) with adequate protection provide to pedestrians and the public outside of the project site. If there is any exposure to falling objects outside of the project site then the Contractor must provide a covered walkway. Temporary fencing to be revised as necessary to accommodate any project phasing.

1.4 SUBMITTALS

- A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel and Construction Managers.
- B. Erosion- and Sedimentation-Control Plan: Show compliance with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.
- C. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire prevention program.

1.5 QUALITY ASSURANCE

- A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.6 PROJECT CONDITIONS

- A. Temporary Use of Permanent Facilities: Installer of each permanent service shall assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibility.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Pavement: Comply with Division 32 Section "Asphalt Paving." and Section "Concrete Paving."
- B. Temporary Chain-Link Fencing: Minimum 2-inch, 9-gage, galvanized steel, chain-link fence with privacy screening fabric mesh; minimum 6 feet high with galvanized steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch- OD corner and pull posts, with 1-5/8-inch-OD top and bottom rails. Galvanized Steel posts will be required to be driven into the ground for support and stability.

2.2 TEMPORARY FACILITIES FOR PROJECT SITE

- A. Field Office, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.
- B. Field Offices: Provide and maintain for the duration of the Work a temporary office on site for use by the Contractor and a separate onsite trailer for use by the Owner, Construction Manager and the Architect.
 - 1. Owner's Representative. This office shall be a self-contained construction trailer, minimum size 12' X 60', and shall be set up with an office at each end, a bathroom, an area for plans and an area for meetings/conferences. Each office will include a desk (minimum size of 30" X 60"), a rolling office chair (chosen by the CM) and two (2) guest chairs. The conference area furnishings will include a table of sufficient size to accommodate a minimum of twelve people, 16 folding chairs, a plan table, a plan rack, shelves for binders, three (3) lockable 4-drawer filing cabinets. The conference area shall also include two trashcans, water cooler (with bottled water service for entirety of

- project), fire extinguisher, smoke detector, and a complete set of unmarked Contract Documents for the Owner's Representative's use.
2. The office shall also be equipped with a scanner/copier/printer with feeder tray and a dedicated data line (also with wireless option) that print sizes up to 11x17 with outside maintenance service plan, printer copier speed to be confirmed with construction manager.
 3. Two (2) dedicated parking spaces will be provided for use by the Construction Manager's staff.
 4. Offices shall be provided with a door and lock with security bar and a window with a minimum size of 4 feet x 3 feet and security screen. Provide and maintain an electric heater and air conditioning along with adequate electric lighting for each office.
 5. Provide portable water, water services and sewer connections to bathrooms with restroom supplies. If no sewer connection is available contractor is to provide an above ground tank with service and overflow alarm. Contractor to provide at minimum of (1) weekly cleaning of restrooms and office facilities.
 6. Provide microwave and refrigerator for trailer staff.
- C. Office Supplies: The Contractor shall supply the field office of the Owner's Representative with (2) cases of 8-1/2 x 11 paper, (1) case of 11 x 17 paper, (1) box post-it notes, (1) box white-out tape, (1) stapler with staples, (1) box assorted binder clips, (1) box paperclips, (1) box of pens, (1) box of pencils, Printer/Copier Toner or Ink, (2) surge protectors, (1) 24' extension cord, (2) water cooler bottles, (1) box coffee cups, coffee, hand soap, (3) rolls paper towels and (1) case toilet paper. Supplies shall be restocked monthly on an as-needed basis.
- D. Network Setup: The network shall have the following requirements:
1. The internet connection shall have at a minimum a 20-Meg upload / 100-Meg download speed. This should be accomplished via a hard-wired connection. Contractor to provide dedicated network system specific for Construction Manager's use.
 - a. Wired network connections must be provided at
 - 1) The Offices, Planroom, and the Printer/Scanner.
 - 2) A minimum of (8) hard wired connections will be required, location of ports to be approved by Construction Manager.
 - b. Reasonable access to power for the equipment must be provided.
 - c. Offices shall also be equipped with secure wireless internet capabilities to allow for onsite uses access to email and the internet.
 2. If it is necessary to "piggyback" off of an existing hard-wired line, the line provided to the Owner's Representative shall be an unfiltered line, with no limitations set by the main line holder, such as access restrictions or DNS port blocking.
 3. In the cases where a hard-wired connection is not available, the wireless connection provided must meet the same speed needs of 20-Meg upload / 100-Meg download. It shall also be of sufficient bandwidth to meet the needs of the staff.
 4. In the case of sites where the internet speeds do not meet the above requirements, a local storage device must be provided for the location to save the project data. The local storage device will be connected to the Kitchell network, and backed up during non-business hours to the Kitchell network server.
- E. Provide fully outfitted temporary pre-fabricated and pre-engineered units to serve as locker rooms for the Public Safety Building while the locker areas are undergoing renovation.
- F. Temporary Field Fencing: Provide fence size, material and privacy screen fabric mesh to encompass each site, furnish and installed, equipped for entrance of utility trucks (minimum 16-foot gates) and man gates for easy access.
- G. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

2.3 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system in writing, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
 - 1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
 - 2. Heating Units: Listed and labeled for type of fuel being consumed, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
 - 3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return air grille in system and remove at end of construction.
- C. Construction Lighting: Construction lighting shall not generally be used except when necessary such as for utility connections in roadways or when natural light during regular construction hours (Monday through Friday from 7:00 am to 6:00 pm and on Saturday from 8:00 am to 5:00 pm) is limited. Stationary lighting used during construction shall be shielded and directed downward or oriented such that the light source is not directed toward residential areas or into streets where glare could impact motorists or pedestrians.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION FOR PROJECT SITE

- A. General: Install temporary service or connect to existing service.
 - 1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Electric Power Service: It is the Contractor's responsibility to coordinate with PG&E to obtain the temporary electrical service, including submission of services applications, load calculation, and single line diagrams. The Contractor will also be responsible for payment of the monthly PG&E invoices and all other temporary requirements as outlined within the specification section.
 - 1. Contractor shall provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
 - 2. Install electric power service overhead, unless otherwise indicated.
 - 3. Coordinate with Owner to connect temporary service to existing power source, as directed by Owner.
 - 4. Contractor will furnish and pay for power during the course of the work to the extent power is not in the building(s) or on the Site. Contractor shall be responsible for providing temporary facilities require on the Site to point of intended use.

- C. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
 - 1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.
- D. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.
- E. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
- F. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
- G. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
- H. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
 - 1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
 - 2. Contractor shall furnish, wire for, install and maintain temporary electrical lights wherever it is necessary to provide illumination for the proper performance and/ or observe of the Work: a minimum of 20 foot-candles for rough work and 50 foot-candles for finish work.
 - 3. Contractor shall be responsible for maintaining existing lighting levels in the Project vicinity should temporary outage or service interruptions occur.
- I. Construction lighting shall not generally be used except when necessary such as for utility connections in roadways or when natural light during regular construction hours (Monday through Friday from 7:00 am to 6:00 pm and on Saturday from 8:00 am and 5:00 pm) is limited. Stationary lighting used during construction shall be shielded and directed downward or oriented such that the light source is not directed toward residential areas or into streets where glare could impact motorists or pedestrians.
- J. Electronic Communication Service: Provide temporary electronic communication service, including electronic mail in field office, minimum of Cat 6 wiring for hard-wired applications. Provide for wireless internet connectivity through the use of a secure Wi-Fi connection.

3.3 TEMPORARY CONTROLS

- A. Noise Control
 - 1. Contractor acknowledges that adjacent facilities may remain in operation during all or a portion of the Work, and it shall take all reasonable precaution to minimize noise as required by applicable laws and the Contract Documents.
 - 2. Notices of proposed noisy operations, including without limitation, operation of pneumatic demolition tools, concrete saws, and other equipment, shall be submitted to Construction Manager a minimum of seventy-two (72) hours in advance of their performance. Contractor responsible for obtaining all permits required for construction noise outside of the times allowable within the noise ordinance.

3. Contractor to meet the Conditions of Approval related to Noise Control as defined in the Contract Documents.
- B. Noise and Vibration
1. Equipment and impact tools shall have intake and exhaust mufflers.
 2. Contractor shall cooperate with Construction Manager to minimize and /or cease the use of noisy and vibratory equipment if that equipment becomes objectionable by its longevity.
 3. Contractor to meet the Conditions of Approval related to noise and vibration as defined in the Contract Documents.
- C. Dust and Dirt
1. Contractor shall conduct demolition and construction operations to minimize the generation of dust and dirt, and prevent dust and dirt from interfering with the progress of the Work and from accumulating in the Work and adjacent areas including, without limitation, occupied facilities.
 2. Contractor shall water exterior demolition and construction areas daily and or continuously to minimize the generation of dust and dirt.
 3. Contractor shall ensure that all hauling equipment and trucks carrying loads of soil and debris shall have their loads sprayed with water or covered with tarpaulins, and as otherwise required by local and state ordinance.
 4. Contractor shall prevent dust and dirt from accumulating on walks, roadways, parking areas, and planting, and from washing into sewer and storm drain lines.
 5. Contractor to meet the Conditions of Approval related to dust and dirt as defined in the Contract Documents.
 6. Fugitive Dust Control
 - a. At a minimum the following control measures must be implemented during construction:
 - 1) When moisture content is low enough to create dust, all exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day, or as often as needed to control dust emissions.
 - 2) All haul trucks transporting soil, sand, or other loose material off-site shall be covered.
 - 3) All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited.
 - 4) All vehicle speeds on unpaved roads shall be limited to 15 mph.
 - 5) All roadways, driveways, and sidewalks to be paved shall be completed as soon as possible. Building pads shall be laid as soon as possible after grading unless seeding or soil binders are used.
 - 6) Post a publicly visible sign with the telephone number and person to contact at the City of Sunnyvale regarding dust complaints. The City of Sunnyvale shall respond and take corrective action within 48 hours. The Air District's phone number shall also be visible to ensure compliance with applicable regulations.
 - 7) Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes (as required by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations [CCR]). Clear signage shall be provided for construction workers at all access points.
 - 8) Construction equipment shall be properly maintained by a certified mechanic.

- D. Exhaust Controls: All construction equipment used during construction shall be fitted with Level 3 Diesel Particulate Filters (DPF) and engines shall meet or exceed the U.S. Environmental Protection Agency Certified Tier 3 emission standards.
 - 1. Prior to issuance of any construction permit, the construction contractor shall ensure that all construction plans submitted to the City of Sunnyvale clearly show the requirement for Level 3 DPF and Tier 3 or higher emission standards for construction equipment.
 - 2. The construction contractor shall maintain a list of all operating equipment in use on the project site for verification by the City of Sunnyvale Building Division official or their designee.
 - 3. The construction equipment list shall state the makes, models, and number of construction equipment onsite to verify compliance with the requirement for equipment to have Level 3 DPF and Tier 3 or higher emission standards.
- E. Environmental Tobacco Smoke (ETS) Control
 - 1. Where outdoor areas are provided for smoking within 25 feet of building entries, outdoor air intakes and operable windows and within the building as already prohibited by other laws or regulations; or as enforced by ordinances, regulations or policies of any city, county, city and county, whichever are more stringent. When ordinances, regulations or policies are not in place, post signage to inform building occupants of the prohibitions.

3.4 SUPPORT FACILITIES INSTALLATION

- A. General: Comply with the following:
 - 1. Provide incombustible construction for offices, shops, and sheds located within construction area or within thirty (30) feet of building lines. Comply with NFPA 241.
 - 2. Maintain support facilities until near Substantial Completion. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.
- B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas within construction limits indicated on Drawings.
 - 1. Provide dust-control treatment that is nonpolluting and non-tracking. Reapply treatment as required to minimize dust.
- C. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas in same location as permanent roads and paved areas. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.
 - 1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
 - 2. Recondition base after temporary use, including removing contaminated material, regrading, proof-rolling, compacting, and testing.
- D. Traffic Controls: Comply with requirements of authorities having jurisdiction.
 - 1. Protect existing site improvements to remain including curbs, pavement, and utilities.
 - 2. Maintain access for fire-fighting equipment and access to fire hydrants.
- E. Parking: Contractor is to provide temporary parking for construction personnel within confines of the designated construction site. If parking within the designated construction site becomes unavailable due to number of Trades, Subcontractors and Vendors, Contractor shall be responsible for coordinating with the City of Sunnyvale for parking requirements, locations, permits, shuttle services, etc.

- F. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water. (refer to demolition drawings for specifics)
 - 1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties nor endanger permanent Work or temporary facilities.
- G. Project Identification and Temporary Signs: Provide Project identification and other signs as indicated on drawings. Install signs where indicated to inform public and individuals seeking entrance to Project. Unauthorized signs are not permitted.
 - 1. Provide temporary, directional signs for construction personnel and visitors.
 - 2. Maintain and touchup signs so they are legible at all times.
- H. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with Section 01 7300 "Execution Requirements" for progress cleaning requirements.
- I. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
 - 1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.
- J. Temporary Elevator Use: Elevator use will be allowed subject to Owner approval of protection measures and conditions of use.
- K. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.
- L. Temporary Use of Permanent Stairs: Cover finished permanent stairs with protective covering of plywood or similar material so finishes will be undamaged at time of acceptance.

3.5 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
- B. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction.
- C. Stormwater Control: Comply with authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
- D. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.
- E. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using environmentally safe materials.
- F. Temporary Site Enclosure Fence: All costs associated with the installation and monthly fencing rental fees and demobilization of the fencing will be the responsibility of the contractor. Furnish

and install any additional site enclosure fence panels in a manner that will prevent people and animals from easily entering site except by entrance gates. Contractor is responsible for all costs related to revisions to temp fencing to allow for construction phasing and operations.

1. Temporary Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations and protection of the public. Operations include temporary offices, parking, staging areas, actual construction site.
- G. Security Enclosure and Lockup: Install substantial temporary enclosure around partially completed areas of construction. Contractor is responsible to ensure that the fencing and all gates are secured and locked prior to leaving the site on a daily basis to prevent unauthorized entrance, vandalism, theft, and similar violations of security.
- H. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- I. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weather-tight enclosure for building exterior.
 1. Where heating or cooling is needed and permanent enclosure is not complete, insulate temporary enclosures.
 2. Insulate partitions to provide noise protection to occupied areas.
 3. Seal joints and perimeter. Equip partitions with dustproof doors and security locks.
 4. Protect air-handling equipment.
 5. Weather strip openings.
 6. Provide walk-off mats at each entrance through temporary partition.
- J. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by Owner from fumes and noise.
 1. Construct dustproof partitions with gypsum wallboard with joints taped on occupied side, and fire-retardant plywood on construction operations side.
 2. Construct dustproof partitions with 2 layers of 3-mil polyethylene sheet on each side. Cover floor with 2 layers of 3-mil polyethylene sheet, extending sheets 18 inches up the sidewalls. Overlap and tape full length of joints. Cover floor with fire-retardant plywood.
 - a. Construct vestibule and airlock at each entrance through temporary partition with not less than 48 inches between doors. Maintain water-dampened foot mats in vestibule.
- K. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.
 1. Smoking is prohibited in all construction areas.
 2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
 3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
 4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.6 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
 2. At Substantial Completion, clean and renovate permanent facilities used during construction period. Comply with final cleaning requirements specified in Division 01 Section "Closeout Procedures."

END OF SECTION

SECTION 015639 – TEMPORARY TREE AND PLANT PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. General protection and pruning of existing trees and plants that are affected by execution of the Work, whether temporary or permanent construction or on adjacent properties.
- B. Related Sections:
 - 1. Section 000200 "Information Available" for tree assessment report.
 - 2. Refer to Drawings for identification of specific trees to be protected.

1.2 TREE PROTECTION PLAN

- A. A Tree Protection Plan shall be prepared by the Contractor in coordination with the City's ISA-certified Project Arborist in accordance with the requirements of MM Biology -3, as well as City of Sunnyvale ordinance 19.94.110 and 19.94.120. All project work will be conducted in accordance with the Tree Protection Plan.
- B. Ground-disturbing activities shall be conducted outside of the dripline of protected trees. When ground-disturbing activities (i.e., trenching, excavating) encounters roots smaller than two inches occurs outside of the dripline of protected trees, the roots shall be hand trimmed, making clear, clean cuts. All damaged, torn, and cut roots shall be given a clean cut to remove ragged edges, which promote decay.
- C. Trenches shall be filled within 24 hours, but, where, this is not possible, the side of the trench/excavation area adjacent to the protected trees shall be shaded with four layers of dampened, untreated burlap, wetted as frequently as necessary to keep the burlap wet.
- D. Roots two inches or larger, when encountered, shall be reported immediately to the Project Arborist, who shall decide whether the applicant may cut the roots as mentioned above or shall excavate by hand or with compressed air under the root. The root shall be protected with dampened burlap.
- E. In addition, the top two feet of the foundation closest to the protected trees shall be air spaded or hand dug under supervision of the Project Arborist to locate and evaluate any significant roots prior to mechanical excavation.
- F. The Project Arborist shall be required to submit a report to the City regarding the findings of the excavation and recommend any additional actions needed to protect the roots to preserve the health and structure of both the redwood and oak trees. To avoid conflict with roots, underground utilities shall be routed outside of an area, ten times the diameter of a protected tree. In addition, where it is not possible to reroute pipes or trenches, the utility shall be routed beneath the dripline, but as far away from the trunk as possible. The boring shall take place not less than three feet below the surface of the soil in order to avoid encountering feeder roots.
- G. Underground Utilities: To avoid conflict with roots, underground utilities shall be routed outside of an area, ten times the diameter of a protected tree. In addition, where it is not possible to reroute pipes or trenches, the utility shall be routed beneath the dripline, but as far away from the trunk as possible. The boring shall take place not less than three feet below the surface of the soil in order to avoid encountering feeder roots.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 015650 – PROTECTION OF NESTING BIRDS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. General protection of nesting birds that are affected by execution of the Work, whether temporary or permanent construction or on adjacent properties.

1.2 PROTECTION OF NESTING BIRDS

- A. Use of heavy equipment, grading, demolition, construction, and/or tree removal shall avoid the nesting season to the greatest extent feasible.
- B. If construction activities occur during the nesting season, a preconstruction survey for active bird nests on and within 500 feet of the project site shall be conducted by a qualified biologist within 3 days prior to construction start.
- C. In the event active nests are identified within 500 feet of proposed work, work shall stop and the qualified biologist shall establish appropriate "no-disturbance buffer" zones using orange mesh environmentally sensitive area fencing. Prior to construction, this "no-disturbance buffer" will be evaluated in consultation with California Department of Fish and Wildlife and a determination made whether work can proceed.
- D. Any established "no-disturbance buffer" zones will be maintained until the end of the breeding season or until a qualified biologist has determined that the nestlings have fledged.
- E. A qualified biologist shall inspect the active nest to determine whether work activities are disturbing to the nesting birds or nestlings. If the qualified biologist determines that construction activities disturb nesting, construction shall cease and the "no-disturbance buffer" shall be expanded.
- F. Construction workers shall conduct daily inspections for nests. If a nest is discovered by workers on-site, work shall stop and the qualified biologist shall determine whether construction activities can continue following the protocol identified above.
- G. Lighting shall be limited to areas required for operations or safety, shall be directed on-site to avoid backscatter, and shall be shielded from public view to the extent practical. Lighting that is not required to be on during nighttime hours shall be controlled with sensors or switches operated such that lighting shall be on only when needed.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 015700 - TRAFFIC CONTROL SYSTEM

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. This Section sets forth the minimum requirements for traffic routing and traffic control under Contract Documents.
- B. The following traffic control measures shall be incorporated into the Temporary Traffic Control plan prepared as required by the City:
 - 1. Road and Lane Closures
 - a. Time road and lane closures to avoid peak (AM and PM) commuting hours.
 - b. Road closures along West Olive Avenue shall be prohibited during construction. Two lanes of traffic shall be retained at all times on West Olive Avenue.
 - 2. Construction Traffic and Safety
 - a. Time construction worker commute and haul truck trips to avoid peak (AM and PM) commuting hours.
 - b. Construction traffic routes shall avoid the intersection of Mary Avenue/ West Olive Avenue.
 - c. Flaggers shall be posted to control the traffic into and out of the construction site.
 - 3. Notification
- C. The Contractor (having C-10 license issued by the State of California Contractors State License Board) may perform the traffic routing work utilizing his/her own forces, or may engage a subcontractor to perform the traffic routing work. If the Contractor intends to engage a subcontractor to perform this work, the subcontractor must possess a C-31 Construction Zone Traffic Control license issued by the State of California Contractors State License Board, and said subcontractor shall be listed on the list of Subcontractors to be submitted as part of the sealed bid.
- D. If the Contractor does not have a proper license (Contractor's Type C-10 license), he shall have C-31 Construction Zone Traffic Control License issued by the State of California, Contractors Licensing Board to perform any Traffic Routing Work or shall engage a subcontractor who has C-31 license issued by the State of California to perform Traffic Routing work, and said subcontractor shall be listed on the list of Subcontractors to be submitted as part of the sealed bid.
- E. The Contractor shall provide for the protection of the traveling public, pedestrians, bicyclists, and workers within the area covered by the limits of construction, at all times when the area is affected by his/her construction facilities or activities. The Contractor attention is directed to Section 7-1.09, "Public Safety", of the Caltrans Standard Specifications (2010 Edition). Nothing in these Special Provisions shall be construed as relieving the Contractor from his responsibility as provided in said Section 7-1.09.
- F. The Contractor shall so conduct his/her operations as to cause the least possible obstruction and inconvenience to the public and area residents, and shall have under construction no greater length or amount of work, than set forth in the specifications, and that he can prosecute properly

with due regard to the rights of the public and area residents. The Contractor attention is directed to Section 7-1.08, "Public Convenience", of the Caltrans Standard Specifications (2010 Edition).

- G. The Contractor shall furnish, install, relocate to provide for lane shifting, remove, store, maintain (including covering and uncovering as required), move to new locations, replace when damaged or missing and dispose of all traffic signs and traffic control devices and features necessary for safety and convenience of the general public and area residents, and for safeguarding the workers and the work, where, and as required by conditions at the site of the work, and in addition to the requirements specified herein, including but not limited to the following:

1. Traffic signs and parking prohibition signs
2. Barricades with flashers
3. Water-filled K-rail
4. Delineators
5. High level warning devices
6. Solar-powered flashing arrow signs
7. Pedestrian barricades
8. Temporary striping and reflective markers, overlay markers, for both construction and interim re-alignments of traffic lanes, cross-walks prior to final striping
9. Providing certified flag persons
10. Responding to requests and complaints from local merchants and residents regarding traffic related complaints.

The Contractor attention is directed to Section 12, "Construction Area Traffic Control Devices", of the Caltrans Standard Specifications (2010 Edition) and the latest edition of the California Manual on Uniform Traffic Control Devices.

- H. The Contractor shall provide traffic lanes and routing of vehicular and pedestrian traffic, as specified herein, in a manner that will be safe and will minimize traffic congestion and delays during construction.

1.2 APPLICABLE STANDARDS

- A. In addition to compliance with this specification, the Contractor shall comply with all applicable requirements of the latest editions of the following:
1. *California Vehicle Code.*
 2. Other Applicable Government Regulations.
 3. *City of Sunnyvale Temporary Traffic Control Requirements and Checklist.*
 4. Section 12, "Traffic Control," of the *Caltrans Standard Specifications (2010 Edition)*, Department of Transportation, State of California (Caltrans Standard Specifications) except as modified herein.

5. *California Manual of Uniform Traffic Control Devices*, Department of Transportation, State of California.
6. *Manual of Traffic Controls for Construction and Maintenance Work Zones*, Department of Transportation, State of California.
7. *Work Area Traffic Control Handbook*, BNI Books.

1.3 SUBMITTALS

The Contractor shall make the following submittals and get them approved by the authority having jurisdiction (AHJ) before starting any work in the streets:

- Traffic Control and Pedestrian Access Plans
- Storage and Parking Plan
- Schedule of Construction
- Resume and Certification of two Flag Persons
- Truck Routes

1.3.1 Traffic Control and Pedestrian Access Plans

- A. Revised traffic control and pedestrian access plans shall be required for any deviation from the approved traffic control and pedestrian access plans as furnished by the Contractor and must be approved by the AHJ. A separate set of traffic control and pedestrian access plans shall be required for working and non-working hours. The plans shall include an affidavit signed by the licensed engineer who prepared them attesting that he/she has personal knowledge of the traffic conditions in the work areas, understands the impacts the work will have on vehicular, pedestrian, and other modes of transportation, and that the traffic plans comply fully with all ADA requirements and all City of Sunnyvale requirements related to providing path of travel through construction zones.
- B. Complete traffic control, pedestrian access, and detour plans shall be submitted within 15 calendar days following Notice To Proceed. The Contractor shall allow twenty-one (21) calendar days for the Local Agency to review and approve the traffic control plans. A Traffic Control Plan (TCP) shall be submitted via PDF through the eBuilder process. Maximum drawing size shall be 36" X 24". The traffic control plans shall be drawn to a scale of 1 inch = 50 feet. The Contractor shall submit the plans to the Local Agency Traffic Engineer, through the AHJ for approval. No work shall be allowed on the streets without the approved traffic control plans. The Contractor shall use the existing striping plans as a base to prepare the traffic control plans.
- C. Submit construction plans/specs and traffic control and pedestrian access plans with the City of Sunnyvale. Allow at least 2 weeks for review and processing. Fees from the City of Sunnyvale will be waived.
- D. Each traffic control and pedestrian access plan shall show the following minimum applicable information, as required by the AHJ:
 1. Street and traffic lane layout (width of sidewalk, street and lanes etc.); outline of the work under construction (i.e., limits of excavation), location of construction barricades, location of trench protection devices, location of major construction equipment and the ingress and egress routes of trucks hauling materials to and from the construction site.
 2. Sequence of construction and traffic lane transitions.

3. Crosswalk and sidewalk closures and detours.
4. Existing striping, pavement markings and traffic signs, and description of what is to be removed prior to installation of temporary striping and signage, and what will be restored after the construction is completed.
5. Location and spacing of "Tow-Away No Stopping" signs.
6. Location and description of temporary striping, pavement markings, signs, and other traffic control devices necessary to provide and maintain the adequate number and width of traffic lanes specified herein, and to provide and maintain passage and protection for pedestrians.
7. Location and description of traffic control devices proposed for the protection of the work area, excavation, etc.
8. Other proposed changes and provisions for removal, relocation, or temporary installation of:
 - (a) Traffic signs
 - (b) Transit stops
 - (c) Barricades
 - (d) Solar operated flashing arrow signs
 - (e) Traffic Signals
9. The Contractor shall make their own arrangements to find a location for their office/trailer(s). The Local Agency will not provide a location. The trailer(s) shall be located away from intersections in order not to block traffic control devices (STOP signs, signals etc.), hydrants, bus stops, or driveways.
10. Location of detour signs for vehicular, truck, and pedestrian traffic.
11. Truck Routes: Contractor shall submit truck routes for the approval of the AHJ.
12. Storage and Parking Plans

The Contractor shall submit plans for materials storage and equipment parking, for each area of the work, along with the traffic control plans.

Storage, stockpiling or placement shall not in any way obstruct any lane or passageway intended for vehicular or pedestrian traffic.

Storage, stockpiling, or placement of any equipment, materials or supplies within the area of any public street or alley, including the sidewalks thereof, will only be allowed when previously approved by the AHJ on the storage and parking plans.

Previous approvals notwithstanding, if the AHJ determines that such storage, stockpiling or placement is causing a violation of the foregoing or of any law or order of any regulatory body having jurisdiction, the Contractor shall cease or modify the storage, stockpiling or placement as necessary to comply with the specifications, laws, and

orders. No additional compensation will be provided for such modifications to the Contractors storage and stockpiling.

13. Not Used

14. Resume and Certification of Two Flag Persons

The flag persons shall have a minimum experience of one year of manual Traffic Controls on similar construction projects. The flag persons shall have passed "The Flagger Training Course" offered by the National Safety Council Western Regional Office, 303 Twin Dolphin Drive, Suite 520, Redwood City, CA 94065, (800) 848-5588 or from some other reputable institution. The flag persons must have valid certification. The Contractor shall submit the resume of at least two flag persons to the AHJ for review and approval.

15. Truck Routes

The Contractor shall submit plans for truck haul routes, for each area of the work, along with the traffic control plans. Truck haul routes shall be approved by the AHJ and shall comply with all local ordinances for each jurisdiction along the proposed truck routes.

PART 2 – PRODUCTS

2.1 GENERAL

- A. All traffic signs, barricades, delineators, flashing arrow signs and other traffic control devices shall conform to the requirements of the "Manual of Traffic Controls for Construction and Maintenance Work Zones", published by the State of California, Department of Transportation, and to the requirements of the Caltrans Standard Specifications (2010 Edition), except as specified herein.
- B. All special construction traffic signs shall be reflectorized with black messages/symbols having 6" (15 cm) and 8" (20 cm) high series D letters on orange colored aluminum plate. The message and size of the letters shall be determined by the AHJ through the Traffic Engineer. Any changes on any signs shall be made with appropriate decals.
- C. All barricades shall have flashers. The flashers shall be maintained in good operating condition at all times by the Contractor.
- D. Temporary Asphalt, Temporary Wood Ramp, 4-foot wide minimum walking surface with running slope not to exceed eight (8) percent.
- E. Barricade materials: Delineators, A-Frames, Barrier Caution Tape, Fencing Material, water-filled K-rail
- F. Any equipment that does not operate properly or any device that is not in good operating condition shall be removed from the job site immediately at the Contractor's expense.

2.2 DELINEATORS

Delineators for lane taper areas for the separation of traffic from other work, shall be either reflectorized traffic cones minimum 28 inches (71 cm) high, or reflectorized portable tubular delineators minimum 36 inches (91 cm) high, with orange posts and yellow/white reflectors. Reflector units shall be 3"x 12" (8 cm x 30 cm) minimum.

2.3 PLATING

Metal plating and any metal bridging shall be coated with a non-skid and rust-inhibitive product. Plating shall be installed and maintained in such a manner as to provide a non-skid surface with no edges or corners sticking up, and with no bouncing or shifting under traffic loading/impacts. All metal planting within public streets shall sit flush with grade.

PART 3 – EXECUTION

3.1 VEHICULAR AND PEDESTRIAN TRAFFIC

A. Traffic Control System for Lane Closure

A traffic control system shall consist of closing traffic lanes and ramps in accordance with the details shown on State Standard Plans T-11, T-12 and T-14, the provisions of Section 12, "Construction Area Traffic Control Devices," of the Caltrans Standard Specifications (2010 Edition), and the provisions of this Section.

The Traffic Control Plan shall comply with Traffic Control Plan Guidelines available from the City. The checklist is also available online at the following link:

<https://sunnyvale.ca.gov/civicax/filebank/blobdload.aspx?blobid=23792>

The provisions in this section will not relieve the Contractor from the responsibility to provide additional devices or take measures as may be necessary to comply with the provisions in Section 7-1.09, "Public Safety," of the Caltrans Standard Specifications (2010 Edition).

Each vehicle used to place, maintain and remove components of a traffic control system on multilane roads shall be equipped with a Type II flashing arrow sign which shall be in operation when the vehicle is being used for placing, maintaining, or removing the components. Vehicles equipped with a Type II flashing arrow sign not involved in placing, maintaining, or removing the components when operated within a stationary type lane closure shall only display the caution display mode. The sign shall be controllable by the operator of the vehicle while the vehicle is in motion.

If any component in the traffic control system, including signal detection and fiber optics, is displaced, or ceases to operate or function as specified, from any cause, during the progress of the work, the Contractor shall immediately repair the component to its original condition or replace the component, and shall restore the component to its appropriate location. The traffic system shall be restored within 48 hours.

When lane closures are made for work periods only, at the end of each work period, all components of the traffic control system, except portable delineators placed along open trenches or excavations adjacent to the traveled way, shall be removed from the traveled way and shoulder. If the Contractor so elects, the components may be stored at selected central locations, if approved by the AHJ.

The Contractor shall provide lanes, as tabulated below, to satisfactorily accommodate vehicular traffic. Vehicular/ pedestrian access to properties along the project site shall be maintained at all times. Bicycle lanes shall be maintained by the Contractor at all times during construction. Appropriate warning signs designed for bicyclists shall be used by the Contractor, as necessary, so bicyclists can safely traverse the construction zone.

B. Maintaining Pedestrian Access

The Contractor shall provide a continuous, accessible and safe path of travel around or through construction work zones for pedestrians. The Contractor shall use temporary asphalt or wood ramps, signs, cones, barricades, flashers, and flaggers to direct and channel pedestrians during construction. Advance warning shall be provided to pedestrians of the present sidewalk construction site. Means for temporary access for pedestrians with disabilities, such as temporary ramps, boardwalks, hand railings, etc., shall be in compliance with applicable Americans with Disabilities Act Accessibility Guidelines (ADAAG) and Americans with Disabilities Act (ADA) regulations.

Placement:

Temporary ramps shall be constructed so installation and removal will not damage existing pavement, curb, or gutter.

Ramps shall have a minimum 4-foot wide walking surface and a running slope not to exceed 8 percent.

Ramps shall meet existing surfaces without gaps. When required for drainage, a Schedule 40 PVC pipe minimum 2-inch diameter shall be installed under or through the ramp in gutter or flow line.

Transitions between ramps and the street or sidewalk surfaces shall be smooth.

Sides of the ramp shall be protected with hand railings where drop-offs exceed 6 inches.

Maintenance of a Clear and Accessible Pedestrian Corridor:

The Contractor shall maintain an accessible corridor that provides at least one safe path of travel for all pedestrians at all times for the duration of the project. Conversely, if a safe path of travel is not available, the Contractor shall post the sidewalk as being closed with detour route signage. Signage shall be placed at the location of closure as well as the next intersection in both directions.

Installation of Barricades:

Barricades, which will provide protection for pedestrians from traffic or construction operations, shall be installed in the following locations:

Between the pedestrian access route and any adjacent construction site

Between the alternate circulation path and any adjacent construction site

Between the alternate circulation path and the vehicular way, if the alternate circulation path is diverted into the street

Between the alternate circulation path and any protruding objects, drop-offs, or other hazards to pedestrians

At the down curb ramp of an intersection, if opposite up curb ramp is temporarily or completely blocked, and no adjacent alternative circulation path is provided.

Surfacing of Pedestrian Corridors:

During construction, tripping hazards and barriers for people with mobility impairments must be removed to maintain an accessible pedestrian corridor.

Identification of Safe Path of Travel:

If alternate circulation routes are provided for pedestrians to bypass the construction site, the route shall be clearly defined and advance warning shall be provided to clearly delineate the alternate circulation route. Any change of level in a path of travel that is over ¼ inch (1/2" maximum) height must be beveled a 45 degrees to provide a smooth, non- tripping transition. The City of Sunnyvale Traffic Engineers shall review and approve any pedestrian access limitations and notification requirements for pedestrians with mobility or vision impairments.

Public Convenience and Safety:

All trenches shall be backfilled at the end of the day or temporary covers shall be maintained during non-working hours to avoid any safety issues for pedestrians walking on the project areas.

The Contractor shall contact the property Owners 72-hours prior to any disruption to driveway. Closure of driveways or access to private property shall be minimized.

The Contractor shall make all arrangements with the property Owner for the use of private land for detours and for any other purpose and shall make the City and Cities free from any liability incurred through the use or non-use of such private property. All costs for Contractor to use private property shall be at his sole expense.

Warning Signs:

The Contractor shall provide warning signs for temporary ramps and barricades. Warning signs shall be located at both the near side and the far side of the intersection preceding a temporarily completely blocked pedestrian way.

Restoration of Pedestrian Routes:

After construction, the site shall be restored to its former condition, or new condition as required. Restoration of sidewalk areas shall be completed within 5 calendar days following demolition of existing sidewalks and pedestrian pathways. Sidewalk closures in excess of 5 calendar days will be subject to liquidated damages.

Full compensation for providing, installing, removing and maintaining devices for "Maintaining Pedestrian Access" shall be considered as included in the contract lump sum price paid for "Traffic Control System" and no separate payment will be allowed therefore.

3.2 SPECIAL INSTRUCTIONS

- A. The Contractor shall comply with all traffic control requirements as specified in the encroachment permit for each Local Agency.

3.3 NO PARKING SIGNS

- A. The Contractor will furnish and post "No Parking" signs, as necessary, not less than 72 hours in advance of scheduled work that will restrict parking. If the work is not performed during the timeframe indicated on the "No Parking" signs, the work will be rescheduled with at least ten (10) working days advance notice. The Contractor shall leave the streets open to traffic until just prior to starting the work, and will provide all barricades, signs and traffic control necessary to protect

the work. The Contractor will perform all re-posting of “No Parking” signs and re-notification occasioned by his failure to meet the posted schedule.

- B. “No Parking” signs shall indicate time, day, and date and the statement “Violators will be Towed at City’s Expense - CVC 22651 For info on Towed Vehicles call [Contractor to coordinate with Local Agency Inspector for appropriate contact phone number for towed vehicles]”
- C. The Contractor shall furnish and place the sign, spaced every 50 feet, as approved by the AHJ. The Contractor shall maintain the signs on a continual basis and shall replace damaged or missing signs daily, and shall remove the signs immediately after they are no longer needed.

3.4 TEMPORARY CONSTRUCTION AND TRAFFIC SIGNS

- A. The Contractor shall be familiar with the latest edition of California Department of Transportation’s “Manual of Traffic Controls for Construction and Maintenance Work Zones”, and the Special Provisions of the Contract.
- B. The Contractor, before starting any work which will affect the normal flow of traffic, shall furnish, install where and as necessary, or directed, and maintain, temporary signs, mounted on barricades or other suitable supports.
- C. The Contractor shall, as a minimum, furnish and make available to the site the following signs and equipment in sufficient quantities to maintain required traffic routing:
 - 1. Barricades, as required by Section 21,400 of the State of California Vehicle Code and as specified in the State of California’s Department of Transportation “Manual of Traffic Controls, for Construction and Maintenance Work Zones”, dated 1990, in a sufficient amount to safeguard the public and the work.
 - 2. “NO PARKING” signs as herein specified.
 - 3. Traffic cones and delineators and temporary reflectorized removable tape of 3M Series 5710 (white), Series 5711 (yellow) or equal, to delineate traffic lanes as required to guide and separate traffic movements, as directed by the AHJ.
 - 4. High level warning flag units, in advance of traffic approaching the work, each displaying three (3) flags mounted at a height of 8 feet (2.4 m).
 - 5. Additional signs as required by the AHJ.

The actual number and type of signs to be placed shall be as shown on the approved traffic control and pedestrian access plans or as directed by the AHJ.

All the signs and temporary striping shall be reflectorized. All signs shall be installed so that the bottom of the sign is at least 7 feet (2.1 m) above the sidewalk or pavement, or as directed by the AHJ.

- D. The signs and equipment shall conform to the requirements of the latest edition of the "California Manual on Uniform Traffic Control Devices" and to applicable local agency Noise Ordinances.
- E. The Traffic Control Plan shall comply with Traffic Control Plan Guidelines available from the City. The checklist is also available online at the following link:
<https://sunnyvale.ca.gov/civicax/filebank/blobdload.aspx?blobid=23792>

3.5 TRAFFIC CONTROL

A. TRAFFIC COORDINATION WITH OTHERS

- 1. The Contractor, in order to maintain a continuous flow of traffic, shall coordinate the traffic routing work with sub-contractors and other contractors, working in the same adjacent area. This includes truck traffic hauling materials, equipment and etc.
- 2. All proposed traffic routing changes shall be subject to approval of the Traffic Engineer through the AHJ.
- 3. The Contractor is also required to coordinate this work with other projects occurring within or adjacent to the limits of work.

B. TRAFFIC CONTROL FLAG PERSONS

- 1. Flaggers, flagging procedures (signaling), flagger stations and flagger control, shall conform to Section 5-07, of the Caltrans "Manual of Traffic Controls for Construction and Maintenance Work Zones", 1990.
- 2. The Contractor shall ensure that flaggers are trained in the proper fundamentals of flagging traffic before being assigned as flaggers.
- 3. The flaggers shall be used in each situation where the Contractor's equipment or vehicles back up into a travel lane, or occupy intermittently a traffic lane, or enter from the work area into a traffic lane, or where required for traffic control, as directed by the AHJ.

3.6 MAINTENANCE OF TRAFFIC

- A. The Contractor shall cause the least possible interference with traffic. Obstruction or closure of any roadway to vehicular or pedestrian traffic will not be permitted, except in the immediate vicinity of the work.
- B. Those parts of public streets, ways and sidewalks that are occupied by the Contractor shall be immediately vacated and returned to public use when the use thereof is no longer necessary for the prosecution of the work.
- C. The Contractor, except as hereinafter provided, shall not impede, at any time, free access for vehicles and pedestrians to warehouses, stores, service stations, dwellings, garages and other properties in the vicinity of the work and on adjacent streets, including those properties fronting on streets allowed or stipulated by the Specifications to be closed to through vehicular traffic. Such local access shall be maintained by phasing operations, bridging, or employing other procedures approved by the AHJ.
- D. The Contractor shall obtain written permission of each affected property or business City, or responsible building or business manager, for any proposed period of prohibition or impediment of such access. Prohibition or impediment of access to any building or property, for which the AHJ does not have a copy of the specified signed permission, will not be allowed.

- E. Access to fire hydrants, to assure their immediate and unhampered use at all times, shall not be impaired by the Contractor. No debris, materials or equipment shall be placed within 10 feet of any fire hydrant.

3.7 DIVERTING OF VEHICULAR TRAFFIC

- A. When closing one or more lanes to vehicular traffic or to otherwise divert such traffic from its normal paths, the Contractor shall clearly delineate temporary centerlines separating two-way traffic, and dividing lines for other temporary traffic lanes, by employing cones, barricades, flags, reflectors, or other approved methods or devices.
- B. Placing of devices shall commence sufficiently in advance of the obstruction or other cause of the diverting of traffic to minimize congestion and shall enable traffic to enter, traverse and leave the site of the work without abrupt or unwarranted changes in direction. Unless otherwise specified or approved, each temporary traffic lane shall be not less than 10 feet clear width.
- C. When a detour is necessary for full or partial roadway closure, all detour signs needed for the required traffic routing must be in place before the roadway can be closed for construction. Failure to comply with this requirement shall result in liquidated damages associated with improper lane closure.
- D. High rise warning flag units, each displaying three flags mounted at the height of 8 feet, to provide advance warning for traffic approaching the work, will be required in all cases where motorists' visibility of the work is limited or obscured.

3.8 RELOCATION AND REMOVAL OF EXISTING PERMANENT TRAFFIC CONTROL AND SIGNS

- A. The Contractor shall be familiar with all existing permanent traffic signs and other traffic control devices within the project limits.
- B. The Contractor shall temporarily relocate all traffic control, street name, and other Local Agency signs, as required for the prosecution of the work and to prevent interference with traffic signal installations, and shall satisfactorily maintain such signs in place at all times. The standards for such signs shall be similarly relocated, or removed and salvaged as Local Agency property. The Contractor shall salvage standards in their entirety, and shall remove any concrete therefrom.
- C. The temporary relocation of each arterial traffic regulatory sign shall be done immediately upon its removal, and to a location as close as possible to the original position of such sign, or where directed by the AHJ.
- D. The Contractor shall permanently relocate traffic control and other signs and standards to the locations shown, as directed in the plans. Signs to be removed and salvaged are to be delivered by the Contractor to the Corp Yard of the Local Agency,
- E. At least 5 working days prior to the time the Contractor's work will be done to the point that permanent installation of the signs temporarily relocated can be inspected, the AHJ shall be notified.
- F. If additional materials (sign, pole, frame, mounting equipment, etc.) and adjustments are identified as needed during the inspection, the associated cost shall be borne by the Contractor for an additional cost to be included in a contract change order.

END OF SECTION

SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; product substitutions; and comparable products.
- B. See Section 017700 "Closeout Procedures" for submitting warranties for Contract closeout.
- C. See Divisions 02 through 49 Sections for specific requirements for warranties on products and installations specified to be warranted.

1.2 DEFINITIONS

- A. Products: Items purchased for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
 - 2. New Products: Items that have not previously been incorporated into another project or facility, except that products consisting of recycled-content materials are allowed, unless explicitly stated otherwise. Products salvaged or recycled from other projects are not considered new products.
 - 3. Comparable Product: Product that is demonstrated and approved through submittal process, or where indicated as a product substitution, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
- C. Basis-of-Design Product Specification: Where a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other named manufacturers.

1.3 SUBMITTALS

- A. Substitution Requests: Refer to Section 012513 "Substitutions".
 - 1. Documentation: Refer to Section 012513 "Substitutions"
 - 2. Comparable Product Requests: Refer to Section 012513 "Substitutions"
- B. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 013300 "Submittal Procedures." Show compliance with requirements.
- C. Samples: Contractor shall maintain a list of approved product samples, listing manufacturer, contact information, and specific attributes of selected and approved product (such as manufacturer's product number and color). This list shall be turned over to the Owner upon project completion.

1.4 QUALITY ASSURANCE

- A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, product selected shall be compatible with products previously selected, even if previously selected products were also options.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.
- B. Delivery and Handling:
 - 1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
 - 2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
 - 3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
 - 4. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
- C. Storage:
 - 1. Store products to allow for inspection and measurement of quantity or counting of units.
 - 2. Store materials in a manner that will not endanger Project structure.
 - 3. Store products that are subject to damage by the elements, under cover in a weather tight enclosure above ground, with ventilation adequate to prevent condensation.
 - 4. Store cementitious products and materials on elevated platforms.
 - 5. Store foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
 - 6. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
 - 7. Protect stored products from damage and liquids from freezing.

1.6 MANUFACTURER'S LABELS AND NAME PLATES

- A. Except as otherwise indicated for required labels and operating data, do not permanently attach or imprint manufacturer's or producer's nameplates or trademarks on exposed surfaces of products which will be exposed to view either in occupied spaces or on the exterior of the completed project. Visible, non-required labels and nameplates shall be removed.
 - 1. Labels: Locate required product labels and stamps on a concealed surface or, where required for observation after installation, on an accessible surface which, in occupied spaces, is not conspicuous.
 - 2. Equipment Nameplates: Provide a permanent nameplate on each item of service-connected or power-operated equipment. Locate the nameplate on an easily accessible surface which is inconspicuous in occupied spaces. The name plate shall contain the following information as well as other essential operating data:
 - a. Name of manufacturer.
 - b. Model number.
 - c. Serial number.
 - d. Capacity.

1.7 PRODUCT WARRANTIES

- A. Refer to Section 017836 "Warranties"

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, that are new at time of installation.
1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
 2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
 3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
 4. Where products are accompanied by the term "as selected," Architect will make selection.
 5. Where products are accompanied by the term "match sample," sample to be matched is Architect's.
 6. Descriptive, performance, and reference standard requirements in the Specifications establish "salient characteristics" of products.
- B. Product Selection Procedures:
1. Product: Where Specifications name a single product and manufacturer, provide the named product that complies with requirements.
 2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements.
 3. Products: Where Specifications include a list of names of both products and manufacturers, provide one of the products listed that complies with requirements.
 4. Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements.
 5. Available Products: Where Specifications include a list of names of both products and manufacturers, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product.
 6. Available Manufacturers: Where Specifications include a list of manufacturers, provide a product by one of the manufacturers listed, or an unnamed manufacturer, that complies with requirements. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product.
 7. Product Options: Where Specifications indicate that sizes, profiles, and dimensional requirements on Drawings are based on a specific product or system, provide the specified product or system. Comply with provisions in Part 2 "Product Substitutions" Article for consideration of an unnamed product or system.
 8. Basis-of-Design Product: Where Specifications name a product and include a list of manufacturers, provide the specified product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product by the other named manufacturers.
 9. Visual Matching Specification: Where Specifications require matching an established Sample, select a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.

- a. If no product available within specified category matches and complies with other specified requirements, comply with provisions in Part 2 "Product Substitutions" Article for proposal of product.
- 10. Visual Selection Specification: Where Specifications include the phrase "as selected from manufacturer's colors, patterns and textures" or a similar phrase, select a product that complies with other specified requirements.
 - a. Standard Range: Where Specifications include the phrase "standard range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, density, or texture from manufacturer's product line that does not include premium items.
 - b. Full Range: Where Specifications include the phrase "full range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 016400 – OWNER-FURNISHED ITEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for treatment of owner-furnished items.

1.2 DEFINITIONS

- A. Owner-Furnished Items: Physical property, items or equipment supplied by the owner for placement, integration and installation into the Work.

1.3 PROCEDURES

- A. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the Owner-Furnished item(s) into the Project.
 - 1. Include as part of each installation, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
 - 2. Coordinate all trades involved.
 - 3. Coordinate for inspections that might involve installed items.
- B. Notification: No later than 60 days following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to alternates.
- C. For Owner Furnished Contractor Installed items
 - 1. Delivery and placement: Delivery to the site by the Owner. Item shall be off loaded by the contractor may be placed near installation as is practical, or at a location of the Contactor's convenience. Contractor will be responsible for final positioning at installation. Contractor will be responsible for the item once delivered to the site, until the Project is turned back over to the Owner.
 - 2. Execute installation under the same conditions as other work of the Contract.
- D. Schedule: A Schedule of Owner-Furnished Items is included at the end of this Section. Specification Sections (may or may not be) referenced in schedule contain requirements for materials necessary to achieve the work described under each item.
- E. Owner Furnished Owner Installed
 - 1. Site Access: Provide access to Project site for Owner's construction personnel.
 - 2. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel.
 - a. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
 - b. Preinstallation Conferences: Include Owner's construction personnel at preinstallation conferences covering portions of the Work that are to receive Owner's construction personnel at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences

conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF OWNER-FURNISHED ITEMS

- A. Site:
 - 1. Owner furnished items as noted on the plans.
- B. Building:
 - 1. Moveable Furniture, unless noted otherwise.
 - 2. Telecom equipment.
 - 3. Fitness Apparatus/Equipment
 - 4. Individual equipment chargers
 - 5. Dispatch equipment, radios, antennas
 - 6. Owner furnished items as noted on the plans.

END OF SECTION

SECTION 017113 – MOBILIZATION

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Mobilization consists of preparatory work including, but not limited to, work necessary for the mobilizing and furnishing at the site, equipment, materials, supplies and incidentals; for the establishment of all offices, buildings and other temporary facilities necessary for work on the project; cost for pre-paid bonds and insurances; and for all other work and operations which must be performed or costs incurred to begin work on the various Bid Items at the project site. Compensation for mobilization includes, but is not limited to, the following principal items:
1. Moving onto the site of all Contractor's equipment required for operations.
 2. Installing temporary construction power and wiring.
 3. Developing and installing construction water supply.
 4. Providing all on-site communication facilities, including telephones.
 5. Providing on-site sanitary facilities and potable water facilities.
 6. Arranging for and erection of Contractor's work and storage yard(s).
 7. Obtaining and paying for all required bonds and insurances including the bond required by Article 2.4 of the Public Works Code.
 8. Posting all OSHA-required notices and establishing safety programs.
 9. Having the Contractor's superintendent at the job site full time, whenever construction is in progress.
 10. Submitting preconstruction submittals, including:
 - a. Construction Schedule as specified in Section 01 3216 Construction Progress
 11. This item shall also include contractor demobilization; removal of Contractor's temporary facilities and installations, tools, equipment, and all other materials from the premises upon completion of the work and final clean up of the project area
- B. Contractor is alerted to the condition that the maximum amount to be listed for Mobilization in the Contractor prepared Schedule of Values shall not exceed five percent (5%) of the various line items sub-total, excluding the Mobilization item itself.

1.2 RELATED SECTIONS

- A. Division 00 – General Requirements and Supplemental General Provisions
- B. Section 013300 – Submittal Procedures
- C. Section 015000 - Temporary Facilities and Controls

1.3 PAYMENT

- A. The line Item amount in the Schedule of Values for "Mobilization" will be paid over the course of the project based on percent completion of the work.

% Mobilization Payment	%Project Completion
50%	2%
70%	5%
90%	10%
100%	50%

- B. Any extension of the contract time that may be granted will not of itself constitute grounds for a claim for additional payment under the Bid Item "Mobilization."

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

END OF SECTION

SECTION 017300 - EXECUTION REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes general procedural requirements governing execution of the Work including, but not limited to, the following:
 - 1. Construction layout.
 - 2. Field engineering and surveying.
 - 3. General installation of products.
 - 4. Cutting and patching.
 - 5. Progress cleaning.
 - 6. Starting and adjusting.
 - 7. Protection of installed construction.
 - 8. Correction of the Work.
- B. See Section 017839 "Project Record Documents" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.
- C. Related Requirements:
 - 1. Section 011100 "Summary of Work" for limits on use of Project site.
 - 2. Section 017700 "Closeout Procedures" for submitting Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.

1.2 SUBMITTALS

- A. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.
- B. Certificates: Submit certificate signed by land surveyor certifying that location and elevation of improvements comply with requirements.

1.3 QUALITY ASSURANCE

- A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.
- B. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
 - 1. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
- C. Any disturbed street monuments need to be reset and a record of the survey filed with the County (at Contractor's sole expense).

1.4 EXAMINATION

- A. Existing Utilities: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities and other construction affecting the Work.
 - 1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; and underground electrical services.
 - 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
 - 3. Each existing utility shall be dimensionally located on the as-builts as they are found
- B. Acceptance of Conditions: Examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
 - 1. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
 - 2. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
 - 3. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
 - 4. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

1.5 PREPARATION

- A. Existing Utility Information: Furnish information to local utility that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, and no later than 5 working days, submit a request for information to Architect. Include a detailed description of problem encountered, together with recommendations for changing the Contract Documents.

1.6 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.
- B. General: Engage a land surveyor to lay out the Work using accepted surveying practices.
 - 1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
 - 2. Establish limits on use of Project site.

3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
 4. Inform installers of lines and levels to which they must comply.
 5. Check the location, level and plumb, of every major element as the Work progresses.
 6. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
 7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
- C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and invert elevations.
- D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.
- E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

1.7 FIELD ENGINEERING

- A. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
- B. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.
1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
- C. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.
- D. Final Property Survey: Not required
- E. Record of survey needed for any disturbed street monuments.

1.8 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
1. Make vertical work plumb and make horizontal work level.
 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- F. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- G. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.
 - 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
 - 2. Allow for building movement, including thermal expansion and contraction and seismic forces.
 - 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- H. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- I. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

1.9 CUTTING AND PATCHING

- A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties
- C. Temporary Support: Provide temporary support of work to be cut.
- D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- E. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable
 - 1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.

2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.

- F. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

1.10 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.
 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 2. Do not hold materials more than seven (7) days during normal weather or three (3) days if the temperature is expected to rise above 80 deg F.
 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
 4. All areas shall be broom cleaned, at a minimum, once per week.
- B. Site: Maintain Project site free of waste materials and debris. Water site as needed to maintain dust control. Should cleaning of adjacent properties or replacement of filters be required due to lack of dust control, contractor shall pay for services required.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
 1. Remove liquid spills promptly.
 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to assure that no part of the construction completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

1.11 STARTING AND ADJUSTING

- A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- B. Adjust operating components for proper operation without binding. Adjust equipment for proper operation.
- C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Manufacturer's Field Service: If a factory-authorized service representative is required to inspect field-assembled components and equipment installation, comply with qualification requirements in Section 014000 "Quality Requirements."

1.12 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Comply with manufacturer's written instructions for temperature and relative humidity.

1.13 CORRECTION OF THE WORK

- A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Section 017329 "Cutting and Patching."
 - 1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.
- B. Restore permanent facilities used during construction to their specified condition.
- C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.
- D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.
- E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 017329 - CUTTING AND PATCHING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes procedural requirements for cutting and patching.

1.2 SUBMITTALS

- A. Cutting and Patching Proposal: Submit a proposal describing procedures at least 10 days before the time cutting and patching will be performed, requesting approval to proceed. Include the following information:
 - 1. Extent: Describe cutting and patching, show how they will be performed, and indicate why they cannot be avoided.
 - 2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building's appearance and other significant visual elements.
 - 3. Products: List products to be used and firms or entities that will perform the Work.
 - 4. Dates: Indicate when cutting and patching will be performed.
 - 5. Utility Services and Mechanical/Electrical Systems: List services/systems that cutting and patching procedures will disturb or affect. List services/systems that will be relocated and those that will be temporarily out of service. Indicate how long services/systems will be disrupted.
 - 6. Structural Elements: Where cutting and patching involve adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with original structure.
 - 7. Architect's Approval: Obtain approval of cutting and patching proposal before cutting and patching. Approval does not waive right to later require removal and replacement of unsatisfactory work.

1.3 QUALITY ASSURANCE

- A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.
- B. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that result in increased maintenance or decreased operational life or safety.
- C. Miscellaneous Elements: Do not cut and patch miscellaneous elements or related components in a manner that could change their load-carrying capacity, and result in reducing their capacity to perform as intended, or that result in increased maintenance or decreased operational life or safety.
- D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections.
- B. In-Place Materials: Use materials identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
 - 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.
 - 1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with in-place finishes or primers.
 - 2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Temporary Support: Provide temporary support of Work to be cut.
- B. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- D. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.

3.3 PERFORMANCE

- A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
 - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.

3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 4. Excavating and Backfilling: Comply with requirements in applicable Division 31 Sections where required by cutting and patching operations.
 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 6. Proceed with patching after construction operations requiring cutting are complete.
- C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections.
1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 4. Ceilings: Patch, repair, or re-hang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
 5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.
- D. Cleaning: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

END OF SECTION

SECTION 017419 - CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Section 018113 – Sustainable Design Requirements, for sustainable design goals and submittals.
- C. LEED Reference Guide for Building Design and Construction (BD+C), version 4, U.S. Green Building Council.
- D. LEED v4.1 Building Design and Construction (BD+C), Getting Started Guide for Beta Participants (Beta Guide), U.S. Green Building Council, issued January 2020.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
 - 1. Waste Management Goals.
 - 2. Diversion and disposal of demolition and construction waste.
 - 3. Construction and Demolition Waste Management Plan (C+DWM Plan).
 - 4. C+DWM Plan implementation.
 - 5. Requirements and documentation for LEED Certification. The C+DWM Plan is part of the Project LEED Requirements.
 - 6. Appendix A: Sample Construction and Demolition Waste Tracking Log.
 - 7. Appendix B: Construction and Demolition Waste Calculator.
- B. Sustainable Design Requirements: The Owner requires the Contractor to implement practices and procedures to meet the Project's environmental performance goals, which include achieving LEED v4 Certification. Refer to Section 018113 - SUSTAINABLE DESIGN REQUIREMENTS for the Project's target certification level and specific LEED requirements. The Contractor shall ensure that the requirements related to the Project's sustainability design goals are implemented to the fullest extent. Substitutions, or other changes to the work proposed by the Contractor or their Subcontractors, shall not be allowed if such changes compromise the Project's sustainability goals and LEED certification.

1.3 REFERENCES

- A. Abbreviations and Acronyms:
 - 1. ADC: Alternative Daily Cover
 - 2. BD+C: Building Design + Construction
 - 3. C+D: Construction and Demolition
 - 4. C+DWM Plan: Construction and Demolition Waste Management Plan
 - 5. CORR: Certification Institute's Certification of Real Rates
 - 6. CRR: Construction Recycling and Reuse
 - 7. LEED: Leadership in Energy and Environmental Design
 - 8. NC: New Construction
 - 9. USGBC: US Green Building Council

B. Definitions:

1. Alternative Daily Cover (ADC): Cover material other than soil placed on the surface of a municipal solid waste landfill at the end of each operating day to control vectors, fires, odors, blowing litter, and scavenging.
2. Clean: Untreated and unpainted; not contaminated with oils, solvents, caulk, or the like.
3. Commingled Waste: Waste streams that are combined on the project site and hauled away for sorting into recyclable streams. Commingled Waste is considered as one Diversion Stream unless diversion rates can be provided by the recycling facility for specific materials based on measured quantities. Commingled Waste may be considered as two Diversion Streams provided that all commingled waste is sent to an offsite sorting facility (or facilities) certified by the Recycling Certification Institute or approved equivalent, and the certification period covers the entire time period that waste is generated for the Project and sent to the facility.
4. Construction and Demolition Waste: Building and site improvement materials and other solid waste resulting from construction, demolition, remodeling, renovation, or repair operations. Construction waste includes packaging. Hazardous materials, land clearing debris, excavation soil, and landscaping materials are not included.
5. Construction and Demolition Waste Management Plan (C+DWM Plan): A project-specific plan for the collection, separation, handling, transportation, and disposal of waste generated at the construction site, to reduce the amount of waste sent to landfill or incineration.
6. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations. Hazardous materials, land clearing debris, excavation soil, and landscaping materials are not included.
7. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.
8. Diversion: To remove, or have removed, from the site for recycling, reuse, salvage, donation, or wood combustion, materials that might otherwise be sent to a landfill or incinerator. Diversion from landfill does not include burning, incinerating, thermally destroying waste, or waste-to-energy processes, except for wood-derived fuel or wood combustion, which is considered diversion.
9. Diversion Rate: The percentage of material by weight that is diverted from landfill or incineration by Recycling, Salvage, Reuse, donation, or combustion (for wood only). The total weight of Recycled, Salvaged, Reused, and donated material, plus combusted wood, is the numerator; the total weight of Construction and Demolition Waste is the denominator. Land clearing debris, excavation soil and landscaping materials, and hazardous waste SHALL NOT be included in total weight of Construction and Demolition Waste for this calculation. ADC and non-wood waste used as incinerator fuel do not count as diversion but must be included in total construction and demolition waste. Diversion Rate is also referred to as 'Recycling Rate'.
10. Diversion Stream: A flow of materials coming from a job site into markets for building materials, comprised of both a Material Category (or mixture of several material categories) and a Diversion Method. A Diversion Stream shall constitute at least five percent (5%), by weight or volume, of total diverted materials for the Project.
 - a. Examples of Diversion Streams include source separated materials sent to specific recycling facilities, commingled waste sent to a mixed-waste recycling facility, deconstructed materials sent back to a manufacturer as part of a take-back program, or salvaged materials reused on site.

- b. Examples of Material Categories include the following. Each of these material categories below is considered a separate Diversion Stream when separated on site, however multiple materials that are commingled on site are considered one Diversion Stream. Commingled Waste may be considered as two Diversion Streams provided that all commingled waste is sent to an offsite sorting facility (or facilities) certified by the Recycling Certification Institute or approved equivalent, and the certification period covers the entire time period that waste is generated for the Project and sent to the facility.
 - 1) Metal
 - 2) Glass
 - 3) Plastic
 - 4) Wood
 - 5) Masonry
 - 6) Cardboard/paper
 - 7) Gypsum Board
 - 8) Ceiling Tile
 - 9) Carpet
 - c. Examples of Diversion Methods include:
 - 1) On-site Separation: Gypsum scrap; metal framing scrap; ceiling tile scrap; carpet scrap
 - 2) On-site waste diversion: Crushing concrete or asphalt for reuse onsite
 - 3) Reuse Off-site: Pallets; wood reels; blankets
 - 4) Salvage
 - 5) Donations: Tax deductible; non-tax deductible
- 11. Land Clearing Debris and Soil: Natural materials such as rock, soil, stone and vegetation. Excludes man-made materials even if found on-site pre-construction.
 - 12. Non-Diversion Streams: Materials disposed of via landfills (including Alternative Daily Cover) or incinerators (excluding wood combustion).
 - 13. Onsite Separation: Placing of selected materials in special containers or areas on the Project site to implement disposal in a segregated waste stream, for specialized recycling.
 - 14. Packaging: Materials used for the protection or handling products delivered to the site, but which are not installed as part of the Work. Examples: Wood reels, pallets, blankets.
 - 15. Recyclable: The ability of a product or materials to be recovered at the end of its life cycle and remanufactured into a new product.
 - 16. Recycle (Recycling): Recovery of demolition and construction waste for subsequent processing in preparation for reuse.
 - 17. Return: To send back reusable or unused products to vendors or manufacturers.
 - 18. Reuse: Recovery of demolition or construction waste and subsequent incorporation on site into the Work of this Project.
 - 19. Salvage: Recovery of demolition or construction waste from existing buildings or construction sites and subsequent sale or reuse in another facility.
 - 20. Segregation: To place similar waste materials together for collection in a designated site area, trash bin, or roll-off container.
 - 21. Source Reduction: Strategies minimizing potential waste that is brought to or generated on the site. Examples: Reduced packaging; industry standard dimensioned materials; prefabrication.
 - 22. Waste Stream: Comprised of two major substreams: waste disposed of via landfills or incinerators and waste diverted from disposal through recycling, reuse, salvage, or

donation (i.e., Diversion Stream). Land clearing debris, soil and landscaping materials, and hazardous waste do not qualify as a Waste Stream.

23. Waste-To-Energy: The conversion of non-recyclable waste materials into usable heat and/or fuel through a variety of processes such as combustion (not including the combustion of wood into wood-derived fuel), gasification, pyrolyzation, anaerobic digestion, and land fill gas.

C. Reference Standards

1. ISO/IEC Guide 65, General Requirements for Bodies Operating Product Certification Systems
2. ISO/IEC 17065, Conformity Assessment – Requirements for Bodies Certifying Products, Processes and Services
3. ISO 14000, Family of Standards

1.4 PERFORMANCE REQUIREMENTS

- A. Project Diversion Goal: The Owner has established a goal to achieve total diversion rate of a minimum of seventy five percent (75%) by weight for the total non-hazardous solid waste generated by the Work, including at least four (4) identified Diversion Streams.
- B. Project Diversion Goal: The Owner has established a goal to achieve total diversion rate of a minimum of seventy five percent (75%) by weight or volume for the total non-hazardous solid waste generated by the renovation and demolition Work.
- C. Alternative Daily Cover (ADC) must be accounted for in the waste diversion calculations, but for the purposes of LEED Certification, does not qualify as material diverted from disposal.
- D. General: Practice efficient waste management in the use of materials in the course of the Work. Use all reasonable means to divert construction and demolition waste from landfills and incinerators. Facilitate recycling and salvage of materials.
- E. Diversion Requirements: Salvage, recycle, or reuse as much non-hazardous construction waste as possible. Diversion shall include, but not be limited to, the following waste categories as applicable to the Project:
 1. Demolition Waste:
 - a. Asphalt paving.
 - b. Concrete.
 - c. Concrete reinforcing steel.
 - d. Brick.
 - e. Concrete masonry units.
 - f. Clean dimensional wood, trim, paneling, plywood, and oriented strand board.
 - g. Structural and miscellaneous steel.
 - h. Rough hardware.
 - i. Roofing materials.
 - j. Insulation.
 - k. Doors and frames.
 - l. Door hardware.
 - m. Windows.
 - n. Glass and Glazing.
 - o. Metal studs.
 - p. Gypsum board.
 - q. Acoustical tile and panels.

- r. Carpet and Carpet pad.
 - s. Flooring materials.
 - t. Demountable partitions.
 - u. Casework.
 - v. Plumbing fixtures.
 - w. Piping.
 - x. Supports and hangers.
 - y. Electrical conduit.
 - z. Supports and hangers.
 - aa. Valves.
 - bb. Sprinklers.
 - cc. Mechanical equipment.
 - dd. Refrigerants.
 - ee. Electrical conduit.
 - ff. Copper wiring.
 - gg. Lighting fixtures.
 - hh. Lamps.
 - ii. Ballasts.
 - jj. Electrical devices.
 - kk. Switchgear and panelboards.
 - ll. Transformers.
2. Construction Waste:
- a. Masonry and CMU.
 - b. Lumber.
 - c. Wood sheet materials.
 - d. Wood trim.
 - e. Metals.
 - f. Roofing.
 - g. Insulation.
 - h. Carpet and pad.
 - i. Gypsum board.
 - j. Piping.
 - k. Electrical conduit.
 - l. Packaging: Regardless of diversion goal indicated in "General" Paragraph above, salvage or recycle 100 percent of the following uncontaminated packaging materials:
 - 1) Paper.
 - 2) Cardboard.
 - 3) Boxes.
 - 4) Plastic sheet and film.
 - 5) Polystyrene packaging.
 - 6) Wood crates.
 - 7) Plastic pails.
 - m. Waste generated by on-site workers, such as plastic and metal beverage containers.
- F. Hazardous Waste: Take appropriate measures for safe collection, storage and disposal of hazardous waste (e.g. batteries, mercury-containing lamps, e-waste), in accordance with all applicable law, codes, and standards.

1.5 SUBMITTALS

- A. General: Submit the following according to Conditions of the Construction Contract and Division 01 Specification Sections. Quantities shall be indicated using weight (lbs. or tons) throughout the duration of the Project.

- B. Construction and Demolition Waste Management Plan (C+DWM Plan): Within 30 days of date established for the Notice to Proceed, submit for approval a detailed C+DWM Plan in accordance with the following requirements:
1. Project Diversion Goal, as outlined in this Section.
 2. Identify responsible parties for C+DWM Plan implementation.
 3. Waste Identification: Identify Material Categories targeted for diversion, but at a minimum five.
 4. For each Material Category, identify Diversion Method, including but not limited to:
 - a. On-site Separated
 - b. Commingled
 - c. Re-Use: Wood pallets; Wooden reels; Blankets
 - d. Salvage (when applicable)
 - e. Sale or Donation (when applicable)
 5. List all Diversion Streams applicable to the Project, but at a minimum four (4).
 6. Describe Project-specific means and methods by which waste generated by the Project will be diverted or disposed:
 - a. Materials Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including whether waste will be segregated on-site or commingled and separated off-site, means by which recyclable materials will be protected from contamination, sizes of containers, container labeling procedures, and designated location where materials separation will be performed.
 - b. Describe source reduction strategies to reduce the quantity of C+D waste generated by the Project (e.g., take back of reusable material packaging, such as wood reels, pallets, or blankets).
 - c. Waste Hauling Procedures:
 - 1) Identify names, addresses, and telephone numbers of all Waste Haulers which will be hauling waste materials for the Project.
 - 2) Provide sample waste hauler contract, including waste reporting structure; sample waste report; responsible parties; contact information; and chain of communication.
 - d. Sorting and Recycling Facility Procedures:
 - 1) Identify names, addresses, and telephone numbers of all sorting, recycling, and disposal facilities which will be accepting waste materials for the Project.
 - 2) For facilities that will be accepting commingled waste materials for the Project, identify the local or state authority that regulates the facility. Identify if the facility is certified by the Recycling Certification Institute or approved equivalent that meets the Sorting and Recycling Facility Qualifications, as described in this Section.
 - 3) Describe how all sorting, recycling, and disposal facilities will process waste materials for the Project. Visual inspection is not an acceptable method of evaluation for determining diversion rate of commingled waste streams.
 - e. Salvage, Sale and Donation Procedures:
 - 1) Identify names, addresses, and telephone numbers of all individuals and organizations which will be accepting waste materials for the Project.
 - 2) For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.
 - f. Landfill and Incineration Facility Procedures:
 - 1) Indicate how and where materials will be disposed of.
 - 2) Include name, address, and telephone number of each landfill and incinerator facility. Distinguish between wood and non-wood waste sent to incinerator.

- g. Other Disposal Procedures: Account for and describe disposal method for all other waste materials, including those that will not contribute to diversion from landfill. Non-recyclable waste should be distinguished from non-diverted waste that cannot be included in Diversion Rate calculation, including:
 - 1) Land clearing debris
 - 2) Excavation soil and rock
 - 3) Hazardous Materials (provide summary of materials and identify safe removal and disposal strategies for each material)
 - 7. Kick-off meeting and additional meetings as required informing Subcontracted Trades of requirements, and monitoring their progress towards the Project goals.
 - 8. Waste Reduction Tracking and Documentation: Describe Project-specific means and methods by which diverted or disposed waste generated by the Project will be tracked for reporting.
 - a. Retain waste hauler reports.
 - b. Retain tickets or receipts for all waste disposal at landfill facilities.
 - c. Record estimated weight of materials that are reused or salvaged.
 - d. Retain receipts and record estimated weight of materials that are donated or sold.
 - 9. C+D Waste Estimates: Estimate expected diversion rates for each material stream applicable to the Project.
 - C. Waste Hauler(s) C+D Progress Report: The Waste Hauler(s) shall submit progress reports to the Contractor on a monthly basis. The Waste Hauler(s) C+D Progress Report shall include the following information for the time period covered:
 - 1. The names of all Waste Streams per the C+DWM Plan. This includes Diversion Streams and Non-Diversion streams.
 - 2. The name and address of the sorting, recycling, or disposal facility for each Waste Stream.
 - 3. Weight for each Waste Stream.
 - 4. Total weight of waste.
 - D. Contractor C+D Progress Report: The Contractor shall submit progress reports to the Owner on a monthly basis prior to application for payment. Contractor shall track demolition and construction waste diversion throughout the project and maintain documentation of materials and disposal methods. Progress Reports shall include the following information for the time period covered:
 - 1. Compiled information from all Waste Haulers for all Waste Streams into a single report.
 - 2. Updated Construction & Demolition Waste Tracking Log (see Appendices of this Section) for all waste hauled from site, identifying:
 - a. Date of pick-up by Waste Hauler
 - b. Waste Hauler Name
 - c. Gross Total quantity, measured by weight, of demolition and construction waste hauled from the Project site during the period.
 - d. Quantity of materials disposed of in landfills or incineration facilities as a percentage of total waste during the period.
 - e. Quantity of materials, measured by weight, diverted by methods of recycling, reuse, salvage, and/or donations during the period. Include breakdown of diverted waste for major material types, including but not limited to:
 - 1) Asphalt
 - 2) Cardboard and Papers
 - 3) Carpet and Pad
 - 4) Gypsum Board
 - 5) Wood
 - 6) Commingled Waste
 - 7) Metals

- 8) Glass
 - 9) Masonry
 - 10) Vinyl
 - 11) Concrete
 - 12) Plastic
 - 13) Ceiling Tile
- f. Quantity of land clearing debris, excavation soil, and hazardous material (if applicable). Note that these materials shall be reported but excluded from Waste Diversion Calculations.
 - g. Diverted waste as a percentage of total waste, for the period and cumulative for the project-to-date.
- E. Waste Hauler(s) Sorting Facility Reports: For each waste receiving facility, the Waste Haulers shall provide Sorting Facility Data on sorting facility letterhead to the Contractor each calendar year:
- 1. Name and address of sorting facility.
 - 2. State regulation, license and license number under which the facility operates.
 - 3. End-use information for each Diversion Stream. Provide the following:
 - a. Receiver Information– Facility/Party receiving material from the Sorting Facility
 - b. End Product Information– How material is used by the Receiver (e.g. manufactured into water bottles, used as feedstock for new steel products).
 - 4. If mixed construction and demolition (C+D) waste will be commingled on-site and diverted off-site, provide the following:
 - a. Verification of Diversion Rate: Provide project-specific and/or facility-wide diversion rates in accordance with the following:
 - 1) Project-Specific: On Sorting Facility letterhead, provide project-specific monthly summaries of diversion rates from each waste receiving facility for each Diversion Stream the facility accepts, including statement that visual inspection was not used to estimate weights of Project Diversion Streams. ADC must be listed as a separate line item on the report under the category of non-diverted waste.
 - 2) Facility-Wide: On Sorting Facility letterhead, provide facility-wide aggregated annual averaged diversion rates, average percentage of ADC produced by the facility, and provide documentation that the facility's method of recording and calculating these rates is regulated by a local or state government authority. The facility-wide aggregated annual averaged diversion rate shall include ADC under the category of non-diverted waste.
 - b. Third-party Certification of Diversion Rate: If the sorting facility has third-party verified facility-wide diversion rates according to Recycling Certification Institute's Certification of Real Rates (CORR) Protocol or approved equivalent in accordance with the Sorting and Recycling Facility Qualifications as described in this Section, provide documentation of the independent third-party certification.
- F. Contractor Sorting Facility Report: The Contractor shall provide Sorting Facility Reports for each sorting facility once annually to Owner. If multiple waste haulers or receiving facilities are utilized on the Project, then the Contractor shall aggregate individual reports on an annual basis.
- G. Waste Management Records: Contractor shall maintain the following records and provide to Owner upon request.

1. Recycling and Processing Facility Records: Document receipt and acceptance of recyclable waste by licensed recycling and processing facilities. Include legible copies of on-site logs, manifests, weight tickets, receipts, and invoices.
 2. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include legible copies of manifests, weight tickets, receipts, and invoices.
 3. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and charitable organizations. Indicate whether organization is tax exempt.
 4. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.
- H. Qualification Data: For Waste Management Coordinator, submit data within 30 days of date established for the Notice to Proceed confirming compliance with Waste Management Coordinator Qualifications.
- I. Refrigerant Recovery Report: Submit as refrigerant recovery activities are completed on site, if applicable:
1. Qualification Data for refrigerant recovery technician, indicating Refrigerant Recovery Technician Qualifications are met.
 2. Statement of Refrigerant Recovery:
 - a. Date refrigerant was recovered.
 - b. Statement that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations, signed by refrigerant recovery technician responsible for recovering refrigerant.
 - c. Name, address and telephone number of refrigerant technician.

1.6 CLOSEOUT SUBMITTALS

- A. Provide final approved C+DWM Plan and summary table indicating site-separated waste, by diverted material type, that indicates the total percentage of construction waste diverted from landfill and the identified Diversion Streams prior to request for Substantial Completion.
- B. LEED v4 Construction and Demolition Waste Calculator. At the completion of waste management activities for the Project and prior to final application for payment, the Contractor shall provide a completed LEED v4 Excel Calculator to the Owner summarizing the final diversion and disposal quantities for LEED documentation purposes.
1. A copy of the LEED v4 Construction and Demolition Waste Calculator can be downloaded from: <https://www.usgbc.org/resources/construction-and-demolition-waste-calculator> . A sample is provided in the Appendices of this Section.
 2. The LEED v4 Construction and Demolition Waste Calculator shall include:
 - a. Material description and material type for each material stream.
 - b. Cumulative waste for each material stream, measured by weight, for Project to date.
 - c. Average percentage of ADC produced by the sorting facility receiving commingled waste stream.
 - d. Cumulative diverted waste for each material stream, measured by weight.
 - e. Percent of each material stream diverted.
 - f. Cumulative quantity of each material stream sent to landfill, measured by weight.
 - g. Cumulative diverted waste as a percentage of total waste.
 - h. Gross Total quantity of demolition and construction waste generated on site.
 - i. Gross Total quantity of demolition and construction waste diverted from landfill.
 - j. Total number of material streams tracked for the Project.
 - k. Calculations may be performed using either weight (lbs. or tons), however the method shall be consistent throughout the duration of the Project.

3. Name and location of the recycling or disposal facility that accepted each material.
- C. Waste Hauler(s) Final C+D Report:
1. Submit to Contractor prior to request for Substantial Completion.
 2. Include following information covering the entire time period for Waste Hauler's scope of work:
 - a. The names of the Waste Streams per the C+DWM Plan.
 - b. The name of the sorting or disposal facility for each Waste Stream.
 - c. Sorting Facility Report for each disposal facility.
 - d. Weight for each Waste Stream.
 - e. Total quantity of waste, measured by weight.
 - f. Final Diversion (Recycling) Rate
 3. Provide backup documentation concurrent with the Waste Hauler's Final C+D Report:
 - a. Recycling and Processing Facility Records: Document receipt and acceptance of recyclable waste by licensed recycling and processing facilities. Include legible copies of on-site logs, manifests, weight tickets, receipts, and invoices.
 - b. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include legible copies of manifests, weight tickets, receipts, and invoices.
 - c. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and charitable organizations. Indicate whether organization is tax exempt.
 - d. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.
- D. Contractor Final C+D Report:
1. Compile Waste Hauler(s) Final C+D Reports into a single Final Project C+D Report.
 2. Submit following Substantial Completion and prior to final Application for Payment. The final date of submission will be set by the Owner.
 3. Copies of annual Waste Hauler's Sorting Facility Reports, covering entire Project time period.

1.7 QUALITY ASSURANCE

- A. Waste Management Coordinator Qualifications: Experienced firm, with a record of successful waste management coordination of projects with similar requirements, that employs a LEED-Accredited Professional, certified by the USGBC, as waste management coordinator. Waste management coordinator may also serve as the Contractor's LEED coordinator.
- B. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.
- C. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.
- D. Sorting and Recycling Facility Qualifications:
1. Each commingled recycling facility must be regulated by a local or state authority.
 2. To count commingled waste as two Diversion Streams, each facility must meet one of the following qualification compliance options:
 - a. CORR Certification: Facility has received the Recycling Certification Institute's Certification of Real Rates (CORR), and the certification period covers the entire time period that waste is generated for the Project and sent to the facility.

- b. Approved-Equivalent: Facility's average recycling rates for co-mingled waste streams are certified by qualified third-party organizations, and meet minimum program requirements:
- 1) The third-party certification organization follows guidelines for environmental claims and third-party oversight, including ISO/IEC Guide 65 or ISO/IEC 17065 and relevant portions of the ISO 14000 Family of Standards.
 - 2) The third-party certification organization continuously monitors "certified" facilities to ensure that the facilities are operating legally and meeting the minimum program requirements for facility certification and recycling rates.
 - 3) The third-party certification organization shall certify to a protocol that was developed on a consensus basis for recycling facility diversion rates that is not in a draft or pilot program.
 - 4) The methodology for calculating facility recycling rates must be:
 - a) Developed with construction and demolition recycling industry stakeholders and be specific to the construction and demolition recycling industry;
 - b) Based on a methodology that is applicable across broad regions (i.e. nationally); and
 - c) A published and publicly available standard.
 - 5) Data submitted by the facilities to the certification organization in support of the recycling rate is audited. The audit includes, at a minimum: the evaluation of recyclables sales records, verification of facility sales into commodity markets, monitoring off-site movement of materials, and a review of the facilities' customers weight tags information.
 - 6) Facilities submit data to the certification organization that supports the recycling rate, such as a mass balance recycling rate (tons in/tons out) for a twelve-month period, or quarterly sorts completed and verified by an independent third-party entity.
 - 7) Breakdown of materials (by type and by weight), including analysis of supporting data relating to amounts (in tons) and types of materials received and processed at the facility.
 - 8) At a minimum, the third-party certifying organization conducts an on-site visit of the Facility for the first-year certification, with subsequent site visits occurring at least once every two (2) years, unless additional visits are deemed necessary by the certification organization. The site visit will examine:
 - a) How materials enter, are measured, deposited, processed/sorted and exit facility.
 - b) Conduct interviews with key personnel and discuss how materials are managed after they leave the site.
 - c) Confirm equipment types and capacity.
 - d) Observe and verify load/materials sorting and accuracy.
 - e) Verify use and accuracy of scales including calibration frequency.
 - 9) Diversion rates shall adhere to these requirements:
 - a) Measurements must be based on weight (not volume), using scales.
 - b) Recycling rates must be available on a website and viewable by the general public.
 - c) Methodology for calculating diversion and recycling rates must be publicly available and applicable to national or country-level accounting standards for construction and demolition waste recycling facilities.
 - 10) Facility recycling data submitted to certification program will be analyzed for recycling rates using a mass balance formula or quarterly sorts completed and verified by an in-dependent third-party entity.
 - 11) Final recycling rate will include overall facility recycling rate with and without ADC/Beneficial Reuse, and will include separate recycling rates by material

type as well as combined average including wood derived fuel/bio-fuel separate from other waste to energy or incineration end-markets.

- E. Waste Management Conference: Conduct conference at Project site to comply with requirements in Division 01 Section for "Project Management and Coordination". Review methods and procedures related to waste management including, but not limited to, the following:
 - 1. Review and discuss waste management plan including responsibilities of Waste Management Coordinator.
 - 2. Review requirements for documenting quantities of each type of waste and its disposition.
 - 3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
 - 4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
 - 5. Review waste management requirements for each trade.
- F. Project Meetings: Waste management plans and implementation shall be discussed at the following meetings:
 - 1. Pre-demolition meeting.
 - 2. Pre-construction meeting.
 - 3. Regular job-site meetings.
 - 4. Sub-contractor job-site coordination meetings.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

- A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
 - 1. Comply with operation, termination, and removal requirements in Division 01 Section for Temporary Facilities and Controls.
- B. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan. Coordinator shall be present at Project site full time for duration of Project.
- C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work.
 - 1. Distribute C+DWM Plan to all impacted parties within three (3) days of submittal return.
 - 2. Distribute C+DWM Plan to entities when they first begin work on-site. Review plan procedures and locations established for diversion and disposal.
- D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold. Provide labeling in multiple languages as needed to enable proper communication and understanding.
2. Comply with Division 01 Section for Temporary Facilities and Controls for requirements to control dust and dirt, environmental protection, and noise control.

3.2 SALVAGING DEMOLITION WASTE

- A. Salvaged Items for Reuse in the Work: Salvage items for reuse and handle as follows:
1. Clean salvaged items.
 2. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
 3. Store items in a secure area until installation.
 4. Protect items from damage during transport and storage.
 5. Install salvaged items to comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make items functional for use indicated.
- B. Salvaged Items for Sale and Donation: Not permitted to be stored on Project site.
- C. Salvaged Items for Owner's Use: Salvage items for Owner's use and handle as follows:
1. Clean salvaged items.
 2. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
 3. Store items in a secure area until delivery to Owner.
 4. Transport items to Owner's storage area off-site.
 5. Protect items from damage during transport and storage.
- D. Doors and Hardware: Brace open end of door frames. Except for removing door closers, leave door hardware attached to doors.
- E. Equipment: Drain tanks, piping, and fixtures. Seal openings with caps or plugs. Protect equipment from exposure to weather.
- F. Plumbing Fixtures: Separate by type and size.
- G. Lighting Fixtures: Separate lamps by type and protect from breakage.
- H. Electrical Devices: Separate switches, receptacles, switchgear, transformers, meters, panelboards, circuit breakers, and other devices by type.

3.3 RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL

- A. General: Recycle paper and beverage containers used by on-site workers.
- B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Contractor
- C. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.

- D. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical. At a minimum, four (4) Diversion Streams are required.
1. Provide appropriately marked containers or bins for controlling recyclable waste until removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.
 - a. Inspect containers and bins for contamination and remove contaminated materials if found.
 2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
 4. Store components off the ground and protect from the weather.
 5. Remove recyclable waste from Owner's property and transport to recycling receiver or processor.

3.4 RECYCLING DEMOLITION WASTE

- A. Asphaltic Concrete Paving: Break up and transport paving to asphalt-recycling facility.
- B. Concrete: Remove reinforcement and other metals from concrete and sort with other metals.
1. Pulverize concrete to maximum 1-1/2-inch size.
 2. Crush concrete and screen to comply with requirements in Division 31 Section related to Earth Moving for use as satisfactory soil for fill or subbase.
- C. Masonry: Remove metal reinforcement, anchors, and ties from masonry and sort with other metals.
1. Pulverize masonry to maximum 3/4-inch size.
 2. Clean and stack undamaged, whole masonry units on wood pallets.
- D. Wood Materials: Sort and stack members according to size, type, and length. Separate lumber, engineered wood products, panel products, and treated wood materials.
- E. Metals: Separate metals by type.
1. Structural Steel: Stack members according to size, type of member, and length.
 2. Remove and dispose of bolts, nuts, washers, and other rough hardware.
- F. Acoustical Ceiling Panels and Tile: Stack large clean pieces on wood pallets and store in a dry location.
- G. Metal Suspension System: Separate metal members including trim, and other metals from acoustical panels and tile and sort with other metals.
- H. Carpet and Pad: Roll large pieces tightly after removing debris, trash, adhesive, and tack strips.
1. Store clean, dry carpet and pad in a closed container or trailer provided by Carpet Reclamation Agency or carpet recycler.
- I. Carpet Tile: Remove debris, trash, and adhesive.

1. Stack tile on pallet and store clean, dry carpet in a closed container or trailer provided by Carpet Reclamation Agency or carpet recycler.
- J. Piping: Reduce piping to straight lengths and store by type and size. Separate supports, hangers, valves, sprinklers, and other components by type and size.
- K. Lighting Fixtures: Separate lamps by type and protect from breakage.
- L. Electrical Devices: Separate switches, receptacles, switchgear, transformers, meters, panelboards, circuit breakers, and other devices by type.
- M. Equipment: Drain tanks, piping, and fixtures. Seal openings with caps or plugs. Protect equipment from exposure to weather.
- N. Conduit: Reduce conduit to straight lengths and store by type and size.

3.5 RECYCLING CONSTRUCTION WASTE

- A. Packaging:
 1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
 2. Polystyrene Packaging: Separate and bag materials.
 3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
 4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.
- B. Wood Materials:
 1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
 2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.
 - a. Comply with requirements in Division 32 Section related to Plantings for use of clean sawdust as organic mulch.
- C. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location.
 1. Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.
 2. Comply with requirements in Division 32 Section related to Plantings for use of clean ground gypsum board as inorganic soil amendment.

3.6 DISPOSAL OF WASTE

- A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
 1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.

2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Burning: Do not burn waste materials.
- C. Disposal: Remove waste materials from Owner's property and legally dispose of them.
- D. Disposal: Remove waste materials and dispose of at designated spoil areas on Owner's property.

3.7 APPENDICES

- A. APPENDIX A-017419 – SAMPLE CONSTRUCTION AND DEMOLITION WASTE TRACKING FORM
- B. APPENDIX B-017419 – SAMPLE LEED V4 CONSTRUCTION AND DEMOLITION WASTE CALCULATOR

- END OF SECTION 017419 -

Project Name
MRO6 Construction and Demolition Waste Tracking Log
This worksheet should be filled in by the contractor at regular intervals during construction.

Instructions:
All yellow cells should be filled in by the contractor. All white cells will tabulate automatically. All light green cells show a total which determines the credit status.

Note that

Construction Waste Calculations:

Last Updated: [fill in with today's date]

[illegible]

			Commingled		Excluded				
Glass [tons]	Plastic [tons]	Paper/ Cardboard [tons]	Commingled [tons]	Commingled Diversion Rate [%]	Land Clearing Debris/Solid/Hazar- dous Materials [tons]	Landfilled [tons]	Landfilled [%]	Recycled [tons]	Recycled [%]
0.00	0.00	0.00	0.00		0.00	0.00	#DIV/0!	0.00	#DIV/0!

Calculator

Material Description	Material Type	Material Stream	Total Waste (cubic yards)	Commingled Waste: Average Percentage of ADC Produced by the Sorting Facility (%)	Diverted Waste (cubic yards)	Percent Diverted (%)	Waste to Landfill (cubic yards)	
						0.00%	0.00	
						0.00%	0.00	
						0.00%	0.00	
						0.00%	0.00	
						0.00%	0.00	
						0.00%	0.00	
						0.00%	0.00	
						0.00%	0.00	
						0.00%	0.00	
Total construction waste (cubic yards)								0.00
Total diverted construction waste (cubic yards)								0.00
For D+C projects							0	
For ND projects								
Add Rows							Delete Rows	

SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
 - 1. Inspection procedures
 - 2. Final Completion
 - 3. Warranties
 - 4. Final cleaning
 - 5. Repair of work
- B. See Section 012900 "Payment Procedures" for requirements for Applications for Payment for Substantial and Final Completion.
- C. See Section 017839 "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
- D. See Section 017900 "Demonstration and Training" for requirements for instructing Owner's personnel.

1.2 SUBSTANTIAL COMPLETION

- A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.
 - 1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
 - 2. Advise Owner of pending insurance changeover requirements.
 - 3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 - 4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 - 5. Prepare and submit electronic copies of the following: Project Record Documents, , damage or settlement surveys, property surveys, and similar final record information.
 - 6. Prepare and submit electronic and hard copy of final operation and maintenance manuals (30) days prior to substantial completion.
 - 7. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable. All items shall have a minimum 3"x5" sticker with information related to the project and the material. The final information to be printed on the material shall be agreed to at the time of delivery.
 - 8. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
 - 9. Complete startup testing of systems.
 - 10. Submit test/adjust/balance records.
 - 11. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
 - 12. Advise Owner of changeover in heat and other utilities.
 - 13. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
 - 14. Complete final cleaning requirements, including touchup painting.

15. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
16. Successful completion of Functional Testing for equipment as specified or required.

- B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.
1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
 2. Results of completed inspection will form the basis of requirements for Final Completion.

1.3 FINAL COMPLETION

- A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:
1. Submit a final Application for Payment according to Division 01 Section 2900 "Payment Procedures."
 2. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
 3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
 4. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.
- B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.4 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Preparation: Submit list via eBuilder. Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
1. Organize list of spaces in sequential order, starting with exterior areas first.
 2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
 3. Submit list of incomplete items in the following format:
 - a. MS Excel electronic file or as required by eBuilder. Architect, through Construction Manager, will return annotated copy.

1.5 WARRANTIES

- A. Submittal Time: Submit written warranties for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated. See Division 0 for Warranty requirements.
- B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.

1. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper. Provide two complete binders.
2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
4. Provide electronic PDF file of all warranty documentation.

C. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 FINAL CLEANING

- A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:
 - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
 - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
 - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - e. Remove snow and ice to provide safe access to building.
 - f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
 - g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - h. Sweep concrete floors broom clean in unoccupied spaces.
 - i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
 - j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials.

- Replace chipped or broken glass and other damaged transparent materials.
Polish mirrors and glass, taking care not to scratch surfaces.
 - k. Remove labels that are not permanent.
 - l. Touch up and otherwise repair and restore marred, exposed finishes and surfaces.
Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
 - 1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.
 - m. Wipe surfaces of mechanical and electrical equipment and similar equipment.
Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - n. Replace parts subject to unusual operating conditions.
 - o. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - p. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
 - q. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
 - r. Leave Project clean and ready for occupancy.
- C. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

END OF SECTION

SECTION 017823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
 - 1. Emergency manuals.
 - 2. Operation manuals for systems, subsystems, and equipment.
 - 3. Maintenance manuals for the care and maintenance of products, materials, and finishes systems and equipment.

1.2 SUBMITTALS

- A. Manual: Submit one copy of each manual in final form at least thirty (30) calendar days before Substantial Completion inspection. Architect will return copy with comments within twenty-one (21) calendar days.
 - 1. Correct or modify each manual to comply with Architect's comments. Submit two (2) copies of each corrected manual within fifteen (15) calendar days of receipt of Architect's comments.

PART 2 - PRODUCTS

2.1 MANUALS, GENERAL

- A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain a title page, table of contents, and manual contents.
- B. Title Page: Enclose title page in transparent plastic sleeve. Include the following information:
 - 1. Subject matter included in manual.
 - 2. Name and address of Project.
 - 3. Name and address of Owner.
 - 4. Date of submittal.
 - 5. Name, address, and telephone number of Contractor.
 - 6. Name and address of Architect.
 - 7. Cross-reference to related systems in other operation and maintenance manuals.
- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
- D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
 - 1. Binders: Heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch (215-by-280-mm) paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
 - a. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.

2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software CDs for computerized electronic equipment.
4. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
 - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
 - b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.
 - c. Provide Computer Aided Drafting (CAD)/DWG formatted files for Owner record and deliver (2) USB thumb drives with soft copies of all documentation.
5. Provide PDF files for all hard copies of documents provided, organized in an orderly fashion. Deliver (2) USB thumb drives with soft copies of all documentation.

2.2 EMERGENCY MANUALS

- A. Content: Organize manual into a separate section for type of emergency, emergency instructions, and emergency procedures.
- B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component for fire, gas leak, water leak, power failure, water outage, equipment failure, and chemical release or spill.
- C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.
- D. Emergency Procedures: Include instructions on stopping, shutdown instructions for each type of emergency, operating instructions for conditions outside normal operating limits, and required sequences for electric or electronic systems.
 1. Provide (2) copies of emergency operation instructions for various systems. Operation instructions shall be laminated. Coordinate with Owner on placement of emergency operation instructions for each system

2.3 OPERATION MANUALS

- A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and equipment descriptions, operating standards, operating procedures, operating logs, wiring and control diagrams, and license requirements.
- B. Descriptions: Include the following:
 1. Product name and model number.
 2. Manufacturer's name.
 3. Equipment identification with serial number of each component.
 4. Equipment function.
 5. Operating characteristics.
 6. Limiting conditions.
 7. Performance curves.
 8. Engineering data and tests.
 9. Complete nomenclature and number of replacement parts.

- C. Operating Procedures: Include start-up, break-in, and control procedures; stopping and normal shutdown instructions; routine, normal, seasonal, and weekend operating instructions; and required sequences for electric or electronic systems.
- D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.
- E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.4 PRODUCT MAINTENANCE MANUAL

- A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
- B. Source Information: List each product included in manual identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.
- C. Product Information: Include the following, as applicable:
 - 1. Product name and model number.
 - 2. Manufacturer's name.
 - 3. Color, pattern, and texture.
 - 4. Material and chemical composition.
 - 5. Reordering information for specially manufactured products.
- D. Maintenance Procedures: Include manufacturer's written recommendations and inspection procedures, types of cleaning agents, methods of cleaning, schedule for cleaning and maintenance, and repair instructions.
- E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

2.5 SYSTEMS AND EQUIPMENT MAINTENANCE MANUAL

- A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.
- B. Source Information: List each system, subsystem, and piece of equipment included in manual identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.
- C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including maintenance instructions, drawings and diagrams for maintenance, nomenclature of

parts and components, and recommended spare parts for each component part or piece of equipment:

- D. Maintenance Procedures: Include test and inspection instructions, troubleshooting guide, disassembly instructions, and adjusting instructions, and demonstration and training videotape if available, that detail essential maintenance procedures:
- E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
- F. Spare Parts List and Source Information: include lists of replacement, repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation, and local sources of maintenance materials and related services.
- G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.
- H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

- A. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.
- B. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- C. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
- D. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
- E. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in Record Drawings to ensure correct illustration of completed installation.
 - 1. Do not use original Project Record Documents as part of operation and maintenance manuals.
- F. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION

SECTION 017836 - WARRANTIES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for preparing warranties of products and installation.
- B. All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:
 - 1. General Conditions, including, without limitation, Warranty/Guarantee Information;
 - 2. Applicable sections of Division 01.
- C. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
 - 1. Manufacturer's Warranty: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
 - 2. Special Warranty: Written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide more rights for Owner.
- D. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution. Submit a draft for approval before final execution.
 - 1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
 - 2. Specified Form: When specified forms are included with the Specifications, prepare a written document using appropriate form properly executed.

1.2 SUBMITTALS

- A. Binders: Contractor shall use commercial quality, 8-1/2 by 11 inch, three-side rings, with durable plastic covers; two inch maximum ring size.
- B. Cover: Contractor shall identify each binder with typed or printed title "WARRANTIES" and shall list title of Project.
- C. Table of Contents: Contractor shall provide title of Project; name, address, and telephone number of Contractor and equipment supplier, and name of responsible principal. Contractor shall identify each item with the number and title of the specific Specification, document, provision, or section in which the name of the product or work item is specified.
- D. Contractor shall separate each warranty with index tab sheets keyed to the Table of Contents listing, providing full information and using separate typed sheets as necessary. Contractor shall list each applicable and/or responsible Subcontractor(s), supplier(s), and/or manufacturer(s), with name, address, and telephone number of each responsible principal(s).

1.3 PREPARATION

- A. Contractor shall obtain warranties, executed in duplicate by each applicable and/or responsible subcontractor(s), supplier(s), and manufacturer(s). Except for items put into use with City's permission, Contractor shall leave date of beginning of time of warranty until the date of completion is determined.
- B. Contractor shall verify that documents are in proper form, contain full information, and are notarized, when required.
- C. Contractor shall co-execute submittals when required.
- D. Contractor shall retain warranties until time specified for submittal.
- E. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
- F. Comply with Division 01 Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION

SECTION 017839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for Project Record Documents, including the following:
 - 1. Record Drawings.
 - 2. Record Specifications.

1.2 CLOSEOUT SUBMITTALS

- A. Record Drawings: Comply with the following:
 - 1. Number of Copies: Submit one (1) copy of Record Drawings as follows:
 - a. Initial Submittal:
 - 1) Submit one (1) set(s) of marked-up Record Prints.
 - 2) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
 - b. Final Submittal:
 - 1) Record CAD Drawing Files and Plots:
 - a) Submit one (1) paper-copy set(s) of marked-up record prints.
 - b) Submit record digital data files and three (3) set(s) or record digital data file plots.
 - c) Plot each drawing file, whether or not changed and additional information were recorded. one (1) set(s).
- B. Record Specifications: Submit annotated PDF electronic files (scanned, searchable copy) of Project's Specifications, including addenda and contract modifications.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

- A. Record Prints: Maintain one set of prints of the Contract Drawings and Shop Drawings.
 - 1. Preparation: Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.
 - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 - b. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.
 - 2. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.
 - 3. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
 - 4. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

1. Record Prints: Organize Record Prints and newly prepared Record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
2. Record CAD Drawings: Organize CAD information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each CAD file.
3. Identification: As follows:
 - a. Project name.
 - b. Date.
 - c. Designation "PROJECT RECORD DRAWINGS."
 - d. Name of Architect.
 - e. Name of Contractor.

2.2 RECORD SPECIFICATIONS

- A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
 3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
 4. Note related Change Orders and Record Drawings where applicable.

2.3 MISCELLANEOUS RECORD SUBMITTALS

- A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference. Miscellaneous records include, but are not limited to, the following:
 1. Field records on underground construction and similar work.
 2. Surveys showing locations and elevations of underground lines.
 3. Invert elevations of drainage piping.
 4. Surveys establishing building lines and levels.
 5. Authorized measurements using unit prices or allowances.
 6. Records of plant treatment.
 7. Ambient and substrate condition tests.
 8. Certifications received in lieu of labels on bulk products.
 9. Batch mixing and bulk delivery records.
 10. Testing and qualification of trade persons.
 11. Documented qualification of installation firms.
 12. Load and performance testing.
 13. Inspections and certifications by governing authorities.
 14. Final inspection and correction procedures

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

- A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and modifications to Project Record Documents as they occur; do not wait until the end of Project. Documents shall be reviewed as part of the monthly Pay Application process and, if not complete, be the basis, for reducing by 5% from the monthly request for payment.

- B. Maintenance of Record Documents and Samples: Store Record Documents and Samples in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Architect's reference during normal working hours.

END OF SECTION

SECTION 017900 – DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
 - 1. Demonstration of operation of systems, subsystems, and equipment.
 - 2. Training in operation and maintenance of systems, subsystems, and equipment.
 - 3. Demonstration and training DVD's.

1.2 SUBMITTALS

- A. Instruction Program: Submit two (2) copies of outline of instructional program for demonstration and training, including a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.
- B. Demonstration and Training: Provide digital recordings in format acceptable to Owner.

1.3 QUALITY ASSURANCE

- A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.
- B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 014000 "Quality Requirements," experienced in operation and maintenance procedures and training.
- C. Pre-instruction Conference: Conduct conference at Project site. Review methods and procedures related to demonstration and training.
- D. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

- A. Program Structure: Develop an instruction program that includes individual training modules for each system and equipment not part of a system, as required by individual Specification Sections, and includes but is not limited to the following:
 - 1. Building Energy Management System.
 - 2. Fire Alarm
 - 3. Back-up Generator Activation, Maintenance, Use
 - 4. Lighting
 - 5. Card Access
 - 6. Gates
 - 7. Security Cameras

8. Mechanical Systems
 9. Fire Sprinklers and Plumbing Systems
 10. Other systems and equipment as specified
- B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following:
1. Basis of System Design, Operational Requirements, and Criteria: Include system and equipment descriptions, operating standards, regulatory requirements, equipment function, operating characteristics, limiting conditions, and performance curves.
 2. Documentation: Review emergency, operations, and maintenance manuals; Project Record Documents; identification systems; warranties and bonds; and maintenance service agreements.
 3. Emergencies: Include instructions on stopping; shutdown instructions; operating instructions for conditions outside normal operating limits; instructions on meaning of warnings, trouble indications, and error messages; and required sequences for electric or electronic systems.
 - a. Provide (2) copies of emergency operation instructions for systems as identified above. Operation instructions shall be laminated. Coordinate with Owner placement of emergency operation instructions for each system.
 4. Operations: Include startup, break-in, control, and safety procedures; stopping and normal shutdown instructions; routine, normal, seasonal, and weekend operating instructions; operating procedures for emergencies and equipment failure; and required sequences for electric or electronic systems.
 5. Adjustments: Include alignments and checking, noise, vibration, economy, and efficiency adjustments.
 6. Troubleshooting: Include diagnostic instructions and test and inspection procedures.
 7. Maintenance: Include inspection procedures, types of cleaning agents, methods of cleaning, procedures for preventive and routine maintenance, and instruction on use of special tools.
 8. Repairs: Include diagnosis, repair, and disassembly instructions; instructions for identifying parts; and review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 INSTRUCTION

- A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.
- B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
 1. Owner will furnish an instructor to describe Owner's operational philosophy.
- C. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
 1. Schedule training with Owner, through Construction Manager, with at least fourteen (14) days' advance notice.
- D. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of a demonstration performance-based test.

3.2 DEMONSTRATION AND TRAINING VIDEO

- A. General: Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.
 - 1. At beginning of each training module, record each chart containing learning objective and lesson outline.
- B. Media Format: Electronic media in format agreed to by City.
- C. Narration: Describe scenes on video by audio narration by microphone while video is recorded. Include description of items being viewed. Describe vantage point, indicating location, direction (by compass point), and elevation or story of construction.

END OF SECTION

SECTION 018113 - SUSTAINABLE DESIGN REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Section 01 74 19 – Construction and Demolition Waste Management and Disposal
- C. Section 01 81 19 – Construction Indoor Air Quality Requirements
- D. LEED Reference Guide for Building Design and Construction (BD+C), version 4, U.S. Green Building Council
- E. LEED v4.1 Building Design and Construction (BD+C), Getting Started Guide for Beta Participants (Beta Guide), U.S. Green Building Council, issued January 2020.

1.2 DESCRIPTION OF WORK

- A. Section includes general, administrative, procedural, and product requirements for compliance with the prerequisites and credits of the U.S. Green Building Council's (USGBC) Leadership in Energy and Environmental Design (LEED) for Building Design and Construction (BD+C), Version 4 Green Building Rating System for New Construction (NC) and select credits of the USGBC LEED for BD+C Version 4.1 Beta Rating System for New Construction (NC).
- B. Section includes the following appendices:
 - 1. APPENDIX A-018113 – VOC LIMITS
 - 2. APPENDIX B-018113 – LEED APPRAISAL
 - 3. APPENDIX C-018113 – LEED v4.1 MATERIALS REPORTING FORM
 - 4. APPENDIX D-018113 – TARGETED BPDO PRODUCT TABLE
 - 5. APPENDIX E-018113 – LEED BOUNDARY
- C. The Owner has established that this Project shall achieve at a minimum LEED Platinum. LEED requirements outlined in this Section apply to all Work within the LEED Boundary provided in the Appendix of this Section.
- D. Several LEED prerequisites and credits needed to obtain LEED certification depend on product selections and may not be specifically identified as LEED requirements. Compliance with requirements needed to obtain LEED prerequisites and credits may be used as one criterion to evaluate substitution requests and comparable product requests.
- E. Any discrepancies between the LEED Requirements outlined in this Section and those in other Sections require notification of the Architect and the Architect's approval of the resolution.

- F. LEED Platinum goals and targeted credits are outlined in the LEED Appraisal appended at the end of this Section. The Contractor is responsible for LEED credits highlighted in **yellow** in the LEED Appraisal in the Appendix of this Section.
- G. Note: For clarity, identification numbers have been added to LEED v4 and LEED v4.1 prerequisite and credit names as used throughout this Section.

1.3 SUSTAINABLE BUILDING REQUIREMENTS

- A. The Owner requires the Contractor to implement practices and procedures to meet the project's environmental performance goals, which include achieving LEED v4 Platinum Certification. Specific project goals that may impact this area of work include, but not limited to:
 - 1. Reduction of facility energy and water consumption.
 - 2. Reduction of exposure of occupants to potentially harmful pollutants.
 - 3. Reuse and recycling of construction materials.
 - 4. Construction air quality protection control.
 - 5. Construction water quality protection control.
 - 6. Sourcing of products from manufacturers that disclose information on material impacts, chemical content of products, and manufacturing practices.
 - 7. Sourcing of products that minimize negative environmental and human health impacts.
- B. The Contractor shall ensure that the requirements related to these goals, as defined in the Articles below, are implemented to the fullest extent. Substitutions, or other changes to the work proposed by the Contractor or their Subcontractors, shall not be allowed if such changes compromise the aforementioned environmental goals and LEED certification.

1.4 REFERENCES

- A. Abbreviations and Acronyms:
 - 1. BD+C: Building Design + Construction
 - 2. BPDO: Building Product Disclosure + Optimization
 - 3. CARB: California Air Resources Board
 - 4. CDPH: California Department of Public Health
 - 5. CFC: Chlorofluorocarbons
 - 6. CGP: Construction General Permit
 - 7. CoC: Chain-of-Custody
 - 8. CSR: Corporate Sustainability Reports
 - 9. EA: Energy & Atmosphere
 - 10. EPAct: Energy Policy Act

11. EPD: Environmental Product Declaration
12. EPR: Extended Producer Responsibility
13. ESC: Erosion and Sedimentation Control
14. EQ: Environmental Quality
15. FSC: Forest Stewardship Council
16. GBCI: Green Business Certification Inc.
17. GRI: Global Reporting Initiative
18. HPD: Health Product Declaration
19. IN: Innovation in Design
20. LCA: Life Cycle Assessments
21. LEED: Leadership in Energy and Environmental Design
22. LEM: Low-Emitting Materials
23. MERV: Minimum Efficiency Reporting Value
24. MR: Materials and Resources
25. MSDS: Material Data Safety Sheet
26. NAF: No Added Formaldehyde
27. NC: New Construction
28. PCB: Polychlorinated Biphenyls
29. SANSA: Sustainable Agricultural Network's Sustainable Agricultural
30. SCAQMD: South Coast Air Quality Management District
31. SCM: Suggested Control Measure
32. SR: Solar Reflectance
33. SRI: Solar Reflectance Index
34. SS: Sustainable Sites
35. TVOC: Total Volatile Organic Compound
36. ULEF: Ultra-Low-Emitting Formaldehyde
37. USGBC: US Green Building Council
38. VOC: Volatile Organic Compound
39. WE: Water Efficiency

B. Reference Standards

1. ANSI/ASHRAE/IESNA 90.1-2010 – Energy Standard for Buildings Except Low-Rise Residential Buildings

2. ANSI/ASHRAE 52.2-2007 – Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size
3. ANSI/ASHRAE 62.1-2010 – Ventilation for Acceptable Indoor Air Quality
4. ANSI/ASTM-E779-10 – Determining Air Leakage Rate by Fan Pressurization
5. ASHRAE 52.2-2007 – Filtration Minimum Efficiency Reporting Value (MERV)
6. ASHRAE Guideline 0 – 2005, The Commissioning Process
7. ASHRAE Guideline 1.1-2007, HVAC&R Technical Requirements for the Commissioning Process
8. ASHRAE 55-2010 – Thermal Comfort Conditions for Human Occupancy
9. ASTM C1371-04 (R2010) – Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers
10. ASTM C1549-04 – Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer
11. ASTM D1003-11 – Haze and Luminous Transmittance of Transparent Plastics
12. ASTM E408-13 – Methods for Total Normal Emittances of Surfaces Using Inspection-Meter Techniques
13. ASTM E903-12 – Method for Solar Absorptance, Reflectance, and Transmittance of Materials Using Integrating Spheres
14. ASTM E1903-11– Phase II Environmental Site Assessment.
15. ASTM E1918-06 – Method for Measuring Solar Reflectance of Horizontal and Low-Sloped Surfaces in the Field
16. ASTM E1980-11 – Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces
17. ASTM/BIFMA Standard Method M7.1-2011 (R2016), Standard Test Method for Determining Emissions from Office Furniture Systems, Components and Seating – Furniture evaluation standard for VOC emissions
18. ATSM/BIFMA e3-2014e Furniture Sustainability Standard Section 7.6.1 and 7.6.2 – VOC emission limits for office furniture, components and seating
19. California Air Resources Board (CARB) Airborne Toxic Measure to Reduce Formaldehyde Emissions from Composite Wood Products Regulation
20. CARB Suggested Control Measure for Architectural Coatings, 2007
21. California Title 24-2013, Part 6 – Building Energy Efficiency Standards
22. California Dept. of Public Health Standard Method v1.2-2017, Standard Method for The Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers
23. (The) Carbon Trust – Good Practice Guide (GPG) 237, Natural Ventilation in Non-Domestic Buildings, A Guide for Designers, Developers, and Owners, 1998

24. CIBSE – Chartered Institute of Building Services Engineers Applications Manual 10, Natural Ventilation in Non-Domestic Buildings, 2005
25. CRI – Carpet and Rug Institute Green Label and Green Label Plus Testing Program
26. IgCC/ASHRAE 189.1 – Cooling Tower & Evaporative Condenser Requirements
27. EN 717-1: 2014 Wood-based Panels – Determination of Formaldehyde Release – Formaldehyde Emission by the Chamber Method
28. EN 15804 – Sustainability of Construction Works, Environmental Product Declarations, Core Rules for the Product Category of Construction Products
29. EPA ENERGY STAR – Qualified Products
30. EPA Construction General Permit (CGP): 2012
31. EPA – Brownfields Definition – Sustainable Redevelopment of Brownfields Program
32. EPA Clean Air Act, Title VI, Section 608, Compliance with the Section 608 Refrigerant Recycling Rule
33. EPA – Energy Policy Act (EPAAct) of 1992 (and as amended), Fixture Flow Requirements
34. EPA – Energy Policy Act (EPAAct) of 2005, Fixture Flow Requirements
35. EPA – Energy Star Roofing Guidelines
36. EPA 832-R-92-005 – Storm Water Management for Construction Activities, Chapter 3
37. EPA 840-B-92-002, Jan 1993 – Guidance Specifying Management Measures for Sources of Non-Point Pollution in Coastal Waters
38. EPA PB90200288 – Compendium of Methods for the Determination of Air Pollutants in Indoor Air
39. EPA 763-E-C-40-CFR Asbestos Remediation Testing
40. EPA TSCA Title VI – The Formaldehyde Standards for Composite Wood Products
41. FEMA – 100-Year Flood Definition
42. FSC – Forest Stewardship Council's Principles and Criteria
43. Greenguard Certification Program – Greenguard Environmental Institute
44. IAPMO/ ANSI UPC 1-2006 – Uniform Plumbing Code 2006 Section 402.0 Water-Conserving Fixtures and fittings, effective 2006
45. ICC – International Plumbing Code 2006, Section 604, Design of Building Water Distribution System, effective 2006
46. ISO 14025 – Environmental Labels and Declarations – Type III Environmental Declarations – Principles and Procedures
47. ISO 14044 – Environmental Management – Life Cycle Assessment – Requirements and Guidelines

48. ISO 14071 – Environmental Management – Life Cycle Assessment – Critical Review Processes and Reviewer Competencies: Additional Requirements and Guidelines to ISO 14044: 2006
49. ISO 21930 – Sustainability in Buildings and Civil Engineering Works – Core Rules for Environmental Product Declarations of Construction Products and Services
50. South Coast Air Quality Management District (SCAQMD) Rule #1113 – VOC Limits for Architectural Coatings, effective February 5, 2016
51. SCAQMD Amendment to South Coast Rule #1168 – VOC Limits for Adhesives, Sealant and Sealant Primers, effective October 6, 2017
52. SMACNA/ANSI 008-2008 – IAQ Guidelines for Occupied Buildings Under Construction, 2nd Edition 2007
53. USGBC – LEED Version 4 BD+C Reference Guide
54. USGBC – LEED v4.1 BD+C Beta Guide

C. Definitions

1. Brownfield: U.S. EPA Definition of Brownfields – With certain legal exclusions and additions, brownfield site means real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant.
2. Chain-of-Custody (CoC): A tracking procedure to document the status of a wood product from the point of harvest or extraction to the ultimate end use. A “vendor” is defined as the company that supplies wood products to project contractors or subcontractors for on-site installation.
3. Chain-of-custody certification: Awarded to companies that produce, sell, promote, or trade forest products after audits verify proper accounting of material flows and proper use of the Forest Stewardship Council name and logo. The CoC certificate number is listed on invoices for non-labeled products to document that an entity has followed FSC guidelines for product accounting.
4. Chlorofluorocarbons (CFCs): Hydrocarbons that deplete the stratospheric ozone layer.
5. Composite wood: Consists of wood or plant particles or fibers bonded by a synthetic resin or binder. Examples include particleboard, medium-density fiberboard (MDF), plywood, oriented-strand board (OSB), wheatboard, strawboard, and structural composite wood.
6. Environmental Product Declaration (EPD): A statement that the product meets the environmental requirements of ISO 14025, and EN 15804 or ISO 21930.
7. Extended Producer Responsibility (EPR): Program implemented by a product manufacturer to accept its own and sometimes other manufacturers’ products as postconsumer waste at the end of the products’ useful life. Alternatively known as a manufacturer’s take-back program.
8. Forest Stewardship Council (FSC): An independent, non-governmental, not for profit organization established to promote the responsible management of the world’s forests. FSC provides certifications to award forest managers who adopt environmentally and

socially responsible forest management practices and to companies that manufacture and sell products that directly support responsible forest management.

9. Formaldehyde Emissions Evaluation: Evaluation demonstrating that the product meets one of the following:
 - a. EPA TSCA Title VI or California Air Resources Board (CARB) ATCM for formaldehyde requirements for ultra-low-emitting formaldehyde (ULEF) resins.
 - b. EPA TSCA Title VI or CARB ATCM formaldehyde requirements for no added formaldehyde resins (NAF).
 - c. Tested per EN 717-1:2014 for formaldehyde emissions and complies with emissions class E1.
 - d. Structural composite wood product made with moisture resistant adhesives meeting ASTM 2559, no surface treatments with added urea-formaldehyde resins or coatings, and certified according to one of the industry standards as described in the LEED v4.1 BD+C Beta Guide.
10. Furniture Emissions Evaluation: Evaluation demonstrating that new furniture and furnishing items are tested in accordance with ANSI/BIFMA Standard Method M7.1–2011 (R2016) and compliant with ANSI/BIFMA e3-2014e Furniture Sustainability Standard, Sections 7.6.1 or 7.6.2. Laboratories that conduct the tests must be accredited under ISO/IEC 17025 for the test methods they use. Seating products must be evaluated using the seating scenario. Classroom furniture must be evaluated using the standard school classroom scenario. Other products must be evaluated using the open plan or private office scenario, as appropriate. Statements of product compliance must include the exposure scenario(s). Organizations that certify manufacturers' claims must be accredited under ISO Guide 17065.
11. Health Product Declaration (HPD): Products with a published and complete HPD with full disclosure of known hazards and residuals disclosure at no less stringent than 1,000 parts per millions (ppm), in compliance with the Health Product Declaration Open Standard as maintained by the Health Product Declaration Collaborative (www.hpd-collaborative.org).
12. Hydrochlorofluorocarbons (HCFCs): Refrigerants used in building equipment that deplete the stratospheric ozone layer, but to a lesser extent than CFCs.
13. Inherently Non-emitting Materials: Naturally occurring materials and products made from inorganic materials that emit either very low or no VOCs. Products that are inherently nonemitting sources of VOCs (stone, ceramic, powder-coated metals, plated or anodized metal, glass, concrete, clay brick, and unfinished or untreated solid wood flooring) are considered fully compliant with the Low-Emitting Materials credit without any VOC emissions testing, if they do not include integral organic based surface coatings, binders, or sealants.
14. Life Cycle Assessment (LCA): An evaluation of the environmental effects of a product from cradle (resource extraction) to grave (product disposal), as defined by ISO 14040–2006 and ISO 14044–2006.
15. Low-Emitting Materials (LEM) Product Categories: flooring; composite wood; ceilings; wall panels; insulation; field-applied adhesives and sealants; field-applied paints and coatings; and furniture products.

16. **Material Cost:** For the purposes of LEED calculations and tracking, the dollar value of a product furnished for the Project including the cost of materials, shop labor, Contractor markups, taxes, fees, delivery costs, and all expenses incurred by the Contractor to bring the product to the Project site. Material cost excludes any cost for site labor and site equipment required for installation on the Project site.
17. **Point of Harvest/Extraction/Recovery:** Location where raw material is gathered for use in production.
18. **Point of Manufacturing:** Location where individual components are assembled into a product that is furnished and installed on site.
19. **Point of Purchase:** Location of the purchase transaction for a product. For online or other transactions that do not occur in person, the point of purchase is considered the location of product distribution.
20. **Pre-Consumer Recycled Content:** Defined as material diverted from the waste stream during the manufacturing process. Examples in this category include planer shavings, plytrim, sawdust, chips, bagasse, sunflower seed hulls, walnut shells, culls, trimmed materials, print overruns, over-issue publications, and obsolete inventories. Excluded is reutilization of materials such as rework, regrind or scrap generated in a process and capable of being reclaimed within the same process that generated it. (Previously referred to as Post-industrial Content.)
21. **Post-Consumer Waste:** Waste material generated by households or by commercial, industrial and institutional facilities in their role as end-users of the product, which can no longer be used for its intended purpose. This includes returns of materials from the distribution chain. Examples of this category include construction and demolition debris, materials collected through curbside and drop-off recycling programs, broken pallets, discarded products (e.g., furniture, cabinetry and decking) and urban maintenance waste (e.g., leaves, grass clippings, tree trimmings, etc.).
22. **Solar Reflectance (SR):** the fraction of solar energy that is reflected by a surface on a scale of 0 to 1. It is defined so that a standard black has a solar reflectance of 0 and a standard white has a solar reflectance of 1.
23. **Solar Reflectance Index (SRI):** A measure of a material's ability to reject solar heat, as shown by a small temperature rise. It is defined so that a standard black (reflectance 0.05, emittance 0.9) has a SRI of 0, and a standard white (reflectance 0.80, emittance 0.90) has a SRI of 100.
24. **Vendor:** A Vendor of certified wood is the organization that sells/supplies wood products to contractors or subcontractors. A vendor must have a FSC Chain of Custody (CoC) certificate if it is selling FSC-certified products for which its packaging or form will be modified and/or products that are not individually labeled; this includes most lumber.
25. **Volatile Organic Compounds (VOCs):** Carbon-containing compounds that participate in atmospheric photochemical reactions (excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides and carbonates, and ammonium carbonate). The compounds vaporize (become a gas) at normal room temperatures.
26. **VOC Emissions Evaluation:** Evaluation demonstrating that the product has been tested according to California Department of Public Health (CDPH) Standard Method v1.2–2017 and complies with the VOC limits in Table 4-1 of the method. Additionally, the range of total VOCs after 14 days (336 hours) was measured as specified in the CDPH Standard Method

v1.2 and is reported (TVOC ranges: 0.5 mg/m³ or less, between 0.5 and 5 mg/m³, or 5 mg/m³ or more). Laboratories that conduct the tests must be accredited under ISO/IEC 17025 for the test methods they use. Products used in school classrooms must be evaluated using the classroom scenario, products used in other spaces must be evaluated using the default private office scenario. The statement of product compliance must include the exposure scenario(s) used, the amount of wet-applied product applied in mass per surface area (if applicable), the range of total VOCs, and follow guidelines in CDPH Standard Method v1.2-2017, Section 8. Organizations that certify manufacturers' claims must be accredited under ISO Guide 17065.

27. Total Volatile Organic Compounds (TVOCs): Sum of the concentrations of all identified and unidentified VOCs between and including n-pentane through n-heptadecane (i.e., C₅ - C₁₇) as measured by the gas chromatography/mass spectrometry (GC/MS) total ion-current chromatogram (TIC) method and expressed as a toluene equivalent value.

1.5 ADMINISTRATIVE REQUIREMENTS

- A. Respond to questions and requests from Architect and Sustainability/LEED Consultant regarding LEED credits that are the responsibility of the Contractor, that depend on product selection or product qualities, or that depend on Contractor's procedures until the GBCI has made its final determination on the project's LEED certification application. Document responses as informational submittals.

1.6 SUBMITTALS

A. General Requirements:

1. Submit additional LEED submittals required by other Specification Sections.

B. LEED Product Submittals

1. Projects seeking LEED certification must track and record product, material, and cost information for LEED credit documentation. The contractor shall complete and submit the LEED v4 Materials Reporting Form with product submittals for the following:
 - a. All permanently installed products and materials related to the work of any Section installed on the interior of the building (i.e. inside the weatherproofing membrane) and falling within one of the applicable LEM Product Categories.
 - b. All permanently installed products and materials specified in CSI MasterFormat 2012 Edition Divisions 03-12, 31 (Sections relating to Foundations), and 32 (Sections relating to Pavings, Site Improvements, and Planting).
2. For each building product and material listed on the Materials Reporting Form, provide information and support documentation for the product as defined in this Section to support all environmental claims listed in the Materials Reporting Form. Submittal requirements for the support documentation can be found in the "LEED Credit-Specific Submittal" paragraph of this Section.
3. A sample Materials Reporting Form for this project has been included in the Appendix of this Section.

C. LEED Credit-Specific Submittals

1. General

- a. For detailed explanation of credit requirements, refer to LEED v4 BD+C Reference Guide and LEED v4.1 BD+C Beta Guide.
 - b. For MR Credits 2, 3, and 4 - Building Product Disclosure and Optimization (BPDO) listed below:
 - 1) Submittals apply to permanently installed products and materials specified in CSI MasterFormat 2012 Edition Divisions 3-12, 31 (Sections relating to Foundations), and 32 (Sections relating to Pavings, Site Improvements, and Planting).
 - 2) Submit the following for any regionally sourced products that have raw materials extracted, are manufactured (including distribution), and are purchased within 100 miles of the Project site, provide cut sheet or a written affidavit from the manufacturer indicating:
 - a) The Point of Purchase (location of purchase transaction). If purchased online or not in-person, Point of Purchase is considered the location of product distribution.
 - b) Breakdown of product component materials which are extracted, manufactured, and purchased within 100 miles of the project site and the material percentage of each component by weight.
 - c) The distance in miles from the Points of raw material extraction, product manufacturing, and purchasing/distribution to the Project site location, measured as the most direct route between points.
 - c. For EQ Credit 2 - Low-Emitting Materials, submittals apply to permanently installed products and materials related to the work of any Section on the interior of the building (i.e. inside the weatherproofing membrane) and falling within one of the applicable LEM Product Categories.
2. SS Prerequisite 1 - Construction Activity Pollution Prevention: The Contractor shall implement and document the Project Erosion and Sedimentation Control (ESC) Plan for construction activities associated with the project.
 - a. The documentation shall consist of one or more of the following measures, as determined by the Owner and Architect.
 - 1) The Contractor shall declare the occurrence of periodic inspections throughout the construction process and provide documentation and reporting that the Erosion and Sedimentation Control Plan was executed appropriately. The documentation must include the following:
 - a) Documentation of sample dates.

- b) Inspection frequency, which shall occur a minimum of once per month.
 - c) Minimum of three (3) inspections equally spaced over the duration of site work.
 - d) Detailed descriptions of corrective actions taken.
 - 2) The Contractor shall provide date-stamped photos which shall document the implemented measures prescribed by the Erosion and Sedimentation Control Plan and document corrective actions taken during construction.
 - 3) The Contractor shall provide a narrative describing the measures taken to implement the Erosion and Sedimentation Control Plan.
3. SS Credit 5 - Heat Island Reduction: submit the following documentation:
- a. For roofing materials, submit cut sheets indicating three-year aged Solar Reflectance Index (SRI) values. Initial SRI values are acceptable only if three-year aged SRI values are not available.
 - b. For hardscape materials, submit cut sheets indicating three-year aged Solar Reflectance (SR) values. Initial SR values are acceptable only if three-year aged SRI values are not available.
4. WE Prerequisite 2 and Credit 2 - Indoor Water Use Reduction: for plumbing fixtures, submit cut sheets with water consumption flow or flush rates highlighted.
5. WE Prerequisite 1 and Credit 1 - Outdoor Water Use Reduction: submit cut sheets for components of the landscape irrigation system (if applicable) indicating water saving efficiency.
6. MR Prerequisite 2 - Construction and Demolition Waste Management Planning: For submittal requirements, refer to Section 017419 - Construction and Demolition Waste Management.
7. MR Credit 2 - BPDO – Environmental Product Declarations (EPD): submit the following documentation, as described in the LEED v4.1 BD+C Beta Guide.
- a. Credit Option 1 (EPD): submit at least one of the following for each applicable product:
 - 1) Life-cycle assessment: manufacturer's publicly available, critically reviewed product-specific life-cycle assessment (LCA) conforming to ISO 14044 and that has at least a cradle to gate scope.
 - 2) Product-specific Type III EPD – Internally Reviewed: manufacturer's internally reviewed product-specific LCA in accordance with ISO 14071, and product-specific internal EPD conforming to ISO 14025, and EN 15804 or ISO 21930 and that has at least a cradle to gate scope.
 - 3) Industry-wide Type III EPD – Externally Reviewed: externally reviewed industry-wide Type III EPD conforming to ISO 14025, and EN 15804 or ISO 21930 and that has at least a cradle to gate scope and recognizes the manufacturer as a participant by the program operator.

- 4) Product-specific Type III EPD – Externally Reviewed: externally reviewed product-specific Type III EPD conforming to ISO 14025 and EN 15804 or ISO 21930 and that has at least a cradle to gate scope.
- b. Credit Option 2 (Multi-Attribute Optimization): submit at least one of the following for each applicable product:
 - 1) Life Cycle Impact Reduction Action Plan: manufacturer's publicly available plan to mitigate or reduce product life cycle impacts identified in product-specific LCA using EN 15804 or ISO 21930.
 - 2) Life Cycle Impact Reductions in Embodied Carbon Comparative Analysis: two iterations of the manufacturer's third-party verified LCA or EPD (for the same product or product type) in accordance with MR Credit 2 Option 1 requirements above, and manufacturer's publicly available narrative, demonstrating the required environmental impact reductions in global warming potential.
8. MR Credit 3 - BPDO – Sourcing of Raw Materials: submit the following documentation as described in the LEED v4.1 BD+C Beta Guide, as applicable.
 - a. For products purchased from a manufacturer (producer) that participates in an extended producer responsibility (i.e., take-back) program, provide company brochure or similar describing the program, including contact information and verification that the product is included in the program.
 - b. For products containing bio-based materials, provide documentation from the raw-material manufacturer stating conformance to testing per ASTM Method D6866 and legal harvesting, as defined by the exporting and receiving country. If available, provide documentation from the raw-material manufacturer stating conformance to the Sustainable Agricultural Network's Sustainable Agricultural (SANSA) Standard in the form of a signed letter on company letterhead.
 - c. For products that are salvaged, refurbished, or reused, provide statement of source of materials, including statement of costs. The cost of reused or reclaimed materials is either the actual cost paid or the replacement value, whichever is higher. Replacement cost is determined by pricing comparable materials in the local market, excluding labor and shipping, and shall reflect any price discounts if applicable.
 - d. For products containing recycled content, provide product cut sheet or a written affidavit on company letterhead (email is not acceptable) from the manufacturer indicating the percentages, by material weight, of post-consumer and pre-consumer recycled content.
 - e. For permanently installed non-recycled wood and wood-based material, submit the following:
 - 1) Forest Stewardship Council's Chain of Custody (CoC) Certification Number for each installed certified wood product, declaring conformance with FSC Guidelines for certified wood. CoC numbers shall be obtained from the manufacturer and must be itemized on a line-item basis. When applicable, a CoC number is required by the source forest, transportation entity, supplier/manufacturer, and vendors of the material.

- 2) Vendor invoices, including all FSC-certified and non FSC-certified wood products purchased. Vendors are defined as those companies that sell products to the project contractor or subcontractors for installation on the Project site. Invoices must include:
 - a) Itemization of each wood product identified as such on a line item basis.
 - b) FSC products identified as such on a line-item basis and must be identified as “FSC Pure, FSC Mixed Credit”, or “FSC Mixed [NN] %”.
 - c) The dollar value of each line item.
 - d) iv. The vendor’s chain-of-custody (CoC) number must be shown on any invoice that includes FSC products.
 - e) If it is impractical for a vendor to invoice wood products on a line-item basis because the invoice would be excessive in length, the invoice should indicate the aggregate value of wood products sold by the vendor.
9. MR Credit 4 - BPDO – Material Ingredients: submit the following documentation, as described in the LEED v4.1 BD+C Beta Guide.
 - a. Credit Option 1 (Material Ingredient Reporting): Submit at least one of the following demonstrating a chemical inventory of the product to at least 0.1% (1000 ppm) for each applicable product:
 - 1) Manufacturer's publicly available ingredient inventory
 - 2) Health Product Declaration (HPD)
 - 3) Cradle to Cradle Material Health Certificate
 - 4) Cradle to Cradle certificate (minimum v3 with Material Health achievement level at the Bronze level or higher)
 - 5) Declare product label
 - 6) ANSI/BIFMA e3 Furniture Sustainability Standard
 - 7) UL Product Lens certificate
 - 8) Facts – NSF/ANSI 336: Sustainability Assessment for Commercial Furnishings Fabric
 - b. Credit Option 2 (Material Ingredient Optimization): Submit at least one of the following for each applicable product:
 - 1) Material ingredient screening and optimization action plan for optimizing chemical inventory reported under MR Credit 4 Option 1.
 - 2) Third-party verified manufacturer's publicly available ingredient inventory or HPD demonstrating the product's chemical inventory to at least 0.01% (100 ppm), showing compliance with at least one of the following:
 - a) No GreenScreen LT-1 hazards or GHS Category 1 hazards.

- b) At least 75% by weight of the product is assessed using GreenScreen Benchmark assessment, with the remaining percentage inventoried.
 - 3) Third-party verified Declare label designated as Red List Free.
 - 4) Cradle to Cradle Material Health Certificate
 - 5) Cradle to Cradle certificate (minimum v3 with Material Health Achievement level at the Silver level or higher)
- 10. MR Credit 5 - Construction and Demolition Waste Management: For submittal requirements, refer to Section 017419 - Construction and Demolition Waste Management.
- 11. EQ Credit 2 - Low-Emitting Materials: submit the following documentation, as applicable and as described in the LEED v4.1 BD+C Beta Guide.
 - a. For composite wood products, including but not limited to particleboard, medium density fiberboard, plywood, and structural composite wood, submit a cut sheet, approved third-party certification, test report, or written affidavit from the manufacturer demonstrating compliance with Formaldehyde Emissions Evaluation, as defined in this Section.
 - b. For interior flooring products, including but not limited to carpet, resilient flooring, engineered wood, and mineral-based tile, submit a cut sheet, approved third-party certification, test report, or written affidavit from the manufacturer demonstrating compliance with VOC Emissions Evaluation or inherently non-emitting sources criteria for each installed product or system.
 - c. For wet-applied, field-installed interior products including adhesives, sealants, paints, and coatings, submit the following:
 - 1) Material Data Safety Sheet (MSDS) or product data sheets highlighting VOC content measured in grams per liter (g/L) less water and exempt solvents.
 - 2) A cut sheet, approved third-party certification, test report, or written affidavit from the manufacturer demonstrating compliance with VOC Emissions Evaluation.
 - d. For interior ceiling assemblies, including but not limited to ceiling panels, ceiling tile, surface ceiling structures such as gypsum or plaster, suspended systems (including canopies and clouds), and glazed skylights, submit a cut sheet, approved third-party certification, test report, or written affidavit from the manufacturer demonstrating compliance with VOC Emissions Evaluation or inherently non-emitting sources criteria for each installed product or system.
 - e. For wall panels, including but not limited to finish wall treatments, surface wall structures such as gypsum or plaster, cubicle/curtain/partition walls, trim, doors, frames, windows, and window treatments, submit a cut sheet, approved third-party certification, test report, or written affidavit from the manufacturer demonstrating compliance with VOC Emissions Evaluation or inherently non-emitting sources criteria for each installed product or system.
 - f. For insulation, including but not limited to thermal and acoustic boards, batts, rolls, blankets, sound attention fire blankets, foamed-in place, loose-fill, blown, and sprayed insulation, submit a cut sheet, approved third-party certification, test report,

or written affidavit from the manufacturer demonstrating compliance with VOC Emissions Evaluation for each installed product or system.

- g. For interior furniture and furnishings, submit a cut sheet, approved third-party certification, test report, or written affidavit from the manufacturer demonstrating compliance with Furniture Emissions Evaluation, including testing per ANSI/BIFMA Standard Method M7.1-2011 (R2016) and compliance with ANSI/BIFMA e3-2014e Furniture Sustainability Standard, Sections 7.6.1 or 7.6.2, or inherently non-emitting sources criteria.
- 12. EQ Credit 3 - Construction Indoor Air Quality Management Plan: For submittal requirements, refer to Section 018119 - Construction Indoor Air Quality Requirements.
- 13. EQ Credit 4 – Indoor Air Quality Assessment: For submittal requirements, refer to Section 018119 - Construction Indoor Air Quality Requirements.
- 14. ID Credit 1 - Verified Construction and Demolition Rates: For submittal requirements, refer to Section 017419 - Construction and Demolition Waste Management. LEED intent and requirements also available for reference at <https://www.usgbc.org/credits/new-construction-core-and-shell-schools-new-construction-retail-new-construction-commercial-3>.

D. LEED Materials Tracking Submittals

- 1. The Contractor shall complete a LEED v4/v4.1 Building Product Disclosure + Optimization (BPDO) Calculator for products in CSI MasterFormat 2012 Edition Divisions 03-12, 31 (Sections relating to Foundations), and 32 (Sections relating to Paving, Site Improvements, and Planting) according to the following schedule and requirements:
 - a. The LEED v4 BPDO Calculator is available for download at <http://www.usgbc.org/resources/bpdo-calculator>.
 - b. At the commencement of construction, submit a BPDO Calculator with preliminary materials cost information and the anticipated submittal log.
 - c. On a monthly basis during construction, update and submit the BPDO Calculator with actual product data and cost information from approved LEED Product Submittals.
 - d. At substantial completion, submit a final and complete BPDO Calculator with required product data and cost data.
- 2. The Contractor shall complete a LEED v4/4.1 Low-Emitting Materials Calculator for permanently installed interior products related to the work of any Section, for the applicable LEM Product Categories.
 - a. The LEED v4 Low-Emitting Materials Calculator is available for download at <http://www.usgbc.org/resouces/low-emitting-materials-calculator>.
 - b. On a monthly basis during construction, update and submit the Low-Emitting Materials Calculator with actual product data from approved LEED Product Submittals
 - c. At substantial completion, submit a final and complete Low-Emitting Materials Calculator with required product data.

3. The Contractor shall consider using established LEED management software, such as GreenBadger and/or GreenHalo.

E. LEED Submission Documentation:

1. At or before substantial completion, the Contractor shall prepare supporting documentation for each LEED construction prerequisite and credit to be attempted, which have been assigned to the Contractor by the Owner or Architect.
 - a. Sustainability/LEED Consultant shall prepare and distribute a LEED v4/4.1 Documentation Matrix to the Contractor. The LEED v4/4.1 Documentation Matrix illustrates the deliverables required to adequately record that the project has met the intent of each credit.
 - b. Contractor shall register and log-in to LEED Online (<http://www.leedonline.com>).
 - c. Contractor shall complete LEED Online credit forms and upload associated required backup documentation for all the credits assigned in LEED v4/4.1 Documentation Matrix.
 - 1) The LEED Online credit forms shall contain all proper data fields completed declaring that the project has met the intent of the credit, including narrative(s) when applicable. Provide electronic signature of Contractor and date signed, where required.
 - 2) For credits requiring product data, compile all LEED product data into one package per credit. Irrelevant product data shall be excluded from the backup documentation.
 - d. The contractor shall notify sustainability/LEED Consultant of completion of LEED Online documentation and availability for review and coordinate with sustainability/LEED Consultant for preparation of final documentation of LEED submission.

1.7 QUALITY ASSURANCE

- A. The Contractor shall retain a dedicated Sustainability Representative to oversee all on-site activities related to compliance with LEED criteria. The Sustainability Representative shall, at minimum:
 1. Be a LEED Green Associate.
 2. Be assigned to manage on-site construction administration of the Project's Sustainable Design Requirements, including but not limited to, Erosion and Sedimentation Control, Construction and Demolition Waste Management, indoor air quality, and material tracking.
 3. Take primary responsibility for managing the process of implementing and documenting the construction-related LEED prerequisites and credits for which the Contractor will be responsible, including collecting, organizing, and uploading the documentation required for the Project's LEED submission to LEED Online.
 4. Preference for staff with experience on LEED v4/ v4.1 projects.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Provide products and procedures necessary to obtain LEED credits required in this Section. Although other Sections may specify some requirements that contribute to LEED credits, the Contractor shall determine additional materials and procedures necessary to obtain LEED credits indicated.
- B. LEED Performance Criteria: Products and Materials shall meet the following project-wide criteria as well as applicable product-specific criteria in Part 2 of this Section.
 - 1. MR Credit 2 - BPDO - EPD, Option 1 (EPD):
 - a. Install at least twenty (20) different permanently installed products sourced from at least five (5) different manufacturers that meet criteria described in the LEED v4.1 BD+C Beta Guide.
 - b. For a list of specific products that have been identified as contributing towards this credit, refer to the Targeted BPDO Product Table in the Appendix of this Section.
 - 2. MR Credit 2 - BPDO - EPD, Option 2 (Multi-Attribute Optimization):
 - a. Use products that comply with credit criteria described in the LEED v4.1 BD+C Beta Guide for at least 10%, by cost, of the total value of permanently installed products in the Project, or use at least ten (10) different permanently installed products sourced from at least three (3) different manufacturers that meet credit criteria described in the LEED v4.1 BD+C Beta Guide.
 - b. For a list of specific products that have been identified as contributing towards this credit, refer to the Targeted BPDO Product Table in the Appendix of this Section.
 - 3. MR Credit 3 - BPDO - Sourcing of Raw Materials:
 - a. Install products that meet at least one (1) of the responsible extraction criterion described in the LEED v4.1 BD+C Beta Guide and in aggregate comprise at least 20 percent, by cost, of the total value of permanently installed building products in the Project.
 - 4. MR Credit 4 - BPDO - Material Ingredients, Option 1 (Material Ingredient Reporting):
 - a. Install at least twenty (20) different permanently installed products sourced from at least five (5) different manufacturers that meet criteria described in the LEED v4.1 BD+C Beta Guide.
 - b. For a list of specific products that have been identified as contributing towards this credit, refer to the Targeted BPDO Product Table in the Appendix of this Section.
 - 5. MR Credit 4 - BPDO - Material Ingredients, Option 2 (Material Ingredient Optimization):
 - a. Use permanently installed products from at least three (3) different manufacturers that document their material ingredient optimization in accordance with criteria described in the LEED v4.1 BD+C Beta Guide for at least ten (10) different permanently installed products or for products that constitute at least 10%, by cost, of the total value of permanently installed products in the Project.

- b. For a list of specific products that have been identified as contributing towards this credit, refer to the Targeted BPDO Product Table in the Appendix of this Section.
6. EQ Credit 2 - Low-Emitting Materials: Install interior products that meet overall Project compliance levels, as listed below and described in the LEED v4.1 BD+C Beta Guide.
- a. Wet-applied interior adhesives and sealants applied on site:
 - 1) 100 percent compliance for VOC Content Evaluation for adhesives and sealants.
 - 2) Minimum 75 percent compliance (by volume or surface area) for VOC Emissions Evaluation.
 - b. Wet-applied interior paints and architectural coatings applied on site:
 - 1) 100 percent compliance for VOC Content Evaluation for paints and coatings.
 - 2) Minimum 75 percent compliance (by volume or surface area) for VOC Emissions Evaluation.
 - c. Interior flooring products: minimum 90 percent compliance (by cost or surface area) for VOC Emissions Evaluation or inherently non-emitting sources criteria.
 - d. Interior composite wood products: minimum 75 percent compliance (by cost or surface area) for Formaldehyde Emissions Evaluation.
 - e. Interior ceiling assemblies: minimum 90 percent compliance (by cost or surface area) for VOC Emissions Evaluation or inherently non-emitting sources criteria.
 - f. Interior wall panels: minimum 75 percent compliance (by cost or surface area) for VOC Emissions Evaluation or inherently non-emitting sources criteria.
 - g. Interior insulation: minimum 75 percent compliance for VOC emissions evaluation.
 - h. Interior furniture and furnishings installed at time of Project occupancy: minimum 75 percent compliance (by cost) for Furniture Emissions Evaluation or inherently non-emitting sources criteria.

2.2 ADHESIVES AND SEALANTS

- A. Wet-applied adhesives and sealants installed in the building interior (i.e. inside of the weatherproofing membrane) must comply with the following:
 - 1. VOC Emissions Evaluation, as defined in this Section.
 - 2. VOC Content Evaluation for adhesives and sealants, as defined below:
 - a. Methylene chloride (CAS # 75-09-2) and perchloroethylene (CAS # 127-18-4) may not be intentionally added ingredients.
 - b. Chemical content requirements and maximum VOC content limits established by SCAQMD Rule #1168, October 6, 2017 Amendment and listed in the Appendix of this Section.

- 1) VOC limits are defined in grams per liter, less water and less exempt compounds unless otherwise noted.
- 2) VOC contents are determined by the methods of EPA Reference Test Method 24.

2.3 PAINTS AND COATINGS

- A. Wet-applied paints and coatings installed in the building interior (i.e. inside of the weatherproofing membrane) must comply with the following:
1. VOC Emissions Evaluation, as defined in this Section.
 2. VOC Content Evaluation for paints and coatings, as defined below:
 - a. Methylene chloride (CAS # 75-09-2) and perchloroethylene (CAS # 127-18-4) may not be intentionally added ingredients.
 - b. Maximum VOC content limits established by California Air Resources Board (CARB) 2007, Suggested Control Measure (SCM) for Architectural Coatings, or the South Coast Air Quality Management District (SCAQMD) Rule #1113, February 5, 2016 Amendment and listed in the Appendix of this Section.
 - 1) VOC limits are defined in grams per liter, less water and less exempt compounds unless otherwise noted.
 - 2) VOC contents are determined by the methods of EPA Reference Test Method 24.

2.4 FLOORING SYSTEMS

- A. Carpet systems or assemblies: must meet VOC Emissions Evaluation requirements as defined in this Section.
1. Carpet adhesives must meet the product requirements for Adhesives, as defined in this Section.
- B. Hard and soft surface flooring, wall base, underlayments, and other floor coverings:
1. Flooring products must meet VOC Emissions Evaluation requirements, as defined in this Section. Products which qualify as Inherently Non-emitting Material, as defined in this Section, are exempt from this requirement.
 2. Associated site-applied adhesives, grouts, epoxies, mortars, finishes and sealers must meet applicable requirements for Adhesives, Sealants, or Coatings, as defined in this Section.
- C. Site-applied concrete, wood, bamboo and cork floor finishes such as sealer, stain and finish: must meet applicable requirements for Adhesives, Sealants, or Coatings, as defined in this Section.
- D. Tile setting adhesives and grout: must meet applicable requirements for Adhesives, Sealants, or Coatings, as defined in this Section.

2.5 CEILING SYSTEMS

- A. Ceiling systems such as ceiling panels, ceiling tile, surface ceiling structures such as gypsum or plaster, suspended systems (including canopies and clouds), and glazed skylights, must meet VOC Emissions Evaluation requirements as defined in this Section.

2.6 WALL PANELS

- A. Wall panels such as finish wall treatments (wall coverings, wall paneling, wall tile), surface wall structures such as gypsum or plaster, cubicle/curtain/partition walls, trim, doors, frame, windows, and window treatments, must meet VOC Emissions Evaluation requirements as defined in this Section.

2.7 INSULATION

- A. Insulation such as thermal and acoustic boards, batts, rolls, blankets, sound attention fire blankets, foamed-in place, loose-fill and sprayed insulation must meet VOC Emissions Evaluation requirements as defined in this Section.

2.8 WOOD AND WOOD PRODUCTS

- A. New, non-recycled wood and wood-based materials shall be certified in accordance with Forest Stewardship Council (FSC) Guidelines. This includes wood permanently installed in the project but is not limited to structural framing and dimensional lumber, blocking, flooring, finished woodwork, millwork, casework, and non-rented temporary construction applications including bracing, concrete form work, and pedestrian barriers.
- B. No partial claims shall be made for products that contain FSC certified wood but are not sold with a FSC claim. A product that contains a mix of FSC-certified components with non-certified components is not considered a FSC Mixed product in an assembly and is not eligible to receive credit for the certified portion. The product shall only contribute to the MR LEED credit if the product complies with FSC Chain-of-Custody rules for Mixed products and the invoice carries a valid FSC claim and chain of custody number.
- C. Contractors and subcontractors that temporarily possess FSC-certified material prior to installation shall not mix FSC-certified material with non-FSC-certified material.
- D. Chain of Custody (CoC) Requirements:
 - 1. Transportation entities shall require a CoC when the transport to the next entity involves a change of ownership of the material or product. Shippers or transport companies handling goods owned by FSC CoC certified companies are exempt.
 - 2. Each wood products supplier and/or manufacturer that invoices FSC-certified wood products to a vendor must be certified by an FSC-accredited certifier.
 - 3. Each wood products vendor that invoices FSC-certified wood products to product contractors and subcontractors must be certified by an FSC-accredited certifier.

4. Parties that manufacture FSC-certified wood products off-site and then install them on-site must be FSC CoC certified for the products to contribute to LEED credit MRc7. This includes, but is not limited to, cabinetmakers and architectural millworkers.
5. Parties that do not manufacture, but install an FSC-certified product on the project site, do not require FSC Chain of Custody certification as long as they do not modify the product packaging or form except for the purposes of installation. This includes, but is not limited to, contractors, subcontractors, and furniture installers.
6. If a manufacturer places its FSC CoC label on product packaging used for individual sale (generally applying to fabricated products), then subsequent entities in the supply chain are not required to have CoC certification unless the product's packaging or form is changed before it reaches the end consumer.
7. For products that are not individually packaged for sale to be sold as FSC certified, the vendor to the consumer is required to have CoC certification. Contractors and subcontractors are considered the end consumers and may demonstrate with copies of invoices (if requested) the quantity purchased for the job and their suppliers' CoC numbers.

2.9 COMPOSITE WOOD PRODUCTS

- A. Composite wood products such as particleboard, medium density fiberboard, hardwood veneer plywood, and structural composite wood shall comply with the Formaldehyde Emissions Evaluation, as defined in this Section.

2.10 FURNITURE AND FURNISHINGS

- A. Furniture and furnishing items purchased and installed for the Project shall meet the Furniture Emissions Evaluation requirements as defined in this Section.

2.11 PLUMBING FIXTURES

- A. All newly installed toilets, urinals, private lavatory faucets, and showerheads that are eligible for labeling must be WaterSense labeled.
- B. Plumbing fixtures scheduled in the Construction Documents have been specified to meet a calculated aggregate reduction in potable water consumption by thirty percent (30%) compared to a LEED v4 calculated baseline. Substitutions shall not be allowed if such changes compromise the required reduction.

2.12 APPLIANCES

- A. Appliances shall meet the following requirements:
 1. Residential dishwashers (standard and compact): Energy Star or performance equivalent
 2. Ice machines: Energy Star or performance equivalent and use either air-cooled or closed-loop cooling, such as chilled or condenser water system
 3. Residential refrigerators: Energy Star or performance equivalent

PART 3 - EXECUTION

3.1 CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT

- A. For the following credits, comply with Section 017419 – Construction and Demolition Waste Management:
 - 1. MR Prerequisite 2 - Construction and Demolition Waste Management Planning
 - 2. MR Credit 5 - Construction and Demolition Waste Management

3.2 CONSTRUCTION INDOOR-AIR-QUALITY MANAGEMENT

- A. For the following credits, comply with Section 018119 – Construction Indoor Air Quality Requirements:
 - 1. EQ Credit 3 - Construction IAQ Management Plan
 - 2. EQ Credit 4 - Indoor Air Quality Assessment

3.3 EROSION AND SEDIMENTATION CONTROL

- A. SS Prerequisite 1 - Construction Activity Pollution Prevention: [Comply with Section 31 25 00 – Erosion and Sedimentation Control.] Develop, implement and document the Project Erosion and Sedimentation Control (ESC) Plan.
 - a. The contractor shall be responsible for the development and implementation of the ESC Plan in compliance with the 2012 U.S. Environmental Protection Agency Construction General Permit (CGP) or more stringent local equivalent, which may include, but shall not be limited to the following:
 - 1) The prevention of soil loss from stormwater runoff and wind erosion, including the protection and stockpiling of topsoil for reuse.
 - 2) The prevention of sedimentation of storm sewers and receiving streams.
 - 3) The prevention of air pollution from dust and particulate matter.
 - b. The contractor shall be responsible for the documentation of the pollution prevention measures implemented during construction, per Submittal requirements of this Section.

3.4 LEED APPRAISAL

- A. The Contractor is responsible for ensuring compliance with LEED prerequisites and credits highlighted in **[yellow]** in the LEED Appraisal in the Appendix of this Section.
- B. Updates to the LEED Appraisal will be provided by the LEED consultant throughout construction.

3.5 APPENDICES

- A. APPENDIX A-018113 – VOC LIMITS
- B. APPENDIX B-018113 – LEED APPRAISAL
- C. APPENDIX C-018113 – LEED v4 MATERIALS REPORTING FORM
- D. APPENDIX D-018113 – TARGETED BPDO PRODUCT TABLE
- E. APPENDIX E-018113 – LEED BOUNDARY

END OF SECTION 018113

APPENDIX A-018113 – VOC LIMITS

Emissions evaluations are also required for these product categories.

Product Category		VOC Limit (g/L, less water and exempt compounds)
Adhesives: Architectural Applications		
1.	Building envelope membrane adhesive	250
2.	Indoor carpet adhesive	50
3.	Carpet pad adhesive	50
4.	Ceramic glass, porcelain, & stone tile adhesive	65
5.	Cove base adhesive	50
6.	Drywall and panel adhesive	50
7.	Multipurpose construction adhesive	70
8.	Single ply roof membrane adhesives	250
9.	All other roof adhesives	250
10.	Rubber floor adhesive	60
11.	Structural glazing adhesive	100
12.	Structural wood member adhesive	140
13.	Sub-floor adhesive	50
14.	VCT and asphalt tile adhesive	50
15.	Wood flooring adhesive	100
16.	All other indoor floor covering adhesives	50
17.	All other outdoor floor covering adhesives	150
Adhesives: Specialty Applications		
18.	Computer diskette manufacturing adhesive	350
19.	Contact adhesive	80
20.	Edge glue adhesive	250
21.	PVC welding cement	510
22.	CPVC welding cement	490
23.	ABS welding cement	325

24.	ABS to PVC transition cement	510
25.	All other plastic welding cements	250
26.	Rubber vulcanization adhesive	250
27.	Special purpose contact adhesive	250
28.	Thin metal laminating adhesive	780
29.	Tire tread adhesive	100
30.	Top and Trim Adhesive	250
31.	Waterproof resorcinol glue	250
32.	All other adhesives	250
Adhesives: Substrate Specific Applications		
33.	Metal to metal	30
34.	Plastic foams	50
35.	Porous material (except wood)	50
36.	Wood	30
37.	Fiberglass	80
38.	Reinforced plastic composite	250
Sealants		
39.	Clear, paintable, and immediately water-resistant sealant	250
40.	Foam insulation	250
41.	Foam sealant	250
42.	Grout	250
43.	Roadway sealant	250
44.	Non-staining plumbing putty	250
45.	Single Ply Roof Membrane	450
46.	All other roof sealants	300
47.	All other architectural sealants	250
48.	Marine Deck	760
49.	All other sealants	420
Adhesive Primer		
50.	Plastic	550

51.	Pressure sensitive	250
52.	Traffic marking tape	150
53.	Vehicle glass	250
54.	All other adhesive primers	250
Sealant Primer		
55.	Architectural – Nonporous	250
56.	Architectural – Porous	775
57.	Modified Bituminous	500
58.	Marine Deck	760
59.	Other Sealant Primer	750
Paints and Coatings		
60.	Basement specialty coatings	400
61.	Bond breakers	350
62.	Clear wood finishes - Varnish	275
63.	Clear wood finishes - Sanding sealers	275
64.	Clear wood finishes - Lacquer	275
65.	Colorant - Architectural coatings, excluding IM coatings	50
66.	Colorant - Solvent-based IM	600
67.	Colorant - Waterborne IM	50
68.	Concrete - Curing compounds	100
69.	Concrete - Curing compounds for roadways and bridges	350
70.	Concrete masonry sealers	100
71.	Concrete surface retarder	50
72.	Driveway sealer	50
73.	Dry-fog coatings	50
74.	Faux finishing coatings - Clear topcoat	100
75.	Faux finishing coatings - Decorative coatings	350
76.	Faux finishing coatings - Glazes	350
77.	Faux finishing coatings - Japan	350

78.	Faux finishing coatings - Trowel applied coatings	50
79.	Fire-proofing coatings	150
80.	Flats	50
81.	Floor coatings	50
82.	Form release compound	100
83.	Graphic arts (sign) coatings	200
84.	High temperature coatings	420
85.	Industrial maintenance coatings	100
86.	Industrial maintenance coatings – Color indicating safety coatings	480
87.	Industrial maintenance coatings - High temperature IM coatings	420
88.	Industrial maintenance coatings - Non-sacrificial anti-graffiti coatings	100
89.	Industrial maintenance coatings - Zinc-rich IM primers	100
90.	Magnesite cement coatings	450
91.	Mastic coatings	100
92.	Metallic pigmented coatings	150
93.	Multi-Color coatings	250
94.	Nonflat coatings	50
95.	Nonflat coatings – high gloss	150
96.	Pre-treatment wash primers	420
97.	Primers, sealers, and undercoaters	100
98.	Reactive penetrating sealers	350
99.	Recycled coatings	250
100.	Roof coatings	50
101.	Roof coatings, aluminum	100
102.	Roof coatings, bituminous	50
103.	Roof primers, bituminous	350
104.	Rust preventative coatings	100
105.	Sacrificial anti-graffiti coatings	50

106.	Shellac - Clear	730
107.	Shellac - Pigmented	550
108.	Specialty primers, sealers, and undercoaters	100
109.	Stains	100
110.	Stains, interior	250
111.	Stone consolidants	450
112.	Swimming pool coatings	340
113.	Traffic coatings	100
114.	Tub and tile refinish coatings	420
115.	Waterproofing membranes	250
116.	Waterproofing sealers	100
117.	Waterproofing concrete/masonry sealers	100
118.	Wood coatings	275
119.	Wood preservatives	350
120.	Zinc-rich primers	340
121.	Low solids coatings	120*

*measured in g/L of material

LEED v4 for BD+C: New Construction and Major Renovation Project Checklist

Project Name:

	Y	?	N
Credit	1		
Integrative Process			

	12	2	2	2	Location and Transportation	16
					Credit	16
					LEED for Neighborhood Development Location	
					Credit	1
					Sensitive Land Protection	
					Credit	1
					High Priority Site	2
					Credit	
					Surrounding Density and Diverse Uses	5
					Credit	
					Access to Quality Transit (V4.1)	5
					Credit	
					Bicycle Facilities (V4.1)	1
					Credit	
					Reduced Parking Footprint	1
					Credit	
					Electric Vehicles (V4.1)	1
					Credit	

	10	0	0	0	Sustainable Sites	10
	Y				Prereq	Required
	1				Construction Activity Pollution Prevention	1
	2				Site Assessment	2
	1				Site Development - Protect or Restore Habitat	1
	3				Open Space (V4.1)	3
	2				Rainwater Management (V4.1)	2
	1				Heat Island Reduction	1
					Light Pollution Reduction	

Y	Y	Prereq	Indoor Water Use Reduction	Required
1	1	Credit	Building-Level Water Metering	2
2	2	Credit	Outdoor Water Use Reduction	6
		Credit	Indoor Water Use Reduction	2
		Credit	Cooling Tower Water Use (V4.1)	1
1	1	Credit	Water Metering	

	28	0	5	Energy and Atmosphere	33
Water Metering					
Credit	1				
Green			2		
Cooling Power Water Use (Wt.)					

Priority	Y	Y	Prereq	Building-Level Refrigerant Management	Required
	4	2	Credit	Enhanced Commissioning	6
	18		Credit	Optimize Energy Performance	18
	1		Credit	Advanced Energy Metering	1
	2		Credit	Grid Harmonization (V4.1)	2
	3		Credit	Renewable Energy Production	3
		1	Credit	Enhanced Refrigerant Management	1
		2	Credit	Green Power and Carbon Offsets	2

- 1 EAc2 Exemplary Performance
- 2 EAc5 Exemplary Performance
- 3 Purchasing lamps (mercury free)
- 4 Pilot Credit: Daylight - non-regularly occupied spaces
- 5 Bird Collision Deterrence, OR Design for Active Occupancy

APPENDIX C-018113 – LEED v4.1 MATERIALS REPORTING FORM (FOR REFERENCE ONLY)

LEED-NC v4 Materials Reporting Form

Please complete this form for all permanently installed products within the Divisions noted below. Check boxes for the appropriate product type and complete all fields as indicated. Provide backup documentation for each environmental claim. See page 2 for definitions and submittal requirements.

Submittal Number : _____ Submittal Name : _____ Subcontractor : _____		Product Name or Model # : _____ Manufacturer : _____ Manufacturer Contact : _____		Total Material Cost (w/o site labor/equip) : _____ Location of Product : _____ Interior <input type="checkbox"/> Exterior <input type="checkbox"/> (Relative to weatherproofing membrane) Is product used in building structure or enclosure? Y <input type="checkbox"/> N <input type="checkbox"/>	
NOTES					
REQUIRED FOR ALL PRODUCTS – DIVS 3-12, 31, 32					
1. MRC2 Environmental Product Declaration (EPD) Does the product have one of the documents listed below: a) EPD Y <input type="checkbox"/> N <input type="checkbox"/> b) 3rd Party Life Cycle Assessment (LCA) Y <input type="checkbox"/> N <input type="checkbox"/>					
2. MRC3 Sourcing of Raw Materials Does the product's manufacturer have a corporate sustainability report? Y <input type="checkbox"/> N <input type="checkbox"/> Does the product meet one of the attributes below? a) Take-back program Y <input type="checkbox"/> N <input type="checkbox"/> b) Bio-based materials% c) Materials reuse% d) FSC Certified Wood% - COC# e) Recycled content - Pre-consumer% - Post-consumer% f) Extraction, manufacture, and purchase locations all within 100 miles? Y <input type="checkbox"/> N <input type="checkbox"/>					
3. MRC4 Material Ingredients Does the product disclose material ingredients via one of the applicable programs below? a) Manufacturer Inventory Y <input type="checkbox"/> N <input type="checkbox"/> b) Health Product Declaration Y <input type="checkbox"/> N <input type="checkbox"/> c) Cradle to Cradle Certificate Y <input type="checkbox"/> N <input type="checkbox"/> d) GreenScreen Assessment Y <input type="checkbox"/> N <input type="checkbox"/> e) REACH Optimization Y <input type="checkbox"/> N <input type="checkbox"/> f) Declare Label Y <input type="checkbox"/> N <input type="checkbox"/> g) UL Product Lens Y <input type="checkbox"/> N <input type="checkbox"/>					
REQUIRED FOR INTERIOR PRODUCTS – ALL DIVS					
4. EQc2 Low-Emitting Materials Select the appropriate section for the type of product submitted: <input type="checkbox"/> ADHESIVES / SEALANTS / PAINTS / COATINGS Provide VOC content (grams/Liter): _____ g/L Estimate installed volume (Liters): _____ L General Emissions Evaluation available?: Y <input type="checkbox"/> N <input type="checkbox"/> Type of documentation: 3rd Party Certificate* <input type="checkbox"/> or Testing Report <input type="checkbox"/> TVOC range: <0.5 mg/m ³ <input type="checkbox"/> 0.5-5.0 mg/m ³ <input type="checkbox"/> >5.0 mg/m ³ <input type="checkbox"/> <input type="checkbox"/> COMPOSITE WOOD PRODUCTS Confirm CARB compliance with one of the following: ULEF <input type="checkbox"/> or NAF <input type="checkbox"/> or CARB Exempt <input type="checkbox"/> <input type="checkbox"/> FLOORING / CEILINGS / WALLS / INSULATION PRODUCTS General Emissions Evaluation available?: Y <input type="checkbox"/> N <input type="checkbox"/> Type of documentation: 3rd Party Certificate* <input type="checkbox"/> or Testing Report <input type="checkbox"/> TVOC range: <0.5 mg/m ³ <input type="checkbox"/> 0.5-5.0 mg/m ³ <input type="checkbox"/> >5.0 mg/m ³ <input type="checkbox"/> OR, is the product inherently non-emitting? Y <input type="checkbox"/> N <input type="checkbox"/> <input type="checkbox"/> FURNITURE PRODUCTS Furniture Evaluation available?: Y <input type="checkbox"/> N <input type="checkbox"/> Type of documentation: 3rd Party Certificate* <input type="checkbox"/> or Testing Report <input type="checkbox"/>					
Contractor Certification: I, _____ a duly authorized representative of _____ hereby certify that the material information contained herein is an accurate representation of the material qualifications to be provided by us, as components of the final building construction. Furthermore, I understand that any change in such qualification during the purchasing period will require prior written approval from the Construction Manager and Owner. Signature of Authorized Representative _____ Date: _____					

* See the USGBC Low-Emitting Materials Third Party Certification table for acceptable 3rd party certifications and programs:
<https://www.usgbc.org/resources/low-emitting-materials-third-party-certification-table>



APPENDIX D-018113 –TARGETED BPDO PRODUCT TABLE

The following tables include products that have been identified as contributing towards the LEED v4.1 Materials & Resources – Building Product Disclosure & Optimization (BPDO) credits listed below. Any product substitutions shall contribute equivalent credit value towards the LEED credits and meet all requirements for substituted products as outlined elsewhere in this specification.

MR Credit BPDO – Environmental Product Declarations, Option 1

Spec Section	Manufacturer	Product Name	Documentation Type	Credit Value
	Sample: Product A	Manufacturer A	Product-specific EPD (Internally Verified)	1 product
	Sample: Product B	Manufacturer B	Industry-wide EPD (Externally Verified)	1 product

MR Credit BPDO – Environmental Product Declarations, Option 2

Spec Section	Manufacturer	Product Name	GWP Reduction	Credit Value
	Sample: Product A	Manufacturer A	>10%	1.5 product
	Sample: Product B	Manufacturer B	>0%	1 product

MR Credit BPDO – Material Ingredients, Option 1

Spec Section	Manufacturer	Product Name	Documentation Type	Credit Value
	Sample: Product A	Manufacturer A	Health Product Declaration	1 product

	Sample: Product B	Manufacturer B	Declare Label	1 product

MR Credit BPDO – Material Ingredients, Option 2

Spec Section	Manufacturer	Product Name	Documentation Type	Credit Value
	Sample: Product A	Manufacturer A	Material Ingredient Optimization: Health Product Declaration	1.5 product
	Sample: Product B	Manufacturer B	Advanced Inventory: Declare Label	1 product

[illegible]

SECTION 018119 - CONSTRUCTION INDOOR AIR QUALITY REQUIREMENTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
 - 1. Sustainable Design Requirements – Section 018113
- B. All technical Sections of the Specifications related to interior construction and finish materials, MEPFP systems, and items affecting indoor air quality.
- C. LEED Reference Guide for Building Design and Construction (BD+C), version 4, U.S. Green Building Council.
- D. LEED v4.1 Building Design and Construction (BD+C), Getting Started Guide for Beta Participants (Beta Guide), U.S. Green Building Council, issued January 2020.

1.2 DESCRIPTION OF WORK

- A. This Section includes:
 - 1. Requirements for the development of a Construction Indoor Air Quality Management Plan (herein referred to as the Plan). The Plan shall be developed by the Contractor and approved by the Owner and Architect.
 - 2. Requirements for documenting the continuous implementation of the Construction Indoor Air Quality Management Plan throughout all applicable phases of construction. The Plan shall be implemented throughout the duration of the Project construction under the direction of the Contractor's IAQ Representative and shall be documented per the Submittal Requirements in Part 1 of this Section.
 - 3. Requirements and documentation for LEED Certification. The Plan is part of the Project LEED Requirements. Note: For clarity, identification numbers have been added to LEED v4.1 prerequisite and credit names as used throughout this Section.

1.3 CONSTRUCTION IAQ MANAGEMENT GOALS FOR THE PROJECT

- A. The Owner has established that this Project shall minimize the detrimental impacts on Indoor Air Quality (IAQ) resulting from construction activities. Factors that contaminate indoor air, such as dust entering HVAC systems and ductwork, improper storage of materials on-site, and poor housekeeping, shall be minimized through development and implementation of a Construction Indoor Air Quality (IAQ) Plan.
- B. During construction, meet or exceed all recommended control measures of SMACNA IAQ Guidelines for Occupied Buildings under Construction, 2nd Edition, 2007, ANSI/SMACNA 008-2008, Chapter 3.
- C. Establish better quality indoor air in the building through implementation of a flush-out or air testing after construction but before occupancy.

1.4 SUSTAINABLE BUILDING REQUIREMENTS

- A. The Owner requires the Contractor to implement practices and procedures to meet the Project's environmental performance goals, which include achieving LEED v4 Certification. Refer to Section

018113 - SUSTAINABLE DESIGN REQUIREMENTS for the Project's target certification level and specific LEED requirements. The Contractor shall ensure that the requirements related to the Project's sustainability design goals are implemented to the fullest extent. Substitutions, or other changes to the work proposed by the Contractor or their Subcontractors, shall not be allowed if such changes compromise the Project's sustainability goals and LEED certification.

1.5 REFERENCES

A. Acronyms and Abbreviations

1. ANSI: American National Standards Institute.
2. ASHRAE: The American Society of Heating, Refrigerating and Air-Conditioning Engineers.
3. EQ: Environmental Quality
4. HEPA: HIGH-EFFICIENCY PARTICULATE
5. IAQ: Indoor Air Quality.
6. LEED: Leadership in Energy and Environmental Design
7. MERV: Minimum Efficiency Reporting Value.
8. NC: New Construction
9. SMACNA: Sheet Metal and Air Conditioning National Contractors Association.
10. USGBC: US Green Building Council
11. VOC: Volatile Organic Compound.

B. Reference Standards

1. ANSI/SMACNA 008-2008, "IAQ Guidelines for Occupied Buildings Under Construction", Second Edition 2007, Chapter 3, The Sheet Metal and Air Conditioner National Contractors Association (SMACNA), www.smacna.org.
2. ANSI/ASHRAE 52.2-2017, "Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size", www.ashrae.org.
3. ASTM D5149-02, "Standard Test Method for Ozone in the Atmosphere: Continuous Measurement by Ethylene Chemiluminescence."
4. ASTM D5197-16, "Standard Test Method for Determination of Formaldehyde and Other Carbonyl Compounds in Air (Active Sampler Methodology)."
5. U.S. Environmental Protection Agency (EPA) "Compendium of Methods for the Determination of Air Pollutants in Indoor Air."

C. Definitions

1. Volatile Organic Compounds (VOC's): Carbon compounds that participate in atmospheric photochemical reactions (excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides and carbonates, and ammonium carbonate). The compounds vaporize (become a gas) at normal room temperatures. These compounds are common in and emitted by many building products, including solvents in paints, coatings, adhesives and sealants, wood preservatives; composite wood binder, and foam insulations. Not all VOC's are harmful, but

many of those contained within building products contribute to the formation of smog and may irritate building occupants or construction workers by their smell and/or health impact.

- a. Materials that act as “sinks” for VOC contamination: absorptive materials, typically dry and soft (such as textiles, carpeting, acoustical ceiling tiles and gypsum board) that readily absorb VOC’s emitted by “source” materials and release them over a prolonged period of time.
- b. Materials that act as “sources” for VOC contamination: products with high VOC contents that emit VOC’s either rapidly during application and curing (typically “wet” products, such as paints, sealants, adhesives, caulks and sealers) or over a prolonged period (typically “dry” products such as flooring coverings with plasticizers and engineered wood with formaldehyde).
2. Minimum Efficiency Reporting Value (MERV): Filter rating established by ASHRAE and determined according to ASHRAE Standard 52.2-2017. MERV categories range from 1 (very low efficiency) to 16 (very high efficiency),

1.6 CONSTRUCTION IAQ MANAGEMENT PLAN - OVERVIEW

- A. The Contractor shall implement indoor air quality management during construction per the requirements of LEED v4.1 EQ Credit 3 – Construction Indoor Air Quality Management Plan.
- B. As directed by the Owner, the Contractor shall assist in coordinating and implementing an indoor air quality assessment after construction ends and before occupancy, per the requirements of LEED v4.1 EQ Credit 4 – Indoor Air Quality Assessment.
- C. The Contractor shall prepare and submit a Construction IAQ Management Plan for the construction and pre-occupancy phases of the Project to the Owner and Architect. The Plan shall meet the following criteria:
 1. Construction Phase
 - a. Construction activities shall be planned to meet or exceed the minimum requirements included in the SMACNA “IAQ Guidelines for Occupied Buildings Under Construction”, as listed in PART 1 of this Section.
 - b. Absorptive or porous materials shall be protected from moisture damage when stored on-site and after installation. Contractor shall not install water damaged materials in the building.
 - c. Filtration media shall be installed to protect ductwork and/or HVAC equipment used during the construction process, per the requirements of PART 2 of this Section.
 - d. The use of tobacco products shall be prohibited inside the building and within 25 feet of the building entrance during construction.
 - e. Only low-emitting and low- or no-VOC products shall be installed in the field on the interior of the Project, per the requirements of Division 01 Section 018113 - Sustainable Design Requirements. Examples of such products include, but are not limited to, adhesives, sealants, paints, coatings, and carpet.
 - f. A Sequence of Finish Installation Plan shall be developed, highlighting measures to reduce the absorption of VOCs by materials that act as “sinks”.

- g. Upon approval of the Plan by the Owner and Architect, it shall be implemented by the Contractor and Subcontractors throughout the duration of the construction process and documented in accordance with the LEED Submittal Requirements of this Section.

2. Pre-Occupancy Phase

- a. All occupiable and habitable spaces within the Project shall be subject to either an air flush-out or air testing after construction and immediately prior to occupancy, as directed by the Owner and described in PART 1 of this Section, per the requirements of LEED v4.1 EQ Credit 4 – Indoor Air Quality Assessment.

1.7 CONSTRUCTION IAQ MANAGEMENT PLAN (CONSTRUCTION PHASE) – DETAILED REQUIREMENTS

- A. The SMACNA “IAQ Guidelines for Occupied Buildings Under Construction” (Chapter 3) outline IAQ measures in five categories as listed below. The Construction IAQ Management Plan shall be organized in accordance with the SMACNA format and shall address measures to be implemented by the Contractor and/or Subcontractors in each of the five SMACNA categories (including subsections). All subsections shall be listed in the Plan; items that are not applicable for this project should be listed as such.

1. HVAC Protection

a. Return Side

- 1) Operation of permanent air handling equipment during construction:
 - a) Operate only with the prior written approval from the building Owner. Install minimum MERV 8 filters at each return air grill and each return transfer duct inlet opening. Do not permit air flow to bypass the filtration media. Dual filtration (e.g. MERV 7 followed by MERV 11 filtration) shall not be an acceptable substitution.
 - b) Immediately before occupancy, at permanent filter locations install new filtration media in accordance with the design requirements and manufacturer’s installation instructions.
- 2) Seal with plastic all return system openings in, or immediately adjacent to, the construction area.
- 3) Block or damper off heavy work areas from HVAC system if temporary imbalance of the return air system does not create a problem.
- 4) Do not store construction or waste materials in mechanical rooms with return-side equipment.

b. Central Filtration

- 1) Upgrade filter efficiency (e.g. 60 to 80 percent dust spot efficiency) where major dust loading is expected to impact operating HVAC systems.
- 2) Consider using filtration with media such as activated charcoal or potassium permanganate where source control options for construction-related odors are not sufficiently effective.

c. Supply Side

- 1) Wrap in plastic any equipment left in place; isolated ducts serving occupied and construction areas; protect new equipment from weather, dust and physical damage by storing equipment in clean, protected areas shielded from rain and moisture.
- 2) When the system is off for the duration of construction: seal diffusers and window units in plastic; frequently inspect ducts, diffusers, and window units for cleanliness upon completion of the work, and clean where needed.
- 3) If particulate discharge after system start-up is minor, delay occupancy until dust may be sufficiently cleaned up.

- 4) If particulate discharge after system start-up is severe, install temporary coarse filters on diffusers or clean ducts as necessary.
 - 5) Check the condition of the main filters whenever visible particulates are discharged from the system.
- d. Duct Cleaning
- 1) Conduct a detailed visual inspection of the system to determine if excessive dust or debris is in the system, and determine most appropriate cleaning method as necessary. Clean the ducts and associated equipment before occupancy using specialized equipment and professional expertise to ensure dust is effectively removed and contained.
2. Source Control
- a. Product Substitution
- 1) Use only materials which comply with VOC limit requirements, emissions testing requirements, and chemical component restrictions in accordance with Section 018113 – Sustainable Design Requirements.
- b. Modifying Equipment Operation
- 1) Modify equipment operation as needed to meet IAQ objectives. Modifications may include substitutions for cleaner equipment or adjustments in operating procedures.
- c. Changing Work Practices
- 1) Establish measures for contaminant source control resulting from construction processes. For example, contain the oil from construction processes and equipment so it does not contact concrete.
 - 2) Consider using demolition techniques that produce less airborne dust.
 - 3) Consider painting techniques that release less odor.
 - 4) Consider cleaning practices that raise less dust.
 - 5) Consider using hand tools instead of power tools, when feasible.
 - 6) Consider using vacuum-assisted drywall sanders and concrete saws to control dust.
- d. Local Exhaust
- 1) Directly exhaust pollution sources to the outside. Provide special filtration for exhaust if necessary, and ensure emissions to the outside comply with applicable outdoor air regulations.
 - 2) Ensure exhaust separation distances from fresh air-intakes, windows, and occupant entry ways meet applicable codes. Typical recommendation for separation distance is a minimum of 30 feet.
- e. Air Cleaning
- 1) Where exhaust is not feasible, consider local recirculation of air through a portable air cleaner. Choose a filter type that is appropriate for the material being controlled.
- f. Cover or Seal
- 1) Reduce VOC emissions from evaporation by sealing or covering possible sources of emissions.
 - a) An enclosed tanker is preferable to an open kettle for roofing.
 - b) Keep containers of wet products closed when not in use.
 - c) Cover or seal waste materials that may release dust, odor, or other contaminants.
 - d) Control surfaces that are persistent odor sources by applying a sealer.
- g. Store solvent-contaminated rags in closed, flame-proof containers.
- h. Enforce the no-smoking job site policy.

3. Pathway Interruption

- a. Depressurize the work area.
- b. Pressurize occupied space by increasing supply air or reducing return/exhaust air in areas occupied during construction. Consider extending HVAC system fan schedule to pressurize occupied spaces 24 hours per day.
- c. Erect barriers to contain construction areas.
- d. Relocate pollutant sources and/or temporarily redirect air intakes when project equipment or staging areas coincide with critical airflow pathways.
- e. Temporarily seal the building to exterior emissions if deemed necessary and allowed by building code.

4. Housekeeping

- a. Suppress dust with wetting agents or sweeping compounds. Increase the cleaning frequency for dust based on visible inspection.
- b. Use efficient dust collection methods, such as a damp rag, wet mop, or a vacuum equipped with a high efficiency particulate filter, wet scrubber, or exterior exhaust.
- c. Keep all surfaces, including high ledges, areas behind furniture, and surfaces inside mechanical equipment, clean. Consider covering contents prior to construction activity or installing elements after dust generation has ceased to facilitate the cleaning process.
- d. Remove spills, excess applications of solvent-containing products, and accumulated water as soon as possible. Spot removers and cleaning agents should be low odor emitters.
- e. Use vacuum cleaners with high-efficiency particulate (HEPA) filtration.
- f. Protect absorptive, porous materials and other building systems installed or stored on-site from exposure to moisture and contamination.
 - 1) Store materials on elevated platforms under cover and in a dry location.
 - 2) If materials are not stored in an enclosed location, cover tops and sides of material with secured, waterproof sheeting.
 - 3) Phase construction to ensure that absorptive materials are installed only in areas that are weather-tight.
 - 4) Provide a description of corrective measures that will be taken if absorptive materials are exposed to moisture during construction.
- g. Use specialized cleaning procedures, as specified in the NIBS guidelines, when stripping lead-based paint.

5. Scheduling

- a. Sequence construction activities and installation of materials to minimize impact on indoor air quality.
- b. Install absorptive-finish materials after wet-applied materials have fully cured whenever possible.
- c. Institute cleaning activities concentrated on removal of contaminants from HVAC systems and building spaces prior to occupancy, including cleaning of coils, air filters, and fans.

- d. Replace filtration media (MERV 13 or better) immediately prior to substantial completion and occupancy. Dual filtration (e.g. MERV 7 followed by MERV 11 filtration) shall not be an acceptable substitution.
 - e. Provide a description of measures taken to ensure appropriate IAQ levels after occupation of interior construction and finish work.
 - f. Schedule installation during unoccupied periods.
 - g. Avoid building occupancy while construction-related pollutants and odors are still present.
- B. Protection of Materials from Moisture Damage: Under the Housekeeping section of the Plan, describe measures to prevent installed materials or material stored on-site from moisture. This section should also describe measures to be taken if moisture damage does occur to absorptive materials during the course of construction.
 - 1. Store materials on elevated platforms or pallets under cover and in a dry location.
 - 2. If materials are not stored in an enclosed location, cover tops and sides of materials with waterproof sheeting, securely tied.
 - 3. Phase construction such that absorptive materials are installed only in areas that are weather-tight.
- C. Protection of Ductwork: Under the HVAC Protection section of the Plan, describe measures to protect air handling and distribution equipment and air supply and return ducting during construction.
 - 1. All ductwork arriving on site shall have the ends and openings sealed with plastic sheeting and stored on pallets or dunnage until installed. Plastic seals shall remain in place during ductwork installation and shall be repaired or replaced as necessary to maintain continuous protection throughout the duration of construction.
 - 2. The Contractor shall cover and protect all exposed air inlets and outlets, openings, grilles, ducts, plenums, etc. to prevent water, moisture, dust and other contaminant intrusion.
 - 3. All ductwork shall be stored on site above the ground or floor slabs.
 - 4. Ducting runs shall be protected at the end of each day's work.
 - 5. The Contractor shall apply protection immediately after ducting.
 - 6. The Contractor's designated IAQ Representative shall inspect work and monitor subcontractor(s) to ensure compliance.
- D. Temporary Filtration: The Contractor shall inspect temporary filtration weekly and replace as required to maintain the proper ventilation rates in the building.
 - 1. Filtration Media shall meet the requirements as listed in PART 2 of this Section.
- E. Replacement of Filtration Media: Under the HVAC Protection section of the Plan, provide a description of the filtration media in all ventilation equipment used during construction. The description shall include replacement criteria for filtration media during construction and confirmation of filtration media replacement for all equipment immediately prior to occupancy.

1. Filtration media shall meet the requirements of PART 2 of this Section. As part of required LEED Submittals outlined in PART 1 of this Section, at the end of construction the Contractor shall provide a confirmation that all filtration media were replaced prior to occupancy.

F. Sequence of Finish Installation for Materials

1. Absorptive materials should be installed after the installation of materials or finishes which have high short-term emissions of VOC's, formaldehyde, particulates, or other air-borne compounds.
 - a. Absorptive materials ("sinks") include but are not limited to: carpets; acoustical ceiling panels; fabric wall coverings; insulations (exposed to the air stream); upholstered furnishings; and other woven, fibrous or porous materials.
 - b. Materials with high short-term emissions ("sources") include, but are not limited to: adhesives, sealants and glazing compounds (specifically those with petrochemical vehicles or carriers); paints, wood preservatives and finishes; control and/or expansion joint fillers; hard finishes requiring adhesive installation; finish processes and products associated with gypsum board installation; and composite or engineered wood products with formaldehyde binders.
2. The Contractor shall develop a Sequence of Finish Installation Plan and schedule that identifies how the sequencing of finish material installation will occur for the project. The schedule shall be submitted to the Owner and Architect in accordance with the Submittal Requirements of this Section.

- G. Ventilation during installation of materials and finishes: Outside air shall be provided during the installation of materials and finishes, beginning after the building is substantially enclosed. If permanent building HVAC systems are used to supply the ventilation air, filtration media shall be installed per the requirements of PART 2 of this Section.

1.8 CONSTRUCTION IAQ MANAGEMENT PLAN (PRE-OCCUPANCY PHASE) – DETAILED REQUIREMENTS

- A. As directed by the Owner, the Contractor shall assist in coordinating and implementing one of the following compliance options after construction ends and before occupancy, once all interior finishes and movable furnishings are installed, major VOC-related punch list items are finished, and the building is completely cleaned, per the requirements of LEED v4.1 EQ Credit 4 - Indoor Air Quality Assessment:
1. OPTION 1 - Flush-Out:
 - a. Perform building flush-out in accordance with the requirements outlined in the LEED v4.1 Building Design and Construction (BD+C), Getting Started Guide for Beta Participants (Beta Guide), U.S. Green Building Council.
 - b. Note that this Option includes two potential paths to perform the flush-out either before or during occupancy.
 - c. Contractor shall identify estimated flush-out duration to include in construction schedule.
 2. OPTION 2 - Air Testing: Conduct baseline IAQ testing in accordance with the requirements and standard methods outlined in the LEED v4.1 Building Design and Construction (BC+C), Getting Started Guide for Beta Participants (Beta Guide), U.S. Green Building Council. Concentrations of contaminants shall be tested and shall not exceed maximum levels specified in the Beta Guide. For each sampling point where the concentration exceeds the limit, take corrective action and retest for the noncompliant contaminants at the same sampling points. Repeat until all requirements are met.

1.9 LEED SUBMITTAL REQUIREMENTS

A. The Contractor shall submit the following required records and documents:

1. Prior to start of construction, submit the following:
 - a. A construction schedule outlining the start-up date and expected duration of all Construction IAQ Management Plan control measures.
 - b. A copy of the Construction IAQ Management Plan and the Sequence of Finish Installation Plan for approval by the Owner and Architect, as defined in PART 1 of this Section.
2. Product cut-sheets for all filtration media used during construction and installed immediately prior to occupancy, with MERV values highlighted and meeting the criteria for filtration media in PART 2 of this Section. Cut sheets shall be submitted with the Contractor's 'approved' stamp as confirmation that the products submitted are the same products installed on the project.
3. At end of construction, submit the following:
 - a. Photographs that document the implementation of the Construction IAQ Management Plan throughout the course of the project construction. Submit a minimum of (18) photographs, (6) photographs taken on at least (3) different occasions during construction, each labeled with the SMACNA control measure illustrated. Examples include photographs of ductwork sealing and protection, temporary ventilation measures, and conditions of on-site materials storage to prevent moisture damage. Photographs shall include integral date stamping and shall be submitted with brief descriptions or be referenced to project meeting minutes or similar project documents.
 - b. Construction IAQ Management Summary Report.
 - c. Narrative describing measures taken to protect absorptive materials from moisture damage.
 - d. Required documentation for LEED v4.1 EQ Credit 3 Construction Indoor Air Quality Management Plan and EQ Credit 4 Indoor Air Quality Assessment, including completed LEED Online credit forms and required supporting documentation uploaded to the LEED Online website.

1.10 LEED SUBMISSION DOCUMENTATION

A. The Construction Manager shall provide documentation for the LEED submission.

1. At or before substantial completion, the Construction Manager shall prepare supporting documentation for each LEED construction prerequisite and credit to be attempted, which have been assigned to the Construction Manager by the Owner or Sustainability Coordinator.
2. The Construction Manager shall register and log-in to LEED Online (<http://www.leedonline.com>).
3. The Construction Manager shall complete LEED Online credit forms and upload backup documentation and associated LEED Calculators. The LEED Online credit forms and supporting documentation shall contain:

- a. All proper data fields completed declaring that the project has met the intent of the credit, including narrative(s) when applicable.
 - b. Electronic signature of Construction Manager and date signed, where required.
4. The Construction Manager shall notify Sustainability Coordinator of completion of LEED Online documentation and availability for review and coordinate with Sustainability Coordinator for preparation of final documentation of LEED submission.

1.11 QUALITY ASSURANCE

- A. Contractor IAQ Representative: IAQ Engineer with five (5) years' experience performing IAQ supervision on projects of comparable size and scope.
- B. IAQ Testing Agency: Independent testing and inspecting agency, subject to approval by the Owner and meeting the following qualifications:
 1. Minimum of five (5) years' experience in performing the types of testing specified herein and to meet requirements of LEED v4.1 EQ credit 4 Indoor Air Quality Assessment, Option 2, on projects of comparable size and scope.
 2. Laboratories that conduct tests must be accredited under ISO/IEC 17025 for the test methods used.

PART 2 PRODUCTS

2.1 FILTRATION MEDIA

- A. Construction filters: If permanently installed air handlers are used during construction, filtration media must be installed at each return grill and air handling unit, having a Minimum Efficiency Reporting Value (MERV) of at least 8 as determined by ASHRAE Standard 52.2-2017. All construction filtration media shall be replaced immediately prior to occupancy.
- B. Flush-out filters: If the Flush-out option will be pursued for LEED v4.1 EQ credit Indoor Air Quality Assessment, as described in PART 1 of this Section, new filtration media shall be installed at air handling units having a Minimum Efficiency Reporting Value (MERV) of 13 as determined by ASHRAE Standard 52.2-2017.
- C. Final filters: Replace all filtration media immediately prior to occupancy. For all ventilation systems that supply outside air, install filters having a Minimum Efficiency Reporting Value (MERV) of 13 or better as determined by ASHRAE Standard 52.2-2017.

2.2 BUILDING MATERIALS

- A. Low-emitting products specified in technical Sections of the Project Manual. VOC content and emissions shall comply with requirements specified in Division 01 Section 018113 - Sustainable Design Requirements.
- B. Dust Control Adhesive-Surface Walk-off Mats: Provide mats minimum 36 by 60 inches, commencing with installation of finishes inside the Project.

2.3 CLEANING SUPPLIES

- A. Use low toxicity cleaning supplies for surfaces, equipment and workers personal use, during periodic and final cleaning. Comply with requirements for closeout and final cleaning specified in Division 01.

PART 3 – EXECUTION

3.1 IMPLEMENTATION AND COORDINATION

- A. The Contractor shall be responsible for implementation of the Construction IAQ Management Plan and for the coordination of the Plan with all affected trades per the requirements of PART 1 of this Section.
 - 1. The Contractor shall designate one individual as the Construction IAQ Representative, who will be responsible for communicating the progress of the Plan with the Owner and Architect on a regular basis and for assembling the required LEED documentation.
 - 2. The Contractor shall include provisions in the Construction IAQ Management Plan for addressing conditions in the field that do not adhere to the Plan, including provisions to implement a stop work order or to rectify non-compliant conditions.
 - 3. Assign an on-site Construction Air Quality Control Representative to coordinate issues associated with implementation of the Plan.
 - 4. Designate responsibility to Contractors and Subcontracted Trades for the implementation of specific control measures as indicated in the Plan.
- B. The Contractor shall include procedures related to IAQ Management on the agenda during pre-construction meetings and during regularly scheduled meetings on the jobsite. Minutes shall be recorded at all such meetings.
- C. Trade subcontractors shall be responsible for the implementation of specific control measures, as specified in the Construction IAQ Management Plan. Subcontractors shall coordinate their responsibilities through the Contractor and their designated Construction IAQ Representative.

- END OF SECTION -

SECTION 01 91 00 – GENERAL COMMISSIONING REQUIREMENTS

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

- A. The purpose of the Commissioning Process is to provide the Owner/Operator of the facility with independent verification that the systems to be commissioned have been installed according to the contract documents and operate within the performance guideline set in the Owner's Project Requirements, the Basis of Design, the construction drawings and these specifications. The Commissioning Authority will provide the Owner with independent, unbiased, objective view of the system's installation, operation and performance. The commissioning process does not alleviate or reduce the responsibility of the design professionals or installing contractors to provide a complete and finished product, installed and fully functional in accordance with the contract documents.
- B. Commissioning is intended to enhance the quality of system start-up and aid in the orderly transfer of systems for use by the Owner. Quality commissioning requires participation by all parties involved with the design and construction process, including the owner, architect and engineer, general and sub-contractors, and owner's facilities department. The Commissioning Authority will lead the commissioning team planning and coordinating all commissioning activities in conjunction with the design professionals, project manager, general contractors, manufacturers and equipment vendors. In addition, training of the Owner's Operations Personnel will be verified, and final project O&M Documents will be reviewed for completeness.

1.2 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.
- B. Owners Project Requirements
- C. Basis of Design
- D. Commissioning Plan
- E. Related Specifications / Sections
 - 1. Section 01 31 00 – Project Management and Coordination
 - 2. Section 01 32 16 – Construction Progress
 - 3. Section 01 32 19 – Submittal Schedules/Daily Reports/Field Reports
 - 4. Section 01 33 00 – Submittal Procedures
 - 5. Section 01 73 00 – Execution Requirements
 - 6. Section 01 77 00 – Closeout Procedures
 - 7. Section 01 78 23 – Operation and Maintenance Data
 - 8. Section 01 78 36 – Warranties
 - 9. Section 01 78 39 – Project Record Documents

- 10. Section 01 79 00 – Demonstration and Training
- 11. Division 11 - Equipment
- 12. Division 22 – Plumbing
- 13. Division 23 – Heating, Ventilation, and Air Conditioning (HVAC)
- 14. Division 26 – Electrical
- 15. Section 32 84 00 – Planting Irrigation

1.3 SUMMARY

A. This section includes:

1. Commissioning: Commissioning is a systematic process of ensuring that all building systems perform interactively according to the Basis of Design and Owner's Project Requirements. This is achieved by beginning in the design phase and documenting Basis of Design and continuing through construction, acceptance, and the warranty period with actual verification of performance. The commissioning process shall encompass and coordinate the traditionally separate functions of system documentation, equipment startup, control system calibration, testing and balancing, performance testing to include integration to all related systems and training.
2. Commissioning during the construction phase is intended to achieve the following specific objectives according to the Contract Documents:
 - a. Verify that applicable equipment and systems are installed according to the manufacturer's recommendations and to industry accepted standards and that they receive adequate operational checkout by installing contractors.
 - b. Verify and document proper performance of equipment and systems.
 - c. Verify that Operation and Maintenance documentation left on site is complete.
 - d. Verify that the Owner's operating personnel are adequately trained.
3. The commissioning process does not take away from or reduce the responsibility of the Contractor to meet the Contract Documents.

1.4 ABBREVIATIONS

A. Abbreviations: The following are common abbreviations used in this *Specification* and in the *Commissioning Plan*.

A/E	Architect and design engineers	GC	General contractor
CxA	Commissioning authority	HVAC	HVAC contractor
CC	Construction checklist	IC	Installing contractor
CT	Commissioning team	MEOR	Mechanical Engineer of Record
Cx	Commissioning	PC	Plumbing contractor
Cx Plan	Commissioning plan document	Subs	Subs to prime contractors
EC	Electrical contractor	TAB	Test and balance contractor
EEOR	Electrical Engineer of Record		
FPT	Functional performance test		

1.5 COORDINATION

- A. Commissioning Team: The members of the commissioning team consist of the Owner's Representatives, Commissioning Authority, General Contractor, Architect of Record (Architects and Engineers, or A/E), HVAC Contractor, Plumbing Contractor, Electrical Contractor, Test and Balance (TAB) Representative, Controls Contractor, and any other installing subcontractors or equipment suppliers. (Please note: all contractors other than the General Contractor may be referred to as Sub-Contractor in this Section.)
- B. Management: The Commissioning Authority (CxA) is Contracted by the Owner directly. The CxA directs and coordinates the commissioning activities and the reports to the Owner's Representative. All members work together to fulfill their contracted roles and responsibilities and meet the objectives of the Contract Documents.
- C. Scheduling: The CxA will work with the Owner's Representative and General Contractor (GC) according to established protocols to schedule the commissioning activities. The CxA will provide enough notice to the Owner's Representative and General Contractor for scheduling commissioning activities. The General Contractor will integrate all commissioning activities into the project master schedule. All parties will address scheduling problems and make necessary notifications in a timely manner in order to expedite the commissioning process.
- D. The CxA will provide the initial list of primary commissioning events, or commissioning milestones, at the initial commissioning meeting. As construction progresses and more detailed schedules are available from the GC, the GC and CxA will adjust the commissioning schedule accordingly.

1.6 DEFINITIONS

- A. Acceptance Phase: Phase of construction after startup and initial checkout when functional performance tests, O&M documentation review, and training occurs.
- B. Approval: Acceptance that a piece of equipment or system has been properly installed and is functioning in the tested modes according to the Contract Documents.
- C. Architect / Engineer (A/E): The prime consultants who comprise the design team, generally the HVAC mechanical designer/engineer and the electrical designer/engineer.
- D. Basis of Design: A dynamic document that provides the explanation of the ideas, concepts, and criteria that are considered to be very important to the owner. It is initially the outcome of the programming and conceptual design phases.
- E. Commissioning Authority (CxA): An independent authority, not otherwise associated with the A/E team members or the Contractor. The CxA leads and coordinates the day-to-day commissioning activities. The CA does not take an oversight role.
- F. Commissioning Plan: An overall plan, developed before or after bidding that provides the structure, schedule, identifies team members roles and responsibilities and coordination planning for the commissioning process.
- G. Construction Checklist (CC): A list of items to inspect and elementary component tests to conduct to verify proper installation of equipment, provided by the CA to the Sub. Construction checklists are primarily static inspections and procedures to prepare the equipment or system for initial operation (e.g., correct belt tension, oil levels OK, labels affixed, gages in place, sensors calibrated, etc.). However, some construction checklist items entail simple testing of the function of a component, a piece of equipment, or system (such as measuring the voltage imbalance on a three-phase pump motor of a chiller system). The word construction refers to

before functional testing. Construction checklists augment and are combined with the manufacturer's start-up checklist. Even without a commissioning process, Contractors typically perform some, if not many, of the construction checklist items a commissioning authority will recommend. However, few Contractors document in writing the execution of these checklist items. Therefore, for most equipment, the Contractors execute the checklists on their own. The CxA only requires that the procedures be documented in writing and does not witness much of the completion of construction checklists, except for larger or more critical pieces of equipment. Whenever a manufacturer's start up document is completed on any equipment, that shall be attached to the CC.

- H. Contract Documents: The documents binding on parties involved in the construction of this Project (drawings, specifications, change orders, amendments, contracts, Cx Plan, etc.)
- I. Control system: The central building control system.
- J. Data Logging: Monitoring flows, currents, status, pressures, etc. of equipment using stand-alone data loggers separate from the control system.
- K. Deferred Functional Tests: FPTs that are performed later, after substantial completion, due to partial occupancy, equipment, seasonal requirements, design, or other site conditions that prevent the test from being performed.
- L. Deficiency: A condition in the installation or function of a component, piece of equipment or system that is not in compliance with the Contract Documents.
- M. Factory Testing: Testing of equipment on-site or at the factory by factory personnel with a Project Manager present.
- N. Functional Performance Test (FPT): Test of the dynamic function and operation of equipment and systems using manual (direct observation) or monitoring methods. Functional testing is the dynamic testing of systems (rather than just components) under full operation (e.g., the chiller pump is tested interactively with the chiller functions to see if the pump ramps up and down to maintain the differential pressure setpoint). Systems are tested under various modes, such as during low cooling or heating loads, high loads, component failures, unoccupied, varying outside air temperatures, fire alarm, power failure, etc. The systems are run through all the control system's sequences of operation, and components are verified to be responding as the sequences state. Traditional air or water test and balancing (TAB) is not functional testing, in the commissioning sense of the word. TAB's primary work is setting up the system flows and pressures as specified, while functional testing is verifying that which has already been set up. The CxA develops the functional test procedures in a sequential written form, coordinates, oversees, and documents the actual testing, which is usually performed by the installing Contractor or vendor. FPTs are performed after construction checklists and equipment startup-ups are complete.
- O. General Contractor (GC): The Contractor for this project. Generally, refers to all the GC's subs as well. Also referred to as the Contractor, in some contexts.
- P. Indirect Indicators: Indicators of a response or condition, such as a reading from a control system screen reporting a damper to be 100% closed.
- Q. Installing Contractor: Contractor who installs specific equipment and/or systems.
- R. Manual Test: Using hand-held instruments, immediate control system readouts, or direct observation to verify performance (contrasted to analyzing monitored data taken over time to make the "observation").

- S. Monitoring: The recording of parameters (flow, current, status, pressure, etc.) of equipment operation using data loggers or the trending capabilities of control systems.
- T. Non-Compliance: See Deficiency.
- U. Non-Conformance: See Deficiency.
- V. Over-written Value: Writing over a sensor value in the control system to see the response of a system (e.g., changing the outside air temperature value from 50°F to 75°F to verify economizer operation). See also “Simulated Signal.”
- W. Owner-Contracted Tests: Tests paid for by the Owner outside the GC’s contract and for which the CA does not oversee. These tests will not be repeated during functional tests if properly documented.
- X. Owner’s Project Requirements (OPR): Documentation that describes the owner and user requirements, environmental and sustainability goals, energy efficiency goals, indoor environmental quality requirements, equipment and system expectations, building and O&M personnel expectations.
- Y. Phased Commissioning: Commissioning that is completed in phases (by floors, for example) due to the size of the structure or other scheduling issues, in order minimize the total construction time.
- Z. Sampling: Functionally testing only a fraction of the total number of identical or near-identical pieces of equipment. Refer to Part 3.7 F for details.
- AA. Seasonal Performance Tests: FPTs that are deferred until the system(s) will experience conditions closer to their design conditions.
- BB. Simulated Condition: Condition that is created for the purpose of testing the response of a system (e.g., applying a hair blower to a space sensor to see the response in a VAV box).
- CC. Simulated Signal: Disconnecting a sensor and using a signal generator to send an amperage, resistance, or pressure to the transducer and DDC system to simulate a sensor value.
- DD. Specifications: The construction specifications of the Contract Documents.
- EE. Startup: The initial starting or activating of dynamic equipment, including executing construction checklists.
- FF. Subs: The subcontractors to the Prime Contractor who provide and install building components and systems.
- GG. Test Requirements: Requirements specifying what modes and functions, etc. shall be tested. The test requirements are not the detailed test procedures. The test requirements for each system are specified in the respective section of the Contract Documents.
- HH. Trending: Monitoring specific points using the building control system.
- II. Vendor: Supplier of equipment.
- JJ. Warranty Period: Warranty period for entire project, including equipment components. Warranty begins at Substantial Completion and extends for at least one year, unless specifically noted otherwise in the Contract Documents and accepted submittals.

PART 2 - PRODUCTS

2.1 TEST EQUIPMENT

- A. All standard testing equipment required to perform startup and initial checkout and required functional performance testing shall be provided by the installing contractor for the equipment being tested. For example, the HVAC and Controls Contractors of Division 23 shall ultimately be responsible for all standard testing equipment for the HVAC system and controls system in Division 23, except for equipment specific to and used by TAB in their commissioning responsibilities. The Installing Contractor shall also provide two-way radios. Testing equipment will be identified in the Functional Performance Test Procedures.
- B. Special equipment, tools and instruments (only available from vendor, specific to a piece of equipment) required for testing equipment, according to these Contract Documents, shall be included in the base bid price to the General Contractor and left on site, except for stand-alone data logging equipment that may be used by the CxA.
- C. All testing equipment shall have the necessary quality and accuracy to test and/or measure system performance with the tolerances specified in the Specifications. If not otherwise noted, the following minimum requirements apply: Temperature sensors and digital thermometers shall have a certified calibration within the past year to an accuracy of 0.5°F and a resolution of $\pm 0.1^\circ\text{F}$. Pressure sensors shall have an accuracy of $\pm 2.0\%$ of the value range being measured (not full range of meter) and have Current annual calibration certification.
- D. Refer to Part 3 for details regarding equipment that may be required to simulate required test conditions.

PART 3 - EXECUTION

3.1 COMMISSIONING PROCESS

- A. Commissioning Plan: The commissioning plan provides guidance in the execution of the commissioning process. Following the initial commissioning scoping meeting the CxA will update the plan which is then considered the “final” plan, though it will continue to evolve and expand as the project progresses. The Specifications will take precedence over the Commissioning Plan.
- B. Commissioning Process: The following narrative provides a brief overview of the typical commissioning tasks during construction and the general order in which they occur.
 - 1. Commissioning during construction begins with a scoping meeting conducted by the CxA where the commissioning process is reviewed with the commissioning team members. The initial meeting will outline the roles and responsibilities of all commissioning team members
 - 2. Additional meetings will be required throughout construction, scheduled by the CxA with necessary parties attending, to plan, scope, coordinate, schedule future activities and resolve problems.
 - 3. Equipment documentation is submitted to the CxA during normal submittals, including detailed start-up procedures.
 - 4. The CxA works with the Sub-Contractors in developing startup plans and startup documentation formats, including providing the Sub-Contractors with construction checklists (developed by the CxA) to be completed, during the startup process.

5. In general, the checkout and performance verification proceeds from simple to complex; from component level to equipment to systems and intersystem levels with construction checklists being completed prior to the start of functional testing.
6. The Sub-Contractors, under their own direction, execute and document the construction checklists and perform startup and initial checkout. The CxA documents that the checklists and startup were completed according to the approved plans. This may include the CxA witnessing start-up of selected equipment.
7. The CxA develops specific equipment and system functional performance test procedures. The General Contractor and its Sub-Contractors review the procedures.
8. The functional testing and procedures are executed by the Contractors under the direction of, and documented by, the CxA.
9. Items of non-compliance in material, installation or setup are corrected at the Sub-Contractor's expense and the system retested at no additional cost to the Owner.
10. The CxA reviews the O&M documentation for completeness.
11. The project will not be considered substantially complete until the conclusion of Commissioning functional testing procedures as defined in the Commissioning Plan.
12. The CxA reviews and coordinates the training provided by the Sub-Contractors and verifies that it was completed through subsequent interviews with the Operational and Maintenance Staff.
13. Deferred testing is conducted, as specified or required.

3.2 RESPONSIBILITIES

- A. The responsibilities of various parties in the commissioning process are provided in this section. The responsibilities of the Installing Plumbing Contractor are in Division 22, the Installing HVAC, TAB and Controls Contractor are in Divisions 23, and those of the Electrical Contractor in Division 26. It is noted that the services for the A/E and CxA are not provided for in this Contract. That is, the Contractor is not responsible for providing their services.
- B. All Parties
 1. Follow the Commissioning Plan.
 2. Attend an initial commissioning Kickoff meeting and additional coordination meetings, as necessary.
- C. Commissioning Authority (CxA)
 1. The CxA is not responsible for design concept, design criteria, compliance with codes, design or general construction scheduling, cost estimating, or construction management.
 2. The CxA may assist with issues resolution non-conformance or deficiencies, but ultimately that responsibility resides with the general contractor and the Architect of Record.

3. The primary role of the CxA is to develop and coordinate the execution of a testing plan, observe and document performance—that systems are functioning in accordance with the Basis of Design and Owners Project Requirements.
4. Coordinates and Leads the commissioning activities in a logical, sequential and efficient manner.
5. Coordinates the commissioning work and, with the General Contractor and Owner's Representative, ensure that commissioning activities are being scheduled into the master schedule.
6. Revise, as necessary, the Commissioning Plan.
7. Plan and conduct a commissioning scoping meeting and other commissioning meetings.
8. Request and review additional information required to perform commissioning tasks, including O&M materials, contractor start-up and checkout procedures.
9. Before startup, gather and review the current control sequences and interlocks and work with contractors and design engineers until enough clarity has been obtained, in writing, to be able to write detailed testing procedures.
10. Review Contractor submittals applicable to systems being commissioned for compliance with commissioning needs, concurrent with the Architect of Record reviews.
11. Develop and distribute construction checklists.
12. Assist the Sub-Contractors in the development of an enhanced start-up and initial systems checkout plan.
13. Verify construction checklist completion by reviewing construction checklist reports and by selected site observation and spot checking.
14. Verify systems startup by reviewing start-up reports and by selected site observation.
15. Review TAB execution plan.
16. Verify air and water systems balancing by sample testing, by reviewing completed reports and by selected site observation.
17. With necessary assistance and review from installing contractors and design engineer, develop the functional performance test procedures for equipment and systems. This may include control system trending, stand-alone data-logger monitoring or manual functional testing. Submit to Owner's Representative for review, and for approval if required.
18. Analyze any functional performance trend logs and monitoring data to verify performance of the systems prior to the demonstration of the test procedures. The trending points and durations will be called out by the CxA.
19. Coordinate, lead and witness functional performance test procedures performed by installing contractors. Coordinate retesting as necessary until satisfactory performance is achieved.
20. Maintain a master deficiency and resolution log and a separate testing record.

21. Review equipment warranties to ensure that the Owner's responsibilities are clearly defined.
22. Oversee the training of the Owner's operating personnel.
23. Facilitate and develop a systems concept manual.
24. Review the preparation of the O&M manual.
25. Provide a final commissioning report.
26. Coordinate and lead required deferred testing and deficiency corrections.
27. Provide to the Owner daily testing reports

D. Owner's Representative

1. Manage the contract of the CxA, Architect of Record and of the General Contractor.
2. Facilitate the coordination of the commissioning work by the CxA and, with the General Contractor and CxA, ensure that commissioning activities are being scheduled into the master schedule.
3. Review and approve the final Commissioning Plan in parallel with A/E.
4. Attend a commissioning scoping meeting and other commissioning team meetings, as necessary.
5. Arrange for facility operating and maintenance personnel to attend various field commissioning activities and field training sessions according to the Commissioning Plan.
6. Provide a copy of all construction documents, addenda, change orders and approved submittals and shop drawings related to commissioned equipment to the CxA.
7. Review and approve the functional performance test procedures submitted by the CxA, prior to testing, in parallel with A/E.
8. When necessary, observe and witness construction checklists, startup and functional testing of selected equipment.
9. Review commissioning progress and deficiency reports.
10. Coordinate the resolution of non-compliance and design deficiencies identified in all phases of commissioning with A/E.
11. Assist the General Contractor in coordinating the training of owner personnel.
12. Assist the CxA as necessary in the deferred testing and deficiency corrections required by the specifications.

E. Architect/Engineer of Record

1. Perform submittal review; participate in construction observation, as-built drawing preparation, etc., as contracted. Contractually required site observations should be completed just prior to system startup.

2. Provide any design narrative and sequences documentation requested by the CxA. The designers shall assist (along with the contractors) in clarifying the operation and control of commissioned equipment in areas where the specifications, control drawings or equipment documentation is not adequate for developing detailed testing procedures.
3. Attend commissioning scoping meetings and other selected commissioning team meetings, as necessary.
4. Participate in the resolution of system deficiencies identified during commissioning, according to the contract documents.
5. Prepare and submit the final as-built basis of design and operating parameters documentation for inclusion in the O&M manuals. Review and approve the O&M manuals.

F. General Contractor (GC)

1. Facilitate the coordination of the commissioning work by the CxA, and with the General Contractor, installing contractors and CxA to ensure that commissioning activities are being identified in the master schedule (at no additional cost to the Owner).
2. Include the cost of commissioning in the total contract price.
3. In each purchase order or subcontract written, include requirements for submittal data, O&M data, commissioning tasks and training.
4. Ensure that all Sub-Contractors execute their commissioning roles and responsibilities according to the Contract Documents and schedule.
5. A designated representative shall be identified to attend a commissioning scoping meeting and other necessary meetings scheduled by the CxA to facilitate the Commissioning process.
6. Provide the CxA with applicable product data material and shop drawing submittals for equipment and systems to be commissioned
7. General Contractor shall provide additional requested documentation, prior to normal O&M manual submittals, to the CxA for development of start-up and functional testing procedures.
8. Prepare O&M manuals, according to the Contract Documents, including clarifying and updating the original sequences of operation to as-built conditions.
9. Facilitate required training of owner personnel.
10. Ensure that Sub-Contractors execute all required deferred functional performance testing, witnessed by the CxA, according to the specifications.

G. Equipment Suppliers

1. Provide all requested submittal product data, including detailed start-up procedures and specific responsibilities of the Owner to keep warranties in force.
2. Assist in equipment start up and testing per agreements with Sub-Contractors.

3. Include all special tools and instruments (only available from vendor, specific to a piece of equipment) required for testing equipment according to these Contract Documents in the base bid price to the General Contractor, except for stand-alone data-logging equipment that may be used by the CxA.
4. Through the contractors they supply products to, analyze specified products and verify that the designer has specified the newest most updated equipment reasonable for this project's scope and budget.
5. Provide information requested by CxA regarding equipment sequence of operation and testing procedures.
6. Review test procedures for equipment installed by factory/Vendor representatives.

3.3 MEETINGS

- A. Commissioning Meeting: Within 60 days of commencement of construction, the CxA will schedule, plan and conduct a commissioning meeting with the entire commissioning team in attendance. Meeting minutes will be distributed to all parties by the CxA. Information gathered from this meeting will allow the CxA to revise the Commissioning Plan, which will be distributed to all parties.
- B. Miscellaneous Meetings: Other meetings will be planned and conducted by the CxA as construction progresses. These meetings will cover coordination, deficiency resolution and planning issues with particular contractors. The CxA will plan these meetings and will minimize unnecessary time being spent by contractors. These meetings may be held monthly, until the final 3 months of construction when they may be held as frequently as one per week.

3.4 SYSTEMS TO BE COMMISSIONED

- A. The following systems are to be commissioned.

1. HVAC&R

- a. VAV Air Handling Units: Heat Recovery, DOAS
- b. Air Source Heat Recovery Heat Pumps
- c. Terminal Units: VAV, VAV w/ Reheat
- d. Chilled Water Pumps
- e. Heating Water Pumps
- f. Exhaust Fans
- g. Supply Air Fans: Pressurization, Ventilation
- h. VRF Air Conditioning Units: Outdoor CUs, Indoor FCUs
- i. Building Automation System
- j. Any additional HVAC&R equipment/systems that require LEED commissioning, CALGreen commissioning, and/or Title-24 commissioning.

2. Plumbing

- a. Domestic Hot Water Systems and Controls: Air Source Heat Pump, Recirculating Hot Water Pump, Storage Tank, Mixing Valves
- b. Sump Pumps
- c. Sewage Ejector Pump
- d. Any additional Plumbing equipment/systems that require LEED commissioning, CALGreen commissioning, and/or Title-24 commissioning.

3. Electrical

- a. Service and Distribution: Switchgears, Transformers, Distribution Panelboards
 - b. Grounding System
 - c. Lighting and Emergency Lighting Systems: Interior, Exterior, Occupancy Sensors, Controls, Photocells
 - d. Emergency Power Supply for Emergency Operations Center Only (EOC): Generators, Automatic Transfer Switches Uninterruptable Power Supply (UPS)
 - e. Any additional Electrical equipment/systems that require LEED commissioning, CALGreen commissioning, and/or Title-24 commissioning.
4. Landscape Irrigation Systems
- a. Water Supply/Delivery: Pumps, Backflow Prevention, Sprinklers, Driplines, Valves, etc.
 - b. Controller and related equipment, Flow Sensors, Decoders, Weather Sensors etc.
 - c. Any additional Landscape Irrigation equipment/systems that require LEED commissioning, CALGreen commissioning, and/or Title-24 commissioning.
5. Renewable Energy (Solar Photovoltaic System)
- a. PV Arrays
 - b. Inverters
 - c. Any additional Renewable Energy equipment/systems that require LEED commissioning, CALGreen commissioning, and/or Title-24 commissioning.

3.5 STARTUP, CONSTRUCTION CHECKLISTS, AND INITIAL CHECKOUT

- A. The following procedures apply to all equipment to be commissioned. Some systems that are not comprised so much of actual dynamic machinery, e.g., electrical system power quality, may have very simplified Construction Checklists and startup.
- B. General: Construction Checklists (CC) are important to ensure that the equipment and systems are hooked up correctly and operational. Checklists also ensure that functional performance testing (in-depth system checkout) may proceed without unnecessary delays. Each piece of equipment receives full construction checkout. No sampling strategies are used. The construction testing for a given system must be successfully completed prior to formal functional performance testing of equipment or subsystems of the given system.
- C. Startup and Initial Checkout Plan: The CxA will assist the commissioning team members responsible for startup of any equipment in developing detailed startup plans for all equipment. The primary role of the CxA in this process is to ensure that there is written documentation that each of the manufacturer-recommended procedures has been completed. Parties responsible for construction checklists and startup are identified in the initial commissioning meeting and in the checklist forms.
 - 1. The CxA adapts, if necessary, the representative construction checklists and procedures from the related sections. These checklists indicate required procedures to be executed as part of startup and initial checkout of the systems and the party responsible for their execution.
 - 2. The CxA provides these checklists and tests to the General Contractor. The General Contractor determines which trade is responsible for executing and documenting each of the line item tasks and notes that trade on the form. Each form will have more than one trade responsible for its execution.

3. The contractor is responsible for the purchase of the equipment, develops the full startup plan by combining (or adding to) the CxA's checklists with the manufacturer's detailed startup and checkout procedures from the O&M manual and the normally used field checkout sheets. The plan will include checklists and procedures with specific boxes or lines for recording and documenting the checking and inspections of each procedure and a summary statement with a signature block at the end of the plan.
 - a. The full startup plan could consist of something as simple as:
 - 1) The CxA's construction checklists
 - 2) The manufacturer's standard written startup procedures copied from the installation manuals with check boxes by each procedure and a signature block added by hand at the end
 - 3) The manufacturer's normally used field checkout sheets
4. The contractor submits the full startup plan to the CxA for review and approval.
5. The CxA reviews and approves the procedures and the format for documenting them, noting any procedures that need to be added.

D. Execution of Construction Checklists and Startup

1. Four weeks prior to startup, the contractors and vendors schedule startup and checkout with the GC and CxA. The performance of the construction checklists, startup and checkout are directed and executed by the contractor or vendor. When checking off construction checklists, signatures may be required of other contractors for verification of completion of their work.
2. The CxA will, at their own discretion, observe, at minimum, the procedures for each piece of primary equipment unless there are multiple units. In no case will the number of units witnessed be less than four on any one building, nor less than 20% of the total number of identical or very similar units.
3. For lower-level components of equipment, (e.g., VAV boxes, sensors, controllers), the CxA will observe a sampling of the construction and startup procedures, at their own discretion.
4. The contractors shall execute startup and provide the CxA with a signed and dated copy of the completed startup and construction tests and checklists.
5. Only installing individuals who have direct knowledge that a line item task on the construction checklist was actually performed shall initial or check off that item.

E. Deficiencies, Non-Conformance and Approval in Checklists and Startup

1. The contractors shall clearly list any outstanding items of the initial startup and construction procedures that were not completed successfully, at the bottom of the procedures form or on an attached sheet. The procedures form and any outstanding deficiencies are provided to the CxA within two days of test completion.
2. The CxA reviews the report and submits either a non-compliance report or an approval form to the contractors. The CxA shall work with the Prime contractors to correct and retest deficiencies or uncompleted items. The CxA will involve the contractors and others as necessary. The installing contractors shall correct all areas that are deficient or

incomplete in the checklists and tests in a timely manner and shall notify the CxA as soon as outstanding items have been corrected and resubmit an updated startup report and a Statement of Correction on the original non-compliance report. When satisfactorily completed, the CxA recommends approval of the execution of the checklists and startup of each system to the A/E using a standard form.

3. Items left incomplete, which later cause deficiencies or delays during functional testing, may result in back charges to the responsible party.

3.6 PHASED COMMISSIONING

- A. The project may require startup and initial checkout to be executed in phases. This phasing will be planned and scheduled in a coordination meeting of the CxA, GC and appropriate Sub-contractors. Results will be added to the master and commissioning schedule.

3.7 FUNCTIONAL PERFORMANCE TESTING

- A. This subsection applies to functional testing for all divisions.
- B. The list of systems and equipment to be commissioned can be found in this Section 3.4
- C. The parties responsible to execute each test are listed with each test in the respective sections.
- D. Objectives and Scope: The objective of functional performance testing is to demonstrate that each system is operating according to the Contract Documents. Functional testing facilitates bringing the systems from a state of substantial completion to full dynamic operation. Additionally, during the testing process, areas of deficient performance are identified and corrected, improving the operation and functionality of the systems.
 1. In general, each system should be operated through all modes of operation (seasonal, occupied, unoccupied, warm-up, cool-down, part- and full-load, failure and recovery) where there is a specified system response. Verifying each sequence in the approved sequences of operation is required. Proper responses to such modes and conditions as power failure, freeze condition, low oil pressure, no flow, equipment failure, etc. shall also be tested.
- E. Development of Test Procedures: Before test procedures are written, the CxA shall obtain all requested documentation and a current list of change orders affecting equipment or systems, including an updated points list, program code, control sequences and parameters. Using the parameters and requirements in Divisions 22, 23, 26, and elsewhere, the CxA shall develop specific test procedures and forms to verify and document proper operation of each piece of equipment and system. Each contractor or vendor responsible to execute a test shall provide limited assistance to the CxA in developing the procedures review (answering questions about equipment, operation, sequences, etc.). Prior to execution, the CxA shall provide a copy of the test procedures to the contractors, who shall review the tests for feasibility, safety, equipment, and warranty protection.
 1. The CxA shall review Owner-contracted factory testing or required Owner acceptance tests which the CxA is not responsible to oversee, including documentation format, and shall determine what further testing or format changes may be required to comply with the Specifications. Redundancy of testing shall be minimized.
 2. The purpose of any given specific test is to verify and document compliance with the stated criteria of acceptance given on the test form.

3. Representative test formats and examples are found at the end of this section. The test procedure forms developed by the CxA shall include (but not be limited to) the following information:
 - a. System and equipment or component name(s)
 - b. Equipment location and ID number
 - c. Unique test ID number, and reference to unique construction checklist and start-up documentation ID numbers for the piece of equipment
 - d. Date
 - e. Project name
 - f. Participating parties
 - g. A copy of the specification section describing the test requirements
 - h. A copy of the specific sequence of operations or other specified parameters being verified
 - i. Formulas used in any calculations
 - j. Required pre-test field measurements
 - k. Instructions for setting up the test
 - l. Special cautions, alarm limits, etc.
 - m. Specific step-by-step procedures to execute the test, in a clear, sequential, and repeatable format
 - n. Acceptance criteria of proper performance with a Yes / No checkbox to allow for clearly marking whether or not proper performance of each part of the test was achieved
 - o. A section for comments
 - p. Signatures and date block for the CxA

F. Test Methods

1. Functional performance testing and verification may be achieved by manual testing (persons manipulate the equipment and observe performance) or by monitoring the performance and analyzing the results using the control system's trend log capabilities or by stand-alone data loggers. Division 22, 23, and 26 Sections specify which methods shall be used for each test. The CxA may substitute specified methods or require an additional method to be executed other than what was specified. The CxA will determine which method is most appropriate for tests that do not have a method specified.
2. Simulated Conditions: Simulating conditions (not by an overwritten value) shall be allowed, though timing the testing to experience actual conditions is encouraged wherever practical.

3. **Overwritten Values:** Overwriting sensor values to simulate a condition, such as overwriting the outside air temperature reading in a control system to be something other than it really is, shall be allowed, but shall be used with caution and avoided when possible. Such testing methods often can only test a part of a system, as the interactions and responses of other systems will be erroneous or not applicable. Simulating a condition is preferable, e.g., for the above case, by heating the outside air sensor with a hair dryer rather than overwriting the value or by altering the appropriate setpoint to see the desired response. Before simulating conditions or overwriting values, sensors, transducers, and devices shall have been calibrated.
 4. **Simulated Signals:** Using a signal generator which creates a simulated signal to test and calibrate transducers and DDC constants is generally recommended over using the sensor to act as the signal generator via simulated conditions or overwritten values.
 5. **Altering Setpoints:** Rather than overwriting sensor values, and when simulating conditions is difficult, altering setpoints to test a sequence is acceptable. For example, to see the AC compressor lockout work at an outside air temperature below 55°F, when the outside air temperature is above 55°F, temporarily change the lockout setpoint to be 2°F above the current outside air temperature.
 6. **Indirect Indicators:** Relying on indirect indicators for responses or performance shall be allowed only after visually and directly verifying and documenting, over the range of the tested parameters, that the indirect readings through the control system represent actual conditions and responses. Much of this verification is completed during construction testing.
 7. **Setup:** Each function and test shall be performed under conditions that simulate actual conditions as close as is practically possible. The contractor executing the test shall provide all necessary materials, system modifications, etc. to produce the necessary flows, pressures, temperatures, etc. necessary to execute the test according to the specified conditions. At completion of the test, the contractor shall return all affected building equipment and systems, due to these temporary modifications, to their pre-test condition.
 8. **Sampling:** Multiple identical pieces equipment excluding life-safety or critical equipment may be functionally tested using a sampling strategy. Significant application differences and significant sequence of operation differences in otherwise identical equipment invalidates their common identity. A small size or capacity difference, alone, does not constitute a difference. The specific recommended sampling rates are specified with each type of equipment in Divisions 22, 23, and 26. It is noted that no sampling by contractors is allowed in construction checklist execution.
- G. **Coordination and Scheduling:** The contractors shall provide sufficient notice to the CxA regarding their completion schedule for the construction checklists and startup of all equipment and systems. The CxA will schedule functional tests through the A/E, GC and other contractors. The CxA shall direct, witness and document the functional testing of all equipment and systems. The contractors shall execute the tests.
1. In general, functional testing is conducted after construction testing and startup has been satisfactorily completed. The control system is sufficiently tested and approved by the CxA before it is used for TAB or to verify performance of other components or systems. The air balancing and water balancing is completed and debugged before functional testing of air-related or water-related equipment or systems. Testing proceeds from components to subsystems to systems. When the proper performance of all individual interacting systems has been achieved, the interface or coordinated responses between systems is checked. (Integrated Systems Testing; IST)

- H. Problem Solving: The CxA will recommend solutions to problems found; however, the burden of responsibility to solve, correct, and retest problems is with the GC, contractors, and A/E.

3.8 DOCUMENTATION, NON-CONFORMANCE AND APPROVAL OF TESTS

- A. Documentation: The CxA shall witness and document the results of all functional performance tests using the specific procedural forms developed for that purpose. Prior to testing, these forms are provided to the contractors for review.

- B. Non-Conformance

1. The CxA will record the results of the functional test on the procedure or test form. All deficiencies or non-conformance issues shall be noted and reported to the A/E on a standard non-compliance form known as the Corrective Issues Report.
2. Corrections of minor deficiencies identified may be made during the tests at the discretion of the CxA. In such cases the deficiency and resolution will be documented on the procedure form.
3. Every effort will be made to expedite the testing process and minimize unnecessary delays, while not compromising the integrity of the procedures. However, the CxA will not be pressured into overlooking deficient work or loosening acceptance criteria to satisfy scheduling or cost issues, unless there is an overriding reason to do so at the request of the Owner.
4. As tests progress and a deficiency is identified, the CxA discusses the issue with the executing contractor.
 - a. When there is no dispute on the deficiency and the contractor accepts responsibility to correct it:
 - 1) The CxA documents the deficiency and the Prime contractor's response and intentions, and they go on to another test or sequence. After the day's work, the CxA submits the non-compliance reports to the A/E for signature, if required. A copy is provided to the contractor and CxA. The contractor corrects the deficiency, signs the statement of correction at the bottom of the non-compliance form certifying that the equipment is ready to be retested, and sends it back to the CxA.
 - 2) The contractor reschedules the test and coordinates with CxA to establish a time and date that the test is to be repeated.
 - b. If there is a dispute about a deficiency, regarding whether it is a deficiency or who is responsible:
 - 1) The deficiency shall be documented on the non-compliance form with the contractor's response and a copy given to the A/E and to the contractor representative assumed to be responsible.
 - 2) Resolutions are made at the lowest management level possible. Other parties are brought into the discussions as needed. Final interpretive authority is with the A/E. Final acceptance authority is with the A/E.
 - 3) The CxA documents the resolution process.

- 4) Once the interpretation and resolution have been decided, the appropriate party corrects the deficiency, signs the statement of correction on the non-compliance form and provides it to the CxA. The contractor reschedules the test and notifies the CxA of the date and time the test is to be repeated. This will occur until satisfactory performance is achieved.
5. Cost of Retesting
 - a. The cost for the contractor to retest a construction or functional test, if they are responsible for the deficiency, shall be theirs. If they are not responsible, any cost recovery for retesting costs shall be negotiated with the responsible parties.
 - b. For a deficiency identified, not related to any construction checklist or startup fault, the following shall apply: The CxA will direct the retesting of the equipment once at no “charge” to the contractor for their time. However, the CxA’s time for a second retest will be charged to the contractor, who may choose to recover costs from the responsible Sub.
 - c. The time for the CxA to direct any retesting required because a specific construction checklist or start-up test item, reported to have been successfully completed, but determined during functional testing to be faulty, will be back charged to the contractor, who may choose to recover costs from the party responsible for executing the faulty construction test.
 - d. Refer to the sampling section of Section 01 91 00, for requirements for testing and retesting identical equipment.
6. The contractor shall respond in writing to the CxA at least as often as commissioning meetings are being scheduled concerning the status of each apparent outstanding discrepancy identified during commissioning. Discussion shall cover explanations of any disagreements and proposals for their resolution.
7. The CxA retains the original non-conformance forms until the end of the project.
8. Any required retesting by any contractor shall not be considered a justified reason for a claim of delay or for a time extension by the contractor.
- C. Failure Due to Manufacturer Defect: If 10%, or three, whichever is greater, of identical pieces (size alone does not constitute a difference) of equipment fail to perform to the Contract Documents (mechanically or substantively) due to manufacturing defect, not allowing it to meet its submitted performance spec, all identical units may be considered unacceptable by the Owner. In such case, the contractor shall provide the Owner with the following:
 1. Within one week of notification from the A/E, the contractor shall examine all other identical units making a record of the findings. The findings shall be provided to the A/E within two weeks of the original notice.
 2. Within two weeks of the original notification, the contractor shall provide a signed and dated, written explanation of the problem, cause of failures, etc. and all proposed solutions, which shall include full equipment submittals. The proposed solutions shall not significantly exceed the specification requirements of the original installation.
 3. The A/E will determine whether a replacement of all identical units or a repair is acceptable.

4. Two examples of the proposed solution will be installed by the contractor and the CxA will be allowed to test the installations for up to one week, upon which the CxA will decide whether to accept the solution.
 5. Upon acceptance, the contractor and/or manufacturer shall replace or repair all identical items, at their expense and extend the warranty accordingly, if the original equipment warranty had begun. The replacement/repair work shall proceed with reasonable speed beginning within one week from when parts can be obtained.
- D. Approval: The CxA notes each satisfactorily demonstrated function on the test form. Formal approval of the functional test is made later after review by the CxA. The CxA recommends acceptance of each test to the Owner and A/E using a standard form. The A/E gives final approval on each test using the same form, providing a signed copy to the CxA and the contractor.

3.9 OPERATION AND MAINTENANCE MANUALS

- A. Refer to Section 01 78 23 for specific details on O&M manual documentation requirements.
- B. CxA Review: Prior to substantial completion, the CxA and A/E shall review the O&M manuals, documentation and redline as-builts for systems that were commissioned to verify compliance with the Specifications. The CxA will communicate deficiencies in the manuals to the Owner's Representative or Architect of Record, as requested. Upon a successful review of the corrections, the CxA and A/E recommends approval and acceptance of these sections of the O&M manuals to the Owner's Representative. The CxA also reviews each equipment warranty and verifies that all requirements to keep the warranty valid are clearly stated. This work does not supersede the Architect of Record's review of the O&M manuals according to the Architect of Record's contract.

3.10 SYSTEM'S MANUAL

- A. CxA develops documentation of the operational aspects of the building for delivery to the Owner's facility operator. The manual will include the elements listed below to comply with LEED v4, CALGreen, and Title-24 commissioning requirements.
1. Site information including facility description, history and current requirements.
 2. Site contact information.
 3. Basic operation, maintenance and troubleshooting
 4. Systems covered include major systems listed in the BOD
 5. Site equipment inventory and maintenance notes
 6. Special inspection verification
 7. Other resources and documentation
- B. CxA will submit Systems Manual to the A/E and GC for review and comment prior to acceptance and Owner approval.

3.11 TRAINING OF OWNER PERSONNEL

- A. The GC shall be responsible for training coordination and scheduling and ultimately for ensuring that training is completed.
- B. The CxA shall be responsible for overseeing and approving the content and adequacy of the training of Owner personnel for commissioned equipment.

1. The CxA shall interview the facility manager and lead engineer to determine the special needs and areas where training will be most valuable. The Owner and CxA shall decide how rigorous the training should be for each piece of commissioned equipment. The CxA shall communicate the results to the contractor and vendors who have training responsibilities.
2. The CxA develops an overall training plan and coordinates and schedules, with the Owner and contractors, the overall training for the commissioned systems. The CxA develops criteria for determining that the training was satisfactorily completed, including attending some of the training, etc. The CxA recommends approval of the training to the A/E using a standard form. The A/E also signs the approval form.
3. The GC will provide videotaping of the training sessions, with tapes cataloged by the GC, and added to the O&M manuals.
4. The installing contractors shall have the following training responsibilities:
 - a. Provide the Commissioning Authority and A/E with a training plan at least two weeks before the planned training. The plan will cover the following elements:
 - 1) Equipment (included in training)
 - 2) Intended audience
 - 3) Location of training
 - 4) Objectives
 - 5) Subjects covered (description, duration of discussion, special methods, etc.)
 - 6) Duration of training on each subject
 - 7) Instructor for each subject
 - 8) Methods (classroom lecture, video, site walk-through, actual operational demonstrations, written handouts, etc.)
 - 9) Instructor and qualifications
 - b. Provide designated Owner personnel with comprehensive orientation and training in the understanding of the systems and the operation and maintenance of each piece of equipment.
 - c. Training shall normally start with classroom sessions followed by hands-on training on each piece of equipment, which shall illustrate the various modes of operation, including startup, shutdown, etc.
 - d. During any demonstration, should the system fail to perform in accordance with the requirements of the O&M manual or sequence of operations, the system will be repaired or adjusted as necessary and the demonstration repeated.

- e. The appropriate trade or manufacturer's representative shall provide the instructions on each major piece of equipment. This person may be the start-up technician for the piece of equipment, the installing contractor or manufacturer's representative. Practical building operating expertise as well as in-depth knowledge of all modes of operation of the specific piece of equipment are required. More than one party may be required to execute the training.
- f. The controls contractor shall attend sessions other than the controls training, as requested, to discuss the interaction of the controls system as it relates to the equipment being discussed.
- g. Training shall include:
 - 1) Use of the printed installation, operation and maintenance instruction material included in the O&M manuals.
 - 2) A review of the written O&M instructions emphasizing safe and proper operating requirements, preventative maintenance, special tools needed and spare parts inventory suggestions. The training shall include start-up, operation in all modes possible, shut-down, seasonal changeover and any emergency procedures.
 - 3) Discussion of relevant health and safety issues and concerns.
 - 4) Discussion of warranties and guarantees.
 - 5) Common troubleshooting problems and solutions.
 - 6) Explanatory information included in the O&M manuals and the location of all plans and manuals in the facility.
 - 7) Discussion of any peculiarities of equipment installation or operation.
 - 8) Classroom sessions shall include the use of overhead projections, slides, video/audio-taped material as might be appropriate.
 - 9) Hands-on training shall include start-up, operation in all modes possible, including manual, shut-down and any emergency procedures and preventative maintenance for all pieces of equipment.
 - 10) Training shall occur after functional testing is complete, unless approved otherwise by the Owner's Representative.

3.12 DEFERRED TESTING

- A. Unforeseen Deferred Tests. If any check or test cannot be completed due to the building structure, required occupancy condition or other deficiency, execution of checklists and functional testing may be delayed upon approval of the Owner's Representative. These tests will be conducted as soon as possible. Services of necessary parties will be negotiated if circumstances warrant it.

3.13 WRITTEN WORK PRODUCTS

- A. The commissioning process generates a number of written work products described in various parts of the Specifications. The Commissioning Plan lists all the formal written work products, describes briefly their contents, who is responsible to create them, their due dates, who receives and approves them, and the location of the specification to create them. In summary, the written products are:

Product	Developed By
Commissioning plan	CxA
Commissioning meeting minutes	CxA
Commissioning schedule	GC and CxA with other contractors
Equipment documentation submittals	Contractors
Sequence clarifications	Contractors and A/E as needed
Construction checklists	CxA, filled out by Contractors
Startup and initial checkout plan	Contractors
Final TAB report	TAB Contractor
Issues log (deficiencies)	CxA with responses provided by contractors
Commissioning progress reports	CxA
Functional test forms	CxA
Filled-out functional tests	CxA
O&M manuals	Contractors with review by CxA
Overall training plan	CxA, GC, and Contractors
Specific training agendas and records	Contractors
Final commissioning report	CxA
Systems Manual	CxA

3.14 SAMPLE DOCUMENTS

- A. The following documents are included in this section:
1. Figure 1 – Pre-Functional Checklist
 2. Figure 2 – Functional Performance Test

FIGURE 1 – Pre-Functional Checklist**PROJECT:****PROJECT NUMBER:****REPORT ID:****EQUIPMENT DESCRIPTION:****MANUFACTURER:****MODEL NO:** _____**TAG NO:****SERIAL NO:** _____**LOCATION:****AREA SERVED:**

This Construction Checklist is used during the Commissioning Process to insure the correct equipment is delivered, installed and properly started in preparation for Functional Testing of related building systems. This checklist does not take the place of the Manufacturer's recommended checkout and startup procedures.

This Checklist is divided into 4 Sections and is to be completed by the Contractor in 4 separate steps. As each Section is completed, the Contractor shall mail, fax or e-mail the completed Section(s) to the Commissioning Authority at this address:

JACOBS

Address:

Attn:

Phone:

E-mail: firstname.lastname@jacobs.com

When completing each Section, be sure to check and initial EACH line item as being completed. Immediately notify the Commissioning Authority should any item be checked incomplete or there be any question regarding the level of completeness. Each Section's items must ALL be checked complete and initialed before the form is mailed to the Commissioning Authority.

SECTION 1 – EQUIPMENT DELIVERY:

The Contractor shall complete Section 1 of this form when the equipment is delivered to the site. The purpose is to record the actual design parameters listed below along with the checklist items as indicated. Should there be any discrepancy between the Actual and the Submitted information, or any item be checked incomplete, the Contractor shall immediately notify the Commissioning Authority.

DESIGN PARAMETERS:

Parameter	Designed	Submitted	Actual
Air Flow			
Fan Motor HP			
Voltage			
Refrigerant			
Cooling (Total) Capacity			
Cooling (Sensible)			
EAT			
LAT			
Electric Heating Coil			
Heating EAT			
Heating LAT			

CHECKLIST ITEMS:

Initial	Complete	Description
_____	Yes / No	All related submittals approved by A/E
_____	Yes / No	Equipment thoroughly inspected for physical damage
_____	Yes / No	Room thermostat included in shipment
_____	Yes / No	Air openings sealed and protected
_____	Yes / No	Piping connections sealed and protected
_____	Yes / No	Power supply voltage and phase correct

COMMENTS:

Submitted By: _____ Date: _____

SECTION 2 – EQUIPMENT INSTALLATION:

The Contractor shall complete Section 2 of this form when the installation of the equipment is being performed. The purpose of this Section is to insure the equipment is installed to the Project Design and the Manufacturer's recommendations. Immediately notify the Commissioning Authority should any item be checked incomplete.

CHECKLIST ITEMS:

Initial	Complete	Description
_____	Yes / No	All quality assurance testing complete and reports submitted
_____	Yes / No	Refrigerant piping vacuum and pressure testing
_____	Yes / No	O&M and warranty data provided to Cx Authority
_____	Yes / No	Proper maintenance access provided
_____	Yes / No	Proper access to service air filters
_____	Yes / No	Vibration isolation installed per specifications
_____	Yes / No	All shipping blocks removed
_____	Yes / No	Power supply energized and properly identified
_____	Yes / No	Dampers operate full stroke without binding
_____	Yes / No	Fan rotation correct
_____	Yes / No	Refrigerant piping accessories installed per drawing details
_____	Yes / No	All insulation installed
_____	Yes / No	Drain pan installed and piped to acceptable discharge location
_____	Yes / No	Clean filters installed and blank filler plates are proper size
_____	Yes / No	Flexible duct connections properly aligned
_____	Yes / No	Permanent labels attached

COMMENTS:

Submitted By: _____

Date: _____

SECTION 3 – EQUIPMENT START-UP:

The Contractor shall complete Section 3 of this form during the Start-up procedures for the equipment. The purpose of this Section is to document that proper start-up and check-out procedures were completed and documented.

CHECKLIST ITEMS:

Initial	Complete	Description
_____	Yes / No	Cx Authority has been notified of start-up
_____	Yes / No	Manufacturers Rep on site for start-up
_____	Yes / No	Air flow measured and recorded
_____	Yes / No	Motor supply voltage balanced and within normal limits
_____	Yes / No	Motor amperage balanced and within normal limits
_____	Yes / No	Control system operational
_____	Yes / No	Clean air filters installed
_____	Yes / No	Extra set of filters turned over to Owner

COMMENTS:

Submitted By: _____ Date: _____

SECTION 4 – NOTIFICATION FOR TESTING:

This piece of equipment is properly installed, has been properly started up and is operational and ready for performance testing.

COMMENTS:

Submitted By: _____ Date: _____

FIGURE 2 – Functional Performance Test**PROJECT:****PROJECT NUMBER:****REPORT ID:****SYSTEM DESCRIPTION:****Date of Test:*****Design Criteria:***

Supply Fan Maximum Air Flow:

Supply Fan External Static Pressure:

Supply Fan Motor Horse Power:

Total Cooling:

Sensible Cooling:

Minimum Outdoor Air:

Related Documents:

Specification Sections:

Drawings:

Submittal Data:

Prerequisite Checklist:**Y/N ITEM**☐ Construction Checklists are Completed, Reviewed & Accepted☐ Balancing Report Completed, Reviewed & Accepted☐ O&M Manual Submitted, Reviewed & Accepted***Test Equipment Required:***

2-Way Radios

Space Temperature Sensor (Fluke or similar)

Infrared Temperature Gun

Full Set of Balancing Equipment

Laptop to access controls

Digital Manometer for filter pressure drop

Sequences of Operation:
(Insert)**System Setpoints:**

System Setpoint	Measured Units	Setpoint Design Value	Current Setpoint	Current Status/Value
Discharge Air Temperature	°F			
Discharge Air Reset Schedule	°F			
Duct Static Pressure	in. w.g.			
Space Static Pressure	in. w.g.			
Minimum Outside Airflow	CFM			
Maximum Outside Air Enthalpy	BTU/lb			

Alarm Listing & Status:

System Alarm	Measured Units	Alarm Design Value	Operational Status/Value	Current Status/Value
Supply Fan Failure	N/A			
High Discharge Air Temperature	°F			
Low Discharge Air Temperature	°F			
High Zone CO ₂	ppm			
High Duct Static Pressure	in. w.g.			
High Space Static Pressure	in. w.g.			
High Return Air Temperature	°F			
Low Limit Status	°F			
Filter Status	Psi			

Functional Test Procedures:

Pass Y/N	No	TEST PROCEDURE	EXPECTED RESULTS
GENERAL SYSTEM REDINESS			
Y	1	Verify system has been operating at stable, normal conditions. All test pre-requisites have been satisfied.	
		Field Notes:	
Y	2	Verify adequate access is provided to all components that require periodic maintenance.	1. Record any problems existing that interfere with equipment access.
		Field Notes:	
ALARMS & SAFETIES			
N	3	Verify that the specified alarm is indicated at the BAS Workstation PC for each listed condition.	1. Supply Fan Failure 2. High Discharge Air Temperature 3. Low Discharge Air Temperature 4. High Zone CO ₂ 5. High Duct Static Pressure 6. High Space Static Pressure 7. High Return Air Temperature 8. Low Limit Status 9. Filter Status
		Field Notes: Alarms not displayed at BAS Front End workstation	
	4	Utilize aerosol smoke product within duct to verify that supply air smoke detector shuts down the air handling unit when activated.	1. Supply Air Duct Smoke Detector activates and shuts down unit. 2. Supply Fan shuts down. 3. Outside air damper modulates closed. 4. Cooling coil valve modulates closed. 5. Alarm is received at the BAS. 6. Alarm is received at the Fire Alarm panel.
		Field Notes:	

Pass Y/N	No	TEST PROCEDURE	EXPECTED RESULTS
	5	Reset duct smoke detector. Acknowledge alarm at BAS and Fire Alarm panel.	1. Unit restarts. 2. Alarm is cleared at the BAS. 3. Alarm is cleared at the Fire Alarm panel. 4. Supply fan VFD, outside air damper and cooling coil valve to return to pre-alarm conditions.
		Field Notes:	
N	6	While the unit is in Occupied mode and the supply fan is On, turn off the power to the supply fan at the VFD to simulate a supply fan malfunction.	1. Supply fan VFD ramps down and supply fan turns off. 2. Supply fan failure alarm is received at BAS. 3. Outside air damper and cooling coil valve modulate closed.
		Field Notes: Unit shut down but no alarm was displayed at BAS Front End workstation	
Y	7	Reset supply fan power at the VFD and acknowledge alarm at the BAS. Turn HOA switch on VFD to Auto position.	1. Unit restarts. 2. Alarm is cleared at the BAS. 3. Supply fan VFD, outside air damper, and cooling coil valve to satisfy pre-test conditions.
		Field Notes:	
	8	Reset the high discharge air temperature alarm setpoint to be 3°F below the current discharge air temperature.	1. High discharge air temperature alarm is received at the BAS.
		Field Notes:	
	9	Return high discharge air temperature alarm setpoint to initial value.	1. High discharge air temperature alarm is cleared at the BAS.
		Field Notes:	
	10	Reset the low discharge air temperature alarm setpoint to be 3°F above the current discharge air temperature.	1. Low discharge air temperature alarm is received at the BAS.
		Field Notes:	

Pass Y/N	No	TEST PROCEDURE	EXPECTED RESULTS
	11	Return low discharge air temperature alarm setpoint to initial value.	1. Low discharge air temperature alarm is cleared at the BAS.
		Field Notes:	
	12	Using a magnehelic gauge, verify the setpoint of high duct static pressure alarm and activate the alarm by increasing the pressure to 0.1 in w.g. beyond the setpoint.	1. High duct static pressure alarm is received at the BAS. 2. Supply fan VFD ramps down and supply fan is off. 3. Outside air damper modulates closed. 4. Cooling coil valve modulates closed.
		Field Notes:	
	13	Reset duct static pressure sensor and acknowledge alarm at the BAS.	1. Unit restarts. 2. Alarm is cleared at the BAS. 3. Supply fan VFD, outside air damper and, cooling coil valve modulate to return to pre-test conditions.
		Field Notes:	
	14	Using a magnehelic gauge, verify the setpoint of filter differential pressure alarm.	1. Filter alarm is received at the BAS. 2. Alarm is cleared at the BAS when differential pressure sensor is reset.
		Field Notes:	
NORMAL OPERATION - OCCUPIED			
Y	15	Record current status of AHU.	1. The current status of the AHU matches the displayed state on the graphics at the BAS workstation.
		Field Notes:	
Y	16	Through the BAS, place the AHU in Unoccupied mode.	1. AHU supply fan VFD ramps down and the supply fan is off. 2. Return fan VFD ramps down and the return fan is off. 3. Cooling coil valve modulates closed. 4. Outside air and relief air dampers modulate to closed position. 5. AHU indicates these status positions on the graphics at the BAS workstation.

Pass Y/N	No	TEST PROCEDURE	EXPECTED RESULTS
		Field Notes:	
Y	17	Reset AHU schedule to start in 5 minutes. Record status of indicated points. Allow system to achieve equilibrium.	<ol style="list-style-type: none"> 1. AHU supply fan VFD ramps up and the supply fan starts at indicated time. 2. Return fan VFD ramps up. 3. Cooling coil valve modulates to satisfy discharge air temperature setpoint. 4. Outside air dampers open to minimum position. 5. Relief air damper modulates in proportion to the outside air damper. 6. AHU indicates status positions on the graphics at the BAS workstation.
		Field Notes: Discharge air temperature: Discharge air temperature setpoint: Discharge air humidity: Outside air damper: Supply fan VFD speed: Return fan VFD speed: Cooling coil valve position:	
Y	18	Reset all zone space temperature setpoints to 5°F above the current space temperature such that the VAV boxes call for heating. Ensure economizer mode is not enabled. Allow system to achieve equilibrium.	<ol style="list-style-type: none"> 1. Supply fan VFD modulates towards minimum speed. 2. Return fan VFD modulates to track supply fan VFD speed. 3. Cooling coil valve modulates closed. 4. Outdoor air dampers modulate toward minimum position. 5. Exhaust damper modulates closed. 6. AHU indicates these status positions on the graphics at the BAS workstation.
		Field Notes: Discharge air temperature: Discharge air temperature setpoint: Discharge air humidity: Outside air damper: Supply fan VFD speed: Return fan VFD speed: Cooling coil valve position:	

Pass Y/N	No	TEST PROCEDURE	EXPECTED RESULTS
Y	19	Reset zone space temperature setpoints to 5°F below the current space temperature such that the VAV boxes call for cooling. Allow system to achieve equilibrium.	<ol style="list-style-type: none"> 1. Supply fan VFD modulates up to maintain space temperature. 2. Return fan VFD modulates to track supply fan VFD speed. 3. Cooling coil valve modulates open. 4. OA & RA Dampers modulate open to meet required OA airflow. 5. AHU indicates these status positions on the graphics at the BAS workstation.
		Field Notes: Discharge air temperature: Discharge air temperature setpoint: Discharge air humidity: Outside air damper: Supply fan VFD speed: Return fan VFD speed: Cooling coil valve position:	
Y	20	Return space temperature setpoint to initial values.	<ol style="list-style-type: none"> 1. Supply fan VFD modulates to maintain space temperature setpoint. 2. Return fan VFD modulates to track supply fan VFD speed. 3. Cooling coil valve modulate to satisfy discharge air temperature setpoint. 4. AHU indicates these status positions on the graphics at the BAS workstation.
		Field Notes:	
	21	Reset supply air duct static pressure setpoint to above current value.	<ol style="list-style-type: none"> 1. Supply fan VFD modulates to maintain new supply air duct static pressure setpoint 2. Return fan VFD modulates to track supply fan speed.
		Field Notes:	
	22	Reset supply air duct static pressure setpoint to initial value. Allow system to achieve equilibrium.	<ol style="list-style-type: none"> 1. Supply fan VFD modulates to maintain original supply air duct static pressure setpoint 2. Return fan VFD modulates to track supply fan speed.

Pass Y/N	No	TEST PROCEDURE	EXPECTED RESULTS
		Field Notes:	
	23	Reset space pressure setpoint to above current value.	1. Return fan VFD modulates to maintain new space static pressure setpoint.
		Field Notes:	
	24	Reset space pressure setpoint to initial value. Allow system to reach equilibrium	1. Return fan VFD modulates to maintain initial space static pressure setpoint.
		Field Notes:	
	25	Adjust outdoor air minimum setpoint above initial value.	1. Outdoor air and relief air dampers modulate further open to maintain new setpoint. 2. Outdoor air flow meter reads stable flow rate of ____ CFM.
		Field Notes:	
	26	Adjust outdoor air minimum setpoint to original value.	1. Outdoor air and relief air dampers modulate towards closed to maintain new setpoint. 2. Outdoor air flow meter reads stable flow rate of ____ CFM.
		Field Notes:	
ECONOMIZER MODE			
	27	Override the outside air enthalpy signal to be 4°F below the current return air enthalpy. Ensure outside air enthalpy is less than maximum of ____btu/lb	1. Supply fan VFD modulates to maintain space temperature setpoint. 2. Return fan VFD modulates to track supply fan VFD speed. 3. Outside air and return air dampers modulate to maintain discharge air temperature setpoint. 4. Cooling coil valve modulates to maintain discharge air temperature. 5. AHU indicates these status positions on the graphics at the BAS workstation.

Pass Y/N	No	TEST PROCEDURE	EXPECTED RESULTS
		Field Notes: Outside air enthalpy maximum setpoint: ____°btu/lb Discharge air temperature: ____°F Modified outside air enthalpy signal: ____°F Space temperature setpoint: ____°F Supply fan VFD speed: ____% Return fan VFD speed: ____% Outside air damper position: ____% Return air damper position: ____% Mixed air temperature: ____°F	
	28	Release override on outside air enthalpy signal. Outside air enthalpy is greater than the outside enthalpy maximum setpoint.	1. Supply fan VFD modulates to maintain space temperature setpoint. 2. Return fan VFD modulates to track supply fan VFD speed. 3. Outside air damper modulates to minimum position. 4. Cooling coil valve modulates to maintain cooling discharge air temperature.. 5. AHU indicates these status positions on the graphics at the BAS workstation.
		Field Notes: Outside air damper position: ____% Return air damper position: ____%	
NORMAL OPERATION - UNOCCUPIED			
	29	Reset the AHU schedule to go to Unoccupied in 5 minutes.	1. AHU supply fan VFD ramps down and the supply fan shuts off at indicated time. 2. 'Return fan VFD ramps down and the return fan shuts off. 3. Cooling coil valve modulates closed. 4. Outside air and relief air dampers modulate to closed position. 5. AHU indicates these status positions on the graphics at the BAS workstation.
		Field Notes:	

Pass Y/N	No	TEST PROCEDURE	EXPECTED RESULTS
	30	<p>Set unoccupied heating space temperature setpoint to 5°F above the current space temperature such that the BAS calls for heating.</p> <p>Allow system to achieve equilibrium.</p>	<ol style="list-style-type: none"> 1. AHU supply fan VFD ramps up and the supply fan starts. 2. Return fan VFD ramps up and modulates to track supply fan VFD speed. 3. Outside air and relief air dampers remain closed. 4. Cooling coil valve remains closed.
		<p>Field Notes:</p> <p>Discharge air temperature: ____°F</p> <p>Discharge air temperature setpoint: ____°F</p> <p>Discharge air humidity: ____%RH</p> <p>Outside air damper: ____%</p> <p>Supply fan VFD speed: ____%</p> <p>Return fan VFD speed: ____%</p> <p>Cooling coil valve position: ____%</p>	
	31	<p>Reset the unoccupied heating space temperature setpoint to initial value.</p>	<ol style="list-style-type: none"> 1. AHU supply fan VFD ramps down and the supply fan shuts off at indicated time. 2. Cooling coil remains closed. 3. Outside air and relief air dampers remain at closed position. 4. AHU indicates these status positions on the graphics at the BAS workstation.
		<p>Field Notes:</p>	
	32	<p>Reset unoccupied space temperature cooling setpoint to 5°F below the current space temperature such that the BAS calls for cooling.</p> <p>Allow system to achieve equilibrium.</p>	<ol style="list-style-type: none"> 1. AHU supply fan VFD ramps up and the supply fan starts. 2. Outside air and relief air dampers remain closed. 3. Cooling coil valve modulates as necessary to achieve space temperature setpoint.
		<p>Field Notes:</p> <p>Discharge air temperature: ____°F</p> <p>Discharge air temperature setpoint: ____°F</p> <p>Discharge air humidity: ____%RH</p> <p>Outside air damper: ____%</p> <p>Supply fan VFD speed: ____%</p> <p>Return fan VFD speed: ____%</p> <p>Cooling coil valve position: ____%</p>	

Pass Y/N	No	TEST PROCEDURE	EXPECTED RESULTS
	33	At the BAS workstation, reset the unoccupied space temperature cooling setpoint to initial value.	<ol style="list-style-type: none">1. AHU supply fan VFD ramps down and the supply fan shuts off at indicated time.2. Return fan VFD ramps down and the return fan shuts off.3. Chilled water valve modulates closed.4. Outside air and relief air dampers modulate to closed position.5. AHU indicates these status positions on the graphics at the BAS workstation.
	Field Notes:		
RETURN TO NORMAL OPERATION			
Y	34	At the BAS workstation, return all system setpoints to initial values.	<ol style="list-style-type: none">1. AHU-1 resumes normal operation.
	Field Notes:		

COMMENTS:**ACCEPTANCE OF TEST:**

- ☐ This test cannot be accepted at this time due to the Corrective Issues noted above.
- ☐ This test is accepted by the Commissioning Authority identified below. Any Corrective Issues noted above do not adversely impact the overall performance of the system.

Witnessed _____

Date _____

Commissioning Authority

END OF SECTION

SECTION 024113 – SELECTIVE SITE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

- A. General: Develop waste management plan that conforms with City of Sunnyvale Standards and Sunnyvale Building Department Demolition Permit requirements.
- B. This Section includes the following:
 - 1. Demolition and removal of existing site features.
 - 2. Abandoning in place or removing below-grade construction.
 - 3. Disconnecting or rerouting, capping or sealing, and abandoning in-place or removing site utilities.
 - 4. Salvaging nonhazardous demolition and construction waste.
 - 5. Recycling nonhazardous demolition and construction waste.
 - 6. Disposing of nonhazardous demolition and construction waste.
- C. Related Sections include the following:
 - 1. Section 015639 – Temporary Tree and Plant Protection
 - 2. Section 015700 – Traffic Control System
 - 3. Section 024116 – Structure Demolition
 - 4. Section 024119 – Selective Demolition for the Salvaging of Site Redwood Trees
 - 5. Section 311000 – Site Clearing
 - 6. Section 312000 – Earth Moving

1.2 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.

1.3 SUBMITTALS

- A. Proposed Protection Measures: Submit informational report, including drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control and, for noise control. Indicate proposed locations and construction of barriers.

- B. Provide schedule of proposed selective demolition activities including: proposed start and end dates of each activity, interruption of utility services, coordination with Owner's continued operations of adjacent facilities.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 DEMOLITION, GENERAL

- A. Site Access and Temporary Controls: Conduct site demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 - 1. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
 - 2. Use water mist and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations. Do not use water when it may damage adjacent construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.
- B. Completely clear the site of all existing improvements, vegetation and surface treatments, as required to permit construction of proposed improvements.
- C. Existing Utilities: Demolish existing utilities and below-grade utility structures that are within 5 feet (1.5 m) outside footprint indicated for new construction. Above ground site utilities and drainage inlet grates are to be maintained during construction and relocated or abandoned during the site improvement phase as indicated on plans. Underground site utilities for the existing Civic Center and Department of Public Safety buildings are to remain active or be rerouted if in conflict with future construction zones; Civic Center and Department of Public Safety buildings are to remain in operation until the completion of the new City Hall building.
 - 1. Unless otherwise noted, Contractor to fill abandoned utility structures according to backfill requirements in Section 311000 – Site Clearing. Contractor to refer to Shoring Plan for exceptions.
- D. All removed asphalt, concrete and miscellaneous materials will become the property of the Contractor, unless specifically directed otherwise by the Owner, and shall be properly disposed of offsite at a location approved by the City of Sunnyvale. This includes excess excavation spoils (earth and aggregate base) not needed as fill, unless otherwise directed by the Owner.

3.2 CLEANING

- A. Clean adjacent structures and improvements of dust, dirt, and debris caused by building demolition operations. Return adjacent areas to condition existing before building demolition operations began.

END OF SECTION

SECTION 024116 - STRUCTURE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Demolition and removal of buildings.
- B. Related Requirements:
 - 1. Section 015639 "Temporary Tree and Landscape Protection."
 - 2. Section 017419 "Construction and Demolition Waste Management and Disposal."
 - 3. Section 024113 "Structure Site Demolition."
 - 4. Section 311000 "Site Clearing."
 - 5. Section 312000 "Earth Moving."

1.3 DEFINITIONS

- A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged.
- B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and deliver to City of Sunnyvale ready for reuse. Include fasteners or brackets needed for reattachment elsewhere.

1.4 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.
- B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to City of Sunnyvale that may be uncovered during demolition remain the property of City of Sunnyvale.
 - 1. Carefully salvage in a manner to prevent damage and promptly return to City of Sunnyvale.

1.5 PREINSTALLATION MEETINGS

- A. Predemolition Conference: Conduct conference at Project site.

1. Inspect and discuss condition of construction to be demolished.
2. Review structural load limitations of existing structures.
3. Review and finalize building demolition schedule and verify availability of demolition personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review and finalize protection requirements.
5. Review procedures for noise control and dust control.
6. Review procedures for protection of adjacent buildings.
7. Review items to be salvaged and returned to City of Sunnyvale.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For refrigerant recovery technician.
- B. Engineering Survey: Submit engineering survey of condition of building.
- C. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control and, for noise control. Indicate proposed locations and construction of barriers.
 1. Adjacent Buildings: Detail special measures proposed to protect adjacent buildings to remain including means of egress from those buildings.
- D. Schedule of Building Demolition Activities: Indicate the following:
 1. Detailed sequence of demolition work, with starting and ending dates for each activity.
 2. Temporary interruption of utility services.
 3. Shutoff and capping or re-routing of utility services.
- E. Predemolition Photographs or Video: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by demolition operations. Comply with Div. 01 "Photographic Documentation." Submit before the Work begins.
- F. Interim Utility Shut-Off Plan, Shop Drawing and Schedule. Indicate provisions, routing and scheduling and all new and temporary Work required to maintain full-time operations in all adjacent buildings and site areas. Include all associated field-verified existing conditions, including but not limited to piping and cabling, below-grade structures and equipment, valves, hand holes and vaults. Field verify and include existing conditions outside of the Limit of Work if necessary to fully convey necessary provisions for continuity of utilities.

1.7 CLOSEOUT SUBMITTALS

- A. Inventory: Submit a list of items that have been removed and salvaged.

1.8 QUALITY ASSURANCE

- A. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.

1.9 FIELD CONDITIONS

- A. Buildings to be demolished will be vacated and their use discontinued before start of the Work.
- B. Buildings immediately adjacent to demolition area will be occupied. Conduct building demolition so operations of occupied buildings will not be disrupted. This includes utilizing sound-dampening methods.
 - 1. Provide not less than 72 hours' notice of activities that will affect operations of adjacent occupied buildings.
 - 2. Maintain access to existing walkways, exits, and other facilities used by occupants of adjacent buildings.
 - a. Do not close or obstruct walkways, exits, or other facilities used by occupants of adjacent buildings without written permission from authorities having jurisdiction. All paths, walkways, etc. must meet minimum ADA width requirements.
- C. Conditions existing at time of inspection for bidding purpose will be maintained by City of Sunnyvale as far as practical.
 - 1. Before building demolition, City of Sunnyvale will remove the following items:
 - a. Records.
 - b. Personal effects of employees.
 - c. Fire-safe file cabinets.
- D. Hazardous Materials: Hazardous materials are known to exist on the site. Refer to Asbestos Containing Material Report, Lead Based Paint Report, and Universal Waste Report. Refer to, and comply with, Specification Section 028400 for provisions regarding hazardous materials.
 - 1. If materials suspected of containing hazardous materials are encountered, other than those that have been identified, do not disturb; immediately notify Construction Manager and City of Sunnyvale.
- E. On-site storage or sale of removed items or materials is not permitted.

1.10 COORDINATION

- A. Arrange demolition schedule so as not to interfere with Owner's on-site operations or operations of adjacent occupied buildings.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements:
 - 1. Comply with governing EPA notification regulations before beginning demolition.
 - 2. Comply with hauling and disposal regulations of Authorities Having Jurisdiction.
 - 3. Comply with City of Sunnyvale requirements for screening of PCB's prior to demolition. Requirements can be found at the following link:
<https://sunnyvale.ca.gov/business/environmental/pcbs.htm>

Contractor is required to conduct the screening, submit the required report, secure the permit and follow all required protocol.

- B. Standards: Comply with ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting demolition operations and that all temporary utility connections are in place.
- B. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.
- C. Engage a professional engineer to perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during building demolition operations.
- D. Steel Tendons: Locate tensioned steel tendons and include recommendations for de-tensioning.
- E. Verify that hazardous materials have been remediated before proceeding with building demolition operations.
- F. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage operations.

3.2 PREPARATION

- A. Refrigerant: Before starting demolition, remove refrigerant from mechanical equipment according to 40 CFR 82 and regulations of authorities having jurisdiction.
- B. Salvaged Items: Note: Lumber from existing trees is to be salvaged. Refer to Section 024119 – Selective Demolition

3.3 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Utilities to be Disconnected: Locate, identify, disconnect, and seal or cap off utilities serving buildings and structures to be demolished.
 - 1. Owner will arrange to shut off utilities when requested by Contractor.
 - 2. Arrange to shut off utilities with utility companies.
 - 3. If removal, relocation, or abandonment of utility services will affect adjacent occupied buildings, then provide temporary utilities that bypass buildings and structures to be demolished and that maintain continuity of service to other buildings and structures.
 - 4. Contractor shall design, engineer, coordinate and implement all interim utilities with exception of the electrical services to maintain continuity of service to other buildings, structures, and site areas.

- a. Do not start demolition work until an interim utilities plan, shop drawings and schedule have been reviewed by the Architect of Record and approved in writing by the Owner.
5. Do not start demolition work until utility disconnecting and sealing have been completed and verified in writing.

3.4 PROTECTION

- A. Existing Facilities: Protect adjacent walkways, loading docks, building entries, and other building facilities during demolition operations. Maintain exits from existing buildings.
- B. Temporary Shoring: Provide and maintain interior and exterior shoring, bracing, or structural support to preserve stability and prevent unexpected movement or collapse of construction being demolished.
 1. Strengthen or add new supports when required during progress of demolition.
- C. Existing Utilities to Remain: Maintain utility services to remain and protect from damage during demolition operations.
 1. Do not interrupt existing utilities serving adjacent occupied or operating facilities unless authorized in writing by Owner and authorities having jurisdiction.
 2. Provide temporary services during interruptions to existing utilities, as acceptable to Owner and authorities having jurisdiction.
 - a. Provide at least 72 hours' notice to occupants of affected buildings if shutdown of service is required during changeover.
- D. Temporary Protection: Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction and as indicated. Comply with requirements in Section 015000 "Temporary Facilities and Controls."
 1. Protect adjacent buildings and facilities from damage due to demolition activities.
 2. Protect existing site improvements, appurtenances, and landscaping to remain.
 3. Erect a plainly visible fence around drip line of individual trees or around perimeter drip line of groups of trees to remain.
 4. Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 5. Provide protection to ensure safe passage of people around building demolition area and to and from occupied portions of adjacent buildings and structures.
 6. Protect walls, windows, roofs, and other adjacent exterior construction that are to remain and that are exposed to building demolition operations.
 7. Erect and maintain dustproof partitions and temporary enclosures to limit dust, noise, and dirt migration to occupied portions of adjacent buildings.
- E. Remove temporary barriers and protections where hazards no longer exist. Where open excavations or other hazardous conditions remain, leave temporary barriers and protections in place.

3.5 DEMOLITION, GENERAL

- A. General: Demolish indicated buildings and site improvements completely. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Do not use cutting torches until work area is cleared of flammable materials. Maintain portable fire-suppression devices during flame-cutting operations.
 2. Maintain fire watch during and for at least **<Insert number>** hours after flame-cutting operations.
 3. Maintain adequate ventilation when using cutting torches.
 4. Locate building demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
- B. Site Access and Temporary Controls: Conduct building demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
1. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from City of Sunnyvale and authorities having jurisdiction. Provide alternate routes around closed or obstructed trafficways if required by authorities having jurisdiction.
 2. Use water mist and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations. Do not use water when it may damage adjacent construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.
- C. Explosives: Use of explosives is not permitted.

3.6 DEMOLITION BY MECHANICAL MEANS

- A. Proceed with demolition of structural framing members systematically, from higher to lower level. Complete building demolition operations above each floor or tier before disturbing supporting members on the next lower level.
- B. Remove debris from elevated portions of the building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
1. Remove structural framing members and lower to ground by method suitable to minimize ground impact and dust generation.
- C. Below-Grade Construction: Demolish foundation walls and other below-grade construction.
1. Remove below-grade construction, including basements, foundation walls, and footings, completely.
- D. Existing Utilities: Demolish and remove existing utilities and below-grade utility structures.
- E. Hydraulic Elevator Systems: Demolish and remove elevator system, including cylinder, plunger, well assembly, steel well casing and liner, oil supply lines, and tanks.

3.7 SITE RESTORATION

- A. Below-Grade Areas: Rough grade below-grade areas ready for further excavation or new construction.

3.8 INVESTIGATION

- A. Site Grading: Uniformly rough grade area of demolished construction to a smooth surface, free from irregular surface changes. Provide a smooth transition between adjacent existing grades and new grades.

3.9 REPAIRS

- A. Promptly repair damage to adjacent buildings caused by demolition operations.

3.10 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove demolition waste materials from Project site and recycle or dispose of them according to Section 017419 "Construction Waste Management and Disposal."
 - 1. Do not allow demolished materials to accumulate on-site.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Do not burn demolished materials.

3.11 CLEANING

- A. Clean adjacent structures and improvements of dust, dirt, and debris caused by building demolition operations. Return adjacent areas to condition existing before building demolition operations began.
 - 1. Clean roadways of debris caused by debris transport.

END OF SECTION

SECTION 024119 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Demolition and removal of selected portions of building or structure.
 - 2. Removal of redwood trees to be salvaged.
 - 3. Coordination of transport of harvested logs to mill.
- B. Related Requirements:
 - 1. Section 024113 "Selective Site Demolition" for site clearing and removal of above- and below-grade improvements not part of selective demolition.
 - 2. Section 125190 "Salvaged Tree Preparation and Custom Furniture".

1.3 DEFINITIONS

- A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged or reinstalled.
- B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse.
- C. Remove and Reinstall: Detach items from existing construction, in a manner to prevent damage, prepare for reuse, and reinstall where indicated.
- D. Existing to Remain: Leave existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.
- E. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

1.4 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.

- B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.
 - 1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.5 PREINSTALLATION MEETINGS

- A. Predemolition Conference: Conduct conference at Project site.
 - 1. Inspect and discuss condition of construction to be selectively demolished.
 - 2. Review structural load limitations of existing structure.
 - 3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
 - 4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
 - 5. Review areas where existing construction is to remain and requires protection.
- B. Tree Removal Conference: Conduct conference at Project site.
 - 1. On-site pre-tree removal meeting required between tree removal contractor, local milling yard, Contractor, and Architect to address the following:
 - a. Identify in field the selected redwood trees to be salvaged.
 - b. Establish best course of action to maximize yield prior to tree removal.
 - c. Establish maximum lengths and size of harvested logs that can be safely removed and transported to local milling yard based on site conditions, tree access, construction equipment available, and size of vehicle to deliver harvested logs.
 - d. All end cuts of harvested logs shall be sealed with Anchorseal 2 Log & Lumber End Sealer to prevent end checking during transport and milling.
 - e. Minimum harvested log dimension: 1'-6" diameter x 15'-0" length.
 - f. Transportation of harvested logs to a local milling yard within 100 mile radius of project site.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For refrigerant recovery technician.
- B. Engineering Survey: Submit engineering survey of condition of building.
- C. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control and, for noise control. Indicate proposed locations and construction of barriers.
- D. Schedule of Selective Demolition Activities: Indicate the following:

1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's building manager's on-site operations are uninterrupted.
 2. Interruption of utility services. Indicate how long utility services will be interrupted.
 3. Coordination for shutoff, capping, and continuation of utility services.
 4. Use of elevator and stairs.
 5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
- E. Predemolition Photographs or Video: Show existing conditions of adjoining construction, including finish surfaces, that might be misconstrued as damage caused by demolition operations. Comply with Section 013233 "Photographic Documentation." Submit before Work begins.
- F. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.
- G. Warranties: Documentation indicating that existing warranties are still in effect after completion of selective demolition.

1.7 CLOSEOUT SUBMITTALS

- A. Inventory: Submit a list of items that have been removed and salvaged.

1.8 QUALITY ASSURANCE

- A. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.
- B. Tree Removal Contractor (Logging Company): Company that employs skilled workers to carefully cut trees and transport logs. Tree Removal Contractor shall have ten years' experience and a record of successful in-service performance.

1.9 FIELD CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
- B. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- C. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
1. Hazardous materials will be removed by Owner before start of the Work.
 2. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

- D. Hazardous Materials: Present in buildings and structures to be selectively demolished. A report on the presence of hazardous materials is on file for review and use. Examine report to become aware of locations where hazardous materials are present.
 - 1. Hazardous material remediation is specified elsewhere in the Contract Documents.
 - 2. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.
 - 3. Owner will provide material safety data sheets for suspected hazardous materials that are known to be present in buildings and structures to be selectively demolished because of building operations or processes performed there.
- E. Storage or sale of removed items or materials on-site is not permitted.
- F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
 - 1. Maintain fire-protection facilities in service during selective demolition operations.

1.10 COORDINATION

- A. Arrange selective demolition schedule so as not to interfere with Owner's operations.
- B. All Contractors shall review all new work drawings to ensure proper coordination with selective demolition requirements.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ASSE A10.6 and NFPA 241.

2.2 TREE REMOVAL CONTRACTOR

- A. General: Subject to compliance with requirements, engage a tree removal contractor (logging company) to carefully remove trees from the site and transport to designated sawmill.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.

- B. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.
- C. Perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.
 - 1. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.
- D. Steel Tendons: Locate tensioned steel tendons and include recommendations for de-tensioning.
- E. Verify that hazardous materials have been remediated before proceeding with building demolition operations.
- F. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs or video.
 - 1. Comply with requirements specified in Section 013233 "Photographic Documentation."
 - 2. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage operations.
 - 3. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

3.2 PREPARATION

- A. Refrigerant: Before starting demolition, remove refrigerant from mechanical equipment according to 40 CFR 82 and regulations of authorities having jurisdiction.

3.3 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
- B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.
 - 1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
 - 2. Arrange to shut off utilities with utility companies.
 - 3. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
 - 4. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated on Drawings to be removed.
 - a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
 - b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.

- c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
- d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
- e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
- f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
- g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material and leave in place.

3.4 PROTECTION

- A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 - 1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
 - 2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
 - 3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
 - 4. Cover and protect furniture, furnishings, and equipment that have not been removed.
 - 5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 015000 "Temporary Facilities and Controls."
- B. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
 - 1. Strengthen or add new supports when required during progress of selective demolition.
- C. Remove temporary barricades and protections where hazards no longer exist.

3.5 SELECTIVE DEMOLITION, GENERAL

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
 - 1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
 - 2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
 - 3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 - 4. Do not use cutting torches.

5. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 6. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
 7. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 8. Dispose of demolished items and materials promptly. Comply with requirements in Section 017419 "Construction Waste Management and Disposal."
- B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
- C. Removed and Salvaged Items:
1. Clean salvaged items.
 2. Pack or crate items after cleaning. Identify contents of containers.
 3. Store items in a secure area until delivery to Owner.
 4. Transport items to Owner's storage area designated by Owner.
 5. Protect items from damage during transport and storage.
- D. Removed and Reinstalled Items:
1. Clean and repair items to functional condition adequate for intended reuse.
 2. Pack or crate items after cleaning and repairing. Identify contents of containers.
 3. Protect items from damage during transport and storage.
 4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
- E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.6 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Concrete: Demolish in small sections. Using power-driven saw, cut concrete to a depth of at least 3/4 inch at junctures with construction to remain. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete. Neatly trim openings to dimensions indicated.
- B. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, and then remove masonry between saw cuts.
- C. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, and then break up and remove.
- D. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings." Do not use methods requiring solvent-based adhesive strippers.

3.7 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove demolition waste materials from Project site and recycle or dispose of them according to Section 017419 "Construction Waste Management and Disposal."
 - 1. Do not allow demolished materials to accumulate on-site.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 - 3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
 - 4. Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."
- B. Burning: Do not burn demolished materials.

3.8 CLEANING

- A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION

Issued for Construction - October 27, 2020

**HAZARDOUS MATERIALS
ABATEMENT SPECIFICATIONS**

City of Sunnyvale Civic Center
City Hall, City Hall Annex, Public Safety and
Sunnyvale Office Complex (SOC) Buildings
456 West Olive Avenue, Sunnyvale, California

ATC Project Number 118BS02271

August 25, 2020

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TABLE OF CONTENTS

SECTION I- ASBESTOS	4
PART 1 - GENERAL	4
1.2 DEFINITIONS	7
1.3 QUALITY CONTROL	10
1.4 SUBMITTALS AND NOTIFICATIONS	11
1.5 ADMINISTRATION OF THE CONTRACT	14
1.6 SAFETY	14
1.7 TRAINING PROGRAM	14
1.8 DRESS AND EQUIPMENT	14
1.9 RESPIRATORS	15
PART 2 - PRODUCTS	16
2.0 GENERAL	16
2.1 PROTECTIVE COVERING (PLASTIC)	16
2.2 TAPE	16
2.3 PROTECTIVE PACKAGING	16
2.4 WARNING LABELS AND SIGNS	16
2.5 SURFACTANT	16
2.6 ENCAPSULATING SEALER	17
2.7 LAGGING ADHESIVE	17
2.10 LUMBER	18
2.11 SOLVENTS	18
PART 3 – EXECUTION	18
3.0 WORKER PROTECTION	18
3.1 WORK AREA PREPARATION	19
3.2 DECONTAMINATION ENCLOSURE SYSTEMS	24
3.3 ASBESTOS REMOVAL	26
3.4 DECONTAMINATION OF WORK AREA	29
3.5 ASBESTOS DISPOSAL	37
3.6 AIR MONITORING AND TESTING	38
3.7 REIMBURSEMENT OF COSTS OF THE OWNER OR THE OBSERVATION SERVICE	39
3.8 STOPPING THE WORK	39
3.9 CLEANUP	40
SECTION II- LEAD	41
PART 1 - GENERAL	41
1.0 DESCRIPTION	41
1.1 DEFINITIONS	42
1.2 SUBMITTALS	45
1.3 PERSONAL PROTECTION & HYGIENE	45
1.4 RESPIRATORS	46
1.5 DRESS AND EQUIPMENT	48

PART 2 - PRODUCTS	48
2.0 WASHING AGENT	49
2.1 PROTECTIVE COVERING	49
2.2 PROTECTIVE PACKAGING	49
2.3 CAUTION SIGNS	49
PART 3 - EXECUTION	49
3.0 WORK AREA PREPARATION	49
3.1 DECONTAMINATION PROCEDURES	50
3.2 REMOVAL PROCEDURES	50
3.3 CLEANUP OF THE WORK AREA	51
3.4 AIR MONITORING AND CLEARANCE TESTING	52
3.5 BUILDING CONTAMINATION	53
3.6 REPAIR AND PAINTING	53
3.7 DISPOSAL OF LEAD-BASED PAINT WASTE	53
3.8 DISPOSAL OF NON-HAZARDOUS CONTAMINATED SOLID WASTE	54
3.9 DISPOSAL OF HAZARDOUS WASTE	55
3.10 COST FOR DISPOSAL OF HAZARDOUS WASTE	56

**SECTION I- ASBESTOS
ASBESTOS CONTAINING MATERIALS &
ASBESTOS CONTAINING CONSTRUCTION MATERIALS
ABATEMENT SPECIFICATIONS**

PART 1 - GENERAL

1.0 DESCRIPTION

- A. Work included: Contractor shall furnish all labor, materials, services, permits, insurance (specifically covering the handling and transportation of Asbestos-Containing Material, Asbestos-Containing Construction Material and Asbestos-Containing Waste Material), and equipment which is specified, shown, or reasonably implied for Asbestos Abatement materials/activities.

IDENTIFIED ACM/ACCM CITY OF SUNNYVALE CIVIC COMPLEX CITY HALL, CITY HALL ANNEX, AND SOC BUILDINGS 456 WEST OLIVE AVENUE, SUNNYVALE, CALIFORNIA				
Homogenous Material	Sample Location	Approximate Quantity	NESHAP Category	Asbestos Content
City Hall				
Drywall System	West Council Auditorium, Throughout	3,000 SF	RACM	Joint Compound: 2% CH Skim Coat: 2% CH
12"x12" Tan Vinyl Floor Tile w/ White Stripes and Black Mastic	West Council Auditorium	80 SF	CAT I	Mastic: 5% CH
Building Caulking	West Council Auditorium, Interior Roof Perimeter	200 LF	CAT I	3% CH
Mastic under Blue/Green Carpet	West Hall & East Office Areas	12,000 SF	CAT I	Mastic 2 (Black): 3% CH
9"x9" Brown, Brown-Streaked Vinyl Floor Tile w/ Black Mastic	East Office Area & Basement, Throughout	12,000 SF	CAT I	Floor Tile: 3% CH Mastic: 5% CH
12"x12" Green Vinyl Floor Tile w/ Black Mastic	Room 145 near Central Lobby, Ground Floor	60 SF	CAT I	Mastic: 2% CH
12"x12" Red, Black-Streaked Vinyl Floor Tile w/ Black Mastic	Basement near Elevator	150 SF	CAT I	Mastic: 2% CH

IDENTIFIED ACM/ACCM CITY OF SUNNYVALE CIVIC COMPLEX CITY HALL, CITY HALL ANNEX, AND SOC BUILDINGS 456 WEST OLIVE AVENUE, SUNNYVALE, CALIFORNIA				
Homogenous Material	Sample Location	Approximate Quantity	NESHAP Category	Asbestos Content
Tan Ceramic Pattern Vinyl Floor Tile w/ Black Mastic	Ground Floor, Employee Lounge	250 SF	CAT I	Mastic 2 (Black): 4% CH
TSI Wrap & Packing	Throughout	600 LF	RACM	10% Amosite 30% CH
Cementitious Wall Panels	Exterior, Throughout	10,500 SF	CAT II	19% CH
Fire Doors	Throughout	N/A	N/A	Assumed ACM
City Hall Annex				
Drywall System	Throughout	14,000 SF	RACM	Joint Compound=2% CH Skim Coat=2% CH
Wall Texture	Throughout	8,000 SF	RACM	2% CH
9"x9" Fake Ceramic Pattern Vinyl Floor Tile w/ Black Mastic	Ground Floor A125, A146	800 SF	CAT I	Mastic=3% CH
Mastic under 2"x2" Green Carpet Squares	Throughout	13,000 SF	CAT I	2% CH
12"x12" White, Brown-Streaked Vinyl Floor Tile w/ Black Mastic	Ground Floor A123, Basement Throughout	1,500 SF	CAT I	Mastic=2% CH
Brown Mastic under 2'x2' Blue Carpet Squares	Ground Floor Main Entrance Lobby,	250 SF	CAT I	2% CH
Tan, Beige-Streaked Stair Tread w/ Mastic	Stairway between Basement and Ground Floor	60 SF	CAT I	Mastic 2 = 5% CH
Cementitious Wall Panels	Exterior Throughout	6,000 SF	CAT II	10% CH
Fire Doors	Throughout	N/A	N/A	Assumed
Public Safety				
Fire Doors	Throughout	N/A	N/A	Assumed
Sunnyvale Office Complex (SOC)				
Drywall System	Throughout	70,000 SF	RACM	Joint Compound=2% CH

IDENTIFIED ACM/ACCM CITY OF SUNNYVALE CIVIC COMPLEX CITY HALL, CITY HALL ANNEX, AND SOC BUILDINGS 456 WEST OLIVE AVENUE, SUNNYVALE, CALIFORNIA				
Homogenous Material	Sample Location	Approximate Quantity	NESHAP Category	Asbestos Content
Tan 9"x9" Floor Tile & Black Mastic	Ground Floor, West & East Janitor Storage	50 SF	CAT I	Floor Tile=2% CH
TSI Pipe Elbow Packing	Basement	30 LF	RACM	8% CH
Popcorn Ceiling	Ceilings Throughout	42,000 SF	RACM	4% CH
HM = Homogenous Material; O.D. = Outside Diameter; N/A = Not Applicable; SF = Square Feet; LF = Linear Feet; ND = Not Detected; CH = Chrysotile; AM = Amosite RACM = Regulated Asbestos Containing Material; CAT I = Category I Non Friable Asbestos Containing Material				

Unidentified ACM may be present in inaccessible or concealed spaces. These spaces include, but are not limited to, pipe chases, spaces between wall/ceiling/floor/door cavities and the interior of mechanical components such as boiler cavities and interior ducts. If the demolition/renovation activities make these areas accessible, Contractor must perform a thorough assessment of these spaces to identify and confirm the presence or absence of additional ACM. Until sampled, all unidentified materials should be treated as Asbestos Containing Materials and handled in accordance with these specifications.

Contractor has sole responsibility for confirming the location, quantity and degree of difficulty in removing the identified materials.

- B. Applicable Publications: The publications listed below form a part of these Specifications to the extent referenced. The publications are referred to in the text by the basic designation only.

Where applicable, all work shall be conducted in accordance with the following regulations.

- Code of Federal Regulations (CFR) Publications:

29 CFR 1910.1001	Occupational Exposure to Asbestos, Tremolite, Anthophyllite and Actinolite
29 CFR 1926.1101	Asbestos
29 CFR 1910.1200	Hazard Communication
29 CFR 1910.20	Access to Employee Exposure and Medical Records
29 CFR 1910.132	General Requirements - Personal Protective Equipment
29 CFR 1910.133	Eye and Face Protection
29 CFR 1910.134	Respiratory Protection
29 CFR 1910.145	Specifications for Accident Prevention, Signs and Tags
29 CFR 1926.58	Asbestos, Tremolite, Anthophyllite and Actinolite
40 CFR 61, Subpart A	General Conditions
40 CFR 61, Subpart M	National Emission Standards for Asbestos

- 40 CFR 61.152 Standard for Waste Disposal for Manufacturing, Demolition, Renovation, Spraying and Fabrication Operations
2. American National Standard Institute (ANSI) Publications:
 - Z9.2-1979 Fundamentals Governing The Design and Operation of Local Exhaust Systems
 - Z88.2-1992 Practices for Respiratory Protection
3. National Fire Protection Association (NFPA):
 - Standard 90A Installation of Air Conditioning and Ventilation Systems.
4. U. S. Environmental Protection Agency (EPA):
 - Publication No. 560/5-85-024 Guidance for Controlling Asbestos-Containing Materials in Buildings, June, 1985
5. American Society for Testing and Materials (ASTM) Publications:
 - E 849-82 Safety and Health Requirements Relating to Occupational Exposures to Asbestos
 - P-189 Specifications for Encapsulates for Friable Asbestos-Containing Materials
6. National Institute of Occupational Safety and Health (NIOSH) Publications:
 - Manual of Analytical Methods, 2nd Ed., Vol. 1.
 - Physical and Chemical Analysis Method (P&CAM):
 - Method 239 Asbestos Fibers in Air
 - Method 7400 Fibers (N1, 3rd Ed., Vol. 1.)
7. Underwriters Laboratories, Inc. (UL) Publications:
 - 586-77 Test Performance of High Efficiency, Particulate, Air Filter Units
 - (R1982)
8. Title 8 California Code of Regulations (CCR):
 - Section 1529 Asbestos
 - Section 5208 General Industry Safety Orders
 - Section 5144 Respirator Regulations
9. Bay Area Air Quality Management District (BAAQMD):
 - Regulation 11 Hazardous Pollutants, Rule 2, Asbestos Demolition, Renovation and Manufacturing
10. Other Local or Regional Regulations that apply to Asbestos-Related Work.

1.2 DEFINITIONS

- A. Owner: City of Sunnyvale
- B. Abatement: Procedures to control fiber release from Asbestos-Containing building materials. Includes removal, encapsulation, and enclosure.
- C. Air Lock: A system for permitting ingress and egress with minimum air movement between a contaminated area and an uncontaminated area.
- D. Air Monitoring: The process of measuring the fiber content of a specific volume of air in a stated period of time.
- E. Air Sampling Professional: The professional contracted or employed to supervise air monitoring and analysis schemes. This individual is also responsible for recognition of technical deficiencies in Worker protection equipment and procedures during both planning and on-site phases of an Abatement Project. Acceptable Air Sampling Professionals include Industrial Hygienists, Environmental Engineers and Environmental Scientists with equivalent experience in Asbestos air monitoring and Worker protection.
- F. Amended Water: Water to which a surfactant has been added.

- G. Area Monitoring: Sampling of airborne fiber concentrations within the Asbestos Work Area and outside the Asbestos Work Area which are representative of the airborne concentrations of Asbestos fibers which may reach the breathing zone.
- H. Asbestos: (29 CFR 1926.1101 and CCR Title 8 Section 1529 Definitions) Includes Chrysotile, Amosite, Crocidolite, Tremolite asbestos, and any of these minerals that has been chemically treated and/or altered.
- I. Asbestos (CCR definitions): Means fibrous forms of various hydrated minerals including Chrysotile, (fibrous serpentine), Crocidolite (fibrous Riebeckite), Amosite (fibrous Cumingtonite-Grunerite), Fibrous Tremolite, fibrous Actinolite, and fibrous Anthophyllite.
- J. Asbestos-Containing Material (ACM): Material composed of asbestos of any type in an amount greater than one percent (1%) by weight, either alone or mixed with other fibrous or non-fibrous materials.
- K. Asbestos-Containing Construction Material (ACCM): Means any manufactured construction material which contains more than one-tenth of one percent (0.1%) asbestos by weight.
- L. Asbestos-Containing Waste Material: Means friable asbestos waste and asbestos waste from control devices (Pollution Control Devices).
- M. Asbestos Fibers: Asbestos fibers having an aspect ratio of at least 3:1 and 5 micrometers in length.
- N. Authorized Visitor: The Owner's Project Team members, the Owner's Representative, Observation Service and any representative of a regulatory or other agency having jurisdiction over the Project.
- O. Clean Room: An uncontaminated area or room which is a part of the Worker Decontamination Enclosure with provisions for storage of Workers' street clothes and protective equipment.
- P. Contained Work Area: A Work Area which has been Isolated, Plasticized, and equipped with a Decontamination Enclosure System.
- Q. Curtained Doorway: A device to allow ingress or egress from one area to another while permitting minimal air movement between the areas, typically constructed by placing three overlapping sheets of plastic over an existing or temporarily framed doorway, securing each along the top of the doorway, and securing the vertical edge of the outer two sheets along the opposite vertical side of the doorway.
- R. Decontamination Enclosure System: A series of connected rooms, with Air Locks or Curtained Doorways between any two adjacent rooms, for the decontamination of Workers and of materials and equipment. A Decontamination Enclosure System always contains at least one Air Lock to the Work Area.
- S. Encapsulant (sealant): A liquid material which can be applied to Asbestos-Containing material and which controls the possible release of Asbestos fibers from the material either by creating a membrane over the surface (bridging encapsulant) or by penetrating into the material and binding its components together (penetrating encapsulant).
- T. Encapsulation: All herein-specified procedures necessary to apply an encapsulant to Asbestos-Containing building materials to control the possible release of Asbestos fibers into the ambient air.
- U. Enclosure: All herein-specified procedures necessary to enclose completely Asbestos-Containing Material behind airtight, impermeable, permanent barriers.

- V. Excursion Limit: An exposure of airborne concentrations of Asbestos fibers of one fiber per cubic centimeter of air (1f/cc) as averaged over a sampling period of thirty (30) minutes.
- W. Equipment Room: A contaminated area or room which is part of the Worker Decontamination Enclosure with provisions for storage of contaminated clothing and equipment.
- X. Equipment Decontamination Enclosure: That portion of a Decontamination Enclosure System designed for controlled transfer of materials, waste containers and equipment, typically consisting of a Washroom and a Holding Area.
- Y. Friable Asbestos Material (40 CFR, Subpart M Definition): Material that contains more than one percent (1%) Asbestos by weight and that can be broken, crumbled, pulverized, or reduced to powder by hand pressure when dry.
- Z. Fixed Object: A unit of equipment or furniture or other building component which cannot be detached from the building or can only be detached by destructive methods resulting in irreparable damage to the item.
- AA. Glove-bag Method: A method with limited applications for removing small amounts of friable Asbestos-Containing material from heating ventilation and air-conditioning ducts, short piping runs, valves, joints, elbows, and other non-planar surfaces in an Isolated (non-contained) Work Area. The glove-bag (typically constructed of six [6] mil transparent Regulite plastic) has two inward-projecting long-sleeve rubber gloves, one inward-projecting water-wand sleeve, an internal tool pouch, and an attached, labeled receptacle for Asbestos waste. The glove-bag is constructed and installed in such a manner that it surrounds the object or area to be decontaminated and contains all Asbestos fibers released during the removal process. All Workers who are permitted to use the Glove-bag Method must be highly trained, experienced, and skilled in this method.
- AB. HEPA Filter: A high-efficiency particulate air (HEPA) filter capable of trapping and retaining 99.97 percent of all mono-dispersed particles (Asbestos fibers) equal to or greater than 0.3 microns in mass median aerodynamic equivalent diameter.
- AC. HEPA Vacuum Equipment: Vacuuming equipment with a HEPA filter system.
- AD. Holding Area: A room in the Equipment Decontamination Enclosure located between the Washroom and an uncontaminated area. The Holding Area consists of a chamber with an Air Lock connecting it to the Washroom and an Air Lock connecting it to the uncontaminated area.
- AE. Isolation: The sealing of all openings into a Work Area.
- AF. Isolated (non-contained) Work Area: A Work Area which is Isolated, but has not been Plasticized and may or may not be equipped with a Decontamination Enclosure System.
- AG. Movable Object: A unit of equipment, furniture or other building component which is detached or can be detached from the building without destructive methods or results.
- AH. Negative Air Pressure Equipment: A portable local exhaust system equipped with HEPA filtration and capable of maintaining a constant, low velocity air flow into contaminated areas from adjacent uncontaminated areas.
- AI. Non-friable Asbestos-Containing Material: Material that contains more than one (1) percent Asbestos by weight in which the fibers have been locked in by a bonding agent, coating, binder, or other material so that the Asbestos is well bound and will not release fibers during any appropriate end-use, handling, demolition, storage, transportation, processing, or disposal.
- AJ. Observation Service: The agent of the Owner or the Owner's Representative who shall observe the Work, perform tests, verify that abatement methods and procedures specified

by the Contract Documents are being complied with, and reports all observations and test results to the Owner or the Owner's Representative.

- AK. Permissible Exposure Limit (PEL): An airborne concentration of asbestos, (Tremolite, Anthophyllite, Actinolite, or a combination of these minerals) in excess of 0.1 fibers per cubic centimeter (f/cc) of air as an eight (8) hour time-weighted average (TWA), as determined by the method prescribed in Appendix A of Section Five, Part 1925(amended) §1926.1101 (c).CFR.
- AL. Personal Monitoring: Sampling of Asbestos fiber concentrations within the breathing zone of an Asbestos Worker.
- AM. Plasticize: To cover floors, walls and other structural elements of a Work Area with plastic sheeting as herein specified with all seams securely taped.
- AN. Removal: All herein-specified procedures necessary to remove Asbestos-Containing materials from the designated areas and to dispose of these materials at an acceptable site.
- AO. Shower Room: A room between the Clean Room and the Equipment Room in the Worker Decontamination Enclosure with hot and cold or warm running water, and suitably arranged for complete showering during decontamination. The Shower Room comprises an Air Lock between contaminated and clean areas.
- AP. Surfactant: A chemical wetting agent added to water to reduce surface tension and improve penetration.
- AQ. Washroom: A room between the Work Area and the Holding Area in the Equipment Decontamination Enclosure System where equipment and waste containers are decontaminated. The Washroom comprises an Air Lock.
- AR. Wet Cleaning: The process of eliminating Asbestos contamination from building surfaces and objects by using cloths, mops, or other cleaning tools which have been dampened with water, and by afterwards disposing of these cleaning tools as Asbestos-contaminated waste.
- AS. Work Area (Also known as "Regulated Area"): Designated rooms, spaces, or areas of the Project in which Asbestos Abatement actions are to be undertaken or which may become contaminated as a result of such abatement actions. A Contained Work Area is a Work Area which has been Isolated, Plasticized, and equipped with a Decontamination Enclosure System. An Isolated (non-contained) Work Area is a Work Area which is Isolated, but has not been Plasticized and may or may not be equipped with a Decontamination Enclosure System.
- AT. Worker Decontamination Enclosure System: That portion of a Decontamination Enclosure System designed for controlled passage of Workers, and other personnel and Authorized Visitors, typically consisting of a Clean Room, a Shower Room, and an Equipment Room.

1.3 QUALITY CONTROL

- A. Safety Compliance: In addition to detailed requirements of this Specification, comply with laws, ordinances, rules, and regulations of federal, state, regional, and local authorities and publications regarding handling, storing, transporting, and disposing of Asbestos and Asbestos Waste materials. Submit matters of interpretation of standards to the appropriate administrative agency for resolution before starting the Work. Where the requirements of this Specification and referenced documents vary, the most stringent requirement shall apply.

- B. Contractor shall have at least one copy each of 29 CFR Part 1910 - Occupational Safety and Health Standards, 29 CFR 1926.1101, 40 CFR Part 61, Subparts A & M, CCR Title 8 Section 1529, Bay Area Air Quality Management District (BAAQMD), Regulation 11 Hazardous Pollutants, Rule 2, and all pertinent state and local regulations at his office and at the job site.
- C. Before the commencement of any work at the site, the Contractor shall post bilingual (as appropriate) EPA, OSHA and DOSH caution signs in and around the Work Area to comply with EPA, OSHA and DOSH regulations.
- D. Area Monitoring shall be performed by the Observation Service, which will conduct air sampling of the Abatement Project (1) immediately outside the Work Area, (2) in the Work Area, and (3) for Work Area Clearance Testing after decontamination operations.
- E. Personal Monitoring and other monitoring, which are required by law, or considered necessary by the Contractor for Worker protection shall be the responsibility of the Contractor.
- F. Job Walk: The Contractor must attend the Job Walk to qualify to bid on any or all portions of this Contract.

1.4 SUBMITTALS AND NOTIFICATIONS

- A. Personnel Training: At the Preconstruction Meeting, Contractor shall submit (1) declaration certifying that all Contractor's employees have been adequately trained, and (2) a photocopy of training certificates for each employee from their respective training agency or organization. When certified or other formal worker training is required by state or local agencies, Contractor may submit a photocopy of the employee's Asbestos Worker Certification card in lieu of training certificates.
- B. Respirators: Submit at Preconstruction Meeting manufacturer's certification that the respirators to be used in this Project comply with government agency requirements. Contractor's certifications for each employee must clearly state that each employee has been fit tested and properly trained for respirators.
- C. Medical Examinations: Submit proof that all persons providing labor and/or professional services who will be entering contaminated areas have had current (less than one year prior to the date of their participation on the Project) medical examinations. Furnish physician's interpretation of said examinations to the Owner on the Certificate of Medical Compliance form provided in the Supplementary General Conditions section of these Construction Documents at the Preconstruction Meeting, or prior to that person's commencing work on this Project, and for each person subsequently providing labor and/or professional services at the job site for whom a certificate was not initially furnished. Refer to Article 2.5, A. NOTE: In lieu of the above certificate, current medicals will be acceptable providing that a statement in the medical exam declares that the worker can wear a negative pressure respirator while performing their work. Contractor shall resubmit physician's interpretation of medical examination for each worker or professional employed by him whose physician or regulatory required annual or employment termination examination becomes due while said worker or professional is participating in the Project. This requirement can be waived or modified only by the Owner in writing or verbally, followed up in writing.
- D. Product Submittals and Substitutions: Comply with pertinent provisions of Section 01340.
- E. Abatement Product Data: Within 24-hours after Contractor has received the Owner's Notice of Award, submit manufacturer's catalogue, samples, Safety Data Sheets (SDS) and other items needed to demonstrate fully the quality of the proposed abatement

materials. Under no circumstances shall proposed materials be used before written approval from the Owner, Owner's Representative or Observation Service. Submittals are required if the following materials are proposed (not necessarily a complete list):

1. Encapsulant
2. Surfactant
3. Protective packaging
4. Lagging adhesive
5. Solvents

Do not submit data on products not proposed for this Project.

- F. Permits: Submit at Preconstruction Meeting proof satisfactory to the Owner, Owner's Representative or Observation Service that all required permits have been obtained. If no permits are required, submit notarized letter stating such.
- G. Waste Transportation: Submit at Preconstruction Meeting the method of transport of Hazardous Waste, including the name, address, EPA ID number, and telephone number of the Transporter(s).
- H. Hazardous Waste Disposal Facility: Submit for approval at the Preconstruction Meeting the name, address, EPA ID number, and telephone number of the Hazardous Waste Disposal Facility(s) to be used.
- I. Contractor's Work Plan: Submit at the Preconstruction Meeting for approval a detailed plan of the work procedures to be used in the removal, repair, clean-up or encapsulation of materials containing Asbestos. Such a plan shall include:
 1. Location of Asbestos Work Areas.
 2. Layout and construction details of Decontamination Enclosure Systems.
 3. Project schedule including important milestones, critical paths and interface of trades involved in the Work.
 4. Personal air monitoring procedures.
 5. Detailed description of the method to be employed in order to control pollution, including negative air equipment calculations.
 6. Names of Superintendent, Foremen, Project Manager and other key personnel, and their day time and emergency telephone numbers.
 7. Security Plan including sketches necessary to clearly describe the plan.
 8. Emergency evacuation plan for injured workers, compressor failure, fire and other emergencies.
 9. Fire-watch Plan including any sketches necessary to clearly describe the plan.
 10. A contingency plan, in the event of a major contamination incident caused by fire (on or off the floor being abated), a large breach in the Work area containment barrier, the opening of stairwell doors, breakage of the buildings exterior windows or sabotage. Such a plan will focus on how to maintain safety and order when the building is fully occupied by office employees and other building users.
 11. The Asbestos Plan must be approved in writing by the Observation Service and Owner before the start of any work.
- J. Equipment Certification: Submit at Preconstruction Meeting manufacturers' certification that vacuums, negative air pressure equipment filters, and other local exhaust ventilation equipment conform to ANSI Z9.2-1979 and have been challenge tested.

- K. Rental Equipment: When rental equipment is to be used in removal areas or to transport waste materials, a copy of the written notification provided to the rental company informing them of the nature of use of the rented equipment shall be signed by the rental company and submitted to the Observation Service at the Preconstruction Meeting.
- L. Notifications: If required, contact the following government agencies in writing by certified/registered mail or overnight mail service, postmarked or delivered at least ten (10) days prior to Project commencement:
1. EPA Regional Asbestos Coordinator:
EPA Region IX
75 Hawthorne Street
San Francisco, California 94105
 2. Occupational Safety and Health Administration:
1515 Clay Street, Suite 1901
Oakland, California 94612
 3. Air Pollution Control District or Air Quality Management District:
BAAQMD
375 Beale Street, Suite 600
San Francisco, California 94105

All notifications shall contain as a minimum the following information:

1. Name, address and telephone number of the Owner including the contact person.
2. Name, address, EPA numbers, license number and telephone number of the Contractor including the contact person.
3. Name, address and description of the building, including size, age, and prior use of building.
4. The type and quantity of friable Asbestos material involved and the description of the Work.
5. Scheduled starting and completion dates for Abatement Work.
6. Procedures that shall be employed to comply with the regulations.
7. The name, address, EPA number and telephone number of the Transporter.
8. The name and address of the Hazardous Waste Disposal Facility where the Asbestos Waste shall be deposited.

Copies of all required government agency correspondence and proof of delivery shall be delivered to the Owner, Owner's Representative or the Observation Service at the Preconstruction Meeting. NOTE: No work shall commence until verification of required notifications is made by the Owner, Owner's Representative or the Observation Service.

- M. Certificate of Worker's Release: The Contractor shall have any person providing labor and professional services at the Project site sign a Certificate of Worker's Release, on the form provided in the Supplementary General Conditions section of these Construction Documents, before commencing work on this Project. Contractor shall furnish the notarized original of such Certificate of Worker's Release for each such person at the Preconstruction Meeting or before that person's commencement of Work, and for each person subsequently providing labor or professional services at the job site for whom a Certificate was not initially furnished. This requirement can be waived or modified only by the Owner, in writing or verbally, followed in writing.

- N. Provide proof of Contractor's License and Asbestos Certification from the Contractor Licensing Board, and proof of registration with the Division of Occupational Safety and Health in accordance with California Labor Code, Section 6501. Submit proof with Bid.
- O. Encapsulant manufacturer's certification (when required) that the Contractor is an approved applicator of the encapsulant to be used on this project
- P. Scaffolding: Submit to the Owner's Representative or Observation Service prior to abatement work, certification from a licensed Civil or Structural Engineer that the scaffolding design and installation is safe and adequate for the purpose for which it will be used. Submit copy of scaffolding permit when required by local regulatory agencies.
- Q. Certification naming the manufacturer of supplied-air (Type C) respirator equipment. Include certification of compliance with Occupational Safety and Health Administration, United States Environmental Protection Agency, and all other pertinent regulatory agencies. Include testing reports (previous and current). Include the rated capacity of each type of equipment used.

1.5 ADMINISTRATION OF THE CONTRACT

- A. All Work is to be performed under the observation of the Observation Service and the Owner's Representative, who shall be free to enter and review all Work.

1.6 SAFETY

- A. Submit at the Preconstruction Meeting written procedures for evacuation of injured Workers. Aid for seriously injured Workers shall not be delayed in order to comply with standard decontamination procedures. It is the responsibility of the Contractor to decide if the seriousness of the injury warrants noncompliance with the standard decontamination procedures.

1.7 TRAINING PROGRAM

- A. Each employee shall receive training in the proper handling of materials that contain Asbestos, including all aspects of work procedures and protective measures, use of protective clothing and respiratory protection, use of showers, entry and exit procedures from Work Areas and in OSHA and DOSH regulations. All workers who are scheduled to use the Glove-bag Method must be highly trained, experienced and skilled in this method. Each employee shall also understand the health implications and risks involved, including the illness possible from exposure to airborne Asbestos fibers and the increased risk of lung cancer associated with smoking cigarettes and Asbestos exposure, understand the use and limits of the respiratory equipment to be used, and understand the purpose of medical surveillance and the monitoring of airborne quantities of Asbestos as related to health and respiratory equipment. The training program shall comply with federal, state or local regulatory requirements.
- B. Emergency evacuation procedures to be followed in the event of Worker injury or compressor failure, shall be included in Worker Training program.

1.8 DRESS AND EQUIPMENT

- A. Work clothes shall consist of disposable full-body coveralls, head covers, boots, rubber gloves, sneakers or equivalent. Sleeves at wrists and cuffs at ankles shall be secured. Fire retardant full-body coveralls are required in areas of open flame, or where required by local regulations.

- B. Eye protection and hard hats shall be available as appropriate or as required by applicable safety regulations.
- C. Provide Authorized Visitors with suitable protective clothing, headgear, eye protection, and footwear whenever they are required to enter the Work Area.

1.9 RESPIRATORS

- A. Respiratory protective equipment shall be Mine Safety and Health Administration (MSHA) National Institute of Occupational Safety and Health (NIOSH) approved in accordance with the provisions of 30 CFR Part 11 unless superseded by local regulations with more stringent requirements. Respiratory instructions shall be posted in the Clean Room.
- B. Use Type C Supplied-Air Respirator in the following locations or for the abatement of the following materials until the Contractor establishes the average airborne concentrations of Asbestos fibers the employees will confront. Determine in accordance with 29 CFR 1926.1101 and CCR Title 8 Section 1529 regulations both the Excursion Limit and the 8-hour, time-weighted average (TWA) concentration of Asbestos fibers to which employees will be exposed in each Work Area. When the exposure limits are established, the respirators presented in 30 CFR Part 11, that afford greater protection at such upper concentrations of airborne Asbestos, may be used.
 - 1. When required by regulations or Owner.
- C. At the sole discretion of the Contractor use Powered Air Purifying Respirators in lieu of Type C Supplied Air Respirators in the following locations or for the abatement of the following materials until the Contractor establishes the average airborne concentrations of Asbestos fibers the employees will confront. Determine, in accordance with 29 CFR 1926.1101 regulations, both the 30 minute Excursion Limit and the 8-hour TWA concentration of Asbestos fibers to which employees will be exposed in each Work Area. When the exposure levels are established the respirators presented in 30 CFR Part 11, that afford greater protection at such upper concentrations of airborne Asbestos fibers, may be used.
 - 1. When required by regulations or Owner.
- D. Half-mask or full-face air-purifying respirators with HEPA filters may be worn during the preparation of the Work Area, performance of repair work, use of glove-bag techniques and decontamination work, provided Work Area fiber concentrations are less than 0.1 f/cc.
- E. Compressed air systems shall be designed to provide air volumes and pressures to accommodate respirator manufacturer's specifications. The compressed air systems shall have a receiver of adequate capacity to allow escape of all respirator wearers from contaminated areas in the event of compressor failure. Compressors must meet the requirements of 29 CFR 1910.134(d) or local regulations. Compressors must have an in-line carbon monoxide monitor, and periodic inspection of the carbon monoxide monitor must be evidenced. Documentation of adequacy of compressed air system/respiratory protection system must be retained on site. This documentation will include a list of compatible components, with the maximum number and type of respirators that may be used with the system. Periodic testing of compressed air shall ensure that systems provide air of sufficient quality.
- F. When Type C respirators are not required, the Contractor shall provide Workers with approved, permanently personally-issued and marked respirators with changeable filters. The Contractor shall provide a sufficient quantity of filters approved for Asbestos so that Workers can change filters during the workday. Filters shall not be used any longer than one (1) workday or whenever an increase in breathing resistance is detected. The

respirator filters shall be stored at the job site in the Clean Room and shall be totally protected from exposure to Asbestos before their use.

- G. Workers shall always wear a respirator, properly fitted on the face, in the Work Area, from the initiation of preparation work until all areas have been given written clearance by the Observation Service.
- H. Provide at least two (2) extra air hoses and respirators when Type C respirators are required. Provide at least two (2) extra Powered Air Purifying Respirator (PAPR) respirators when this type of respirator is required. Provide instruction on the use of the above respirators to Authorized Visitors.

PART 2 - PRODUCTS

2.0 GENERAL

- A. Contractor shall furnish, provide and utilize the following products in the Work as specified.

2.1 PROTECTIVE COVERING (PLASTIC)

- A. Ten (10) mil, six (6) mil, and four (4) mil fire-retardant polyethylene plastic sheets in sizes to minimize the frequency of joints.

2.2 TAPE

- A. Duct Tape 2" or wider, or equal, and capable of sealing joints of adjacent sheets of plastic, and for attachment of plastic sheet to finished or unfinished surfaces of dissimilar materials, and capable of adhering under both dry and wet conditions, including use of amended water.

2.3 PROTECTIVE PACKAGING

- A. Appropriately labeled clear, double six (6) mil sealable polyethylene bags as a minimum.
- B. Appropriately labeled, sealable, impermeable drum containers.
- C. Bilingual labels (English and other appropriate language[s]) on containment glove-bags, waste packages, contaminated material packages and other containers shall be in accordance with EPA, OSHA and DOSH standards.

2.4 WARNING LABELS AND SIGNS

- A. As required by 29 CFR 1910.1001, 29 CFR 1910.1200, 29 CFR 1926.1101, CCR Title 8 Section 1529, and other pertinent state and local regulations, whichever is the most stringent.

2.5 SURFACTANT

- A. Surfactant, or wetting agent, for amending water will be 50 percent polyoxyethylene polyglycol ester and 50 percent polyoxyethylene ether, or equivalent, at a concentration of one (1) ounce per five (5) gallons of water.

2.6 ENCAPSULATING SEALER

- A. Shall be a penetrating or bridging type, pollution-free, non-toxic, with a Class A fire classification as specified herein. Encapsulants with the ingredient Methylene Chloride are not acceptable unless the contractor can prove to the Owner's satisfaction that equal substitute materials are not available. If substitutes are not used, the Contractor shall submit with the Asbestos Plan, for Owner approval, respiratory protection and negative air discharge procedures to protect workers, authorized personnel and the public from Methylene Chloride exposure. Material shall be flexible when cured, resistant to weathering, oxidation, aging and abuse. Approved manufacturer for encapsulation of spray-applied or trowel-applied materials includes American Coatings, Niles, Illinois, (800) 323-7580. No substitutions will be considered. Approved manufacturers for all other encapsulation work include American Coatings, HB Fuller Company - Fosters Product Division, (713) 926-3125, or equal.
- B. Shall be a water-dispensed coating, insoluble in water when cured.
- C. Shall be used undiluted.
- D. Shall have a written certification from the manufacturer that the encapsulant is compatible with the replacement material and will safely withstand temperatures of all surfaces on which the encapsulation will be applied.
- E. The Owner's Representative may at any time take random samples of encapsulant from open containers or spray equipment for testing to ensure product quality and compliance with the Specifications.
- F. Encapsulant found not to be in conformance with requirements of these Specifications shall be removed from the site immediately. All areas where the defective encapsulant has been applied shall be re-sprayed with approved encapsulant or remedied in a manner, including the possibility of removal and replacement of the subject Asbestos-Containing Material, acceptable to the Owner. Re-encapsulation expense shall be borne by the Contractor.
- G. Encapsulant to be applied to structural members before reapplication of spray-applied or trowel-applied fireproofing must be a component of the fireproofing system when it was tested and rated by the underwriters laboratory (UL), ASTM, Factory Mutual (FM) or other building code approved testing agencies.

2.7 LAGGING ADHESIVE

- A. Shall meet NFPA 90A Code, such as Arabol, Childers CP52, Insul-Coustic 102, or approved equal.

2.8 GLOVEBAGS

- A. The glove-bag (typically constructed of six [6] mil transparent regulated plastic) has two (2) inward-projecting long-sleeve rubber gloves, one (1) inward-projecting water-wand sleeve, an internal tool pouch, and an attached labeled receptacle for Asbestos Waste.

2.9 TOOLS AND EQUIPMENT

- A. Provide suitable tools for Asbestos removal and encapsulation.
- B. Negative air pressure equipment: HEPA filtration systems shall have filtration equipment in compliance with ANSI Z9.2-1979, local exhaust ventilation. No air movement system or air filtering equipment shall discharge unfiltered air outside the Work Area.

- C. Manometer:
 - 1. Shall have a built-in alarm. Continuous hard copy readout is optional.
- D. HEPA Vacuums:
 - 1. Shall comply with ANSI Z9.2-1979.
- E. Vacuum Loaders:
 - 1. Shall have HEPA filtration system in compliance with ANSI Z9.2-1979.
 - 2. Meets or exceeds OSHA, DOSH and EPA safety regulations.
 - 3. Fully-enclosed negative pressure system.

2.10 LUMBER

- A. Shall be flame retardant and carrying markings certifying such properties.

2.11 SOLVENTS

- A. Shall be non-toxic, non-carcinogenic, nonflammable (flash-point in excess of 200° F.), non-reactive with or damaging to materials it will come in contact with and approved for indoor use by regulatory agencies. Provide ventilation of Work Area as required by manufacturer. Vent exhaust to the exterior of the building and in a manner that will not result in adverse affects to other areas of the facility, adjacent facilities or public areas. Solvents shall not be used in areas which food stuffs are stored.

PART 3 – EXECUTION

3.0 WORKER PROTECTION

- A. Worker protection procedures – to be posted in clean room:
 - 1. Bilingual (English and other appropriate language[s]) Worker Protection Procedures must be posted in the Clean Room. If the first language of all Workers is English, the bilingual procedures are excepted.
 - 2. Each Worker and Authorized Visitor shall, upon entering the job site: remove street clothes in the Clean Room and put on a respirator and clean protective clothing before entering the Equipment Room or the Work Area.
 - 3. All Workers shall, each time they leave the Work Area: remove gross contamination from clothing before leaving the Work Area; proceed to the Equipment Room and remove all clothing except respirators; still wearing the respirator, proceed naked to the showers; clean the outside of the respirator with soap and water while showering; remove the respirator; thoroughly shampoo and wash themselves.
 - 4. Following showering and drying off, each Worker shall proceed directly to the Clean Room and dress in their personal clothing. Before reentering the Work Area, each Worker and Authorized Visitor shall put on a clean respirator and shall dress in clean protective clothing.
 - 5. Contaminated protective clothing and work footwear shall be stored in the Equipment Room when not in use in the Work Area. At appropriate times or upon completion of Asbestos Abatement, dispose of protective clothing and footwear as contaminated waste, or launder in accordance with government regulations.

6. Workers removing waste containers from the Equipment Decontamination Enclosure shall enter the Holding Area from outside wearing a respirator and dressed in clean disposable coveralls. No Worker shall use this system as a means to leave or enter the Washroom or the Work Area.
7. The disposable clothing worn outside the Work Area shall be of different color or markings from the disposable clothing worn inside the Work Area.
8. Workers shall not eat, drink, smoke, or chew gum or tobacco while in the Work Area.
9. Workers and Authorized Visitors with beards or who are unshaven shall not enter the Work Area.

B. Medical Examinations and Histories

1. Before exposure to airborne Asbestos, the Contractor will provide each employee providing labor or professional services at the Project site with a current comprehensive medical exam, including a history of respiratory and gastrointestinal diseases, meeting the general definition outlined in 29 CFR 1910.1001, 29 CFR 1910.134, and 29 CFR 1926.1101 and CCR Title 8 Section 1529. Contractor shall submit the signed original "Certificate of Medical Compliance" form provided in these Contract documents as proof of compliance with regulatory medical requirements. In lieu of the above form, a current Medical Examination report will be accepted. The medical report shall contain a statement from the examining physician that the employee can (or cannot) function normally wearing a respirator or that the safety or health of the employee or other employees will or will not be impaired by his use of a respirator. Submission of medicals or completed Certificates of Medical Compliance is not required when local jurisdictions (New York City, Massachusetts, etc.) require proof of current medical examination before issuance or renewal of Asbestos Worker Certificates. No employee will be allowed to enter the Work Area without having first provided the completed Certificate of Medical Compliance form, or a copy of their Medical Examination, to the Owner's Representative and until the submitted form or medical has been approved by the Observation Service. Local medical requirements shall apply if they are more stringent.

C. Employee Identification

1. The Contractor shall furnish an employee roster to the Owner's Representative for each work shift. Each employee entering the Work Area shall have in his possession a plastic-coated identification tag with the employee's photograph, name, age, height, weight, and eye color. Each employee shall bring to the job at least two forms of identification, one of which has his/her photograph.

3.1 WORK AREA PREPARATION

- A. Preparation procedures for removal of thermal system insulation (TSI), surfacing materials and other friable materials:
 1. Removal of friable ACM, unless specified otherwise, shall be executed in a **"Contained" Work Area**.
 2. Contractor shall isolate the Work Area for the duration of the Project, completely sealing all openings including, but not limited to, heating, ventilation and air

conditioning (HVAC) ducts, diffusers and grilles, skylights, doorways, and windows, with six (6) mil polyethylene taped securely to a clean surface. Spray adhesive, used on finished surfaces, should be avoided where possible. Particular attention shall be paid to the sealing of cracks in the field area of the floor deck, openings along the perimeter of the floor, openings at floor/wall intersection adjacent to stairwell, elevator and utility shafts and any other openings in the floor in general that would provide an avenue for water migration to occupied areas below. Construct barriers that enclose or separate Work Areas with wood or metal framing members and sheathed with 3/8-inch minimum plywood, or as required by Owner. Barriers shall form a seal at vertical walls and at the floor deck above and below. Particular attention shall be paid to providing the appropriate seal at the floor deck above without causing unnecessary disturbance to the Asbestos-Containing fireproofing, acoustical materials or other ACM.

3. HVAC systems shall be shut down. Contractor shall design his Work Area preparation and engineering controls as specified and/or as required to prevent damage to and contamination of the affected HVAC system.
4. Contractor shall remove all movable Objects from the Work Area that are vulnerable to damage or contamination, or that will impede or prevent the completion of the Work. All movable Objects removed from the Work Area shall be clean before being moved to the designated storage area.
5. Clean and cover Fixed and Movable Objects that can remain in the Work Area with six (6) mil polyethylene sheeting taped securely in place. Special precautions shall be taken to protect Fixed Objects vulnerable to damage or contamination.
6. All Fixed and Movable Objects requiring cleaning shall be washed with amended water or cleaned with a HEPA filtered vacuum.
7. All objects removed shall be adequately marked and charted on a plan to ensure proper reinstallation upon completion of the decontamination of the Work Area. The objects shall be stored in a location designated by the Owner, and in a manner that will prevent contamination or damage to the objects. Damaged and missing objects will be replaced by the Contractor at his own expense and to the satisfaction of the Owner.
8. Seal and protect all light fixtures, computer systems, communication systems, lighted exit signs and other electrical items, etc., that will remain within the Work Area, with six (6) mil polyethylene, taped securely. The polyethylene cover shall be kept away from heat-generating electrical devices where fire or damage to the device is possible. Light fixtures and all other electrical items shall be thoroughly cleaned before covering. Make waterproof all electrical conduit connections and other electrical devices that will be exposed to moisture.
9. After Work Area abatement but prior to clearance testing, if Owner directs, the Contractor shall remove heating, ventilation and air conditioning system filters, and pack them in protective six (6) mil polyethylene sheeting for burial in the approved Waste Disposal Facility. Installation of new filters upon completion of all work by the Contractor.
10. After Work Area abatement but prior to clearance testing the air handling and duct system shall be cleaned, if required by Owner. The Contractor shall possess the necessary skills or shall retain the services of a professional company that is experienced in the decontamination of air handling and duct systems.
11. Clean the proposed Work Areas before plasticizing floors and walls, using HEPA vacuum equipment or wet-cleaning methods, as appropriate. Do not use methods

that raise dust, such as dry sweeping or vacuuming with equipment not equipped with HEPA filters.

12. Work Area (Containment): Contractor shall cover entire floor with a minimum of two (2) six (6) mil protective coverings. Cover wall and column surfaces with a minimum of two (2) four (4) mil protective coverings. Floor coverings shall extend a minimum of 12" up vertical surfaces and behind wall covers. All seams shall be staggered and securely taped.
 - a. If required by Owner, Contractor shall cover entire floor with a heavy duty tarpaulin (reinforced polyethylene) followed by three (3) layers of six (6) mil protective coverings and a single ten mil protective floater sheet. Cover walls and columns with three (3) four (4) mil protective covering. Floor coverings shall extend a minimum of 12" up vertical surfaces and behind wall coverings. All seams shall be staggered, adhesive sprayed and securely taped.
13. Install 2' x 2' plexiglass observation window(s) at strategic location(s) in the "Containment" barrier to allow observation of work from outside the Work Area. Do not install observation windows at locations accessible to building occupants or the public.
14. Seal all wall, plumbing, duct and other cavities to prevent Asbestos materials from falling into such cavities during the Work.
15. The Contractor shall check regularly (at beginning, middle and end of each shift as a minimum) all polyethylene isolation and containment (protective) barriers for punctures, loose seals, and contact with heat-generating devices, etc. Problem areas shall be repaired or mended immediately.
16. Maintain existing emergency exits from the building. Maintain a minimum of two (2) exits from Work Areas where possible. The first exit shall be the Worker the Decontamination Enclosure System. The second exit may be the Equipment Decontamination Enclosure System or a ripcord type, emergency only exit in the plastic containment at a door, window or other appropriate location. Exits, where possible, shall be on opposite ends of the Work Area. All exits shall be labeled in bright letters or signage. The second exit shall be labeled "Emergency Exit Only." Establish alternative exits satisfactory to fire officials where existing building or Work Area emergency exits are unavoidably blocked by activities of this project.
17. Provide and maintain appropriate fire extinguisher inside and outside the Work Area. [One 30-pound type "ABC" fire extinguisher is required for each 2,000 sq. ft. of floor area.]
18. Install and maintain temporary emergency exit lighting with battery backup power in all Work Areas. Work Areas with natural lighting, and no night work to be performed, are exempt from this requirement.
19. Shutdown of electric power during the wet removal or encapsulation phase of the Project is mandatory unless directed otherwise. Provide temporary power and lighting when necessary, and ensure safe installation of temporary power sources and equipment per applicable electrical code requirements including appropriate Ground Fault protection. Temporary light fixtures will be explosion proof. Provide and maintain auxiliary diesel generator equipment where existing facility power is insufficient. Locate generator or vent generator exhaust in a manner that will prevent carbon monoxide hazards to workers and the public. When power shutdown is required, the Contractor shall check for conditions where shutdown will pose a danger to the building or to the building's components. Contractor shall

take all precautions necessary, including inspections and testing, to ensure the safety of his employees and other building occupants from electrical hazards during the course of the Project. Existing fire, smoke detection and other life safety systems shall be kept in operation at all times, or, the Contractor shall install and maintain a temporary system or alternate acceptable to the Owner and fire officials.

20. The Contractor shall install and maintain Negative Air Pressure Equipment during the abatement and decontamination phases of the Project until the Clearance Test has passed. In unoccupied facilities a sufficient amount of air shall be exhausted by the unit(s) to create a pressure of -0.02 inches of water within the Work Area with respect to the area outside the Work Area. The negative pressure for occupied facilities shall be -0.02 inches of water. If only one unit is necessary to provide the specified negative air pressure in a Work Area, the Contractor shall have a backup unit in place should the first unit fail, and for filter changes. [Install and maintain emergency self-starting diesel generator back-up power for negative pressure equipment in the event of power loss in the facility. Locate generator or vent generator exhaust in a manner that will prevent carbon monoxide hazards to workers and the public. When more than one negative air pressure unit is required, emergency power back-up is required for only 50% of the units].
 21. Install and maintain a manometer from the time abatement begins until the Clearance Test has passed in Work Areas where adjacent areas are occupied by unprotected workers, other building users or the public and when dry removal methods are required to be employed due to restrictive project conditions. Report readings to the Observation Service at the start and end of each work shift.
 22. Notify the Observation Service twenty-four (24) hours in advance of when preparatory steps will be completed. Asbestos Abatement Work shall not commence until: all preparation requirements have been completed; all tools, equipment, and materials are on hand; all required submittals, notices and permits have been approved, and until the Observation Service authorizes in writing that Work may commence.
- B. Preparation Procedures for: The removal of resilient floor tile, resilient sheet flooring, flooring mastic and the removal of pipe insulation by the Glove-bag Method (when approved) and for minor or localized debris cleanup:
1. Above removal, repair and debris cleanup activities unless specified otherwise, shall be executed in an "Isolated" Work Area.
 2. Contractor shall isolate the Work Area for the duration of the Project, completely sealing all openings, including but not limited to, HVAC ducts, diffusers and grilles, skylights, doorways and windows, with six (6) mil polyethylene sheet plastic securely taped to a clean surface. Spray adhesive applied on finished surfaces should be avoided where possible. As an option to isolating an entire room or area, the Contractor may construct a single-layer six (6) mil polyethylene plastic sheet isolation barrier (Mini Containment) around pipe, equipment or debris being worked on or removed. Work Areas with permeable finishes and/or components, permanent fixtures, equipment, and school supplies will require the covering of such items with one layer of six (6) mil polyethylene plastic. In addition, when removing floor tile and/or floor tile mastic, a 4-foot high wainscot (splash-guard) shall be constructed around the Work Area and other items within the Work Area.
 3. Curtained Doorway: Contractor shall construct a Curtained Doorway of clear plastic sheeting, using six (6) mil polyethylene plastic, at entrances and exits to the Work Area. If the Mini Containment option is used, move the construction of the Curtained Doorway from the room entrance to the Mini Containment itself.

4. HVAC systems shall be shut down. If the air handling system cannot be shut down and there is an avenue for asbestos fibers generated during abatement work to enter into the air stream of the HVAC system, construct a single-layer six (6) mil polyethylene plastic barrier (Mini Containment) around the item(s) being abated. In addition contain/secure HVAC System when possible without interfering with service to areas outside the Work Area.
5. Shutdown of electric power during work unless directed otherwise is mandatory where electrical hazards are possible. Provide temporary power and lighting when necessary, and ensure safe installation of temporary sources and equipment per applicable electrical code requirements, including appropriate ground-fault protection. [Temporary light fixtures must be explosion proof]. Provide and maintain auxiliary diesel generator equipment where existing facility power is insufficient. Locate generator or vent generator exhaust in a manner that will prevent carbon monoxide hazards to workers and the public. When power shutdown is required, the Contractor shall check for conditions where shutdown will pose a danger to the building or to the building's contents. Contractor shall take all precautions necessary, including inspections and testing, to ensure the safety of his employees and other building occupants from electrical hazards during the course of the Project. Existing fire, smoke detection and other life safety systems shall be kept in operation at all times or, the Contractor shall install and maintain a temporary system or alternative acceptable to the Owner and fire officials.
6. The Contractor shall check regularly (at the beginning, middle and end of each shift as a minimum) all polyethylene isolation barriers for punctures, loose seals, and contact with heat-generating devices, etc. Problem areas shall be repaired or mended immediately.
7. The Contractor shall install and maintain Negative Air Pressure Equipment during the abatement and decontamination phases of the Project until the Clearance Test has passed. In unoccupied facilities a sufficient amount of air shall be exhausted by the unit(s) to create a pressure of -0.02 inches of a column of water within the Work Area in respect to the area outside the Work Area. If only one unit is necessary to provide the specified negative air pressure in a Work Area, the Contractor shall have a backup unit in place should the first unit fail and for filter changes. When the "Mini Containment" option is utilized the Contractor may substitute a HEPA vacuum to create the specified negative air pressure within the Work Area when standard Negative Air Pressure Equipment volumes are too great. [Install and maintain emergency self-starting diesel generator backup power for negative pressure equipment in the event of power loss in the facility. Locate generator or vent generator exhaust in a manner that will prevent carbon monoxide hazards to workers and the public. When more than one negative air pressure unit is required emergency power back -up is required only for 50% of the units.]
8. Maintain existing emergency exits from the building. Maintain a minimum of two (2) exits from the Work Area where possible. The first exit shall be the Worker Decontamination Enclosure system. The second exit, when possible, shall be a second door, window, or other appropriate opening with a rip cord emergency only exit seal. Exits, where possible, shall be on opposite ends of the Work Area. All exits shall be labeled in bright letters or signage. The second exit shall be labeled "Emergency Exit Only." Establish alternative exits satisfactory to fire officials when existing building Work Area emergency exits are unavoidably blocked by activities of this project.

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9. Provide and maintain appropriate "ABC" type fire extinguishers in the Work Area. The size and number of extinguishers shall be as required by local fire officials, but shall not be less than one (1) fire extinguisher inside and outside the Work Area.
 10. Provide temporary emergency lighting with battery backup power in all Work Areas where none exists. Work Areas with natural lighting, and no night work to be performed, are exempt from this requirement.
 11. Notify the Observation Service twenty-four (24) hours in advance of when preparatory steps will be completed. Asbestos Abatement Work shall not commence until: all preparation requirements have been completed; all tools, equipment, and materials are on hand; all required submittals, notices and permits have been approved, and until the Observation Service authorizes in writing that Work is to commence.
- C. Preparation procedures for removal of non-friable Asbestos-Containing roofing materials.
1. Above removal and debris cleanup activities unless specified otherwise, shall be executed in a "Regulated" Work Area.
 2. Contractor shall prepare the Work Area for the duration of the Project, completely sealing all openings, including but not limited to, HVAC intake and exhausts, skylights, doorways and windows, vents, and pipe vents with six (6) mil polyethylene sheet plastic securely taped to a clean surface. The preparation of the Work Area for the roof shall also prevent roofing debris from falling into the site building. Roofing debris falling into ceiling cavities shall be removed and ceiling cavities cleaned, immediately. Spray adhesive applied on finished surfaces should be avoided where possible.
 3. HVAC systems shall be shut down. If the air handling system cannot be shut down and there is an avenue for asbestos fibers generated during abatement work to enter into the air stream of the HVAC system, construct a single-layer six (6) mil polyethylene plastic barrier (Mini Containment) around the item(s) being abated. In addition contain/secure HVAC System when possible without interfering with service to areas outside the Work Area.
 4. The Contractor shall check regularly (at the beginning, middle and end of each shift as a minimum) all polyethylene isolation barriers for punctures, loose seals, contact with heat-generating devices, etc. Problem areas shall be repaired or mended immediately.
 5. Provide temporary lighting in Work Areas when required to perform work with limited lighting, such as night work.
- D. Preparation procedures for removal of non-friable Asbestos-Containing Transite materials (in good condition).
1. No Work Area preparation required.
- 3.2 DECONTAMINATION ENCLOSURE SYSTEMS
- A. Decontamination Enclosure Systems (Worker and Equipment) general requirements:
1. Build suitable wood, metal or Polyvinyl Chloride (PVC) framing as described herein and as approved by the Observation Service at the shop drawing submittal stage. [Framed walls susceptible to damage or which also form a security barrier between Work Areas and public areas shall be sheathed with 3/8" min. plywood. Paint

public facing side of plywood (color to be selected by Owner)]. Portable prefabricated units, if utilized, must be submitted for review and approval by the Observation Service before start of construction. Submittal shall include, but not be limited to, a floor plan layout complying with the schematic layouts bound herein, showing dimensions, materials, sizes, thickness, plumbing, and electrical outlets, etc.

B. Decontamination Enclosure System for asbestos abatement work in "Contained" Work Areas:

1. Construct a Workers' Decontamination Enclosure System contiguous to the Work Area consisting of three totally enclosed chambers to conform with standard drawings bound herein as follows:
 - a. An Equipment Room with an Air Lock to the Work Area and a Curtained Doorway to the Shower Room.
 - b. A Shower Room with two Curtained Doorways, one to the Equipment Room and one to the Clean Room. Plastic on Shower Room and adjoining Equipment and Clean Rooms shall be opaque. The Shower Room shall contain at least one shower with hot and cold or warm water. Careful attention shall be paid to the shower enclosure to ensure against leaking of any kind. Trap shower waste using filters having a maximum pore size of 1.0 micron, and drain into a sanitary sewer. Replace filters when they become clogged. Ensure a supply of soap and disposable towels at all times in the Shower Room.
 - c. A Clean Room with one Curtained Doorway into the shower and one entrance or exit to non-contaminated areas of the building. The Clean Room shall have sufficient space for storage of the Workers' street clothes, towels, and other non-contaminated items. Joint use of this space for other functions, such as offices, storage of equipment, materials, or tools, shall be prohibited.
2. Construct an Equipment Decontamination Enclosure System consisting of two totally enclosed chambers as follows:
 - a. A Washroom with an Air Lock to a designated staging area of the Work Area and a Curtained Doorway to the Holding Room.
 - b. A Holding Room with a Curtained Doorway to the Washroom and a doorway to an uncontaminated area.

C. Decontamination Enclosure System for asbestos-abatement work in "Isolated" Work Areas:

1. Construct a Decontamination Enclosure System consisting of two totally enclosed chambers, as follows:
 - a. An Equipment Room, consisting of a Curtained Doorway to the Isolated Work Area and a Curtained Doorway to the Shower Room.
 - b. A Shower Room, consisting of a Curtained Doorway to the Equipment Room and a Curtained Doorway to an uncontaminated area. Plastic on Shower Room and adjoining Equipment and Clean Rooms shall be opaque. The Shower Room shall contain at least one shower with hot and cold or warm water. Careful attention shall be paid to the shower enclosure to ensure against leaking of any kind. Trap shower waste using

filters having a maximum pore size of 1.0 micron, and drain into a sanitary sewer. Replace filters when they become clogged. Ensure a supply of soap and disposable towels at all times in the Shower Room.

2. Construction of an Equipment Decontamination Enclosure System is optional.
 - a. A Washroom with an Air Lock to a designated staging area of the Work Area and a Curtained Doorway to the Holding Room.
 - b. A Holding Room with a Curtained Doorway to the Washroom and a doorway to an uncontaminated area.
- D. Decontamination Enclosure System for encapsulation of spray-applied or trowel-applied materials:
 1. Construct a Decontamination Enclosure System (Worker and Equipment) in accordance with Article 4.2.B.
- E. Decontamination Enclosure System for non-friable Asbestos-Containing materials:
 1. None required. However, workers shall wash exposed portion of the body with soap and water each time they leave the Work Area.
- F. Movable Decontamination Enclosure Unit for ceiling panel removal and ceiling debris removal:
 1. A Movable Decontamination Enclosure Unit shall be erected for the ceiling panel removal and ceiling debris removal work. The enclosure shall be of a scaffold frame type on locked casters with six (6) mil polyethylene sheeting at floor and all four sides, one side to serve as a Curtained Doorway with a double-layer polyethylene sheeting. (See standard drawing). Construction of enclosure to comply with EPA, OSHA, DOSH and local regulatory requirements. Install and operate negative air equipment connected to or within the unit. Negative pressure within the enclosure shall be sufficient to create a high flow of air into the top of the enclosure.
 - a. Build suitable framing as described herein and as approved by the Observation Service at the shop drawing submittal stage. Portable prefab units, if utilized, must be submitted for review and approved by the Observation Service before start of construction. Submittal shall include, but not be limited to, a floor plan layout complying with the schematic layouts bound herein, showing dimension, materials, size, thickness, plumbing, and electrical outlets, etc.

3.3 ASBESTOS REMOVAL

- A. Before removal, Asbestos materials shall be sprayed with Amended Water. The Asbestos materials shall be sufficiently saturated without causing excessive dripping and to prevent emission of airborne fibers, at any time, in excess of Maximum Acceptable Level. Spray materials repeatedly during the work process to maintain a wet condition. If the materials are not easily saturated, then the Work Area shall be constantly misted to keep fiber emission minimal.
- B. Asbestos material shall be removed in manageable sections by a multi-person team, some of whom are wetting and the remainder removing and cleaning. Any material which falls

to the floor shall be wetted and picked up immediately. Material shall not be allowed to dry out. Material drop shall not exceed 15 feet. For heights up to 50 feet, provide inclined chutes or scaffolding to intercept drop. For heights exceeding 50 feet, provide enclosed dust-proof chutes. Before a second area can be started, removed material shall be packed into approved and labeled packaging while it is still wet. The outside of all containers shall be clean before leaving the Work Area. Move containers to the Washroom (Shower Room when Equipment Decontamination System is not required), wet-clean each container thoroughly, and move to Holding Area pending removal to uncontaminated areas.

- C. Asbestos material applied to concrete, steel decks, beams, columns, pipes, tanks, and other nonporous surfaces shall be wet-cleaned to a degree that no traces of debris or residue are visible.
- D. Asbestos material debris, drippings, splatters, and overspray on surfaces within accessible ceiling cavities and other accessible areas shall be removed in the same manner and cleaned to the degree as specified above.
- E. The Work Area shall be kept orderly, clean and clear of work materials, polyethylene sheeting, tape, cleaning material, and clothing, and all other disposable material or items used in the Work Area shall be packed into properly labeled protective packaging and removed from the Work Area.
- F. Protective packages and drums containing Asbestos materials shall be cleaned and stored in the isolated Holding Area until that time when the materials are to be loaded and hauled to the Hazardous Waste Disposal Facility for burial. The packages and drums shall be stored in piles no higher than four (4) feet, and in a manner that will not result in damage to the packages or drums. Transport bags in covered drums or carts from the Holding Area to the transport.
- G. Equipment removal procedures: Clean surfaces of contaminated equipment thoroughly by wet-sponging or wiping before moving such items into the Washroom (Shower Room when Equipment Decontamination System is not required) for final cleaning and removal to uncontaminated areas. Ensure that personnel do not leave Work Area through the Equipment Decontamination Enclosure.
- H. Do not bag water used during abatement activities. Properly filter and drain water into building sanitary drain unless prohibited by local regulations. Filter shall have a maximum pore size of 1.0 micron.
- I. Friable materials:
 - 1. TSI, Wallboard and Insulated Wire:
 - a. Remove TSI, wallboard and insulated wire materials with wet methods and in a manner that will not create exposures above the PEL. Do not use saws or other such mechanical equipment. Adequately wet the TSI materials before, during and after removal.
 - b. The Work Area shall be kept orderly, clean and clear of work materials.
 - c. Package TSI, wallboard and insulated wire materials in labeled double six (6) mil lined containers or bags, or in accordance with the disposal facility's requirements.
 - 2. Ceiling Tiles:
 - a. Remove ceiling tiles with wet methods and in a manner that will keep the material substantially intact. Do not use saws or other such mechanical equipment. Adequately wet the ceiling tiles before, during and after removal.

- b. The Work Area shall be kept orderly, clean and clear of work materials.
 - c. Package ceiling tiles in labeled double six (6) mil lined containers or bags, or in accordance with the disposal facility's requirements.
 - J. Non-friable materials:
 - 1. Roofing Materials:
 - a. Use removal methods that will keep the tearing and fraying of the roof membrane to a minimum. If sawing tools are used, they must be factory equipped with HEPA filtering devices, or perform in a manner that will not release visible dust emissions. Roofing debris made friable shall be misted with an asphalt re-saturant before transportation to dumpsters. Do not use water. Do not use excessive amounts of re-saturant that may result in leakage into the building. Apply additional re-saturant, if necessary when the roofing debris is in the dumpster. Install, when possible, a protective tarp under the Work Area or dumpster where re-saturant leakage may result in property damage.
 - b. Off-load roofing debris into dumpster by means of chutes. Use dust control methods as required to hold dust generation to a minimum.
 - c. Roofing shall be removed so that no felts are visible. Asphalt bitumen residue need not be removed from the substrate unless directed otherwise in the Contract Documents.
 - d. Have adequate material on hand and available labor to protect exposed roof areas from water intrusion during inclement weather.
 - e. Do not commence with removal work if inclement weather is probable. NOTE: Contractor shall be responsible for water damage as the result of the Contractor's work or failure to perform work. [Contractor shall be responsible for maintaining the abated portions of the roof free from moisture intrusion for seven (7) calendar days following the written notice of completion, or until the roofing contractor has been given Notice to Proceed by the Owner, whichever comes first].
 - f. The Work Area shall be kept orderly, clean and clear of work materials.
 - g. Package roofing materials in labeled double six (6) mil lined containers or bags, or in with the disposal facilities requirements.
 - 2. Floor Tile, Floor Tile Mastic and Carpet Adhesive:
 - a. Remove floor tile and mastic and carpet adhesive with wet methods and in a manner that will not create friable debris. Do not use chipper, bead blasters, buffers or other such mechanical equipment. Use hand tools and manual removal methods. Remove tile and mastic and carpet adhesive until no residue is visible other than that which is embedded in the pores, cracks, or other voids below the surface of the floor substrate.
 - b. The Work Area shall be kept orderly, clean and clear of work materials.
 - c. Package floor tile and mastic in labeled double six (6) mil lined containers or bags, or in accordance with the disposal facilities requirements.
 - 3. Window Glazing and Transite Material:
 - a. Remove window glazing and Transite materials with wet methods and in a manner that will not create friable debris. Do not use saws or other such mechanical equipment.

- b. The Work Area shall be kept orderly, clean and clear of work materials.
- c. Package window glazing and Transite materials in labeled double six (6) mil lined containers or bags, or in accordance with the disposal facility's requirements.

3.4 DECONTAMINATION OF WORK AREA

- A. Decontaminated procedures for "Contained" Work Areas, excluding Asbestos-Containing Material encapsulation work:
 - 1. Remove all visible accumulations of Asbestos material and debris. Wet-clean all surfaces within the Work Area to remove Asbestos residue.
 - 2. After cleaning, the Contractor shall perform a complete visual inspection of the Work Area to ensure that the Work Area is free of any visible debris or residue.
 - 3. Upon completion of his visual inspection, the Contractor shall notify the Observation Service in advance that the Work Area is ready for Initial Review.
 - 4. Upon proper notification, the Observation Service will review the Work Area for general conformance with the Specifications. Any nonconformance of the Work shall be remedied by the Contractor until the Work Area is in compliance, and at the Contractor's expense.
 - 5. Upon successful compliance with the Initial Review by the Observation Service and after written notification, the Contractor shall encapsulate surfaces where Asbestos materials have been removed. Unless specified otherwise encapsulate those portions of the items where the Asbestos-Containing material was missing prior to the start of this Contract. All surfaces within ceiling and other accessible cavities where spray-applied or trowel-applied materials have been removed shall also be encapsulated. Apply encapsulant in sufficient amounts to render the affected surface tacky to the touch. The encapsulant shall be compatible with the existing substrate and replacement materials and shall be rated to safely withstand the temperature of the items to which it will be applied. Encapsulants to be applied to structural members prior to reapplication of spray-applied or trowel-applied fireproofing must be a component of the fireproofing system when it was tested and rated by the UL, ASTM, FM or other building code approved testing agencies.
 - 6. Upon completion of the Encapsulation Work, the Contractor shall notify the Observation Service in advance that the encapsulated surfaces are ready for Encapsulation Review.
 - 7. Upon proper notification, the Observation Service will review the encapsulated surfaces for general conformance with the Specifications. Any nonconformance of the Work shall be remedied by the Contractor until the Work is in compliance and at the Contractor's expense.
 - 8. Upon successful compliance with the Encapsulation Review by the Observation Service and after written notification, the Contractor shall remove the outer layer of plastic on the walls, floors, and ceilings (where applicable). The inner plastic layer and isolation barriers on vents, grilles, diffusers, etc., shall remain in place.
 - 9. Wet-clean the Work Area, wait twenty-four (24) hours to allow for the settlement of dust, and again wet-clean, or clean with HEPA vacuum equipment, all surfaces within the Work Area. After completing of the second cleaning operation the Contractor shall perform a complete visual inspection of the Work Area to ensure that the Work Area is free of contamination.

10. Sealed drums and bags, and all equipment used in the Work Area, shall be included in the cleanup and shall be removed from the Work Area via the Equipment Decontamination Enclosure System, at the appropriate time in the cleaning sequence.
11. Upon completion of the second cleaning operation, the Contractor shall notify the Observation Service twenty-four (24) hours in advance that the Work Area is ready for Pretesting Review and Clearance Testing. Refer to appropriate Article on Air Monitoring in this Section for Clearance Testing standards. Contamination found during the Pre-testing Review shall be remedied by the Contractor, at his expense, prior to clearance testing.
12. Upon written notification from the Observation Service that the Work Area has passed the standard for Clearance Testing, the Contractor shall apply, when included in the Contract, the Asbestos-free replacement materials and re-establish objects and systems as specified in these specifications. The inner plastic layer and isolation barriers may be removed by the Contractor at any time after written notification.
13. Upon completion of the application of replacement materials, or if no replacement materials are required, after the removal of the inner plastic layer, isolation barriers and the re-establishment of objects and systems the Contractor shall notify the Observation Service and/or Owner's Representative twenty-four (24) hours in advance that the Work Area is ready for Pre-final Review.
14. Upon notification, the Observation Service and Owner's Representative will review the Work Area. Improper application of replacement materials, unapproved damage to the facility or its contents, or improper re-establishment of objects and systems discovered during the Pre-final Review shall be itemized on a Punch List for correction by the Contractor at his expense. If no deficiencies are discovered the Contract or this portion of the Contract shall be approved in writing by the Observation Service and Owner's Representative as complete. If deficiencies are noted, continue with the subsequent procedures. NOTE: If deficiencies noted do not prevent the Owner from occupancy or proceeding with reconstruction work, the Contract, or this portion of the Contract, shall be specified in writing by the Observation Service and the Owner's Representative Substantially Complete.
15. Upon correction of Punch List deficiencies the Contractor shall notify the Observation Service and Owner's Representative in advance that the Work Area is ready for Final Review.
16. Upon notification the Observation Service and Owner's Representative will review the corrected Punch List deficiencies. If all deficiencies have been corrected, the Contract, or this portion of the Contract, shall be approved in writing by the Observation Service and Owner's Representative as complete. If deficiencies have not been properly corrected the Contractor shall repeat, at his expense, procedures 15 and 16 until all deficiencies have been corrected and approved. NOTE: If deficiencies noted do not prevent the Owner from occupancy or proceeding with reconstruction work, the Contract or this portion of the Contract shall be specified in writing by the Observation Service and the Owner's Representative Substantially Complete.

B. Decontamination procedures for "Isolated" Work Areas:

1. Contractor shall perform a complete visual inspection of the Work Area to ensure that the Work Area is free of any contamination.

2. If any evidence of Asbestos material or debris is encountered, the Contractor shall remove the contaminants and shall wet-clean all surfaces within the Work Area to remove Asbestos residue.
3. Sealed drums and bags, and all equipment used in the Work Area, shall be included in the cleanup and shall be removed from the Work Area at the appropriate time in the cleaning sequence.
4. Upon completion of his visual inspection and any necessary cleaning, the Contractor shall notify the Observation Service in advance that the Work Area is ready for Initial Review.
5. Upon proper notification, the Observation Service will review the Work Area for general conformance with the Specifications. Any nonconformance of the Work shall be remedied by the Contractor until the Work Area is in compliance, and at the Contractor's expense.
6. Upon successful compliance with the Initial Review of the Observation Service and after written notification, the Contractor shall encapsulate surfaces where Asbestos-Containing Materials were removed. Unless specified otherwise, encapsulate those portions of the items where the Asbestos-Containing Material was missing prior to the start of this Contract. Apply encapsulant in sufficient amounts to render the affected surface tacky to the touch. The encapsulant shall be compatible with the existing substrate and replacement materials and shall be rated to safely withstand the temperatures of the surface to which it will be applied. Do not encapsulate substrates from which resilient flooring (tile or sheets), flooring mastic, or roofing materials have been removed. Encapsulants to be applied to structural members, prior to reapplication of spray-applied or trowel-applied fireproofing, must be a component of the fireproofing system when it was tested and rated by the UL, ASTM, FM or other building code approved testing agencies.
7. Upon completion of the Encapsulation Work, the Contractor shall notify the Observation Service twenty-four (24) hours in advance that the encapsulated surfaces are ready for Encapsulation Review and Clearance Testing.
8. Upon proper notification, the Observation Service will review the encapsulated surfaces for general conformance with the Specifications. Any nonconformance of the Work shall be remedied by the Contractor until the Work is in compliance, and at the Contractor's expense.
9. Upon successful compliance with the Encapsulation Review of the Observation Service, the Work Area is ready for Clearance Testing. Refer to the appropriate Article on Air Monitoring in this Section for Clearance Testing standards.
10. Upon written notification from the Observation Service that the Work Area has passed the standard for Clearance Testing, the Contractor shall, when included in the Contract, apply Asbestos-free replacement materials and re-establish objects and systems as specified in these Specifications. The isolation barriers may be removed by the Contractor at any time after the written notification.
11. Upon completion of the application of replacement material, or if no replacement materials are required, after the removal of the isolation barriers and the re-establishment of objects and systems, the Contractor shall notify the Observation Service and Owner's Representative twenty-four (24) hours in advance that the Work Area is ready for Pre-final Review.
12. Upon notification, the Observation Service and Owner's Representative will review the Work Area. Improper application of replacement materials, unapproved damage to the facility or its contents or improper re-establishment of objects and

systems discovered during the Pre-final Review shall be itemized on a Punch List for correction by the Contractor at his expense. If no deficiencies are discovered, the Contract, or this portion of the Contract, shall be approved in writing by the Observation Service and Owner's Representative as complete. If deficiencies are noted continue with the subsequent procedures. NOTE: If deficiencies noted do not prevent the Owner from occupancy or proceeding with reconstruction work, the Contract, or this portion of the Contract, shall be specified in writing by the Observation Service and the Owner's Representative Substantially Complete.

13. Upon correction of the Punch Lists deficiencies, the Contractor shall notify the Observation Service and Owner's Representative in advance that Work Area is ready for Final Review.
14. Upon notification, the Observation Service and the Owner's Representative will review the corrected Punch List deficiencies. If all deficiencies have been corrected to the satisfaction of the Observation Service and the Owner's Representative, the Contract or this portion of the Contract, shall be approved in writing by the Observation Service and Owner's Representative as completed. If deficiencies have not been properly corrected the Contractor shall repeat, at his expense, procedures 13 and 14 until all deficiencies have been corrected and approved. NOTE: If deficiencies noted do not prevent the Owner from occupancy or proceeding with reconstruction work, the Contract, or this portion of the Contract, shall be specified in writing by the Observation Service and the Owner's Representative Substantially Complete.

C. Decontamination procedures for encapsulation of spray-applied, trowel-applied or other friable materials in a "Contained" Work Area:

1. Upon completion of the Encapsulation Work, the Contractor shall notify the Observation Service in advance that the encapsulated surfaces are ready for Encapsulation Review.
2. Upon proper notification, the Observation Service will review the encapsulated surfaces for general conformance with the Specifications. Any nonconformance of the Work shall be remedied by the Contractor until the Work is in compliance, and at the Contractor's expense.
3. Upon successful compliance with the Encapsulation Review by the Observation Service and after written notification, the Contractor shall remove all visible accumulations of Asbestos material debris, and wet-clean all surfaces within the Work Area to remove any Asbestos residue.
4. After cleaning, the Contractor shall perform a complete visual inspection of the Work Area to ensure that the Work Area is free of any debris or residue.
5. Upon completion of his visual inspection, the Contractor shall notify the Observation Service in advance that the Work Area is ready for Initial Review.
6. Upon successful compliance with the Observation Service's Initial Review, and after written notification, the Contractor shall remove the layer of plastic on the walls and floors. The isolation barriers on vents, grilles, diffuser, etc., shall remain in place.
7. After removal of the plastic covering, clean the Work Area, vacuuming with HEPA vacuum equipment all surfaces within the Work Area. After the completion of the cleaning operation, the Contractor shall perform a complete visual inspection of the Work Area to ensure that it is free of contamination.

8. Sealed drums and bags, and all equipment used in the Work Area shall be included in the cleanup, and shall be removed from the Work Area via the Equipment Decontamination Enclosure at the appropriate time in the cleaning sequence.
 9. Upon completion of the cleaning operation, the Contractor shall notify the Observation Service twenty-four (24) hours in advance that the Work Area is ready for review and Clearance Testing. Refer to the appropriate Article on Air Monitoring in this Section for Clearance Testing standards.
 10. Upon written notification from the Observation Service that the Work Area has passed the standard for Clearance Testing, the Contractor shall remove the isolation barriers, proceed with the re-establishment of objects and systems and when included in the Contract, apply Asbestos-free replacement materials as specified in these Specifications.
 11. Upon completion of the application of replacement materials, or if no replacement materials are required, after the removal of isolation barriers and the re-establishment of objects and systems, the Contractor shall notify the Observation Service and Owner's Representative twenty-four (24) hours in advance that the Work Area is ready for Pre-final Review.
 12. Upon notification, the Observation Service and Owner's Representative will review the Work Area. Improper application of replacement materials or improper re-establishment of objects and systems, or unapproved damage to the facility or its contents, discovered during the Pre-final Review, shall be itemized on a Punch List for correction by the Contractor at his expense. If no deficiencies are discovered, the Contract, or this portion of the Contract, shall be approved in writing by the Observation Service and Owner's representative as complete. If deficiencies are noted continue with the subsequent procedures. NOTE: If deficiencies noted do not prevent the Owner from occupancy or proceeding with reconstruction work, the Contract, or this portion of the Contract, shall be specified in writing by the Observation Service and the Owner's Representative Substantially Complete.
 13. Upon correction of the Punch List deficiencies, the Contractor shall notify the Observation Service and the Owner's Representative in advance that the Work Area is ready for Final Review.
 14. Upon notification, the Observation Service and the Owner's Representative will review the corrected Punch List deficiencies. If all deficiencies have been corrected, the Contract, or this portion of the Contract, shall be approved in writing by the Observation Service and Owner's representative as complete. If deficiencies have not been properly corrected, the Contractor shall repeat, at his expense, procedures 13 and 14 until all deficiencies have been corrected and approved. NOTE: If deficiencies noted do not prevent the Owner from occupancy or proceeding with reconstruction work, the Contract, or this portion of the Contract, shall be specified in writing by the Observation Service and the Owner's Representative Substantially Complete.
- D. Decontamination procedures for ceiling panel removal in non-prepared Work Areas:
1. Set up movable decontamination enclosure unit under selected ceiling panels to be removed.
 2. Remove the panels carefully so that damage to the panels and resultant fiber generation will be kept to a minimum. Place panels in appropriately labeled protective packaging.

3. HEPA vacuum and wet wipe all surfaces of the suspension system including adjacent light fixtures, HVAC diffusers, and other components of the suspension system to remove debris.
4. After cleaning, the Contractor shall perform a complete visual inspection of the Work Area to ensure that the suspension system and other ceiling components are free of debris.
5. Upon completion of his inspection the Contractor shall notify the Observation Service in advance that the Work Area is ready for Initial Review.
6. Upon notification the Observation Service will review the Work Area for general conformance with the specifications. Any nonconformance of the work shall be remedied by the Contractor until the Work Area is in compliance, and at the Contractor's expense.
7. At the appropriate time after each work shift and after the cleaning operation is complete, the Contractor shall HEPA vacuum and wet wipe the movable decontamination enclosure system to remove all ceiling panel debris and residue prior to dismantling the unit. The Contractor shall obtain the review and approval of the Observation Service prior to dismantlement.
8. Upon successful compliance with the Observation Service's Initial Review the Observation Service shall perform Clearance Testing. Refer to the appropriate Article on Air Monitoring in this section for Clearance Testing standards.
9. Upon written notification from the Observation Service that the Work Area has passed the standard for Clearance Testing, the Contractor shall, when included in the Contract, install asbestos-free replacement panels and reestablish objects and systems as specified in these Specifications.
10. Upon completion of application of replacement materials, or if no replacement materials are required, after the re-establishment of objects and systems, the Contractor shall notify the Observation Service and Owner's Representative twenty-four (24) hours in advance that the Work Area is ready for Pre-final Review.
11. Upon notification, the Observation Service and Owner's Representative will review the Work Area. Improper application of replacement materials, unapproved damage to the facility or its contents, or improper re-establishment of objects and systems discovered during the Pre-final Review, shall be itemized on a Punch List for correction by the Contractor at his expense. If no deficiencies are discovered, this Contract, or this portion of the Contract, shall be approved in writing by the Observation Service and Owner's Representative as complete. If deficiencies are noted continue with the subsequent procedures. NOTE: If deficiencies noted do not prevent the Owner from occupancy or proceeding with reconstruction work, the Contract, or this portion of the Contract, shall be specified in writing by the Observation Service and the Owner's Representative Substantially Complete.
12. Upon completion of Punch List deficiencies, the Contractor shall notify the Observation Service and Owner's Representative in advance that the Work Area is ready for Final Review.
13. Upon notification the Observation Service and the Owner's Representative will review the corrected Punch List deficiencies. If all deficiencies have been corrected to the satisfaction of the Observation Service and Owner's Representative, the Contract, or this portion of the Contract, shall be approved in writing by the Observation Service and Owner's Representative as complete. If deficiencies have not been properly corrected the Contractor shall repeat procedures 12 and 13 until all deficiencies have been corrected and approved.

NOTE: If deficiencies noted do not prevent the Owner from occupancy or proceeding with reconstruction work, the Contract or this portion of the Contract shall be specified in writing by the Observation Service and the Owner's Representative Substantially Complete.

- E. Decontamination procedures for ceiling debris removal in non-prepared Work Areas:
1. Set up movable decontamination enclosure unit under selected ceiling tile, panels, access holes, or light fixtures in a pattern that will provide adequate coverage of the designated areas.
 2. Remove the panels, light fixtures, or other access items carefully so that debris on top of the items will not fall. NOTE: Seal all access openings, after each work shift, with temporary six (6) mil plastic seals, if the opening cannot be permanently sealed prior to the next business day.
 3. Remove visible fireproofing or other Asbestos-Containing debris from top of ceiling panels, light fixtures and other surfaces, etc., with HEPA vacuum equipment, or wet cleaning method, in a manner that will not raise dust.
 4. After cleaning, the Contractor shall perform a complete visual inspection of the Work Area to ensure that the Work Area is free of any debris or residue.
 5. Upon completion of his visual inspection, the Contractor shall notify the Observation Service in advance that the Work Area is ready for Initial Review.
 6. Upon proper notification, the Observation Service will review the Work Area for general conformance with the Specifications. Any nonconformance of the Work shall be remedied by the Contractor until the Work Area is in compliance, and at the Contractor's expense.
 7. Upon successful compliance with the Observation Service's Initial Review, and after written notification, the Contractor shall encapsulate the top surface of the ceiling. Encapsulant shall be applied in a manner that will provide complete coverage of the ceiling surface while also minimizing encapsulation drippage through openings in the ceiling to the area below.
 8. After the completion of the encapsulation operation, the Contractor shall perform a complete visual inspection of the Work Area to ensure that uniform encapsulation coverage has been achieved.
 9. Sealed drums and bags, and all equipment used in the Work Area shall be included in the cleanup and shall be removed from the Work Area at the appropriate time in the cleaning sequence.
 10. Upon completion of his encapsulation inspection, the Contractor shall notify the Observation Service twenty-four (24) hours in advance that the Work Area is ready for Encapsulation Review and Clearance Testing. Refer to the appropriate Article on Air Monitoring in this Section for Clearance Testing standards.
 11. Upon written notification from the Observation Service that the Work Area has passed the standard for Clearance Testing, the Contractor shall re-establish objects and systems as stipulated in these Specifications.
 12. Upon completion of the re-establishment of objects and systems, the Contractor shall notify the Observation Service and Owner's Representative twenty-four (24) hours in advance that the Work Area is ready for Pre-final Review.

13. Upon notification, the Observation Service and Owner's Representative will review the Work Area. Improper re-establishment of objects and systems or unapproved damage to the facility or its contents discovered during the Pre-final review shall be itemized on a Punch List for correction by the Contractor at his expense. If no deficiencies are discovered, the Contract, or this portion of the Contract, shall be approved in writing by the Observation Service and Owner's Representative as complete. If deficiencies are noted continue with the subsequent procedures. NOTE: If deficiencies noted do not prevent the Owner from occupancy or proceeding with reconstruction work, the Contract or this portion of the Contract shall be specified in writing by the Observation Service and the Owner's Representative Substantially Complete.
 14. Upon correction of the Punch List deficiencies the Contractor shall notify the Observation Service and Owner's Representative in advance that the Work Area is ready for Final Review.
 15. Upon notification, the Observation Service and Owner's Representative will review the corrected Punch List deficiencies. If all deficiencies have been corrected, the Contract or this portion of the Contract, shall be approved in writing by the Observation Service and the Owner's representative as complete. If deficiencies have not been properly corrected, the Contractor shall repeat, at his expense, procedures 14 and 15 until all deficiencies have been corrected and approved. NOTE: If deficiencies noted do not prevent the Owner from occupancy or proceeding with reconstruction work, the Contract or this portion of the Contract shall be specified in writing by the Observation Service and the Owner's Representative Substantially Complete.
- F. Decontamination procedure for removal of non-friable materials in non-prepared Work Areas:
1. The Contractor shall perform a complete visual inspection of the Work Area.
 2. Asbestos debris encountered shall be removed.
 3. Sealed drums and bags, and all equipment used in the Work Area shall be included in the cleanup, and shall be removed from the Work Area at the appropriate time in the cleaning sequence.
 4. Upon completion of his visual inspection and any necessary cleaning, the Contractor shall notify the Observation Service that the Work Area is ready for Initial Review.
 5. Upon proper notification, the Observation Service will review the Work Area for general conformance with the Specifications. Any nonconformance of the Work shall be remedied by the Contractor until the Work Area is in compliance, and at the Contractor's expense.
 6. Upon successful compliance with the Initial Review, the Observation Service shall conduct Clearance Testing. Refer to appropriate Article in this Section on Air Monitoring for Clearance Testing standards.
 7. Upon written notification from the Owner's Representative that the Work Area has passed the standard for Clearance Testing, the Contractor shall apply the asbestos-free replacement materials, when included in the contract, and re-establish objects and systems as specified in these Specifications.
 8. Upon completion of the application of replacement materials, or if no replacement materials are required, after the re-establishment of objects and systems, the

Contractor shall notify the Observation Service and the Owner's Representative within twenty-four (24) hours, in advance, that the Work Area is ready for Pre-final Review.

9. Upon notification, the Observation Service and the Owner's Representative will review the Work Area. Improper application of the replacement materials, unapproved damage to the facility or its contents or improper re-establishment of objects and systems shall be itemized on a Punch List for correction by the Contractor at his expense. If no deficiencies are discovered, the Contract, or this portion of the Contract, shall be approved in writing by the Observation Service as complete. If deficiencies are noted continue with the subsequent procedures. NOTE: If deficiencies noted do not prevent the Owner from occupancy or proceeding with reconstruction work, the Contract, or this portion of the Contract, shall be specified in writing by the Observation Service and the Owner's Representative Substantially Complete.
10. Upon correction of Punch List deficiencies the Contractor shall notify the Observation Service and Owner's Representative in advance that the Work Area is ready for Final Review.
11. Upon notification the Observation Service and the Owner's Representative will review the corrected Punch List deficiencies. If all deficiencies have been corrected, the Contract or this portion of the Contract, shall be approved in writing by the Observation Service as complete. If deficiencies have not been properly corrected, the Contractor shall repeat, at his expense, procedures 10 and 11 until all deficiencies have been corrected and approved. NOTE: If deficiencies noted do not prevent the Owner from occupancy or proceeding with reconstruction work, the Contract or this portion of the Contract shall be specified in writing by the Observation Service and the Owner's Representative Substantially Complete.

3.5 ASBESTOS DISPOSAL

- A. Asbestos-Containing Waste Materials shall be packed into approved sealed and labeled protective packaging.
- B. Containers removed from the Holding Area must be removed by Workers who have entered from uncontaminated areas dressed in clean coveralls. Workers must not enter from uncontaminated areas into the Washroom or the Work Area; contaminated Workers must not exit the Work Area through the Equipment Decontamination Enclosure System.
- C. Contractor shall deliver Asbestos-Containing Waste Materials to the pre-designated Hazardous Waste Disposal Facility in accordance with the guidelines of the EPA.
- D. The Contractor shall notify the Observation Service twenty-four (24) hours, in advance, when Asbestos-Containing Waste Materials are to be removed from the site. The Observation Service must be present during the removal of Asbestos-Containing Waste Materials from the Work Area. A copy of the Uniform Hazardous Waste Manifest, or other document required by State or Local agencies, shall be submitted to the Observation Service for review and signature prior to transporting Asbestos-Containing Waste Materials to the disposal facility.
- E. At the conclusion of Work, the Contractor shall provide evidence (such as a "Bill of Lading" or "Hazardous Waste Manifest") that the Asbestos-Containing Waste Material was disposed of at the approved EPA Hazardous Waste Disposal Facility. The evidence shall be submitted with the final request for payment, the Contractor shall indicate on the "Bill of Lading" or "Hazardous Waste Manifest" the weight, in tons, of the Asbestos-Containing

Waste Material generated from the Project. This weight amount must be confirmed by a party independent from the Contractor.

- F. The Contractor shall be responsible for the safe handling and transportation of all Non-Hazardous and/or Hazardous Waste, generated by the Project of this Contract, to the designated Non- Hazardous and/or Hazardous Waste Disposal Facility. The Contractor shall bear all costs for all claims, damages, losses, and clean up expenses against the Owner or the Observation Service, including but not limited to attorney's fees rising out of, or resulting from, Asbestos spills on the site or spills en route to the Hazardous Waste Disposal Facility.
- G. Friable Debris Disposal: Friable Asbestos-Containing Materials shall be disposed of as hazardous waste.
- H. Non-friable Debris Disposal: Non-friable Asbestos-Containing Materials shall be disposed of as non-friable asbestos waste.

3.6 AIR MONITORING AND TESTING

A. Area Air Monitoring:

1. Throughout removal, encapsulation, and cleaning operations, Area Air Monitoring shall be conducted by the Observation Service to ensure that the Contractor's engineering controls and work practices are minimizing worker and public exposures to airborne asbestos fibers, in accordance with applicable codes, regulations, and ordinances. Fiber counting shall be done by the PCM Method No. 7400 established by NIOSH, with the following as minimum samplings recommended by the EPA:

<u>Areas To Be Sampled</u>	<u>Minimum Number of Samples</u>	<u>Minimum Volume</u>
Work Area	1/work shift	1200L
Adjacent to Work Area	1/work shift	1200L
At Negative Air Equipment Exhausts	1/work shift	1200L

2. The Observation Service shall report the Area Air Monitoring results to the Contractor on the following day. If Area Air Monitoring results are unsatisfactory, the Contractor shall make changes in his engineering controls and work practices to assure compliance with the following standards. Unsatisfactory results are fiber counts within the Work Area in excess of the Maximum Acceptable Level or fiber counts outside the Work Area in excess of the Benchmark.

B. Personal Air Monitoring:

1. The Contractor shall conduct initial and periodic eight (8) hour TWA and thirty (30) minute excursion limit air monitoring of Worker exposures to airborne concentrations of Asbestos fibers in accordance with OSHA (CFR 1926.1101) and DOSH (CCR Title 8 Section 1529) requirements.
2. Once OSHA and DOSH sampling requirements are satisfied the Contractor shall conduct, as a requirement of this Contract, not less than one (1) personal air sample, twice per calendar week, to determine 8-hour TWA exposures and thirty (30) minute Excursion Limit exposures of workers operating in each Work Area.

Samples shall be collected within the Workers' breathing zones. Samples shall be taken for each ten (10) workers from the time preparation work is started until the Work Area has passed Clearance Testing. NOTE: Contract required personal sampling is not necessary while the Contractor is conducting OSHA and/or DOSH required sampling or when Type C Respirators are in use.

3. The Contractor shall report Personal Monitoring results to the Observation Service within 48 hours from the end of the work shift. Worker exposures to airborne Asbestos concentrations shall not exceed the Permissible Exposure Limit (PEL) of 8-hour TWA of 0.1 fibers (longer than 5 micrometers) per cubic centimeter of air, or the 1f/cc 30 minute period Excursion Limit.

C. Clearance Testing:

1. The Contractor shall not be released until final inspection and air testing are performed in each Work Area using PCM Method No. 7400 in accordance with the guidelines set forth in EPA Document 560/5-85-024 Guidance for Controlling Asbestos-Containing Materials in Buildings with the exception that a minimum of one (1) air sample be taken for each Work Area and that 1,200 liters of air is required.

3.7 REIMBURSEMENT OF COSTS OF THE OWNER OR THE OBSERVATION SERVICE

- A. In the event that reviews and/or Clearance Testing by the Observation Service or regulatory agencies shows that the Work Area or any portion of the Work Area is not decontaminated or if the Work is not in conformance with the Contract Documents, the Owner, Observation Service and his Consultants will record all time, tests and project related expenses expended to monitor the Work until the work is in compliance. All time, and expenses recorded by the Owner, Observation Service and his Consultants to monitor the above work, and all time, tests and project related expenses incurred by the Owner and Observation Service and his Consultants outside the Project Work Days, Work Hours or Contract Time shall, at the discretion of the Owner, be paid for by the Contractor. The Contractor, promptly upon receipt of the billing from the Owner, or the Observation Service, shall reimburse the Owner at the normal billing rate of the Owner or the Observation Service and his Consultants, or the Owner is authorized to withhold funds from the Contract Sum, for all time spent by the Owner, Observation Service and his Consultants for reviews, testing, and other project related expenses when any of the above conditions occur.

3.8 STOPPING THE WORK

- A. If, at any time, the Observation Service decides that Work Practices are violating pertinent regulations, these Specifications or, in his opinion, endangering Workers or the public, he will immediately notify the Contractor (followed up in writing) that operations shall cease until corrective action is taken, and the Contractor shall take such corrective action before proceeding with the Work. Loss or Damages due to a Stop Work Order shall be borne by the Contractor.

3.9 CLEANUP

- A. Contractor shall maintain a clean Project site during and upon completion of the Project. All debris, materials and wastes shall be removed from the Project site.

END OF SECTION I

**SECTION II- LEAD
LEAD BASED COATING (LBC) & LEAD CONTAINING COATING (LCC)
ABATEMENT SPECIFICATIONS**

PART 1 - GENERAL

1.0 DESCRIPTION

- A. Work included: Contractor shall furnish all labor, materials, services, permits, insurance (specifically covering the handling and transportation of Lead Based Material & Lead-Containing Material and Lead-Containing Waste Material), and equipment which is specified, shown, or reasonably implied for Lead Abatement materials/activities.

IDENTIFIED LBC/LCC CITY OF SUNNYVALE CITY HALL, CITY HALL ANNEX, PUBLIC SAFETY AND SOC BUILDINGS MARE ISLAND, VALLEJO, CALIFORNIA			
Material	Location	Condition*	Lead Content (%wt)
City Hall			
White Paint on Drywall	West Council Auditorium	Good	0.035
Grey Paint on Concrete	Basement, Mechanical Room	Good	0.11
White Paint on Duct	Basement, Mechanical Room	Good	0.40
Dark Brown Paint on Wood	Exterior	Good	0.31
Tan Paint on Concrete	Exterior	Good	0.042
City Hall Annex			
White Paint on Concrete	Interior Throughout	Good	0.040
Beige Paint on Concrete	Basement Throughout	Good	0.043
Grey Epoxy	Basement	Good	0.11
Dark Brown Paint on Wood	Exterior	Good	0.043
Public Safety			
14"x18" Tan Ceramic Wall Tile	Room 1078	Good	0.016
SOC			
White Paint on Duct	Janitor Closets	Fair	0.019
*Conditions are based on visual observations of accessible areas at the time of the survey. Additional conditions and quantities may be present in inaccessible or concealed locations.			

Unidentified LBC/LCC may be present in inaccessible or concealed spaces. These spaces include, but are not limited to, pipe chases, spaces between wall/ceiling/floor/door cavities

and the interior of mechanical components such as boiler cavities and interior ducts. If the demolition activities make these areas accessible, ATC recommends that a thorough assessment of these spaces be conducted at that time to identify and confirm the presence or absence of deteriorated LBC/LCC. Until sampled, all unidentified materials should be treated as LBC and handled in accordance with these specifications.

Contractor has sole responsibility for confirming the location, quantity and degree of difficulty in removing the identified materials.

- B. Applicable Publications: The work conducted shall comply with all applicable federal, state and local regulations. Applicable guidelines and standards listed in this Scope of Work include, but are not necessarily limited to:
1. Department of Housing & Urban Development (HUD) "Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing" dated June, 1995.
 2. Code of Federal Regulations (CFR) Publications:

29 CFR 1910.20	Access to Employee Exposure & Medical Records
29 CFR 1910.134	Respiratory Protection
29 CFR 1910.145	Specifications for Accident Prevention Signs & Tags
29 CFR 1910.1025	General Industry Standards - Lead
29 CFR 1910.1200	Hazard Communication
29 CFR 926.55	Gases, Vapors, Fumes, Dusts & Mists
29 CFR 926.58	Construction Standards
29 CFR 1926.62	Lead Exposure In Construction
29 CFR 1926.200	Signs, Signals & Barricades
40 CFR 61	Subpart A General Provisions
40 CFR 61.152	Standard for Waste Manufacturing, Demolition, Spraying and Fabricating Operations
40 CFR 241	Guidelines for the Land Disposal of Solid Wastes
40 CFR 257	Criteria for Classification of Solid Waste
40 CFR 261 & 262	Waste Disposal Facilities & Practices
40 CFR 745	Lead; Requirements for Lead-Based Paint Activities
 3. California Code of Regulations - General Industry Safety Orders (GISO)

Section 5216	Lead Regulations
Section 5155	Airborne Contaminants
 4. American National Standards Institute (ANSI) Publications:

Z88.2-80	Practices for Respiratory Protection
Z87.1	Eye Protection
 5. National Institute of Occupational Safety & Health (NIOSH) Publications:

Manual of Analytical Methods, 2nd Edition, Volume 1, Physical & Chemical Analysis Method (P&CAM)	
Method 7082	
Method 7105	

1.1 DEFINITIONS

General Explanation: A substantial amount of specification language constitutes definitions for terms found in other contract documents. Certain terms used in Contract Documents are defined in this article.

- A. Owner: City of Sunnyvale
- B. Abate or Abatement: Means the elimination of exposure to lead-based substances that may result in lead toxicity or poisoning, by the removal or encapsulation of lead-containing substances, by thorough cleanup procedures, and by post-cleanup treatment of surfaces.
- C. Accredited or Accreditation: A person or laboratory accredited in accordance with Section 206 of Title II of the Toxic Substances Control Act (TSCA) and/or accredited by the American Industrial Hygiene Association (AIHA)
- D. Aerosol: A system consisting of particles, solid or liquid, suspended in air.
- E. Air Monitoring: The process of measuring the lead content of a specific volume of air.
- F. Authorized Visitor: The Owner, the Owner's Representative, the Consultant/Engineer, emergency personnel or a representative of any federal, state and local regulatory or other agency having authority over the project.
- G. Barrier: Any surface that seals off the work area to inhibit the movement of particles.
- H. Breathing Zone: A hemisphere forward of the shoulders with a radius of approximately 6 to 9 inches.
- I. Ceiling Concentration: The concentration of an airborne substance that shall not be exceeded.
- J. Certified Industrial Hygienist (C.I.H.): An industrial hygienist certified in Comprehensive Practice by the American Board of Industrial Hygiene.
- K. Contractor: Means any business entity, public unit, or person performing the actual abatement for a lead abatement project.
- L. Dangerous Level of Lead: When present in paint offered for sale is 0.06% by weight or 600 parts per million (ppm) as determined by atomic absorption (AA).
- M. Demolition: The wrecking or taking out of any building component, system, finish or assembly of a facility together with any related handling operations.
- N. Disposal Bag: A properly labeled 6 mil thick leak-tight plastic bags used for transporting lead waste from work and to disposal site.
- O. Encapsulation: Means to resurface or cover surfaces and to seal or caulk seams with a durable material, so as to prevent or control chalking, flaking lead-containing substances from becoming part of construction dust.
- P. Filter: A media component used in respirators to remove solid or liquid particles from the inspired air.
- Q. HEPA Filter: A High Efficiency Particulate Air (HEPA) filter capable of trapping and retaining 99.97% of particles greater than 0.3 microns in diameter.
- R. HEPA Filter Vacuum Collection Equipment (or vacuum cleaner): High efficiency particulate air filtered vacuum collection equipment with a filter system capable of collecting and

retaining lead particles. Filters should be of 99.97% efficiency for retaining particles of 0.3 microns or larger.

- S. High-efficiency particulate air filter: HEPA refers to a filtering system capable of trapping and retaining 99.97 percent of all mono-dispersed particles 0.3 μm in diameter or larger.
- T. Interior Work Area: A hallway, room or group of rooms in which abatement takes place on the inside of a property.
- U. Lead Abatement Project: Any work performed in order to abate the presence of lead-containing substances.
- V. Lead-Based Coating (LBC): Paint or other surface coatings that contain lead equal to or greater than one milligram per square centimeter (1 mg/cm^2) or more than half of one percent (0.5 %) by weight or more than five-thousand parts per million (5,000 ppm) by weight.
- W. Lead-Containing Coating (LCC): For the purposes of this survey, Lead-Containing Coating is defined as paint or other surface coatings that contain lead greater than 0.1 mg/cm^2 .
- X. Negative Pressure Respirator: A respirator in which the air pressure inside the respiratory-inlet covering is positive during exhalation in relation to the air pressure of the outside atmosphere and negative during inhalation in relation to the air pressure of the outside atmosphere.
- Y. Negative Pressure Ventilation System: A pressure differential and ventilation system.
- Z. Personal Monitoring: Sampling of the lead concentrations within the breathing zone of an employee.
- AA. Pressure Differential and Ventilation System: A local exhaust system, utilizing HEPA filtration capable of maintaining a pressure differential with the inside of the Work Area at a lower pressure than any adjacent area, and which cleans re-circulated air or generates a constant air flow from adjacent areas into the Work Area.
- AB. Protection Factor: The ratio of the ambient concentration of an airborne substance to the concentration of the substance inside the respirator at the breathing zone of the wearer. The protection factor is a measure of the degree of protection provided by a respirator to the wearer.
- AC. Repair: Returning damaged lead-based paint to an undamaged condition or to an intact state so as to prevent particle release.
- AD. Time Weighted Average (TWA): The average concentration of a contaminant in air during a specific time period.
- AE. Visible Emissions: Any emissions containing particulate material that are visually detectable without the aid of instruments. This does not include condensed uncombined water vapor.
- AF. Wet Cleaning: The process of eliminating lead contamination from building surfaces and objects by using cloths, mops, or other cleaning utensils which have been dampened with water containing 5% trisodium phosphate (TSP) or diluted removal encapsulant and afterwards thoroughly decontaminated or disposed of as lead-contaminated waste.

- AG. Work Area: The area where lead-related work or removal operations are performed which is defined and/or isolated to prevent the spread of lead dust or debris, and entry by unauthorized personnel. Work area is a Regulated Area as defined by 29 CFR 1926.

1.2 SUBMITTALS

- A. Copies of medical records and blood testing results of workers to be utilized on the project, as performed by an occupational physician or medical doctor and appropriate blood laboratory, as applicable.
- B. Record of successful fit testing performed by a qualified individual within the previous six months, for each employee to be used on this project with the employee's name and social security number with each record.
- C. Proposed respiratory protection program for employees throughout all phases of the job, including make, model and NIOSH approval number of the respirators to be used.
- D. Safety Data Sheets (SDS) on potentially hazardous materials to be used on the project.
- E. The name and address of the Contractor's blood lead testing lab, Occupational Safety and Health Administration (OSHA) – Center for Disease Control and Prevention (CDC) listing and Certification in the State where the work is located.
- F. Contractor shall submit certification that the job supervisor/foreperson and each de-leading abatement workers have successfully completed a California Department of Public Health (DPH) training course that each has had instruction on the dangers of lead exposure, respirator use, decontamination and applicable regulations.

1.3 PERSONAL PROTECTION & HYGIENE

- A. All persons working on a lead abatement site shall, when present in the work area, wear disposable clothing with attached foot and head covers and at minimum a half face air purifying respirator equipped with high efficiency particulate air filters.
- B. The Contractor shall ensure that all persons entering the work area without exception:
 - 1. Change from street clothes to protective clothing at designated areas prior to starting the day's work.
 - 2. No smoking, eating or drinking is to take place beyond the established critical barrier. Prior to smoking, eating or drinking, the workers will be fully decontaminated. Each worker will then dress in clean overalls to eat, drink or smoke. These new coveralls can then be worn back into the work area.
- C. The Contractor shall require that each person entering the Work Area shall wear an approved respirator and protective clothing. There shall be no exceptions to this rule.
- D. Protective clothing shall consist of disposable full-body clothing of non-woven material comprised of heat and pressure-bonded polyethylene fibers. Material shall be chemically and biologically inert, low-linting and static free (unless laundered); durable enough to resist abrasion, puncturing and tearing; highly resistant to penetration of air-borne particulate when wet or dry. Suits may be fabricated with integral head and foot covering. Disposable clothing shall be adequately sealed to the footwear to prevent body contamination.

- E. The Contractor shall require a minimum of a half-face negative pressure respirator with high efficiency filters during the removal and clean-up operations. Supply a sufficient quantity of respirator filters so that workers can change filters as needed. Require that respirators be wet-rinsed and filters discarded each time a worker exits the work area. Require that new filters be installed each time a worker re-enters the work area. Store respirators and filters at the job site and protect them totally from exposure to lead dust prior to their use.
- F. Wearing of contact lenses in the contaminated atmosphere shall not be permitted.

1.4 RESPIRATORS

- A. The Contractor shall provide approved respirators to all workers at no charge.
- B. The Contractor shall require that each person entering the work area shall wear an approved respirator. There shall be no exceptions to this rule.
- C. The Contractor shall instruct and train each worker involved in lead abatement or maintenance and repair of lead-containing materials in proper respiratory use and require that each worker always wear a respirator, properly fitted on the face in the work area from the start of any operation which may cause airborne lead particles until the work area is completely decontaminated.
- D. The Contractor shall ensure that the employees will use respiratory protection that is appropriate for the lead level encountered in the work place or as required for other toxic or oxygen-deficient situations encountered.
- E. Except to the extent that more stringent requirements are written directly into the Contract Documents, the following regulations and standards have the same force and effect (and are made a part of the Contract Documents by reference) as if copied directly into the Contract Documents, or as if published copies were bound herewith. Where there is a conflict in requirements set forth in these regulations and standards, meet the more stringent requirement.

OSHA - U.S. Department of Labor Occupational Safety and Health Administration, Safety and Health Standards 29 CFR 1910, Section 1001 and Section 1910.134. 29 CFR 1926.58.

ANSI - American National Standard Practices for Respiratory Protection, ANSI Z88.2-1980.

NIOSH - National Institute for Occupational Safety and Health

MSHA - Mine Safety and Health Administration

DOSH - State of California, Department of Industrial Relations, Division of Occupational Safety and Health

DPH – California Department of Public Health

- F. Air Purifying Respirators
 - 1. Respirator Bodies: Provide half face or full face type respirators. Equip full face respirators with a nose cup or other anti-fogging device.

2. Filter Cartridges: Provide, at a minimum, HEPA type filters labeled with NIOSH and MSHA Certification for "Radionuclides, Radon Daughters, Dust, Fumes, Mists including Asbestos-Containing Dusts and Mists" and color coded in accordance with ANSI Z88.2 (1980). In addition, a chemical cartridge section may be added, if required, for solvents, etc., in use. In this case, provide cartridges that have each section of the combination canister labeled with the appropriate color code and NIOSH/MSHA Certification.
3. Non-permitted respirators: Do not use single use, disposable or quarter face respirators.

G. Fit Testing:

1. Initial Fitting: Provide initial fitting of respiratory protection during a respiratory protection training course. Fit types of respirator to be actually worn by each individual. Allow an individual to use only respirators for which training and fit testing have been provided.
2. On a Semi-Annual Basis: check the fit of worker's respirator by having irritant smoke blown onto the respirator from a smoke tube.
3. Upon Each Wearing: Require that each time an air-purifying respirator is put on it be checked for fit with a positive and negative pressure fit test in accordance with the manufacturer's instructions or ANSI Z88.2 (1980).

11 TYPE OF RESPIRATORY PROTECTION REQUIRED:

H. Permissible Exposure Limit (PEL):

1. 8-Hour Time Weighted Average: TWA of lead to which any worker may be exposed shall not exceed 50 ug/m³.

I. Respiratory Protection Factor:

<u>Respirator Type</u>	<u>Protection Factor</u>
Air purifying: Negative pressure respirator High efficiency filter Half face-piece	10
Air purifying: Negative pressure respirator High efficiency filter Full face-piece	50
Powered Air Purifying (PAPR): Positive pressure respirator High efficiency filter Half or Full face-piece	50
Type C supplied air: Positive pressure respirator Pressure demand or other positive pressure mode Half face-piece	1,000
Type C supplied air: Positive pressure respirator Pressure demand or other positive pressure mode	2,000

Full face-piece

Type C supplied air:	10,000
Positive pressure respirator	
Pressure demand or other positive pressure mode	
Full face-piece	
Equipped with an auxiliary positive pressure	
Self-contained breathing apparatus (SCBA)	
Self-contained breathing apparatus (SCBA):	10,000
Positive Pressure respirator	
Pressure demand or other positive pressure mode	

1.5 DRESS AND EQUIPMENT

- A. The Contractor shall provide approved protective clothing to all workers, and to all official representatives of the Owner, State or other governmental entity, and the Consultant who may inspect the job site.
- B. Protective clothing shall consist of disposable full-body clothing of non- woven material comprised of heat and pressure-bonded polyethylene fibers. Material shall be chemically and biologically inert, low-linting and static free (unless laundered); durable enough to resist abrasion, puncturing and tearing; highly resistant to penetration of air-borne particulate when wet or dry. Suits may be fabricated with integral head and foot covering. Disposable clothing shall be adequately sealed to the footwear to prevent body contamination.
- C. Disposable protective clothing shall be disposed of as lead waste every time the wearer exists from the work space/equipment room to the shower room while proceeding to the clean area. Workers shall thoroughly wash with soap and water before exiting the shower room.
- D. If launderable clothing is to be worn underneath disposable protective clothing, it shall be provided by the Contractors to all abatement workers. (It is recommended that launderable clothing be a unique, specific color to enable it to be distinguished from general purpose blue, gray or black coveralls which are commonly worn). It is preferable that the following procedures be utilized:
 1. Launderers must be trained in proper techniques for handling lead contaminated clothing and provided with personal protective equipment consisting of appropriate respirators and disposable clothing for use when needed.
 2. Machines used for laundering contaminated clothing shall be isolated and restricted for such use.
 3. Discharged water shall not exceed 0.02 mg/l of lead.
 4. Dryers shall be isolated and restricted for use with contaminated fabrics and have HEPA filtered exhaust.
 5. Such maintenance shall be performed by protected individuals (as per paragraph a above).
- E. Additional safety equipment: Hard hats shall meet the requirements of ANSI Standard Z89.1-1982; eye protection shall meet the requirements of ANSI Standard Z87.1 and foot protection shall meet the requirements of ANSI Standard Z41.1-1967; disposable PVC gloves as necessary shall be provided to all workers and authorized visitors. Non-skid footwear shall be provided to all abatement workers.

PART 2 - PRODUCTS

2.0 WASHING AGENT

- A. 5% Tri-Sodium phosphate (TSP) at one ounce per gallon of water.

2.1 PROTECTIVE COVERING

- A. Protective sheeting for floors and walls shall be a minimum of 6 mil in thickness and conform to ASTM E154, D-124B, D-2103 and D4379.
- B. Polyethylene sheeting shall be fire resistive.
- C. Polyethylene sheeting shall be opaque in color.

2.2 PROTECTIVE PACKAGING

- A. Bags utilized for waste shall be a minimum of 6 mil in thickness and labeled for hazardous waste. Drums utilized for waste shall be 55-gallon drums with a sealable lid and properly labeled.

2.3 CAUTION SIGNS

- A. At each separate work area, the contractor performing abatement shall display a caution sign in the following manner wherever the treatment process is expected to break or disturb any lead-containing substances.
- B. Before removing lead, the Contractor shall post signs immediately outside all entrances and exits to the work area.
- C. The Contractor shall ensure that caution signs meet the following description:
 - 1. The sign is at least 20" by 14", and states the date and place of the lead abatement project.
 - 2. The sign shall state in bold lettering at least 2" high:

**WARNING
LEAD WORK AREA
NO EATING OR DRINKING**

2.4 CHEMICAL STRIPPING AGENT

- A. Contractor shall receive Environmental Consultant's approval of chemical stripping agents prior to implementation. Stripping agents shall not contain methylene chloride.

PART 3 - EXECUTION

3.0 WORK AREA PREPARATION

- A. Contractor shall ensure that the lead contamination is confined within the work area and that all surfaces located in the work area are free from any lead accumulation when the work is completed. This shall be accomplished by creation of an impermeable containment.
- B. Procedures for the removal of lead-based paint from **interior** walls and ceilings, woodwork, windows, doors, trim, etc., and removal of lead-containing ceramic tile, removal shall be executed in a Contained Work Area:

1. Establish critical barriers to contain and prevent the movement of lead out of the work area. Critical barriers will be established over all penetrations leading to areas adjacent to work areas, utilizing two layers of 6-mil polyethylene sheeting.
 2. Cover floor in the work area with a minimum of two layers of polyethylene sheeting at least 6 mils in thickness and duct tape. All seams and joints shall be at least six (6) feet apart, where applicable, and sealed with duct tape.
 3. Erect containment walls utilizing a minimum of two of fire resistive and opaque 4-mil polyethylene sheeting.
 4. Connect a two-stage de-contamination unit to the contained work area. Decontamination unit shall consist of a clean room and an equipment room. Z locks shall be established to contain and prevent the movement of lead out of the work area.
 5. Containment shall not impede ingress or egress from residences.
- C. Procedures for the removal of lead-based paint from **exterior** walls and ceilings, woodwork, trim, railings, downspouts, etc., removal shall be executed in an Isolated Work Area:
1. Establish barriers to contain and prevent the movement of lead out of the work area. Barriers will be established to isolate the Work Area utilizing barricade tape.
 2. Cover ground in the Work Area with a minimum of one layer of polyethylene sheeting at least 6 mils in thickness. All seams and joints shall be at least six (6) feet apart, where applicable, and sealed with duct tape. Sheeting is to extend a minimum of 15 feet out from walls.
 3. Decontamination equipment shall consist of a wash station and HEPA equipment. Steps shall be taken to contain and prevent the movement of lead out of the Work Area.
 5. Containment shall not impede ingress or egress from non-Work Area.

3.1 DECONTAMINATION PROCEDURES

- A. The employer shall assure that all employees, who work in areas where airborne exposure to lead is expected, decontaminate whenever exiting the work area and at the end of the work shift.
- B. Decontaminating will consist of rinsing the whole body and protective clothing with water from a water sprayer or portable shower located in the two stage decontamination unit and then disposing of the protective clothing.
- C. All shower waste water will be filtered through a final stage 5 micron filter prior to disposal.
- D. Disposable protective clothing shall be disposed of as lead waste every time the wearer exits from the work area.

3.2 REMOVAL PROCEDURES

- A. Depending on extent and location of work, establish either an exterior regulated area or work area containment respectively a negative pressure differential may be required to provide adequate engineering control.

The following descriptions include a preparation of surfaces for enclosures and the stabilization of lead-based painted surface to be encapsulated or painted.

1. Surface Preparation (building demolition or renovation)

- a. Begin work by applying a light mist of TSP-treated water to painted surfaces to be abated. Scrape off flaking paint using soft nylon bristled brushes.
 - b. Remove loose, flaking and deteriorated paint by wet scraping or wet sanding.
 - c. Remove loose, unsound or deteriorated substrate. Place in 6mil polyethylene disposal bag and dispose of accordingly.
 - d. HEPA vacuum and wet wipe to remove all paint chips, debris and dust generated during work. Do not allow dust or debris to accumulate.
 2. Paint Stabilization
 - a. Substrate Repairs (building demolition or renovation)
 - i. Prior to stabilizing lead-based paint, correct substrate surface defects. Remove loose unsound deteriorated substrates.
 - ii. Place in 6 mil polyethylene disposal bag and dispose according to applicable regulations.
 3. Paint Repairs (building demolition or renovation)
 - a. Wet scraping: remove all loose, flaking and deteriorated paint by wet scraping. Continually mist surface with water during scraping.
 - b. Wet sanding: prepare finish surface by wet sanding. Feather edges lightly. Keep surface wet while sanding.
 4. Encapsulation (building renovation only)
 - a. Once all the loose, flaking and deteriorated paint has been scraped from the substrate an encapsulant must be applied on the stabilized surfaces to minimize future delaminating of the remaining paint as well as lock down any lead dust still adhered to the substrate.
 - b. The encapsulant must be of a different color from the lead paint that is being stabilized so as to be clearly visible to the inspector.
 - B. If chemical stripping agents are to be utilized, use of said products shall be used in strict accordance with the manufacture's instructions. Products containing Methylene Chloride are prohibited, unless approved in writing.
 - C. In the case of lead-containing ceramic tiles, the tile must be removed in manageable sections by a multi-person team, some of whom are wetting to prevent emission of lead-based paint dust and the remainder removing and cleaning.
 - D. Prevent build up of excess water and debris by regularly using a HEPA vacuumed system to containerize debris and water.
 - E. Wash all work area surfaces with TSP solution and HEPA vacuum area.
- 3.3 CLEANUP OF THE WORK AREA
- A. After completion of the removal, separate and deposit all lead waste, including sealing tape, plastic sheeting, mop heads, sponges filters, and disposable clothing in double polyethylene bags of at least 6 mils thick and seal each bag separately;
 - B. Again wash with TSP, vacuum-clean all surfaces in the work area woodwork, walls, floors, etc. with a HEPA vacuum.

- C. No equipment, supplies or materials (except properly containerized waste materials) shall be removed from the project work area unless such equipment, supplies and/or materials have been cleaned free of lead debris. Where the configuration of the equipment, supplies and/or materials is such that decontamination and cleaning free of lead debris is neither possible or feasible, then the object shall be thoroughly wrapped in a minimum of two (2) layers of six (6) mil fire-resistant polyethylene sheeting with all joints, seams and overlaps sealed with duct tape; or containerized in a metal drum with a locking lid. Examples include, but are not limited to Air Filtration or HEPA vacuuming equipment which may be wrapped in plastic rather than dismantling beyond the filters for cleaning purposes; sections of woodwork or other objects to be disposed of intact may be wrapped in plastic without prior removal of lead; wood or other materials used to construct on-site decon or shower units may be wrapped in plastic for transport to another contaminated work site for reuse.
- D. HEPA vacuums shall be emptied of collected lead waste contents prior to removal of the equipment from the work area.
- E. Plastic shall be bagged as contaminated waste, until testing can prove otherwise.
- F. Following the verification, by an independent third party, which "no visible debris remains", the critical barriers and floor covering may be removed and disposed.

3.4 AIR MONITORING AND CLEARANCE TESTING

- A. Throughout removal operations, Area Air Monitoring shall be conducted by the Observation Service to ensure that the Contractor's engineering controls and work practices are effective. Air sample analysis shall be performed by NIOSH Methods No. 7082 and 7105 for lead. The following sampling protocol may be employed:

Areas To Be Sampled	Minimum No. of Samples	Minimum Volume
Benchmark at Work Area	1/work area	1200L
Common Area Adjacent to Work Area	1/work area	1200L
Work Area	1/work shift	800L
Common Area Adjacent to Work Area	1/work shift	1200L
At Negative Air Equipment (if exhausts inside building)	1/work shift	1200L

- B. If Area Monitoring results are unsatisfactory Contractor shall make changes in his engineering controls and work practices to ensure compliance with the following standards. Unsatisfactory results are dust levels within the Work Area in excess of the PEL (50 micrograms per cubic meter) or dust levels outside the Work Area in excess of the benchmark.
- C. Clearance Testing
 - 1. After the final clean-up, a preliminary visual inspection will be conducted by the Owner's Representative to ensure that all visible dust and debris has been removed. The Contractor shall provide the Owner's Representative at least 24 hours notice prior to scheduling inspections. If the results of the initial visual inspection are satisfactory, the Owner's Representative will proceed to collect clearance dust wipe samples within 24 hours of the inspection.

2. If the Work Area is not visibly clean, as determined by the preliminary visual inspection by the Owner's Representative, the Contractor shall reclean and decontaminate, until the work area passes inspection.
3. All clearance wipe samples shall be collected in accordance with Regulatory Guidelines at the discretion of the Owner's Representative, 1 sample per 1,000 SF with a minimum of three samples.
 - a. Clearance Guidelines:
 - 40 $\mu\text{g}/\text{ft}^2$ (floors)
 - 250 $\mu\text{g}/\text{ft}^2$ (window sills)
 - 800 $\mu\text{g}/\text{ft}^2$ (window jamb)

3.5 BUILDING CONTAMINATION

- A. If it is determined by visual identification or air samples that building contamination has occurred as a result of the negligence and/or poor work practices of the Contractor, the Contractor agrees to clean the affected premises at no charge to the Owner. The Contractor also agrees to accept all liability for damages claimed or lawsuits brought by person(s) exposed to such contamination.
- B. The Contractor shall be responsible for all costs incurred by the Consultant should other portions of the building become contaminated with lead dust as a result of the Contractors poor work practices or other activities.

3.6 REPAIR AND PAINTING

- A. Contractor shall leave all finished surfaces and other items in Work Areas in the condition in which they were prior to the commencement of the Project. Damage to finishes and other items as the result of Work under this Contract shall be repaired or replaced, painted or cleaned to the satisfaction of the Owner's Representative. Delays due to repair Work are not cause for extension of the deadline for the completion of the Project. Repairs shall be in accordance with standard construction methods for the item(s) in need of repair. Submit for approval all repair materials and methods. All costs for cleaning, painting, and repair as the result of the Contractor's or his Subcontractors' activities shall be borne by the Contractor.

3.7 DISPOSAL OF LEAD-BASED PAINT WASTE

- A. The De-leading Contractor shall contact the regional EPA, state, and local authorities to determine lead-based paint debris disposal requirements. The requirements of Resource Conservation and Recovery Act (RCRA) shall be complied with as well as applicable state solid waste plan requirements. During abatement, the De-leading Contractor shall not leave debris on the property, incinerate debris, dump waste by the road or in an unauthorized dumpster, or introduce lead-contaminated water into storm (will not be flushed down yard inlet or street drain) or sanitary sewers (will not be flushed down toilet or other household drain).
- B. The following materials, individually and at a minimum, shall be tested by Contractor and results made available to Owner and Industrial Hygienist, to determine whether or not they are to be considered hazardous:
 1. paint chips
 2. waste water
 3. dust from HEPA filters and from damp sweeping

4. wood-work, plaster, windows, doors, and other components removed from building
 5. plastic sheets, duct tape, or tape used to cover floors and other services during the lead-based paint abatement
 6. liquid waste, such as wash water used to decontaminate wood after removal has been performed
 7. rags, sponges, mops, HEPA filters, respirator cartridges, scrapers, and other materials used for testing, abatement, and clean up
 8. disposable work clothes and respirator filters
 9. Representative samples of components being removed
 10. any other items intended for non-hazardous disposal.
- C. In order to determine whether the wastes are classified as nonhazardous solid or hazardous waste as defined under the RCRA, the Toxicity Characteristic Leaching Procedure (TCLP) must be performed. Representative samples shall be required of all material to be disposed. Representative sampling shall be at a minimum, one sample of each component with lead-based paint to be disposed of.
- Contractor must comply with California regulations on projects in California and conduct tests for SW-846 for Total Threshold Limit Concentration (TTLC) and the Waste Extraction Test (WET) for Soluble Threshold Limit Concentration (STLC). If any of these samples are above the TTLC, STLC, or TCLP regulatory limits, the De-leading Sub-Contractor shall dispose of all of that type of material in accordance with regulations for hazardous material.
- D. De-leading Sub-Contractor shall submit written manifest to Owner prior to removing any waste from site and shall submit complete manifest to Owner after waste is disposed at the approved landfill.
- E. For waste disposal and classification, the following documents are made applicable and part of this Section: 40 CFR 241, -257, -261, -262, and 49 CFR 172, -173, -178, and -179.

3.8 DISPOSAL OF NON-HAZARDOUS CONTAMINATED SOLID WASTE

- A. The De-leading Sub-Contractor shall place lead-based paint chips, debris, and lead dust in double six-mil polyethylene bags that are air-tight and puncture resistant. Pieces of wood or other types of substrates that do not fit into plastic bags shall be wrapped and labeled "DANGER, LEAD DUST".
- B. De-leading Sub-Contractor shall place all disposable cleaning materials, such as sponges, mop heads, filters, disposable clothing in double 6-mil plastic bags and seal.
- C. De-leading Sub-Contractor shall clean surfaces and equipment and bag large debris. De-leading Sub-Contractor shall then remove plastic sheeting and tape from covered surfaces. Prior to removing the plastic sheeting, De-leading Sub-Contractor shall lightly mist the sheeting in order to keep dust down and fold inward to form tight bundles to bag for disposal. De-leading Sub-Contractor shall place all plastic sheeting in double 6-mil thick plastic bags and seal. Any bags shall be labeled "Danger, Lead Dust".
- D. De-leading Sub-Contractor shall bag and seal vacuum bags and filters in double 6-mil thick plastic bags.
- E. De-leading Sub-Contractor shall place all contaminated clothing or work area clothing used during abatement, in plastic bags for disposal prior to leaving the work area.

- F. De-leading Sub-Contractor shall place caustic paste residues in drums made out of materials that cannot be dissolved or corroded by chemicals. Caustic and acid waste must be segregated and not stored in the same containers.
- G. De-leading Sub-Contractor shall contain and properly dispose of all liquid waste, including lead-dust contaminated waste water.
- H. De-leading Sub-Contractor shall HEPA vacuum the exterior of all liquid waste containers. Prior to removing the waste containers from the work area, and wet wipe the containers to ensure that there is no residual contamination. Containers shall then be moved out of the work area into the designated storage area.
- I. De-leading Sub-Contractor shall carefully place the containers into the truck or dumpster used for disposal.
- J. De-leading Sub-Contractor shall ensure that all waste is transported in covered vehicles to a landfill, or lined landfill, if available, in accordance with applicable United States Department of Transportation (DOT) and EPA Regulations.
- K. De-leading Sub-Contractor shall submit to Owner, the waste transfer procedure and route, and shall comply with all EPA and DOT regulations concerning hazardous and non-hazardous waste removal and transportation. If a De-leading Sub-Contractor is utilized for the disposal procedure, De-leading Sub-Contractor shall submit for Owner's approval, the Sub-Contractor qualifications to perform the work as specified in this Specification. De-leading Sub-Contractor shall be responsible for all actions of the waste hauler as pertaining to waste removal and disposal under this Section.

3.9 DISPOSAL OF HAZARDOUS WASTE

- A. De-leading Sub-Contractor and transporting Sub-Contractor will be required to comply with the RCRA and with all applicable state and local regulations.
- B. De-leading Sub-Contractor shall comply with all EPA regulations.
- C. De-leading Sub-Contractor shall place caustic paste residues in drums made out of materials that cannot be dissolved or corroded by chemicals. Caustic and acid waste must be segregated from each other and cannot be stored in the same containers. Other materials testing as hazardous shall be prepared for disposal as follows:
 - 1. Packaged and sealed in containers approved under 49 CFR 173, -178, and -199.
 - 2. Containers shall be numbered to correspond to the seal number, labeled with the type of materials, date it was filled and sealed, seal number, weight of sealed container in addition to the information required under 49 CFR 172.
 - 3. A log shall be prepared at time of filling, identifying each numbered container and the information from "b" above. A copy of this log shall be turned over to the Industrial Hygienist within 3 working days after the containers are filled.
 - 4. Name, location and telephone number of the disposal site used. A copy of the sites state and locally issued license, and a signed agreement that they will accept the hazardous lead waste, shall be provided to the Industrial Hygienist.

5. Name, address and telephone number of any waste Sub-Contractors used. Provide copies of licenses and signed agreements to the Industrial Hygienist.
 6. Submit copies of the Hazardous Waste manifest as required by these specifications.
- D. Waste Containers: De-leading Sub-Contractor will comply with EPA and DOT regulations for containers. De-leading Sub-Contractor shall contact state and local authorities to determine their criteria for containers, with such information presented to the Owner and Industrial Hygienist. The more stringent regulation shall apply.
- E. Waste Transportation: If the De-leading Sub-Contractor is not a certified hazardous waste transporter, a contract shall be entered into with a certified transporter to move the waste who shall be at the approval of Owner. De-leading Sub-Contractor shall require the certified hazardous waste transport to follow RCRA and DOT regulations.
- F. Prior to the removal of any hazardous waste the below listed information must be received in writing to the Industrial Hygienist and Owner for their review and approval. Once approval is received by the De-leading Sub-Contractor from the Industrial Hygienist, the waste may be transported as required.
1. Quantity of Hazardous Waste.
 2. Type of Waste Materials.
 3. Method of Containerizing Waste or Waste Treatment and appropriate licensing, certification and regulatory approvals.
 4. Proposed Waste Hauler and Disposal Route.
 5. Proposed Waste Disposal Site or Landfill.
- G. Receipts from the Waste Hauler and waste disposal site or landfill must be received and approved by Owner and Industrial Hygienist prior to approval of completion of the applicable phase of work.

3.10 COST FOR DISPOSAL OF HAZARDOUS WASTE

- A. The cost for the correct disposal of all waste of this project shall be included in the Total Base Bid, including the lead abatement waste to be disposed of as hazardous waste based upon TTLC, STLC, and TCLP testing as outlined in this section, and according to 40 CFR 241, -261, and -262.

The cost for the disposal as hazardous waste shall include all fees, permits, labor, materials, profit, overhead, waste transfer costs, and all other costs incidental of hazardous disposal.

- B. De-leading Sub-Contractor shall submit to its approved laboratory for testing, samples of each type of component removed as part of the work of this project. General Contractor's total base bid shall include minimum requirements of the testing of materials referred to in this Section. In addition to these materials, General Contractor's base bid shall include the cost of two samples of each type component that was not removed in the sample dwelling units but will be removed during the project.
- C. Any additional TTLC, STLC, and TCLP testing requested by the Owner shall be at cost agreed to between Owner and Sub-Contractor. This cost shall be based upon required turnaround time for sample analysis results, and upon type of analysis requested. Sub-Contractor shall provide a minimum of three (3) competitive prices for review by Owner.

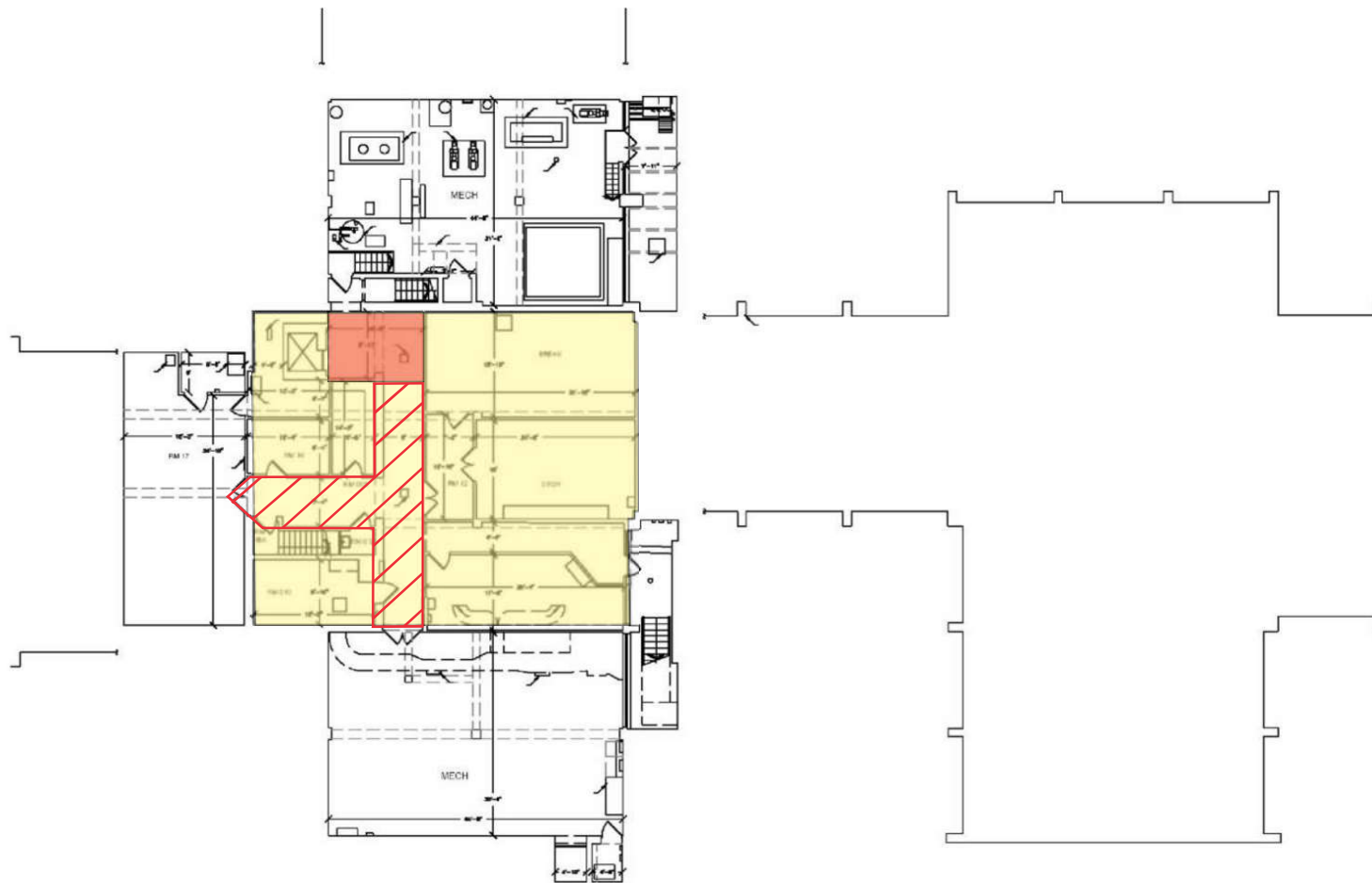
General Contractor shall apply for payment for additional testing costs under proper change order procedures as defined in the Contract Documents. The acceptance of the application for change order is subject to the review and approval of the Owner.

END OF SECTION II

**Sunnyvale Civic Center
Abatement Specification Appendices:**


**Appendix Section I - Asbestos Abatement Maps
Appendix Section II - Lead Abatement Maps**

Appendix Section I - Asbestos Abatement Maps



LEGEND

 POTENTIAL AREAS OF CH-15

 CH-16: (12" X 12" RED/BLACK STREAKED VINYL FLOOR TILE WITH BLACK MASTIC)

 CH-15: (9" X 9" BROWN/BROWN-STREAKED VINYL FLOOR TILE WITH BLACK MASTIC)

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FIGURE 1
SUNNYVALE CIVIC CENTER
CITY HALL BASEMENT
ACM ABATEMENT DIAGRAM
 456 WEST OLIVE AVENUE
 SUNNYVALE, CALIFORNIA

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DATE: 8/25/2020

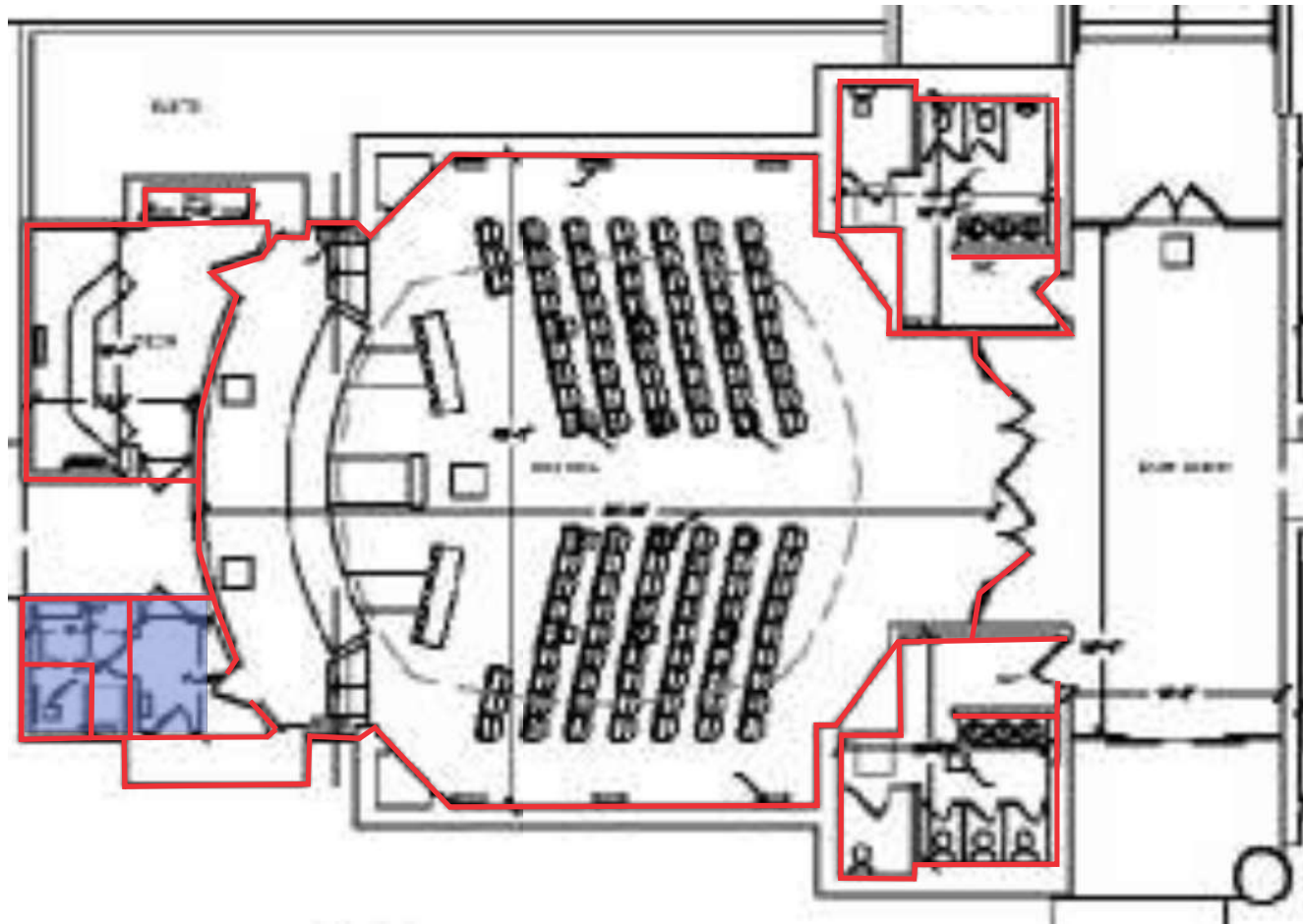
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FILE: SITE PLAN





LEGEND

- CH-1 DRYWALL
- CH-2 (12" x 12") TAN VINYL FLOOR TILE WITH WHITE STRIPES AND BLACK MASTIC)

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FIGURE 2
SUNNYVALE CIVIC CENTER
CITY HALL WEST COUNCIL AUDITORIUM
ACM ABATEMENT DIAGRAM
 456 WEST OLIVE AVENUE
 SUNNYVALE, CALIFORNIA



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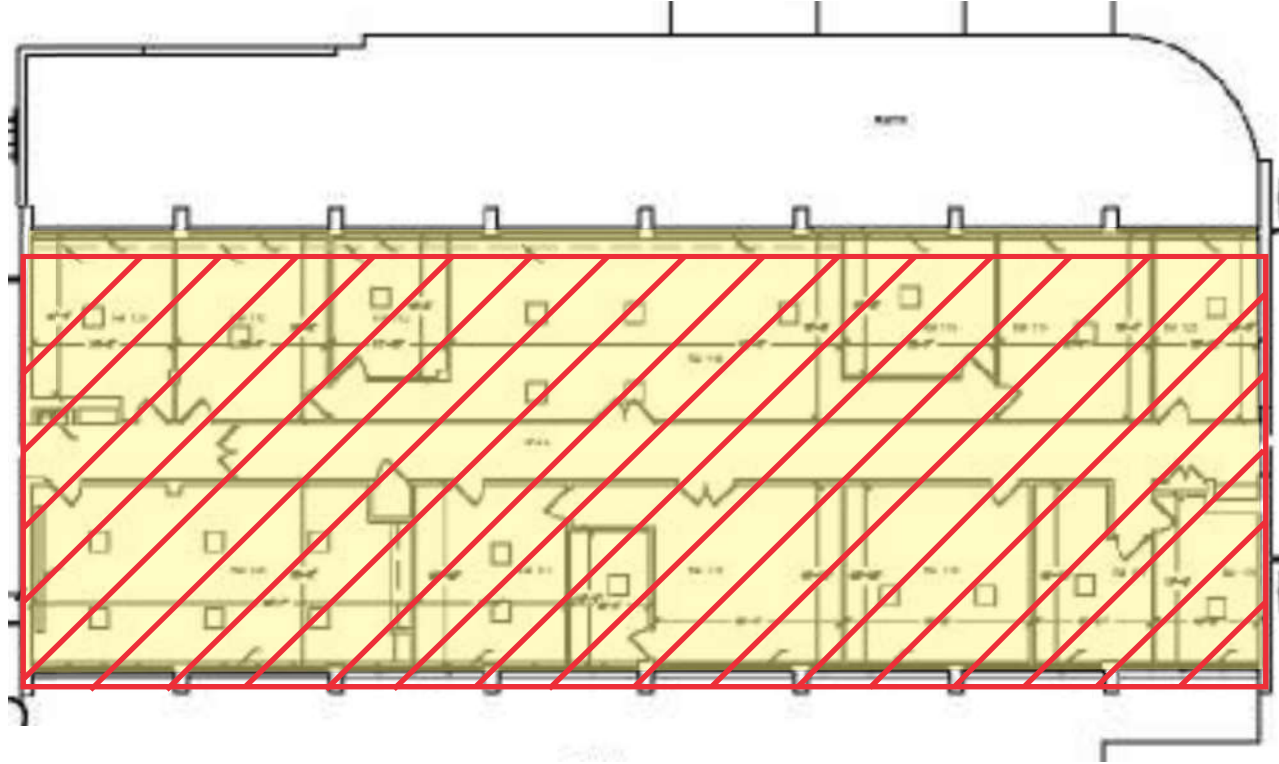
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LEGEND

 POTENTIAL AREAS OF CH-15 (9" X 9" BROWN/BROWN-STREAKED VINYL FLOOR TILE)

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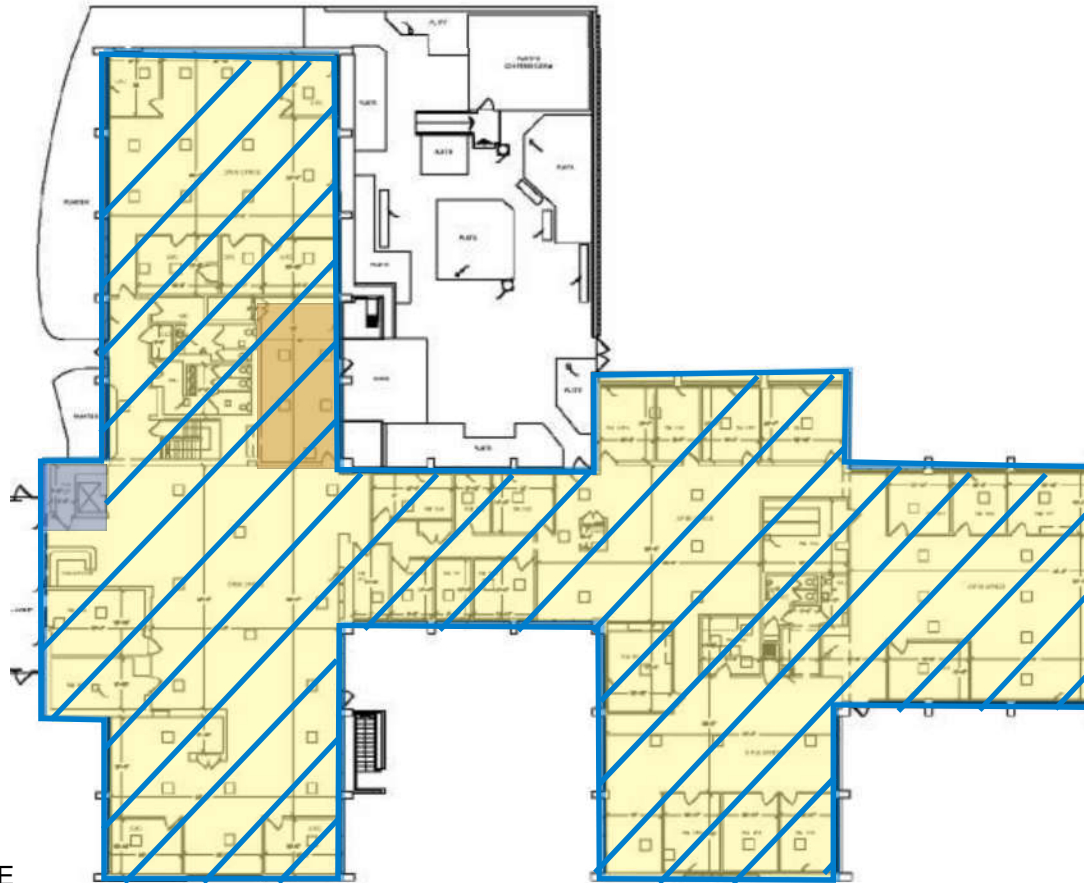
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FIGURE 3
SUNNYVALE CIVIC CENTER
CITY HALL WEST HALL AREA
ACM ABATEMENT DIAGRAM
 456 WEST OLIVE AVENUE
 SUNNYVALE, CALIFORNIA





LEGEND

- CH-17: 12" GREEN FLOOR TILE
- CH-15: 9" BROWN VINYL FLOOR TILE
AND CH-14: MASTIC UNDER CARPET)
- CH-29: TAN CERAMIC PATTERN FLOOR TILE

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FIGURE 4
SUNNYVALE CIVIC CENTER
CITY HALL EAST OFFICE AREA
ACM ABATEMENT DIAGRAM
 456 WEST OLIVE AVENUE
 SUNNYVALE, CALIFORNIA



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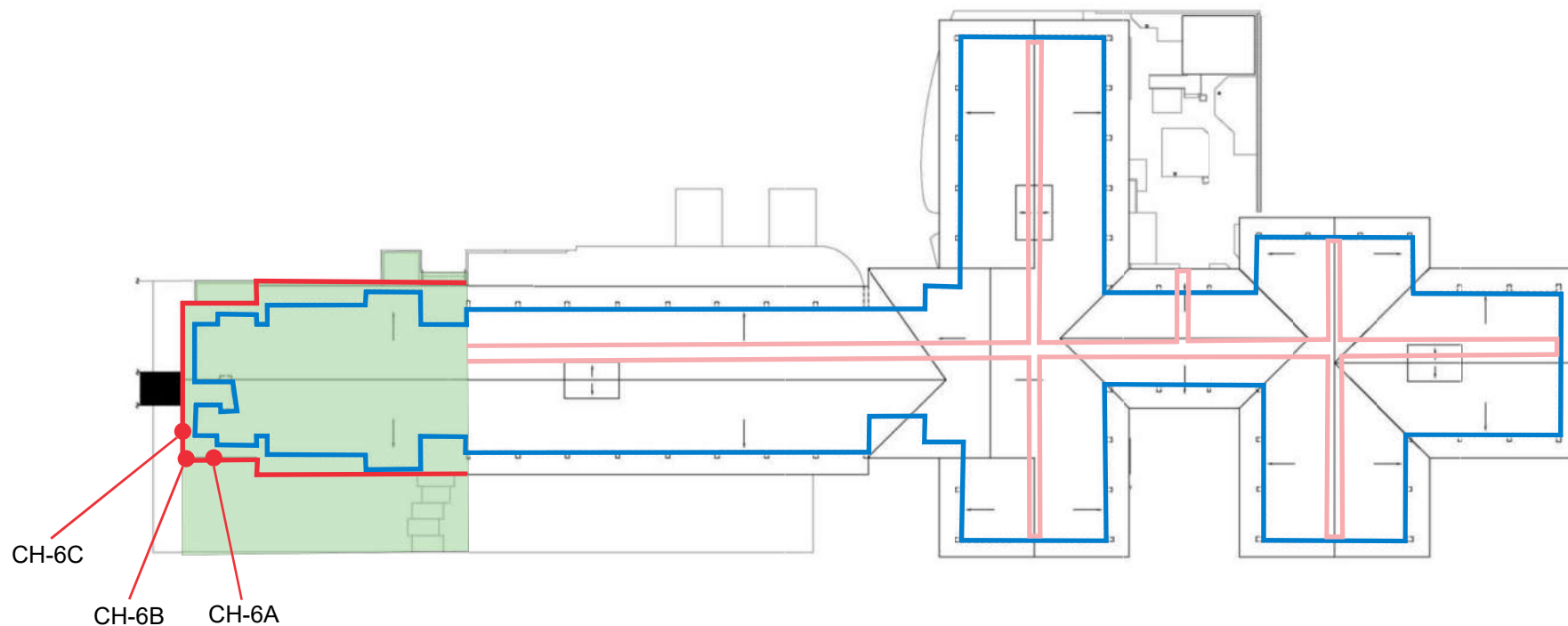
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LEGEND

- ATTIC AREA BETWEEN FLOOR AND ROOF
- POSITIVE ASBESTOS SAMPLE NUMBER/LOCATION
- POTENTIAL BUILDING PENETRATION MASTIC AREA
- CH-39 EXTERIOR CEMENTITIOUS WALL PANEL
- POTENTIAL AREAS OF THERMAL SYSTEM INSTALLATION

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FIGURE 5
SUNNYVALE CIVIC CENTER
CITY HALL ROOF
ACM ABATEMENT DIAGRAM
 456 WEST OLIVE AVENUE
 SUNNYVALE, CALIFORNIA

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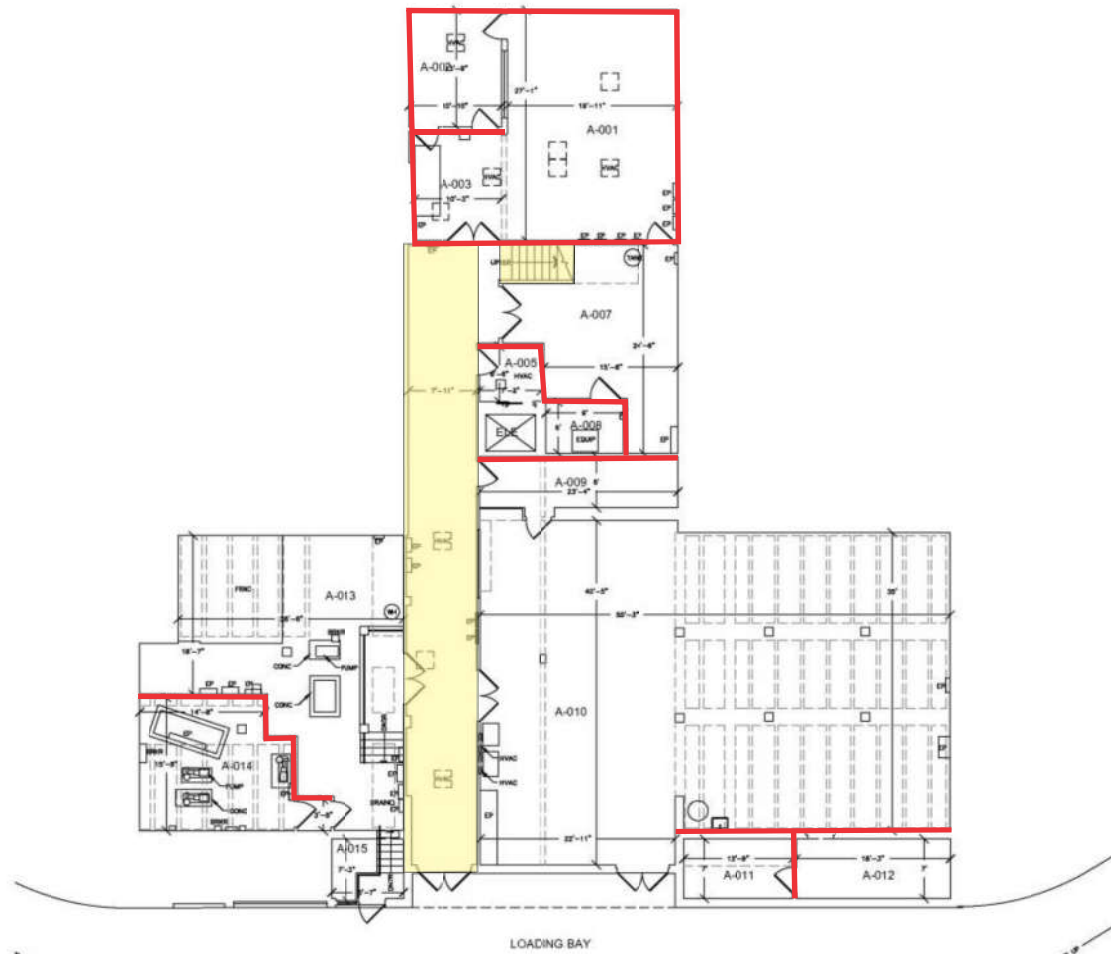
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LEGEND

- ABATEMENT AREA
- CHA-3: DRYWALL

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FIGURE 6
SUNNYVALE CIVIC CENTER
CITY HALL ANNEX - BASEMENT
ACM ABATEMENT DIAGRAM
 456 WEST OLIVE AVENUE
 SUNNYVALE, CALIFORNIA



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LEGEND



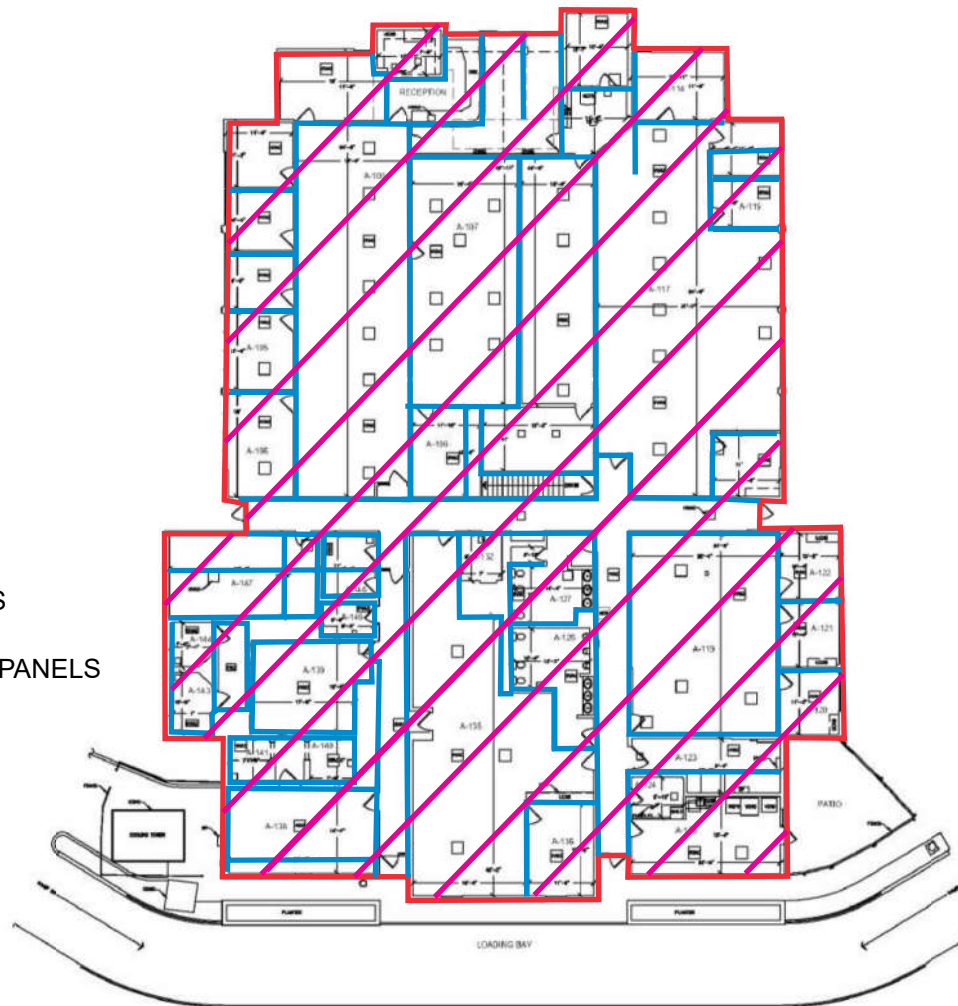
CH-1: MASTIC UNDER CARPET SQUARES



CH-27: EXTERIOR CEMENTITIOUS WALL PANELS



CHA-3: DRYWALL AND CHA-4: TEXTURE



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FIGURE 7
SUNNYVALE CIVIC CENTER
CITY HALL ANNEX - GROUND FLOOR
MATERIAL DIAGRAM
 456 WEST OLIVE AVENUE
 SUNNYVALE, CALIFORNIA



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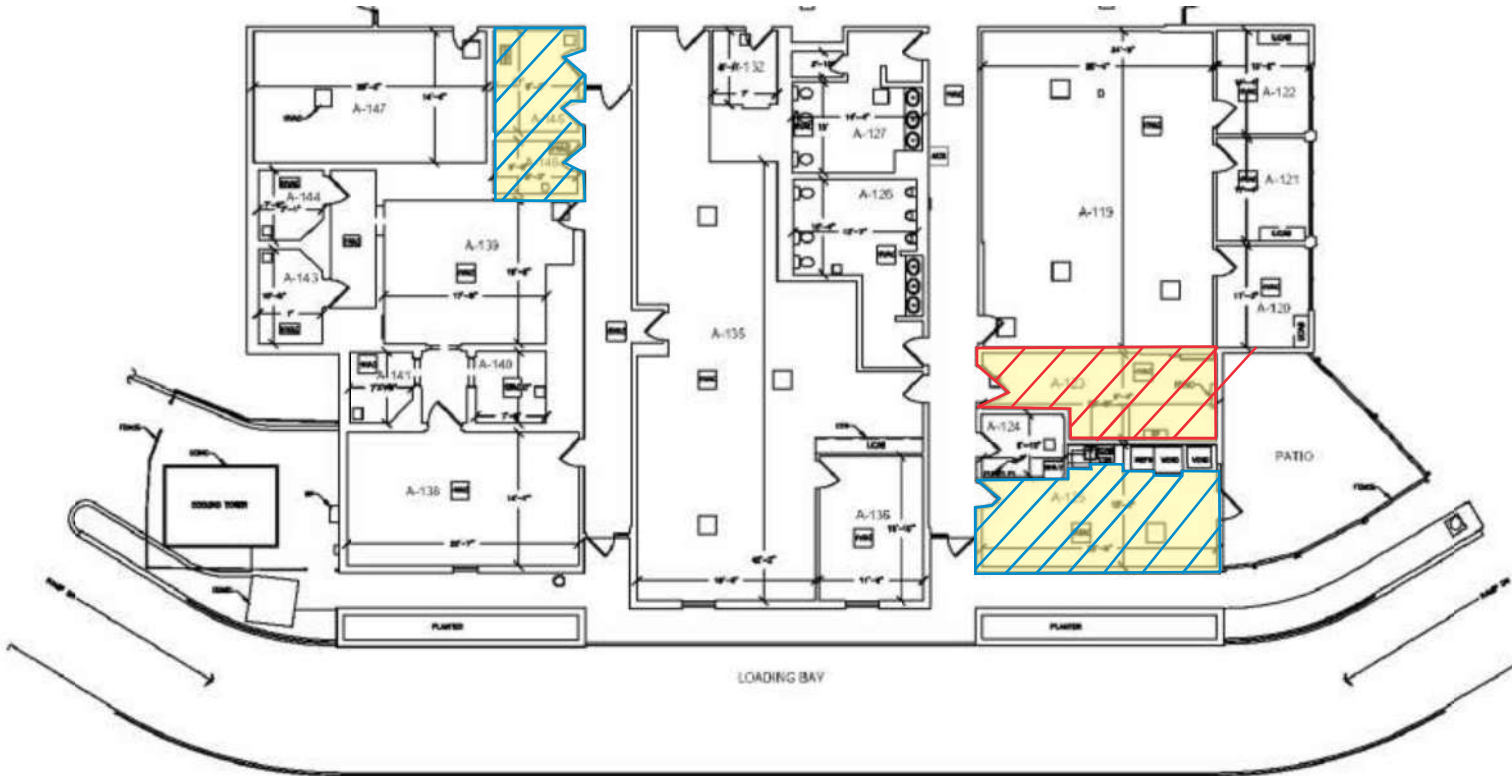
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LEGEND



CHA-10 (12" X 12" WHITE/BROWN-STREAKED FLOOR TILE WITH BLACK MASTIC)



CHA-5 (9" X 9" FAKE CERAMIC PATTERN VINYL FLOOR TILE WITH BLACK MASTIC)

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FIGURE 8
SUNNYVALE CIVIC CENTER
CITY HALL ANNEX - GROUND FLOOR
ACM ABATEMENT DIAGRAM
 456 WEST OLIVE AVENUE
 SUNNYVALE, CALIFORNIA



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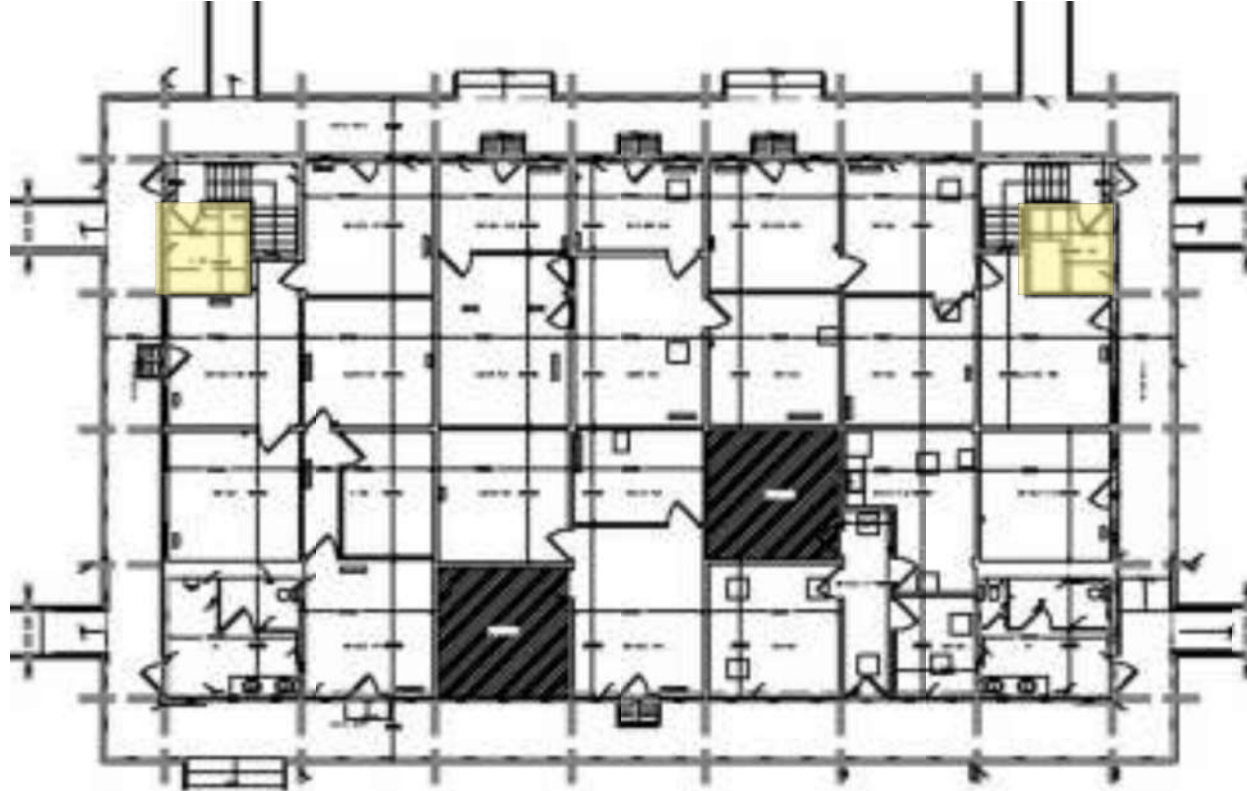
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LEGEND

 ABATEMENT AREA - SOC-15: TAN 9" VINYL FLOOR TILE AND BLACK MASTIC

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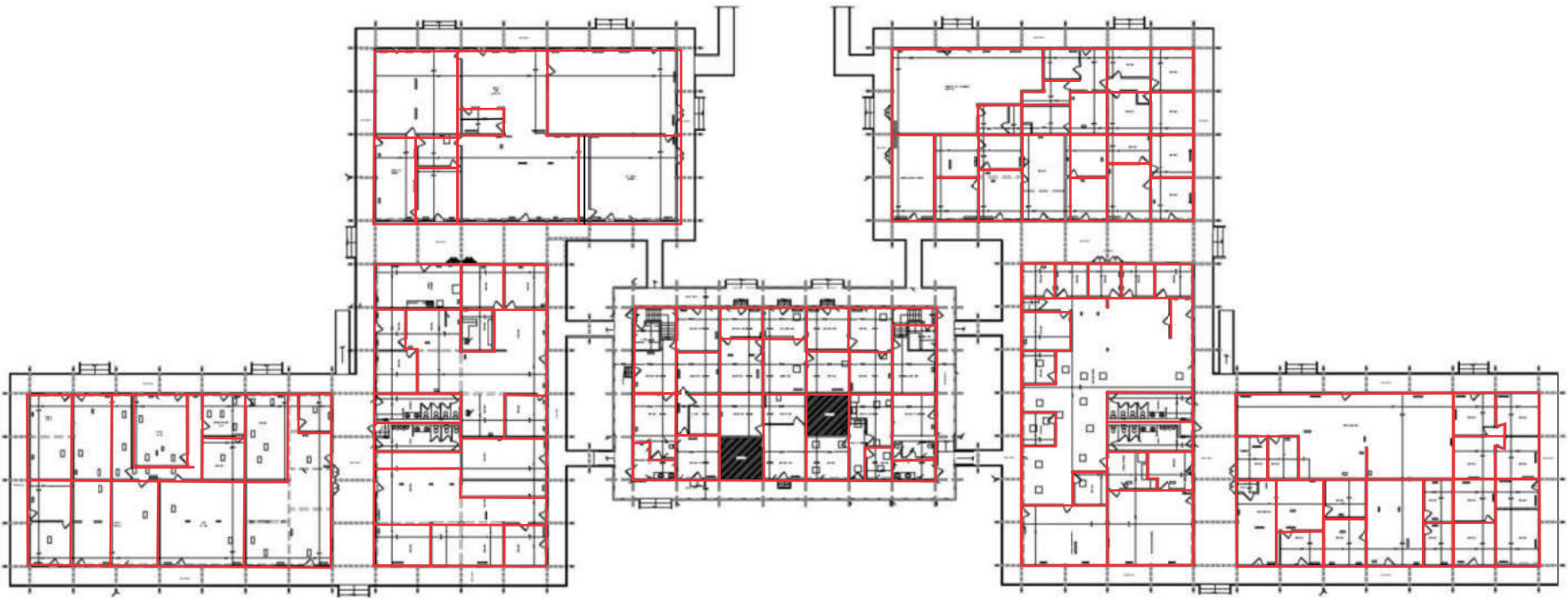
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FIGURE 9
SUNNYVALE CIVIC CENTER
SUNNYVALE OFFICE COMPLEX - GROUND FLOOR
MIDDLE BUILDING
ABATEMENT DIAGRAM
 456 WEST OLIVE AVENUE
 SUNNYVALE, CALIFORNIA





LEGEND

— DRYWALL (SOC-6)

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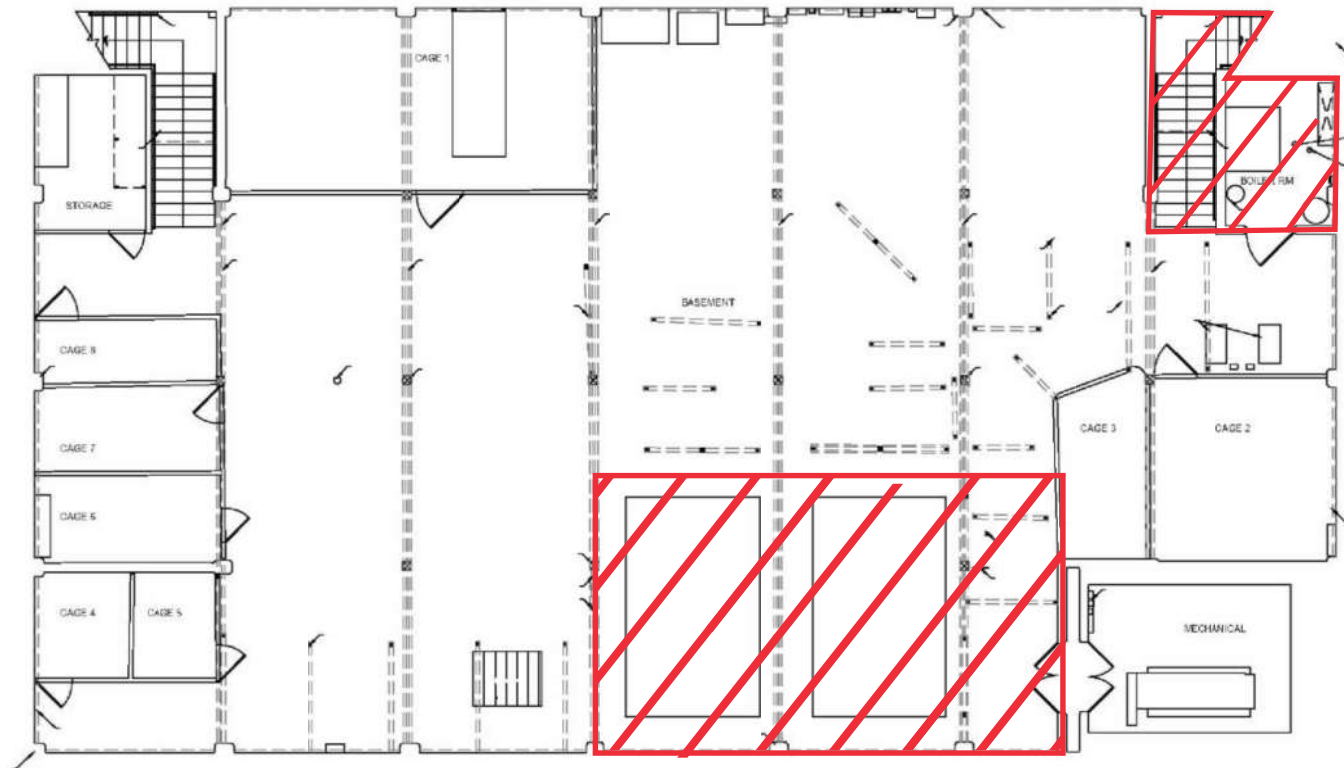
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FIGURE 10
SUNNYVALE CIVIC CENTER
SUNNYVALE OFFICE COMPLEX - GROUND FLOOR
MATERIAL DIAGRAM
 456 WEST OLIVE AVENUE
 SUNNYVALE, CALIFORNIA





LEGEND

 ABATEMENT AREA - SOC-16: THERMAL
SYSTEM INSULATION PIPE ELBOW PACKING

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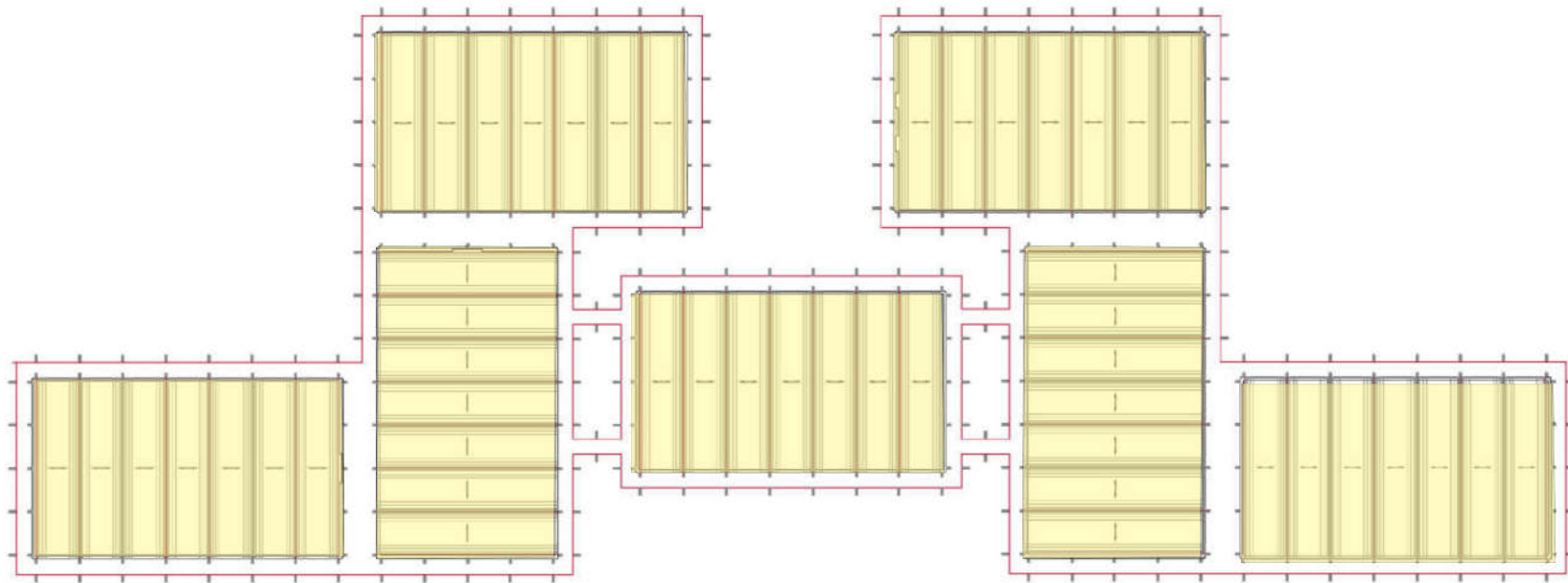
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FIGURE 11
SUNNYVALE CIVIC CENTER
SUNNYVALE OFFICE COMPLEX -
WING 400 - BASEMENT
MATERIAL DIAGRAM
456 WEST OLIVE AVENUE
SUNNYVALE, CALIFORNIA





LEGEND



ABATEMENT AREA - SOC-25: POPCORN CEILING UNDER ROOFS

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FIGURE 12
SUNNYVALE CIVIC CENTER
SUNNYVALE OFFICE COMPLEX - ROOF
ABATEMENT DIAGRAM
 456 WEST OLIVE AVENUE
 SUNNYVALE, CALIFORNIA

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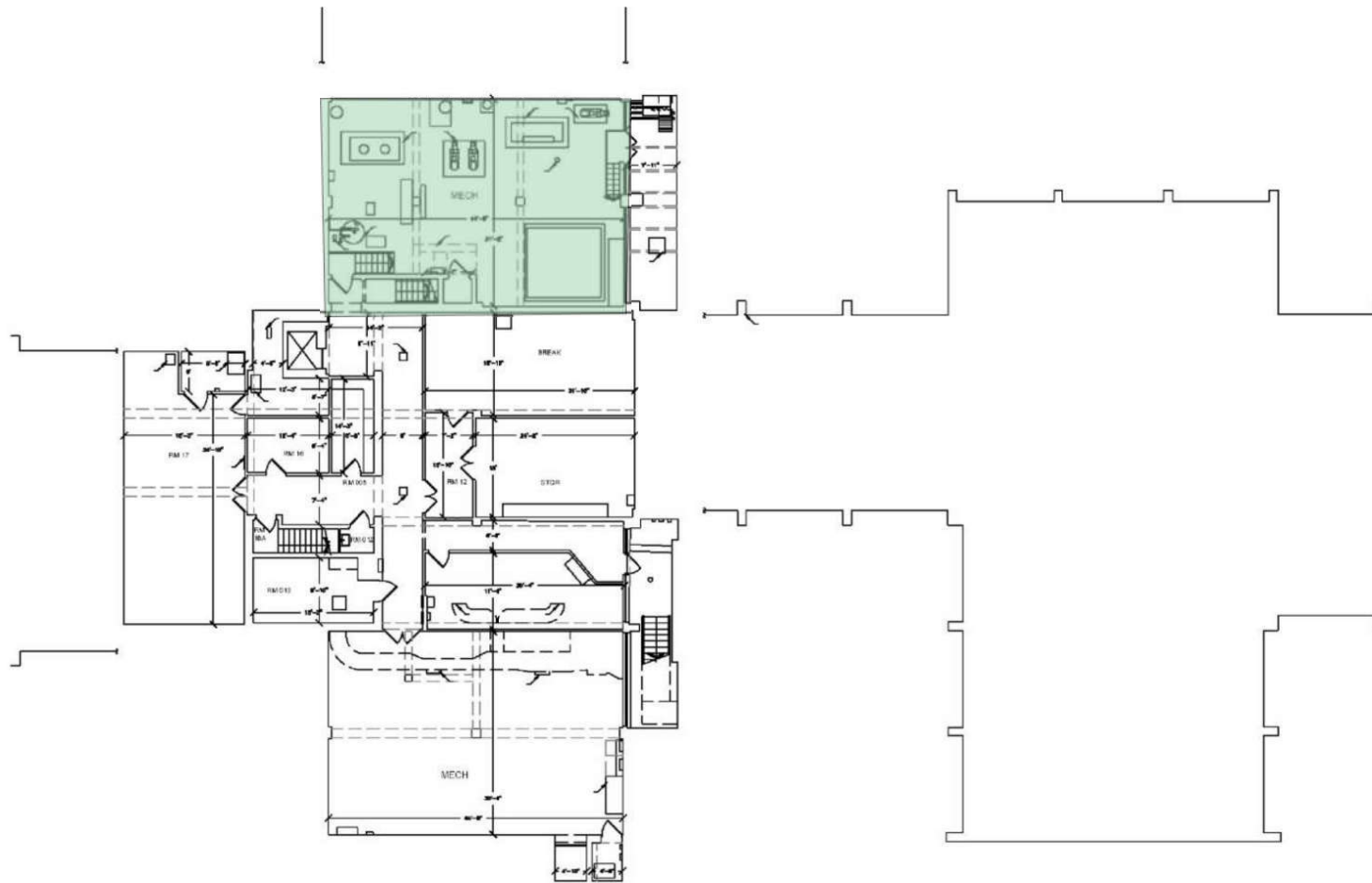
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Appendix Section II - Lead Abatement Maps



LEGEND

GREY PAINT ON CONCRETE
 AND WHITE PAINT ON DUCT

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FIGURE 1
SUNNYVALE CIVIC CENTER
CITY HALL BASEMENT
LEAD MATERIALS DIAGRAM
 456 WEST OLIVE AVENUE
 SUNNYVALE, CALIFORNIA

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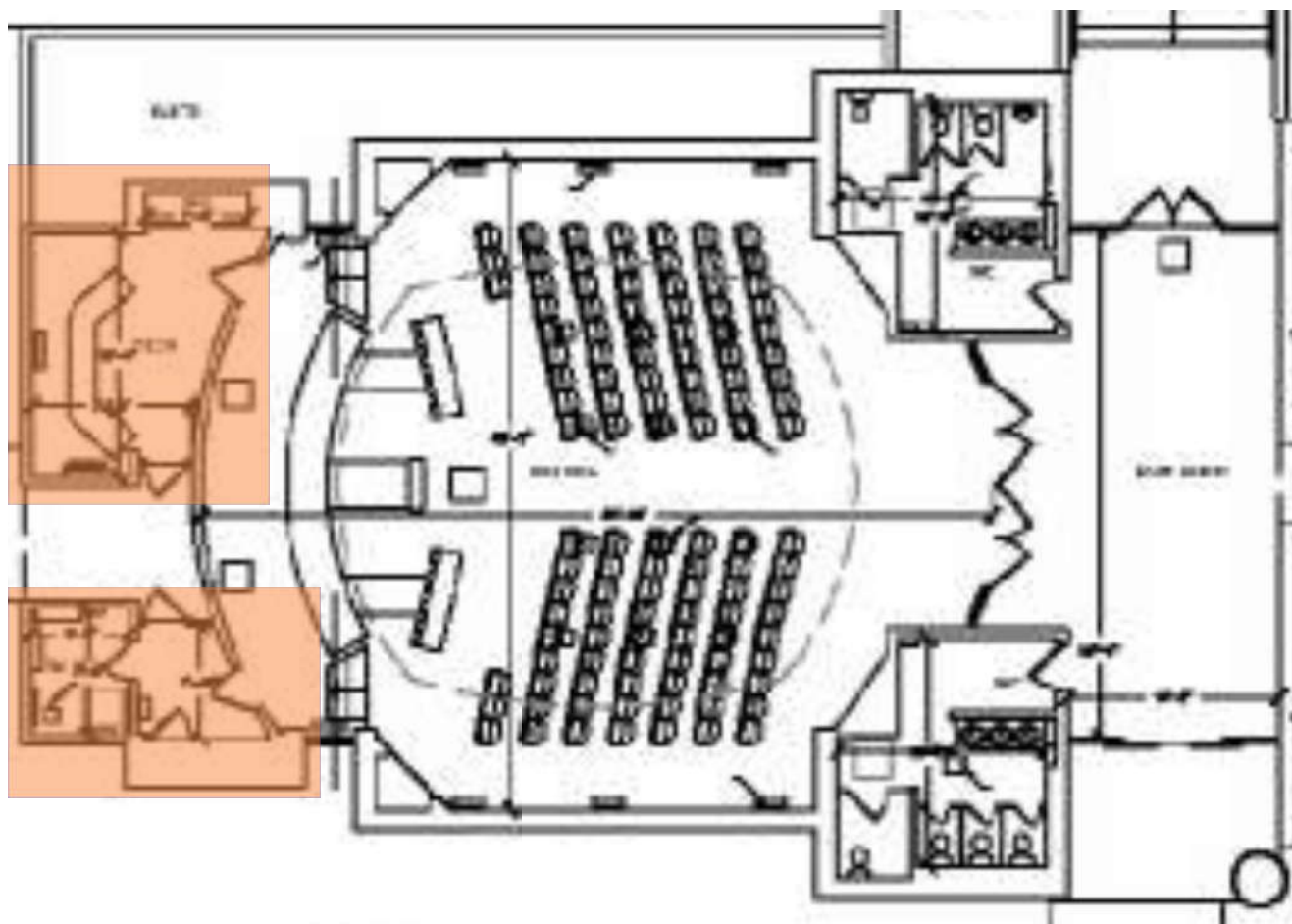
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LEGEND

 WHITE PAINT ON DRYWALL

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FIGURE 2
SUNNYVALE CIVIC CENTER
WEST COUNCIL AUDITORIUM
LEAD MATERIAL DIAGRAM
 456 WEST OLIVE AVENUE
 SUNNYVALE, CALIFORNIA

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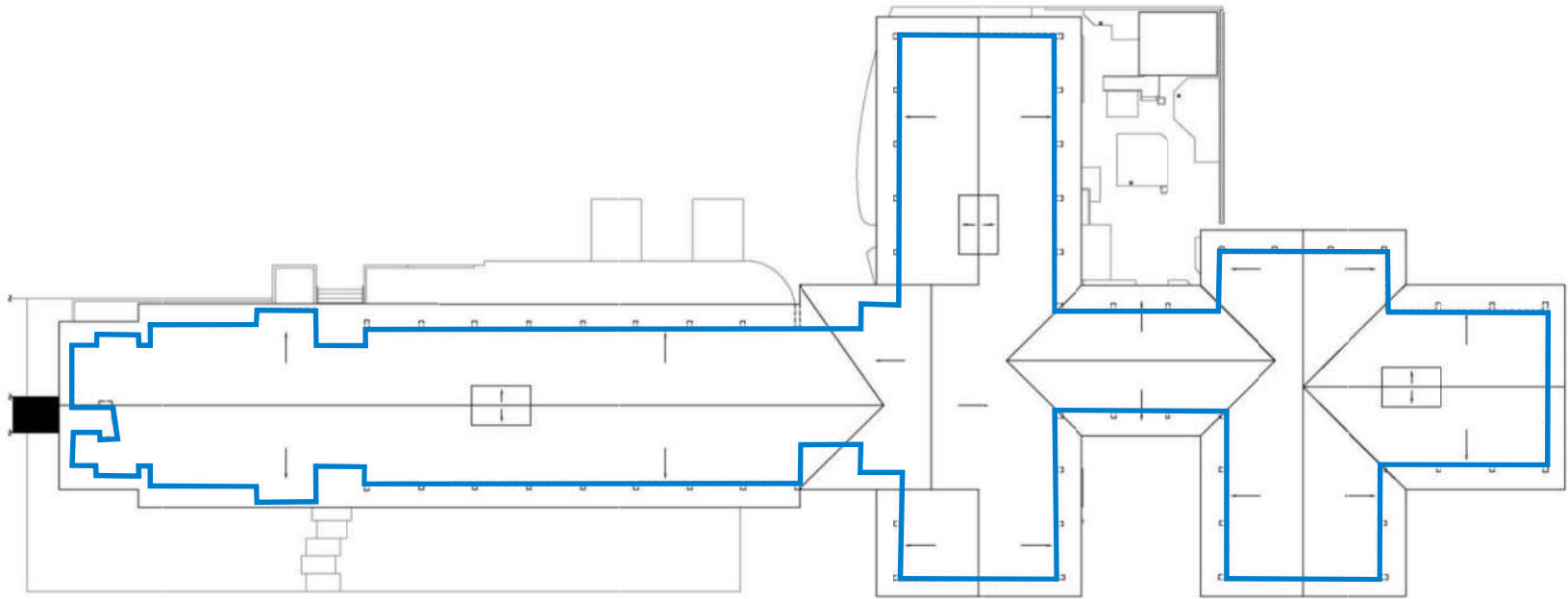
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LEGEND

— DARK BROWN PAINT ON WOOD
AND TAN PAINT ON CONCRETE

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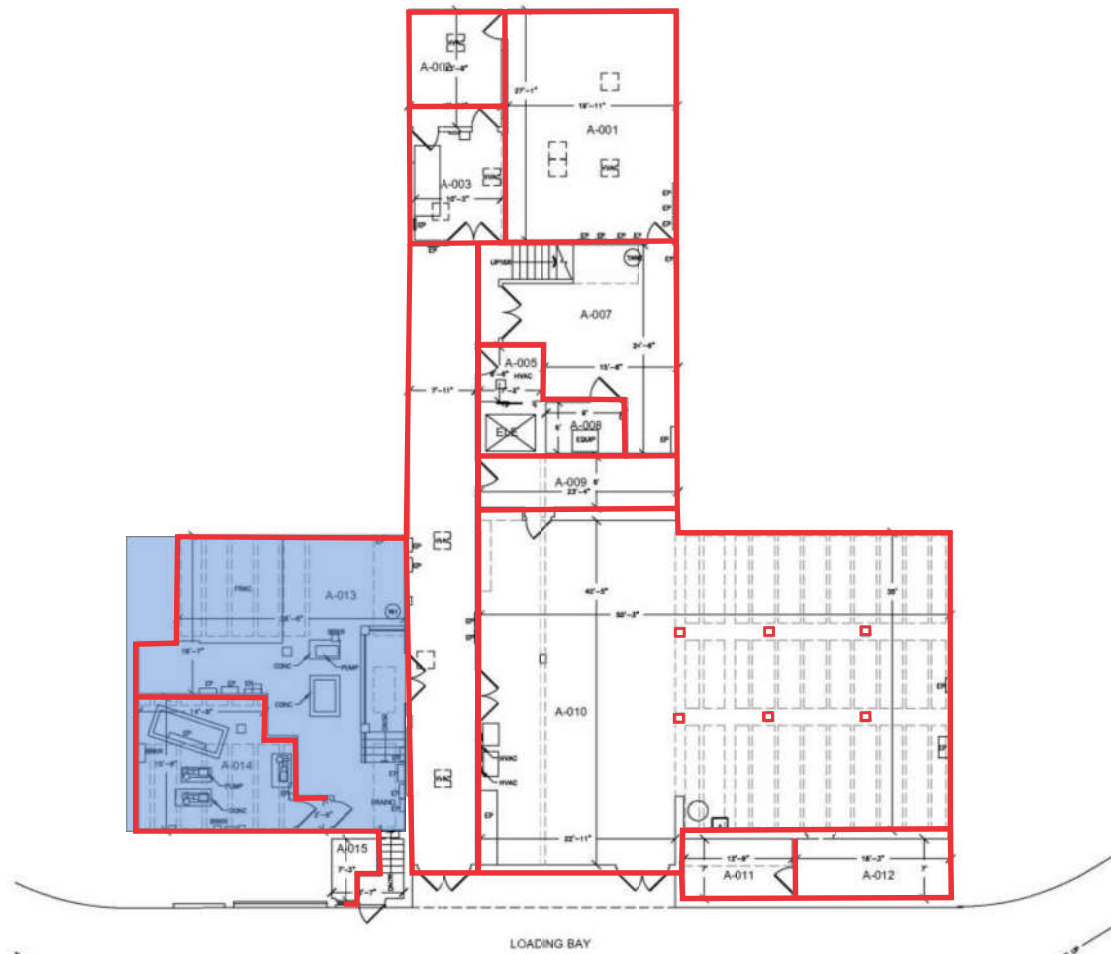
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FIGURE 3
SUNNYVALE CIVIC CENTER
CITY HALL ROOF
LEAD MATERIAL DIAGRAM
456 WEST OLIVE AVENUE
SUNNYVALE, CALIFORNIA





LEGEND



GRAY EPOXY



WHITE AND/OR BEIGE LEAD CONTAINING PAINT

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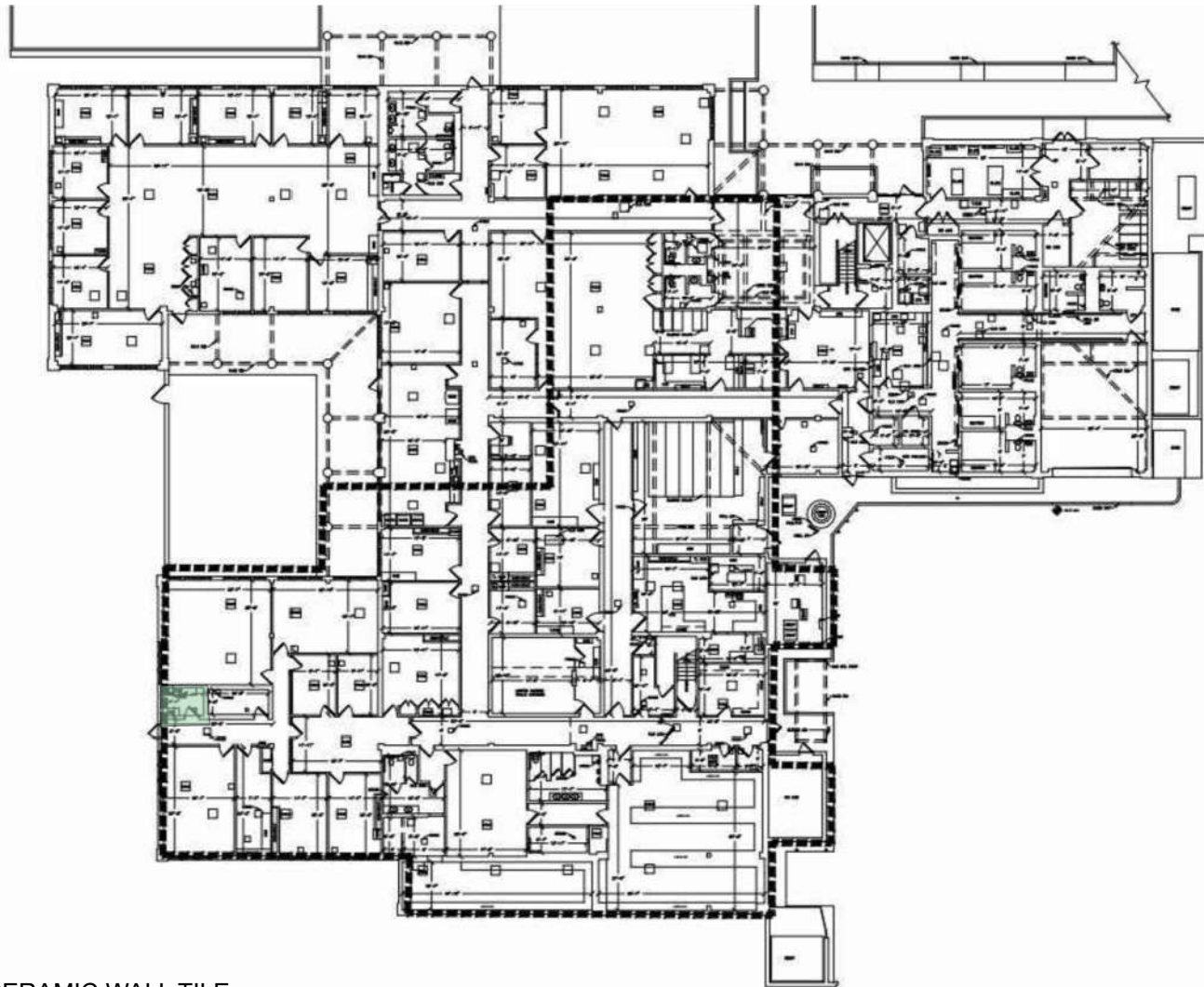
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FIGURE 4
SUNNYVALE CIVIC CENTER
CITY HALL ANNEX - BASEMENT
LEAD MATERIAL DIAGRAM
 456 WEST OLIVE AVENUE
 SUNNYVALE, CALIFORNIA





LEGEND

 14" x 18" TAN CERAMIC WALL TILE

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FIGURE 6
SUNNYVALE CIVIC CENTER
PUBLIC SAFETY BUILDING - GROUND FLOOR
LEAD MATERIALS DIAGRAM
 456 WEST OLIVE AVENUE
 SUNNYVALE, CALIFORNIA

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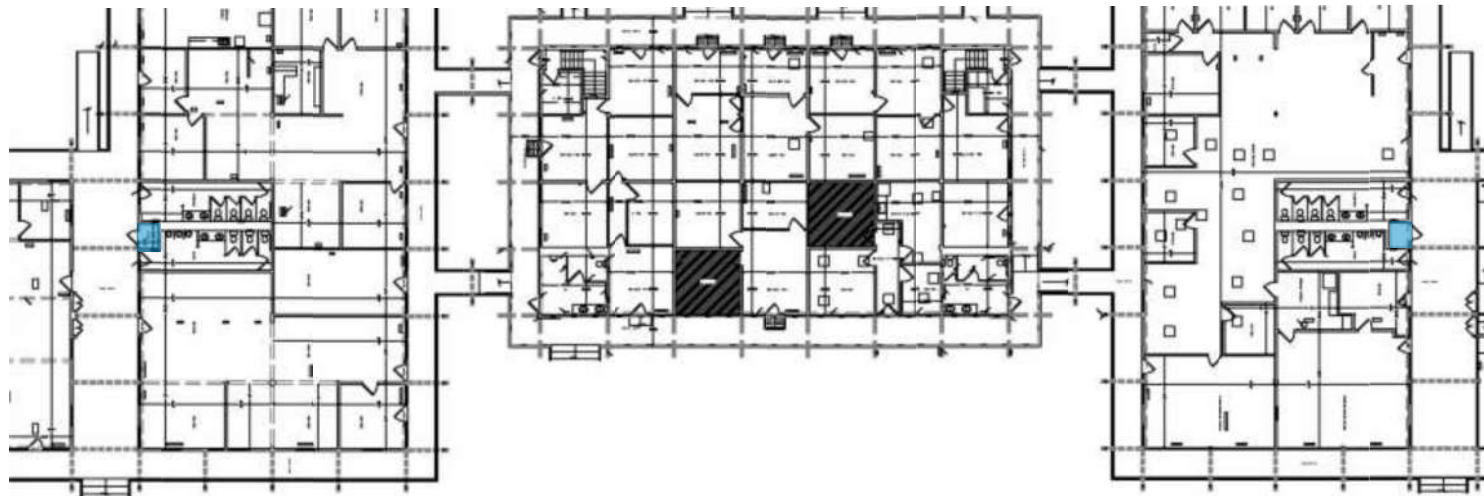
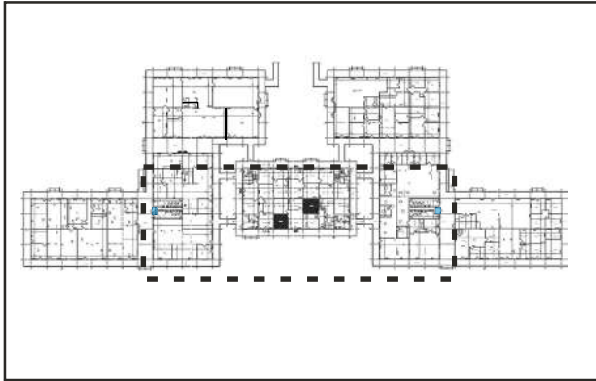
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LEGEND



WHITE PAINT ON DUCT

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FIGURE 7
SUNNYVALE CIVIC CENTER
SUNNYVALE OFFICE COMPLEX - GROUND FLOOR
LEAD MATERIAL DIAGRAM
 456 WEST OLIVE AVENUE
 SUNNYVALE, CALIFORNIA



**SECTION III
PCB CONTAINING MATERIALS
ABATEMENT SPECIFICATIONS**

PART 1 - GENERAL

DESCRIPTION OF WORK

- A. Quantity of materials to be removed: No Polychlorinated Biphenyls (PCB)-containing materials sampling has been performed. The Contractor will need to perform a PCB survey to inventory PCB-containing materials present at the site prior to demolition. The survey should be performed according to the Bay Area Stormwater Management Agencies Association (BASMAA) *PCB's in Priority Building Materials: Model Screening Assessment Applicant Package, Attachment C: Protocol for Evaluating Priority PCBs Containing Materials Before Demolition*.

According to BASMAA, the following materials are considered priority building materials:

1. Caulks and Sealants
 2. Thermal/Fiberglass Insulation and Other Insulating Materials
 3. Adhesive/Mastic
 4. Rubber Window Seals/Gaskets
- B. Any PCB work should be reported to the State of California Department of Toxic Substance Control. Although DTSC is a lead regulatory agency for site cleanups in California, engagement with the U.S. Environmental Protection Agency (U.S. EPA) is required when addressing PCB-contaminated sites. Since Toxic Substances Control Act (TSCA) PCB regulations are not delegated, United States Environmental Protection Agency (EPA) is the regulatory lead for the cleanup of PCBs under the TSCA PCB cleanup requirements in 40 CFR 761. For more details, see Section A(4)(e), PCB FAST (PCB Facility Approval Streamlining Toolbox.)
- C. This section applies to only PCB-containing exterior expansion joint and window caulking, PCB-containing soil, and PCB-containing light ballasts to be removed, transported and disposed in an off-site United States Environmental Protection Agency (EPA)-approved treatment, storage and disposal facility, approved for handling PCBs. Based on the EPA's PCB Reinterpretation for Caulking in 2014, the caulking, foam and concrete materials can be treated as "PCB Bulk Waste". Contractors must provide or make arrangements for drums, containers, transportation and disposal of PCB and contaminated items. Contractor will be responsible for the removal, containerizing, temporary storage, transportation and disposal of PCB-containing light ballasts, PCB contaminated fixture components.
1. Remove and dispose of all exterior caulking/sealant, foam, rubber joint materials on windows, doors, foundation, sidewalk joints, concrete panels and concrete entry foundation and caulking materials along the perimeter of the windows and doors;
 2. Remove and dispose of concrete in contact with caulking on exterior concrete panels to a minimum depth of two inches;
 3. Remove and dispose of PCB impacted soil along the perimeter of the building and in landscape areas;
 4. Remove and dispose of light ballasts;

Exterior caulking and insulation foam and rubber will be removed prior to demolition. Handling and disposal of PCB-containing exterior caulking must be in accordance with the EPA PCB Regulations, 40 CFR 761.

Disposal in solid waste landfills - PCB bulk product waste may be disposed of in non-hazardous waste landfills as permitted. Disposal under this option does not require EPA approval. However, contractor is responsible to check State regulations, which may prohibit or limit disposal of PCB bulk product waste in solid waste landfills. Contract shall confirm prior to shipment that the landfill is willing and able to accept the PCB waste. Contractor sending PCB bulk product waste to a non-hazardous waste landfill permitted by a state must send written notice to the landfill prior to shipment of the waste stating that the waste contains PCBs at greater than 50 ppm (see [40 CFR 761.62\(b\)\(4\)\(ii\)](#)). Handling and disposal of PCB-containing exterior caulking must be in accordance with the EPA PCB Regulations, 40 CFR 761.

Disposal in solid waste landfills - PCB bulk product waste may be disposed of in non-hazardous waste landfills as permitted by local, state, and federal rules. Contractor to determine disposal location and provide information to Environmental Consultant/Owner for review.

- D. Soils identified as PCB-Impacted soil will be removed prior to demolition. Handling and disposal of PCB-contaminated soil must be in accordance with the EPA PCB Regulations, 40 CFR 761. Following removal, confirmation soil samples will be collected to confirm removal of PCB-contaminated soil.
- E. Light fixtures will be removed prior to demolition and inspected for “No PCBs” labeling. Ballasts without “No PCBs” labels will be considered to be PCB-containing. Handling and disposal of PCB-containing light ballasts must be in accordance with the EPA PCB Regulations, 40 CFR 761. Ballasts with “No PCBs” labels may still have the potential to contain diethylhexyl phthalate (DEHP), a hazardous substance listed under the federal Resource Conservation and Recovery Act (RCRA). All non-PCB ballasts will be recycled accordance with the guidelines established by Federal, State and local protocols. Leaking ballasts cannot be recycled and must be incinerated at a permitted facility.
- F. Potential work of this project includes the following:
 - 1. Removal of the PCB caulking/sealant from exterior concrete panels and concrete foundation. Removal may be done in place (in situ) or following removal from the building (ground removal). The windows will be salvaged so care will need to be given to avoid breaking or damaging the windows during panel and/or PCB caulk removal.

 In Situ Removal - Removal of the PCB caulk and foam and rubber from the affected concrete panels may be done in situ. Safe methods and engineering controls shall be utilized. The proper personal protective equipment (fall protection, respiratory protection, etc.) shall be utilized. The use of plastic drapes or other methods (possibly a negative pressure containment) shall be utilized to prevent dusts from migrating into the building and to capture and debris. Consideration should be given to keeping the building under positive pressure.

 Ground Removal – Upon removal of the panels from the building and placement on the ground. Safe methods and engineering controls shall be utilized. The proper personal protective equipment (respiratory protection, etc.) shall be utilized. The use of negative pressure containment and wet methods – continuous mist shall be utilized to prevent dust exposure to the workers and general environment.
 - 2. Removal of PCB contaminated soils along the perimeter of the buildings. Hand dig or mechanically scrape affected soils, along the perimeter of the building and in the landscape areas to the specified depths. Excavated soils will be placed in properly labelled drums, or a lined and covered dumpster; for transportation and disposal. Proper work methods, engineering controls, and PPE will be utilized during all phases of PCB soil excavation to control dust and limited other potential

hazards. Used PPE (Tyvek, gloves, boot covers, air filters, etc.) will be disposed in a like manner as the soils. Equipment decontamination will be performed onsite and any rinsate will be collected and disposed with the PCB excavated soils.

3. Removal or cleaning of PCB contaminated concrete in areas formerly in contact with PCB caulking/sealant materials.
4. Partial dismantling of light fixtures to allow for removal of ballast from fixture. Pre-work submittal to provide detailed plan to remove, clean, and segregate waste.
5. The Contractor must coordinate the handling, transportation and disposal of PCB Articles and Items. The Contractor must ensure that PCB-related products are handled and transported by appropriate, certified/licensed individuals and companies.
6. Cleaning of any PCB contamination on concrete, window units and light fixture surfaces.
7. Placement of all PCB or PCB-contaminated items generated as a result of work activities in approved disposal containers.
8. Marking and labeling of all PCB Articles and Items for disposal.
9. Light ballasts and any materials that may be PCB contaminated will be managed in accordance with the guidelines established by Federal, State and local protocols. Leaking ballasts cannot be recycled and must be incinerated at a permitted facility and TSCA.

SUBMITTALS

- A. Contractors shall provide to Environmental Consultant/Owner, a complete submittal package for review by the Environmental Consultant including Site Specific Health and Safety Plan, work plan, and waste management plan. Following receipt of review comments, submit additional complete sets of revised submittals. No removal and disposal related work will be permitted prior to submittals being approved by the Environmental Consultant.
- B. Pre-Work Submittals: The Contractor shall submit to the Environmental Consultant/Owner for review and acceptance the Contractor's Work Plan as a prerequisite to issuance of the Notice to Proceed. The Plan must be suitably titled and indexed, providing detailed information concerning the following items as a minimum in the order listed below:
 1. Submit complete lists of all materials and equipment proposed for used in the work. List shall include such items as protective clothing, breathing apparatus, sorbents, and solvents. The Contractor must provide or make arrangements for all waste containers.
 2. Submit listing addresses of Hazardous Materials Cleanup Agencies, 24-hour manned telephone numbers, and personnel (working on project) home telephone numbers by work status.
 3. Submit name, address and location of proposed disposal facilities.
 4. Submit work plan detailing the method of removal, proposed temporary storage areas and work areas and routes to be used to loading area.

QUALITY ASSURANCE

- A. Single Party Responsibility: The firm performing the work of this section shall be responsible for all PCB related activities.

APPLICABLE REGULATORY AGENCIES

- A. The applicable sections, latest editions and addenda of the following government

regulations, codes, industry standards and recommended practices, form a part of these specifications.

1. EPA – United States Environmental Protection Agency
 2. DOT – Department of Transportation
 3. NEC – National Electric Code
 4. NEMA – National Electrical Manufacturers Association
 5. DTSC – Department of Toxic Substance Control
 6. TSCA – Toxic Substances Control Act.
 7. All other applicable Federal, State and local Standards and Regulations.
- B. The Contractor is cautioned that it is responsible for ascertaining the extent to which these regulations affect the operations and to comply therewith.

COORDINATION

- A. Coordinate caulking removal with the Environmental Consultant/Owner and Contractor.
- B. Coordinate concrete precast panel removal with the Environmental Consultant/Owner and Contractor.
- C. Coordinate soil removal with the Environmental Consultant/Owner and Contractor.
- D. Coordinate ballast removal with the Environmental Consultant/Owner, Contractor and a Certified Electrician for disconnect and lockout of electrical service.
- E. Coordinate all waste shipments with Environmental Consultant/Owner.

SAFETY PROCEDURES AND WORKER PROTECTION

- A. Work Area Protection and Marking: Prior to commencing any PCB related work activities, provide barricades and warning signs to clearly identify and effectively guard against unauthorized entry into work area.
- B. Protective Clothing and Equipment: At all times when PCB-containing materials in any volume are not sealed in drums, containers or electrical equipment, workers shall wear:
 1. Disposable non-porous protective gloves.
 2. Disposable whole body protective clothing impermeable to PCB.
 3. Respiratory protection (NIOSH/MSHA approved) against organic vapors and particles (at least the level of particulate protection required at that stage of work for asbestos protection).
 4. Eye protection.
- C. The Contractor shall provide protective clothing, eye protection and respiratory protection as required by Federal, State and local regulations.
- D. Personnel Protection and Procedures: PCB work areas shall be attended at all times once procedures have commenced for PCB-related work and until all caulking, concrete, soil, ballasts and incidentals have been sealed in approved containers. During these work procedures and whenever PCB-containing materials in any volume are not sealed in drums, containers or electrical equipment, all personnel entering the work area must don protective clothing and equipment listed herein. Upon exiting the work area, all disposable protective clothing shall be placed in open-top drums, sealed and removed from building property when other materials in same areas are removed. Waste Containers shall be stored in work area, or secured on site until shipment.

PART 2 PRODUCTS

MATERIAL AND EQUIPMENT

A. Storage Containers:

1. All PCB-containing caulking shall be stored in sealed drums in accordance with applicable regulations. The Contractor must provide empty waste containers and appropriate waste designation labels. All waste will be temporary stored in a secure location designed by the Environmental Consultant/Owner.

B. Solvents, Sorbents and Cleaners:

1. Solvents: Diesel or deodorized kerosene fuels are recognized for a high degree of PCB solubility.
2. Sorbents: Material recognized for a high degree of absorption.
3. Liquid Cleaners: Concentrated liquid alkaline base cleaner.
4. Unless there is a spill the work plan shall be amended to limit and avoid this type of cleanup.
5. Safety Data Sheets for any solvents, sorbents, and cleaners will be provided and the products must be approved by the environmental consultant prior to usage.

PART 3 EXECUTION

SPILL CLEANUP, CONTAINERIZATION AND MARKING

A. Cleanup of Work Area, PCB Articles and Spills:

1. Equipment and Tools: After the last ballast is removed, all tools and equipment used in the work shall be decontaminated and properly stored for reuse. If building surfaces have been contaminated, the Owner may request that PCB sampling is performed to identify the extent of contamination.
 - a. Where work surfaces have contacted PCB fluids they shall be scraped clean, flushed with solvent, wiped clean and all debris placed in open type drums.
 - b. All tools that may have come in contact with PCB at any concentration shall be thoroughly flushed with solvent, wiped clean and properly stored.
2. Other building or materials that are/were in contact with PCB caulk including all exterior surfaces of electrical equipment to be removed that may have come in contact with PCBs or contaminated oil or fluids either during the course of work activities or due to past leaks shall be thoroughly cleaned with solvent and wiped clean.
3. Slabs, Floors and Walls: All concrete (or other surfaces) which have come in contact with PCBs or PCB mixtures in the course of work as a result of past leaks shall be thoroughly cleaned using a combination of sorbent, solvent and cleaners or removal.
4. All contaminated fixtures will be drummed by contractor and shipped off site for disposal by appropriate approved vendor.
5. Salvaged window decontamination: Clean the glass and metal with an approved solvent and safely store onsite, pending a PCB swipe sample of <10 µg/ml PCB test result. If the window sample fails, the process will be repeated, until the window PCB swipe sample is <10 µg/ml.

Soil Excavation for PCB Containing Soil

Excavation:

1. Verify that a utility locator service has marked the areas to excavate and that a ticket is open and remains open during the excavation work period. This may require extending or requesting that the area be remarked.
2. Define the excavation work area with barricades and caution tape.
3. All workers will wear the proper PPE (Level C) including steel toe boots, hard hat, safety glasses/goggles, Tyvek, and ½ face respirator with high efficiency particulate air (HEPA) filters, and nitrile gloves (or depending on the task other work glove).
4. Provide shoring and bracing (if necessary) where necessary to support existing construction and protect personnel during demolition in accordance with Occupational Safety and Health Agency's construction standard 1926.650-652. Additional standard or codes shall apply if more stringent.
5. Excavated material shall be placed in a separate stockpile and/or 55-gallon drums pending disposal. The stockpile shall be located on 6-mil plastic sheeting above and below the stock pile and with a hay bale berm to prevent rain water infiltration.
6. All excavation work shall be performed in such a manner that the amount of airborne dust is limited. If windy conditions, dry conditions, or other factors are causing excessive dust; secure - plastic or cloth drapes shall be utilized during exaction. Light misting of the air may be considered as another engineering control alternative. However, too much water may cause the PCBs to migrate in the soils and must be avoided. Real time work area dust levels may be periodically measured by a laser particle counter or similar meter.
7. Mechanical digging (back hoe, bobcat, etc.) may be utilized, but care must be given not to damage the building or other objects on the site. Hand digging with shovels may need to be used in sensitive areas of the property.
8. If any other releases are discovered, immediately notify A/E. Discontinue work until A/E provides notification to resume. A/E will notify Ecology of any release reported by Contractor.

Excavation Cleanup

1. Maintain public streets, alleys, or other thoroughfares used in carrying out disposal free of litter or soil attributable to this operation. Equip and load trucks or other vehicles to prevent leakage, blowing off, or other escape of any portion of whatsoever is being hauled.
2. Thoroughly decontaminate all the equipment that is not throw away. Collect the decontamination rinsate and dispose with the PCB soils
3. Upon completion of demolition work, thoroughly clean area of materials not to remain.
4. Avoid creating ruts in the property.
5. Leave areas in clean condition.

B. Containerization and Marking:

1. All liquids generated as a result of work activities and cleanup operation shall be placed in closed top drums and sealed.
2. All solids such as sorbents, rags, disposable protective clothing and other incidentals shall be placed in open top drums and sealed.

3. The Contractor must provide or make arrangements for all drums and labels. No commingling of waste streams, pack according to Federal, State and local regulations. Fill ballast drums to top of rolling hoop only.
4. All PCB Articles such as ballasts and other equipment to be removed shall have a record of such action sealed in a weatherproof envelope displayed on the unit. Label record must include the type of action taken, date of action and the name of the technician in charge. A duplication of this label information shall be furnished to the Environmental Consultant/Owner.

HANDLING AND TRANSPORTATION TO OFF-SITE DISPOSAL FACILITIES:

- A. Handling: Prior to submitting the hazardous waste manifest for a shipment of waste to the Environmental Consultant for signature, the Contractor shall make available the waste for inspection by the Environmental Consultant so that they may verify the amount of waste (for example, number of bags or drums, or volume of waste) and its condition (for example, whether the bags or drums appear to be sealed and not leaking).
- B. Transportation to Disposal Facility: No waste will leave site without the authorization of the Environmental Consultant and a signature on the Waste Manifest by the Environmental Consultant/Owner. The Contractor shall manage the packing, labeling, and identifying drums, as well as the waste shipments, off-site disposal and required documentation.
- C. The following tables will be used as a guide for PCB waste classification and disposal:

PCB Caulk, PCB Caulk Substrate Building Materials, and PCB Soil Disposal

Waste Description	Disposal Classification	Disposal Facility
PCB Containing Caulk – Building Material	PCB Bulk Product Waste	Preselected and Screened - Solid Waste Muni Landfill
PCB Containing Foam – Building Material	PCB Bulk Product Waste	Preselected and Screened - Solid Waste Muni Landfill
PCB Containing Concrete – Building Material	PCB Bulk Product Waste	Preselected and Screened - Solid Waste Muni Landfill
PCB Decontamination Waste – Non-Soils	PCB Bulk Product Waste	Preselected and Screened - Solid Waste Muni Landfill
PCB PPE Waste – Non-Soils	PCB Bulk Product Waste	Preselected and Screened - Solid Waste Muni Landfill
PCB Decontamination Waste – Soils	PCB Remediation Waste	TSCA Approved Landfill in Hazardous Waste Cell
PCB PPE Waste – Soils	PCB Remediation Waste	TSCA Approved Landfill in Hazardous Waste Cell
PCB in soils (PCB - 1-50 ppm)	PCB Remediation Waste	TSCA Approved Landfill in Hazardous Waste Cell
PCB in soils (PCB – above detection to <1 ppm)	PCB Remediation Waste	TSCA Approved Landfill in Hazardous Waste Cell

TSCA Storage Disposal Requirements for Fluorescent Light Ballasts

PCB - Capacitors	PCB - Potting Material	Storage Requirements (if not at a PCB Commercial Storage Facility)	Labeling, Transportation, & Manifesting for Disposal	Disposal Reference in 40 CFR 761	Disposal Options
"No PCBs" label	"No PCBs" label	NTTSCA	NTTSCA	NTTSCA	NTTSCA
< 50 ppm	< 50 ppm	NTTSCA	NTTSCA	NTTSCA	NTTSCA
> or = 50 ppm, Non leaking	> or = 50 ppm	761.65(c)(9) for up to 180 days or 761.65(b) for longer	Is regulated as a PCB bulk product waste¹ - Manifesting and labeling ⁴ are required for disposal in accordance with 761.62(a); is not required under 761.62(b); may be required under 761.62(c)	761.50(b)(2)(ii) and 761.62(a), (b), or (c)	- TSCA Incinerator - TSCA/RCRA Landfill - TSCA-Approved Alternative Destruction Method - Decontamination - Coordinated approval - State-approved landfill (leach test required) - Risk-based approval
< 50 ppm	> or = 50 ppm	761.65(c)(9) for up to 180 days or 761.65(b) for longer	Is regulated as a PCB bulk product waste¹ - Manifesting and labeling ⁴ are required for disposal in accordance with 761.62(a); is not required under 761.62(b); may be required under 761.62(c)	761.50(b)(2)(ii) and 761.62(a), (b), or (c)	- TSCA Incinerator - TSCA/RCRA Landfill - TSCA-Approved Alternative Destruction Method - Decontamination - Coordinated approval - State-approved landfill (leach test required) - Risk-based approval
> or = 50 ppm, Non leaking	< 50 ppm	not regulated for storage under TSCA3	Is regulated as PCB Equipment - No labeling or manifesting required ⁴	761.50(b)(2)(i) and 761.60(b)(2)(ii)	As municipal solid waste 40 CFR 761 subpart D options
> or = 50 ppm, Leaking	Any	761.65(c)(1) for up to 30 days or 761.65(b) for longer	Is regulated as PCB Equipment, but is Regulated as a PCB Bulk Product Waste for Disposal² - Manifesting and labeling are required for disposal in accordance with 761.62(a); may be required under 761.62(c) ⁴	761.50(b)(2) and 761.62(a) or (c)	- TSCA Incinerator - TSCA or RCRA Hazardous Waste Landfill - TSCA-Approved Alternative Destruction Method - Decontamination - Coordinated approval - Risk-based approval

¹ Based on the definition of PCB Bulk Product Waste (761.3)

² Based on 761.50(b) (2)

³ Based on 761.60(b) (7)

⁴ Although labeling may not be required, records or optional labeling must show that the waste is less than 1 year old.

NTTSCA - Not regulated for storage or disposal under TSCA

D. All Waste Manifests and Disposal Certificates will be provided within 30 days.



END OF SECTION III

**SECTION IV
UNIVERSAL WASTE
ABATEMENT SPECIFICATIONS**

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section applies to all Universal Waste at the Site. The work includes, but is not limited to, the following:
1. Placement of all Universal Waste items generated as a result of work activities in approved drums or containers.
 2. Appropriate disposal offsite of all Universal Waste items.
- B. Quantity of materials to be removed: No Universal Waste Inspection has been performed. The Contractor will need to perform a survey to inventory Universal Waste present at the site prior to demolition.
- C. According to the United States Environmental Protection Agency (EPA) Title 40 Code of Federal Regulations (CFR) 273, Universal Wastes include the following:
1. Batteries
 2. Pesticides
 3. Mercury Containing Equipment
 4. Lamps
- D. According to the State of California Department of Toxic Substances Control (Cal/DTSC), Universal Wastes include the following:
1. Cathode Ray Tubes
 2. Batteries
 3. Lamps
 4. Electronic Devices
 5. Mercury Thermostats
 6. Non-Empty Aerosol Cans
 7. Mercury Switches
 8. Mercury Thermometers
 9. Pressure or Vacuum Gauges
 10. Dilators and Weighted Tubing
 11. Rubber Flooring
 12. Mercury Added Novelties
 13. Mercury Gas Flow Regulators
 14. Counterweights and Dampers

1.2 APPLICABLE REGULATIONS

The applicable sections, latest editions and addenda of the following government regulations, codes, industry standards and recommended practices, form a part of these specifications.

- EPA - 40 CFR 273
- Generators of Hazardous Waste – 40 CFR 262
- General Information, Regulation and Definitions – 49 CFR 171

- Hazardous Materials, Tables, and Hazardous Materials Communications Regulations – 49 CFR 172
- NEC - National Electrical Code
- NEMA - National Electrical Manufacturers Association
- RCRA - Resource Conservation and Recovery Act (RCRA) – Title 40 CFR 761
- TSCA - Toxic Substances and Control Act – Title 15 USC 2695
- DOT - Department of Transportation – 49 CFR 178.80 - 178.150, Shipping Container Specifications
- DOSH – State of California, Department of Industrial Relations, Division of Occupational Safety and Health
- Cal/DTSC – Title 22 CCR 66261 Chapter 23 and 42
- All other applicable Federal, State and local Standards and Regulations.

Please note Contractor is responsible for ascertaining the extent to which these regulations will affect removal operations and to comply therewith.

1.3 DEFINITIONS

- A. **Cathode Ray Tubes (CRTs)** – Waste (CRTs), also known as picture tubes, are found in devices such as televisions and computer monitors.
- B. **Batteries** – Universal waste batteries include rechargeable nickel-cadmium batteries, silver button batteries, mercury batteries, small sealed lead acid batteries (burglar alarm and emergency light batteries), most alkaline batteries, carbon-zinc batteries, and any other batteries that exhibit a characteristic of a hazardous waste.

NOTE: Spent automotive-type lead acid storage batteries are not universal waste. They are hazardous wastes that are managed under a different set of regulatory requirements (see Article 7 of Chapter 16 of Title 22 CCR).

- C. **Lamps** – Universal waste lamps include fluorescent tubes and bulbs, high intensity discharge lamps, sodium vapor lamps, and any other type of lamps that exhibit a characteristic of a hazardous waste. Also, any electric lamp that contains **added** mercury, whether or not it exhibits a hazardous waste characteristic, is a universal waste.
- D. **Electronic Devices** – These include any electronic equipment without a CRT, such as cell phones and telephones, computer CPUs and printers, VCRs and portable DVD players that exhibits a hazardous waste characteristic.
- E. **Mercury Thermostats** – These thermostats contain small glass capsules with mercury, to make electrical contact. (Modern electronic thermostats do not contain mercury.)
- F. **Non-Empty Aerosol Cans** – These are universal wastes if they contain an ignitable or toxic propellant or if the contents exhibit any hazardous waste characteristic. For more information, see our fact sheet [SB1158 Designates Aerosol Cans as 'Universal Waste.'](#)
- G. **Mercury Switches** – Two different types of mercury switches are universal wastes:

- Motor vehicle switches that contain mercury. Any mercury switch that is removed from a vehicle is a universal waste. When they are to be crushed for scrap, vehicles that contain mercury light switches are also universal waste until the mercury light switches are removed.
- Non-automotive mercury switches and products that contain them. These switches include thermostats and tip switches in portable heaters, washing machine out-of-balance switches, silent wall switches, and other mercury-containing switches and products containing them. All discarded products that contain mercury switches are universal wastes.

- H. **Mercury Thermometers** – Includes fever thermometers.
- I. **Pressure or Vacuum Gauges** – that contain mercury such as U-tube manometers, barometers, and sphygmomanometers (blood pressure meters.)
- J. **Dilators and Weighted Tubing** – These medical devices contain mercury.
- K. **Rubber Flooring** – that contains mercury. Some older gymnasium floors that were poured in place to form indoor tracks and gymnastic areas contain mercury.
- L. **Mercury-Added Novelties** – This category includes practical joke items, figurines, jewelry, toys, games, cards, ornaments, yard statues and figures, candles, holiday decorations, and footwear that contain mercury or mercury batteries. Effective January 1, 2003, the California Mercury Reduction Act banned sale of mercury-added novelties in this state, but some people still have them in their homes.
- M. **Mercury Gas Flow Regulators** – These older gas flow regulators are managed exclusively by natural gas utilities.
- N. **Counterweights and Dampers** – including devices that use mercury's high density to dampen shaking on hunting bows and snow skis or to absorb recoil on shotguns.
- O. **Pesticides** – as any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest, or intended for use as a plant regulator, defoliant, or desiccant, with the exception of any that is (a) a new animal drug under FFDCA section 201(w), or (b) an animal drug that has been determined by regulation of the Secretary of Health and Human Services not to be a new animal drug, or (c) an animal feed under FFDCA section 201(x) that bears or contains any substances described by either (a) or (b).

The universal waste regulations can be used to manage pesticides that have been recalled if they are either stocks of a suspended and canceled pesticide that are part of a voluntary or mandatory recall under FIFRA Section 19(b) (including, but not limited to those owned by the registrant responsible for conducting the recall) or if they are stocks of a suspended or canceled pesticide, or a pesticide that is not in compliance with FIFRA, that are part of a voluntary recall by the registrant. Universal waste can also be used to manage stocks of other unused pesticide products that are collected and managed as part of a waste pesticide collection program.

- A recalled pesticide becomes a waste on the first date upon which both of the following conditions apply: (i) the generator of the recalled pesticide agrees to participate in the recall; and (ii) the person conducting the recall decides to discard the recalled materials (e.g., burn the pesticide for energy recovery).
- Note that the universal waste requirements apply only in the situation of a recall, suspension, or cancellation described above or when collected as part of a waste pesticide collection program. Hazardous waste pesticides that do not fit into these categories must be managed under the requirements in parts 260 through 272 or in compliance with 40 CFR 262.70 (link), which addresses pesticides disposed on a farmer's own farm in a manner consistent with the disposal instructions on the label when the container is triple rinsed.
- The universal waste requirements do not apply to pesticides that are not wastes or are not hazardous wastes
- [See 40 CFR section 273.3 for more information about universal waste pesticides.](#) For more information on waste disposal programs, see the [Requirements for Pesticide Disposal Web page](#).

PART 2 – EXECUTION

2.1 REMOVAL AND DISPOSAL

- A. Contractor will be responsible for the removal and disposal of all Universal Waste items.
- B. All recyclable Universal Waste items shall be transported to an accepting recycling facility. The Contractor shall maintain a log of shipment dates and quantities.
- C. All non-recyclable Universal Waste items shall be transported to an offsite hazardous waste disposal facility according to Cal/DTSC, RCRA, TSCA, and other applicable regulations. The Contractor shall maintain copies of all hazardous waste manifests.

END OF SECTION IV

SECTION 031113 - CONCRETE FORMING AND ACCESSORIES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included: Furnish, install and remove forms for cast-in-place concrete including shoring and form supports.
- B. Related Work Specified Elsewhere:
 - 1. Formwork for concrete work beyond the building lines: See Sidewalks and Driveways.
 - 2. Excavating, filling and backfilling: See Earthwork.
 - 3. Patching and filling of form tie holes: See Concrete Finishes.

1.2 REFERENCES, CODES AND STANDARDS: The following references, codes and standards are hereby made a part of this Section and formwork shall conform to the applicable requirements therein except as otherwise specified herein or shown on the Drawings. Nothing contained herein shall be construed as permitting work that is contrary to code requirements.

- A. "Recommended Practice for Concrete Formwork", ACI Latest Edition.
- B. California Building Code, 2019 Edition.

1.3 SUBMITTALS: Comply with requirements of Shop Drawings, Product Data and Sample Section.

- A. Shop drawings shall include finished elevations and dimensions of all formed surfaces including finish floor elevations.
- B. Contractor shall check architectural, structural and mechanical drawings to determine size and location of all depressions, openings, chases.
- C. ALLOWABLE TOLERANCES: Design, construct, set, and maintain the formwork so as to insure complete work within the suggested tolerance limits specified in ACI 347, Section 3.3.1. See Concrete Finishes Section for traffic surface tolerances of slabs.
- D. Metal Formwork: LEED MR Credit 3 - BPDO – Sourcing of Raw Materials Submittal - Recycled Content Documentation: Provide a product data sheet or manufacturer affidavit noting the pre-consumer (post-industrial) and post-consumer recycled content value of the product or product components in accordance with requirements described in Section 018113.
- E. Wood and Metal Formwork: LEED MR Credit 3 - BPDO – Sourcing of Raw Materials Submittal - Regional Sourcing Documentation: Provide a product data sheet or manufacturer affidavit demonstrating regional sourcing as defined in Section 018113.
- F. Form Coatings: LEED MR Credit 2 - BPDO – Environmental Product Declarations (EPD) Submittal - EPD/LCA Documentation: Provide a publicly available Environmental Product Declaration in conformance with standards listed and described in Section 018113.

- G. Form Coatings: LEED MR Credit 4 - BPDO – Material Ingredients Submittal - Ingredient Reporting Documentation: Provide a publicly available material ingredient inventory as defined in Section 018113.
- H. Form Coatings: LEED EQ Credit 2 - Low-Emitting Materials Submittal - VOC Content Documentation: Provide a product data sheet or third-party certificates indicating the VOC content of the product (less water and exempt solids). Provide documentation indicating the anticipated volume of product use (liters).

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Earth Forms: Unless otherwise indicated or required by the Structural Drawings, concrete for footings may be placed directly against vertical excavated surfaces provided the material will stand without caving and provided that minimum reinforcing steel clearances indicated on Drawings are maintained and suitable provisions are taken to prevent raveling of top edges or sloughing of loose material from walls of excavation. Sides of excavation shall be made with a neat cut and the width made as detailed on Drawings. Concrete which is exposed to view on exterior shall be formed to a minimum depth of 6" below finished grade.
- B. Wood Forms:
 - 1. Exposed Concrete Utilized to Encase Steel Columns: Plastic or polyurethane form liner to achieve smooth finish, or use metal forms.
 - 2. Exposed Concrete Not Otherwise Noted or Specified: APA Plyform, Grade B-B, Class I or II (as per strength and tolerance requirements), Exterior, each piece grade marked, no mill oiling permitted.
 - 3. Chamfer Strips, Reveals, and Score Marks: Clear Douglas fir or pine, selected straight, milled on all faces -or- extruded polyvinylchloride specially produced for concrete work, Vinylex Corp., Preco Industries, Vulcan Metal Products, or equivalent. Material usage shall be consistent for each application.
 - 4. Unexposed Concrete Not Otherwise Specified: Of sufficient design and strength to hold concrete properly in place and alignment.
 - 5. Framing: At Contractor option subject to meeting necessary strengths and surface tolerances.
 - 6. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials – For formwork purchased for this project Regional Sourcing Preferment: Preference shall be given to products that can demonstrate regional sourcing as defined in Section 018113.
- C. Form Release Agents:
 - 1. Exposed Concrete Including Surfaces to Receive Paint: Chemically active type producing water insoluble soaps. Form release agents shall be delivered in manufacturer's sealed and trademarked containers and shall be guaranteed to provide clean, stain-free concrete release and not to interfere with future applied coatings and finishes. Release agents shall contain no petroleum solvents such as creosote, paraffin, waxes or diesel oil.
 - 2. Concealed Concrete: Contractor option.
 - 3. LEED MR Credit 2 - BPDO – Environmental Product Declarations (EPD) - EPD/LCA Preferment: Preference shall be given to products with a publicly available Environmental Product Declaration in conformance with the standards listed and described in Section 018113.

4. LEED EQ Credit 2 - Low-Emitting Materials - VOC Content Limit Requirement: The product shall not contain VOC content limits (less water and exempt solids) in excess of those listed in Section 018113.
 5. LEED MR Credit 4 - BPDO – Material Ingredients - Ingredient Reporting Preferment: Preference shall be given to products with a publicly available material ingredient inventory as defined in Section 018113.
- D. Form Sealer (Wood Forms): Burke "Form Sealer", or equivalent, and of a type which will not interfere with bond of applied finishes.
1. LEED EQ Credit 2 - Low-Emitting Materials - VOC Content Limit Requirement: The product shall not contain VOC content limits (less water and exempt solids) in excess of those listed in Section 018113.
 2. LEED EQ Credit 2 - Low-Emitting Materials - VOC Content Limit Requirement: The product shall not contain VOC content limits (less water and exempt solids) in excess of those listed in Section 018113.
 3. LEED MR Credit 4 - BPDO – Material Ingredients - Ingredient Reporting Preferment: Preference shall be given to products with a publicly available material ingredient inventory as defined in Section 018113.
- E. Form Ties: Metal, spreader type, removable to 1" from concrete face. Ties for exposed concrete shall be of same type throughout project. Wire ties and wood spreaders will not be allowed except that such devices may be permitted for footings, shallow foundations and similar other totally concealed below grade surfaces upon specific approval of Architect. Wood spreaders shall not remain in concrete.
- F. Cold Joints (Slabs on Grade): Standard 24 ga. galvanized steel, keyed profile, sized to suit slab thickness.
- G. Vinyl Tape (Sandblasted Concrete Form Joints): Pressure sensitive vinyl tape, not thicker than 3 mils, type recommended for sealing forms.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Vertical and Horizontal Controls: Establish and maintain necessary benchmarks, lines, or controls throughout construction.
- B. Secure information and provide for openings, sleeves, chases, pipes, recesses, nailers, anchors, ties, inserts, and similar embedded items. Coordinate with concrete work for requirements governing embedment and sleeving of pipes and conduit.

3.2 CONSTRUCTION

- A. Formwork: - General: Construct wood forms of sound material, straight and rigid, thoroughly braced, mortar tight, and of such strength that the pressure of concrete and the movement of men and equipment will not displace them. Visible waves in exposed concrete surfaces after stripping of forms may result in rejection of that portion of the concrete. The design and engineering of formwork shall be the complete responsibility of the Contractor.

B. Plywood Forms for Exposed Concrete:

1. Plywood panels shall be clean, smooth, uniform in size, and free from damaged edges or faces (including holes other than those required for form ties). Use full size (4' x 8' or larger) panels wherever possible. Make plywood panel pattern regular and symmetrical, joints plumb or level, horizontal joints continuous. Block plywood edges which do not occur at bearing points in order to eliminate joint offsets.
2. Construct forms for sandblasted concrete with butted joints. Joints shall be taped carefully applied to completely eliminate wrinkles, ripples, bubbles, fishmouths and other surface defects which would telegraph onto face of concrete. Tape shall be aligned and centered on the joint. The degree of sandblasting to be done in finishing shall be sufficient to completely remove all traces of the impression in the concrete left by the tape. Construct and externally brace forms so that no form ties or other devices penetrate sandblasted surfaces.

C. Framing and Bracing: Framing, bracing and supporting members shall be of ample size and strength to safely carry, without excessive deflection (exceeding allowable tolerances), all dead and live loads to which formwork may be subjected, and shall be spaced sufficiently close to prevent any apparent bulging or sagging of forms.

D. Form Ties: Form ties shall be of sufficient strength and used in sufficient quantities to prevent spreading of the forms. Ties for exposed concrete surfaces shall be arranged symmetrically and shall be aligned both vertically and horizontally (do not stagger). Form ties are not permitted through sandblasted surfaces.

E. Camber:

1. Camber forms for slabs and beams as required to compensate for deflection or settlement due to closure of forms joints, settlement of mudsills, shrinkage of lumber, elastic shortening and/or deflection of form members. Positive means of adjustment (wedges or jacks) of shores and struts shall be provided to permit realignment or readjustment. See Article 3.03, "Falsework".

F. Forms for exposed concrete shall be constructed full height and width between indicated construction joints or emphasized joints in concrete surface and shall not be broken for pour or construction joints within these areas.

G. Construct forms no higher than 12" above the top of a pour or construction joint.

H. Construction Joints: Construction joints shall be in accordance with requirements of Concrete, Cast-In-Place Section. Confine construction or pour joints to rustication strip locations where they occur; where rusticated joints do not occur in a surface, provide a surfaced pouring strip where construction joints intersect exposed surfaces to provide straight line at joints. Prior to subsequent pour, remove strip and tighten forms. Construction joints shall have no "overlapping" or offsetting of concrete surfaces and shall, as closely as possible, present the same appearance as butted plywood joints. Joints in a continuous line shall be straight and true.

I. Cleanouts: Provide cleanouts along bottom of walls and columns or elsewhere as required to permit thorough cleaning of loose dirt, debris and waste material. Cleanout shall not be apparent on exposed concrete surfaces and no openings in the forms for cleanouts shall be made on surfaces to be sandblasted.

- J. Chamfered Corners: In general, chamfer all corners for exposed concrete unless otherwise noted. Obtain chamfers by placing 3/4" x 3/4" nonstaining moldings in forms. Pieces shall be in longest lengths possible, joints mitered.
- K. Score Lines: Where "score", emphasized or rustication lines are indicated on vertical surface, obtain such lines by accurate placement of moldings in forms. Pieces shall be in longest lengths practical with joints mitered.
- L. Arrange forms to allow proper erection sequence and to permit form removal without damage to concrete.
- M. Form Sealer: Wood forms for exposed concrete shall be sealed on contact faces and edges using specified form sealer in strict accordance with manufacturer's directions.
- N. Form Release Agent: Thoroughly clean forms and coat with release agent prior to initial use and before each reuse. Apply release agent in strict accordance with manufacturer's directions and coverage recommendations avoiding starved areas or excessive applications. Apply release agents before reinforcing steel is placed.
- O. Reuse of Forms: Do not reuse any form which cannot be reconditioned to "like new" condition. Control reuse of forms for exposed surfaces to provide surface of uniform color and texture without sharp demarcation between adjacent surfaces.
- P. Waterproofing Conditions: Concrete surfaces to receive waterproofing materials shall be formed to provide a relatively smooth surface free of sharp corners, projections, and offsets at form joints. Depressions and voids shall permit satisfactory patching as specified under Concrete Finishes Section. Form ties shall not penetrate or damage applied waterproofing.
- Q. Bases and Foundations: Whenever concrete bases or foundations are to be provided for equipment furnished by other trades, dimensions shall be verified for the equipment furnished before concrete is placed.
- R. Prior to placement of concrete, remove dirt, debris, and foreign material from forms. Leave no wood in concrete except nailers.

3.3 REMOVAL OF FORMS AND FALSEWORK

- A. The removal of forms and falsework shall be carried out in such manner as to ensure the complete safety of the structure. Supports shall not be removed until members have sufficient strength to safely support their own weight and superimposed loading with proper factor of safety.
- B. Forms for exposed concrete surfaces shall be removed in such a manner as to preclude damage to finish. Pinch bars and similar tools shall not be used for prying against exposed surfaces. Stripping shall commence at top edge or vertical corner where the use of wooden wedges is possible. Wedging shall be done gradually and shall be accompanied by light tapping on panels to loosen them. When free at one end, gradually loosen remaining area without jerking.
- C. Removal of Forms: After concrete is placed, the following minimum times shall elapse before the removal of forms:
 - 1. Vertical Forms (Walls, Columns, Beam Sides): 24 hours.
 - 2. Side Forms (Footings, Slabs on Grade): 24 hours.

3. Slab and Opening Soffits:
 - a. Conventional Reinforcing: 21 days and $1.0 \times f'c$. Forms may be removed at 14 days and $0.8 \times f'c$ only when reshoring is provided per Section 3.03-D.1.c or 3.03-D.2.c.
 - b. Post-tensioned Concrete: After stressing.
 4. Beam Soffits: 21 days.
 - a. Conventional Reinforcing: 21 days and $1.0 \times f'c$.
 - b. Post-tensioned Concrete: After stressing.
- D. Removal of Shores/Reshores: After concrete is placed, or formwork is removed, the following conditions shall be satisfied prior to the removal of shoring or reshores.
1. Shoring (Conventional Reinforcing):
 - a. Shoring required to support framing for one floor or roof shall not be removed until concrete has attained both:
Minimum 21 day age, and
Minimum Strength of $1.0 \times f'c$.
 - b. Where Shoring is used to support a floor or roof which has not yet attained age and strength stipulated above, such shoring or reshoring shall extend to the ground.
 - c. Reshoring shall be capable of supporting all permanent and temporary construction loads, without allowing the concrete to settle or deflect.
 2. Shoring (Post-tensioned Concrete):
 - a. Shoring required to support framing for one floor or roof shall not be removed until tendons have been satisfactorily stressed.
 - b. Where Shoring is used to support a floor or roof which has not yet attained age and strength stipulated above, such shoring or reshoring shall extend to the ground. Reshoring shall be capable of supporting all permanent and temporary construction loads, without allowing the concrete to settle or deflect.
- E. Upon removal of forms, bolts, wires, clamps, rods, etc., not necessary to the work, shall be removed to a minimum of 1 inch from the surface. The Contractor shall so conduct his operations as to eliminate any danger of rust stains from form tie materials or other unprotected ferrous materials embedded in or adjacent to exposed concrete.

END OF SECTION

SECTION 032100 - CONCRETE REINFORCING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included: Furnish and install reinforcement for cast-in-place concrete.
- B. Related Work Specified Elsewhere:
 - 1. Reinforcement for concrete work: See Sidewalks and Driveways.

1.2 REFERENCES, CODES AND STANDARDS: The following references, codes and standards are hereby made a part of this Section and reinforcement shall conform to the applicable requirements therein except as otherwise specified herein or shown on the Drawings. Nothing contained herein shall be construed as permitting work that is contrary to code requirements.

- A. "Manual of Standard Practice for Detailing Reinforced Concrete Structures", ACI 315, latest edition.
- B. "Building Code Requirement for Reinforced Concrete", ACI 318-14.
- C. "Manual of Standard Practice" published by CRSI, latest edition.
- D. California Building Code, 2019 Edition.

1.3 SOURCE QUALITY CONTROL: Refer to Quality Control Section for general requirement governing testing and inspection. Where certified mill test reports (required hereinafter under "Submittals") are not furnished, conform to the following.

- A. Reinforcing bars shall be tested in tension and bending as per ASTM A-615. Testing shall be done by the Owner's testing agency. Furnish one copy of test reports to Architect, Structural Engineer, Owner and Contractor.
- B. Samples will be taken by the testing agency from bundles as delivered from the mill. Where bundles are identified by heat number and a mill analysis accompanies the report, one tensile and one bending test specimen will be taken from each 10 tons or fraction thereof, of each size and kind of bar. Where positive identification of heat numbers cannot be made or where random samples are taken, one series of tests shall be made from each 2-1/2 tons or fraction thereof, of each size and kind of bar.
- C. The costs of tests, sampling and handling of reinforcing steel shall be paid by the Owner by deducting from moneys due the Contractor.
- D. Include material required to provide samples for testing.

- E. The following is subject to Special Inspection as per California Building Code, Sec. 1704. Costs therefore will be paid by the Owner. No inspection is required for slabs-on-grade 5" thick or thinner.
1. Placement of reinforcing steel as required by Sec. 1705.
- 1.4 SUBMITTALS: Comply with requirements of Shop Drawings, Product Data, and Sample Sections.
- A. Shop Drawings:
1. Fully detailed shop drawings, including bending schedules and bending diagrams, shall be submitted to the Architect for review. Shop drawings shall show placing detail and size location of reinforcing steel.
 2. Shop drawings shall be of such detail and completeness that fabrication and placement at the site can be accomplished without the use of project or contract drawings for reference.
 3. Contractor shall check architectural, structural, mechanical and electrical project or contract drawings for anchor bolt schedules and locations, anchors, inserts, conduits, sleeves, and any other items which are required to be cast in concrete, and shall make necessary provisions as required so that reinforcing steel will not interfere with the placement of such embedded items.
 4. Reinforcing Steel shall not be fabricated or placed before the shop drawings have been reviewed by the Architect and returned to the Contractor. Review of shop drawings by the Architect will not relieve the Contractor of responsibility for errors or for failure in accuracy and complete placing of the work.
- B. Mill Test Reports: Certified mill test reports (tensile and bending) for each heat and melt of steel shall be submitted to the Architect before delivery of any material to the job site. See requirements above under "Source Quality Control".
- C. Reinforcing Steel: LEED MR Credit 2 - BPDO – Environmental Product Declarations (EPD) Submittal - EPD/LCA Documentation: Provide a publicly available Environmental Product Declaration in conformance with standards listed and described in Section 018113.
- D. Reinforcing Steel: LEED MR Credit 3 - BPDO – Sourcing of Raw Materials Submittal - Regional Sourcing Documentation: Provide a product data sheet or manufacturer affidavit demonstrating regional sourcing as defined in Section 018113.
- E. Reinforcing Steel: LEED MR Credit 3 - BPDO – Sourcing of Raw Materials Submittal - Recycled Content Documentation: Provide a product data sheet or manufacturer affidavit noting the pre-consumer (post-industrial) and post-consumer recycled content value of the product or product components in accordance with requirements described in Section 018113.
- F. Chairs, Bolsters, Bar Supports, Spacers, and Welded Steel Wire: LEED MR Credit 2 - BPDO – Environmental Product Declarations (EPD) Submittal - EPD/LCA Documentation: Provide a publicly available Environmental Product Declaration in conformance with standards listed and described in Section 018113.
- G. Chairs, Bolsters, Bar Supports, Spacers, and Welded Steel Wire: LEED MR Credit 3 - BPDO – Sourcing of Raw Materials Submittal - Regional Sourcing Documentation: Provide a product data sheet or manufacturer affidavit demonstrating regional sourcing as defined in Section 018113.

- H. Chairs, Bolsters, Bar Supports, Spacers, and Welded Steel Wire: LEED MR Credit 3 - BPDO – Sourcing of Raw Materials Submittal - Recycled Content Documentation: Provide a product data sheet or manufacturer affidavit noting the pre-consumer (post-industrial) and post-consumer recycled content value of the product or product components in accordance with requirements described in Section 018113.
- 1.5 DELIVERY AND STORAGE: Deliver reinforcing to site properly bundled and tagged, and store so as to prevent excessive rusting or fouling with grease or any coating that will interfere with bond. Segregate so as to maintain identification after bundles are broken. Do not use damaged, reworked, or deteriorated material.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Reinforcing Bars:
1. New, free of loose rust.
 2. Billet Steel Bars: ASTM A615, Grade 40 for #3 bars and smaller, Grade 60 for #4 bars and larger.
 3. Low Alloy Steel Bars: ASTM A706 required for all reinforcing in shear walls and reinforcing bars to be welded.
 4. Grade Ties, 75 & 80
 5. LEED MR Credit 2 - BPDO – Environmental Product Declarations (EPD) Submittal - EPD/LCA Documentation: Provide a publicly available Environmental Product Declaration in conformance with standards listed and described in Section 018113.
 6. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials Submittal - Regional Sourcing Documentation: Provide a product data sheet or manufacturer affidavit demonstrating regional sourcing as defined in Section 018113.
 7. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials Submittal - Recycled Content Documentation: Provide a product data sheet or manufacturer affidavit noting the pre-consumer (post-industrial) and post-consumer recycled content value of the product or product components in accordance with requirements described in Section 018113.
- B. Welded Wire Fabric: Welded wire fabric shall be new, rectangular mesh, welded steel wire fabric, conforming with ASTM A185. Gage or diameter of wire and center-to-center spacing of wire shall be as indicated on the Drawings.
- C. Tie Wire: #16 minimum, black and annealed.
- D. Accessories: Metal or plastic spacers, supports, ties, etc., as required for spacing, assembling, and supporting reinforcing in place. Legs of accessories to be of type that will rest on forms without embedding into forms. Galvanize metal items where exposed to moisture or use approved other non-corrosive, non-staining supports. Use plastic or plastic coated accessories for supporting reinforcing where concrete soffits are exposed.
- E. Welded Wire Fabric, Tie Wire, and Accessories: LEED MR Credit 2 - BPDO – Environmental Product Declarations (EPD) - EPD/LCA Preference: Preference shall be given to products with a publicly available Environmental Product Declaration in conformance with standards listed and described in Section 018113.

- F. Welded Wire Fabric, Tie Wire, and Accessories: LEED MR Credit 3 - BPDO – Sourcing of Raw Materials - Regional Sourcing Preferment: Preference shall be given to products that can demonstrate regional sourcing as defined in Section 018113.
- G. Welded Wire Fabric, Tie Wire, and Accessories: LEED MR Credit 3 - BPDO – Sourcing of Raw Materials - Recycled Content Preferment: Preference shall be given to products that demonstrate high recycled content values as a percentage of the product determined by weight. Recommended recycled content targets by product are included in Section 018113, Appendix E.

2.2 FABRICATION

- A. Comply with details on Drawings.
- B. Where specific details are not shown or noted, do detailing and fabrication in conformance with or superior to requirements contained in the References, Codes and Standards Article.
- C. Clean bars of loose rust, loose mill scale and any substance that may decrease bond. Bend bars accurately to details on reviewed shop drawings. Unless otherwise permitted by the Structural Engineer, bar shall be bent cold.
- D. Shop fabricate reinforcement.

PART 3 - EXECUTION

3.1 PLACING

- A. General: Reinforcing steel shall be placed in accordance with the Drawings and reviewed shop drawings and the applicable requirements of the References, Codes and Standards Articles. Install reinforcement accurately and secure against movement, particularly under the weight of workmen and the placement of concrete. Reinforcing partially embedded in concrete shall not be field bent except as shown on the Drawings or permitted by the Structural Engineer.
- B. Reinforcement Supports:
 - 1. Reinforcement shall be accurately located in the forms and held in place by means of supports adequate to prevent displacement and to maintain reinforcement at proper distance from form face. Supports and their placement shall comply with CRSI "Placing Reinforcing Bars". The use of wood supports and spacers inside the forms is not permitted except as noted in Concrete Forms Section.
 - 2. Support reinforcement for on-grade slabs by wiring to precast concrete blocks spaced 3'-0" o.c. (maximum) both ways staggered. Size blocks so that reinforcing is maintained at the distance from face of concrete shown on the drawings.
- C. Obstructions: Wherever conduits, piping, inserts, sleeves, etc., interfere with placing of reinforcing, reinforcing shall be maintained at the distance from face of concrete shown on the drawings.
- D. Tying: Reinforcing shall be rigidly and securely tied with steel tie wire at splices and at crossing points and intersections in the position shown. Tie wires, after cutting, shall be bent in such a manner that concrete placement will not force the wire ends to surface of exposed concrete.

- E. Spacing: Where Drawings do not show the spacing of the reinforcing, the minimum clear spacing shall conform to ACI 318 Section 7.6.
- F. Splicing: Make splices only at those locations shown on the Drawings or as approved by the Structural Engineer. Where Drawings do not show minimum laps, comply with requirements of ACI 318 Section 12.14. Stagger splices in adjacent bars wherever possible.
- G. Dowels: Dowels shall be tied securely in place before concrete is deposited. In the event there are no bars in position to which dowels may be tied, No. 3 bars (minimum) shall be added to provide proper support and anchorage.
- H. Welding: Not permitted.

3.2 CLEANING

- A. Reinforcement, at time of placing concrete, shall be free of any coating that would impair bond.

3.3 PROTECTIVE CONCRETE COVER: Except where indicated otherwise on the Drawings, the minimum concrete coverage for steel reinforcement shall be as specified in ACI 318 Section 7.7 "Concrete Protection for Reinforcement."

3.4 PLACEMENT TOLERANCES

- A. Where placement tolerances are not indicated on the Drawings, applicable requirements of ACI 301 shall apply. Bars may be shifted as necessary to avoid interference with other reinforcing steel, conduits, or embedded items. If bars are shifted more than one diameter, or enough to exceed specified tolerances, the resulting arrangement of bars shall be subject to the Architect's acceptance.

3.5 NOTIFICATION AND INSPECTION

- A. The Contractor shall notify the Architect at least 72 hours ahead of each concrete pour, and no concrete shall be deposited until reinforcing steel has been installed, and has been observed by the Architect.

3.6 CORRECTION BEFORE CONCRETE PLACEMENT

- A. Capable steel workers shall be kept on the job during the placing of concrete, and they shall properly reset any reinforcement displaced by runways, workers, or other causes. Reinforcement shall not be bent after being partially embedded in hardened concrete.

3.7 DEFECTIVE WORK

- A. The following reinforcing steel work will be considered defective and will be ordered by the Architect to be removed and replaced by the contractor:
 - 1. Bars with kinks or bends not indicated on Drawings.
 - 2. Bars injured due to bending or straightening.

3. Bars heated for bending or straightening.
4. Reinforcement not placed in accordance with the Drawings and Specifications.
5. Reinforcement with corrosion or coatings which may impair bond with concrete.

END OF SECTION

SECTION 032300 - STRESSING TENDONS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Provide labor, material, tools, equipment, appliances, transportation and services required to completely furnish and install post-tensioning for cast-in-place concrete, all as shown on the Drawings and herein specified, including but not limited to the following:
 - 1. Furnishing, installation and stressing of post-tensioning tendons or strands.
 - 2. Furnishing and installation of anchorages, distribution plates, spacers, and tendon enclosures.
- B. Related Work Specified Elsewhere:
 - 1. Concrete Forms.
 - 2. Concrete Reinforcement (typical bars).
 - 3. Concrete, Cast-In-Place.
 - 4. Patching of blockouts for anchorage: See Concrete Finishes.

1.2 REFERENCES, CODES AND STANDARDS: The following references, codes and standards are hereby made a part of this Section and prestressing work shall conform to the applicable requirements therein except as otherwise specified herein or shown on the Drawings. Nothing contained herein shall be construed as permitting work that is contrary to code requirements.

- A. "Building Code Requirements for Reinforced Concrete", ACI 318-14.
- B. "Post-Tensioning Manual", published by Post-Tensioning Institute, latest edition.
- C. California Building Code, 2013 Edition, Chapter 19.

1.3 QUALIFICATIONS: Prestressing work shall be performed by an organization that has successfully performed previous installations of a major nature similar to the one involved in this Contract for a minimum of five (5) years.

1.4 SOURCE QUALITY CONTROL

- A. Prestressing steel shall be tested for tensile strength and elongation at rupture. Two (2) tests (one from each end, 5'-0" long each) shall be made for each reel and shall be tagged for identification purposes. Each size of wire, strand or bar to be shipped to the site shall be assigned an individual lot number and shall be tagged accordingly.
- B. If adequate information concerning the suitability of prestressing system cannot be furnished to the Owner's Representative and Architect, the Owner's Representative and/or Architect may require tests to be made of the system. Contractor shall bear costs of these tests.
- C. Tests shall be performed by Owner's testing agency.

- D. Costs of testing will be paid by the Owner except that when tests reveal failure of materials to meet Contract requirements, costs for subsequent tests shall be paid by the Contractor.
 - E. Furnish materials and handling which testing agency requires for analysis. Samples so submitted shall be accompanied by vendor's certification that the samples are representative of the materials to be furnished.
- 1.5 SUBMITTALS: Comply with requirements of Shop Drawings, Product Data and Sample Section.
- A. Shop Drawings: Including the following:
 - 1. Tendon layout and dimensions locating tendons in horizontal plans at all points. Detail horizontal curvature of tendons at block-out and anchorages. Show openings in slabs and beams.
 - 2. Provide tendon profiles showing chair heights and locations, and any required placement steel. Show clearly the location of each tendon and the method of tendon support.
 - 3. Furnish details of reinforcement around stressing pockets, closures, and delay strips, or where interference with tendons may occur.
 - 4. Anchorage details.
 - 5. Include calculations of friction losses on shop drawings to determine that design forces are obtainable. The friction loss in post-tensioned steel shall be based on experimentally determined wobble (k) and curvature (u) coefficients, and shall be verified during stressing operations. The friction losses shall be calculated as described in ACI 318-05. In case the friction loss is too big to be compensated by stressing to maximum, provide additional tendons.
 - 6. Show required elongation of each tendon at jacking point.
 - B. Manufacturer's Data:
 - 1. Furnish complete prestressing procedure to include the following:
 - a. Jacking force and jack pressure.
 - b. Maximum temporary jacking force and jacking pressure.
 - c. Certified jack calibrations and method of jack identification (use no non-calibrated jack and pump combination on the job).
 - d. Method of determining slack, if any.
 - e. Method of determining anchor force, or force remaining in tendons after anchoring.
 - 2. Furnish method of burning off excess tendon after anchorage.
 - 3. Provide method of sealing tendons.
 - 4. Provide manufacturer's written certification that post-tensioning materials are of strength specified.
 - C. Samples: Submit one sample, 30" long, of sheathed tendon and anchorage including all accessories note in this section, below (plastic tube extension and grease cap). Sample will not be returned.
 - D. When reviewed and returned, the shop drawings and data shall not be changed nor shall construction operations be deviated from, unless resubmitted and reviewed.
 - E. Review of details and construction operations will not relieve the Contractor of his responsibility for completing the work successfully in accord with Contract Drawings and Specifications.

- F. Reinforcing Steel and Anchorages: LEED MR Credit 2 - BPDO – Environmental Product Declarations (EPD) Submittal - EPD/LCA Documentation: Provide a publicly available Environmental Product Declaration in conformance with standards listed and described in Section 018113.
 - G. Reinforcing Steel and Anchorages: LEED MR Credit 3 - BPDO – Sourcing of Raw Materials Submittal - Regional Sourcing Documentation: Provide a product data sheet or manufacturer affidavit demonstrating regional sourcing as defined in Section 018113.
 - H. Reinforcing Steel and Anchorages: LEED MR Credit 3 - BPDO – Sourcing of Raw Materials Submittal - Recycled Content Documentation: Provide a product data sheet or manufacturer affidavit noting the pre-consumer (post-industrial) and post-consumer recycled content value of the product or product components in accordance with requirements described in Section 018113.
- 1.6 PROTECTION: Prestressing steel shall be satisfactorily protected from rust or other physical damage prior to placement and shall be free from detrimental substances when tensioned.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Prestressing Steel:

1. Prestressing steel shall be high-tensile cold-drawn wire strand conforming to ASTM Designation A416-99, Low Relaxation Grade, and additional requirements shown on the Drawings.
2. Wires shall be straightened, if necessary, to produce equal stress in all wires of wire groups or parallel-lay cables that are to be stressed simultaneously, or when necessary to ensure proper positioning in the enclosures.
3. Broken strands and strands showing fabrication defects shall be removed and replaced.
4. All prestressing steel within every group of the same type of members, shall be of the same heat where practicable. All steel shall be assigned a heat number and tagged accordingly.
5. Unbonded tendons for post-tensioning shall be coated with a rust-preventive, lubricating mastic and enclosed in a sheath extending from anchor to anchor that will permit the stressing of the tendons after the concrete has attained the proper strength. All torn and damaged wrapping shall be repaired before placing concrete. Sheath shall fully envelope any exposed tendon.

B. Distribution Plates and Anchorages:

1. Post-tensioned prestressing steel shall be secured at the ends by means of approved anchoring devices which shall be of such nature that wires will not kink, break down or otherwise be damaged.
2. Anchorage devices shall hold the prestressing steel without slip of more than 1/8 inch at a load equal to the applied load on the wire at prestressing.
3. Distribution plates shall consist of welded steel or cast steel bearing assemblies that will permanently support and distribute the load from the anchoring devices and shall develop at least 95% of the minimum specified ultimate strength of the prestressing steel without exceeding anticipated set.

- a. The maximum concentrated bearing stress in the concrete shall not exceed that permitted in ACI 318-14.
 - b. Bending stresses in the plates induced by the pull of the prestressing steel shall not exceed 20,000 psi for structural steel and 15,000 psi for cast steel, except as experimental data may indicate that higher stresses are satisfactory. For higher strength steel, corresponding stresses may be permitted.
 - c. Materials shall meet requirements of ASTM A36-01 for structural shapes, or ASTM A148-01 for cast steel, or higher quality materials as required to meet stress requirements.
 - d. Design, fabrication and erection shall meet the latest AISC Standards: Welding - AWS Standards including Qualification Test of Welders.
 - e. Distribution plates may be omitted if the bearing area of any anchoring device is sufficiently large so that the local concentrated bearing compressible stresses do not exceed the stresses permitted above or cause local failure.
4. Couplers, if used, shall be of high-strength, stress relieved steel to be coupled.
 5. LEED MR Credit 2 - BPDO – Environmental Product Declarations (EPD) Submittal - EPD/LCA Documentation: Provide a publicly available Environmental Product Declaration in conformance with standards listed and described in Section 018113.
 6. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials Submittal - Regional Sourcing Documentation: Provide a product data sheet or manufacturer affidavit demonstrating regional sourcing as defined in Section 018113.
 7. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials Submittal - Recycled Content Documentation: Provide a product data sheet or manufacturer affidavit noting the pre-consumer (post-industrial) and post-consumer recycled content value of the product or product components in accordance with requirements described in Section 018113.

C. Accessories:

1. Sheathing: Flexible polyethylene plastic of 25 mils minimum thickness installed over greased tendons prior to delivery.
2. Grease: Non-corrosive, high viscosity in compliance with Post-Tensioning Institute recommendations.
3. Tie Wire: Minimum 16 gage annealed type, or approved patented system.
4. Chairs, Bolsters, Bar Supports, Spacers: Size and shape for strength and support of reinforcement during tendon location, installation, and placement of concrete.
5. Grease Caps: Plastic caps that are filled with grease and fit securely over anchorages.
6. Polyethylene Tube Extensions: Molded polyethylene tubes, 40 mils thick, which mate with post-tensioning anchorage and provide watertight seal around sheathing and anchorages.
7. Polyethylene Tape: 10 mil thick (minimum) polyethylene tape used to repair torn sheathing.

PART 3 - EXECUTION

3.1 PLACEMENT

- A. Inserts in concrete work shall be accurately installed and secured in place. This shall include prestressing items, such as enclosures, tubes, ducts, spacer bars, anchorage, etc. Architect's approval of any powder driven fasteners shall be obtained before proceeding with the work.
- B. Post-tension tendons shall have a parabolic profile and shall conform to the control points shown on the Drawings. Dimensions locating this profile apply to the center of gravity of the tendon. Low points of the tendons are at mid-span unless otherwise noted.

- C. Slight deviation in spacing of the slab tendons is permitted where required to avoid openings and inserts that are specifically located. Where locations of tendons seem to interface with each other, contact the Structural Engineer before moving any tendons.
- D. Ducts, tendons and anchorages shall be firmly supported to prevent displacement during subsequent operations. They shall be placed with a tolerance of plus or minus 1/4" in concrete dimensions over 8" but not over 2', and plus or minus 1/2" in concrete dimensions over 2'. These tolerances apply separately to both vertical and horizontal dimensions and might be different for both directions.
- E. Suitable horizontal and vertical spacers or chairs shall be provided as required to hold the tendons in true position. In slabs, chairs shall be placed at 36" maximum spacing or as required to properly support the tendon in the required profile. All tendons in a given pour shall be full length without splices or couplers. Plastic-tipped or stainless-steel-legged chairs shall be used on all exposed surfaces. Staples shall be installed in slabs greater than 5" thick to maintain support chairs in the proper location. Staples shall be removed from concrete surface after form removal.
- F. Maximum spacing of slab tendons shall be six (6) times the thickness of the slab but not greater than 36" except where otherwise noted on the Drawings.
- G. Provide anchor bars behind all tendon anchorage. Use bar sizes as shown on Drawings.
- H. Seal all tears in sheathing by spirally wrapping 2 (two) layers of polyethylene tape around the damaged or missing sheathing. Extend tape 4 inches beyond each end of damaged or missing sheathing.
- I. Install polyethylene tube extensions over any exposed strand at dead end anchorages, both sides of intermediate anchorages, and at stressing end anchorages.

3.2 FIELD CONTROL

- A. All post-tensioning work shall be under the immediate control of a foreman experienced in this type of work, with a minimum 5 years experience as a foreman. He shall exercise close check and rigid control of all operations, as necessary for full compliance with the requirements. This person shall be named and shall furnish such proof-of-experience as the Architect may require. He shall be directly responsible for all phases of work as outlined herein, whether such work is performed by his own personnel or not. The named foreman shall be assigned to the job from start to finish, barring illness, injury or vacation.
- B. In the event of difficulty or emergency, a responsible technical representative shall be available at the job site on four (4) hours notice.

3.3 STRESSING

- A. Prestressing shall be done by methods and related equipment that are in conformance with generally accepted systems of prestressing. Approved variations of such generally accepted methods and equipment will be permitted provided equal results can be obtained.
- B. The post-tensioning shall be accomplished after the concrete has attained a compressive strength of 3000 psi minimum as determined from tests on concrete cylinders. Stressing sequence shall be temperature tendons before slab tendons, and slab tendons before beam tendons.

- C. Prestressing steel shall be stressed by means of hydraulic jacks, equipped with accurate reading calibrated hydraulic pressure gauges to permit the stress in prestressing steel to be computed at any time. A certified calibration curve shall accompany each jack. If inconsistencies between the measured elongation and the jack gauge reading occur, the jack gauges shall immediately be recalibrated.
- D. Jacking from each end of the tendons shall be required when, in the opinion of the Structural Engineer, there is excessive friction between the prestressing steel and the enclosures. Proper allowance shall be made in any case for friction losses and one tendon shall be checked for friction losses at the start of post-tensioning.
- E. The prestressing steel shall be anchored at an initial anchor force or stress that will result in the ultimate retention of the working or effective force or stress shown on the Drawings. In no case may the steel be tensioned above 80% of the ultimate strength of the wire, strand or bars. The anchor force shall not exceed 70% of the ultimate strength of the wire, strand or bar.
- F. End bearing forces shall be uniformly distributed, or an end block properly designed and reinforced for induced stresses shall be provided.
- G. Safety precautions shall be taken to prevent workers from standing directly behind, above or in front of the jacks.
- H. Excess strand or tendon shall not be burned off until all tendons within one pour have been satisfactorily stressed and without permission of the Structural Engineer.
- I. Cut off excess tendon inside face of concrete after stressing records have been approved. Apply grease cap to exposed anchorage.

3.4 TREATMENT OF ANCHORAGES

- A. Paint exposed portion of anchor with Rust-oleum paint, install grease cap over stressing anchorages so as to provide watertight seal. Grease cap shall securely attach to anchorage.
- B. Grout fill jacking access port flush with surface of adjacent concrete.

3.5 FIELD QUALITY CONTROL: Refer to Quality Control Section for general requirements governing testing and inspection.

- A. Inspections shall be performed by qualified testing agencies or individuals, as the Owner may require to establish the acceptability of the Work. Inspection services shall be retained by the Owner at his expense except that when inspections reveal failure to meet Contract requirements, costs for subsequent inspections will be deducted from the Contract price.
- B. Before any concrete is cast, an inspection of the strands and reinforcing shall be made. Ensure that the anchorages are aligned normal to the tendon.
- C. Continuous inspection during stressing operations and certifications of compliance with Drawings and Specifications will be performed.
- D. Records shall be kept of elongation after seating and maximum tension applied to each tendon. At the time of stressing the first member of each type, the stresses in the individual tendons shall be checked to establish a procedure for insuring uniform results.

E. The following is subject to Special Inspection as per California Building Code Sec. 1704.

1. Placement of tendons and reinforcing steel.
2. Placing of concrete for prestressed elements.
3. Stressing operations. Stressing records shall clearly indicate any tendon elongation that exceeds tolerance specified on structural drawings.

END OF SECTION

SECTION 033100 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Furnish and install cast-in-place concrete required for the project as shown on the Drawings and specified herein. This Section also includes:

1. Concrete for work specified in Mechanical and Electrical Divisions unless specifically included therein.
2. Grouting of structural steel setting plates and elevator sills (if required).
3. Grouting of bases and equipment not specified under other Sections.
4. Concrete fill for metal stairs and pipe guards (bollards).
5. Coordination with other trades with regard to requirements for special bases, sleeves, chases, inserts, finishes or provisions of any nature.
6. Curing of formed concrete surfaces.
7. Installation of anchor bolts, hangers, anchors, plates, inserts and miscellaneous metal or other materials embedded in concrete and which are furnished by other trades.

- B. Related Work Specified Elsewhere:

1. Concrete work beyond the building lines: See Sidewalks and Driveways.
2. Shotcrete.
3. Aggregate base for slabs on grade: See Earthwork.
4. Concrete Forms (including erection, stripping and removal).
5. Concrete Reinforcement.
6. Post Tensioning.
7. Finish for concrete surfaces including patching and curing of concrete (except curing of formed concrete): See Concrete Finishes.

- 1.2 REFERENCES, CODES AND STANDARDS: The following references, codes and standards are hereby made a part of this Section and concrete work shall conform to the applicable requirements therein except as otherwise specified herein or shown on the Drawings. Nothing contained herein shall be construed as permitting work that is contrary to code requirements.

- A. "Building Code Requirements for Reinforced Concrete", ACI 318-14.

- B. California Building Code, 2019 Edition.

- 1.3 SOURCE QUALITY CONTROL: Refer to quality Control Section for general requirements governing testing and inspection.

- A. Cement and Aggregates: Furnish to the Architect the following data:

1. Mill certificates from cement manufacturer certifying that cement meets Specifications and is suitable for purpose intended.
2. Proof of aggregate's compatibility with cement to be used and certification that aggregates meet Specifications. Owner reserves the right to have his testing agency perform any additional tests on cement and aggregates which may be deemed advisable.

- B. For Portland Cement; Fly Ash/Slag; Admixtures, Bonding Agent; Vapor Barrier; Slab Leveling Compound; Non-shrink Grout; and Absorptive Mats: LEED MR Credit 2 - BPDO – Environmental Product Declarations (EPD) Submittal - EPD/LCA Documentation: Provide a publicly available Environmental Product Declaration in conformance with standards listed and described in Section 018113
- C. For Admixtures, Bonding Agent; Vapor Barrier; Slab Leveling Compound; and Non-shrink Grout: LEED MR Credit 4 - BPDO – Material Ingredients Submittal - Ingredient Reporting Documentation: Provide a publicly available material ingredient inventory as defined in Section 018113.
- D. For Absorptive Mats: Furnish product data to Architect for review
- E. For Portland Cement; Fly Ash/Slag; Aggregates; Non-shrink Grout; and Absorptive Mats: LEED MR Credit 3 - BPDO – Sourcing of Raw Materials Submittal - Regional Sourcing Documentation: Provide a product data sheet or manufacturer affidavit demonstrating regional sourcing as defined in Section 018113.
- F. For Fly Ash/Slag; Slab Leveling Compound; Non-shrink Grout; and Absorptive Mats: LEED MR Credit 3 - BPDO – Sourcing of Raw Materials Submittal - Recycled Content Documentation: Provide a product data sheet or manufacturer affidavit noting the pre-consumer (post-industrial) and post-consumer recycled content value of the product or product components in accordance with requirements described in Section 018113.
- G. For Admixtures, Bonding Agent; Vapor Barrier; Slab Leveling Compound: LEED EQ Credit 2 - Low-Emitting Materials Submittal - VOC Content Documentation: Provide a product data sheet or third-party certificates indicating the VOC content of the product (less water and exempt solids). Provide documentation indicating the anticipated volume of product use (liters).

1.4 ENVIRONMENTAL CONDITIONS

- A. Cold Weather Requirements: Comply with ACI 306R, "Cold Weather Concreting".
- B. Hot Weather Requirements: Comply with ACI 305, "Hot Weather Concreting".

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cement: ASTM C 150, Type II. Cement shall be of same brand, type and source throughout Project.
 - 1. LEED MR Credit 2 - BPDO – Environmental Product Declarations (EPD) - EPD/LCA Requirement: The product shall have documented a publicly available Environmental Product Declaration in conformance with standards listed and described in Section 018113.
 - 2. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials - Regional Sourcing Preference: Preference shall be given to products that can demonstrate regional sourcing as defined in Section 018113.

B. Aggregates:

1. Concrete for Slabs On Grade, suspended slabs: ASTM C 33 from sources with proven history of successful use. Source shall be constant unless 10 days prior notice is given for approval after recheck of mix design.
 - a. Fine Aggregate: Sechelt or Orcas sands.
 - b. Coarse Aggregate: Granite Rock Co., Kaiser Limestone or Kaiser Clayton, Sechelt or Orcas aggregates.
 - c. Other aggregates may be submitted for use provided the concrete mix meets the following shrinkage criteria: .040% drying shrinkage (max.), as tested per Structural Engineers Association of California recommendation, May 1989.
2. All Other Concrete: ASTM C 33 from sources with proven history of successful use. Source shall be constant unless 10 days prior notice is given for approval after recheck of mix design.
 - a. Fine Aggregate: Natural sand with sand equivalent of not less than 75 when tested per Test Method Calif. 217-E. Radum sand, or approved equal.
 - b. Coarse Aggregate: Fine grain, sound crushed stone, natural gravel or granite with cleanness value not less than 75 when tested as per Test Method Calif. 227. Granite Rock Co., Kaiser Limestone or Kaiser Clayton.
3. All Concrete: LEED MR Credit 3 - BPDO – Sourcing of Raw Materials - Regional Sourcing Preferment: Preference shall be given to products that can demonstrate regional sourcing as defined in Section 018113.

C. Water: Clean and potable, free from impurities detrimental to concrete.

D. Admixtures: The use of admixtures shall be confined to those admixtures listed below. Admixtures containing chlorides are not permitted. Admixtures shall be batched in strict accordance with manufacturer's recommendations.

1. Chemical Admixtures:
 - a. Water Reducing Admixture: Grace Construction Products "WRDA-79", Master Builders "Pozzolith 200N" or Sika Chemical Corp. "Plastocrete 161". Admixture shall conform to ASTM C 494, Type A and shall not contain more chloride ions than are present in the municipal drinking water.
 - (1) LEED MR Credit 2 - BPDO – Environmental Product Declarations (EPD) - EPD/LCA Preferment: Preference shall be given to products with a publicly available Environmental Product Declaration in conformance with standards listed and described in Section 018113.
 - (2) LEED MR Credit 4 - BPDO – Material Ingredients - Ingredient Reporting Preferment: Preference shall be given to products with a publicly available material ingredient inventory as defined in Section 018113.
 - (3) LEED EQ Credit 2 - Low-Emitting Materials - VOC Content Limit Requirement: The product shall not contain VOC content limits (less water and exempt solids) in excess of those listed in Section 018113, Appendix C.
 - b. High-Range Water Reducing Admixture: Grace Construction Products. "WRDA-19" or approved equal. Admixture shall conform to ASTM C494 Type F and shall not contain more chloride ions than are present in the municipal drinking water.
 - (1) LEED MR Credit 2 - BPDO – Environmental Product Declarations (EPD) - EPD/LCA Preferment: Preference shall be given to products with a publicly available Environmental Product Declaration in conformance with standards listed and described in Section 018113.

- (2) LEED MR Credit 4 - BPDO – Material Ingredients - Ingredient Reporting Preferment: Preference shall be given to products with a publicly available material ingredient inventory as defined in Section 018113.
 - (3) LEED EQ Credit 2 - Low-Emitting Materials - VOC Content Limit Requirement: The product shall not contain VOC content limits (less water and exempt solids) in excess of those listed in Section 018113, Appendix C.
- c. Mid-Range Water Reducing Admixture: Grace Construction Products, Daracon 50, 55, 04 65, or approved equal. Admixtures should conform to ASTM C494 Type A/F and shall not contain more chloride ions than are present in the municipal drinking water.
 - (1) LEED MR Credit 2 - BPDO – Environmental Product Declarations (EPD) - EPD/LCA Preferment: Preference shall be given to products with a publicly available Environmental Product Declaration in conformance with standards listed and described in Section 018113.
 - (2) LEED MR Credit 4 - BPDO – Material Ingredients - Ingredient Reporting Preferment: Preference shall be given to products with a publicly available material ingredient inventory as defined in Section 018113.
 - (3) LEED EQ Credit 2 - Low-Emitting Materials - VOC Content Limit Requirement: The product shall not contain VOC content limits (less water and exempt solids) in excess of those listed in Section 018113, Appendix C.
- d. Air Entraining Agent: Air-entraining admixture conforming with ASTM C260 may be introduced into the mix. Air-entrainment shall not exceed 4 percent. Submit manufacturer's data to Architect for review.
 - (1) LEED MR Credit 2 - BPDO – Environmental Product Declarations (EPD) - EPD/LCA Preferment: Preference shall be given to products with a publicly available Environmental Product Declaration in conformance with standards listed and described in Section 018113.
 - (2) LEED MR Credit 4 - BPDO – Material Ingredients - Ingredient Reporting Preferment: Preference shall be given to products with a publicly available material ingredient inventory as defined in Section 018113.
 - (3) LEED EQ Credit 2 - Low-Emitting Materials - VOC Content Limit Requirement: The product shall not contain VOC content limits (less water and exempt solids) in excess of those listed in Section 018113, Appendix C.
- e. Flyash: Pozzolanic admixtures, conforming with ASTM C618, Class F, with weight loss on ignition limited to 3%, may be utilized in mix designs where indicated on structural drawings. Maximum cement replacement shall be 15% by weight, unless otherwise noted on drawings.
 - (1) LEED MR Credit 2 - BPDO – Environmental Product Declarations (EPD) - EPD/LCA Preferment: Preference shall be given to products with a publicly available Environmental Product Declaration in conformance with standards listed and described in Section 018113.
 - (2) LEED MR Credit 3 - BPDO – Sourcing of Raw Materials - Regional Sourcing Preferment: Preference shall be given to products that can demonstrate regional sourcing as defined in Section 018113.

- (3) LEED MR Credit 3 - BPDO – Sourcing of Raw Materials - Recycled Content Requirement: The product or product components shall meet or exceed the maximum recycled content percentages as listed for the product or component type in Section 018113, Appendix E, in accordance with standards listed in Section 018113.
 - f. Ground Granulated Blast Furnace Slag Cement (GGBFS): Slag Cement shall conform to ASTM C989 or AASHTO M302 Grade Level 100 or 120.
 - (1) LEED MR Credit 2 - BPDO – Environmental Product Declarations (EPD) - EPD/LCA Preferment: Preference shall be given to products with a publicly available Environmental Product Declaration in conformance with standards listed and described in Section 018113.
 - (2) LEED MR Credit 3 - BPDO – Sourcing of Raw Materials - Regional Sourcing Preferment: Preference shall be given to products that can demonstrate regional sourcing as defined in Section 018113.
 - (3) LEED MR Credit 3 - BPDO – Sourcing of Raw Materials - Recycled Content Requirement: The product or product components shall meet or exceed the maximum recycled content percentages as listed for the product or component type in Section 018113, Appendix E, in accordance with standards listed in Section 018113.
 - g. Crystalline Waterproofing Additive: Zypex crystalline waterproofing admixture, Admix C-1000 or C-2000, by Xypex Chemical Corporation, or approved equal.
 - (1) LEED MR Credit 2 - BPDO – Environmental Product Declarations (EPD) - EPD/LCA Preferment: Preference shall be given to products with a publicly available Environmental Product Declaration in conformance with standards listed and described in Section 018113.
 - (2) LEED MR Credit 4 - BPDO – Material Ingredients - Ingredient Reporting Preferment: Preference shall be given to products with a publicly available material ingredient inventory as defined in Section 018113.
 - (3) LEED EQ Credit 2 - Low-Emitting Materials - VOC Content Limit Requirement: The product shall not contain VOC content limits (less water and exempt solids) in excess of those listed in Section 018113, Appendix C.
 - 2. Certification: Written conformance to above requirements and the chloride ion content of the admixture shall be submitted by the admixture manufacturer prior to review of mix designs by the Architect.
- E. Expansion Joint Fillers: ASTM D 994, asphaltic compound strips, 1/2" thick unless otherwise noted, precut to proper size.
- F. Non-Shrink Grout (Non-Metallic): Euclid Chemical Co. "Euco N-S", L&M "Crystex", Upco "Upcon", U.S. Grout Corp. "Five Star", Master Builders "Masterflow 713", or approved equal, nonmetallic, nonstaining, premixed grout having a compressive strength at 28 days of not less than 6800 psi, non-shrink at all flow levels. Grout shall conform to ASTM C1107.
- 1. LEED MR Credit 2 - BPDO – Environmental Product Declarations (EPD) - EPD/LCA Preferment: Preference shall be given to products with a publicly available Environmental Product Declaration in conformance with standards listed and described in Section 018113.
 - 2. LEED MR Credit 4 - BPDO – Material Ingredients - Ingredient Reporting Preferment: Preference shall be given to products with a publicly available material ingredient inventory as defined in Section 018113.

3. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials - Regional Sourcing Preferment: Preference shall be given to products that can demonstrate regional sourcing as defined in Section 018113.
 4. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials - Recycled Content Preferment: Preference shall be given to products that demonstrate high recycled content values as a percentage of the product determined by weight. Recommended recycled content targets by product are included in Section 018113, Appendix E.
- G. Curing Compounds (Formed Concrete): Conform to requirements of Concrete Finishes Section (for Clear Curing and Sealing Compound).
1. LEED MR Credit 2 - BPDO – Environmental Product Declarations (EPD) - EPD/LCA Preferment: Preference shall be given to products with a publicly available Environmental Product Declaration in conformance with standards listed and described in Section 018113.
 2. LEED MR Credit 4 - BPDO – Material Ingredients - Ingredient Reporting Preferment: Preference shall be given to products with a publicly available material ingredient inventory as defined in Section 018113.
 3. LEED EQ Credit 2 - Low-Emitting Materials - VOC Content Limit Requirement: The product shall not contain VOC content limits (less water and exempt solids) in excess of those listed in Section 018113, Appendix C.
- H. Volclay Waterstops: Bentonite/butyl rubber-based waterstop, RX-101 series by CETCO Building Materials Group, or approved equal.
1. LEED MR Credit 2 - BPDO – Environmental Product Declarations (EPD) - EPD/LCA Preferment: Preference shall be given to products with a publicly available Environmental Product Declaration in conformance with standards listed and described in Section 018113.
 2. LEED MR Credit 4 - BPDO – Material Ingredients - Ingredient Reporting Preferment: Preference shall be given to products with a publicly available material ingredient inventory as defined in Section 018113.
 3. LEED EQ Credit 2 - Low-Emitting Materials - VOC Content Limit Requirement: The product shall not contain VOC content limits (less water and exempt solids) in excess of those listed in Section 018113, Appendix C.

2.2 MIXES

- A. Mix Designs:
1. Mix designs for concrete shall be Contractor-designed at his expense. Designs shall be prepared by a qualified agency approved by the Architect and Structural Engineer. Four (4) copies of mix designs shall be submitted for Architect's review at least 30 days prior to placing any concrete and shall indicate completely, brands, types and quantities of admixtures included. If concrete is to be placed by pumping, recommendations of ACI Committee 304 shall be followed.
 2. Mix designs shall be proportioned in accordance with Section 5.3, "Proportioning on the Basis of Field Experience and/or Trial Mixtures" of ACI 318. Submit mix designs for each class of concrete for review.
 3. Mix designs for pit foundations and pit walls shall include a crystalline waterproofing admixture at the rate of 3% of cementitious weight. See drawings for locations.
- B. Structural Drawings indicate minimum compressive strengths, slumps, maximum size aggregates and minimum cement contents.

PART 3 - EXECUTION

3.1 MIXING: Concrete shall be ready mixed as per ASTM C 94a. Equipment shall be adequate for the purpose and kept in good mechanical condition at all times.

- A. The rate of delivery, haul time, mixing time and hopper capacity shall be such that mixed concrete delivered shall be placed in the forms within 90 minutes or 300 revolutions of the drum from the time of introduction of cement and water to the mixer. Any interruption in placing in excess of 90 minutes or 300 revolutions will be cause for shutdown of the work for the day and the wasting of any remaining mixed concrete in hoppers or mixers. In case such interruption occurs, the Contractor shall provide construction joints where and as directed and cut concrete back to such line, cleaning forms and reinforcing as herein specified. Delivery tickets shall show departure time from plants. Revolution counters shall be set at "0" and shall commence to operate when drum revolution begins after introduction of ingredients into the mixer.
- B. No water shall be added to the mix after the initial introduction of mixing water for the batch except when, on arrival at the job site, the slump of the concrete is less than that specified. In this case, and only under the direction of the Special Inspector and with not more than one application per load, additional water may be added from the truck system to bring the slump within required limits. The drum or blades shall then be turned an additional 30 revolutions or more until mix is uniform.
- C. Mixers shall be equipped with an automatic device for recording number of revolutions of drum or blades prior to completion of mixing operation.
- D. Concrete shall be kept continuously agitated until discharged into the hopper at the job site.
- E. Contractor shall note that the appearance of unpainted exposed concrete surfaces depends upon uniform color and texture within any one area and between adjacent areas and he shall exercise strict batching and mixing controls to achieve this end.

3.2 PLACING

- A. Absorbent forms shall be thoroughly wetted before concrete is placed. Aggregate base for slabs on grade shall be moist but not saturated when concrete is placed.
- B. Placing of concrete shall be done immediately after mixing. No concrete shall be placed or used after it has begun to set and no re-tempering will be allowed. The method used in placing shall be such that concrete is conveyed to place and deposited without separation of the ingredients. No concrete shall be placed with a free unconfined fall in excess of six (6) feet. Concrete shall not be allowed to cascade through reinforcing steel in such manner as to promote segregation. Do not support runways on reinforcing steel.
- C. Splash or accumulations of hardened or partially hardened concrete shall be removed. Contact faces of forms for exposed concrete shall be protected from splash during placing of adjacent concrete. Concrete containing piping shall be placed in a manner that will prevent damage to pipes.
- D. Deposit concrete in approximate horizontal layers not exceeding 18" in thickness, unless otherwise authorized. Placing of concrete shall be carried on in a continuous operation without interruption until placing of course, section, panel or monolith is completed.

- E. Distribution of concrete shall be even and continuous and no placement joints shall show. Before a placement is started, make certain that adequate equipment, men, and concrete will be available to place in cycles which will permit proper and thorough integration of each layer of concrete. Upon stopping of a placement, the top surface shall be on a level. Points of deposit in walls shall be so spaced that it will not be necessary for concrete to flow laterally more than 24 inches.
- F. No concrete shall be placed for any element until reinforcing for same is fastened in place nor until forms are complete. No concrete shall be placed before work that is to be embedded has been set. Notify other crafts so they may deliver anchor, inserts, etc., or other work to be embedded in ample time and also notify them when their assistance in setting is required. Reinforcing or other materials that have been set in place shall not be disturbed.
- G. No pipes except electrical conduits 1-1/4" and less in diameter shall be embedded in structural concrete. Before placing concrete, such pipes and large conduits shall be sleeved providing 1/4" clearance (min.) all around. Sleeves for plumbing and mechanical pipes shall be placed so as not to impair strength of concrete or interfere with reinforcing bar placement. Multiple sleeve openings shall be placed no closer than three times diameter of the larger sleeve. Reinforcing clearances to sleeves shall conform to clearances specified for concrete surfaces. Sleeves and inserts will be provided and set under other Sections of the work.
- H. Remove debris, mud and water from places to receive concrete.
- I. Concrete splash and/or grout shall be removed from surfaces that will receive painter's finish.
- J. Place no concrete in water unless written permission has been obtained from Structural Engineer.
- K. Notify Owner's Representative, Architect and Structural Engineer 48 hours' minimum prior to placing of any concrete.

3.3 VIBRATION AND CONSOLIDATION

- A. Concrete shall be thoroughly consolidated by means of internal mechanical vibrators. Such consolidation shall be produced as will be obtained by placing the vibrator directly in concrete at 18" - 30" intervals for a period of approximately 5 to 15 seconds and withdrawing slowly or as directed, depending on the consistency of concrete. One vibrator will be required for each location where simultaneous placing takes place, to ensure thorough vibrating of all sections. Provide sufficient spare vibrators on the job so as to have them readily available in case any vibrator in use should suddenly cease to function properly. Where spare vibrators are employed, provide additional spares. Provide smaller diameter vibrators for areas with congested reinforcing steel. Under no condition shall vibrator be placed against reinforcing steel or attached to forms. Use no vibrators to transport material.
- B. Vibrator shall be of the flexible immersion type having a frequency of not less than 8,000 rpm. Use and type of vibrator shall conform to ACI 309, "Recommended Practice for Consolidation of Concrete".
- C. Spading will not be permitted on exposed concrete surfaces.
- D. Voids and rock pockets shall be eliminated. Voids and rock pockets in exposed concrete may subject that portion to rejection.

3.4 CONSTRUCTION JOINTS

- A. Placement of construction joints and the manner in which they are provided for shall be only as approved by Owner's Representative or as shown on the Drawings. Construction joints shall be few as possible and will not be permitted simply to save forms. Submit shop drawings of construction joints showing proposed locations and details. Submit to Architect prior to forming or placing concrete.
- B. Provide waterstop material in all construction joints in pit foundations and pit wall construction (top and bottom of walls pours) in accordance with manufacturer's recommendations, and as shown on drawings.

3.5 CURING: See Section 033500, Paragraph 3.01.

3.6 EQUIPMENT BASES: Verify sizes and shapes required by items specified elsewhere. Concrete bases for special equipment shall be installed in strict accordance with Drawing details and the specifications and recommendations of the equipment manufacturer.

3.7 EXPANSION JOINT FILLERS: Place filler material so that top of surfaces is level and aligned uniformly 1/4" below adjacent concrete surface.

3.8 GROUTING

- A. The setting of steel base plates is specified under Structural Steel Section. The grouting of the steel base plates shall be performed as hereinafter specified and as a part of this Section.
- B. Grout used for the grouting of base plates shall be non-metallic, non-shrink grout mixed and applied in strict accordance with manufacturer's directions.
- C. Grouting of bases shall be carefully done so as not to leave any voids between the base plates and the concrete.

3.9 FIELD QUALITY CONTROL: Refer to Quality Control Section for general requirements governing testing and inspection.

- A. Tests and inspections shall be performed by qualified individuals, engineering companies or testing laboratories who shall perform those special inspections required by Sec. 1704 of the California Building Code, those tests and inspections specified below and such other tests and inspections as the Architect or Owner may require to establish the acceptability of the work.
- B. Testing and inspection services shall be retained by the Owner at his expense except that when tests or inspections reveal failure of materials to meet contract requirements, costs for subsequent tests and inspections will be deducted from the Contract Price. Excessive inspection time required by Contractor's failure to provide sufficient workmen or to properly pursue the progress of the work shall likewise be deducted from the Contract Price.

- C. Furnish material and handling for test cylinders and any other samples which testing agency requires for analysis of concrete work.
- D. Compression Tests; unless noted otherwise:
 - 1. Mat Concrete: Six compression test cylinders will be taken for each placement of 150 cu. yd. or fraction thereof placed each day. Make, cure, and store test cylinders per ASTM C 31. One cylinder shall be tested at 7 days, one at 29 days, two at 56 days and two held in reserve.
 - 2. Mild Reinforced Concrete: 4 compression test cylinders will be taken for each placement of 150 cu. yd. or fraction thereof of each class of concrete placed each day. Make, cure and store test cylinders as per ASTM C 31. One cylinder will be tested at 7 days for information; two at 28 days for acceptance; and one retained as a spare.
 - 3. Post Tensioned Concrete: 5 compression test cylinders will be taken for each placement of 150 cu. yds or fraction thereof of each class of concrete placed each day, with 2 sets minimum per pour per day. Make, cure, and store test cylinders as per ASTM C31. Test one cylinder at 96 hours for stressing, one at 28 days for information, two at 56 days for acceptance and one held in reserve.
- E. Slump Test: Slump tests will be performed as per ASTM C 143 (slump cone) 360-63 at time of taking test cylinders. Tests shall be taken at the truck.
- F. Testing agencies shall select and prepare samples taken at job site.

END OF SECTION

SECTION 033500 - CONCRETE FINISHING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included: Finish required on exposed cast-in-place concrete and shotcrete surfaces including patching or repair of defective areas.
- B. Related Work Specified Elsewhere:
 - 1. Finish for concrete work beyond the building lines: See Sidewalks and Driveways.
 - 2. Curing of formed concrete and expansion joint fillers: See Concrete, Cast-In-Place.
 - 3. Caulking and Sealants.
 - 4. Painting.
 - 5. Moisture and alkalinity control: See Section 072600.

- 1.2 PROTECTION: Protect exposed surfaces including flat work as required to prevent damage by impact or stains

1.3 SUBMITTALS

- A. Curing Compounds and Sealers: LEED MR Credit 2 - BPDO – Environmental Product Declarations (EPD) Submittal - EPD/LCA Documentation: Provide a publicly available Environmental Product Declaration in conformance with standards listed and described in Section 018113
- B. Curing Compounds and Sealers: LEED MR Credit 4 - BPDO – Material Ingredients Submittal - Ingredient Reporting Documentation: Provide a publicly available material ingredient inventory as defined in Section 018113.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Curing Compounds: ASTM C 309-81, Type 1, clear resin type free of oil, wax, grease, or other substance which might prove deleterious to any material to be applied to concrete and shall be approved by Environmental Protection Agency for use in the State of California and at this Project Site. Curing compounds for exposed slabs shall be a multi-purpose curing-hardener-sealer type equivalent to Floorseal "Mirrorcrete Hardener", or Vaporseal 309 Curing/Sealing Membrane and shall meet the above requirements.
 - 1. LEED MR Credit 2 - BPDO – Environmental Product Declarations (EPD) - EPD/LCA Preferment: Preference shall be given to products with a publicly available Environmental Product Declaration in conformance with standards listed and described in Section 018113.
 - 2. LEED MR Credit 4 - BPDO – Material Ingredients - Ingredient Reporting Preferment: Preference shall be given to products with a publicly available material ingredient inventory as defined in Section 018113.

3. LEED EQ Credit 2 - Low-Emitting Materials - VOC Content Limit Requirement: The product shall not contain VOC content limits (less water and exempt solids) in excess of those listed in Section 018113, Appendix C.
- B. Sealer: Floorseal "Mirrorcrete Sealer".
- C. Weakened Plane Joint Former: Burke Co. "Zip Strip Plastic Joint Former", or approved equal, two-part, rigid PVC plastic, depth equal to 1/4 of slab thickness(min.).

PART 3 - EXECUTION

3.1 CURING

- A. Curing Compound - General:
 1. Follow directions and recommendations of compound manufacturer.
 2. Application shall commence immediately following completion of specified finishing and/or following disappearance of surface "sheen".
 3. When applying compound, the surfaces shall be damp but shall be free from standing water.
 4. Surfaces shall be covered with a uniform and even film of compound, as supplied. Using pressurized spray equipment, lambswool applicator or short nap roller, apply in a single coat to achieve total coverage as recommended by manufacturer.
 5. When curing compound is applied inside enclosed spaces, adequate mechanical ventilation shall be provided and maintained throughout the periods of application.

3.2 PATCHING AND REPAIR OF DEFECTIVE AREAS

- A. Within 3 days after stripping formwork, surface defects such as rock pockets, honeycombs, cracks, and holes exceeding 3/16" diameter shall be filled and patched. The Architect shall distinguish between concrete which requires replacement or repair and surface defects which require patching. Permission to patch any area shall not be construed as a waiver of the Architect's right to require complete removal of the defective work if the patching, in his opinion, does not satisfactorily restore the quality and appearance of the surface.
- B. Areas to be patched shall have loose material chipped away and shall be thoroughly dampened for at least 6 inches entirely surrounding the patch. Coat areas with thin brush coat of fine sand-cement grout followed by patching mortar. Patching mortar shall be prepared of the same material and proportions as used for concrete, except that coarse aggregate shall be removed. Where exposed formed concrete is to remain unpainted, trial patches using combinations of white cement and cement used in concrete mix shall be allowed to set up in order to verify that the patching mortar shall match the color of the adjacent concrete surface. Water in the mix shall be kept to a minimum. Mortar shall not be re-tempered by adding water. Mortar shall be allowed to stand for one hour prior to use and shall be mixed to prevent setting. Mortar shall be compacted thoroughly into place and screeded to leave patch slightly higher than surrounding surfaces and then left undisturbed for 1 to 2 hours to permit initial shrinkage. Patch shall then be finished to match adjacent surfaces.
- C. Form tie holes shall be patched and finished flush with adjacent surface. For holes passing entirely through walls, a plunger type "grease gun" or other suitable device shall be used to completely fill holes.

3.3 FINISHING

- A. Flatwork: Unless otherwise noted or specified, slabs shall be finished monolithically. Floor slabs which are indicated as sloped to floor drains shall be sloped uniformly so as to provide positive drainage of the indicated areas. Special care shall be taken that a smooth, even joint is obtained between successive pours.
- B. Formed Surfaces: Remove fins and projections, patch, and leave "as formed". Air bubbles or "bug-holes" not exceeding 3/16" diameter need not be repaired.
- C. Floor slabs that are indicated to be formed with camber specified on the drawings, shall have concrete placed to maintain the minimum thickness noted on the drawings throughout each pour. Set screed spins or other elevation devices to match camber requirements.
- D. Slabs to receive concrete wall pours above shall have keys and or roughened surfaces per drawings.
- E. Tolerance: Comply with ACI 117 for local flatness/levelness tolerance measured in accordance with ASTM E1155. Specified Overall Value (SOV), all as per ACI 302 and with the following specific requirements:
1. Slabs on grade and mat slabs designated to receive carpet and to receive mortar beds:
 - a. Floor Flatness (F/F): SOV=25 MLV=17
 - b. Floor Levelness (F/L): SOV=30 MLV=20
 2. Slabs on grade and mat slabs designated to receive resilient flooring, ceramic tile or left exposed:
 - a. Floor Flatness (F/F): SOV=25 MLV=17
 - b. Floor Levelness (F/L): SOV=30 MLV=20
 3. Suspended concrete slabs in general office or to receive carpeting or thick set tile:
 - a. Floor Flatness (F/F): SOV=25 MLV=17
 4. Suspended Concrete Slabs to receive resilient flooring, ceramic tile or left exposed:
 - a. Floor Flatness (F/F): SOV=35 MLV=20
 5. Concrete fill on metal deck designated to receive mortar beds and roofing:
 - a. Floor Flatness (F/F): SOV=30 MLV=20
 6. Elevation tolerance: 80 percent points taken within individual sets of readings shall fall within +3/8 inch to -3/8 inch from design elevation indicated on Drawings.
- F. Swirl-Float Finish (Typical for Vehicle Traffic and Parking Areas): Place, consolidate, strike off and level concrete slab to proper elevation. After concrete has stiffened sufficiently to permit the operation and water sheen has disappeared, surface shall receive a swirl-float finish using a magnesium or aluminum float so as to produce a uniform non-slip, non-skid surface having a swirl design.
- G. Broom Finish (Typical for exterior and filled metal pan stairs): After the concrete has received a float finish, the surface shall be given a non-slip medium broom finish.
- H. Trowel Finish (Typical for interior exposed areas): After the concrete slab has been float finished, the surface shall be troweled at least twice to a smooth, dense, uniform finish free of defects and blemishes. Jitterbugs shall not be used. No dry cement or mixture of dry cement and sand shall be sprinkled on the surface.
- I. Treads of concrete stairs shall have a broom finish. Forms for risers shall be removed as soon as concrete has set and surfaces plastered with cement grout and troweled smooth. Treads without safety nosings shall have (4) evenly spaced grooves troweled in with grooving tool.

- 3.4 SEALER: At cleanup time for the entire Project, concrete slabs which will be exposed in the completed project, shall receive one (1) coat of the same curing-hardener-sealer compound used for original curing and specified herein under "Curing Materials". Follow manufacturer's directions and recommendations
- 3.5 FLATNESS AND LEVELNESS TESTING: Concrete slabs on grade, suspended slabs, and concrete fill on metal deck shall be tested to verify that flatness and levelness of the completed work meets the specified tolerances in accordance with ACI and ASTM references noted above.
- 3.6 DEFECTIVE WORK: Finish which is not true to line and plane, which is not in conformance with specified finish and appearance requirements, which exceeds specified tolerances, which does not properly connect to adjoining work, which does not slope to drain and which has been improperly cured, will be deemed as defective. Defective work shall be repaired or removed and replaced as directed by the Architect with proper work meeting Drawing and Specification requirements and at no added cost to the Owner

END OF SECTION

SECTION 033713 - SHOTCRETE

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This Section describes the requirements for furnishing and installing pneumatically placed concrete, "shotcrete."

1.2 QUALITY CONTROL

A. Reference Standards.

1. ACI, American Concrete Institute: "Specifications for materials, proportioning and applications of shotcrete" (ACI 506.2-95).
2. ASTM, American Society for Testing Materials.
3. CSHS, State of California, Dept. of Public Works Division of Highways, Standard Specification.
4. California Building Code, 2019 Edition.
5. Gunite Contractors Assn. Brochure G-84.

B. Tests and Inspections: Dry mix and wet mixed shotcrete.

1. Tests shall be made of shotcrete work by an approved independent Testing Laboratory.
2. Testing Agency: Perform and report on following tests, inspections and control of concrete during construction:
 - a. Preconstruction Tests and Mock-Up Panels.
 - (1) Required for locations to be constructed of shotcrete and each nozzleman to be prequalified.
 - (2) Prior to shotcrete placement, shoot, cure, saw, examine, and test representative samples simulating actual job conditions as closely as possible. Reproduce the most thickly reinforced and most congested areas of the structural design, including laps and couplers. Shoot test panels at the same angle, using the same nozzleman and equipment, and using the same mix designs to be used on the Project. Minimum size of test panels shall not be less than 4' wide x "1 story height" tall for wall samples and the full size column dimensions x "1 story height" tall for columns. If pilasters are to be shotcreted, incorporate pilasters into wall test panels and widen as necessary.
 - (3) One wall test panel and one column test panel shall be shot by each nozzleman to be prequalified.
 - (4) From each test panel, take three cores, not through reinforcing, to determine f'c. Take six additional cores from each column and each wall sample, through congested reinforcing, to demonstrate adequate encasement of bars and concrete consolidation; three cores near the bottom of the test panel or column and three cores near the top of the test panel or column.
 - (5) Average Grade of cores shall be 2.0 or less with no single core above 2.0, per ACI 506.2.

- (6) Obtain core or cube samples to determine f'_c at 7 and 28 days in accordance with Section 1.02.B.2.d.
 - b. Provide continuous inspection of shotcrete placement at all locations.
 - c. Slump test for wet mixed shotcrete: Make slump tests as required during progress of work.
- 3. Construction Compression Tests and Test Panels.
 - a. A representative of the Testing Laboratory shall take not less than one test panel each shift nor less than one for each 50 cubic yards of shotcrete placed.
 - (1) Each panel shall be dated, given a number, the name of the nozzleman making the panel and the point in the structure where the panel was taken.
 - b. The Contractor shall furnish at his own expense specially constructed plywood forms for making unreinforced test panels at least 1 foot square and 3 inches thick.
 - c. The test panels of shotcrete shall be shot with the same air pressure, nozzle tip, and hydration as the shotcrete in the structure at the point where the panel was taken.
 - d. At the end of 24 hours after the cylinders are made, the form shall be removed and the panel stored in the testing laboratory in accordance with the current issue of "Standard Method of Making Compression Tests on Concrete", ASTM Designation C39.
 - e. Three cubes or cores shall be taken from each panel for testing.
 - (1) The specimens shall be tested in compression at 7 and 28 days in conformance with ASTM C42.
 - (2) Test results should be evaluated as described in ACI 214-65.
 - (3) The average compressive strength of the three cores shall be at least 0.85 f'_c with no individual core less than 0.75 f'_c .
 - (4) The average compressive strength of the three cubes shall be at least 1.0 f'_c with no individual core less than 0.88 f'_c .
 - f. Should the specimen strengths be less than the above criteria, then test cores shall be taken under the direction of the Testing Laboratory.
 - (1) Should the ultimate compressive strength of these cores be less than the specified f'_c in any part of the said deficient work, then this work shall be removed and replaced.
 - g. Tests for absorption, drying shrinkage, resistance to freezing and thawing and other properties may also be made at the Engineer's direction using appropriate specimens cored or sawed from the panel.

C. Testing Agency.

- 1. All testing shall be done by the independent Testing Laboratory.
- 2. Test reports: Submit shotcrete test reports indicating compliance with specifications.

D. Certification.

- 1. Furnish mill certificates for Portland cement indicating compliance with the Specifications.
- 2. Certify that aggregates comply with the Specifications and are suitable for the intended use.

1.3 SUBMITTALS

A. Mix Designs.

- 1. Mix designs shall indicate, completely, types of cements and admixtures; quantities, size and source of all aggregates, slump, strength and water cement ratios.

- B. Product Data: Submit manufacturer's product data with application and installation instructions for all proprietary materials and products, including forming and reinforcement accessories, patching compounds, joint systems, and applied materials.
- C. Curing Materials
 - 1. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 oz/sy, and complying with AASHTO M-182.
 - 2. Moisture Retaining Cover: Waterproof paper, polyethylene sheet, or polyethylene-coated burlap complying with ASTM C171.
 - 3. Moisture retaining membrane.
- D. Shop Drawings: Submit shop drawings for formwork and reinforcement in accordance with the requirements of Sections 03 11 00 and 03 20 00, and ACI 315.
- E. Laboratory Test Reports: Submit laboratory test reports for concrete materials, mix designs, and field quality control testing as specified herein.
- F. Placement Schedule: Submit proposed shotcrete placement schedule, including date, method of placement, and location.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Wet Mixed Shotcrete.
 - 1. Shotcrete, as herein specified, and where shown on the Drawings, shall be a mixture of Portland cement, fine aggregate, pea gravel, water reducing admixture, and water. It shall be mixed wet at the batch plant; delivered to the site in transit mixers, pumped through a hose to the point of deposit by means of a concrete pump or other similar machine, deposited under impact by air pressure and consolidated in the place of final repose.
 - 2. Cement: Portland cement, Type II, shall conform to ASTM C150 with latest amendments.
 - 3. Aggregate: The aggregate shall be comprised of 20 to 40 percent round pea gravel and 60 to 80 percent fine aggregate. The aggregate shall be thoroughly washed, free from oil or other deleterious substances such as clay lumps, shale, free alkalies, coated grains, or soft, flaky particles.
 - a. Pea gravel shall conform to ASTM C33 requirements for coarse aggregates with 3/8 inch diameter maximum.
 - b. Fine aggregates shall be evenly graded from fine to coarse in accordance with ASTM C33 and shall contain no particles larger than 3/8 inch in diameter. When tested in accordance with ASTM Standard C33, sand shall not show a color solution darker than the standard color solution No. 2.
 - 4. Water: Clean and free from deleterious amounts of acids, alkalies, salts or organic materials.
 - 5. Admixtures:
 - a. Calcium chloride: Do not use calcium chloride in concrete; admixtures may be used only when approved by the Engineer.
 - b. Water-reducing admixtures: ASTM C494 Type A, Pozzolith 300-N by Master Builders, WRDA by W. R. Grace Co., or equal.

2.2 FORMWORK

- A. Form material as specified in Section 031100.
- B. Formwork shall be adequately braced to insure against excessive vibration; forms shall be built so as to permit the escape of air and rebound and to facilitate the placing of shotcrete to finish tolerances.

2.3 REINFORCEMENT

- A. Reinforcement shall be as indicated on the Drawings; see Section 03 20 00 for Material Specification.
- B. Reinforcing shall be secured in place so that it is not displaced during shotcreting.
- C. Reinforcement may have contact lap splices provided preconstruction mock-up test panels demonstrate adequate coverage and encasement of bars.
- D. Reinforcement shall be secured rigidly to eliminate vibration and insure proper encasement in the shotcrete.
- E. Reinforcement shall be reviewed by the Testing Agency before placement of shotcrete.
- F. Electrical conduits within shotcrete walls shall maintain 2 inches clear from all horizontal and vertical reinforcing. Conduits shall not be placed directly behind and parallel to any horizontal or vertical reinforcing. Secure all conduit rigidly in place to eliminate vibration during shotcrete placement.

2.4 SHOTCRETE QUALITY

- A. Wet Mixed Shotcrete:
 - 1. Wet mixed shotcrete materials shall be mixed with a minimum of seven sacks of cement per cubic yard. The water/cement ratio shall be less than 0.5. The slump shall be such that the material will not slough or sag when placed. The slump at the pump shall be 2 inches plus or minus 1 inch. The materials shall be mixed in an approved power batch mixer equipment with a device for accurately measuring the quantity of fine aggregate. The materials shall be intimately mixed until fully blended as indicated by visual inspection. Wet mixed shotcrete shall be placed within 90 minutes after cement, admixture, and water have been mixed with the aggregate.

2.5 APPARATUS

- A. Wet Mixed Shotcrete:
 - 1. The concrete pump shall be capable of moving the concrete to the nozzle at the proper slump. The air compressor shall be capable of maintaining sufficient nozzle velocity for all parts of the work and for the simultaneous operation of a blow pipe for clearing away rebound. All material, hose and joints shall be tight. The entire machine, apparatus, or device shall be in excellent operating condition before starting work.

2.6 SCAFFOLDING

- A. Provide safety code-approved, remotely controlled type which permits uninterrupted gunning at proper angle and distance.

2.7 WORKMEN AND CONTRACTOR'S EXPERIENCE

- A. Only experienced foremen, gunmen and nozzle men and rodmen shall be employed and satisfactory written evidence of such experience shall be furnished to the Architect or his representative upon demand.
- B. All nozzle men shall be prequalified for this project by shooting an accepted preconstruction mock-up test panel in accordance with Section 1.02.3.2.a.
- C. The Contractor must have had at least five years experience in shotcrete construction and must be able to show examples of similar installations of the shotcrete work as shown on the drawings, which he has constructed and which on investigation have been found to be completed in a satisfactory manner.

PART 3 - EXECUTION

3.1 PREPARATION OF SURFACES TO RECEIVE SHOTCRETE

- A. Forms - Use form-coating material on removable forms to prevent absorption of moisture and to prevent bond with the shotcrete. Use a non-stain material for surfaces exposed to view when construction is completed. The form-coating material shall not interfere with subsequent bonding to the shotcrete when this is required.

3.2 GROUND WIRES

- A. Ground wires shall be installed in such a manner that they accurately outline the finished surface of the shotcrete as indicated on the Drawings. They shall be located at intervals sufficient to insure proper thickness throughout. Wire shall be stretched tight and shall not be removed prior to application of the finish coat. All surfaces shall be rodged to these wires to finish tolerances.

3.3 PLACING SHOTCRETE

- A. In placing shotcrete, the materials shall be delivered at the nozzle in a constant and steady stream and when from any cause the flow is interrupted by "plugs" "blow-outs", or any intermittent separation of the air and cement-fine aggregate mixture, the nozzle shall be turned away from the work until a steady delivery is recovered.
- B. Shotcrete deposited on vertical surfaces shall be shot at right angles to the surface, and shall be built up in layers of a thickness that will not slump, allowing sufficient time between layers for set to take place. All loose, fine aggregate or rebound shall be removed from the surface being shotcreted before placing succeeding layers of shotcrete. No rebound shall be used over or in anyway incorporated into the work. Rebound pockets, sags, sloughing or other defects shall be cut out and removed from the surface. If a trowel, straight edge or other implement is used to remove excessive material from the surface, care shall be exercised to prevent the shotcrete from being dragged or torn.

- C. When enclosing reinforcing steel, the nozzle shall be held so as to direct the material behind the bars. Each side of each bar shall not be shot separately.
- D. Wherever possible, the first layer shall entirely cover the reinforcing in order to secure it in its proper position.
- E. Shotcrete shall be placed to final thickness (ground wires) in one operation, before screeding. Multiple layers of shotcrete application will not be allowed for wall less than 18" inches thick. Walls 18" thick or thicker shall not be shotcreted without approval of the architect.
- F. Wet mixed shotcrete applied on vertical surfaces shall be applied to within 12 inches from the bottom of the existing concrete beam or ceiling which will form the top of the new shotcrete wall. After a period of not less than 3 hours after the application of the lower wall portion of wet mixed shotcrete, the 12 inch gap between the new shotcrete wall and the existing concrete above shall be filled with shotcrete.
- G. Whenever possible the nozzle shall be held at right angles to the surface to be shotcreted and at a distance from two and one-half to three feet. The use of "puddled" shotcrete in which air pressure is reduced and water content of the mix increased to facilitate the placing in difficult locations will not be permitted. Shotcrete shall not be placed where the stream from the nozzle cannot directly impinge on the surface on which the shotcrete is to be placed. Where shooting conditions are difficult, the proper results are to be obtained by reducing the supply of material.
- H. The proportion of water to cement shall be accurately controlled so as to produce thorough and uniform hydration of the gunite which, when shot, will form a homogeneous mass containing neither sags nor dry sand formations.
- I. Placing of shotcrete shall be under the continuous inspection of a qualified shotcrete inspector.
- J. A second experienced nozzleman equipped with an air jet shall attend the operators whenever reinforcing steel is being enclosed.
- K. Shotcrete Placement Limits
 - 1. One story height in one day.
 - 2. 100 feet length between construction joints.

3.4 CONSTRUCTION JOINTS

- A. Where shotcreting is terminated, particular care shall be given to formation of construction joints. They shall be square edge with 2" x 4" x 0'-8" beveled keys at 1'-6" on center and the entire joint shall be thoroughly wetted before adjacent shotcrete is placed.
- B. Construction joints at tops of walls shall have a roughened surface without any loose aggregate or shotcrete. Trowel and roughen as required. Provide 2" x 4" x 0'-8" beveled keys at 1'-6" on center.
- C. The film of laitance which forms on the surface of the shotcrete shall be carefully removed by wire brushing one hour after application. After 24 hours, the film shall be removed by sand blasting.
- D. Joints which receive future concrete or shotcrete placement shall be sound concrete, free of all debris and cleaned and roughened by sandblasting or other approved method. Top of shotcrete walls shall be trowelled with keys formed as shown on drawings.

3.5 FINISHING

- A. Upon reaching the thickness and planes outlined by the forms and ground wires, excess material shall be sliced off with a sharp edge cutting screed to true lines. Low spots shall be built up to proper thickness. All surfaces shall be given a flash coat as soon as possible after the screeding.
- B. All exposed surfaces shall have a wood float finish.
- C. Finishes shall be true to plane within 1/8 inch in 10 feet as determined by a 10 foot straight edge placed anywhere on the surface in any direction. Grind or patch surface defects which are incompatible with finish.
- D. Joints shall be sacked and patched on all interior surfaces and 6 inches below adjacent grade and at exterior exposed surfaces.

3.6 CURING

- A. Shotcrete shall be maintained above 40°F(4.4°C) and in moist condition. In initial curing, shotcrete shall be kept continuously moist for 24 hours after placement is complete by means of soaked burlap with soaker hose or spray. Alternative spray applied moisture retaining membrane may be allowed for initial curing, submit products to architect for review. Final curing shall continue for seven days after shotcrete placement or until the specified strength is obtained. Final curing shall consist of a fog spray or an approved moisture-retaining cover or membrane.
- B. Method of curing shall be subject to approval of the Architect.

END OF SECTION

SECTION 034600 - GLASS-FIBER-REINFORCED CONCRETE (GFRC)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes glass-fiber-reinforced concrete (GFRC) fabricated into precast planter walls and amphitheater seat-steps.
- B. Related Requirements:
 - 1. Section 079200 "Joint Sealants" for elastomeric joint sealants and sealant backings.

1.3 REFERENCES

- A. ASTM (American Society for Testing and Materials):
 - 1. ASTM C33-07 — Specification for Concrete Aggregates^[1]^[SEP]
 - 2. ASTM C150-07 — Specification for Portland Cement^[1]^[SEP]
 - 3. ASTM C330 / C 330M-09 — Specification for Lightweight Aggregates for Structural Concrete.
 - 4. ASTM C979-05 — Specification for Pigments for Integrally Colored Concrete^[1]^[SEP]
 - 5. ASTM C1116 / C 1116M-10a — Specification for Fiber-Reinforced Concrete.
- B. PCI – Precast Concrete Institute.

1.4 DEFINITIONS

- A. Design Reference Sample: Sample of GFRC color, finish, and texture that has been preapproved by Architect before execution of the Contract.

1.5 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.6 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include GFRC design mixes.
- B. Shop Drawings: Show fabrication and installation details for GFRC panels including the following:
 - 1. Finishes.
 - 2. Joint details.
 - 3. Erection details.

4. Erection sequence for special conditions.
5. Relationship to adjacent materials.

- C. Samples for Verification: For each type of finish indicated on exposed GFRC surfaces, representative of finish, color, and texture variations expected, approximately 8 inches by 5-3/8 inches by 3/4 inch thick.

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer.
- B. Source Quality-Control Program: For GFRC manufacturer.

1.8 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Specializing in manufacturing of the type products specified and in current and continuous production for previous twenty years.
- B. Regulatory Requirements: Meet requirements of applicable laws, codes, and regulations required by authorities having jurisdiction over Work.
- C. Installer Qualifications: Manufacturer of GFRC panels.
- D. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for fabrication and installation.
 1. Construct one full scale sample for each element. Include the specified color admixture and finish
 2. Construct as many samples as necessary to achieve acceptable samples.
 3. Place accepted samples in a location where samples can be referenced.
 4. Accepted sample shall become the project standard for tolerances and appearance.
 5. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Carefully pack the units for shipment free from stains and other deleterious material
- B. Exercise precautions against damage in transit
- C. Store units vertically on foam or other appropriate surface at least four inches above grade.
- D. Place units to distribute weight evenly and to prevent breakage or cracking.
- E. Protect and store units from weather and soiling with waterproof non-staining covers or enclosure, but allow air to circulate around units.
- F. Handle units to prevent chipping, breakage, or other damage.

- G. Do not use pinch or wrecking bars without protecting edges of units with wood or other rigid materials.
- H. Lifts with appropriate manpower according to manufacturer's Installation Guidelines.

1.10 WARRANTY

- A. General Description: In addition to manufacturer's guarantees or warranties, Work shall be warranted for one year from the date of Final Completion against defects in materials and workmanship.
- B. Other Items Covered: Warranty shall cover repair of damage to any materials and workmanship resulting from defects in precast concrete specialty materials and workmanship.
- C. Exceptions: Contractor shall not be held responsible for failures due to neglect by Owner, vandalism and other causes outside the Contractor's control.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide custom made planter walls and amphitheater seat-steps as manufactured by Concreteworks, Alameda, CA, www.concreteworks.com, contact: Mark Rogero, 510-534-7141 ext. 12, mark@concreteworks.com or Sohan Mutucumarana 510-534-7141 ext. 15 sohan@concreteworks.com, or comparable product by one of the following:
 - 1. QCP.
 - 2. Clark Pacific.

2.2 PERFORMANCE REQUIREMENTS

- A. Structural Performance: GFRC units, shall withstand the following design loads as well as the effects of thermal- and moisture-induced dimensional changes within limits and under conditions indicated:
 - 1. Seismic Loads: Seismic Zone 4
 - 2. Thermal Movements: Provide for thermal movements resulting from annual ambient temperature changes of 80 deg F.
- B. PCI Manuals: Comply with requirements and recommendations in the following PCI manuals unless more stringent requirements are indicated:
 - 1. PCI MNL 128, "Recommended Practice for Glass Fiber Reinforced Concrete Panels."
 - 2. PCI MNL 130, "Manual for Quality Control for Plants and Production of Glass Fiber Reinforced Concrete Products."
- C. Materials:
 - 1. Cement: ASTM C 150, Type II Portland Cement.
 - 2. Aggregates
 - a. Back-up Mix: Washed and dried silica sand or other sand having a history of successful use in GFRC construction, passing through a No. 20 sieve.

- b. Facing Mix: Fine and course aggregate for face mix shall conform to ASTM C 33 except for gradation. Aggregates shall be clean, hard, strong, durable, inert and free of staining and deleterious materials. Provide aggregate in colors and sizes as required to achieve the finish texture and color of accepted samples.
 - 3. Water: Clean, potable, concrete mixing water free from injurious amounts of salts, oils, acids, alkalis, organic materials or other deleterious substances which could cause staining.
 - 4. Coloring Admixtures for Colored Concrete: Concreteworks Proprietary Color System.
 - 5. Glass Fiber: Fibers specifically designed to be compatible with the aggressive alkaline environment of Portland cement-based composites or fibers with a history of successful use in Portland cement-based composites that has been modified to be compatible with the fibers.
 - 6. Forming Material: MDO or HDO composite overlaid plywood for face forms.
 - 7. Form Release Agent: Non-staining material, compatible with finish specified and VOC compliant in California.
 - 8. Form Sealer: Concreteworks Proprietary Release.
- D. Mixes:
 - 1. GFRC Mix
 - a. Portland cement, glass fibers and sand mixed in proportions determined in accordance with PCI.
 - b. Coloring Agent: Achieve color by integrally mixing color admixture with mix, as specified by the color admixture manufacturer's current printed instructions.
- E. Fabrication:
 - 1. Proportioning and Mixing:
 - a. Carefully measure mix constituents in a manner to achieve the desired mix proportions.
 - b. Meter the glass fiber and cement slurry to the spray head at rates to achieve the desired mix proportion and glass content. Check rates in accordance with standard procedures described in PCI.
 - 2. Hand Spray Application:
 - a. Spray apply a mist coat consisting of the matrix without fiber. Apply this coating not to exceed 1/32 inch thick in order to avoid an unreinforced surface.
 - b. Spray-up main body of material before the mist coat has set.
 - c. Apply by spraying such that uniform thickness and distribution of glass fiber and cement matrix is achieved during the application process.
 - d. Consolidate by rolling or such other techniques as necessary to achieve complete encapsulation of fibers and compaction.
 - e. Control thickness by using a pin gauge or other accepted method. Perform a minimum of 2 measurements per 5 square feet of surface.
 - 3. Forming and Molds:
 - a. Select mold material to provide a finish matching the accepted sample.
 - b. Cast elements in molds of rigid construction and accurate in detail.
 - c. Prior to installing GFRC elements, fill, grind, file and adjust mold surfaces to provide a finished surface that is smooth, dense and free of honey-combing, air pockets, offsets, shrinkages, joint marks and other irregularities.
 - d. Provide for skateboard notching as shown on Drawings.
 - 4. Color: To match accepted sample submittal.
 - 5. Finish: Polished smooth finish to match accepted sample submittal, free of form marks, laitance, grease, form release treatments, efflorescence, curing compounds or other foreign material.
 - 6. Curing: Meet requirements of industry standards for this type of work.

2.3 FINISHES

- A. Exposed faces shall be free of joint marks, grain, and other obvious defects. Corners, including false joints, shall be uniform, straight, and sharp. Finish exposed-face surfaces of GFRC to match approved design reference sample and as follows:
1. As-Cast-Surface Finish: Provide surfaces to match approved sample for acceptable surface, air voids, sand streaks, and honeycomb, with uniform color and texture.
 2. Textured-Surface Finish: Impart by form liners.
 3. Retarded Finish: Use chemical-retarding agents applied to concrete forms and washing and brushing procedures to expose aggregate and surrounding matrix surfaces after form removal.
 4. Sand- or Abrasive-Blast Finish: Use abrasive grit, equipment, application techniques, and cleaning procedures to expose aggregate and surrounding matrix surfaces.
 5. Acid-Etched Finish: Use acid and hot-water solution equipment, application techniques, and cleaning procedures to expose aggregate and surrounding matrix surfaces.

2.4 SOURCE QUALITY CONTROL

- A. Quality-Control Testing: Establish and maintain a quality-control program for manufacturing GFRC panels according to PCI MNL 130.
1. Test materials and inspect production techniques.
 2. Quality-control program shall monitor glass-fiber content, spray rate, unit weight, product physical properties, anchor pull-off and shear strength, and curing period and conditions.
 3. Prepare test specimens and test according to ASTM C1228, PCI MNL 130, and PCI MNL 128 procedures.
 4. Test GFRC inserts and anchors according to ASTM C1230 to validate design values.
 5. Produce test boards at a rate of no fewer than one per work shift per operator for each spray machine and for each mix design.
 - a. For each test board, determine glass-fiber content according to ASTM C1229 and flexural yield and ultimate strength according to ASTM C947.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Examine site and verify that conditions are suitable to receive Work and that no defects or errors are present which would cause defective installation of products or cause latent defects in workmanship and function.
- B. Notification of Unsuitable Conditions: Before proceeding with Work, notify Owner and Architect in writing of unsuitable conditions.

3.2 ERECTION

- A. Install at locations approximately as shown on Drawings and as identified in the field by Architect

- B. Install GFRC units level, plumb, square, and in alignment. Provide temporary supports and bracing as required to maintain position, stability, and alignment of units until permanent connections are completed.
 - 1. Maintain horizontal and vertical joint alignment and uniform joint width.
 - 2. Remove projecting hoisting devices.
- C. Connect GFRC units in position by bolting, as indicated on Shop Drawings. Remove temporary shims, wedges, and spacers as soon as possible after connecting is completed.

3.3 REPAIRS

- A. Repairs are permitted provided structural adequacy of GFRC units and appearance are not impaired, as approved by Architect.
- B. Mix patching materials and repair GFRC so cured patches blend with color, texture, and uniformity of adjacent exposed surfaces.
- C. Remove and replace damaged GFRC units when repairs do not comply with requirements.

3.4 CLEANING AND PROTECTION

- A. Perform cleaning procedures, if necessary, according to GFRC manufacturer's written instructions. Clean soiled GFRC surfaces with detergent and water, using soft fiber brushes and sponges, and rinse with clean water. Prevent damage to GFRC surfaces and staining of adjacent materials.
- B. Barricades and Coverings: Protect Work against damage, defacement, and staining during subsequent construction operations until Final Completion.

END OF SECTION

SECTION 035416 - CEMENT UNDERLAYMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes cement-based, polymer-modified, self-leveling underlayment for application below interior floor coverings.
- B. Related Sections:
 - 1. Section 017419 "Construction and Demolition Waste Management and Disposal".
 - 2. Section 018113 "Sustainable Design Requirements".
 - 3. Section 018119 "Construction Indoor Air Quality Requirement".
 - 4. Floor Finishes: Div. 09

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

LEED Submittals: The Owner requires the Contractor to implement practices and procedures to meet the project's environmental performance goals, which include conformance with California Green Building Code (CAL Green) and achieving LEED v4 Platinum Certification. The requirements related to these goals are defined in the Articles below and represent a combination of sustainability performance criteria necessary to comply with the California Green Building Code and achieve LEED certification goals. The Contractor shall ensure that the requirements related to these goals are implemented to the fullest extent.

- 1. LEED EQ Credit 2 - Low-Emitting Materials Submittal - VOC Content Documentation: Provide a product data sheet or third-party certificates indicating the VOC content of the product (less water and exempt solids). Provide documentation indicating the anticipated volume of product use (liters).
- 2. LEED MR Credit 2 - BPDO – Environmental Product Declarations (EPD) Submittal - EPD/LCA Documentation: Provide a publicly available Environmental Product Declaration in conformance with standards listed and described in Section 018113.
- 3. LEED MR Credit 4 - BPDO – Material Ingredients Submittal - Ingredient Reporting Documentation: Provide a publicly available material ingredient inventory as defined in Section 018113.

1.3 INFORMATIONAL SUBMITTALS

- A. Product Certificates: Signed by manufacturers of underlayment and floor-covering systems certifying that products are compatible.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Installer who is approved by manufacturer for application of underlayment products required for this Project.
- B. Product Compatibility: Manufacturers of underlayment and floor-covering systems certify in writing that products are compatible.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store materials to comply with manufacturer's written instructions to prevent deterioration from moisture or other detrimental effects.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Comply with manufacturer's written instructions for substrate temperature, ventilation, ambient temperature and humidity, and other conditions affecting underlayment performance.
 - 1. Place hydraulic-cement-based underlayments only when ambient temperature and temperature of substrates are between 50 and 80 deg F.

1.7 COORDINATION

- A. Coordinate application of underlayment with requirements of floor-covering products and adhesives, to ensure compatibility of products.

PART 2 - PRODUCTS

2.1 LEED REQUIREMENTS

- A. LEED EQ Credit 2 - Low-Emitting Materials - VOC Content Limit Requirement: The product shall not contain VOC content limits (less water and exempt solids) in excess of those listed in Section 018113, Appendix C.
- B. LEED MR Credit 2 - BPDO – Environmental Product Declarations (EPD) - EPD/LCA Preferment: Preference shall be given to products with a publicly available Environmental Product Declaration in conformance with standards listed and described in Section 018113.
- C. LEED MR Credit 4 - BPDO – Material Ingredients - Ingredient Reporting Preferment: Preference shall be given to products with a publicly available material ingredient inventory as defined in Section 018113.

2.2 CEMENT-BASED UNDERLAYMENTS

- A. Underlayment: Hydraulic-cement-based, polymer-modified, self-leveling product that can be applied in minimum uniform thickness of 1/4 inch and that can be feathered at edges to match adjacent floor elevations.

1. Products: Subject to compliance with requirements, provide one of the following, or approved equal:
 - a. Ardex; K-15 Self-Leveling Underlayment Concrete.
 - b. Euclid Chemical Company (The); Super Flo-Top.
 2. Cement Binder: ASTM C 150, Portland cement, or hydraulic or blended hydraulic cement as defined by ASTM C 219.
 3. Compressive Strength: Not less than 4000 psi at 28 days when tested according to ASTM C 109/C 109M.
- B. Water: Potable and at a temperature of not more than 70 deg F.
- C. Primer: Product of underlayment manufacturer recommended in writing for substrate, conditions, and application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for conditions affecting performance.
1. Proceed with application only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. General: Prepare and clean substrate according to manufacturer's written instructions.
1. Treat nonmoving substrate cracks according to manufacturer's written instructions to prevent cracks from telegraphing (reflecting) through underlayment.
 2. Fill substrate voids to prevent underlayment from leaking.
- B. Concrete Substrates: Mechanically remove, according to manufacturer's written instructions, laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants that might impair underlayment bond.
- C. Adhesion Tests: After substrate preparation, test substrate for adhesion with underlayment according to manufacturer's written instructions. Verify compatibility with adhesives and finishes to be applied over the underlayment.

3.3 APPLICATION

- A. General: Mix and apply underlayment components according to manufacturer's written instructions.
1. Close areas to traffic during underlayment application and for time period after application recommended in writing by manufacturer.
 2. Coordinate application of components to provide optimum underlayment-to-substrate and intercoat adhesion.
 3. At substrate expansion, isolation, and other moving joints, allow joint of same width to continue through underlayment.

- B. Apply primer over prepared substrate at manufacturer's recommended spreading rate.
- C. Apply underlayment to produce uniform, level surface.
 - 1. Feather edges to match adjacent floor elevations.
- D. Cure underlayment according to manufacturer's written instructions. Prevent contamination during application and curing processes.
- E. Do not install floor coverings over underlayment until after time period recommended in writing by underlayment manufacturer.
- F. Remove and replace underlayment areas that evidence lack of bond with substrate, including areas that emit a "hollow" sound when tapped.

3.4 PROTECTION

- A. Protect underlayment from concentrated and rolling loads for remainder of construction period.

END OF SECTION

SECTION 042200 - CONCRETE UNIT MASONRY

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included: Concrete block masonry including reinforcing, grouting and cleaning.
- B. Related Work Specified Elsewhere:
 - 1. Dowels to concrete: See Concrete Reinforcement.
 - 2. Foam sealant related to below-grade wall waterproof membranes: See Composite Bentonite Waterproofing.
 - 3. Caulking and Sealants.
 - 4. Painting.
 - 5. Furnishing of bolts, anchors, etc., set in masonry: See other Sections of these Specifications.

1.2 REFERENCES, CODES AND STANDARDS: The following references, codes and standards are hereby made a part of this Section and masonry work shall conform to applicable requirements therein except as otherwise specified herein shown on the Drawings. Nothing contained herein shall be construed as permitting work that is contrary to code requirements.

- A. California Building Code, 2019 Edition, Chapter 21.
- B. Building Code Requirements for Masonry Structures, ACI 530.

1.3 SUBMITTALS: Comply with requirements of Shop Drawings, Product Data, and Samples Section.

- A. Certifications: Submit certificates that block and lime meet these specifications
- B. Mix Designs: Submit mix designs for grout and mortar. Comply with strengths shown in Drawings.
- C. Reinforcing Steel Shop Drawings: Submit shop drawings for reinforcing steel. Shop drawings shall show bar size, length, spacing, location, and placement.
- D. Concrete Unit Masonry:
 - 1. LEED MR Credit 2 - BPDO – Environmental Product Declarations (EPD) Submittal - EPD/LCA Documentation: Provide a publicly available Environmental Product Declaration in conformance with standards listed and described in Section 018113.
 - 2. LEED/Sustainable Design Submittal - CSR Documentation: Provide a Corporate Sustainability Report for the manufacturer or parent company of the product demonstrating conformance with one of the guidelines listed and described in Section 018113.

3. LEED MR Credit 4 - BPDO – Material Ingredients Submittal - Ingredient Reporting Documentation: Provide a publicly available material ingredient inventory as defined in Section 018113.
4. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials Submittal - Regional Sourcing Documentation: Provide a product data sheet or manufacturer affidavit demonstrating regional sourcing as defined in Section 018113.
5. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials Submittal - Recycled Content Documentation: Provide a product data sheet or manufacturer affidavit noting the pre-consumer (post-industrial) and post-consumer recycled content value of the product or product components in accordance with requirements described in Section 018113.

E. Mortar and Grout:

1. LEED MR Credit 2 - BPDO – Environmental Product Declarations (EPD) Submittal - EPD/LCA Documentation: Provide a publicly available Environmental Product Declaration in conformance with standards listed and described in Section 018113.
2. LEED MR Credit 4 - BPDO – Material Ingredients Submittal - Ingredient Reporting Documentation: Provide a publicly available material ingredient inventory as defined in Section 018113.
3. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials Submittal - Regional Sourcing Documentation: Provide a product data sheet or manufacturer affidavit demonstrating regional sourcing as defined in Section 018113.
4. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials Submittal - Recycled Content Documentation: Provide a product data sheet or manufacturer affidavit noting the pre-consumer (post-industrial) and post-consumer recycled content value of the product or product components in accordance with requirements described in Section 018113.
5. LEED EQ Credit 2 - Low-Emitting Materials Submittal - VOC Content Documentation: Provide a product data sheet or third-party certificates indicating the VOC content of the product (less water and exempt solids). Provide documentation indicating the anticipated volume of product use (liters).

1.4 DELIVERY, HANDLING AND STORAGE:

- A. Do not bring cementitious or other material to the site if it has become lumpy, caked, hardened or air slaked from absorption of moisture.
- B. Handle blocks in manner to prevent chipping and breakage. Protect reinforcing steel from kinking and bending and from contamination with dirt, mud, oil and other foreign matter detrimental to bond.
- C. Store materials where protected from weather, contact with soil, traffic and construction operations.

PART 2 - PRODUCTS

2.1 MATERIALS:

- A. Concrete Block: Medium weight block conforming to ASTM C 90, two-cell, double-open end, bond beam units where indicated or required, made with lightweight expanded clay or shale aggregates.
 1. Size: See Drawings.

2. Unit Weight: 105 to 125 pcf.
 3. Max. Linear Shrinkage: 0.065%.
 4. Min. Tensile Strength: 135 psi.
 5. Water absorption: 15 pcf (average of 3 with no test greater than 17 pcf).
 6. Color: Gray.
 7. Texture: Smooth conventional.
 8. LEED MR Credit 2 - BPDO – Environmental Product Declarations (EPD) - EPD/LCA Requirement: The product shall have documented a publicly available Environmental Product Declaration in conformance with standards listed and described in Section 018113.
 9. LEED/Sustainable Design - CSR Requirement: The product shall be documented with a publicly available Corporate Sustainability Report from the manufacturer or parent company of the product demonstrating conformance with one of the guidelines listed and described in Section 018113.
 10. LEED MR Credit 4 - BPDO – Material Ingredients - Ingredient Reporting Preferment: Preference shall be given to products with a publicly available material ingredient inventory as defined in Section 018113.
 11. LEED MR Credit 4 - BPDO – Material Ingredients - Ingredient Reporting Preferment: Preference shall be given to products with a publicly available material ingredient inventory as defined in Section 018113.
 12. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials - Recycled Content Preferment: Preference shall be given to products that demonstrate high recycled content values as a percentage of the product determined by weight. Recommended recycled content targets by product are included in Section 018113, Appendix E.
- B. Reinforcing Steel: Conform to requirements of Drawings and Concrete Reinforcement Section. Provide positioning devices or other approved means for maintaining vertical and horizontal reinforcing in the locations indicated on the Drawings. Devices shall occur at top and bottom of vertical steel and at intermediate points not to exceed 200 bar diameters or 10 feet.
- C. Portland Cement: ASTM C 150, Type II, "Low Alkali". No masonry cement permitted.
- D. Hydrated Lime: ASTM C 207, Type S.
- E. Aggregates:
1. Setting Mortar Sand: ASTM C 144, with not less than three percent passing #100 sieve. Use same source throughout Project.
 2. Grout Aggregate: ASTM C 404, size 1 for sand and size 8 for coarse aggregates (pea gravel).
- F. Water: Clean and potable, free of impurities detrimental to mortar or grout.
- G. Fiber Joint Filler: Asphalt saturated fiber type conforming to ASTM D 1751, 1/2" thick unless otherwise noted.

2.2 SETTING MORTAR

- A. Type: M as per ASTM C 270.
- B. Minimum Strength (psi at 28 days): See Structural Drawings.

- C. LEED MR Credit 2 - BPDO – Environmental Product Declarations (EPD) - EPD/LCA Preferment: Preference shall be given to products with a publicly available Environmental Product Declaration in conformance with standards listed and described in Section 018113.
- D. LEED MR Credit 4 - BPDO – Material Ingredients - Ingredient Reporting Preferment: Preference shall be given to products with a publicly available material ingredient inventory as defined in Section 018113.
- E. LEED MR Credit 4 - BPDO – Material Ingredients - Ingredient Reporting Preferment: Preference shall be given to products with a publicly available material ingredient inventory as defined in Section 018113.
- F. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials - Recycled Content Preferment: Preference shall be given to products that demonstrate high recycled content values as a percentage of the product determined by weight. Recommended recycled content targets by product are included in Section 018113, Appendix E.
- G. LEED EQ Credit 2 - Low-Emitting Materials - VOC Content Limit Requirement: The product shall not contain VOC content limits (less water and exempt solids) in excess of those listed in Section 018113, Appendix C.
- H. Mixing: Measure materials accurately and machine mix in batch type mixer in which quantity of water can be accurately controlled. Use mixers of full sack (cement) capacity, split sack batches not permitted. Mix for at least 3 minutes after all materials are in drum. Empty mixer completely before loading each succeeding batch. Work mortar at frequent enough intervals to prevent separation of ingredients. Retemper only as necessary to replace water lost through evaporation. Do not use mortar after final set has begun.

2.3 GROUT

- A. Type: Coarse as per ASTM C 476.
- B. Minimum Strength (psi at 28 days): See Structural Drawings.
- C. LEED MR Credit 2 - BPDO – Environmental Product Declarations (EPD) - EPD/LCA Preferment: Preference shall be given to products with a publicly available Environmental Product Declaration in conformance with standards listed and described in Section 018113.
- D. LEED MR Credit 4 - BPDO – Material Ingredients - Ingredient Reporting Preferment: Preference shall be given to products with a publicly available material ingredient inventory as defined in Section 018113.
- E. LEED MR Credit 4 - BPDO – Material Ingredients - Ingredient Reporting Preferment: Preference shall be given to products with a publicly available material ingredient inventory as defined in Section 018113.
- F. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials - Recycled Content Preferment: Preference shall be given to products that demonstrate high recycled content values as a percentage of the product determined by weight. Recommended recycled content targets by product are included in Section 018113, Appendix E.
- G. LEED EQ Credit 2 - Low-Emitting Materials - VOC Content Limit Requirement: The product shall not contain VOC content limits (less water and exempt solids) in excess of those listed in Section 018113, Appendix C.

- H. Batching and Mixing: ASTM C 94- (transit mixed). Water shall be added as required to provide a pourable consistency without segregation (approximately 9" - 11" slump).

2.4 REINFORCING STEEL

- A. ASTM A616 Grade 60 for #5 and larger, Grade 40 for #3 and #4 bars. See 032100 for additional requirements.

PART 3 - EXECUTION

- 3.1 PREPARATION: Clean and roughen concrete at bonding surface, sandblasting where required. Bend dowels into proper alignment, straight and uninked. Install preformed fiber joint filler between concrete columns and abutting concrete block walls so as to provide installation of sealant and back-up materials.

3.2 CONSTRUCTION

- A. Construct concrete block masonry in accord with Reference Standards except where otherwise qualified or modified herein. Where standards conflict, assume the more stringent condition.
- B. Bond Pattern and Joint Treatment: Common running bond with nominal 3/8" wide joints; compacted and tooled concave where exposed and struck flush where concealed. Block surfaces to receive waterproofing shall be smooth without ridges or projections, voids pointed, joints struck flush with face of block.
- C. Masonry units shall not be wet prior to laying.
- D. Set masonry units plumb, true to line, with level courses accurately spaced. Keep bond pattern plumb and in alignment full height of wall, corners and reveals plumb and true. Do not use line pins unless absolutely necessary and, if used, fill holes immediately with mortar when pin is withdrawn. Cut facing units with a power driven carborundum saw. No chipped faces, corners or edges permitted.
- E. Lay block with head and bed joints solidly filled with mortar for a distance in from the face of the unit equal to the thickness of the face shell.
- F. Provide cleanouts at bottom of grouted cells except that cleanouts are not required where height of grout pour is less than four feet. Where cleanouts are required to occur on exposed masonry surface, remove entire face shell.
- G. Build in anchors, inserts, bolts, frames, etc., furnished by others, as the work progresses.
- H. Lay blocks to preserve unobstructed vertical continuity of cells.
- I. Remove overhanging mortar or obstructions from inside of cells to be grouted using high pressure jet stream or approved mechanical means.

3.3 GROUTING

- A. Fill all cells with grout.
- B. Grout spaces shall not be wet at the time grout is placed.
- C. Spaces to be filled with grout shall be free from debris, mortar, etc., before filling.
- D. Grout shall not be placed by high lift process until mortar in joints has set for 24 hours.
- E. High-lift grout shall be poured in maximum lifts of 4 feet. At cessation of each lift, the grout in this lift shall be vibrated with a 3/4" flexible cable vibrator for the full height of the lift. Vibrator shall be placed in cells not to exceed 16" centers (in plan). When top of wall is reached, alternately "top" and vibrate to complete the pour to top of wall. Succeeding lifts of grout shall be placed following an appropriate lapse of time for grout settlement and absorption of excess moisture.
- F. Place high-lift grout using adequate grout pumps.
- G. For such time as may be required immediately following grouting, keep walls flushed down with a pressure stream of clear water to completely remove laitance from exposed faces.

- 3.4 CLEANING: Clean work as it progresses keeping exposed finished portions of work free of soil and mortar stains. Use no acid cleaners.

3.5 FIELD QUALITY CONTROL

- A. Tests and inspections shall be performed by testing laboratories who shall perform those tests and inspections specified below and such other tests and inspections as the Engineer or Owner may require to establish the acceptability of the Work. Testing and inspection services shall be retained by the Owner at his expense except that when tests or inspections reveal failure of materials to meet contract requirements, costs for subsequent tests and inspections will be deducted from moneys due to the Contractor.
- B. Compressive Strength of Masonry: Conform to Code Sections 2105.2.2.2, Prism test method.
 - 1. Minimum Compressive Strength (psi at 28 days): See Structural Drawings.

END OF SECTION

SECTION 044000 - STONE ASSEMBLIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Stone stair treads.
 - 2. Interior flooring pavers over mortar bed.
 - 3. Exterior pavers.
 - 4. Planter wall and cap.
- B. Related Requirements:
 - 1. Division 01 for fluid-applied damp-proofing of stone panels that extend below grade.
 - 2. Section 079200 "Joint Sealants" for sealing joints in stone system with elastomeric sealants unless noted herein.
 - 3. Section 093000 "Tiling" for thickset mortar and grout at interior locations.
 - 4. Section 321400 "Unit Paving" for stone paving, using species specified herein.

1.3 DEFINITIONS

- A. Definitions contained in ASTM C119 apply to this Section.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.5 ACTION SUBMITTALS

- A. Product Data: For each variety of stone, stone accessory, and manufactured product. Quarry, granite, manufacturing and processing shall all occur within the state of California.
- B. Shop Drawings: Show fabrication and installation details for stone assembly, including dimensions and profiles of stone units.
 - 1. Show locations and details of joints both within stone assembly and between stone assembly and other construction.
 - 2. Include details of mortar joints and sealant joints.
 - 3. Show locations and details of anchors and backup structure.
 - 4. Show direction of veining, grain, or other directional pattern.
 - 5. Include large-scale shaded elevations and details of decorative surfaces and inscriptions.

- C. Stone Samples for Verification: Sets for each variety, color, and finish of stone required; not less than 12 inches (300 mm) square.
 - 1. Sets shall consist of at least four Samples, exhibiting extremes of the full range of color and other visual characteristics expected and will establish the standard by which stone will be judged.
- D. Colored Pointing Mortar Samples for Verification: For each color required. Make Samples using same sand and mortar ingredients to be used on Project.
- E. Sealant Samples for Verification: For each type and color of joint sealant required.
- F. Stone anchorage system elements.
- G. LEED Submittals: The Owner requires the Contractor to implement practices and procedures to meet the project's environmental performance goals, which include conformance with California Green Building Code (CAL Green) and achieving LEED v4 Platinum Certification. The requirements related to these goals are defined in the Articles below and represent a combination of sustainability performance criteria necessary to comply with the California Green Building Code and achieve LEED certification goals. The Contractor shall ensure that the requirements related to these goals are implemented to the fullest extent.
 - 1. LEED MR Credit 2 - BPDO – Environmental Product Declarations (EPD) Submittal - EPD/LCA Documentation: For mortar and grout materials, provide a publicly available Environmental Product Declaration in conformance with standards listed and described in Section 018113.
 - 2. LEED EQ Credit 2 - Low-Emitting Materials Submittal - VOC Content Documentation: For mortar and grout materials, provide a product data sheet or third-party certificates indicating the VOC content of the product (less water and exempt solids). Provide documentation indicating the anticipated volume of product use (liters).
 - 3. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials Submittal - Regional Sourcing Documentation: For mortar and grout materials, provide a product data sheet or manufacturer affidavit demonstrating regional sourcing as defined in Section 018113.
 - 4. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials Submittal - Recycled Content Documentation: For mortar and grout materials, provide a product data sheet or manufacturer affidavit noting the pre-consumer (post-industrial) and post-consumer recycled content value of the product or product components in accordance with requirements described in Section 018113.
 - 5. LEED MR Credit 4 - BPDO – Material Ingredients Submittal - Ingredient Reporting Documentation: For mortar and grout materials, provide a publicly available material ingredient inventory as defined in Section 018113.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and fabricator, and testing agency.
- B. Material Test Reports:
 - 1. Stone Test Reports: For each stone variety proposed for use on Project, by a qualified testing agency, indicating compliance with required physical properties, other than

- abrasion resistance, according to referenced ASTM standards. Base reports on testing done within previous five years.
2. For metal components, by a qualified testing agency, indicating chemical and physical properties of metal.
 3. Sealant Compatibility and Adhesion Test Report: From sealant manufacturer complying with requirements in Section 079200 "Joint Sealants" and indicating that sealants will not stain or damage stone. Include interpretation of test results and recommendations for primers and substrate preparation needed for adhesion.
- C. Preconstruction test reports.
- D. Source quality-control reports.
- E. Cold-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with cold-weather requirements.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Stone Units: Furnish 2% of finished stone for each finish and variety of stone specified.

1.8 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate stone assemblies similar to that required for this Project and whose products have a record of successful in-service performance.
- B. Installer Qualifications: Engage installer with 15 years or more experience and completion of stone installations similar in size, scale, material, design, detail, and extent to that indicated for the project. Installer shall provide a list of no less than 5 projects in the San Francisco Bay Area that are built and available for inspection of craftsmanship of the Work.
- C. Testing Agency Qualifications: Qualified according to ASTM E329 for testing indicated.
- D. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
1. Build mockups of one complete stone stair tread with contrasting stainless steel strip, embedded into tread.
 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 3. Test mockups in accordance with the DCOF AcuTest. Refer to Performance Requirements for testing criteria.
 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 PRECONSTRUCTION TESTING

- A. Preconstruction Stone Testing Service: Owner will engage a qualified testing agency to perform preconstruction testing.
 - 1. Retesting of materials that fail to meet specified requirements shall be done at Contractor's expense.
 - 2. Furnish test specimens that are representative of materials proposed for incorporation into the Work.
 - 3. Physical Property Tests: For each stone variety proposed for use on Project, tested for compliance with physical property requirements, other than abrasion resistance, according to referenced ASTM standards.
 - 4. Flexural Strength Tests: For each combination of stone variety, thickness, orientation of cut, and finish, proposed for use on Project, tested according to ASTM C880/C880M, in both wet and dry conditions.
 - 5. Anchorage Tests: For each combination of stone variety, orientation of cut, finish, and anchor type proposed for use on Project, tested according to ASTM C1354/C1354M.
- B. Preconstruction Sealant Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers, for compatibility and adhesion testing according to sealant manufacturer's standard testing methods and Section 079200 "Joint Sealants," Samples of materials that will contact or affect joint sealants.
- C. Preconstruction Field Testing of Sealants: Before installing joint sealants, field test their adhesion to joint substrates according to Section 079200 "Joint Sealants."

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Store and handle stone and related materials to prevent deterioration or damage due to moisture, temperature changes, contaminants, corrosion, breaking, chipping, and other causes.
 - 1. Lift stone with wide-belt slings; do not use wire rope or ropes that might cause staining. Move stone, if required, using dollies with cushioned wood supports.
 - 2. Store stone on wood skids or pallets with nonstaining, waterproof covers. Arrange to distribute weight evenly and to prevent damage to stone. Ventilate under covers to prevent condensation.
- B. Mark stone units, on surface that will be concealed after installation, with designations used on Shop Drawings to identify individual stone units. Orient markings on vertical panels so that they are right side up when units are installed.
- C. Deliver sealants to Project site in original unopened containers labeled with manufacturer's name, product name and designation, color, expiration period, pot life, curing time, and mixing instructions for multicomponent materials.
- D. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- E. Store aggregates in locations where grading and other required characteristics can be maintained and where contamination can be avoided.

1.11 FIELD CONDITIONS

- A. Protect stone during installation by doing the following:
1. Cover tops of stone installation with nonstaining, waterproof sheeting at end of each day's work. Cover partially completed structures when work is not in progress. Extend cover a minimum of 24 inches (600 mm) down both sides and hold securely in place.
 2. Prevent staining of stone from mortar, grout, sealants, and other sources. Immediately remove such materials without damaging stone.
 3. Protect base of walls from rain-splashed mud and mortar splatter by coverings spread on ground and over wall surface.
 4. Protect sills, ledges, and projections from mortar and sealant droppings.
- B. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Remove and replace stone damaged by frost or freezing conditions. Comply with cold-weather construction and protection requirements for masonry contained in TMS 602/ACI 530.1/ASCE 6.
- C. Hot-Weather Requirements: Comply with hot-weather construction and protection requirements for masonry contained in TMS 602/ACI 530.1/ASCE 6.
- D. Environmental Limitations for Sealants: Do not install sealants when ambient and substrate temperatures are outside limits permitted by sealant manufacturer or below 40 deg F (5 deg C) or when joint substrates are wet.

1.12 COORDINATION

- A. Coordinate installation of inserts that are to be embedded in concrete or masonry, flashing reglets, and similar items to be used by stone Installer for anchoring, supporting, and flashing of stone assembly. Furnish setting drawings, templates, and directions for installing such items and deliver to Project site in time for installation.
- B. Time delivery and installation of stone to avoid extended on-site storage and to coordinate with work adjacent to stone.
- C. After contract award and upon request and execution of the Architect's Electronic File Transfer Agreement, a 3D digital model of the Planter Wall will be made available to the Contractor for use. The model is divided into "Segments" or individual models; "Assemblies" or similar system models; and "Components" or specific geometry models. Whether or not the Architect's digital model is used, the Fabricators of the different "segments", "assemblies" and components" must have the capacity to coordinate with and produce a continuously updated 3D digital fabrication model for review by the Architect and Subcontractors performing work on the element or in close proximity to it.

Note that the Architect's digital model is of limited completeness. It provides information which might assist the Contractor in coordination and fabrication as follows:

- Scope understanding of represented elements
- Dimensional control for represented elements
- As a basis for the development of field lay-out

- D. After contract award and upon request and execution of the Architect's Electronic File Transfer Agreement, a 3D digital model of the Paver will be made available to the Contractor for use. The model is divided into "Segments" or individual models; "Assemblies" or similar system models; and "Components" or specific geometry models. Whether or not the Architect's digital

model is used, the Fabricators of the different “segments”, “assemblies” and components” must have the capacity to coordinate with and produce a continuously updated 3D digital fabrication model for review by the Architect and Subcontractors performing work on the element or in close proximity to it.

Note that the Architect’s digital model is of limited completeness. It provides information which might assist the Contractor in coordination and fabrication as follows:

- Scope understanding of represented elements
- Dimensional control for represented elements
- As a basis for the development of field lay-out

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. The Dynamic Coefficient of Friction (DCOF), per ANSI A137.1, shall be 0.42 or better.
- B. Solar Reflectance Index (SRI): To be determined.

2.2 STONE SOURCE

- A. Source Limitations for Stone: Obtain each variety of stone, regardless of finish, from single quarry, whether specified in this Section or in another Section of the Specifications, with resources to provide materials of consistent quality in appearance and physical properties, and sufficient reserves to satisfy the requirements of the project. Granite supplier shall have the capabilities to cut and finish the stone without delaying the project.
 - 1. Granite Source:
 - a. Coldspring
 - 2. For stone types that include same list of varieties and sources, provide same variety from same source for each.
 - 3. Stone Source Examination: Make quarried blocks available for examination by Architect.
- B. Source Limitations for Mortar Materials: Obtain mortar ingredients of uniform quality for each cementitious component from single manufacturer and each aggregate from single source or producer.
- C. Source Limitations for Other Materials: Obtain each type of stone accessory, sealant, and other material from single manufacturer for each product.

2.3 INSTALLERS

- A. Hunt Masonry
- B. European Paving Designs
- C. Superior Construction

2.4 LEED REQUIREMENTS

- A. LEED MR Credit 2 - BPDO – Environmental Product Declarations (EPD) - EPD/LCA Preferment: Preference shall be given to mortar and grout materials with a publicly available Environmental Product Declaration in conformance with standards listed and described in Section 018113.
- B. LEED EQ Credit 2 - Low-Emitting Materials - VOC Content Limit Requirement: Mortar and grout materials shall not contain VOC content limits (less water and exempt solids) in excess of those listed in Section 018113, Appendix C.
- C. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials - Regional Sourcing Preferment: Preference shall be given to mortar and grout materials that can demonstrate regional sourcing as defined in Section 018113.
- D. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials - Recycled Content Preferment: Preference shall be given to mortar and grout materials that demonstrate high recycled content values as a percentage of the product determined by weight. Recommended recycled content targets by product are included in Section 018113, Appendix E.
- E. LEED MR Credit 4 - BPDO – Material Ingredients - Ingredient Reporting Preferment: Preference shall be given to mortar and grout materials with a publicly available material ingredient inventory as defined in Section 018113.

2.5 GRANITE

- A. Material Standard: Comply with ASTM C615/C615M.
- B. Basis of Design:
 - 1. ColdSpring “Sierra White” and “Academy Black”, as shown on Drawings.
- C. Cut: Vein.
 - 1. Orientation of Veining: Horizontal.
- D. Cut stone from one block or contiguous, matched blocks in which natural markings occur.
- E. Finish:
 - a. Interior: Honed, Diamond 8.
 - b. Plaza:
 - 1) Rub & Sand
 - 2) Diamond 200
- F. Fabrication: CNC milled.
- G. Match Architect's samples for color, finish, and other stone characteristics relating to aesthetic effects.
- H. Thickness: Refer to details and Finish Schedule on Drawings.

2.6 MORTAR MATERIALS

- A. Portland Cement: ASTM C150/C150M, Type I or Type II, except Type III may be used for cold-weather construction, natural color or white as required to produce mortar color indicated.
 - 1. Low-Alkali Cement: Portland cement for use with limestone shall contain no more than 0.60 percent total alkali when tested according to ASTM C114.
- B. Hydrated Lime: ASTM C207.
- C. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C979/C979M. Pigments shall have a record of satisfactory performance in mortar.
- D. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime.
- E. Colored Portland Cement-Lime Mix: Packaged blend of portland cement, hydrated lime, and mortar pigments. Mix shall produce color indicated or, if not indicated, as selected from manufacturer's standard colors. Pigments shall not exceed 10 percent of portland cement by weight.
- F. Aggregate: ASTM C144; except for joints narrower than 1/4 inch and pointing mortar, 100 percent shall pass No. 16 sieve.
 - 1. White Aggregates: Natural white sand or ground white stone.
 - 2. Colored Aggregates: Natural-colored sand or ground marble, granite, or other durable stone; of color necessary to produce required mortar color.
- G. Water: Potable.

2.7 STONE ACCESSORIES

- A. Setting Shims: Strips of resilient plastic or vulcanized neoprene, Type A Shore durometer hardness of 50 to 70, nonstaining to stone, of thickness needed to prevent point loading of stone on anchors and of depths to suit anchors without intruding into required depths of pointing materials.
- B. Setting Buttons: Resilient plastic buttons, nonstaining to stone, sized to suit joint thicknesses and bed depths of stone units without intruding into required depths of pointing materials.

2.8 SEALANT AND GROUT

- A. Sealants for Joints in Stone Assemblies: Manufacturer's standard chemically curing, elastomeric sealants of base polymer and characteristics indicated below that comply with applicable requirements in Section 079200 "Joint Sealants" and do not stain stone.
- B. Sealant: Multi-component, polyurethane, joint sealant: ASTM C 920, Type M, Grade NS, Class 25, for use NT, T, A, M, O, and I.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide BASF "MasterSeal NP 2" or equivalent product by the following:
 - a. Dow Corning Corporation
 - b. Tremco, Inc.
 - 2. Color: As selected by Architect to match adjacent granite.

- C. Grout: ANSI 118.7, cementitious grout.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Laticrete "Permacolor Grout" or equivalent product by the following:
 - a. Custom Building Products
 - b. Mapei
 - 2. Color: Grout to match each finish of every granite type specified and as selected by Architect.
- D. Grout Sealer:
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Laticrete "StoneTech BulletProof Sealer" or equivalent product by the following:
 - a. Custom Building Products
 - b. Mapei

2.9 FABRICATION OF STONE

- A. General: Fabricate stone units in sizes and shapes required to comply with requirements indicated.
 - 1. For granite, comply with recommendations in NBGQA's "Specifications for Architectural Granite."
- B. Control depth of stone and back check to maintain minimum clearance of 1 inch between backs of stone units and surfaces or projections of structural members, fireproofing (if any), backup walls, and other work behind stone.
- C. Dress joints (bed and vertical) straight and at right angle to face unless otherwise indicated. Shape beds to fit supports.
- D. Cut and drill sinkages and holes in stone for anchors, fasteners, supports, and lifting devices as indicated or needed to set stone securely in place.
- E. Finish exposed faces and edges of stone, to comply with requirements indicated for finish and to match approved samples and mockups.
- F. Quirk-miter corners unless otherwise indicated; provide for cramp anchorage in top and bottom bed joints of corner pieces.
- G. Cut stone to produce uniform joints 1/4 inch wide and in locations indicated.
- H. Contiguous Work: Provide chases, reveals, reglets, openings, and similar features as required to accommodate contiguous work.
- I. Fabricate molded work, including washes and drips, to produce stone shapes with a uniform profile throughout entire unit length, with precisely formed arris slightly eased to prevent snipping, and with matching profile at joints between units.
 - 1. Produce moldings and molded edges with machines that use abrasive shaping wheels made to reverse contour of molding shape.
- J. Clean backs of stone to remove rust stains, iron particles, and stone dust.
- K. Inspect finished stone units at fabrication plant for compliance with requirements for appearance, material, and fabrication. Replace defective units.

1. Grade and mark stone for overall uniform appearance when assembled in place. Natural variations in appearance are acceptable if installed stone units match range of colors and other appearance characteristics represented in approved samples and mockups.

2.10 MORTAR MIXES

- A. General: Comply with referenced standards and with manufacturers' written instructions for mix proportions, mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures needed to produce mortar of uniform quality and with optimum performance characteristics.
 1. Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated. Do not use calcium chloride.
 2. Combine and thoroughly mix cementitious materials, water, and aggregates in a mechanical batch mixer unless otherwise indicated. Discard mortar when it has reached initial set.
- B. Pointing Mortar: Comply with ASTM C270, Proportion Specification, **[Type S]** **[Type N]** **[Type O]**. Provide pointing mortar mixed to match Architect's sample and complying with the following:
 1. Pigmented Pointing Mortar: Select and proportion pigments with other ingredients to produce color required. Do not exceed pigment-to-cement ratio of 1:10, by weight.
 2. Packaged Portland Cement-Lime Mix Mortar: Use portland cement-lime mix of selected color.
 3. Colored-Aggregate Pointing Mortar: Produce color required by combining colored aggregates with portland cement of selected color.
 4. Point granite with **[Type S]** **[Type N]** mortar.

2.11 SOURCE QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform source quality-control testing.
 1. Retesting of materials that fail to meet specified requirements shall be done at Contractor's expense.
 2. Furnish test specimens selected by testing agency from same blocks as actual materials proposed for incorporation into the Work.
 3. Flexural Strength Tests: ASTM C880/C880M, performed on specimens of same thickness, orientation of cut, and finish as installed stone. One set of test specimens is required to be tested for every 10,000 sq. ft., but not fewer than two sets for each stone variety.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces to receive stone and conditions under which stone will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.

- B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of stone.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF STONE WITH MORTAR

- A. Set stone with mortar and mechanical anchors where indicated.
- B. Set stone in full bed of mortar with head joints filled unless otherwise indicated.
 - 1. Use setting buttons of adequate size, in sufficient quantity, and of thickness required to maintain uniform joint width and to prevent mortar from extruding. Hold buttons back from face of stone a distance at least equal to width of joint, but not less than depth of pointing materials.
 - 2. Do not set heavy units or projecting courses until mortar in courses below has hardened enough to resist being squeezed out of joint.
 - 3. Support and brace projecting stones until wall above is in place and mortar has set.
 - 4. Provide compressible filler in ends of dowel holes and bottoms of kerfs to prevent end bearing of dowels and anchor tabs on stone. Fill remainder of anchor holes and kerfs with mortar.
- C. Fill space between back of stone units and backup wall solidly with mortar or grout.
- D. Embed ends of sills in mortar; leave remainder of joint open until final pointing.
- E. Rake out joints for pointing with mortar to depths of not less than 1/2 inch. Rake joints to uniform depths with square bottoms and clean sides.
- F. Prepare stone-joint surfaces for pointing with mortar by removing dust and mortar particles. Where setting mortar was removed to depths greater than surrounding areas, apply first layer of pointing mortar in layers not more than 3/8 inch until a uniform depth is formed.
- G. Point stone joints by placing pointing mortar in layers not more than 3/8 inch. Compact each layer thoroughly and allow to become thumbprint hard before applying next layer.
- H. Tool joints with a round jointer having a diameter 1/8 inch larger than width of joint, when pointing mortar is thumbprint hard.

3.3 INSTALLATION OF JOINT-SEALANTS

- A. Prepare joints and apply sealants of type and at locations indicated to comply with applicable requirements in Section 079200 "Joint Sealants."

3.4 INSTALLATION TOLERANCES

- A. Variation from Plumb: For vertical lines and surfaces of walls, do not exceed 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (10 mm in 6 m), or 1/2 inch in 40 feet (12 mm in 12 m) or more. For external corners, corners and jambs within 20 feet (6 m) of an entrance, expansion joints, and other conspicuous lines, do not exceed 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 3/8 inch in 40 feet (10 mm in 12 m) or more.

- B. Variation from Level: For lintels, sills, water tables, parapets, horizontal bands, horizontal grooves, and other conspicuous lines, do not exceed 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 3/8 inch (10 mm) maximum.
- C. Variation of Linear Building Line: For positions shown in plan and related portions of walls and partitions, do not exceed 1/4 inch in 20 feet (6 mm in 6 m) or 1/2 inch in 40 feet (12 mm in 12 m) or more.
- D. Variation in Cross-Sectional Dimensions: For thickness of walls from dimensions indicated, do not exceed plus or minus 1/4 inch (6 mm).
- E. Variation in Joint Width: Do not vary from average joint width more than plus or minus 1/8 inch (3 mm) or a quarter of nominal joint width, whichever is less. For joints within 60 inches (1500 mm) of each other, do not vary more than 1/8 inch (3 mm) or a quarter of nominal joint width, whichever is less from one to the other.
- F. Variation in Plane between Adjacent Stone Units (Lipping): Do not exceed 1/16-inch (1.5-mm) difference between planes of adjacent units.

3.5 ADJUSTING AND CLEANING

- A. Remove and replace broken, chipped, stained, or otherwise damaged stone, defective joints, and stone that does not match approved samples and mockups. Damaged stone may be repaired if Architect approves methods and results.
- B. Replace damaged or defective work in a manner that results in stone matching approved samples and mockups, complying with other requirements, and showing no evidence of replacement.
- C. In-Progress Cleaning: Clean stone as work progresses. Remove mortar fins and smears before tooling joints. Remove excess sealant and smears as sealant is installed.
- D. Final Cleaning: Clean stone no fewer than six days after completion of pointing and sealing, using clean water and stiff-bristle fiber brushes. Do not use wire brushes, acid-type cleaning agents, cleaning agents containing caustic compounds or abrasives, or other materials or methods that could damage stone.

END OF SECTION

SECTION 044200 - EXTERIOR STONE CLADDING**PART 1 - GENERAL****1.1 SUMMARY****A. Section Includes:**

1. Dimension stone panels set with individual anchors.
2. Dimension stone trim units, including copings sills and soffits.

B. Related Sections:

1. Section 014543 - EXTERIOR WALL MOCKUPS
2. Section 044000 - STONE ASSEMBLIES
3. Section 054000 - COLD-FORMED METAL FRAMING
4. Section 076200 - SHEET METAL FLASHING AND TRIM
5. Section 079200 - JOINT SEALANTS

1.2 ACTION SUBMITTALS

- A. Product Data: For each variety of stone, stone accessory, and manufactured product.
- B. Shop Drawings: Show fabrication and installation details for dimension stone cladding assembly, including dimensions and profiles of stone units.
 1. Show locations and details of joints both within dimension stone cladding assembly and between dimension stone cladding assembly and other construction.
 2. Show locations and details of anchors.
 3. Show direction of veining, grain, or other directional pattern.
- C. Stone Samples: Sets for each variety, color, and finish of stone required; not less than 12 inches square.
- D. Sealant Samples: For each type and color of joint sealant required.
- E. Delegated-Design Submittal: For dimension stone cladding assembly.
- F. LEED Submittals: The Owner requires the Contractor to implement practices and procedures to meet the project's environmental performance goals, which include conformance with California Green Building Code (CAL Green) and achieving LEED v4 Platinum Certification. The requirements related to these goals are defined in the Articles below and represent a combination of sustainability performance criteria necessary to comply with the California Green Building Code and achieve LEED certification goals. The Contractor shall ensure that the requirements related to these goals are implemented to the fullest extent.
 1. LEED MR Credit 2 - BPDO – Environmental Product Declarations (EPD) Submittal - EPD/LCA Documentation: For mortar and grout materials, provide a publicly available Environmental Product Declaration in conformance with standards listed and described in Section 018113.
 2. LEED EQ Credit 2 - Low-Emitting Materials Submittal - VOC Content Documentation: For mortar and grout materials, provide a product data sheet or third-party certificates indicating the VOC content of the product (less water and exempt solids). Provide documentation indicating the anticipated volume of product use (liters).

3. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials Submittal - Regional Sourcing Documentation: For mortar and grout materials, provide a product data sheet or manufacturer affidavit demonstrating regional sourcing as defined in Section 018113.
4. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials Submittal - Recycled Content Documentation: For mortar and grout materials, provide a product data sheet or manufacturer affidavit noting the pre-consumer (post-industrial) and post-consumer recycled content value of the product or product components in accordance with requirements described in Section 018113.
5. LEED MR Credit 4 - BPDO – Material Ingredients Submittal - Ingredient Reporting Documentation: For mortar and grout materials, provide a publicly available material ingredient inventory as defined in Section 018113.

1.3 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.
- B. Provide the following upon request:
 1. Material Test Reports:
 - a. Stone Test Reports: For each stone variety proposed for use on Project, by a qualified testing agency, indicating compliance with required physical properties, other than abrasion resistance, according to referenced ASTM standards. Base reports on testing done within previous five years.
 2. Preconstruction test reports.
 3. Source quality-control reports.
- C. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 1. Build mockups of typical exterior wall area as indicated in documents.

1.4 PRECONSTRUCTION TESTING

- A. Preconstruction Stone Testing: Engage a qualified independent testing agency to perform preconstruction testing.
 1. Furnish test specimens that are representative of materials proposed for incorporation into the Work.
 2. Physical Property Tests: For each stone variety proposed for use on Project, tested for compliance with physical property requirements, other than abrasion resistance, according to referenced ASTM standards.
 3. Flexural Strength Tests: For each combination of stone variety, thickness, orientation of cut, and finish, proposed for use on Project, tested according to ASTM C 880/C 880M, in both wet and dry conditions.
 4. Anchorage Tests: For each combination of stone variety, orientation of cut, finish, and anchor type proposed for use on Project, tested according to ASTM C 1354/C 1354M.

1.5 FIELD CONDITIONS

- A. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Remove and replace dimension stone cladding damaged by frost or freezing conditions. Comply with cold-weather construction and protection requirements for masonry contained in ACI 530.1/ASCE 6/TMS 602.
- B. Hot-Weather Requirements: Comply with hot-weather construction and protection requirements for masonry contained in ACI 530.1/ASCE 6/TMS 602.
- C. Environmental Limitations for Sealants: Do not install sealants when ambient and substrate temperatures are outside limits permitted by sealant manufacturer or below 40 deg F or when joint substrates are wet.

PART 2 - PRODUCTS**2.1 MANUFACTURERS**

- A. Source Limitations for Stone: Obtain each variety of stone, regardless of finish, from single quarry.

2.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design dimension stone cladding assembly.
- B. General: Design stone anchors and anchoring systems according to ASTM C 1242.
 - 1. Stone anchors shall withstand not less than two times the weight of the stone cladding in both compression and tension.
- C. Structural Performance: Dimension stone cladding assembly shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
 - 1. Wind Loads: As indicated.
- D. Seismic Performance: Dimension stone cladding assembly shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - 1. Component Importance Factor: 1.25.
- E. Safety Factors for Stone: Design dimension stone cladding assembly to withstand loads indicated without exceeding stone's allowable working stress determined by dividing stone's average ultimate strength, as established by testing, by the following safety factors:
 - 1. Safety Factor for Granite: 3.

2.3 STONE SOURCE

- A. Source Limitations for Stone: Obtain each variety of stone, regardless of finish, from single quarry, whether specified in this Section or in another Section of the Specifications, with resources to provide materials of consistent quality in appearance and physical properties, and sufficient reserves to satisfy the requirements of the project. Granite supplier shall have the capabilities to cut and finish the stone without delaying the project.
 - 1. Granite Source:
 - a. Basis-of-Design: Coldspring or approved equal.
 - 2. For stone types that include same list of varieties and sources, provide same variety from same source for each.
 - 3. Stone Source Examination: Make quarried blocks available for examination by Architect.
- B. Source Limitations for Other Materials: Obtain each type of stone accessory, sealant, and other material from single manufacturer for each product.

2.4 LEED REQUIREMENTS

- A. LEED MR Credit 2 - BPDO – Environmental Product Declarations (EPD) - EPD/LCA Preferment: Preference shall be given to mortar and grout materials with a publicly available Environmental Product Declaration in conformance with standards listed and described in Section 018113.
- B. LEED EQ Credit 2 - Low-Emitting Materials - VOC Content Limit Requirement: Mortar and grout materials shall not contain VOC content limits (less water and exempt solids) in excess of those listed in Section 018113, Appendix C.

- C. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials - Regional Sourcing Preferment: Preference shall be given to mortar and grout materials that can demonstrate regional sourcing as defined in Section 018113.
- D. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials - Recycled Content Preferment: Preference shall be given to mortar and grout materials that demonstrate high recycled content values as a percentage of the product determined by weight. Recommended recycled content targets by product are included in Section 018113, Appendix E.
- E. LEED MR Credit 4 - BPDO – Material Ingredients - Ingredient Reporting Preferment: Preference shall be given to mortar and grout materials with a publicly available material ingredient inventory as defined in Section 018113.

2.5 GRANITE

- A. Material Standard: Comply with ASTM C 615.
- B. Varieties and Sources: Subject to compliance with requirements, provide the following:
 - 1. Sierra White, by Coldspring.
- C. Finish: As indicated.
- D. Match Architect's samples for color, finish, and other stone characteristics relating to aesthetic effects.
- E. Schedule
- F.

STONE PANEL	COLDSPRING; COLOR: SIERRA WHITE; FINISH:HONED (DIAMOND 8); SIZES AS ELEVATED, 3" THICKNESS., CNC MILLED	PODIUM STAIR WALL
STONE PANEL	COLDSPRING; COLOR: SIERRA WHITE; FINISH:HONED (DIAMOND 8); SIZES AS ELEVATED, 2" THICKNESS.	LEVEL 1 EXTERIOR WALL & COLUMN ENCLOSURE
STONE PANEL	COLDSPRING; COLOR: SIERRA WHITE; FINISH:HONED (DIAMOND 8); SIZES AS ELEVATED, 1 1/4" THICKNESS., CNC MILLED	PODIUM EDGE

2.6 FRAMING FOR BACKUP STRUCTURE

- A. Steel Stud Frames: Galvanized-steel wall framing complying with Section 054000 "Cold-Formed Metal Framing."

2.7 ANCHORS AND FASTENERS

- A. Fabricate anchors, including shelf angles, from stainless steel, ASTM A 240/A 240M or ASTM A 666, Type 316; temper as required to support loads imposed without exceeding allowable design stresses. Fabricate dowels and pins for anchors from stainless steel, ASTM A 276, Type 316.

2.8 STONE ACCESSORIES

- A. Setting Shims: Strips of vulcanized neoprene, Type A Shore durometer hardness of 50 to 70, nonstaining to stone, of thickness needed to prevent point loading of stone on anchors and of depths to suit anchors without intruding into required depths of pointing materials.
- B. Concealed Sheet Metal Flashing: Fabricated from stainless steel in thicknesses indicated, but not less than 0.0156 inch thick, and complying with Section 076200 "Sheet Metal Flashing and Trim."
- C. Cementitious Dampproofing: Cementitious formulation recommended by stone source and nonstaining to stone; compatible with joint sealants and noncorrosive to anchors and attachments.
- D. Mesh Weep/Vent: Free-draining mesh; made from polyethylene strands, of length required to extend from exterior face of stone to cavity behind, in color selected from manufacturer's standard.
- E. Sealant: Manufacturer's standard chemically curing, elastomeric sealants of base polymer and characteristics indicated below that comply with applicable requirements in Section 079200 "Joint Sealants" and that do not stain stone:
 - 1. Single-component, nonsag, neutral-curing, medium- to high-modulus silicone sealant; Class 25, Use NT (nontraffic), and Use M (masonry).

2.9 STONE FABRICATION

- A. Control depth of stone and back check to maintain minimum clearance of 1 inch between backs of stone units and surfaces or projections of structural members, fireproofing (if any), backup walls, and other work behind stone.
- B. Dress joints (bed and vertical) straight and at right angle to face unless otherwise indicated. Shape beds to fit supports.
- C. Finish exposed faces and edges of stone to comply with requirements indicated for finish and to match approved samples and mockups.
- D. Options in first paragraph below are examples only. Revise to suit Project.
- E. Cut stone to produce uniform joints 3/8 inch wide and in locations indicated.
- F. Contiguous Work: Provide chases, reveals, reglets, openings, and similar features as required to accommodate contiguous work.
- G. Fabricate molded work, including washes and drips, to produce stone shapes with a uniform profile throughout entire unit length, with precisely formed arris slightly eased to prevent snipping, and with matching profile at joints between units.

2.10 FABRICATION OF BACKUP STRUCTURE

- A. Fabrication of Steel Stud Frames: Fabricate and assemble by welding to comply with requirements in Section 054000 "Cold-Formed Metal Framing."

PART 3 - EXECUTION

3.1 INSTALLING BACKUP STRUCTURE

- A. Installing Steel Stud Frames: Install to comply with requirements in Section 054000 "Cold-Formed Metal Framing."
 - 1. Install steel stud frames level, plumb, and true to line with no variation in plane or alignment exceeding 1/16 inch (1.5 mm) and no variation in position exceeding 1/8 inch (3 mm).
 - 2. For prefabricated frames to which stone has been installed before erection, maintain tolerances of stone faces and edges as specified in "Installation Tolerances" Article.

3.2 SETTING DIMENSION STONE CLADDING, GENERAL

- A. Coat granite with dampproofing to extent indicated below:
 - 1. Stone at Grade: Beds, joints, and back surfaces to at least 12 inches (300 mm) above finish-grade elevations.
 - 2. Stone Extending Below Grade: Beds, joints, back surfaces, and face surfaces below grade.
- B. Execute dimension stone cladding installation by skilled mechanics and employ skilled stone fitters at Project site to do necessary field cutting as stone is set. Use power saws with diamond blades to cut stone.
- C. Set stone to comply with requirements indicated. Install anchors, supports, fasteners, and other attachments indicated or necessary to secure dimension stone cladding in place. Shim and adjust anchors, supports, and accessories to set stone accurately in locations indicated, with uniform joints of widths indicated, and with edges and faces aligned according to established relationships and indicated tolerances.
- D. Provide expansion, control, and pressure-relieving joints of widths and at locations indicated.
 - 1. Sealing expansion and other joints is specified in Section 079200 "Joint Sealants."
- E. Install concealed flashing at continuous shelf angles, lintels, ledges, and similar obstructions to downward flow of water, to divert water to building exterior. Extend flashing 6 inches at ends and turn up not less than 2 inches to form end dams.
- F. Keep cavities open where unfilled space is indicated between back of stone units and backup wall; do not fill cavities with mortar or grout.
 - 1. Place weep holes in joints where moisture may accumulate, including at base of cavity walls and above shelf angles and flashing. Locate weep holes at intervals not exceeding 24 inches (600 mm).
 - 2. Place vents in cavity walls at tops of cavities, below shelf angles and flashing, and at intervals not exceeding 20 feet vertically. Locate vents in joints at intervals not exceeding 60 inches horizontally.

3.3 SETTING MECHANICALLY ANCHORED DIMENSION STONE CLADDING

- A. Attach anchors securely to stone and to backup surfaces. Comply with recommendations in ASTM C 1242.
- B. Provide compressible filler in ends of dowel holes and bottoms of kerfs to prevent end bearing of dowels and anchor tabs on stone. Fill remainder of anchor holes and kerfs with sealant indicated for filling kerfs.

- C. Set stone supported on clips or continuous angles on resilient setting shims. Use material of thickness required to maintain uniform joint widths and to prevent point loading of stone on anchors. Hold shims back from face of stone a distance at least equal to width of joint.

3.4 JOINT-SEALANT INSTALLATION

- A. Prepare joints and apply sealants of type and at locations indicated to comply with applicable requirements in Section 079200 "Joint Sealants."

3.5 INSTALLATION TOLERANCES

- A. Variation from Plumb: For vertical lines and surfaces of walls, do not exceed 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch in 40 feet or more. For external corners, corners and jambs within 20 feet of an entrance, expansion joints, and other conspicuous lines, do not exceed 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 3/8 inch in 40 feet or more.
- B. Variation from Level: For lintels, sills, water tables, parapets, horizontal bands, horizontal grooves, and other conspicuous lines, do not exceed 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 3/8 inch maximum.
- C. Variation of Linear Building Line: For positions shown in plan and related portions of walls and partitions, do not exceed 1/4 inch in 20 feet or 1/2 inch in 40 feet or more.
- D. Variation in Joint Width: Do not vary from average joint width more than plus or minus 1/8 inch or a quarter of nominal joint width, whichever is less. For joints within 60 inches of each other, do not vary more than 1/8 inch or a quarter of nominal joint width, whichever is less from one to the other.
- E. Variation in Plane between Adjacent Stone Units (Lipping): Do not exceed 1/16-inch difference between planes of adjacent units.

3.6 ADJUSTING AND CLEANING

- A. In-Progress Cleaning: Clean dimension stone cladding as work progresses. Remove excess sealant and smears as sealant is installed.
- B. Final Cleaning: Clean dimension stone cladding no fewer than six days after completion of pointing and sealing, using clean water and stiff-bristle fiber brushes. Do not use wire brushes, acid-type cleaning agents, cleaning agents containing caustic compounds or abrasives, or other materials or methods that could damage stone.

END OF SECTION

SECTION 051200 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included: Provision of structural steel. Work Includes, but is not necessarily limited to following:
1. Labor, material, equipment, and services necessary for the complete installation of all structural steel framing and all other steel as shown on the drawings and herein specified.
 2. Anchor bolts and/or anchor rods, bearing plates, and leveling plates and/or shim plates.
 3. Furnishing of all anchor bolt/rod templates and responsibility for their correct locations.
 4. Furnishing and installing all shear stud connectors except on flanges of beams to receive metal deck.
 5. Labor, material, equipment and design services necessary for the shoring and erection bracing required for installation of structural steel and related work.
 6. Shop priming of steel where required.
 7. Galvanizing of steel where required.
- B. Related Work:
1. Cast-in-Place Concrete
 2. Metal floor and roof decking.
 3. Miscellaneous Metals.
 4. Architecturally exposed structural steel.
 5. Cementitious Fireproofing
 6. Paints and Coatings

1.2 REFERENCES CODES AND STANDARDS

- A. American Institute of Steel Construction (AISC):
1. Steel Construction Manual, Thirteenth Edition (AISC 325-05).
 2. Specification for Structural Steel Buildings, (AISC 360-05).
 3. Code of Standard Practice for Steel Buildings and Bridges, (AISC 303-05), modified as follows:
 - a. Section 3 - Design Drawings and Specifications, Paragraph 3.3 Discrepancies; Delete the paragraph: "When discrepancies exist between the Design Drawings and Specifications, the Design Drawings shall govern..."
 - b. Section 4 – Approval, Paragraph 4.4.1; Delete subparagraph (b) "Confirmation that the Owner's Designated Representative for Design has reviewed and approved the Connection details shown on the Shop and Erection Drawings..."
 4. Seismic Provisions for Structural Steel Buildings, 2005 edition including Supplement 1 (AISC 341-05)
 5. Prequalified Connections for Special and Intermediate Moment Frames for Seismic Applications, 2005 edition (AISC 358-05) including Supplement 1 dated June 18, 2009.

B. American Society for Non-Destructive Testing (ANST).

1. Recommended Practice for the Training and Testing of Nondestructive Testing Personnel, ASND SNT TC-1a-2001
2. Standard for the Qualification and Certification of Nondestructive Testing Personnel, ANSI/ASNT CP-189-2001.

C. American Society for Testing and Materials (ASTM).

1. ASTM A6 - Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling
2. ASTM A36 - Standard Specification for Carbon Structural Steel
3. ASTM A53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated, Welded and Seamless
4. ASTM A108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished, Standard Quality
5. ASTM A109 - Standard Specification for Steel, Strip, Carbon (0.25 Maximum Percent), Cold-Rolled
6. ASTM 123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
7. ASTM A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
8. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength
9. ASTM A325 - Standard Specification for High-Strength Bolts, Steel, Heat Treated 120/105 ksi Minimum Tensile Strength
10. ASTM A435 - Standard Specification for Straight-Beam Ultrasonic Examination of Steel Plates
11. ASTM A490 - Standard Specification for Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength
12. ASTM 500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
13. ASTM A506 - Standard Specification Alloy and Structural Alloy Steel, Sheet and Strip, Hot-Rolled and Cold-Rolled
14. ASTM A529 - Standard Specification for High-Strength Carbon-Manganese Steel of Structural Quality.
15. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts
16. ASTM A780 - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
17. ASTM A898 - Standard Specification for Straight Beam Ultrasonic Examination of Rolled Steel Structural Shapes
18. ASTM A992 - Standard Specification for Structural Steel Shapes
19. ASTM F436 - Standard Specification for Hardened Steel Washers
20. ASTM F844 - Standard Specification for Washers, Steel, Plain (Flat), Unhardened for General Use
21. ASTM F959 - Standard Specification for Compressible-Washer Type Direct Tension Indicators for Use with Structural Fasteners
22. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength
23. ASTM F1852 - Standard Specification for "Twist-Off" Type Tension Control Structural Bolt/Nut/Washer Assemblies, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
24. ASTM F2280 - Standard Specification for "Twist-Off" Type Tension Control Structural Bolt/Nut/Washer Assemblies, Steel, Heat Treated, 150 ksi Minimum Tensile Strength

- D. American Welding Society (AWS).
 - 1. AWS D1.1-06 - Structural Welding Code – Steel.
 - 2. AWS D1.3-98 – Structural Welding Code – Sheet Steel
 - 3. AWS D1.8-05 – Structural Welding Code – Seismic Supplement
 - 4. AWS A2.4-98 – Standard Symbols for Welding, Brazing, and Nondestructive Examination
 - 5. AWS A4.3-93R – Standard Method for Determination of Diffusible Hydrogen Content of Martensitic, Bainitic, and Ferritic Steel Weld Metal Produced by Arc Welding.
 - 6. AWS B5.1:2003 – Standard for the Qualification of Welding Inspectors.
- E. California Building Code, 2019 Edition with Amendments.
- F. Research Council on Structural Connections (RCSC).
 - 1. Specification for Structural Joints Using ASTM A325 or A490 Bolts (June 2004)
- G. Steel Structures Painting Council (SSPC).
 - 1. “Systems and Specifications”
 - 2. “Steel Structures Painting Manual”
- H. United States Green Building Council (USGBC):
 - 1. Green Building Rating System – LEED-NC, Version 4.0.

1.3 DEFINITIONS

- A. Architecturally Exposed Structural Steel (AESS): Applies to members specifically designated by the Contract Documents.
- B. Heavy Sections
 - 1. ASTM A6 shapes not located within the Seismic Load Resisting System with flanges thicker than 2-inches
 - 2. ASTM A6 shapes within the Seismic Load Resisting System with flanges thicker than 1-1/2 inches.
 - 3. Members with built-up cross-sections consisting of plates with thicknesses greater than 2 inches
- C. Demand Critical Weld: Weld within the Seismic Load Resisting System identified on the drawings as Demand Critical (DC).
- D. Protected Zone: Areas of members and connections designated on the Drawings in which limitations apply to fabrication and attachments.
- E. Seismic Load Resisting System (SLRS): Assembly of structural elements and connections in the building that resists seismic loads, including struts, collectors, chords, diaphragms and trusses.
- F. Special Inspector: Qualified person or firm, hired by the Owner, with demonstrated competence for inspection of the particular type of construction or operation requiring special inspection.

G. Nondestructive Testing

1. Magnetic particle testing (MT)
2. Penetrant testing (PT)
3. Radiographic testing (RT)
4. Ultrasonic Testing (UT)

1.4 QUALITY ASSURANCE

- A. Contractor is solely responsible for the quality of the work
- B. Pre-Fabrication / Pre-Erection Conference: Prior to fabrication and before any submittals, convene a pre-construction meeting, or series of meetings, to review fabrication and erection methods, submittals, sequencing, and testing and inspection as required.
 1. Include the Contractor's production personnel, the Owner's Testing Agency, Architect, and Structural Engineer
- C. Steel Fabricator's Qualifications: Fabricator shall have a minimum of five years experience in fabrication of structural steel, shall be AISC Certified for "Standard Steel Building Structures" (STD).
- D. Steel Erector's Qualifications: Erector shall have a minimum of five years experience in erection of structural steel, shall be an AISC Certified Steel Erector (CSE).
- E. Welding Qualifications: Welding procedures, welders, welding operators, and tack welders shall be qualified in accordance with AWS D1.1 (and AWS D1.8 Annex C if applicable). All welders shall be qualified for the process, position, and thickness of material to be welded.
 1. The ability of each welder to produce sound welds of all types required by the work shall be established by welder qualification. Current welder qualifications, welding operator qualification, or tack welder qualifications for each welder shall be presented to and accepted by the special inspector prior to any welding on the project. If evidence of welder qualification cannot be provided, test personnel per AWS D1.1. Upon successful completion of qualification testing, provide Welding Performance Qualification Records (WPQRs).
 2. Welders who have not performed welding using the specific process for period of six or more months shall be re-qualified.
 3. Welders whose initial work on the project fails to pass inspection shall be re-qualified before performing further welding.
 4. The Contractor shall pay costs of welding procedure qualifications, welder performance qualifications, welding operator performance qualifications, and tack welder performance qualifications.
 5. Contractor shall pay all costs to remove and replace all welding performed by any welder not qualified per AWS D1.1 (or AWS D1.8 Annex C if applicable) at the time of welding, or performed using a welding procedure that was not submitted and reviewed prior to welding.
 6. Welders performing demand critical beam flange to column flange welds by welding through weld access holes (bottom flange) shall pass the Supplemental Welder Qualification for Restricted Access Welding requirements of AWS D1.8 Annex C.

F. Allowable Tolerances:

1. Straightness of Structural Members: Conform with ASTM A6.
2. Erection Tolerances: Conform to additional requirements of AISC, Section M4.

G. Owner's Testing Agency: Testing and Special Inspections for quality assurance per Article 3.06 will be performed by the Owner's Testing Agency. The cost of such testing and inspection shall be paid for by the Owner.

1.5 SUBMITTALS

A. Erection Drawings:

1. Erection drawings shall be submitted and reviewed prior to the start of shop drawing production. Include complete details, procedures, and diagrams to allow assembly and erection of structural steel without reference to the contract drawings. Include profiles, sizes, spacing, lengths and locations of structural members, indicating stiffener and continuity plates, bolts, fasteners, welds and attachments. The steel detailer shall generate all erection drawings from the latest published structural and architectural drawings and specifications. The submittal of reproductions or photocopies of the contract drawings shall not be permitted.
2. Erection drawings shall include all connection material specifications and sizes and shall indicate the locations of all slip-critical bolts. All welds shall be shown using AWS standard symbols. The drawings shall identify locations where backing bars and/or weld tabs are to be removed.
3. Erection drawings shall designate all members and connections that are part of the SLRS, shall identify locations of Demand Critical welds, and shall identify the locations and dimensions of all Protected Zones.
4. Each individual Special Moment Frame joint shall be drawn to scale and dimensioned, clearly showing sequence of welding beam flanges and webs, where backing bars and/or weld tabs are to be removed, and where backing bars and/or weld tabs are to remain with all supplemental reinforcing fillet welds.
5. Each individual Special Concentric Braced Frame joint shall be drawn to scale and dimensioned, clearly showing work points and gusset plates. Include all gusset plate dimensions, gusset to beam and column attachments, and location of brace on the gusset (with any erection tolerances), and angle of brace to horizontal.
6. Provide setting drawings, templates, and directions for installation of anchor bolts and/or anchor rods, and other anchorage.
7. Erection drawings shall identify those joints, or groups of joints, in which a specific assembly order, welding sequence, or other special precautions are required.

B. Shop Drawings:

1. Upon approval of erection drawings, shop drawing production may begin. If contractor elects to start shop drawing production prior to approval of erection drawings, they will do so at their own risk. Changes made to shop drawings due to revisions required to the erection drawings prior to approval of erection drawings will be at the contractors cost
2. Include complete details, schedules, procedures, and diagrams to allow fabrication of structural steel without reference to the contract drawings. Include profiles, sizes, spacing, lengths, camber and locations of structural members, indicating stiffener and continuity plates. Include details of cuts, copes, connections, threaded fasteners, bolts, and attachments. Include all dimensional and geometric information. The steel detailer shall generate all shop drawings from the latest published structural and architectural drawings and specifications. The submittal of reproductions or photocopies of the contract drawings shall not be permitted.
3. Shop drawings shall include all connection material specifications and sizes and shall indicate the locations of all slip-critical bolts. All welds shall be shown using AWS standard symbols. The drawings shall identify locations where backing bars and/or weld tabs are to be removed. All weld access hole dimensions shall be provided along with surface profile and finish requirements.
4. Shop drawings shall designate all members and connections that are part of the SLRS, shall identify locations of Demand Critical welds, and shall identify the locations and dimensions of all Protected Zones.
5. Shop drawings shall identify any non-destructive testing to be performed by the fabricator.

C. Erection Procedure: Submit descriptive data to illustrate structural steel erection procedure, including, sequence of erection and temporary staging and bracing. Procedure must be approved by Owner prior to erection.

D. Written Frame Distortion Control Program:

1. Include provisions for plumbing and aligning prior to permanent welding
2. Indicate sequence of erection and intended sequence of flange and web welding and bolting to maintain alignment of structural steel elements.
3. Include interior bracing and erection sequencing for vertical framing systems as well as lateral force resisting framing systems.
4. Include elevations of each frame clearly numbering sequence of erection.
5. Frame Distortion Control Program shall take into account effects of shrinkage due to welding sequence and account for these effects in the preparation of erection and shop drawings.

E. Welding:

1. Welding Procedures: Submit written welding procedure specifications (WPS's) conforming with AWS D1.1 (and AISC 341 Appendix W if applicable) for review prior to performing any welding. Include an index of all WPS's and identify in the index whether the procedure will be used in the shop, field, or both. Also identify in the index for each procedure whether it will be used for Demand Critical welds. The WPS variables shall be within the parameters established by the filler-metal manufacturer. Filler metal manufacturer and manufacturer's electrode identification shall be considered essential variables and shall be identified on each WPS. Include electrode manufacturer's data sheet with each WPS showing recommended ranges. For SLRS welding electrodes, include manufacturers certificate of conformance demonstrating that electrodes and electrode-flux combinations meet the requirements for H16 as tested in accordance with AWS A4.3. Do not include welding procedures that do not apply to welds on the project. Submittals containing welding procedures not intended for use on the project will be rejected.
2. Welding Procedure Qualification Records: Where WPS's are not prequalified by AWS D1.1, submit procedure qualification records with WPS's.

F. Manufacturer's Proofs of Compliance for Materials:

1. Submit Certification that materials meet requirements specified. All steel must be identified by the mill using the appropriate ASTM designation. Certified manufacturer's mill analyses and test reports covering chemical and mechanical properties shall be submitted.
2. Any steel not properly identified shall be tested at contractor's expense per the requirements of Article 3.06 to demonstrate compliance with the minimum chemical and mechanical requirements of the ASTM standard appropriate for the steel specified.
3. Provide certified material test reports for bolts, nuts, and washers.. Include heat analysis and heat number, hardness, tensile and proof loads, lot number and purchase order number, and statement of compliance with dimensional and thread fit requirements.
4. Provide stud manufacturer's certification that studs as delivered conform to the applicable requirements of AWS D1.1 Sections 7.2 and 7.3. Include certified copies of in-plant quality control mechanical tests for each diameter supplied completed within the 6-month period prior to delivery of the studs. Also include certified stud material test report from the material supplier indicating diameter, chemical properties, and grade on each heat number delivered.
5. Submit Charpy V-Notch test results for Heavy Sections used in the SLRS.

G. Samples: Provide as requested by the Owner's Testing Agency. Provide one 12 inch long sample of proposed edge finishing for exposed steel column flanges within 10'-0" of walking surfaces.

H. Submit Quality Control Program plan to be used by the contractor in accordance with AISC 341 Appendix Q. Include inspection procedures, nonconformance procedure, material control procedure, bolt installation procedure, and QC inspector qualifications. Note that quality control inspection is the responsibility of the contractor and independent of the quality assurance inspection and testing provided by the owner.

I. Fabricator / Erector Certifications: Submit copy of fabricator's AISC certification, category STD. Submit copy of erector's AISC certification, category CSE.

J. Submit evidence that Environmental, Sustainability, and LEED requirements are met for all materials under this section, including primer paint.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Unload materials promptly upon arrival at site in a careful manner and do not set directly onto ground.
- B. Store structural steel members, whether on or off site, above ground on platforms, skids or other support. Do not store on cinders or otherwise handle so as to damage finishes.
- C. Keep structural steel properly drained. Provide adequate shoring and protection to prevent distortion and other damage. Ensure that all sections are readily accessible for inspection.
- D. Store weld filler metal in accordance with ASW D1.1 and AISC 341 Appendix W.
- E. Replace damaged material with new material or repair in a manner approved by the Architect.

1.7 JOB CONDITIONS

- A. Provide the Owner's Testing Agency with free access to places whether on or off the job site where materials are stored or fabricated, to places where equipment is stored or serviced, and to job site during time of laying out, erection or job-site fabrications.
- B. Sequencing, Scheduling:
 - 1. Notify the Owner in sufficient time prior to shop or field fabrication or erection to permit testing and inspection without delaying work.
 - 2. Ensure timely delivery of items to be embedded in work of other sections so that work is not delayed.
 - 3. Coordinate work with the Owner's Testing Agency to assure that all test and inspection procedures required by the contract documents are properly provided. Cooperate fully with all testing and inspection agencies in the performance of their work and provide the following:
 - a. Information as to starting time and place of Shop Fabrication
 - b. A complete set of approved Contract Documents and reviewed shop and erection drawings.
 - c. Cutting lists, order sheets, material bills, and shipping bills
 - d. Representative sample pieces requested by the inspection agency for testing, if necessary.
 - e. Full and ample means of assistance for testing and inspection of material.
 - f. Proper facilities, including scaffolding, temporary work platforms, etc., for inspection of the work in the shop and field.
 - g. Schedule of anticipated shop and site welding, including the anticipated numbers of welders and their tasks. Provide changes to schedule to inspector in such a timely manner as to not add costs to the inspector, inspection agency, or Owner.

PART 2 - PRODUCTS

- 2.1 **MATERIALS:** (Steel shapes, plates, bars, tubes and pipes shall be manufactured such that 90% of material consist of recycled content calculated based on post-consumer plus one-half pre-consumer recycled content.)

A. Shapes, Plates, and Tubing

1. Steel Wide Flange Shapes, HP shapes and Tees: ASTM A992.
2. Structural Steel Channels, Angles: ASTM A36.
3. Moment Frame Continuity, Doubler Plates, and Base Plates: ASTM A572 - Grade 50 or ASTM A529 – Grade 50.
4. Braced Frame Gusset Plates, Shear Plates, and Base Plates: ASTM A572 - Grade 50 or ASTM A529 – Grade 50.
5. Hollow Structural Sections (Steel Tubing), Square Rectangular, or Round: ASTM A500 Grade C
6. Steel Pipe: ASTM A53, Grade B, Type E or S.
7. Other Steel Shapes, Bars and Plates: ASTM A36 unless otherwise noted on the drawings.

B. Standard Threaded Fasteners: ASTM A36 or A307 as indicated on the drawings.

1. Plain Washers: ASTM F844.
2. Beveled Washers: ASTM F436.

C. Fasteners

1. High Strength Bolts: ASTM A325 or ASTM A490 as noted on the drawings with threads excluded from shear plane.
 - a. High strength bolts designated as slip-critical (SC) of the drawings shall have Class A faying surfaces in accordance with RCSC
 - b. Twist-ff type tension control bolts and washer assemblies meeting the requirements of ASTM F1852 or ASTM F2280 may be used for A325 or A490 bolts, respectively, provided threads are excluded from shear plane.
2. Nuts for High Strength Bolts, Anchor Bolts and/or Anchor Rods: ASTM A563 Heavy Hex Nut Grade
3. Washers for High Strength Bolts: ASTM F436 or ASTM F959.
4. Anchor Bolts or Anchor Rods: ASTM F1554, Grade 36 unless indicated as Grade 55 (weldable) or Grade 105 on the drawings.
5. Shear Connectors (Automatic End-Welded Studs): Headed Stud type, ASTM A108, Grade 1015 or 1020 cold finished low-carbon steel, minimum tensile strength of 60,000 psi. "Nelson/TRW" or approved equal.
6. Threaded Studs: ASTM A108, Grade 1015 or 1020 cold finished low-carbon steel, minimum tensile strength of 60,000 psi; sizes and numbers as indicated, threads are UNC-2A unless otherwise indicated. "Nelson/TRW" or approved equal.

D. Filler Metals for Welding:

1. SMAW Process: AWS A5.1 or A5.5 E70XX Low Hydrogen Type
2. FCAW Process: AWS A5.20 or A5.29, E7XT-X.
3. SAW Process: AWS A5.17 or A5.23
4. All Complete Joint Penetration welds in members and connections not within the SLRS shall be made with a filler metal having a minimum Charpy V-notch toughness of 20 ft-lbs at 40°F.

E. Additional Requirements for Filler Metals for Welding within the SLRS:

1. All welding electrodes and electrode-flux combinations shall meet the requirements for H16 (16 mL maximum diffusible hydrogen per 100 grams deposited weld metal) as tested

- in accordance with AWS A4.3. Filler metal manufacturer's certificate of conformance shall be used to demonstrate compliance with this requirement.
2. All welds in members or connections other than Demand Critical welds shall be made with a filler metal capable of producing welds having a minimum Charpy V-Notch toughness of 20 ft-lbs at 0°F as determined by AWS classification or manufacturer's certification,
 3. All Demand Critical welds shall be made with a filler metal capable of producing welds having a minimum Charpy V-Notch toughness of 20 ft-lbs at -20°F as determined by AWS classification or manufacturer's certification. In addition, all Demand Critical welds shall be capable of producing welds with the following Charpy V-Notch toughness as determined by AISC 341 Appendix X:
 - a. For structures with a Lowest Anticipated Service Temperature (LAST) as defined in the General Notes on the structural drawings greater than or equal to 50°F, 40 ft-lbs at 70°F.
 - b. For structures with a LAST less than 50°F, 40 ft-lbs at 20°F above LAST or lower temperature.
- F. Heavy Sections:
1. Hot rolled shapes shall be supplied with Charpy V-notch impact test results in accordance with "ASTM A6 Supplementary Requirements S30, Charpy V-notch Impact Test for Structural Shapes – Alternate Core Location". The impact test shall meet a minimum value of 20 ft-lbs absorbed energy at 70°F.
 2. Steel in built-up sections shall be supplied with Charpy V-notch impact test results in accordance with ASTM A6, Supplementary Requirement S5, Charpy V-Notch Impact Test. The impact test shall be conducted in accordance with ASTM A673, Frequency P, and shall meet a minimum average value of 20 ft-lbs absorbed energy at 70°F.
- G. Structural Steel Primer Paint: Modified Alkyd Rust-Inhibitive Primer: Tnemec Co., "Series 10-V", International Protective Coatings, "Interprime 298" or approved equivalent. Do not exceed applicable local limits for Volatile Organic Compounds (V.O.V) set by air quality regulations for the conditions of application in the subject area.
- H. Grout beneath base plates: See "Cast-in-place Concrete" Section

2.2 FABRICATION

- A. General Requirements:
1. Fabricate structural steel in accordance with AISC, and requirements of regulatory agencies.
 2. Fabricate and preassemble work in shop to greatest extent possible.
 3. Fabricate members for delivery in a manner that expedites field erection operations.
 4. Perform shearing, flame cutting and chipping carefully and accurately.
 5. Where finishing is required, complete assembly, including welding of units, before start of finishing operations. Provide finish surfaces of members exposed in final structure free of markings, burrs, and other defects.
 6. Properly mark and match-mark materials for field assembly.
 7. Coordinate as required for attachment of other work to structural steel.
 8. Fabricate columns and members of frames supporting vertical loads so as to compensate for building deformations due to dead loads. Provide a minimum of four anchor bolts or anchor rods at each column base plate.

9. Drawings indicate intent of connection details. Where connection detail is not shown, pattern details after a connection of similar condition. Connections not shown on the Drawings but proposed by the Contractor require approval by the Architect.
10. Camber all beams and girders as indicated on the Drawings. Where no camber is specified, place natural camber of the member up, opposite for cantilevers.
11. Within Protected Zones, discontinuities created by fabrication such as tack welds, erection aids, air-arc gouging and thermal cutting shall be repaired as required by the Structural Engineer of Record.
12. Mark Protected Zones on members and connections to prevent temporary or permanent attachments.
13. Refer to Article 3.06 for requirements for Special Inspection.
14. Where structural steel columns are to be left exposed and within 10'-0" of walking surfaces at either Level 1 or Level 2:
 - i. Grind and ease all corners to 1/16" radius
 - ii. Remove all burs and grind all surface imperfections to provide a smooth surface
 - iii. All welds in this zone to be continuous and ground smooth

B. Connections:

1. Connections shall be bolted or welded as indicated.
2. Shop connections not otherwise shown shall be welded.
3. Eccentric connections are not permitted unless shown in detail on reviewed shop drawings.
4. Do not locate combination of welds or bolts on same side of connections.

C. Bolted Connections:

1. Provide standard drilled holes 1/16-inch larger than bolt size unless otherwise noted. If the material thickness is not greater than the nominal diameter of the bolt plus 1/8 inch, the holes may be punched. Drill holes in material thicker than 1 inch from the solid or sub-punch and ream.
2. Provide holes for anchor bolts or anchor rods in accordance with maximum sizes for anchor bolts/rods given in AISC Steel Construction Manual. Provide minimum washer size unless shown otherwise.
3. Remove burrs that prohibit solid seating by grinding. Clean all contact surfaces so that they are free of scale, slag, dirt, and other foreign materials which would prevent solid seating of connected parts.
4. Do not drift to match unfair holes; where enlarging is required, ream unfair holes, but only up to next larger bolt size, and use larger bolts. Where unfairness exceeds maximum, weld hole in base material solid and drill hole of proper size. Misaligned holes will subject members to rejection. Use of gas cutting torch is not permitted.
5. Bolting: See Part 3, Execution, Section 3.03 D.

D. Welded Construction:

1. Weld in accordance with AISC, AWS D1.1, and AISC specification. In addition, all welding within the SLRS shall be in conformance with AISC 341 Appendix W. Welding shall not proceed until WPS have been reviewed and approved by the Architect/SEOR. A copy of the applicable WPS shall be reviewed by the Welder and Special Inspector prior to welding.
2. For weld joint profiles, meet dimensional requirements and maximum tolerances specified by AWS D1.1 or as specified in approved PQR's. Correct joint fit-up that does not comply using approved procedures and obtain approval by the inspector before welding proceeds.

3. Ensure welds present a uniform surface, free of defects as defined by AWS, and without undercutting or overlapping and free of excessive oxides, gas pockets, and non-metallic inclusions. Make welds with the proper number of beads or passes to secure sound, thoroughly fused joints. Do not exceed maximum layer height and bead width specified in AWS D1.1. Clean each pass by chipping and wire brushing to remove scale and slag before placing any additional weld material.
4. Minimum preheat and interpass temperature shall be per AWS Table 3.2.
5. In general, welding procedures should be prequalified by AWS D1.1. Where welding procedures do not meet the AWS D1.1 requirements for prequalification, the welding procedure shall be qualified by test per AWS D1.1 Section 4 prior to performing any project welding. All costs associated with qualifying the welding procedures (including inspection and testing) shall be the responsibility of the contractor.
6. Grind exposed welds reasonably smooth.
7. Welding Equipment: Welding equipment shall be adequate type, voltage, and amperage to make proper welds. Calibrate equipment with meters for voltage and amperage that accurately indicate voltage and amperage quantities at the welding site for the length of cable to be used.
8. Demonstrate to the satisfaction of the Special Inspector the accuracy of the meters, using external meters attached to extension cables of a length that reflects actual project conditions. If equipment meters do not accurately reflect electrical properties at the welding site, use external meters at the welding site provided by the Contractor at the Contractor's expense.
9. The ability of each welder to produce sound welds of all types required by the work shall be established by welder qualification per AWS D1.1 (and AWS D1.8 Annex C where applicable).
10. Storage of electrodes shall meet the requirements of AWS D1.1 and AISC 341 Appendix W.
11. Provide weld access holes of adequate size with minimum dimensions specified by AWS D1.1, or greater if shown on the Drawings, to ensure adequate access for welding and inspection. Grind smooth the cut edges of weld access holes to a surface roughness of 500 microinches.
12. Tack welds attaching backing bars and weld tabs shall be placed where they will be incorporated into the final weld.

E. Column Bases: Prepare base plates per AISC 360, Chapter M, section M.2.8.

F. Column Splice and Splices in Compression Members: Mill contact ends per AISC 360, Chapter M, section M.2.6.

G. Bearing Plates: Provide for attached installation resting on footings, piers and walls.

2.3 FINISHES

A. Shop Painting of Steel Surfaces:

1. Shop prime structural steel except;
 - a. Portions of members to be fireproofed.
 - b. Portions of members to be embedded more than 2-inches in concrete.
 - c. Contact surfaces of slip-critical high strength bolted connections.
 - d. Within four inches of welds to be made after painting.
 - e. Members to be galvanized.
 - f. Prior to prime coat application, remove loose mill scale and rust, oil, grease, dirt spatter, slag or flux deposits, and other foreign matter. Clean steel in accordance with Steel Structures Painting Council (SSPC) and as required by paint

- manufacturers printed directions. Prepare the surface in accordance with SP-1 "Solvent Cleaning", SP-2 "Hand Tool Cleaning", or SP-3 "Power Tool Cleaning" as required.
2. Apply one coat of primer immediately after surface preparation in accordance with manufacturer's instructions and at a rate to provide dry film thickness of not less than 2.0 mills. Use methods that result in full coverage of joints, corners, edges, and exposed surfaces. Permit thorough drying before shipment.
- B. Faying Surfaces of Slip-Critical Bolts
1. Prepare faying surfaces in accordance with "Class A" or better requirements as defined by RCSC.
- C. AECS Members
1. Refer to Division 9 to ensure primer is compatible with specified finish paint.
 2. Fabricate and erect AECS members in accordance with modifications specified in Section 10, AISC Code of Standard Practice for Steel Buildings.
- D. Galvanized Members: Galvanize steel members as indicated in the Drawings and any members permanently exposed to weather.
1. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A123 at locations shown on the drawings or where otherwise unprotected steel will be exposed to the weather.
 - a. Surface preparation: Caustic cleaning, acid pickling, fluxing.
 - b. Fill vent and drain holes that will be exposed in the finished Work, unless they will function as weep holes, by plugging with zinc solder and filing off smooth.
 - c. Galvanize lintels, shelf angles and welded door frames attached to structural steel framing and located within exterior walls.
 - d. Safeguard against warpage and distortion during galvanization in accordance with ASTM A384.
 - e. Where welding is required after galvanization, conform to AWS D19.0 Welding of Zinc Coated Steel. Perform welding in well ventilated area.
 - f. On bolts, nuts, and washers: ASTM B695, Class 50.
 - g. Galvanizing repair paint: ASTM A780.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Survey the base structure before proceeding with erection foundations to support construction and verify the following:
1. Correct location and elevation of bearings and anchor bolts and/or anchor rods.
 2. Absence of other conditions to adversely affect erection of steel.
- B. Do not begin erection before corrective measures for unsatisfactory conditions have been agreed upon with the Architect, the corrective measures have been implemented, and the Erector is fully satisfied for correctness.

- C. Survey the final erected structural steel frame prior to the application of any other work, reporting any discrepancies from the Contract Documents to the Architect.

3.2 PREPARATION

- A. Provide column anchor bolts and/or anchor rods, plate washers, and setting templates for setting anchor bolts/rods as required. Provide 1/8 inch minimum steel plate setting templates for all anchor bolts/rods. Anchor bolts/rods shall be of sufficient length such that they protrude at least 1/4-inch above top of nuts.
- B. Supervise setting of anchor bolts and/or anchor rods and other embedded items required for erection of structural steel. Be responsible for correct bearing of steel and correct location of anchor bolts and/or anchor rods. Furnish all necessary shim plates, etc, for levelness.

3.3 ERECTION

A. General Requirements:

1. Erect structural steel in accordance with the CBC and the AISC Specifications for Structural Steel Buildings, and the AISC Code of Standard Practice for Steel Buildings and Bridges.
2. Protect all materials from corrosion and keep free of dirt, grease, and other foreign matter.
3. Ensure steel is plumb, level and in accurate alignment before making final connections.
4. Where erection requires performing work of fabrication on site, conform to applicable standards of Fabrication Article.
5. Field corrections of major members will not be permitted without the Engineer's prior approval
6. Provide temporary shoring and bracing members with connections of sufficient strength and stiffness to bear imposed loads. Remove temporary members and connections when permanent members are in place and final connections are made. Provide temporary guy lines to achieve proper alignment of structures as erection proceeds. Structural frame is not considered self-supporting until completion of structural work, including casting of concrete floor slabs.
7. Within the Protected Zones, discontinuities created by erection operations such as tack welds, erection aids, air-arc gauging, and thermal cutting shall be repaired as required by the Structural Engineer.
8. Mark Protected Zones on members and connections to prevent other trades from making attachments during construction.

B. Column Bases and Bearing Plates:

1. Attached Column Bases and Bearing Plates: Align with leveling nuts & washers.
2. Loose Column Bases and Bearing Plates: Where too heavy to be placed without derrick or crane, set and align with leveling nuts & washers.
3. Grouting: Grout in accordance with requirements of Concrete, Cast-In-Place Section. (Not included in this section.)

C. Field Assembly:

1. Control all erection procedures and sequences including but not limited to temperature differentials and weld shrinkage.
2. Clean bearing surfaces and surface to be in permanent contact before assembling members.
3. Accurately assemble frames to lines and elevations indicated, within erection tolerances noted. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
4. Splice members only where indicated on the structural drawings.
5. Ensure assembly is plumb, level and aligned before final connecting.
6. Install all beams and girders with cambers up (except cantilevers).
7. Do not fasten splices of compression members before abutting surfaces comply with AISC bearing requirements.
8. Establish leveling and plumbing measurements on mean operating temperature of structure. Make allowances for difference between temperature at time of erection and mean temperature at which structure will be when completed and in service.
9. Promptly grout beneath column base plates after the structural steel frame or portion has been plumbed and before casting of any slab concrete on metal decks. Erector shall ensure that, prior to grouting, load carried by washers, nuts, and anchor bolts/rods does not exceed their strength.

D. Bolting:

1. As erection progresses, bolt up work to take care of all dead loads, construction live loads, lateral and wind forces and erection stresses.
2. Unless otherwise noted, erection bolts used in welded construction may be either tightened securely and left in place or removed and the holes filled with plug welds.
3. High Strength Bolting:
 - a. Shall be performed in accordance with RCSC.
 - b. Contact surfaces shall be free of oil, paint, lacquer or other coatings.
 - c. Install hardened washers per AISC 360 and referenced standards.
 - d. Tighten all nuts of slip critical connections using (1) properly calibrated wrenches, (2) by the "Turn-of-Nut" method, or (3) by the use of a Direct Tension Indicator. Minimum bolt tension as per RCSC for each bolt size used. Check wrenches for accuracy of calibration at least once each day.
 - e. When slip critical bolts have been completely tightened, mark with identifying symbol.
 - f. Tighten nuts of bolts not designated as slip critical on the drawings and not required to be pre-tensioned per AISC 360 Section J.1.10., to snug tight condition and ensure all plies of connection are brought into snug contact.

E. Welding:

1. Conform to AISC and AWS D1.1 for the details of all joints, the technique of welding employed, the appearance and quality of welds made, and the methods used in correcting defective work. In addition all welding within the SLRS shall be in conformance with AISC 341 Appendix W.
2. Perform all welding in accordance with a written WPS which has been reviewed and approved by the Architect/SEOR prior to welding. Provide welders and inspectors with reviewed WPS for the joint being welded.

- a. Use equipment that supplies proper current, voltage, etc. and provide suitable meters and means of adjustment for current and voltage. Calibrate equipment with meters for voltage and amperage that accurately indicate voltage and amperage quantities at the welding site for the length of cable to be used. Demonstrate to the satisfaction of the Special Inspector the accuracy of the meters, using external meters attached to extension cables of a length that reflects actual project conditions. If equipment meters do not accurately reflect electrical properties at the welding site, use external meters at the welding site provided by the Contractor at the Contractor's expense.
 - b. Minimum preheat and interpass temperature shall be per AWS Table 3.2.
 - c. Clean all surfaces for rust, paint, and foreign matter of any kind. Remove scale by wire brush, chipping or hammering as required. Before welding thermal cut edges, chip clean and grind to bright metal. Clamp members as required and space and alternate welds to prevent warping or misalignment.
 - d. For weld joint profiles, meet dimensional requirements and maximum tolerances specified by AWS D1.1 or as specified in approved PQR's. Correct joint fit-up that does not comply using approved procedures and obtain approval by the inspector before welding proceeds.
 - e. Ensure welds present a uniform surface, free of defects as defined by AWS, and without undercutting or overlapping and free of excessive oxides, gas pockets, and non-metallic inclusions. Make welds with the proper number of beads or passes to secure sound, thoroughly fused joints. Do not exceed maximum layer height and bead width specified in AWS D1.1. Clean each pass by chipping and wire brushing to remove scale and slag before placing any additional weld material.
 - f. For highly restrained connections and/or welds, design the welding sequence to minimize distortion of the members and to minimize the build up of internal stresses.
 - g. The ability of each welder to produce sound welds of all types required by the work shall be established by welder qualification per AWS D1.1 (and AWS D1.8 Annex C where applicable).
 - h. Storage of electrodes shall meet the requirements of AWS D1.1 and AISC 341 Appendix W.
 - i. Tack welds attaching backing bars and weld tabs shall be placed where they will be incorporated into the final weld.
- F. Temporary Bracing: Introduce wherever necessary to provide for all loads to which structure is subjected including erection equipment and its operation. Leave in place until no longer required for safety. Make proper provisions for construction loads, piles of materials, equipment, etc., carried by structural frame during erection. Contractor shall be solely responsible for frame during erection.
- G. Touch-Up Painting:
1. Immediately after steel erection, clean filed welds, bolted connections, and abraded areas of shop paint. Apply paint to exposed areas using same material as used for shop painting.
 2. Apply by brush or spray to provide minimum dry film thickness of 1.5 mils.

3.4 CLEANUP

- A. After erection thoroughly clean surface of foreign or deleterious matter such as dirt, mud, oil or grease that would impair bonding of fireproofing or concrete.

3.5 REPAIRS AND PROTECTION

- A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A780.

3.6 QUALITY CONTROL

- A. The Owner's Testing Agency will test and inspect in accordance with the AISC requirements as required, and as follows:
 - 1. Material Identification: Review certificates of compliance and mill test reports and verify that the steel meets the minimum specified chemical and physical properties.
 - 2. Bolting: High strength bolted connections shall be inspected and tested. The inspector shall check the materials, equipment, details of construction, and installation procedure. For slip-critical connections, check bolt tightness on not less than ten percent of bolts selected at random in each high strength bolt connection with a minimum of two bolts per connection. Connections that are not designated slip-critical on the drawings and not required to be pre-tensioned per AISC 360 Section J.1.10., need not be inspected for bolt tension other than to ensure that the plies of the connected elements have been brought into snug contact. Inspection procedure will be as described in RCSC.
 - 3. Welding Inspection: Visual inspection by a qualified welding inspector is required for all welding performed in the shop and field, including installation of automatic end-welded shear stud connectors. The minimum requirements for a qualified welding inspector are those for an AWS associate welding inspector (AWI) or senior welding inspector (SWI), as defined in the provisions of AWS B5.1 Standard Qualification of Welding Inspectors, except AWIs may be used under the direct supervision of WIs, on site and available when weld inspection is being conducted. In addition to inspecting the welds in conformance with AWS D1.1, D1.3 and AISC 341 Appendix W, the welding inspector shall check the welding equipment, details of construction (including fit-up), welder qualifications (Verify welder certifications are valid for process, position, and thickness to be welded), storage of electrodes, and adherence to the WPS. The welding inspector shall verify that all welders have the applicable WPS documents and drawings for each weld to be made, and verify that electrical meters are used and that they accurately reflect voltage and amperage at the welding site for the length of cable in use. The welding inspector shall maintain a record of welds inspected, name of welder who performed weld, defects found, and disposition of each defect. Defective welds shall be repaired and the cost of restoring defective welds shall be borne by the contractor.
 - 4. Welding Tests: Test complete and partial groove penetration welded connection of column to column, column to girder, or beam to girder by ultrasonic or other approved non-destructive tests. Test fillet welds by magnetic particle testing where indicated on the drawings.
 - a. Ultrasonic testing and magnetic particle testing will be performed by a specially trained, qualified technician, who will operate the equipment, examine welds and maintain a record of welds examined, defects found and disposition of each defect. Qualifications on NDT technicians shall be per AISC 341 Appendix W Section W3.3. Defective welds shall be repaired and the cost of retesting of defective welds shall be borne by the Contractor.
 - b. Initially, welds requiring ultrasonic testing will be tested at the rate of 100 percent in order to establish qualifications of each individual welder. After 40 welds have been completed by an individual welder, if rejectable defects occur in less than five percent of the welds tested, the frequency of testing may be reduced to 25 percent. If the rate of rejectable defect increases to five percent or more, 100 percent testing will be reestablished until the rate is reduced to less than five percent. Percentage will be calculated for each welder independently.

- c. When ultrasonic indications arising from the weld root can be interpreted as either a weld defect or the backing strip, the backing strip shall be removed at the expense of the Contractor, and if no root defect is visible, weld shall be retested. If no defect is indicated on this retest and no significant amount of the base and weld metal have been removed, the joint need no further repair or welding. If a defect is indicated, it shall be repaired by the Contractor at no expense to the Owner.
 - d. Questionable root indications that prove not to be defects will not count against the welder to increase test rate.
 - e. Ultrasonic instrumentation will be calibrated by technician to evaluate the quality of the welds in accordance with AWS D1.1, Appendix C.
 - f. Other methods of inspection, for example, x-rays, magnetic particle, or dye penetrant, may be used on welds if deemed necessary by the inspection agency with the cooperation of the Contractor.
 - g. When welds from web doubler plates or continuity plates occur in the k-area of rolled steel wide flange columns, the k-area adjacent to the welds shall be inspected after fabrication using approved nondestructive method conforming to AWS D1.1. The k-area is defined in wide flange shapes to be the area of the web immediately adjacent to the flange, extending from the fillet to a point approximately 1-1/2 inches beyond the point of tangency between the fillet and the web.
 - h. Welded Studs: End welded studs shall be sampled, and tested per the requirements of AWS D1.1.
5. Material Testing: Steel not identified and certified as required shall be tested according to the following requirements. Structural steel fabricator shall cut samples under the direction of the Special Inspector and Testing Laboratory shall machine or otherwise prepare the specimens and perform testing of samples from each 5 tons or fraction thereof for each size of unidentified steel. Cost of such testing shall be paid for by the contractor.
6. Inspection and Test Reports: The inspector shall furnish the architect, structural engineer, and building official with a report stating that the work has been completed in compliance with AWS D1.1 and the approved project plans and specifications.

B. The Contractor shall:

- 1. Make no extra charge for any handling of steel required for complete four-sided inspections of members at Engineer's request. It is not anticipated that complete four-sided inspection of all members will be undertaken. Such inspection will be necessary in case of dispute or uncertainty regarding adherence to Drawings and Specifications.
- 2. Repair defective welds or flaws, lamellar tearing, and replace defective studs.
- 3. Pay for retesting of repaired defective welds flaws and studs.
- 4. Cooperate to the fullest extent to accommodate inspection agency personnel with the on site testing and inspection procedures.
- 5. Assume full responsibility and pay for all corrective work.

END OF SECTION

SECTION 051250 – BUCKLING RESTRAINED BRACES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included: Provisions of structural steel. Work Includes, but is not necessarily limited to following:
1. Furnishing Buckling Restrained Braces (BRB's).
 2. Engineering design of each particular BRB's and corresponding gusset plate connection to meet performance criteria specified. Participation in the Iterative Design Process (IDP) with the project Structural Engineer of Record (SEOR).
 3. Furnishing all BRB's design documents for permit submission.
 4. Design documents shall include stamped and signed structural calculations, test data and drawings of each brace and associated gusset plate connection.
 5. Respond to any related plan check comments from the local jurisdiction.
 6. Qualification of BRB's by uniaxial and sub-assembly cyclic testing and steel core coupon testing.
 7. Furnish all associated shop drawings for each BRB.
 8. Gusset plates shall be shown on structural steel shop drawings (beams and columns) which support associated gusset plates.
- B. Related Work Specified Elsewhere:
1. Structural steel framing.

1.2 INCORPORATED DOCUMENTS

- A. Standards listed below apply where designation is cited in this Section. Where the applicable year of adoption or revision is not listed below, the latest edition applies.
- B. Published specifications, standards, tests or recommended methods of trade, industry or governmental organizations apply to work of this section where cited by abbreviations noted below.
1. American Society for Testing and Materials (ASTM).
 2. American Institute of Steel Construction (AISC)
 - a. "Steel Construction Manual, 13th Edition, "AISC 325-10.
 - b. "Specification for Structural Steel for Buildings," AISC 360-10.
 - c. "Code of Standard Practice for Steel Buildings and Bridges," AISC 303-10.
 - d. "Seismic Provisions for Structural Steel Buildings, "AISC 341-10.
- C. AISC/SEAOC - American Institute of Steel Construction and Structural Engineers of California's "Committee on Buckling Restrained Braced Frames"
1. Recommended Provisions - "Recommended Provisions for Buckling Restrained Braces," October 2001.

D. ASTM - American Society for Testing and Materials:

1. A6 - Specification for General Requirements for Rolled Steel Plates, Shapes, Sheet Piling and Bars for Structural Use.
2. A36 - Specification for Steel.
3. A500 - Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing.
4. A325 - Specification for Structural Steel Bolts..
5. A490 - Specification for Heat-Treated Steel Structural Bolts, 150 ksi min. tensile strength.
6. A354 - Specification for Cold Rolled Bar Stock.

E. AWS - American Welding Society.

F. JIS - Japanese Industrial Standard.

1. G 3136 SN400 B - Rolled Steels for Building Structure.
2. G 3466 STKR 400 - Carbon Steel Square Pipes for General Structural Purposes

1.3 DEFINITIONS

- A. Buckling Restrained Brace (BRB): Specialty structural brace element consisting of an axial force resisting steel core encased by a system that prevents buckling of the steel core:

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Manufacturer shall have manufactured and successfully tested BRB's in accordance with Article 2.1 of this specification and meet all project requirements prior to opening of bids. It is the sole responsibility of the manufacturer to prove they meet the requirements as set forth. The structural engineer of record will have final approval that the brace provided by the manufacturer meets these specifications.
- B. Design Engineer Qualifications: A Structural Engineer, registered in the State of California that is knowledgeable with the results of cyclic testing of BRB's and the requirements of this specification and experienced in the design of BRB's based on engineering analysis shall approve and stamp all drawings.
- C. Quality Assurance Plan: The manufacturer shall have a detailed Quality Assurance Plan to assure the BRB's being manufactured continue to be the same as those tested. The plan shall include the following:
1. Indicate how the product is to be identified so it can be traced back to production quality assurance records.
 2. Include a flow chart of the process by which the product is manufactured, including hold points for QA inspections.
 3. List the test for materials, including the applicable recognized standard for each test and the qualifications of the testing agency or personnel.
 4. Identify the manufacturing tolerances for each process.
 5. Include all internal inspections and in-process quality control, including all forms, and checklists used to document the inspections, hold points, qualifications of personnel performing the inspections, and how the inspections are reviewed and approved
 6. Identify the quality assurance tolerances and handling for erection of the braces.

- D. Qualification Testing: Refer to Article 2.1.D, "Qualification Tests" for requirements/
- E. Extrapolation of Qualification Testing: All deviations from materials, details of fabrication, and quality assurance controls used for the fabrication of tested prototype braces shall be identified by manufacturer and reviewed by Design Engineer to ensure that production braces meet or exceed the level of quality used in fabrication of prototype braces. Include the following items:
 - 1. Weld filler material, including CVN toughness.
 - 2. Welding procedures and details, including weld terminations.
 - 3. Shape and finish of plate edges at transitions.
 - 4. Finish of plate edges, including roughness and treatment of occasional notches.
 - 5. Tolerances for flatness and straightness of plates.
 - 6. Details of isolation between plates and core at transitions, to accommodate lengthening and shortening.
 - 7. Type and thickness of coating materials.
- F. Pre-Erection Conference: Schedule a job conference to review the Structural Documents and to review installation of the BRB's. Procedures for handling, fit-up, fastening, and corrections shall be established. All pertinent parties shall attend
- G. Site Visit: Schedule at least one site visit to observe the installation of the BRB's and provide a written report of observations.

1.5 SUBMITTALS

- A. Submit the following in accordance with requirements of Division 01330, and all requested submittals shall be furnished in English language.
- B. Within 30 days of award of contract, furnish Qualification Testing Report evidencing manufacturer's compliance with Article 2.1 D.
- C. If project specific testing is required to supplement available test data, testing must be performed prior to submission of bids unless approved otherwise.
- D. Manufacturer's Quality Assurance Plan: Conform to requirements of Article 1.05, "Quality Assurance."
 - 1. An authorized representative of the manufacturer shall certify the validity of the Plan by signing and dating.
 - 2. The plan must be approved before fabrication can commence. Allow 30 days for approval.
- E. Engineering Design: Refer to Article 2.1A for Design and Performance Requirements.
 - 1. Design Drawings: Show size and configuration of steel core for full length of BRB. Indicate casing size, thickness and length.
 - 2. Calculations: Provide design calculations showing adequacy of proposed BRB's to achieve Performance Criteria Requirements specified herein.
 - 3. Certification: In accordance with Article 2.1, Design and Performance Requirements.
 - 4. Preliminary Design: At Contractor's option, make an initial submittal of the items listed above, based on assumed material properties, prior to delivery of materials to be employed in work.

5. Final Design: Submit final drawings, calculations and certifications that include the final dimensions of steel core plates based on results of coupon testing of steel to be employed in Work.
 - a. The Design Engineer shall seal final design drawings, calculations and required certification.
 - b. Submittal shall be accompanied by the results of coupon testing.
6. Erection Drawings:
 - a. Show location and size and of BRB's.
 - b. Give complete information necessary for fabrication of elements of structural steel frame to receive braces and fabrication of connection plates.
 - c. Show methods of assembly, including type and size of bolts, hole diameter, and preparation and finish of faying surfaces.
 - d. Identify tolerances for fabrication and erection.
 - e. Submit certified material test reports: to Testing Laboratory for record purposes.
7. All steel: Tensile tests and chemical analysis. Include trace elements for steel core plates.
8. Steel Core Plates:
 - a. Coupon test results for each lot of steel used in fabrication showing initial yield, ultimate tensile stress, and ultimate elongation.
 - b. Charpy V-Notch testing for plates 2 inches (50 mm) and thicker.
9. Welding Electrodes: Include tensile, elongation, and CVN toughness tests. Identify diffusible hydrogen.
 - a. Submit Quality Assurance test and inspection reports to Testing Laboratory for record purposes prior to shipping of braces.
 - b. Pre-Erection Conference: Contractor shall schedule meeting with Owner's Representative, BRB-manufacturer, and the steel erector's personnel supervising installation of buckling restrained braces to review installation procedures including handling, fit-up and fastening.

PART 2 - PRODUCTS

2.1 DESIGN AND PERFORMANCE REQUIREMENTS.

A. Design Requirements:

1. Engage a Structural Engineer, licensed in the State of California, to design braces to achieve the Performance Criteria. Design shall be based on detailed examination and understanding of the results of qualifying cyclic tests and interpolation of results to project conditions. End connections used in the project must be similar to those used in testing per 2.1D.
2. Interpolation of test results for different member sizes shall be justified by rational analysis that demonstrates stress distributions and magnitudes of internal strains that are consistent with or less severe than the tested assemblies and that considers the adverse effects of larger material and variations in material properties.
3. Consider the effect of imposed end rotations.

B. Performance Criteria:

1. BRB-Manufacturer shall work with the SEOR in an Iterative Design Process (IPD) for final brace properties and connection configuration which will achieve the specified performance. All BRB's will be required to achieve the following:
 - a. Steel core shall meet range of minimum yield stress, F_{ysc} , of 39 – 46 ksi.
 - b. Steel core shall meet the minimum area shown in schedule 5/S4.8.
 - c. Inter-story drift limits as shown in table below.
 - d. Gusset plates shall be ASTM A572, grade 50.
 - e. Brace and gusset plate design shall be based on center line work point dimensions as indicated on sheet S4.8.
 - f. Gusset plates shall be designed following the uniform force method. All brace forces are delivered to the centerline of the supporting element (beam, column), not to the outside flange.
 - g. All welding shall follow requirements shown on Sheet, S1.1, for Demand Critical welds listed under "Requirements for Steel Seismic Load Resisting System (SLRS)".
2. Initial "BRB" yield force shall be determined from the initial steel core area, A_{sc} , and the minimum yield stress, F_{ysc} , as indicated on Sheet S1.1 and S4.8, to within plus 10 percent or minus 5 percent of assumed F_{ysc} .
3. Upon completion and acceptance of IDP by the SEOR, the final BRB yield force shall be determined from the actual steel core area, A_{sc} , and the actual F_{ysc} as determined from the coupon testing listed below.
4. Braces shall provide for stable cyclic displacement (lengthening and shortening) corresponding to two times ($2 \times \Delta$) the design inter-story drift, neglecting all contributions to drift from elements beyond the ends of braces. Assume brace end rotations, equal to inter-story drift, occur in combination with lengthening and shortening. Conformance to this provision shall be based upon qualifying cyclic tests in accordance with the procedures and acceptance criteria of AISC 341-05, Appendix T. The following test items shall be submitted with the design package.
 - a. Graphs of test results showing applied load vs. displacement history that exhibits stable, repeatable history, with positive incremental stiffness.
 - b. Graphs of test results shall show no brace fracture, brace instability, or brace end connection failure.
5. The portion of the steel core that projects beyond the casing shall provide for stable cyclic loading at 160 percent of the initial yield force of the "BRB" without initiation of fracture.
6. Final gusset plate end connections and method of connecting used for the project must be similar as used in testing.

C. Coupon Tests: Perform coupon test results for each lot of steel used in fabrication of steel core areas showing initial yield, ultimate tensile stress, and ultimate elongation. Coupons shall be taken from plates at point of brace manufacture and shall be used as the basis for brace design.

D. Qualification Tests: The design of braces shall be based on results from qualifying cyclic tests. Tests shall consist of at least two successful cyclic tests: one is required to be a test of a brace sub-assembly that includes brace connection imposed rotations and the other may be either a uniaxial or sub-assembly test.

1. Qualification Tests shall conform to requirements of Appendix ABRB of the AISC/SEAOC "Recommended Provisions".
2. Qualification tests are permitted to be based on documented full-scale cyclic tests performed for other projects or tests reported in research, provided that there is sufficient basis for extrapolation to project conditions.

3. Extrapolation of previous test results beyond the limitations of Sections ABRB4.2 and ABRB5.3 of Appendix ABRB of the AISC/SEAOC "Recommended Provisions" will not be permitted

2.2 ACCEPTABLE MANUFACTURERS

- A. Manufacturer's which have successfully completed qualification testing of braces meeting the requirements for the project, will be considered acceptable manufacturers, subject to compliance verification with the Contract Documents, including limitations on maximum brace dimensions and strains. The following manufacturers have reported to have passed certain performance criteria in accordance with 2.01D. This does not indicate these manufacturers have met all the requirements of this project. It is the sole responsibility of the manufacturer to prove they meet the requirements as set forth. The engineer of record will have final approval if the brace provided by the manufacturer meets the specification.

1. Core-Brace, LLC; West Jordan, UT.

2.3 MATERIALS

- A. Steel Core Areas: JIS G 3136 SN400 B or ASTM A36; except initial yield stress shall be within the tolerances shown on the Contract Documents, as evidenced by coupon testing of plates to be incorporated in work.
 1. Plates 2 inches (50 mm) and thicker shall be supplied with Charpy V-Notch testing in accordance with ASTM A6 Supplementary Requirement S5, or approved equal. The impact test shall meet a minimum average value of 20 ft-lbs absorbed energy at +70 degrees F and shall be conducted in accordance with AISC Specification, or approved equal.
- B. Casing: JIS G3466 STKR 400 or ASTM A500, Grade B
- C. Welding Filler Material: Meet or exceed CVN toughness and elongation of material used for fabrication of tested assemblies.
 1. H16 (diffusible hydrogen), AWS A4.3.
- D. Shop Primer: Manufacturer's standard zinc-rich rust preventative primer; containing less than 0.002 percent lead.
 1. If faying surfaces of slip-critical bolted connections are painted, primer shall meet requirements of the RCSC (Research Council on Structural Connections) for a Class A coating.
- E. Debonding Agent: Manufacturer's standard; demonstrated suitable to maintain separation of steel core and grout encasement when subjected to a minimum of 30 cycles of inelastic yielding at 2.0 percent strain; resistant to aging effects for a life cycle of 50 years. Provide manufactures certificate of compliance.
- F. Fill Material: Manufacturer's standard cementitious grout; demonstrated suitable for function as a confining in-fill material by sub-assembly qualification testing.

2.4 FABRICATION

- A. Fabricate steel in accordance with Section 05 12 00, "Structural Steel"
 - 1. Cut core plates to profile shown on Design Drawings. Conform to tolerances of Quality Assurance Manual, except tolerance on plate width shall not exceed plus or minus 0.2 inches (5 mm).
 - 2. Splices in the steel core are not acceptable.
 - 3. Roughness: After cutting, edges of core plates shall have roughness less than 1000 micro-inches.
 - 4. Gouges and Notches: Occasional gouges and notches less than 0.2 inches (5 mm) deep in edges of core plates may be repaired by grinding to a smooth transition. The length of transition shall be a minimum of 10 times the depth of gouge. The area shall be inspected by MT after grinding to ensure the entire depth of gouge has been removed. Deeper gouges shall be cause for rejection of piece
- B. The maximum dimensions of the casing of the buckling restrained brace shall be as indicated on the Contract Documents.
- C. Bolted Connections: All holes for bolted connections shall be drilled and burrs removed. All bolted connections shall be slip critical. Maximum excess exposed bolt length beyond that which is structurally required for the performance of the connection is 1/4 inch.
- D. All holes for pinned connections shall be drilled or machined 1/32 inch larger than the pin diameter.
- E. Welding: Continuously weld joints, using procedures intended to minimize distortion.
 - 1. Where cruciform plates are terminated in core, pay particular attention to the detailing and finishing of weld termination; meet or exceed qualification tested assembly as minimum standard
 - 2. Grind welds smooth
- F. Assembly: Assemble components of the Buckling Restrained Brace in a manner to ensure proper performance of the brace.
 - 1. Where cruciform plates are terminated in core, pay particular attention to the detailing and finishing of weld termination; meet or exceed qualification tested assembly as minimum standard
 - 2. Examine steel core areas for straightness prior to coating with debonding agent.
- G. Prepare and shop prime unprotected metal surfaces as follows:
 - 1. Commercial Blast (SSPC-3) clean as minimum surface preparation.
 - 2. Remove all surface burs and irregularities and grind all edges and corners to 1/16 inch radius where BRB's and gusset plates will be exposed when construction is complete. All exposed steel edges to be true and conforming to the designed shape.
 - 3. Apply paint primer at a minimum dry film thickness of 1 mils.

2.5 SOURCE QUALITY CONTROL

A. Testing Laboratory will:

1. Review Manufacturer's Quality Assurance Plan, mill certificates and results of coupon testing.
2. Review Manufacturer's quality assurance test and inspection reports.
3. Observe fabrication and assembly as requested by Owner's Representative

B. Contractor shall

1. Notify Owner's Representative no less than 30 days before the start of fabrication of the buckling restrained braces, to allow Owner's Representative to observe fabrication and assembly process.
2. Perform testing and inspection in accordance with approved Quality Assurance Plan.

PART 3 - EXECUTION

3.1 ERECTION

- A. Braces are erected under Section 05 12 00, "Structural Steel". The erector shall use positive measures to prevent damage to the BRB's. BRB shall only be repaired or have alterations performed by the manufacturer.
- B. Prior to erection, clean faying surfaces of brace to be in contact with bolted connections to remove temporary coatings applied for transport and surface contaminants.
- C. Buckling restrained braces shall not be field cut or altered. Alterations to structural steel components to receive Buckling Restrained Braces shall be as permitted by Section 05 12 00.
- D. No field welding to buckling restrained brace members will be permitted, including attachment of nonstructural components.
- E. In the event of damage to a BRB, the manufacturer shall be contacted and a written procedure describing the damage, proposed repair and when the corrections will take place shall be submitted to the Structural Engineer, the manufacturer, the Owner's representative, and the owners Testing Agency. Repairs shall be performed in strict accordance with the approved repair procedures.

END OF SECTION

SECTION 051519 - STAINLESS STEEL WIRE ROPE ASSEMBLIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Exterior railings at second level terraces, with stainless steel vertical support and cable rail.
- B. Related Sections:
 - 1. Section 051200 "Structural Steel Framing" for structural-steel framing system components.
 - 2. Section 055000 "Metal Fabrications" for metal pipe and tube handrails and railings.

1.3 PERFORMANCE REQUIREMENTS

- A. General: Top rail and posts have been previously designed to resist a force of 300 lbs. per strand. Manufacturer shall design attachment assembly to resist this pull-out load.
- B. Delegated Design: Design stainless steel wire rope assemblies, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements indicated above.

1.4 ACTION SUBMITTALS

- A. Product Data, including instructions and recommendations and installation methods.
- B. Shop Drawings: Include plans, sections, details, and attachments to other work. Show details of anchoring cable railing system to mounting surface.
- C. Material Samples: Submit 16 in. long samples of the following:
 - 1. Railing frame components.
 - 2. Intermediate cable braces.
 - 3. Cables.
 - 4. Cable hardware.

- 5. Grommets
- 6. Provide full size middle post mockup, illustrating material, shape and finish. Sample will be returned after review and acceptance.
- D. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified professional engineer.

1.6 QUALITY ASSURANCE

- A. Single Source Responsibility: For all components required to install the cable railing system.
- B. Provide assembly in accordance with the California Building Code.
- C. Perform design under direct supervision of Professional Engineer experienced in design of this Work and licensed in the State of California.

1.7 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with gratings by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design: C.R. Laurence Co., Inc. or equal.

2.2 COMPONENTS

- A. CableRail Standard Cable Assemblies: 3/16 in. diameter by length as shown and required, Type 316 stainless steel cable.
- B. Bracket: Brushed stainless 2 inch square standard fascia mount bracket.
- C. Tube Railing: Brushed stainless 2 inch square outside diameter pipe rail tubing.
- D. Fittings: Type 316 stainless steel swage style terminals, turnbuckles, joinery, splices, and fixed ends and other hardware recommended by manufacturer for a complete installation.

2.3 MISCELLANEOUS MATERIALS

- A. Grommets: UV-resistant HDPE. Provide cable grommets as a barrier to abrasion of intermediate posts, end posts, and cable braces bored for cables. Color: As selected by Architect.

2.4 FABRICATION

- A. Rail Height: As indicated on drawings. Not less than 42 in.
- B. Space horizontals to meet CBC requirements and as shown on Drawings.
- C. Space intermediate posts at no more than 48 in. on center, unless otherwise noted.
- D. Do not paint steel embedded in concrete.

2.5 STEEL FINISHES

- A. Posts and Top Rail Steel Support: All exterior steel components shall be hot dipped galvanized to ASTM A 123 and ASTM A 153. Steel Sheets shall be galvanized to ASTM A 653, G90 coating.
- B. Provide body and finish field painting in accordance with Section 099600 – High Performance Coatings.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine work to which cable will be anchored or penetrate. Coordinate to perform corrective work, as necessary.
- B. Take field measurements and compare installation conditions to shop drawings. Notify manufacturer of any variation.

3.2 INSTALLATION, GENERAL

- A. Install in accordance with manufacturer's instructions. Assembly shall be plumb, level, square, and true. Do not field weld components.
- B. Install specified cable hardware onto ends of cables using swaging equipment.
- C. Terminate and tension cables in accordance with manufacturer's instructions.
- D. Tension cables to a minimum of 300 pounds each in sequence in accordance with manufacturer's instructions.
- E. Ensure cables are clean, parallel to each other, and without kinks or sags.
- F. Replace defective or damaged components as directed by Architect.

- G. Isolate dissimilar metals with grommets or brushings.

3.3 ADJUSTING AND CLEANING

- A. Adjust cables and hardware as required to provide properly installed cable railing system, as directed by Architect.
- B. Clean surfaces with soap and water; do not use abrasive cleaners.

3.4 PROTECTION

- A. Protect cable railing system and finish from damage during construction.

END OF SECTION

SECTION 051600 - METAL BACKED GYPSUM BOARD

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work includes: Metal Backed Gypsum Board Panels as indicated on the Drawings and specified herein. Work includes basic layout, configuration, fasteners, and cutting of Metal Backed Gypsum Board Panels. Work includes, but is not necessarily limited to the following:

1. Shear walls, interior and/or exterior.
2. Fasteners and fastener spacing.
3. Light Gage wall framing requirements.

- B. Related Work:

1. Structural Steel and Miscellaneous Metal: See Division 05.
2. Load Bearing Metal Stud and Joist Framing: See Division 05.
3. Light Gage Prefabricated Roof Trusses: See Division 05.
4. Rough Carpentry: See Division 06.
5. Exterior Insulation and Finishes: See Division 07.
6. Non-Structural Metal Stud Systems (30 mils and lighter): See Division 09.
7. Gypsum Board and Finish System: See Division 09.
8. Gypsum Board: See Division 09.

- 1.2 REFERENCES CODES AND STANDARDS: The following references, codes and standards are hereby made a part of this Section and Metal Backed Gypsum Board shall conform to the applicable requirements therein except as otherwise specified herein or shown on the Drawings. Nothing contained herein shall be construed as permitting work that is contrary to code requirements

- A. "Specifications for the Design of Light Gage Cold Formed Steel Structural Members" of the American Iron and Steel Institute (AISI), latest edition with current revisions.
- B. "Structural Welding Code-Sheet Steel" of American Welding Society, AWS D 1.3, latest Edition with current supplements, revisions, and addenda.
- C. California Building Code, 2019 Edition, Chapter 22.
- D. American Society for Testing and Materials (ASTM), latest designations or as specified.
- E. International Association of Plumbing and Mechanical Officials: IAPMO-ES Evaluation Report Number ER-0126 for Steel and Wood framing.
- F. International Code Council: ICC-ES Evaluation Report Number ER 5762 for steel framing.

1.3 SUBMITTALS

- A. Product Data: For each type of metal backed gypsum board product including material properties, shear values, and valid ICC reports.
- B. Shop Drawings: None required.

1.4 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM E329 to conduct the testing indicated.
- B. Product Tests: Mill certificates or data from a qualified independent testing agency indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements and metallic-coating thickness.
- C. AISI Specifications and Standards: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" and its "Standard for Cold-Formed Steel Framing - General Provisions."
- D. Preconstruction Meeting: Conduct preconstruction meeting at Project site to review materials, construction details, coordination with other trades, and inspection requirements. Contractor shall have Architect, Structural Engineer, Superintendents, Foremen, and Special Inspector present at meeting. Meeting shall occur no later than one month before the commencement of construction of metal stud framing.

1.5 PERFORMANCE REQUIREMENTS

- A. Shear Wall shear capacity: Metal backed gypsum board panels shall have equivalent shear and deflection characteristics as indicated in ICC-ES Report Number ER 5762.
- B. Fire Rating: Metal backed gypsum board panels shall have been fire-tested and have a valid report prepared by ITS Intertek Testing Laboratories and Fire-Stance certified to be used on 1- and 2-hour fire rated load bearing and non-load bearing metal stud or wood framed assemblies for interior or exterior use

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Package and protect metal backed gypsum board panels from moisture, corrosion, deformation, and other damage during delivery, unloading, storage, and handling.
- B. Cover, store, and protect metal backed gypsum board panels with a waterproof covering, and ventilate to avoid condensation.
- C. Store metal backed gypsum board panels off any ground surfaces with one end elevated for moisture drainage.
- D. Do not bend metal backed gypsum board panels or break/mar gypsum board while handling. Damaged panels shall be replaced prior to installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide metal backed gypsum board panels in 4 foot wide sheets and standard lengths of 8 through 12 feet, by the following, or approved equal:

1. CEMCO, City of Industry, California, or approved equal.

2.2 MATERIALS: Metal backed Gypsum board panels shall be SureBoard® Series 200, as manufactured by Cemco, or approved equal in compliance with requirements of this Section

- A. Galvanized sheet steel: No. 22 gage (0.027 inches, 0.686 mm) base metal thickness minimum per ASTM A 653 of grade and coating weight as follows:

1. Grade 33.
2. Hot dipped galvanizing: ASTM A924.

- B. Gypsum Sheathing, 5/8 inch thick, mold and water resistant, tapered edge, Type X or Type C fire rated, as follows:

1. DensGlass® Gold, by Georgia Pacific, or approved equal.

- C. Fasteners: Sheet Metal Screws as follows, unless noted otherwise on Drawings:

1. Self-drilling/self-tapping pilot point bugle head screws, #8 minimum diameter (0.138 inch) with a 0.3145 inch head diameter, 1-1/2 inch long, 3/8 inch drill tip complying with SAE J78 and ASTM C954, ER 5280 by John Grabber & Associates, or approved equal.

- D. Adhesives: Used to attach sheet steel to gypsum board, as follows:

1. Water soluble, non-combustible, and compatible with gypsum board and galvanized coating.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine supporting framing for compliance with requirements for installation tolerances and other conditions affecting installation:

1. Verify that stud framing is plumb and properly spaced to modulate with metal backed gypsum board panels.
2. Verify that metal backed gypsum board panels are dry and damage free.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install panels in either a vertical or horizontal orientation. Panels installed horizontally shall be fully blocked at adjoining panel edges with solid blocking or 1-1/2 inch flat straps of the same gage as the metal stud framing.
- B. Cutting: of metal backed gypsum board panels shall be achieved with the use of a ferrous metal cutting blade in a typical "sidewinder" type skilsaw. Do not overcut corners at openings or holes. Openings in metal backed gypsum board panels will not be allowed unless shown on the Structural Drawings.
- C. Support framing: Minimum metal stud framing dimensions shall be 3-1/2 inch deep structural metal studs with minimum 1-1/2 inch flange and minimum 3/8 return lip, spaced at 24 inches on center.
- D. Fastener installation: #8 screws shall be driven flush with the gypsum board surface, protrude a minimum of 3 exposed threads through the metal stud framing, and have a minimum edge distance of 3/8 inch on the supporting members and 22 gage metal panel. For fastener spacing, refer to Structural Drawings. Minimum fastener spacing shall be 6 inches on center at all panel edges and 12 inches on center over all interior supports, unless noted otherwise.
- E. When two layers of gypsum board are required for fire ratings, the second layer of gypsum board shall be installed with vertical joints staggered from the first layer (metal backed gypsum board panels). The second layer gypsum board may be screwed with #6x2 inch laminating screws at the required spacing into the 22 gage metal backing in lieu of screwing into the metal studs.

3.3 REPAIRS

- A. Damaged gypsum board shall be repaired in accordance with recommendations of manufacturer. Submit proposed repair method to architect for review and approval:
- B. Damaged metal backing panel is grounds for removal and replacement of the entire panel.

3.4 FIELD QUALITY CONTROL

- A. Testing: Owner will engage a qualified independent testing and inspecting agency to perform field inspections and prepare inspection reports.
- B. Condition of metal backed gypsum board panels will be subject to inspection.
- C. Installation and location of required blocking or flat straps will be subject to inspection.
- D. Screw size and spacing, edge distance, and exposed thread protrusion through support framing will be subject to inspection.
- E. Testing agency shall report inspection results promptly and in writing to Contractor and Architect.
- F. Remove and replace work where inspection results indicate that it does not comply with specified requirements.

- G. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

END OF SECTION

SECTION 053100 - STEEL DECKING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included: Provision of composite metal floor and roof decking with directly attached accessory items including, but not necessarily limited to the following:
1. Closure strips, cover pieces, sump pans and all related accessory items.
 2. Reinforcing of openings and deck edges shown on structural drawings.
 3. All miscellaneous supports required for the proper installation of metal decking and which are not shown on the drawings or specified elsewhere, to obtain concrete-tight deck.
 4. Shear steel connectors on beam flanges.
- B. Related Work Specified Elsewhere:
1. Steel members supporting decking.
 2. Ledger angles and fasteners.
 3. Cutting of openings other than those shown including reinforcing or flashing where required.

1.2 REFERENCES, CODES AND STANDARDS

- A. Published specifications, standards, tests or recommended methods of trade, industry or governmental organizations apply to work of this section where cited by abbreviations noted below.
1. American Society for Testing and Materials (ASTM):
 - a. A653 (2007) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - b. A1008 (2007) Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.
 - c. Specification A1011 (2007) Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra Strength.
 2. California Building Code, 2019 Edition.
 3. American Institute of Steel Construction - "Specification for Design of Light Gauge Structural Members" - (AISC).
 4. American Welding Society's (AWS):
 - a. Structural Welding Code (AWS D1.1-2006).
 - b. Structural Welding Code – Sheet Steel (AWS D1.3-1998).
 5. United States Green Building Council (USGBC) – Green Building Rating System – LEED-NC, Version 4.0.

1.3 QUALITY ASSURANCE

- A. Welder's Qualifications: Welders shall be experienced and competent mechanics and shall be qualified for welding in light gauge metal in accordance with AWS.
- B. Limitations of hanger loads from Metal Decking: Conform to Article 3.3 of this Section.

1.4 SUBMITTALS

- A. Manufacturer's literature describing products.
- B. Samples: Only as requested by Owner.
- C. Shop Drawings: Submit shop drawings prior to fabrication or shipping to show layout of deck, gauge, joint locations; type, location of welds; accessory items. Coordinate location of openings with Architectural, Mechanical etc. Drawings.
- D. Certificates: Certify that materials meet requirements specified.
- E. Welding:
 - 1. Certification of welder's qualifications.
 - 2. Welding Procedure: Submit descriptive data to illustrate welding procedures to be performed.
- F. Metal Decking, Flashing:
 - 1. LEED MR Credit 2 - BPDO – Environmental Product Declarations (EPD) Submittal - EPD/LCA Documentation: Provide a publicly available Environmental Product Declaration in conformance with standards listed and described in Section 018113.
 - 2. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials Submittal - Regional Sourcing Documentation: Provide a product data sheet or manufacturer affidavit demonstrating regional sourcing as defined in Section 018113.
 - 3. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials Submittal - Recycled Content Documentation: Provide a product data sheet or manufacturer affidavit noting the pre-consumer (post-industrial) and post-consumer recycled content value of the product or product components in accordance with requirements described in Section 018113.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver, store and handle decking in manner to prevent damage or deformation.
- B. Discharge materials carefully, store on platform of pallets, and cover with tarpaulins or other suitable weathertight covering, to prevent water damage and rust. Do not dump onto ground.
- C. Do not overload decking during construction period and do not use decking for storage or working platform prior to welding in position.

1.6 JOB CONDITIONS

- A. Provide the Owner's Testing Agency with free access to places whether on or off the job site where materials are stored or fabricated, to places where equipment is stored or serviced, and to job site during times of installation.
- B. Sequencing, Scheduling: Notify the Owner in sufficient time prior to fabrication, field welding or installation to permit testing and inspection without delaying work.

PART 2 - PRODUCTS

2.1 MATERIAL

- A. Framing Components (Fabricated from at least 60% post-industrial waste.)
 - 1. Use US standard gauge structural quality steel conforming to ASTM A1008-SS Grade 33 or ASTM A653-SS Grade 33 to roll decking and fabricate in accordance with the American Institute of Steel Construction "Specification for Design of Light Gauge Structural Members."
 - 2. Decking shall have a galvanized coating conforming to ASTM A653 G60.
 - 3. Composite deck units shall be formed with deformations to provide a mechanical lock between concrete and steel deck.
 - 4. Performance Requirements: Maximum deflection 1/360 of span under total load.
 - 5. Decks: Side and end interlocking type decking; fabricated in 24 inches widths or greater.
- B. Miscellaneous Steel Shapes: ASTM A36.
- C. Touch-up Paint for Abraded Galvanizing: Zinc oxide or Zinc dust primer for galvanized metal.
- D. Flashing and Closures: As recommended by the approved metal decking manufacturer for open ends at columns, walls, spandrels and openings as shown on the drawings.
- E. Provide the gauge sheet steel cover plates as required to close panels and anywhere deck changes direction.
- F. Welding Electrodes and Equipment: As recommended by deck manufacturer and approved for use by Building Department.
- G. Shear Connectors: Nelson shear connectors conforming to ASTM A-108.
- H. Metal Decking, Flashing:
 - 1. LEED MR Credit 2 - BPDO – Environmental Product Declarations (EPD) - EPD/LCA Requirement: The product shall have documented a publicly available Environmental Product Declaration in conformance with standards listed and described in Section 018113.
 - 2. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials - Regional Sourcing Preference: Preference shall be given to products that can demonstrate regional sourcing as defined in Section 018113.

3. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials - Recycled Content Requirement: The product or product components shall meet or exceed the maximum recycled content percentages as listed for the product or component type in Section 018113, Appendix E, in accordance with standards listed in Section 018113.

2.2 FABRICATION

A. Preparation:

1. Coordinate with other work supporting, contacting or adjoining metal decking and verify requirements for cutting out, fitting and attaching.
2. Verify dimensions and locations at site whenever construction progress permits.

B. General Requirements:

1. Fabricate in accordance with AISC unless specifically noted otherwise.
2. Shop-or field-cut units to fit around openings, along building perimeter and around columns.

C. Closure Strips: Fabricated from 16 gauge sheet steel for installation at ends, edges and around openings as required to prevent leakage of concrete.

D. Hanger Slots at Floor and Roof: Size approximately 1/4 by 3/8 inch and located three rows per sheet along low flutes at two foot centers.

E. Shear and Hold-Down Lugs: provide 3/32 inch depth to achieve composite action decking and concrete fill.

2.3 SOURCE QUALITY CONTROL

A. The Owner's Testing Agency will:

1. Review mill analyses and certificates of compliance, and where certification is questionable, test materials to verify compliance.
2. Test materials for tensile and bending strength as described.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine construction to support decking and verify following:

1. That dimensions are correct.
2. That setting conditions are proper.
3. That means of attachment integral with support is correct.

B. Do not start installation until unsatisfactory conditions have been corrected.

- C. Deck is to be furnished, spread and tack welded to coincide with the Steel Contractors erection schedule and in ample time for use as a work platform and as safety planking. Materials must be delivered to the project site in conformance with the project schedule.

3.2 INSTALLATION

A. General Requirements:

1. Install decking in accordance with drawings.
2. Provide and fasten in place by welding, flashings, closure strips, closure plates, and fastenings where shown and as required.
3. Perform shaping, cutting, drilling and fitting in manner to equal workmanship of shop fabrication.
4. Holes shall be cut by the deck erector to fit framed openings shown on the drawings. All other holes shall be cut by the trade requiring the hole under the supervision of the General Contractor and as approved by the Architect.

B. Layout:

1. Place and adjust units in final position prior to permanent fastening.
2. Install in straight, continuous rows with ribs at right angles to supporting members or in the direction indicated on the drawings.
3. Align ribs to be straight within 1/4 inch in overall length of decking.
4. Locate end joints over supporting members. Deck units shall be continuous for three or more spans where structural steel layout permits.
5. Locate butted ends tight at center line of structural support with positive, solid, complete bearing over full width of panel without deforming units. Insure not less than two inch bearing on support.
6. Locate extreme ends and edges over structural supports with positive, solid complete bearing over full width of support for full width or length of panel without deforming units.

C. Welding Procedure:

1. Perform welding in accordance with AISC and AWS D1.1.
2. Insure surfaces to receive weld metal are clean and dry.
3. Weld metal deck to supports and fasten side laps of metal deck as required on General Notes, Sheet S1.1.

D. Opening Reinforcement:

1. Opening reinforcement shall be as detailed on the drawings. Cutting of holes other than those detailed on the drawings shall be done only as specifically approved by the Engineer. Holes not shown on Structural Drawings shall be cut and reinforced in accordance with details on Drawings under this section but shall be located and paid for by trade requiring openings. In general, reinforcing is not required for holes less than four inches in diameter.
2. Provide sub-framing to support deck at openings larger than four inches in any dimension, and as shown on the drawings.

3.3 HANGERLOAD LIMITATIONS

A. General:

1. The Contractor shall coordinate and supervise the location of all hanger devices fastened to, from, or through the metal decking.
2. The Contractor shall verify that all such hanger devices conform to the load and location limitations noted below under B and C, and as otherwise noted in other sections of these specifications.

B. Prior to placing concrete fill on the metal deck (or metal deck without concrete fill), the suspended load with anchoring method shall be as follows:

1. Maximum load on one wire hanger, through field-punched hole in metal deck, with pigtail end for embedment in future fill shall be 40 pounds.
2. Loads, not conforming to the weight noted above, shall be suspended from the structural steel framing. Contractor shall provide additional framing as required and submit details for review by the Architect.

C. After placing concrete fill:

1. Shot or drilled anchors are not permitted unless approved by Engineer.
2. If required, transfer all loads to structural steel framing by providing additional steel framing as noted under B.2 above.

3.4 FIELD QUALITY CONTROL

A. The Owner's Testing Agency will:

1. Provide inspection of welding, including prior fit-up, welding equipment, weld quality and welder certification.
2. Provide inspection during installation as required to establish conformity of work with requirements.

3.5 CLEANUP AND DISPOSAL OF WASTE MATERIALS

- A. Clean all surfaces as necessary for proper application of structural concrete.
- B. After erection, touch-up all welds and abraded areas with paint.
- C. Remove all waste from the site as a result of work in this section.

END OF SECTION

SECTION 054000 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Backup framing for exterior cladding.
- B. Related Requirements:
 - 1. Section 017419 "Construction and Demolition Waste Management and Disposal".
 - 2. Section 018113 "Sustainable Design Requirements".
 - 3. Section 018119 "Construction Indoor Air Quality Requirement".
 - 4. Section 074213 "Insulated Metal Wall Panels."
 - 5. Section 092216 "Non-Structural Metal Framing" for interior non-load-bearing, metal-stud framing and ceiling-suspension assemblies.
 - 6. Section 099600 "High-Performance Coatings".
- C. Summary of Work:
 - 1. Sizes, spacing and gauges of all Cold-Formed Metal Framing (CFMF) shown in the Contract Documents are preliminary design information. This information shall be validated and confirmed by the Contractor for adequate structure and constructability, through engineering design, calculations and detailing. Contractor shall submit this information for review and action by the Architect of Record and eventually submit to the Authority Having Jurisdiction as a deferred approval.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of cold-formed steel framing product and accessory.
- B. Shop Drawings:
 - 1. Include layout, spacings, sizes, thicknesses, and types of cold-formed steel framing; fabrication; and fastening and anchorage details, including mechanical fasteners.
 - 2. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.
- C. Delegated-Design Submittal: For cold-formed steel framing. Stamped and signed by a Professional Engineer registered in the State of California.

- D. LEED Submittals: The Owner requires the Contractor to implement practices and procedures to meet the project's environmental performance goals, which include conformance with California Green Building Code (CAL Green) and achieving LEED v4 Platinum Certification. The requirements related to these goals are defined in the Articles below and represent a combination of sustainability performance criteria necessary to comply with the California Green Building Code and achieve LEED certification goals. The Contractor shall ensure that the requirements related to these goals are implemented to the fullest extent.
1. LEED MR Credit 2 - BPDO – Environmental Product Declarations (EPD) Submittal - EPD/LCA Documentation: Provide a publicly available Environmental Product Declaration in conformance with standards listed and described in Section 018113.
 2. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials Submittal - Regional Sourcing Documentation: Provide a product data sheet or manufacturer affidavit demonstrating regional sourcing as defined in Section 018113.
 3. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials Submittal - Recycled Content Documentation: Provide a product data sheet or manufacturer affidavit noting the pre-consumer (post-industrial) and post-consumer recycled content value of the product or product components in accordance with requirements described in Section 018113.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Welding certificates.
- C. Product Test Reports: For each listed product, for tests performed by manufacturer and witnessed by a qualified testing agency.
1. Steel sheet.
 2. Expansion anchors.
 3. Power-actuated anchors.
 4. Mechanical fasteners.
 5. Vertical deflection clips.
 6. Horizontal drift deflection clips
 7. Miscellaneous structural clips and accessories.
- D. Research Reports: For non-standard cold-formed steel framing, from ICC-ES.

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.
- B. Product Tests: Mill certificates or data from a qualified independent testing agency, or in-house testing with calibrated test equipment indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.
- C. Welding Qualifications: Qualify procedures and personnel according to the following:
1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect cold-formed steel framing from corrosion, moisture staining, deformation, and other damage during delivery, storage, and handling.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following, or equal:
 - 1. AllSteel & Gypsum Products, Inc.
 - 2. California Expanded Metal Products Company.
 - 3. ClarkDietrich Systems, Inc.
 - 4. Formetal Co. Inc. (The).

2.2 LEED REQUIREMENTS

- A. LEED MR Credit 2 - BPDO – Environmental Product Declarations (EPD) - EPD/LCA Requirement: The product shall have documented a publicly available Environmental Product Declaration in conformance with standards listed and described in Section 018113.
- B. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials - Regional Sourcing Preferment: Preference shall be given to products that can demonstrate regional sourcing as defined in Section 018113.
- C. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials - Recycled Content Requirement: The product or product components shall meet or exceed the maximum recycled content percentages as listed for the product or component type in Section 018113, Appendix E, in accordance with standards listed in Section 018113.

2.3 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 4000 "Quality Requirements," to design cold-formed steel framing.
- B. Structural Performance: Provide cold-formed steel framing capable of withstanding design loads within limits and under conditions indicated.
 - 1. Design Loads: As indicated.
 - 2. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:
 - a. Exterior Non-Load-Bearing Framing: Horizontal deflection of 1/360 of the wall height.
 - b. Joist Framing: Vertical deflection of 1/360 for live loads and 1/240 for total loads of the span.
 - 3. Design framing systems to provide for movement of framing members located outside the insulated building envelope without damages or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F.
 - 4. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection, as shown on the Drawings.

5. Design exterior non-load-bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.

C. Cold-Formed Steel Framing Design Standards:

1. Floor and Roof Systems: AISI S210.
2. Wall Studs: AISI S211.
3. Headers: AISI S212.
4. Lateral Design: AISI S213.

- D. AISI Specifications and Standards: Unless more stringent requirements are indicated, comply with AISI S100 and AISI S200.

2.4 COLD-FORMED STEEL FRAMING, GENERAL

- A. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:

1. Grade: As required by structural performance.
2. Coating: G90 or equivalent.

- B. Steel Sheet for Vertical Deflection Clips: ASTM A 653/A 653M, structural steel, zinc coated, of grade and coating as follows:

1. Grade: As required by structural performance.
2. Coating: G90.

2.5 EXTERIOR NON-LOAD-BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0329 inch.
2. Minimum Flange Width: 1-3/8 inches.

- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0329 inch.
2. Minimum Flange Width: 1-1/4 inches.

- C. Vertical Deflection Clips: Manufacturer's standard clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.

1. Manufacturers: Subject to compliance with requirements, provide products by the following, or equal:
 - a. ClarkDietrich Systems, Inc.
 - b. MarinoWARE.
 - c. SCAFCO Corporation.
 - d. Steel Network, Inc. (The).

- D. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:

1. Minimum Base-Metal Thickness: 0.0428 inch.

2. Flange Width: 1 inch plus the design gap for one-story structures and 1 inch plus twice the design gap for other applications.
- E. Drift Clips: Manufacturer's standard bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure through positive mechanical attachment to stud web and structure.

2.6 FRAMING ACCESSORIES

- A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.
- B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:
 1. Supplementary framing.
 2. Bracing, bridging, and solid blocking.
 3. Web stiffeners.
 4. Anchor clips.
 5. End clips.
 6. Foundation clips.
 7. Gusset plates.
 8. Stud kickers and knee braces.
 9. Hole reinforcing plates.
 10. Backer plates.

2.7 ANCHORS, CLIPS, AND FASTENERS

- A. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.
- B. Anchor Bolts: ASTM F 1554, Grade 36, threaded carbon-steel hex-headed bolts and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153/A 153M, Class C.
- C. Expansion Anchors: Fabricated from corrosion-resistant materials, with allowable load or strength design capacities calculated according to ICC-ES AC193 and ACI 318 greater than or equal to the design load, as determined by testing per ASTM E 488 conducted by a qualified testing agency.
- D. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with allowable load capacities calculated according to ICC-ES AC70, greater than or equal to the design load, as determined by testing per ASTM E 1190 conducted by a qualified testing agency.
- E. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.
 1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.
- F. Welding Electrodes: Comply with AWS standards.

2.8 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: ASTM A 780.

- B. Cement Grout: Portland cement, ASTM C 150, Type I; and clean, natural sand, ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.
- C. Nonmetallic, Nonshrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, and plasticizing and water-reducing agents, complying with ASTM C 1107/C 1107M, with fluid consistency and 30-minute working time.
- D. Shims: Load bearing, high-density multimonomer plastic, and nonleaching; or of cold-formed steel of same grade and coating as framing members supported by shims.
- E. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to match width of bottom track or rim track members.

2.9 FABRICATION

- A. Fabricate cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.
 - 1. Fabricate framing assemblies using jigs or templates.
 - 2. Cut framing members by sawing or shearing; do not torch cut.
 - 3. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, pneumatic pin fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.
 - a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - b. Locate mechanical fasteners and install according to Shop Drawings, with screw penetrating joined members by no fewer than three exposed screw threads.
 - 4. Fasten other materials to cold-formed steel framing by welding, bolting, pneumatic pin fastening, or screw fastening, according to Shop Drawings.
- B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.
- C. Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:
 - 1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
 - 2. Squareness: Fabricate each cold-formed steel framing assembly to a maximum out-of-square tolerance of 1/8 inch.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine supporting substrates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Before sprayed fire-resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.
- B. After applying sprayed fire-resistive materials, remove only as much of these materials as needed to complete installation of cold-formed framing without reducing thickness of fire-resistive materials below that are required to obtain fire-resistance rating indicated. Protect remaining fire-resistive materials from damage.
- C. Install load bearing shims or grout between the underside of load-bearing wall bottom track and the top of foundation wall or slab at locations with a gap larger than 1/4 inch to ensure a uniform bearing surface on supporting concrete or masonry construction.
- D. Install sealer gaskets at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.

3.3 INSTALLATION, GENERAL

- A. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled.
- B. Install cold-formed steel framing according to AISI S200 and to manufacturer's written instructions unless more stringent requirements are indicated.
- C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.
 - 1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch.
- D. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.
 - 1. Cut framing members by sawing or shearing; do not torch cut.
 - 2. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.
 - a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - b. Locate mechanical fasteners and install according to Shop Drawings, and complying with requirements for spacing, edge distances, and screw penetration.
- E. Erection Tolerances: Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:
 - 1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.4 FIELD QUALITY CONTROL

- A. Testing: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

- B. Field and shop welds will be subject to testing and inspecting.
- C. Testing agency will report test results promptly and in writing to Contractor and Architect.
- D. Remove and replace work where test results indicate that it does not comply with specified requirements.
- E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.5 REPAIRS AND PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer that ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 054300 - SLOTTED CHANNEL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes strut type metal framing system (Strut System) as provided:
 - 1. To support interior and exterior mechanical, electrical, plumbing, fire protection, audiovisual, and low voltage equipment and devices.
 - 2. To support exterior City Hall PV array system.
 - 3. To support ceiling hung toilet partitions.
 - 4. To support ceiling hung decorative ceiling system at Council Chamber & First Floor Lobby.
 - 5. For structural applications as applicable.
 - 6. Strut System and components must be supplied from a single approved Manufacturer.

1.3 QUALITY ASSURANCE

- A. Manufacturer's qualifications:
 - 1. The manufacturer shall have at least 10 years' experience in manufacturing Strut Systems.
 - 2. The manufacturer must certify in writing all components supplied have been produced in accordance with an established quality assurance program.
- B. Work shall meet the requirements of the following standards:
 - 1. Federal, State and Local codes
 - 2. American Iron and Steel Institute (AISI) Specification for the Design of Cold- Formed Steel Structural Members 2001 Edition
 - 3. American Society for Testing And Materials (ASTM)
 - 4. Metal Framing Manufacturer's Association (MFMA)

1.4 SUBMITTALS

- A. Structural calculations by a Registered Professional or Structural Engineer in the State of the Project's location for approval by the Professional of Record. Calculations may include, but are not limited to:
 - 1. Description of design criteria
 - 2. Stress and deflection analysis
 - 3. Selection of framing members, fittings, and accessories
- B. Assembly drawings necessary to install the Strut System in compliance with the Contract Drawings
- C. Pertinent manufacturers published data

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. All material is to be delivered to the work site in original factory packaging to avoid damage to the finish.
- B. Upon delivery to the work site, all components shall be protected from the elements by a shelter or other covering.

1.6 WARRANTY

- A. Manufacturer shall warrant for 1 year from the shipment date that products will be free from defects in material or manufacture. In the event of any such defect in violation of the warranty, Manufacturer shall have the option to repair or replace any such defective product.
- B. Installer shall warrant for 1 year from the date of completion of work that the work will be free of defects in installation. In the event of any such defect in violation of the warranty, Installer shall have the option to repair or replace any such defective product.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design strut systems.

2.2 MANUFACTURERS

- A. Strut System Basis of Design: UNISTRUT or Approved Equal.

2.3 MATERIALS

- A. All channel members shall be fabricated conforming to one of the following ASTM specifications:
 - 1. At interior spaces: Plain Carbon Steel: ASTM 1011 SS Grade 33
 - 2. At exterior and unconditioned spaces: UNISTRUT DEFENDER™: ASTM 1046 SS Grade 33
- B. All fittings shall be fabricated conforming to one of the following ASTM specifications:
 - 1. Carbon Steel: All carbon steel fittings shall be fabricated from steel that meets/exceeds the physical requirements of ASTM A1011 SS Grade 33 and conforms to one of the following ASTM specifications:
 - a. ASTM 575
 - b. ASTM 576
 - c. ASTM 36
 - d. ASTM 635
 - e. ASTM 1059, at exterior and unconditioned spaces.
 - f. ASTM 1046, at exterior and unconditioned spaces.

2.4 FINISHES

A. FACTORY PAINTED

1. Channel
 - a. Rust inhibiting thermoset acrylic enamel paint applied by electro- deposition after cleaning and phosphating, and thoroughly baked.
2. Fittings
 - a. Polyester powder coat after cleaning and phosphating, and thoroughly baked.
3. Color shall be FHWA Highway Green, Color Tolerance Chart, PR Color No. 4
4. Hardness = 2H
5. Performance
 - a. Salt Spray per ASTM B117
 - (1) Scribed: Exceed 400 hours
 - (2) Unscribed: Exceed 600 hours
 - b. Nominal chalking at 1,000 hours per weatherometer G-23 test
 - c. No checking at 1,000 hours per weatherometer G-23 test

B. ELECTRO-GALVANIZED per ASTM B 633 Type III SC 1

C. UNISTRUT DEFENDER per ASTM A1046 and A1059

1. Strut coated per A1046 to a mass of 0.45 oz./ sq. ft. surface area
2. Fittings coated per A1059 to a thickness of 30 microns and/or A1046 to a mass of 0.45 oz./sq. ft. surface area

PART 3 - EXECUTION

3.1 EXAMINATION

- A. The installer shall inspect the work area prior to installation. If work area conditions are unsatisfactory, installation shall not proceed until satisfactory corrections are completed.

3.2 INSTALLATION

- A. Installation shall be accomplished by a fully trained manufacturer authorized installer.
- B. Set Strut System components into final position true to line, level and plumb, in accordance with approved drawings.
- C. Anchor material firmly in place and tighten all connections to their recommended torques.
- D. All exterior strut and fittings field end cuts and any bare unfinished metal exposed to the exterior to be treated with specified exterior finish for those members to maintain exterior finish warranty.

3.3 CLEANUP

- A. Upon completion of this section of work, remove all protective wraps and debris. Repair any damage due to installation of this section of work.

3.4 PROTECTION

- A. During installation, it shall be the responsibility of the installer to protect this work from damage.
- B. Upon completion of this scope of work, it shall become the responsibility of the general contractor to protect this work from damage during the remainder of construction on the project and until substantial completion.

END OF SECTION

SECTION 055050 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Steel framing and supports for countertops.
 - 2. Steel framing and supports for mechanical and electrical equipment.
 - 3. Steel framing and supports for applications where framing and supports are not specified in other Sections.
 - 4. Steel tube or angle reinforcement for all wall-mounted equipment.
 - 5. Elevator machine beams, hoist beams, and divider beams.
 - 6. Steel shapes for supporting all elevator door sills.
 - 7. Steel interior and exterior roof access ladders.
 - 8. Steel elevator pit sump covers and elevator pit ladders.
 - 9. Loose bearing and leveling plates for applications where they are not specified in other Sections.
 - 10. Miscellaneous steel trim including steel angle corner guards, steel edgings and loading area angles.
 - 11. Steel framing and supports for ceiling-hung toilet compartments.
- B. Products furnished, but not installed, under this Section include the following:
 - 1. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.
 - 2. Steel weld plates and angles for casting into concrete for applications where they are not specified in other Sections.
- C. Related Requirements:
 - 1. Section 017419 "Construction Waste Management and Disposal".
 - 2. Section 018113 "Sustainable Design Requirements".
 - 3. Section 018119 "Construction Indoor Air Quality Requirements".
 - 4. Section 033000 "Cast-in-Place Concrete" for installing anchor bolts, steel pipe sleeves, slotted-channel inserts, wedge-type inserts, and other items cast into concrete.
 - 5. Section 051200 "Structural Steel Framing".
 - 6. Section 054300 "Slotted Channel Framing".
 - 7. Section 057000 "Decorative Metal".
 - 8. Section 102113 "Phenolic Core Toilet Compartments."

1.4 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

- B. Coordinate installation of metal fabrications that are anchored to or that receive other work. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.5 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Nonslip aggregates and nonslip-aggregate surface finishes.
 - 2. Countertop supports.
 - 3. Manufactured metal ladders.
 - 4. Manufactured work platform and access ladder.
 - 5. Metal nosings and treads.
 - 6. Fasteners.
 - 7. Paint products.
 - 8. Grout.
- B. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide Shop Drawings for the following:
 - 1. Steel framing and supports for countertops.
 - 2. Steel framing and supports for mechanical and electrical equipment.
 - 3. Steel angle reinforcement for partial-height partitions.
 - 4. Steel tube or angle reinforcement for all wall-mounted equipment.
 - 5. Elevator hoist beams.
 - 6. Steel shapes for supporting elevator door sills.
 - 7. Steel interior and exterior roof access ladders.
 - 8. Elevator pit sump covers and elevator pit ladders.
 - 9. Aluminum projection platform, alternating tread access stair and associated guard and handrails at the Academic Building Projection Room.
 - 10. Miscellaneous steel trim including steel angle corner guards, steel edgings and loading area angles.
 - 11. Loose bearing and leveling plates.
 - 12. Steel framing and supports for applications where framing and supports are not specified in other Sections.
 - 13. Stainless steel handrails and support brackets.
 - 14. Steel framing and supports within millwork.
 - 15. Aluminum honeycomb panels and aluminum angles for wood acoustical panel reinforcement.
 - 16. Steel framing and supports for ceiling-hung toilet compartments.
- C. Delegated-Design Submittal: For all countertop supports, equipment supports, elevator door sill supports, elevator pit ladder, handrails and brackets, millwork supports, roof access and platform access ladders, including analysis data. Delegated Design submittals and associated shop drawings and calculations shall be prepared, stamped, and signed by a Structural Engineer licensed in the State of California.
- D. LEED Submittals: The Owner requires the Contractor to implement practices and procedures to meet the project's environmental performance goals, which include conformance with California

Green Building Code (CAL Green) and achieving LEED v4 Platinum Certification. The requirements related to these goals are defined in the Articles below and represent a combination of sustainability performance criteria necessary to comply with the California Green Building Code and achieve LEED certification goals. The Contractor shall ensure that the requirements related to these goals are implemented to the fullest extent.

1. LEED MR Credit 2 - BPDO – Environmental Product Declarations (EPD) Submittal - EPD/LCA Documentation: For mortar and grout materials, provide a publicly available Environmental Product Declaration in conformance with standards listed and described in Section 018113.
2. LEED EQ Credit 2 - Low-Emitting Materials Submittal - VOC Content Documentation: For mortar and grout materials, provide a product data sheet or third-party certificates indicating the VOC content of the product (less water and exempt solids). Provide documentation indicating the anticipated volume of product use (liters).
3. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials Submittal - Regional Sourcing Documentation: For mortar and grout materials, provide a product data sheet or manufacturer affidavit demonstrating regional sourcing as defined in Section 018113.
4. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials Submittal - Recycled Content Documentation: For mortar and grout materials, provide a product data sheet or manufacturer affidavit noting the pre-consumer (post-industrial) and post-consumer recycled content value of the product or product components in accordance with requirements described in Section 018113.
5. LEED MR Credit 4 - BPDO – Material Ingredients Submittal - Ingredient Reporting Documentation: For mortar and grout materials, provide a publicly available material ingredient inventory as defined in Section 018113.

1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Structural Engineer.
- B. Mill Certificates: Signed by stainless-steel manufacturers, certifying that products furnished comply with requirements.
- C. Welding certificates.
- D. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
- E. Research/Evaluation Reports: For post-installed anchors, from ICC-ES.

1.4 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Welding Qualifications: Qualify procedures and personnel according to the following:
 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."

3. AWS D1.6/D1.6M, "Structural Welding Code - Stainless Steel."

1.5 FIELD CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 LEED REQUIREMENTS

- A. LEED MR Credit 2 - BPDO – Environmental Product Declarations (EPD) - EPD/LCA Requirement: Steel products shall have documented a publicly available Environmental Product Declaration in conformance with standards listed and described in Section 018113.
- B. LEED MR Credit 2 - BPDO – Environmental Product Declarations (EPD) - EPD/LCA Preferment: Preference shall be given to mortar and grout materials with a publicly available Environmental Product Declaration in conformance with standards listed and described in Section 018113.
- C. LEED EQ Credit 2 - Low-Emitting Materials - VOC Content Limit Requirement: Mortar and grout materials shall not contain VOC content limits (less water and exempt solids) in excess of those listed in Section 018113, Appendix C.
- D. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials - Regional Sourcing Preferment: Preference shall be given to products that can demonstrate regional sourcing as defined in Section 018113.
- E. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials - Recycled Content Requirement: Steel product or product components shall meet or exceed the maximum recycled content percentages as listed for the product or component type in Section 018113, Appendix E, in accordance with standards listed in Section 018113.
- F. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials - Recycled Content Preferment: Preference shall be given to mortar and grout materials that demonstrate high recycled content values as a percentage of the product determined by weight. Recommended recycled content targets by product are included in Section 018113, Appendix E.
- G. LEED MR Credit 4 - BPDO – Material Ingredients - Ingredient Reporting Preferment: Preference shall be given to mortar and grout materials with a publicly available material ingredient inventory as defined in Section 018113.

2.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional Structural Engineer, as defined in Section 014000 "Quality Requirements," to design all miscellaneous supports, countertop supports, partition supports, ceiling-hung toilet compartment supports, wall-mounted equipment reinforcement, elevator door sill supports, elevator pit ladder, roof access and platform access ladders, railings and access stairs. Where specific performance requirements are not provided

for these supports, Contractor shall provide supports as required by manufacturer of items to be supported.

- B. Structural Performance of Steel Ladders: Steel ladders, including landings, shall withstand the effects of loads and stresses within limits and under conditions specified in ANSI A14.3.
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
 - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.3 METALS

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
- B. Steel Plates, Shapes, and Bars: ASTM A36/A36M.
- C. Stainless Steel Sheet, Strip, and Plate: ASTM A240/A240M or ASTM A666, Type 316L.
- D. Stainless-Steel Bars and Shapes: ASTM A276, Type 316L.
- E. Rolled-Stainless-Steel Floor Plate: ASTM A793.
- F. Steel Tubing: ASTM A500/A500M, cold-formed steel tubing.
- G. Steel Pipe: ASTM A53/A53M, Standard Weight (Schedule 40) unless otherwise indicated.
- H. Zinc-Coated Steel Wire Rope: ASTM A741.
 - 1. Wire-Rope Fittings: Hot-dip galvanized-steel connectors with capability to sustain, without failure, a load equal to minimum breaking strength of wire rope with which they are used.
- I. Aluminum Plate and Sheet: ASTM B209, Alloy 6061-T6.
- J. Aluminum Extrusions: ASTM B221, Alloy 6063-T6.
- K. Aluminum Castings: ASTM B26/B26M, Alloy 443.0-F.
- L. Aluminum Panels: Aluminum Honeycomb Panels; maximum panel size 4'-0" x 4'-4". Panel to be 1" thick.
 - 1. Basis-of-Design: Flatiron Panel Products, LLC of Lafayette, CO, or approved equal.

2.4 FASTENERS

- A. General: Unless otherwise indicated, provide Type 316 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B633 or ASTM F1941, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
 - 1. Provide stainless-steel fasteners for fastening aluminum.
 - 2. Provide stainless-steel fasteners for fastening stainless steel.

- B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A307, Grade A; with hex nuts, ASTM A563; and, where indicated, flat washers.
- C. High-Strength Bolts, Nuts, and Washers: ASTM F3125/F3125M, Grade A325, Type 3, heavy-hex steel structural bolts; ASTM A563, Grade DH3, heavy-hex carbon-steel nuts; and where indicated, flat washers.
- D. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, ASTM F593; with hex nuts, ASTM F594; and, where indicated, flat washers; Alloy Group 1.
- E. Anchor Bolts: ASTM F1554, Grade 36, of dimensions indicated; with nuts, ASTM A563; and, where indicated, flat washers.
 - 1. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.
- F. Anchors, General: Anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E488/E488M, conducted by a qualified independent testing agency.
- G. Cast-in-Place Anchors in Concrete: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A47/A47M malleable iron or ASTM A27/A27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F2329.
- H. Post-Installed Anchors: Torque-controlled expansion anchors.
 - 1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or ASTM F1941, Class Fe/Zn 5, unless otherwise indicated.
 - 2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 stainless-steel bolts, ASTM F593, and nuts, ASTM F594.
- I. Slotted-Channel Inserts: Cold-formed, hot-dip galvanized-steel box channels (struts) complying with MFMA-4, 1-5/8 by 7/8 inches by length indicated with anchor straps or studs not less than 3 inches long at not more than 8 inches o.c. Provide with temporary filler and tee-head bolts, complete with washers and nuts, all zinc-plated to comply with ASTM B633, Class Fe/Zn 5, as needed for fastening to inserts.
- J. Separate dissimilar materials to prevent galvanic corrosion.

2.5 MISCELLANEOUS MATERIALS

- A. Shop Primers: Provide primers that comply with Section 099100NC "Painting and Coating."
- B. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.
- C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

- E. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- F. Concrete: Comply with requirements in Section 033000 "Cast-in-Place Concrete" for normal-weight, air-entrained, concrete with a minimum 28-day compressive strength of 3000 psi.

2.6 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Form exposed work with accurate angles and surfaces and straight edges.
- E. Weld corners and seams continuously to comply with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.
- G. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
- J. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches, with a minimum 6-inch embedment and 2-inch hook, not less than 8 inches from ends and corners of units and 24 inches o.c., unless otherwise indicated.

2.7 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
- B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.
 - 1. Fabricate units from slotted channel framing where indicated.
 - 2. Furnish inserts for units installed after concrete is placed.
- C. Countertop Supports: For all countertops, fabricate supports from 3/8" thick steel bent plates and low -profile corner gusset plate. Provide a 35 degree bevel on both the horizontal and vertical flanges. Provide holes in the vertical plate to anchor bracket to wall framing and anchor with countersunk fasteners. Horizontal plate shall extend to 2" from countertop edge.
 - 1. Provide Kynar powder coat finish in color to match countertop surface.
 - 2. Provide supports a 16" o.c.
 - 3. Manufacturer: Furnish Countertop Support Bracket Front Mounting Plus as manufactured by Centerline Steel, LLC; Centerline Steel, LLC 208 W Davis Industrial Dr., St. Augustine, FL 32084.
 - a. Subject to meeting project requirements, custom fabrication is acceptable.
- D. Steel tube or angle reinforcement for wall-mounted equipment. Where equipment loads exceed capacity of wood blocking, provide steel tube or angle in-wall reinforcement, including but not limited to the following wall-mounted applications: shower seats, electrical or mechanical equipment and panels; counter-tops; elevator guide rails; roof access ladders; and stair railings.
 - 1. Fabricate steel tube or angle in-wall columns with steel anchor plates pre-drilled for anchorage to floor deck. Provide 1/2" base plates with four 5/8" anchor bolts at each column.
 - 2. Hot-dip galvanize and shop prime all components with primer specified in Section 099600 "High-Performance Coatings".
 - 3. Provide supports at 16" o.c.

2.8 MISCELLANEOUS ELEVATOR STEEL ANGLES AND BEAMS

- A. Elevator Sill Supports: Provide steel angles at all elevator thresholds, in sizes and spacing to accommodate maximum load rating of specified elevator.
 - 1. Hot-dip galvanize and shop prime with primer specified in Section 099600 "High-Performance Coatings".
- B. Elevator Hoist Beam: Provide steel wide flange beam at all elevator hoistways, with capacity as recommended by elevator manufacturer for elevator installation. Maximize height of hoist beam as necessary to meet elevator and roof clearances.
 - 1. Shop prime with primer specified in Section 099600 "High-Performance Coatings".

2.9 METAL LADDERS

- A. General:

1. Comply with ANSI A14.3, except for elevator pit ladders, and OSHA 1910.
2. For elevator pit ladders, comply with ASME A17.1/CSA B44.
3. Exterior ladders shall be hot dip galvanized.

B. Steel Ladders:

1. Space siderails 18 inches apart unless otherwise indicated.
2. Siderails: Continuous, 1/2-by-2-1/2-inch steel flat bars, with eased edges.
3. Rungs: 1-inch- diameter, steel bars.
4. Fit rungs in centerline of siderails; plug-weld and grind smooth on outer rail faces.
5. Provide nonslip surfaces on top of each rung, either by coating rung with aluminum-oxide granules set in epoxy-resin adhesive or by using a type of manufactured rung filled with aluminum-oxide grout.
6. Provide nonslip surfaces on top of each rung by coating with abrasive material metallically bonded to rung.
7. Source Limitations: Obtain nonslip surfaces from single source from single manufacturer.
8. Provide platforms as required to meet OSHA requirements fabricated from welded or pressure-locked steel bar grating, supported by steel angles. Limit openings in gratings to no more than 1/2 inch in least dimension.
9. Support each ladder at top and bottom and not more than 60 inches o.c. with welded or bolted steel brackets.
10. Hot dip galvanize, shop prime and field paint interior and exterior ladders, including brackets, with products specified in Section 099600 "High-Performance Coatings."
11. At access ladders to roof hatches, provide steel angles for roof hatch opening. Coordinate roof opening supports with top of access ladder and anchorage.
12. Provide minimum 72-inch high, hinged security door with padlock hasp at foot of ladder to prevent unauthorized ladder use.

2.10 METAL FLOOR PLATE

- A. Fabricate from rolled-steel floor rolled-stainless-steel floor abrasive-surface floor plate of thickness indicated below:
 1. Thickness: 1/8 inch 3/8 inch.
- B. Provide stainless-steel angle supports.
- C. Include stainless-steel angle stiffeners, and fixed and removable sections.

2.11 ELEVATOR PIT SUMP COVERS

- A. Fabricate from 1/8-inch abrasive-surface floor plate with four 1-inch-diameter holes for water drainage and for lifting.
- B. Provide steel angle supports.

2.12 LOOSE BEARING AND LEVELING PLATES

- A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.
- B. Galvanize plates.

- C. Prime plates with primer specified in Section 099600 "High-Performance Coatings."
 - 1. Miscellaneous steel trim including steel angle corner guards, steel edgings and loading area angles.

2.13 STEEL WELD PLATES AND ANGLES

- A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with no fewer than two integrally welded steel strap anchors for embedding in concrete.

2.14 FINISHES, GENERAL

- A. Finish metal fabrications after assembly.
- B. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.15 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A153/A153M for steel and iron hardware and with ASTM A123/A123M for other steel and iron products.
 - 1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
- B. Preparation for Shop Priming Galvanized Items: After galvanizing, thoroughly clean railings of grease, dirt, oil, flux, and other foreign matter, and treat with metallic phosphate process.
- C. Shop prime iron and steel items unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.
 - 1. Shop prime with primers specified in Section 099600 "High-Performance Coatings."
- D. Preparation for Shop Priming: Prepare surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 1. Exterior Items: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 2. Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 3. Items Indicated to Receive Primers Specified in Section 099600 "High-Performance Coatings": SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
- E. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.
 - 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

2.16 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, Class I, AA-M12C22A41.
- B. Finish at Interior Locations: High Performance Liquid Fluoropolymer Aluminum Extrusion Coatings, AAMA 2604: Minimum 50 percent Kynar PVDF resin, by weight, in color coat.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- C. Field Welding: Comply with the following requirements:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.
- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- F. Corrosion Protection: Coat concealed surfaces of aluminum that come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:
 - 1. Cast Aluminum: Heavy coat of bituminous paint.
 - 2. Extruded Aluminum: Two coats of clear lacquer.

3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.
- B. Anchor supports for overhead grilles and other ceiling mounted equipment securely to, and rigidly brace from, building structure.
- C. Anchor supports for ceiling-hung toilet compartments securely to, and rigidly brace from, building structure.

3.3 INSTALLING BEARING AND LEVELING PLATES

- A. Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen to improve bond to surfaces. Clean bottom surface of plates.

- B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with nonshrink grout. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.4 INSTALLING NOSINGS, TREADS, AND THRESHOLDS

- A. Center nosings on tread widths unless otherwise indicated.
- B. For nosings embedded in concrete steps or curbs, align nosings flush with riser faces and level with tread surfaces.
- C. Seal thresholds exposed to exterior with elastomeric sealant complying with Section 079200 "Joint Sealants" to provide a watertight installation.

3.5 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - 1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.
- B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 099100 "Painting and Coating" and Section 099600 "High-Performance Coatings."
- C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780/A780M.

END OF SECTION

SECTION 055113 - METAL STAIRS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included: Prefabricated metal building stair and landing assemblies including stairwell railings and wall railings at stairs.
- B. Related Work Specified Elsewhere:
 - 1. Concrete fill for treads and landings: See Cast-in-Place Concrete.
 - 2. Structural Steel and Miscellaneous Metal (including metal railings other than as specified herein).
 - 3. Painting
- C. Contractor Option: At the option of the Contractor, stair assemblies may be furnished with referenced manufacturer's fiber reinforced "EnduraTread" or pre-poured "ReadyStep" treads in lieu of specified site placed concrete filled treads. If either optional tread type is furnished, coordinate with Concrete, Cast-In-Place Section.

1.2 REFERENCES, CODES AND STANDARDS: The following references, codes and standards are hereby made a part of this Section and stair and railing work shall conform to applicable requirements therein except as otherwise specified herein or shown on Drawings. Nothing contained herein shall be construed as permitting work that is contrary to code requirements or governing rules and regulations.

- A. American Society for Testing Materials (ASTM).
 - 1. ASTM A36 - Structural Steel.
 - 2. ASTM A53 - Hot-Dipped, Zinc-coated Welded and Seamless Steel Pipe.
 - 3. ASTM A123 - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - 4. ASTM A500 - Cold-formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
- B. AWS D1.1 - Structural Welding Code – Steel.
- C. AWS D1.3: 2008 – Structural Welding Code – Sheet Metal.
- D. "Pipe Railing Manual", published by National Assn. of Architectural Metal Manufacturers (NAAMM).
- E. "Metal Bar Grating Manual", published by National Assn. of Architectural Metal Manufacturers (NAAMM).
- F. Steel Structures Painting Council (SSPC) Surface Preparation Specifications (Vol. 2, Painting Manual).
- G. California Building Code, 2019 Edition.

1.3 QUALITY ASSURANCE

A. Standards:

1. All materials shall conform to the specifications and standards of the American Society for Testing and Materials (ASTM), latest edition.
2. In addition to standards specified under products and execution, fabrication of structural steel shapes shall conform to latest specifications of the American Institute of Steel Construction (AISC).
3. All welding shall be in accordance with American Welding Society (AWS) specifications and local rules and ordinances.
4. Fabricated metal products shall conform to the latest edition specifications of the National Association of Architectural Metal Manufacturers (NAAMM).

1.4 DESIGN

- A. Metal stairs and railings shall be designed by the Contractor in accord with the 2019 Edition of the California Building Code.
- B. Design stair units, landings and supports for minimum uniform live load of 100 lbs per sq. ft. and a concentrated live load of 300 lbs with deflection not greater than $L/360$.
- C. Design railing systems to support a 200 lb point load or 50 lbs per foot, whichever is greater, applied horizontally at right angle to the top of rail.
- D. Intermediate rails, balusters, and panel fillers shall be designed to withstand a horizontally applied normal load 50 lbs on an areas not to exceed 1 ft. square.
- E. Design calculations shall be prepared and signed by a Professional Civil or Structural Engineer licensed in the State of California. The engineer who signs and stamps the shop drawings shall be the same engineer who signs and stamps the calculations. Review of calculations and shop drawings by the Architect will not relieve the Contractor of providing installed units of the required strengths.
- F. Shop drawing shall be reviewed and signed by a Professional Civil or Structural Engineer licensed in the State of California. Review of calculations and shop drawings by the Architect will not relieve the Contractor of providing installed units of the required strengths.

1.5 SUBMITTALS: Comply with requirements of Shop Drawings, Product Data, and Samples Section.

- A. Manufacturer's Data: For manufactured or prefabricated items, submit manufacturer's specifications, load tables, dimension diagrams, anchor details, and installation instructions for products being provided and installed under the work of this Section. Indicate in the transmittal, that copies of the installation instructions have been provided to the respective installing subcontractors.
- B. Shop Drawings:
 1. Verify all measurements at the building and take field dimensions for fitting and proper attachment to related work prior to producing shop drawings.

2. Submit shop drawings for the fabrication and erection of all assemblies of miscellaneous metal work, which are not completely defined in the manufacturer's data. Included shall be plans, elevation, and details of sections and connections. Show all accessories and anchorage items to be incorporated into the work. Shop drawings shall be signed and stamped by a structural engineer registered in the State of California. The engineer shall also be responsible for the preparation of structural calculations.
 3. Include setting drawings and templates for location and installation of miscellaneous metal items and anchorage devices.
 4. Changes: All changes from the Contract Documents shall be shown on the shop and erection drawings. They shall be clearly identified as changes, and shall be acceptable, contingent upon the Architect's approval.
 5. As-Erected Drawings: After all work of this Section has been done, correct or revise the shop drawings and erection diagrams to correspond to the changes made in the field, following which, (1) set of reproducible prints shall be delivered to the Architect. Theses shall be delivered, prior to the subcontractor for the work of this Section leaving the job site, and prior to acceptance of a final payment request for the work.
- C. Calculations: For interior and exterior stairs submit engineering calculations signed and stamped by a structural engineer registered in the State of California.
- D. Steel Products, Cast Iron, Aluminum Extrusions, Welded Steel Wire:
1. LEED MR Credit 2 - BPDO – Environmental Product Declarations (EPD) Submittal - EPD/LCA Documentation: Provide a publicly available Environmental Product Declaration in conformance with standards listed and described in Section 018113.
 2. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials Submittal - Regional Sourcing Documentation: Provide a product data sheet or manufacturer affidavit demonstrating regional sourcing as defined in Section 018113.
 3. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials Submittal - Recycled Content Documentation: Provide a product data sheet or manufacturer affidavit noting the pre-consumer (post-industrial) and post-consumer recycled content value of the product or product components in accordance with requirements described in Section 018113.
- E. Mortar and Grout Materials, Galvanizing Repair Paint, Primer, Paint (Site applied), Portland Cement:
1. LEED MR Credit 2 - BPDO – Environmental Product Declarations (EPD) Submittal - EPD/LCA Documentation: Provide a publicly available Environmental Product Declaration in conformance with standards listed and described in Section 018113.
 2. LEED MR Credit 4 - BPDO – Material Ingredients Submittal - Ingredient Reporting Documentation: Provide a publicly available material ingredient inventory as defined in Section 018113.
 3. LEED EQ Credit 2 - Low-Emitting Materials Submittal - VOC Content Documentation: Provide a product data sheet or third-party certificates indicating the VOC content of the product (less water and exempt solids). Provide documentation indicating the anticipated volume of product use (liters). Portland Cement is excluded from this requirement.
 4. Portland Cement: LEED MR Credit 3 - BPDO – Sourcing of Raw Materials Submittal - Regional Sourcing Documentation: Provide a product data sheet or manufacturer affidavit demonstrating regional sourcing as defined in Section 018113.
- F. Aggregates:
1. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials Submittal - Regional Sourcing Documentation: Provide a product data sheet or manufacturer affidavit demonstrating regional sourcing as defined in Section 018113.

PART 2 - PRODUCTS

- 2.1 MATERIALS AND ACCESSORIES (Steel shapes, plates, angles, tubes and pipes shall be fabricated from at least 95% post-industrial waste.)
- A. Steel Plates, Shapes and Bars: ASTM A36.
 - B. Steel Plates to be Bent or Cold Formed: ASTM A283, Grade C.
 - C. Steel Tubing: ASTM A500.
 - D. Cold Finished Steel Bars: ASTM A108, grade as selected by fabricator.
 - E. Hot Rolled Carbon Steel Sheets and Strips: ASTM A570.
 - F. Cold Rolled Carbon Steel Sheets: ASTM A366.
 - G. Galvanized Carbon Steel Sheets: ASTM A446, Grade A, with ASTM A525. G90 zinc coating.
 - H. Gray Iron Castings: ASTM A48, Class 30.
 - I. Malleable Iron Castings: ASTM A47, grade as selected by fabricator.
 - J. Steel Pipe: ASTM A53, type as selected, Grade A; black finish unless galvanizing is required; standard weight (Schedule 40) unless otherwise indicated.
 - K. Brackets, Flanges and Anchors: Cast or formed metal of the same type material and finish as supported material, unless otherwise indicated.
 - L. Steel Finish: Shop prime paint in accordance with the requirements of Section 05030, except where galvanized finished indicated.
 - M. Expansive Grout: Hallemite "Por-Rok Cement", Master Builders Co. "Embeco", or accepted equal product.
 - N. Steel Products, Cast Iron, Aluminum Extrusions, Welded Steel Wire:
 - 1. EPD Requirements:
 - a. Steel Products: LEED MR Credit 2 - BPDO – Environmental Product Declarations (EPD) - EPD/LCA Requirement: The product shall have documented a publicly available Environmental Product Declaration in conformance with standards listed and described in Section 018113.
 - b. All others: LEED MR Credit 2 - BPDO – Environmental Product Declarations (EPD) - EPD/LCA Preferment: Preference shall be given to products with a publicly available Environmental Product Declaration in conformance with standards listed and described in Section 018113.
 - 2. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials - Regional Sourcing Preferment: Preference shall be given to products that can demonstrate regional sourcing as defined in Section 018113.
 - 3. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials - Recycled Content Requirement: The product or product components shall meet or exceed the maximum recycled content percentages as listed for the product or component type in Section 018113, Appendix E, in accordance with standards listed in Section 018113.

O. Mortar and Grout Materials, Galvanizing Repair Paint, Primer, Paint (Site applied):

1. LEED MR Credit 2 - BPDO – Environmental Product Declarations (EPD) - EPD/LCA Preferment: Preference shall be given to products with a publicly available Environmental Product Declaration in conformance with standards listed and described in Section 018113.
2. LEED MR Credit 4 - BPDO – Material Ingredients - Ingredient Reporting Preferment: Preference shall be given to products with a publicly available material ingredient inventory as defined in Section 018113.
3. LEED EQ Credit 2 - Low-Emitting Materials - VOC Content Limit Requirement: The product shall not contain VOC content limits (less water and exempt solids) in excess of those listed in Section 018113, Appendix C.

P. Portland Cement:

1. LEED MR Credit 2 - BPDO – Environmental Product Declarations (EPD) - EPD/LCA Requirement: The product shall have documented a publicly available Environmental Product Declaration in conformance with standards listed and described in Section 018113
2. LEED MR Credit 4 - BPDO – Material Ingredients - Ingredient Reporting Preferment: Preference shall be given to products with a publicly available material ingredient inventory as defined in Section 018113.
3. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials - Regional Sourcing Preferment: Preference shall be given to products that can demonstrate regional sourcing as defined in Section 018113.

Q. Aggregates:

1. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials - Regional Sourcing Preferment: Preference shall be given to products that can demonstrate regional sourcing as defined in Section 018113.

2.2 METAL FINISH: Cleaned and given one shop prime coat of paint.

2.3 FABRICATION

A. General:

1. Use welding for joining pieces together, unless otherwise shown or specified. Fabricate units so that mechanical fasteners used, do not appear on finished surfaces. Make joints true and tight, and make connections of parts "light proof" tight. All welds to be continuous, and ground smooth where exposed.
2. Construct stair units to conform to sizes and arrangements as shown. Provide metal framing, hangers, columns, railings, newels, balusters, struts, clips, brackets, bearing plates and other components for the support of stairs and platforms. Erect stair work to line, plumb, square, and true with runs registering level with floor and platform levels.
3. Provide brackets and bearing surfaces as details and as required to anchor and contain the stairs on the supporting structure.
4. Where masonry walls support the steel stair work, provide temporary supporting struts, designed for the erection of steel stair components before installation of masonry.

B. Stair Framing:

1. Fabricate stringers of structural steel channels, plates, or a combination thereof, as shown. Provide closures for exposed ends of stringers.
2. Construct platforms of structural steel channel headers and miscellaneous framing members, as shown. Bolt or weld headers to stringers and newels. Bolt or weld framing members to stringers and headers.

C. Metal Pan Units:

1. Form metal pans of 12 gauge galvanized structural steel. Shape pans to conform to the configuration shown.
2. Construct risers and subread metal pans with steel angle supporting brackets, of size shown, welded to stringers. Secure metal pans to brackets with rivets or by welding. Provide platforms of the same metal and gauge as specified for pans, unless otherwise shown.
3. Secure sub-platform metal pans to platform frames by welding.

D. Steel Plate Treads and Platforms:

1. Provide raised pattern steel floor plate complying with Federal Specification QQ-F-461, Class I. Provide pattern shown, or if not shown, from manufacturer's standard patterns, as selected by Architect.
2. Form treads of 1/4 inch thick steel floor plate with integral nosing and back edge stiffeners. Weld steel supporting brackets to stringers, and treads to brackets.
3. Fabricate platforms or steel floor plate of the thickness shown. Provide nosing matching that on treads, at all landings. Secure floor plates to platform framing members by welding.

E. Stair Railings and Handrails:

1. Fabricate newels of steel tubing and provide gray iron newel caps, as shown.
2. Provide steel pipe railings, consisting of top rail, intermediate rail, post, and wall mounted rails. Unless otherwise shown, fabricate rails of 1-1/2 inch diameter pipe.
3. Non-welded connections: When acceptable to the Architect, intermediate post-to-rail connections may be made using internal pipe sleeve locks and allen screw fasteners. Locking devices which do not produce flush, smooth, rigid, hairline joints will not be acceptable. Weld other connections.
4. Welded connections: Cope intersections of rails and posts, weld joints, and grind smooth. Butt weld end-to-end joints of railings or use welding connectors. At connections to steel supports, weld post directly to steel support.
5. Railings may be bent at corners instead of joining, provided the bends are uniformly formed in jigs, with cylindrical cross section of the pipe maintained throughout the entire bend.
6. Adjust railings prior to securing in place to insure proper matching at butting joints and correct alignment throughout their length. Space posts at not more than 8 feet on centers, unless otherwise shown. Plumb post in each direction. Secure posts and rail ends to building construction as follows:
 - a. Anchor posts in concrete by means of pipe sleeves set and anchored into the concrete. Provide sleeves of galvanized steel pipe, not less than 6 inches long, and having an inside diameter not less than 1/2 inch greater than the outside diameter of the pipe post to be inserted. Provide steel plate closure secured to the bottom of the sleeve and of width and length not less than 1 inch greater than the outside diameter of the sleeve. After the posts have been inserted into the sleeves, fill the annular space between the post and the sleeve, solid with expansive grout.

Cover anchorage joint with a round steel flange welded to the post. At the Contractor's option, anchor posts in concrete by core drilling holes not less than 1 inch greater than the outside diameter of the post. Clean holes of all loose material, insert posts, and fill the space between the post and the concrete with expansive grout. Cover anchorage joint with a round steel flange welded to the post. Anchor post to steel with steel flanges, angles, angle type or floor type as required by the existing conditions, welded to posts and bolted to the steel supporting members.

- b. Provide removable sections of railings where indicated. Furnish slip-fit metal socket or sleeve for casting into concrete. Accurately locate sleeves to match post spacing.
 - c. Provide toe plates between railings posts where shown, consisting of 1/8 inch thick steel flat bars, not less than 4 inches high. Secure toe plates as indicated.
7. Secure handrails to walls with wall brackets and end fittings. Provide brackets of malleable iron castings, with not less than 3 inches clearance between face of wall and railing. Wall brackets and end plates shall be of the concealed fastener type, unless otherwise shown. Locate brackets as indicated, or if not indicated, at not more than 8 feet on center.
8. Provide wall return fitting of cast iron castings, flush type, with the same projection as that specified for wall brackets. Secure wall brackets and wall return fittings to building construction as follows:
 - a. For anchorage to concrete and solid grouted masonry wall, use anchor bolt expansion shields and lag bolts.
 - b. For anchorage to hollow masonry walls, use toggle bolts having square heads.
 - c. For stud partitions, use lag bolts set into wood blocking between studs. Coordinate stud and blocking installation for accurate location of backing members.
9. Galvanized all exterior railings, interior railings where identified as galvanized, pipe fittings, brackets, fasteners, and other ferrous metal components. Provide black steel pipe for interior railings not indicated to be galvanized.

F. Welding:

1. Perform welding in accord with AWS Code D 1.1 and D 1.3.
2. Welds shall be made only by operators experienced in performing type of work indicated.
3. Welds normally exposed to view in finished work shall be uniformly made and ground smooth.
4. Where welding is done in proximity to glass or finished surfaces, protect such surfaces from damage due to weld sparks, spatter, or tramp metal.

G. Surface Treatment and Protective Coating:

1. Cleaning: Thoroughly clean mill scale, rust, dirt, grease and other foreign matter from ferrous metal prior to painting.
2. Painting: After material has been properly cleaned, apply shop prime coat of paint. Apply as per manufacturer's directions. Spot paint abrasions and filed connections after assembly. Shop coat shall be dry prior to shipment to job site.

PART 3 - EXECUTION

3.1 CONDITIONS OF SURFACES: Inspect surfaces to receive stairs and railings and report defects which would interfere with installation. Starting work implies acceptance of surfaces as satisfactory.

3.2 INSTALLATION

- A. Follow manufacturer's directions where not otherwise detailed.
- B. Set work plumb, true, rigid and neatly trimmed out.
- C. Where items must be incorporated or built into work, deliver to trade responsible for such work in sufficient time that progress of work is not delayed. Be responsible for proper location of such items.

3.3 PROTECTION AND CLEANING: Remove soil and foreign matter from finished surfaces and apply such protective measures as may be required to prevent damage of any kind.

END OF SECTION

SECTION 055213 - PIPE AND TUBE RAILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Steel pipe and tube railings.
- B. Related Requirements:
 - 1. Section 017419 "Construction and Demolition Waste Management and Disposal".
 - 2. Section 018113 "Sustainable Design Requirements".
 - 3. Section 018119 "Construction Indoor Air Quality Requirement".
 - 4. Section 055113 "Metal Stairs" for steel tube railings associated with metal stairs.

1.3 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- C. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not satisfy structural performance requirements.

1.4 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Manufacturer's product lines of mechanically connected railings.
 - 2. Railing brackets.
 - 3. Grout, anchoring cement, and paint products.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

- C. Samples: For each type of exposed finish required.
1. Sections of each distinctly different linear railing member, including handrails, top rails, posts, and balusters, including finish.
 2. Fittings and brackets.
 3. Assembled Sample of railing system, made from full-size components, including top rail, post, handrail, and infill. Sample need not be full height.
 - a. Show method of connecting and finishing members at intersections.
- D. Delegated-Design Submittal: For railings, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation. Submittals shall be prepared, stamped and signed by a Professional Engineer licensed in the State of California.
- E. LEED Submittals: The Owner requires the Contractor to implement practices and procedures to meet the project's environmental performance goals, which include conformance with California Green Building Code (CAL Green) and achieving LEED v4 Platinum Certification. The requirements related to these goals are defined in the Articles below and represent a combination of sustainability performance criteria necessary to comply with the California Green Building Code and achieve LEED certification goals. The Contractor shall ensure that the requirements related to these goals are implemented to the fullest extent.
1. LEED MR Credit 2 - BPDO – Environmental Product Declarations (EPD) Submittal - EPD/LCA Documentation: Provide a publicly available Environmental Product Declaration in conformance with standards listed and described in Section 018113.
 2. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials Submittal - Regional Sourcing Documentation: Provide a product data sheet or manufacturer affidavit demonstrating regional sourcing as defined in Section 018113.
 3. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials Submittal - Recycled Content Documentation: Provide a product data sheet or manufacturer affidavit noting the pre-consumer (post-industrial) and post-consumer recycled content value of the product or product components in accordance with requirements described in Section 018113.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Welding certificates.
- C. Mill Certificates: Signed by manufacturers of stainless-steel products certifying that products furnished comply with requirements.
- D. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.
- E. Product Test Reports: For pipe and tube railings, for tests performed by a qualified testing agency, according to ASTM E894 and ASTM E935.
- F. Evaluation Reports: For post-installed anchors, from ICC-ES.

1.6 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

1.8 FIELD CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Steel Pipe and Tube Railings: Refer to Drawings for railing design.
- B. Source Limitations: Obtain each type of railing from single source from single manufacturer.

2.2 LEED REQUIREMENTS

- A. LEED MR Credit 2 - BPDO – Environmental Product Declarations (EPD) - EPD/LCA
Preferment: Preference shall be given to products with a publicly available Environmental Product Declaration in conformance with standards listed and described in Section 018113.
- B. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials - Regional Sourcing Preferment:
Preference shall be given to products that can demonstrate regional sourcing as defined in Section 018113.
- C. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials - Recycled Content Requirement: The product or product components shall meet or exceed the maximum recycled content percentages as listed for the product or component type in Section 018113, Appendix E, in accordance with standards listed in Section 018113.

2.3 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design railings, including attachment to building construction.
- B. Structural Performance: Railings, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
1. Handrails and Top Rails of Guards:

- a. Uniform load of 50 lbf/ ft. applied in any direction.
 - b. Concentrated load of 200 lbf applied in any direction.
 - c. Uniform and concentrated loads need not be assumed to act concurrently.
2. Infill of Guards:
 - a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft.
 - b. Infill load and other loads need not be assumed to act concurrently.
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.4 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.
- B. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.
 1. Provide type of bracket with flange tapped for concealed anchorage to threaded hanger bolt and that provides 1-1/2-inch clearance from inside face of handrail to finished wall surface.

2.5 STEEL AND IRON

- A. Pipe: ASTM A53/A53M, Type F or Type S, Grade A, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.
 1. Provide galvanized finish for exterior installations and where indicated.
- B. Plates, Shapes, and Bars: ASTM A36/A36M.

2.6 FASTENERS

- A. General: Provide the following:
 1. Ungalvanized-Steel Railings: Plated steel fasteners complying with ASTM B633 or ASTM F1941, Class Fe/Zn 5 for zinc coating.
 2. Hot-Dip Galvanized Railings: Type 304 stainless-steel or hot-dip zinc-coated steel fasteners complying with ASTM A153/A153M or ASTM F2329 for zinc coating.
 3. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.
- B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.
- C. Fasteners for Interconnecting Railing Components:

1. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless exposed fasteners are unavoidable or are the standard fastening method for railings indicated.
 2. Provide tamper-resistant screws for exposed fasteners unless otherwise indicated.
- D. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors capable of sustaining, without failure, a load equal to 6 times the load imposed when installed in unit masonry and 4 times the load imposed when installed in concrete, as determined by testing according to ASTM E488/E488M, conducted by a qualified independent testing agency.
1. Material for Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B633 or ASTM F1941, Class Fe/Zn 5, unless otherwise indicated.
 2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 stainless-steel bolts, ASTM F593, and nuts, ASTM F594.

2.7 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B. Etching Cleaner for Galvanized Metal: Complying with MPI#25.
- C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- D. Shop Primers: Provide primers that comply with Section 099600 "High-Performance Coatings" for exterior railings and Section 099100 "Painting and Coating" for interior railings.
- E. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.
- F. Intermediate Coats and Topcoats: Provide products that comply with Section 099600 "High-Performance Coatings" for exterior railings and Section 099100 "Painting and Coating" for interior railings.
- G. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.
- H. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- I. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.

2.8 FABRICATION

- A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.
- B. Shop assemble railings to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units

for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.

- C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- D. Form work true to line and level with accurate angles and surfaces.
- E. Fabricate connections that are exposed to weather in a manner that excludes water. Provide weep holes where water may accumulate.
- F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.
- G. Connections: Fabricate railings with welded connections unless otherwise indicated.
- H. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove flux immediately.
 - 4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.
- I. Nonwelded Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.
 - 1. Fabricate splice joints for field connection using an epoxy structural adhesive if this is manufacturer's standard splicing method.
- J. Form changes in direction as detailed on Drawings.
- K. For changes in direction made by bending, use jigs to produce uniform curvature for each repetitive configuration required. Maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
- L. Close exposed ends of railing members with prefabricated end fittings.
- M. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch or less.
- N. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.
 - 1. At brackets and fittings fastened to gypsum board partitions, provide crush-resistant fillers or other means to transfer loads through wall finishes to structural supports and prevent bracket or fitting rotation and crushing of substrate.
- O. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.

- P. For railing posts set in concrete, provide steel sleeves not less than 6 inches long with inside dimensions not less than 1/2 inch greater than outside dimensions of post, with metal plate forming bottom closure.
- Q. Toe Boards: Where indicated, provide toe boards at railings around openings and at edge of open-sided floors and platforms. Fabricate to dimensions and details indicated.

2.9 STEEL AND IRON FINISHES

- A. Galvanized Railings:
 - 1. Hot-dip galvanize exterior steel railings, including hardware, after fabrication.
 - 2. Comply with ASTM A123/A123M for hot-dip galvanized railings.
 - 3. Comply with ASTM A153/A153M for hot-dip galvanized hardware.
 - 4. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
 - 5. Fill vent and drain holes that are exposed in the finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.
- B. For galvanized railings, provide hot-dip galvanized fittings, brackets, fasteners, sleeves, and other ferrous components.
- C. Preparing Galvanized Railings for Shop Priming: After galvanizing, thoroughly clean railings of grease, dirt, oil, flux, and other foreign matter, and treat with etching cleaner.
- D. For nongalvanized-steel railings, provide nongalvanized ferrous-metal fittings, brackets, fasteners, and sleeves; however, galvanize anchors to be embedded in exterior concrete or masonry.
- E. Preparation for Shop Priming:
 - 1. Railings Indicated to Receive Zinc-Rich Primer: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 2. Hot-Dipped Galvanized Railings Indicated to Receive Paint: Remove water-soluble dirt and chemicals with water and detergent; solvent-soluble contaminants with solvent. Rinse, allow to dry, and power or hand abrade with Scotch-Brite pads to remove the thin film of zinc oxide.
- F. Primer Application: Apply shop primer to prepared surfaces of railings unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Shop, Field, and Maintenance Painting of Steel," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.
- G. Shop-Painted Finish: Comply with Section 099600 "High-Performance Coatings."
 - 1. Color: Match Architect's sample.
- H. High-Performance Coating: Apply epoxy intermediate and polyurethane topcoats to prime-coated surfaces. Comply with coating manufacturer's written instructions and with requirements in SSPC-PA 1, "Shop, Field, and Maintenance Painting of Steel," for shop painting. Apply at spreading rates recommended by coating manufacturer.
 - 1. Color: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine gypsum board assemblies, where reinforced to receive anchors, to verify that locations of concealed reinforcements are clearly marked for Installer. Locate reinforcements and mark locations if not already done.

3.2 INSTALLATION, GENERAL

- A. Fit exposed connections together to form tight, hairline joints.
- B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.
 - 1. Do not weld, cut, or abrade surfaces of railing components that are coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
 - 2. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
 - 3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.
- C. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.
 - 1. Coat, with a heavy coat of bituminous paint, concealed surfaces of aluminum that are in contact with grout, concrete, masonry, wood, or dissimilar metals.
- D. Adjust railings before anchoring to ensure matching alignment at abutting joints.
- E. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

3.3 RAILING CONNECTIONS

- A. Nonwelded Connections: Use mechanical or adhesive joints for permanently connecting railing components. Seal recessed holes of exposed locking screws using plastic cement filler colored to match finish of railings.
- B. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.
- C. Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve extending 2 inches beyond joint on either side, fasten internal sleeve securely to one side, and locate joint within 6 inches of post.

3.4 ANCHORING POSTS

- A. Use metal sleeves preset and anchored into concrete for installing posts. After posts are inserted into sleeves, fill annular space between post and sleeve with nonshrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions.
- B. Form or core-drill holes not less than 5 inches deep and 3/4 inch larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions.
- C. Cover anchorage joint with flange of same metal as post, welded to post after placing anchoring material attached to post with set screws.
- D. Leave anchorage joint exposed with anchoring material flush with adjacent surface.
- E. Anchor posts to metal surfaces with oval flanges, angle type, or floor type as required by conditions, connected to posts and to metal supporting members as follows:
 - 1. For aluminum pipe railings, attach posts using fittings designed and engineered for this purpose.
 - 2. For stainless-steel pipe railings, weld flanges to post and bolt to supporting surfaces.
 - 3. For steel pipe railings, weld flanges to post and bolt to metal supporting surfaces.
- F. Install removable railing sections, where indicated, in slip-fit metal sockets cast in concrete.

3.5 ATTACHING RAILINGS

- A. Anchor railing ends to metal surfaces with flanges bolted to metal surfaces and welded to railing ends or connected to railing ends using nonwelded connections.
- B. Attach railings to wall with wall brackets, except where end flanges are used. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.
- C. Secure wall brackets and railing end flanges to building construction as shown on Drawings

3.6 ADJUSTING AND CLEANING

- A. Clean metal by washing thoroughly with clean water and soap and rinsing with clean water.
- B. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting to comply with SSPC-PA 1 requirements for touching up shop-painted surfaces.
 - 1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.
- C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas, and repair galvanizing to comply with ASTM A780/A780M.

3.7 PROTECTION

- A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.

END OF SECTION

SECTION 057000 - DECORATIVE METAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes, but is not limited to:
 - 1. Architectural awnings.
 - 2. Railings.
 - 3. Fences, gates.
 - 4. Screen elements.
 - 5. Planters.
 - 6. Canopy.
 - 7. Elevator door surrounds.
 - 8. Wall base.
 - 9. Display monitor kiosks in Lobby.
- B. Related Sections:
 - 1. Section 014000 "Mock-ups".
 - 2. Section 017419 "Construction Waster Management and Disposal".
 - 3. Section 018113 "Sustainable Design Requirements".
 - 4. Section 018119 "Construction Indoor Air Quality Requirements".
 - 5. Section 099600 "High Performance Coatings" for exterior metals.

1.3 PERFORMANCE REQUIREMENTS

- A. Engineering: Contractor shall engineer assemblies contained within this Section. Engineer shall be licensed in the State of California.
- B. General: In engineering railings and screens to withstand structural loads indicated, determine allowable design working stresses of railing materials based on the following:
 - 1. Stainless Steel: Per AISC "Manual of Steel Construction", 13th Edition.
- C. Metal Balustrade Assembly, Structural Performance: Railings, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
 - 1. Handrails and Top Rails of Guards:
 - a. Uniform load of 50 lbf/ft. (0.73 kN/m) applied in any direction.
 - b. Concentrated load of 200 lbf (0.89 kN) applied in any direction.
 - c. Uniform and concentrated loads need not be assumed to act concurrently.

2. Infill of Guards:

- a. Concentrated load of 50 lbf (0.22 kN) applied horizontally on an area of 1 sq. ft. (0.093 sq. m).
- b. Infill load and other loads need not be assumed to act concurrently.

D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

E. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1.4 ACTION SUBMITTALS

A. Product Data: For the following:

1. Manufacturer's product lines of railings assembled from standard components, where indicated on Drawings.
2. Grout, anchoring cement, and paint products.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work. Shop Drawings shall be prepared by a professional engineer licensed in the State of California.

C. Samples for Initial Selection: For products involving selection of color, texture, or design, including mechanical finishes.

D. Samples for Verification: For each type of exposed finish required.

1. Sections of each distinctly different linear railing member, including handrails, top rails, posts, and balusters.
2. Fittings and brackets.
3. 6 in. square piece of each finish required by the Decorative Metal section.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified professional engineer.

B. Welding certificates.

C. Calculations.

1.6 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of railing or screen from single source from single manufacturer.

B. Product Options: Information on Drawings and in Specifications establishes requirements for system's aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they

relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including structural analysis, preconstruction testing, field testing, and in-service performance.

1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
- C. Welding Qualifications: Qualify procedures and personnel according to the following:
1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 2. AWS D1.2/D1.2M, "Structural Welding Code-Aluminum."
- D. Powder-Coating Applicator Qualifications: A firm experienced in successfully applying powder coatings of type indicated and employing competent control personnel to conduct continuing, effective quality-control program to ensure compliance with requirements.
- E. Acoustical Requirements: Provide rattle-free construction where shown on Drawings. Provide mock-ups in accordance with Section 014000 "Quality Requirements."
- F. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
1. Build mockup of each type of metal shown on Drawings.
 2. Build mockups for each form and finish of guardrail consisting of two posts, top rail, infill area, and anchorage system components that are full height and are not less than 24 inches in length.
 3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- G. Preinstallation Conference: Conduct conference at Project site.

1.7 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with railings by field measurements before fabrication and indicate measurements on Shop Drawings.

1.8 COORDINATION AND SCHEDULING

- A. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- B. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not suit structural performance requirements.

PART 2 - PRODUCTS

2.1 Performance Requirements

- A. Delegated Design: Design metal fabrications, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Engineering Requirements: Engineer the designated items, including supporting members, connections and anchorage to building structure, making necessary additions and modifications to any specified proprietary system manufacturer's standard details as may be required to comply with specified performance requirements, while maintaining the basic design concept.
- C. Performance Requirements: Comply with Reference Standards, requirements of governing authorities and requirements specified herein.
 - 1. Structural:
 - a. Wind Load: As required by Governing Authorities for applicable heights.
 - b. Horizontal Force:
 - 1) General: 20 psf minimum, but not less than requirements of Governing Authorities.
 - 2) Screens and Similar Open Assemblies: Assume 20 psf over full height and width of screen (no open area).
 - c. Maximum Deflection of Members:
 - 1) Simple Spans: $1/360$ of span when tested in accordance with ASTM E330.
 - 2) Cantilever Members: $2L/360$ maximum, where L is the length of the cantilever.
 - d. Building Movement: Allow for the following movements.
 - 1) Inter-Story Drift: 2.5 percent.
 - 2) Floor Deflection: 0.75-inch
 - e. Fastener Safety Factor: As required by Governing Authorities.
 - f. Seismic: As required by Governing Authorities. See structural Drawings for site specific information.
 - 2. Thermal: Provide for noiseless expansion and contraction of system components within an ambient temperature range of 100 degrees F., without causing buckling, failure of joints, or excessive stress on components and fastenings.

2.2 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

2.3 STEEL AND IRON

- A. Tubing: ASTM A500/A500M (cold formed).
- B. Bars: Hot-rolled, carbon steel complying with ASTM A29/A29M, Grade 1010.
- C. Plates, Shapes, and Bars: ASTM A36/A36M.
- D. Cast Iron: Either gray iron, ASTM A48/A48M, or malleable iron, ASTM A47/A47M unless otherwise indicated.
- E. Steel Sheet, Cold Rolled: ASTM A1008/A1008M, either commercial steel or structural steel, exposed.

- F. Corten Steel: Refer to Finish Schedule as shown on Drawings.
- G. Galvanizing: Hot-dip galvanize products made from rolled, pressed, and forged steel shapes, castings, plates, bars, and strips indicated to be galvanized to comply with ASTM A123/A123M.
 - 1. Hot-dip galvanize steel and iron hardware indicated to be galvanized to comply with ASTM A153/A153M.
 - 2. Do not quench or apply post-galvanizing treatments that might interfere with paint adhesion.
 - 3. Fill vent and drain holes that will be exposed in finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.

2.4 ALUMINUM

- A. Aluminum Sheet: Perforated aluminum canopy located at podium edge. Sheet, ASTM B209, alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required
 - 1. Material gauge shall be as required to meet specified structural performance requirements.
 - 2. Perforations: As shown on Drawings.
 - 3. Finish: Post-fabrication-applied, high-performance organic coating, Kynar, 70 percent PVDF, per AAMA 2605.

2.5 FASTENERS AND BRACKETS

- A. Fastener Materials: Stainless steel or corrosion resistant fasteners shall be provided at all wet zones/exposed conditions.
 - 1. Stainless-Steel Components: Type 316 stainless-steel fasteners.
 - 2. Uncoated Steel Components: Plated-steel fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating where concealed.
 - 3. Dissimilar Metals: Type 316 stainless-steel fasteners.
 - 4. Use stainless steel at hot-dipped galvanized steel components.
- B. Fasteners for Anchoring to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.
- C. Provide concealed fasteners for interconnecting railing components and for attaching railings to other work unless otherwise indicated.
 - 1. Provide tamper-resistant flat-head machine screws for exposed fasteners unless otherwise indicated.
- D. Anchors, General: Anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
- E. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors.
 - 1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.

2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 2 stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.
3. Blind tube steel fixing for exterior locations: Hollo-Bolt by Lindapter, 304 stainless steel.

2.6 ELEVATOR FINISHES

- A. Basis-of-Design Manufacturer: Forms + Surfaces. Alternate products achieving the same aesthetic and technical criteria may be submitted for review/approval. Refer to Drawings for further finish information and design intent.
 1. DGL-05: ViviChrome Chromis Glass.
 - a. Color: Cava.
 - b. Finish: Reflect.
 2. WVM-01: Linq Woven Metal
 - a. Pattern: Slope.
 - b. Finish: Stainless steel.
 3. Modular Handrail: Satin stainless steel with clear anodized aluminum standoff
 4. Ceiling: Stainless steel with LED downlights and LED Perimeter Accent Lighting
 - a. Finish: Seastone.

2.7 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- C. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.
 1. Water-Resistant Product: At exterior locations and where indicated provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

2.8 FABRICATION, GENERAL

- A. Assemble items in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.
- B. Form decorative metal to required shapes and sizes, true to line and level with true curves and accurate angles and surfaces. Finish exposed surfaces to smooth, sharp, well-defined lines and arris.
- C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing the Work.
- D. Form simple and compound curves in bars, pipe, tubing, and extruded shapes by bending members in jigs to produce uniform curvature for each configuration required; maintain cross

section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces.

- E. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- F. Mill joints to a tight, hairline fit. Cope or miter corner joints. Fabricate connections that will be exposed to weather in a manner to exclude water.
- G. Provide weep holes where water may accumulate. Locate weep holes in inconspicuous locations.
- H. Provide necessary rebates, lugs, and brackets to assemble units and to attach to other work. Cut, reinforce, drill, and tap as needed to receive finish hardware, screws, and similar items unless otherwise indicated.
- I. Comply with AWS for recommended practices in shop welding. Weld behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded joints of flux, and dress exposed and contact surfaces.
 - 1. Where welding cannot be concealed behind finished surfaces, finish joints to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 1 Welds: no evidence of a welded joint.
- J. Coordinate work to make provision for the requirements of other trades including low voltage and electrical trades.

2.9 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipment.

2.10 FINISHES

- A. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- B. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.
- C. Powder-Coat Finish for Interior Metals: AAMA 2603 except with a minimum dry film thickness of 1.5 mils (0.04 mm). Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
 - 1. Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of decorative metal.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Provide anchorage devices and fasteners where necessary for securing formed metal fabrications to in-place construction, including threaded fasteners for concrete inserts, through bolts, lag bolts, screws, and other connectors as required.
 - 1. Conceal all fastenings where practical. Form joints exposed to weather to exclude water.
 - 2. Aluminum fasteners shall be used to anchor aluminum. Do not use galvanized or zinc-plated fasteners.
- B. Perform cutting, drilling, and fitting required to install decorative metal. Set products accurately in location, alignment, and elevation, measured from established lines and levels. Provide temporary bracing or anchors in formwork for items to be built into concrete, masonry, or similar construction.
- C. Fit exposed connections accurately together to form tight, hairline joints or, where indicated, uniform reveals and spaces for sealants and joint fillers. Where cutting, welding, and grinding are required for proper shop fitting and jointing of decorative metal, restore finishes to eliminate evidence of such corrective work.
- D. Do not cut or abrade finishes that cannot be completely restored in the field. Return items with such finishes to the shop for required alterations, followed by complete refinishing, or provide new units as required.
- E. Install concealed gaskets, joint fillers, insulation, and flashings as work progresses.
- F. Restore protective coverings that have been damaged during shipment or installation. Remove protective coverings only when there is no possibility of damage from other work yet to be performed at same location.
 - 1. Retain protective coverings intact; remove coverings simultaneously from similarly finished items to preclude nonuniform oxidation and discoloration.
- G. Field Welding: Comply with applicable AWS specification for procedures of manual shielded metal arc welding and requirements for welding and for finishing welded connections in "Fabrication, General" Article. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations.
- H. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.
 - 1. Coat concealed surfaces of aluminum that will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

3.3 CLEANING

- A. Clean metal by washing thoroughly with clean water and soap, rinsing with clean water, and wiping dry.

3.4 PROTECTION

- A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.
- B. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION

SECTION 057100 - DECORATIVE METAL STAIRS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes decorative metal stairs.
- B. Related Requirements:
 - 1. Section 064023 "Interior Architectural Woodwork."
 - 2. Section 096623 "Resinous Matrix Terrazzo" for materials at treads and landings.

1.3 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written instructions to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorages for metal stairs.
 - 1. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry.
 - 2. Deliver such items to Project site in time for installation.
- C. After contract award and upon request and execution of the Architect's Electronic File Transfer Agreement, a 3D digital model of the Lobby Stair will be made available to the Contractor for use. The model is divided into "Segments" or individual models; "Assemblies" or similar system models; and "Components" or specific geometry models. Whether or not the Architect's digital model is used, the Fabricators of the different "segments", "assemblies" and components" must have the capacity to coordinate with and produce a continuously updated 3D digital fabrication model for review by the Architect and Subcontractors performing work on the element or in close proximity to it.

Note that the Architect's digital model is of limited completeness. It provides information which might assist the Contractor in coordination and fabrication as follows:

- Scope understanding of represented elements
- Dimensional control for represented elements
- As a basis for the development of field lay-out

1.4 ACTION SUBMITTALS

- A. Product Data: For metal stairs and the following:
 - 1. Shop primer products.
 - 2. Grout.
- B. Shop Drawings:
 - 1. Include plans, elevations, sections, details, and attachments to other work.
 - 2. Indicate sizes of metal sections, thickness of metals, profiles, holes, and field joints.
 - 3. Include plan at each level.
- C. Samples for Verification: For each type and finish of tread.
- D. Delegated-Design Submittal: For stairs, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For professional engineer's experience with providing delegated-design engineering services of the kind indicated, including documentation that the engineer is licensed in the State in which Project is located.
- B. Welding certificates.
- C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Fabricator of products.
- B. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - 2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
 - 3. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."
 - 4. AWS D1.6/D1.6M, "Structural Welding Code - Stainless Steel."

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store materials to permit easy access for inspection and identification.
 - 1. Keep members off ground and spaced by using pallets, dunnage, or other supports and spacers.
 - 2. Protect members and packaged materials from corrosion and deterioration.
 - 3. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures.
 - a. Repair or replace damaged materials or structures as directed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Wood enclosed feature stair shall be engineered with extreme tolerances per the National Association of Architectural Metal Manufacturers (NAAMM).
- B. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design stairs, and railings, including attachment to building construction.
- C. Structural Performance of Stairs: Metal stairs shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
 - 1. Uniform Load: 100 lbf/sq. ft.
 - 2. Concentrated Load: 300 lbf applied on an area of 4 sq. in.
 - 3. Uniform and concentrated loads need not be assumed to act concurrently.
 - 4. Stair Framing: Capable of withstanding stresses resulting from railing loads in addition to loads specified above.
 - 5. Limit deflection of treads, platforms, and framing members to $L/720$ or $1/4$ inch, whichever is less.
- D. Seismic Performance of Stairs: Metal stairs shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - 1. Component Importance Factor: Refer to Structural Drawings for Importance Factor.

2.2 METALS

- A. Metal Surfaces: Provide materials with smooth, flat surfaces unless otherwise indicated. For components exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
- B. Steel Plates, Shapes, and Bars: ASTM A36/A36M.
- C. Steel Tubing: ASTM A500/A500M (cold formed) or ASTM A513/A513M.
- D. Stainless Steel Bars and Shapes: ASTM A276/A276M, Type 304.
- E. Uncoated, Cold-Rolled Steel Sheet: ASTM A1008/A1008M, either commercial steel, Type B, or structural steel, Grade 25, unless another grade is required by design loads; exposed.
- F. Uncoated, Hot-Rolled Steel Sheet: ASTM A1011/A1011M, either commercial steel, Type B, or structural steel, Grade 30, unless another grade is required by design loads.
- G. Galvanized-Steel Sheet: ASTM A653/A653M, G90 coating, either commercial steel, Type B, or structural steel, Grade 33, unless another grade is required by design loads.
- H. Stainless Steel Sheet: ASTM A240/A240M or ASTM A666, Type 304, stretcher-leveled standard of flatness.

- I. Aluminum Sheet: Flat sheet complying with ASTM B209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with strength and durability properties of not less than Alloy 5005-H32.
- J. Aluminum Extrusions: ASTM B221, Alloy 6063-T6.
- K. Aluminum Castings: ASTM B26/B26M, Alloy 443.0-F.

2.3 ABRASIVE NOSINGS

- A. Extruded Units: Aluminum units with abrasive filler consisting of aluminum oxide, silicon carbide, or a combination of both, in an epoxy-resin binder. Fabricate units in lengths necessary to accurately fit openings or conditions.
 - 1. Provide ribbed units, with abrasive filler strips projecting 1/16 inch above aluminum extrusion.
 - 2. Provide solid-abrasive units without ribs.
 - 3. Nosings: Square-back units, 3 inches wide, without lip.

2.4 FASTENERS

- A. Bolts and Nuts: Regular hexagon-head bolts, ASTM A307, Grade A; with hex nuts, ASTM A563; and, where indicated, flat washers.
- B. Anchor Bolts: ASTM F1554, Grade 36, of dimensions indicated; with nuts, ASTM A563; and, where indicated, flat washers.
- C. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E488/E488M, conducted by a qualified independent testing agency.
 - 1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, unless otherwise indicated.
 - 2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 2 stainless steel bolts, ASTM F593, and nuts, ASTM F594.

2.5 MISCELLANEOUS MATERIALS

- A. Welding Electrodes: Comply with AWS requirements.
- B. Shop Primers: Provide primers that comply with Section 099100 "Painting and Coating."
- C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with ASTM A780/A780M and compatible with paints specified to be used over it.
- D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.
- E. Concrete Materials and Properties: Comply with requirements in Section 033000 "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 3000 psi unless otherwise indicated.

- F. Nonmetallic, Shrinkage-Resistant Grout: ASTM C1107/C1107M, factory-packaged, nonmetallic aggregate grout; recommended by manufacturer for [interior] [exterior] use; noncorrosive and nonstaining; mixed with water to consistency suitable for application and a 30-minute working time.

2.6 FABRICATION, GENERAL

- A. Provide complete stair assemblies, including metal framing, hangers, struts, clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure.
 - 1. Join components by welding unless otherwise indicated.
 - 2. Use connections that maintain structural value of joined pieces.
- B. Assemble stairs in shop to greatest extent possible.
 - 1. Disassemble units only as necessary for shipping and handling limitations.
 - 2. Clearly mark units for reassembly and coordinated installation.
- C. Cut, drill, and punch metals cleanly and accurately.
 - 1. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated.
 - 2. Remove sharp or rough areas on exposed surfaces.
- D. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- E. Form exposed work with accurate angles and surfaces and straight edges.
- F. Weld connections to comply with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. Weld exposed corners and seams continuously unless otherwise indicated.
 - 5. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Finish #1 - No evidence of a welded joint.
- G. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible.
 - 1. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts unless otherwise indicated.
 - 2. Locate joints where least conspicuous.

2.7 FABRICATION OF STAIRS

- A. NAAMM Stair Standard: Comply with NAAMM AMP 510, "Metal Stairs Manual," for Architectural Class, unless more stringent requirements are indicated.
- B. Stair Framing:

1. Fabricate stringers of steel plates or channels.
 - a. Stringer Size: As required to comply with "Performance Requirements" Article.
 - b. Finish: Shop primed.
2. Construct platforms of steel plate or channel headers and miscellaneous framing members as required to comply with "Performance Requirements" Article.
 - a. Finish: Shop primed.
3. Weld or bolt stringers to headers; weld or bolt framing members to stringers and headers. If using bolts, fabricate and join so bolts are not exposed on finished surfaces.

C. Subtreads, Risers, and Subplatforms:

1. Fabricate subtreads and subplatforms of steel plates.
2. Weld subtreads to stringers.
 - a. Locate welds on top of subtreads where they will be concealed by finished treads.
3. Provide subplatforms of configuration indicated or, if not indicated, the same as subtreads.
 - a. Weld subplatforms to platform framing.
 - b. Locate welds on top of subplatforms where they will be concealed by finished flooring.
 - c. Smooth Soffit Construction: Construct subplatforms with flat metal under surfaces to produce smooth soffits.

2.8 STAIR RAILINGS

- A. Comply with applicable requirements in Section 057313 "Decorative Glazed and Metal Railings."
1. Connect posts to stair framing by direct welding unless otherwise indicated.

2.9 FINISHES

- A. Finish metal stairs after assembly.
- B. Steel Galvanized Finish: Hot-dip galvanize items as indicated to comply with ASTM A153/A153M for steel and iron hardware and with ASTM A123/A123M for other steel and iron products.
1. Do not quench or apply post-galvanizing treatments that might interfere with paint adhesion.
 2. Fill vent and drain holes that are exposed in finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.
- C. Steel Shop Prime Finish:
1. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."

2. Apply shop primer to uncoated surfaces of metal stair components, except those with galvanized finishes and those to be embedded in concrete or masonry unless otherwise indicated. Comply with SSPC-PA 1, "Shop, Field, and Maintenance Painting of Steel," for shop painting.

- a. Stripe paint corners, crevices, bolts, welds, and sharp edges.

D. Stainless Steel Finishes:

1. Stainless Steel Sheet and Plate Finishes:

- a. Directional Satin Finish: ASTM A480/A480M, No. 4.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify elevations of floors, bearing surfaces and locations of bearing plates, and other embedments for compliance with requirements.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLING METAL STAIRS

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal stairs to in-place construction.
 1. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.
- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free of rack.
- C. Install metal stairs by welding stair framing to steel structure or to weld plates cast into concrete unless otherwise indicated.
 1. Grouted Baseplates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates.
 - a. Clean bottom surface of plates.
 - b. Set plates for structural members on wedges, shims, or setting nuts.
 - c. Tighten anchor bolts after supported members have been positioned and plumbed.
 - d. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
 - e. Promptly pack grout solidly between bearing surfaces and plates so no voids remain.
 - 1) Neatly finish exposed surfaces; protect grout and allow to cure.
 - 2) Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

- D. Provide temporary bracing or anchors in formwork for items that are to be built into concrete or masonry.
- E. Fit exposed connections accurately together to form hairline joints.
 - 1. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations.
 - 2. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
 - 3. Field Welding: Comply with requirements for welding in "Fabrication, General" Article.

3.3 REPAIRS

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - 1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.
- B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 099100 "Painting and Coating."
- C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas, and repair galvanizing to comply with ASTM A780/A780M.

END OF SECTION 057100

SECTION 057313 - DECORATIVE METAL AND GLAZED RAILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Exterior post-supported railings with integrated light handrail.
 - 2. Interior post-supported railings with glass-infill panels.
 - 3. Glass smoke baffle.
- B. Related Requirements:
 - 1. Section 017419 "Construction and Demolition Waste Management and Disposal".
 - 2. Section 018113 "Sustainable Design Requirements".
 - 3. Section 018119 "Construction Indoor Air Quality Requirement".
 - 4. Section 051519 "Stainless Steel Wire Rope Assemblies".

1.3 DEFINITIONS

- A. Railings: Guards, handrails, and similar devices used for protection of occupants at open-sided floor and exterior deck areas and for pedestrian guidance and support, visual separation, or wall protection.

1.4 COORDINATION AND SCHEDULING

- A. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver items to Project site in time for installation.

1.5 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.6 ACTION SUBMITTALS

- A. Product Data:
 - 1. Metal railings assembled from standard components.
 - 2. Glass products.
 - 3. Glazing cement and accessories for structural glass railings.
 - 4. Sealant and accessories for structural glass railings.

5. Fasteners.
 6. Shop primer.
 7. Bituminous paint.
 8. Nonshrink, nonmetallic grout.
 9. Anchoring cement.
- B. Shop Drawings: Include plans, elevations, sections, attachment details, joint locations, transitions, top rail corners, and terminations.
- C. Samples for Initial Selection: For products involving selection of color, texture, or design, including mechanical finishes.
- D. Samples for Verification: For each type of exposed finish required.
1. Sections of each distinctly different linear railing member, including handrails, top rails, posts, and balusters.
 2. Base channel.
 3. Each type of glass and glass edge required.
 4. Fittings and brackets.
 5. Assembled Samples of railing systems, made from full-size components, including top rail, post, handrail, and glass-infill panels. Show method of finishing members at intersections. Samples need not be full height.
- E. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- F. LEED Submittals: The Owner requires the Contractor to implement practices and procedures to meet the project's environmental performance goals, which include conformance with California Green Building Code (CAL Green) and achieving LEED v4 Platinum Certification. The requirements related to these goals are defined in the Articles below and represent a combination of sustainability performance criteria necessary to comply with the California Green Building Code and achieve LEED certification goals. The Contractor shall ensure that the requirements related to these goals are implemented to the fullest extent.
1. LEED MR Credit 2 - BPDO – Environmental Product Declarations (EPD) Submittal - EPD/LCA Documentation: Provide a publicly available Environmental Product Declaration in conformance with standards listed and described in Section 018113.
 2. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials Submittal - Regional Sourcing Documentation: Provide a product data sheet or manufacturer affidavit demonstrating regional sourcing as defined in Section 018113.
 3. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials Submittal - Recycled Content Documentation: Provide a product data sheet or manufacturer affidavit noting the pre-consumer (post-industrial) and post-consumer recycled content value of the product or product components in accordance with requirements described in Section 018113.
- 1.7 INFORMATIONAL SUBMITTALS
- A. Qualification Data: For professional engineer.
- B. Mill Certificates: Signed by manufacturers of stainless steel products, certifying that products furnished comply with requirements.

- C. Product Test Reports: For tests performed by a qualified testing agency, in accordance with ASTM E894, ASTM E935, ASTM E2353, and ASTM E2358.
- D. Evaluation Reports: From ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.
 - 1. For glazed decorative metal railings.
 - 2. For post-installed anchors.
- E. Preconstruction test reports.

1.8 QUALITY ASSURANCE

- A. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.
 - 1. Build mockups as indicated on Drawings.
 - 2. Build mockups for each form and finish of glass-infill panel railing consisting of two posts, top rail, handrail, glass-infill panel, and anchorage system components that are full height and are not less than 24 inches in length.
 - 3. Build mockups for each form and finish of structural glass railing consisting of top rail, structural glass, base channel, and anchorage system components that are full height and are not less than 24 inches in length.
 - 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 FIELD CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with railings by field measurements before fabrication and indicate measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations for Decorative Metal Railing Components: Obtain from single source from single manufacturer for each component and installation method.
- B. Product Options: Information on Drawings and in the Specifications establishes requirements for railing system's aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.
 - 1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.
- C. Manufacturers (Glazed Railing):
 - 1. Basis-of-Design: CR Laurence Co. Inc. / Blumcraft: BGR Wet Glaze Railing System or products from one of the following acceptable alternates:
 - a. Viva Railings

b. HDI Railing Systems

D. Manufacturers (Integrated Light Railing):

1. Basis-of-Design: Cole Lighting "Lightrail LR5"; XL-14, post-mounted, direct burial, 1.90-inch diameter, formed stainless steel. Mitered ends, curved rail, emergency battery, 3000 degrees Kelvin, 90 degrees beam spread, universal voltage 0.10V driver for dimming.
 - a. Acceptable alternates:
 - 1) Wagner "Lumenpost", integrate post LED driver enclosure; 1.90 inch-diameter, schedule 40, seamless welded construction with single 316 stainless steel tamper resistant fastener, wet location listed, UL8750 certified, 120v.
 - b. Or equal.

2.2 LEED REQUIREMENTS

- A. LEED MR Credit 2 - BPDO – Environmental Product Declarations (EPD) - EPD/LCA
Preferment: Preference shall be given to products with a publicly available Environmental Product Declaration in conformance with standards listed and described in Section 018113.
- B. LEED MR Credit 2 - BPDO – Environmental Product Declarations (EPD) - EPD/LCA
Requirement: Stainless steel products shall have documented a publicly available Environmental Product Declaration in conformance with standards listed and described in Section 018113.
- C. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials - Regional Sourcing Preferment:
Preference shall be given to products that can demonstrate regional sourcing as defined in Section 018113.
- D. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials - Recycled Content Requirement: The product or product components shall meet or exceed the maximum recycled content percentages as listed for the product or component type in Section 018113, Appendix E, in accordance with standards listed in Section 018113.

2.3 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design glazed decorative metal railings, including attachment to building construction.
- B. General: In engineering railings to withstand structural loads indicated, determine allowable design working stresses of railing materials based on the following:
 1. Aluminum: The lesser of minimum yield strength divided by 1.65, or minimum ultimate tensile strength divided by 1.95.
 2. Stainless Steel: 60 percent of minimum yield strength.
 3. Steel: 72 percent of minimum yield strength.
 4. Glass: 25 percent of mean modulus of rupture (50 percent probability of breakage), as listed in "Mechanical Properties" in AAMA CW-12, "Structural Properties of Glass."
- C. Structural Performance: Railings, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Handrails and Top Rails of Guards:
 - a. Uniform load of 50 lbf/ft. applied in any direction.
 - b. Concentrated load of 200 lbf applied in any direction.
 - c. Other loads as shown on Drawings.
 - d. Uniform and concentrated loads need not be assumed to act concurrently.
2. Glass-Infill Panels:
 - a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft.
 - b. Infill load and other loads need not be assumed to act concurrently.

D. Wind Loads: For exterior glazed decorative metal railings, capable of withstanding the following wind loads in accordance with the IBC and ASTM E1300:

1. Wind Load: As indicated on Drawings.

E. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.4 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.
- B. Brackets, Flanges, and Anchors: Same metal and finish as supported rails unless otherwise indicated.

2.5 ALUMINUM

- A. Aluminum, General: Provide alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with strength and durability properties for each aluminum form required not less than that of alloy and temper designated below.
- B. Extruded Bars and Shapes, Including Extruded Tubing: ASTM B221, Alloy 6063-T5/T52.
- C. Extruded Structural Pipe and Round Tubing: ASTM B429/B429M, Alloy 6063-T6.
 1. Provide Standard Weight (Schedule 40) pipe unless otherwise indicated.
- D. Drawn Seamless Tubing: ASTM B210, Alloy 6063-T832.
- E. Plate and Sheet: ASTM B209, Alloy 5005-H32.
- F. Die and Hand Forgings: ASTM B247, Alloy 6061-T6.
- G. Castings: ASTM B26/B26M, Alloy A356.0-T6.

2.6 STAINLESS STEEL

- A. Tubing: ASTM A554, Grade MT 304 at interior locations; Grade MT 316 at exterior locations.
- B. Pipe: ASTM A312/A312M, Grade TP 304 at interior locations; Grade TP 316 at exterior locations.
- C. Castings: ASTM A743/A743M, Grade CF 8 or Grade CF 20.
- D. Sheet, Strip, Plate, and Flat Bar: ASTM A666 or ASTM A240/A240M, Type 304 at interior; Type 316 at exterior.
- E. Bars and Shapes: ASTM A276, Type 304 at interior; Type 316 at exterior.

2.7 STEEL AND IRON

- A. Tubing: ASTM A500/A500M (cold formed) or ASTM A513/A513M.
- B. Bars: Hot-rolled, carbon steel complying with ASTM A29/A29M, Grade 1010.

2.8 GLASS AND GLAZING PRODUCTS, GENERAL

- A. Glazing Publications: Comply with written instructions of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.
 - 1. NGA/GANA Publications: "GANA Laminated Glazing Reference Manual" and "GANA Glazing Manual."
- B. Safety Glazing: Glazing shall comply with 16 CFR 1201, Category II.
- C. Safety Glazing Labeling: Permanently mark glass with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
- D. Glazing Cement and Accessories for Structural Glass Railings: Glazing cement, setting blocks, shims, and related accessories as recommended or supplied by railing manufacturer for installing structural glazing in metal base channels.
- E. Sealant and Accessories for Structural Glass Railings: Sealant, gaskets, setting blocks, shims, and related accessories as recommended or supplied by railing manufacturer for installing structural glazing in metal base channels.
- F. Glazing Gaskets for Glass-Infill Panels: Glazing gaskets and related accessories as recommended or supplied by railing manufacturer for installing glass-infill panels in post-supported railings.

2.9 RAILING TYPES

- A. Interior railings at Lobby: Cantilevered, tempered glass railing, in wet-glazed shoe with cap rail.

- B. Podium: Exterior post-supported with integrated light handrail.

2.10 GLASS GUARDRAIL COMPONENTS

- A. Glazing: ASTM C1048 Kind FT, Quality q3. Provide products that have been tested for impact strength in accordance with 16 CFR 1201 for Category II materials.
 - 1. Monolithic Tempered Thickness: 3/4 inch.
 - 2. Color: Clear
 - 3. Polished, pencil edge on exposed glass edges.
- B. Internal Handrail Cap Connection Sleeves: Metal tube, material compatible with handrail cap material.
- C. Expansion Cement: Hydraulic, conforming to ASTM c 595, CRL Part # KWX50.
- D. Shoe Base:
 - 1. Profile: CRL-Blumcraft Part # RG500; 3-1/2 inches (88.9 mm) wide by 4 inches (101.6 mm) high two-piece rectangular cross-section. Designed to work with expansion cement for use with 3/4" (19 mm) monolithic tempered glass.
 - 2. Finish: Powder-coated matte black.
- E. Metal Cap Railing: CRL-Blumcraft satin anodized, 3243 Series, 1-1/2 inch by 1-1/2 inch extruded aluminum cap rail (for 3/4 inch tempered glass).
 - 1. Material: Aluminum.
 - 2. Finish: Powder-coated semi-gloss black.
- F. Fasteners: Types and sizes indicated in shop drawings.
 - 1. Center-to-center spacing of holes is 12 inches.
- G. Sill Angles for Tempered Glass Railing Assemblies: Steel angle profiles conforming to ASTM A 36, with anchoring devices, sizes indicated in shop drawing of section 05 5000, drilled and tapped for fastener types, sizes, and spacing indicated.

2.11 GLASS SMOKE BAFFLE

- A. Basis of Design: CRL-Blumcraft Pre-Engineered, SB200, two-piece component-based, smoke baffle system.
 - 1. Base 3 inch by 2-7/8 inch two-piece extruded aluminum – for 1/2 inch monolithic, tempered glass.
 - 2. Glass: Factory glazed ANSI Z97.1
 - 3. Finish: Powder-coated, semi-gloss black.

2.12 FASTENERS

- A. Fastener Materials: Unless otherwise indicated, provide the following:
 - 1. Aluminum Components: Stainless steel type 304 at interior locations; type 316 at exterior locations.
 - 2. Stainless Steel Components: Stainless steel type 304 at interior locations; type 316 at exterior locations.
 - 3. Dissimilar Metals: Stainless steel type 304 at interior locations; type 316 at exterior locations.

- B. Fasteners for Anchoring to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.
- C. Provide concealed fasteners for interconnecting railing components and for attaching railings to other work unless otherwise indicated.
- D. Post-Installed Anchors: Fastener systems with working capacity greater than or equal to design load, in accordance with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC193 or ICC-ES AC308.
 - 1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or ASTM F1941/ASTM F1941M, Class Fe/Zn 5, unless otherwise indicated.
 - 2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 stainless steel bolts, ASTM F593, and nuts; ASTM F594.

2.13 MISCELLANEOUS MATERIALS

- A. Handrail Brackets: Cast stainless steel, center of rail dimension, from face of structural glass balusters, as shown on Drawings.
- B. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.
- C. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- D. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.
 - 1. Water-Resistant Anchoring Cement: At exterior locations provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

2.14 FABRICATION OF METAL RAILINGS

- A. Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.
- B. Assemble railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.
- C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- D. Form work true to line and level with accurate angles and surfaces.

- E. Fabricate connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate. Locate weep holes in inconspicuous locations.
- F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.
- G. Mechanical Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.
 - 1. Fabricate splice joints for field connection using an epoxy structural adhesive if this is manufacturer's standard splicing method.
- H. Form changes in direction as follows:
 - 1. As detailed.
- I. Bend members in jigs to produce uniform curvature for each configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
- J. Close exposed ends of hollow railing members with prefabricated end fittings.
- K. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, handrail brackets, miscellaneous fittings, and anchors to interconnect railing members to other work where indicated.
 - 1. At brackets and fittings fastened to plaster or gypsum board partitions, provide crush-resistant fillers, or other means to transfer loads through wall finishes to structural supports and to prevent bracket or fitting rotation and crushing of substrate.
- L. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.
- M. For railing posts set in concrete, provide stainless steel sleeves not less than 6 inches long with inside dimensions not less than 1/2 inch greater than outside dimensions of post, with metal plate forming bottom closure.

2.15 FABRICATION OF GLASS PANELS AND BALUSTERS

- A. Fabricate glass to sizes and shapes required; provide for proper edge clearance and bite on glazing panels.
- B. Glass-Infill Panels: Provide tempered glass-infill panels.
 - 1. Edge Finish: Clean-cut or flat-grind edges to produce smooth, square edges with slight chamfers at junctions of edges and faces.

2.16 METAL FINISH REQUIREMENTS, GENERAL

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipment.

- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.

2.17 STAINLESS STEEL FINISHES

- A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
- B. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
 - 1. Run grain of directional finishes with long dimension of each piece.
 - 2. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
- C. Stainless Steel Sheet, Strip, Plate, and Bar Finishes:
 - 1. Directional Satin Finish: ASTM A480/A480M, No. 4.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Comply with Drawings and manufacturer's written instructions for installing glazed decorative metal railings, accessories, and other components.
- B. Windborne-Debris Resistance: Anchor glazed decorative metal railings to structure using anchoring method, fastener type, and fastening frequency identical to that used in windborne-debris-resistance testing.
- C. Perform cutting, drilling, and fitting required for installing metal railings.
 - 1. Fit exposed connections together to form tight, hairline joints.
 - 2. Install railings level, plumb, square, true to line; without distortion, warp, or rack.
 - 3. Set railings accurately in location, alignment, and elevation; measured from established lines and levels.
 - 4. Do not weld, cut, or abrade surfaces of metal railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
 - 5. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
 - 6. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.
- D. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.
 - 1. Coat concealed surfaces of aluminum that will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with bituminous paint.

- E. Adjust railings before anchoring to ensure matching alignment at abutting joints.
- F. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

3.2 METAL RAILING CONNECTIONS

- A. Nonwelded Connections:
 - 1. Use mechanical or adhesive joints for permanently connecting railing components.
 - 2. Seal recessed holes of exposed locking screws using plastic cement filler colored to match finish of railings.
- B. Expansion Joints: Install expansion joints at locations indicated, but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve extending 2 inches beyond joint on either side, fasten internal sleeve securely to one side, and locate joint within 6 inches of post.

3.3 METAL ANCHORING POSTS

- A. Use steel pipe sleeves preset and anchored into concrete for installing posts. After posts have been inserted in sleeves, fill annular space between post and sleeve with nonshrink, nonmetallic grout, mixed and placed to comply with anchoring material manufacturer's written instructions.
- B. Form or core-drill holes not less than 5 inches deep and 3/4 inch larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout, mixed and placed to comply with anchoring material manufacturer's written instructions.
- C. Cover anchorage joint with flange of same metal as post, welded to post after placing anchoring material.
- D. Leave anchorage joint exposed with 1/8-inch buildup, sloped away from post.
- E. Anchor posts to metal surfaces with flanges, angle type, or floor type as required by conditions, connected to posts and to metal supporting members as follows:
 - 1. For stainless steel railings, weld flanges to posts and bolt to metal-supporting surfaces.
- F. Install removable railing sections, where indicated, in slip-fit metal sockets cast in concrete.

3.4 FIELD QUALITY CONTROL

- A. Extent and Testing Methodology: Testing agency will randomly select completed railing assemblies for testing that are representative of different railing designs and conditions in the completed Work. Test railings in accordance with ASTM E894, ASTM E935, ASTM E2353, and ASTM E2358 for compliance with performance requirements.
- B. Remove and replace railings where test results indicate that they do not comply with specified requirements unless they can be repaired in a manner satisfactory to Architect and comply with specified requirements.

- C. Perform additional testing and inspecting, at Contractor's expense, to determine compliance of replaced or additional work with specified requirements.

3.5 CLEANING

- A. Clean aluminum and stainless steel by washing thoroughly with water and soap, rinsing with clean water, and wiping dry.
- B. Clean and polish glass as recommended in writing by manufacturer. Wash both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion.

3.6 PROTECTION

- A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.
- B. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit or provide new units.

END OF SECTION

SECTION 061000 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Wood blocking, cants, and nailers.
 - 2. Wood furring and grounds.
 - 3. Non-load-bearing wood studs.
 - 4. Marine grade plywood underlayment.
 - 5. Plywood backing panels.
- B. Related Requirements:
 - 1. Section 017419 "Construction Waster Management and Disposal".
 - 2. Section 018113 "Sustainable Design Requirements".
 - 3. Section 018119 "Construction Indoor Air Quality Requirements".
 - 4. Section 061600 "Sheathing."
 - 5. Section 099100 "Painting" for field painting of plywood backerboards.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
 - 1. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
 - 2. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5664.
 - 3. Include copies of warranties from chemical treatment manufacturers for each type of treatment.
- B. LEED Submittals: The Owner requires the Contractor to implement practices and procedures to meet the project's environmental performance goals, which include conformance with California Green Building Code (CAL Green) and achieving LEED v4 Platinum Certification. The requirements related to these goals are defined in the Articles below and represent a combination of sustainability performance criteria necessary to comply with the California Green Building Code and achieve LEED certification goals. The Contractor shall ensure that the requirements related to these goals are implemented to the fullest extent.

1. LEED MR Credit 2 - BPDO – Environmental Product Declarations (EPD) Submittal - EPD/LCA Documentation: Provide a publicly available Environmental Product Declaration in conformance with standards listed and described in Section 018113.
2. LEED EQ Credit 2 - Low-Emitting Materials Submittal - Formaldehyde Documentation: Provide a product data sheet or manufacturer affidavit affirming product compliance with CARB ATCM 17 CCR 93120 as defined in Section 018113.
3. LEED EQ Credit 2 - Low-Emitting Materials Submittal - VOC Emissions (General) Documentation: Provide a product data sheet or third-party certificates demonstrating testing and compliance with CDPH Standard Method v1.1-2010. Please reference Section 018113 for more details.
4. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials Submittal - Regional Sourcing Documentation: Provide a product data sheet or manufacturer affidavit demonstrating regional sourcing as defined in Section 018113.
5. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials Submittal - Recycled Content Documentation: Provide a product data sheet or manufacturer affidavit noting the pre-consumer (post-industrial) and post-consumer recycled content value of the product or product components in accordance with requirements described in Section 018113.
6. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials Submittal - FSC Documentation: Provide an FSC Chain of Custody (COC) certificate, an FSC Chain of Custody transfer certifications for any vendors supplying but not modifying product components and invoices itemizing each wood product. Please reference Section 018113 for more details.

1.4 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For the following, from ICC-ES:
 1. Fire-retardant-treated wood.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Stack wood flat with spacers beneath and between each bundle to provide air circulation. Protect wood from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 LEED REQUIREMENTS

- A. LEED MR Credit 2 - BPDO – Environmental Product Declarations (EPD) - EPD/LCA
Preferment: Preference shall be given to products with a publicly available Environmental Product Declaration in conformance with standards listed and described in Section 018113.
- B. LEED EQ Credit 2 - Low-Emitting Materials - Formaldehyde Requirement: The product shall contain no added formaldehyde (NAF) resins or use ultra-low-emitting formaldehyde (ULEF) resins as defined in Section 018113.
- C. LEED EQ Credit 2 - Low-Emitting Materials - VOC Emissions (General) Requirement: The product shall demonstrate testing and compliance with CDPH Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, Version 1.1-2010, using the appropriate exposure scenario.
- D. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials - FSC Requirement: The product must be certified by the Forest Stewardship Council and demonstrate a continuous Chain-of-Custody from extraction to installation.
- E. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials - Regional Sourcing Preferment: Preference shall be given to products that can demonstrate regional sourcing as defined in Section 018113.
- F. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials - Recycled Content Preferment: Preference shall be given to products that demonstrate high recycled content values as a percentage of the product determined by weight. Recommended recycled content targets by product are included in Section 018113, Appendix E.

2.2 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Use materials complying with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
- B. Fire-Retardant-Treated Plywood by Pressure Process: Products with a flame spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
 - 1. Use treatment that does not promote corrosion of metal fasteners.
- C. Kiln-dry plywood after treatment to a maximum moisture content of 15 percent.
- D. Application: Treat all rough carpentry unless otherwise indicated.
 - 1. Plywood backing panels.

2.3 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:

1. Blocking.
2. Nailers.
3. Cants.
4. Furring.

- B. For items of dimension lumber size, provide Construction or No. 2 grade lumber:
1. Spruce-pine-fir; NLGA.
 2. Western woods; WCLIB or WWP.

2.4 NON-LOAD-BEARING WOOD STUDS

- A. Non-Load-Bearing Interior Partitions: Fire-retardant treated. Construction or No. 2 grade of the following species:
1. Western woods; WCLIB or WWP.

2.5 PLYWOOD BACKING PANELS

- A. Equipment Backing Panels: DOC PS 1, Exterior, AC, in thickness indicated or, if not indicated, not less than 3/4-inch nominal thickness. Panels shall not contain added urea-formaldehyde.

2.6 MARINE GRADE PLYWOOD UNDERLAYMENT

- A. Underlayment: DOC PS 1, Exterior or Marine grade, in thickness indicated, or, if not indicated, not less than 3/4 in. nominal thickness. Panels shall not contain added urea-formaldehyde.

2.7 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
- B. Power-Driven Fasteners: NES NER-272.
- C. Lag Bolts: ASME B18.2.1.
- D. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.
- E. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry assemblies and equal to four times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.
1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry accurately to other construction. Locate furring, blocking, and similar supports to comply with requirements for attaching other construction.
- B. Framing Standard and Installation: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- C. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant treated plywood backing panels with classification marking of testing agency exposed to view.

3.2 WOOD BLOCKING, AND NAILER INSTALLATION

- A. Install where indicated and where required for screeding or attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.
- C. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 1-1/2 inches (38 mm) wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

END OF SECTION

SECTION 061600 - SHEATHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Gypsum wall sheathing.
- B. Related Sections:
 - 1. Section 017419 "Construction Waster Management and Disposal".
 - 2. Section 018113 "Sustainable Design Requirements".
 - 3. Section 018119 "Construction Indoor Air Quality Requirements".
 - 4. Section 054000 "Cold-Formed Metal Framing."
 - 5. Section 072700 "Air Barriers."
 - 6. Section 074213 "Insulated Metal Wall Panels."
 - 7. Section 079213 "Exterior Joint Sealants".

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
- B. LEED Submittals: The Owner requires the Contractor to implement practices and procedures to meet the project's environmental performance goals, which include conformance with California Green Building Code (CAL Green) and achieving LEED v4 Platinum Certification. The requirements related to these goals are defined in the Articles below and represent a combination of sustainability performance criteria necessary to comply with the California Green Building Code and achieve LEED certification goals. The Contractor shall ensure that the requirements related to these goals are implemented to the fullest extent.
 - 1. LEED MR Credit 2 - BPDO – Environmental Product Declarations (EPD) Submittal - EPD/LCA Documentation: Provide a publicly available Environmental Product Declaration in conformance with standards listed and described in Section 018113.
 - 2. LEED/Sustainable Design Submittal - CSR Documentation: Provide a Corporate Sustainability Report for the manufacturer or parent company of the product demonstrating conformance with one of the guidelines listed and described in Section 018113.
 - 3. LEED MR Credit 4 - BPDO – Material Ingredients Submittal - Ingredient Reporting Documentation: Provide a publicly available material ingredient inventory as defined in Section 018113.
 - 4. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials Submittal - Regional Sourcing Documentation: Provide a product data sheet or manufacturer affidavit demonstrating regional sourcing as defined in Section 018113.

5. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials Submittal - Recycled Content Documentation: Provide a product data sheet or manufacturer affidavit noting the pre-consumer (post-industrial) and post-consumer recycled content value of the product or product components in accordance with requirements described in Section 018113.
6. LEED EQ Credit 2 - Low-Emitting Materials Submittal - VOC Emissions (General) Documentation: Provide a product data sheet or third-party certificates demonstrating testing and compliance with CDPH Standard Method v1.1-2010. Please reference Section 018113 for more details.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Stack panels flat with spacers beneath and between each bundle to provide air circulation. Protect sheathing from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 LEED REQUIREMENTS

- A. LEED MR Credit 2 - BPDO – Environmental Product Declarations (EPD) - EPD/LCA Requirement: The product shall have documented a publicly available Environmental Product Declaration in conformance with standards listed and described in Section 018113.
- B. LEED/Sustainable Design - CSR Requirement: The product shall be documented with a publicly available Corporate Sustainability Report from the manufacturer or parent company of the product demonstrating conformance with one of the guidelines listed and described in Section 018113.
- C. LEED MR Credit 4 - BPDO – Material Ingredients - Ingredient Reporting Requirement: The product shall have documented a publicly available material ingredient inventory as defined in Section 018113.
- D. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials - Regional Sourcing Preferment: Preference shall be given to products that can demonstrate regional sourcing as defined in Section 018113.
- E. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials - Recycled Content Requirement: The product or product components shall meet or exceed the maximum recycled content percentages as listed for the product or component type in Section 018113, Appendix E, in accordance with standards listed in Section 018113.
- F. LEED EQ Credit 2 - Low-Emitting Materials - VOC Emissions (General) Requirement: The product shall demonstrate testing and compliance with CDPH Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, Version 1.1-2010, using the appropriate exposure scenario.

2.2 WALL SHEATHING

- A. Non-Structural Gypsum Sheathing: ASTM C1177, Type X, fiberglass-faced, silicone-impregnated core
 1. Products: Subject to compliance with requirements, provide the following, or equal:

- a. Georgia Pacific "DensGlass Fireguard."
 - b. United States Gypsum "Securerock," Firecode Core.
2. Thickness: 5/8 inch thick.
3. Size: 48 by 96 inches for vertical installation.
4. Edge: Square
5. Recycled Content: Provide materials with highest level of post-consumer and pre-consumer recycled content available.

2.3 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 1. Fasteners: Corrosion-resistant conforming to ASTM C954 and requirements of CBC Section 1403.3; USG "Sheathing Type SF," or equal. Provide Type WF at wood framing and backing.
- B. Screws for Fastening Gypsum Sheathing to Cold-Formed Metal Framing: Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing to be attached, with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.
 1. For steel framing less than 0.0329 inch thick, use screws that comply with ASTM C 1002.
 2. For steel framing from 0.033 to 0.112 inch thick, use screws that comply with ASTM C 954.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.
- B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.
- C. Securely attach to substrate by fastening as indicated, complying with the following:
 1. GA-253, ASTM C 1280 and manufacturer's recommendations.
- D. Coordinate wall sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
- E. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.
- F. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.2 GYPSUM SHEATHING INSTALLATION

- A. Comply with GA-253 and with manufacturer's written instructions.
 - 1. Fasten gypsum sheathing to cold-formed metal framing with screws.
 - 2. Install boards with a 3/8-inch gap where non-load-bearing construction abuts structural elements.
 - 3. Install boards with a 1/4-inch gap where they abut masonry or similar materials that might retain moisture, to prevent wicking.
- B. Apply fasteners so heads bear tightly against face of sheathing, but do not cut into facing.
- C. Vertical Installation: Install board vertical edges centered over studs. Abut ends and edges of each board with those of adjacent boards. Attach boards at perimeter and within field of board to each stud.
 - 1. Space fasteners approximately 8 inches o.c. and set back a minimum of 3/8 inch from edges and ends of boards.

END OF SECTION

SECTION 062013 - EXTERIOR FINISH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

- 1. Exterior wood enclosure for beam at Entrance Canopy.
 - 2. Exterior siding at trash enclosure.

- B. Related Requirements:

- 1. Section 017419 "Construction Waster Management and Disposal".
 - 2. Section 018113 "Sustainable Design Requirements".
 - 3. Section 018119 "Construction Indoor Air Quality Requirements".
 - 4. Section 061000 "Rough Carpentry" for furring, blocking, and other carpentry work not exposed to view and for framing exposed to view.
 - 5. Section 079213 "Exterior Joint Sealants".

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials, dimensions, profiles, textures, and colors and include construction and application details.

- 1. Include data for wood-preservative treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained. Include chemical-treatment manufacturer's written instructions for finishing treated material.
 - 2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced before shipment to Project site to levels specified.

- B. Shop Drawings:

- 1. Include dimensioned plans, elevations, sections, and attachment details.
 - 2. Show large-scale details.
 - 3. Show locations and sizes of furring, blocking, and hanging strips, including blocking and reinforcement concealed by construction and specified in other Sections.
 - 4. Apply AWI Quality Certification Program label to Shop Drawings.

C. Samples for Verification:

1. For each species and cut of lumber, with half of exposed surface finished; 50 sq. in. for lumber.
2. Panel Products: 12 inches by 12 inches.

D. LEED Submittals: The Owner requires the Contractor to implement practices and procedures to meet the project's environmental performance goals, which include conformance with California Green Building Code (CAL Green) and achieving LEED v4 Platinum Certification. The requirements related to these goals are defined in the Articles below and represent a combination of sustainability performance criteria necessary to comply with the California Green Building Code and achieve LEED certification goals. The Contractor shall ensure that the requirements related to these goals are implemented to the fullest extent.

1. LEED MR Credit 2 - BPDO – Environmental Product Declarations (EPD) Submittal - EPD/LCA Documentation: Provide a publicly available Environmental Product Declaration in conformance with standards listed and described in Section 018113.
2. LEED EQ Credit 2 - Low-Emitting Materials Submittal - Formaldehyde Documentation: Provide a product data sheet or manufacturer affidavit affirming product compliance with CARB ATCM 17 CCR 93120 as defined in Section 018113.
3. LEED EQ Credit 2 - Low-Emitting Materials Submittal - VOC Emissions (General) Documentation: Provide a product data sheet or third-party certificates demonstrating testing and compliance with CDPH Standard Method v1.1-2010. Please reference Section 018113 for more details.
4. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials Submittal - FSC Documentation: Provide an FSC Chain of Custody (COC) certificate, an FSC Chain of Custody transfer certifications for any vendors supplying but not modifying product components and invoices itemizing each wood product. Please reference Section 018113 for more details.
5. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials Submittal - Regional Sourcing Documentation: Provide a product data sheet or manufacturer affidavit demonstrating regional sourcing as defined in Section 018113.
6. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials Submittal - Recycled Content Documentation: Provide a product data sheet or manufacturer affidavit noting the pre-consumer (post-industrial) and post-consumer recycled content value of the product or product components in accordance with requirements described in Section 018113.

1.4 INFORMATIONAL SUBMITTALS

A. Compliance Certificates:

1. For lumber that is not marked with grade stamp.

B. Sample Warranties: For manufacturer's warranties.

1.5 CLOSEOUT SUBMITTALS

- A. Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

1.6 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.
 - 1. Manufacturer's Certification: Licensed participant in AWI's Quality Certification Program.
- B. Installer Qualifications: Licensed participant in AWI's Quality Certification Program.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber, plywood, and other panels flat with spacers between each bundle to provide air circulation.
 - 1. Protect materials from weather by covering with waterproof sheeting, securely anchored.
 - 2. Provide for air circulation around stacks and under coverings.

1.8 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecast weather conditions permit work to be performed and at least one coat of specified finish can be applied without exposure to rain, snow, or dampness.
- B. Field Measurements: Where exterior architectural woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings.
- C. Do not install finish carpentry materials that are wet, moisture damaged, or mold damaged.
 - 1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Lumber: Reclaimed Douglas fir for wrapping beams. Surfaced smooth, four sides. Finish to be determined.
- B. Siding: Architectural Woodwork Standards Grade: Premium. Refer to Drawings for further information.
 - 1. Wood Species: Ipe (exterior).
 - a. Type: Horizontal T&G.

- b. Wood Moisture Content: 10 to 15 percent.
- c. Fasteners: GRK #9 2 1/2" Phoenix FIN/Trim Screw (316 Stainless Steel) or equal.
- d. Wood Finish: Deckwise IPE Oil or equal. Seal all surfaces before install
- e. End Cut Sealer: Ipe Seal Endgrain Sealant.

2.2 LEED REQUIREMENTS

- A. LEED MR Credit 2 - BPDO – Environmental Product Declarations (EPD) - EPD/LCA
Preferment: Preference shall be given to products with a publicly available Environmental Product Declaration in conformance with standards listed and described in Section 018113.
- B. LEED EQ Credit 2 - Low-Emitting Materials - Formaldehyde Requirement: The product shall contain no added formaldehyde (NAF) resins or use ultra-low-emitting formaldehyde (ULEF) resins as defined in Section 018113.
- C. LEED EQ Credit 2 - Low-Emitting Materials - VOC Emissions (General) Requirement: The product shall demonstrate testing and compliance with CDPH Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, Version 1.1-2010, using the appropriate exposure scenario.
- D. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials - FSC Requirement: The product must be certified by the Forest Stewardship Council and demonstrate a continuous Chain-of-Custody from extraction to installation.
- E. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials - Regional Sourcing Preferment: Preference shall be given to products that can demonstrate regional sourcing as defined in Section 018113.
- F. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials - Recycled Content Preferment: Preference shall be given to products that demonstrate high recycled content values as a percentage of the product determined by weight. Recommended recycled content targets by product are included in Section 018113, Appendix E.

2.3 MISCELLANEOUS MATERIALS

- A. Fasteners for Exterior Finish Carpentry: Provide nails or screws, in sufficient length to penetrate not less than 1-1/2 inches into wood substrate. Fasteners to be hot-dipped galvanized.
- B. Sealants: Latex, complying with ASTM C834 Type OP, Grade NF and applicable requirements in Section 079200 "Joint Sealants," and recommended by sealant and substrate manufacturers for intended application.

2.4 FABRICATION

- A. Back out or kerf backs of standing and running trim wider than 5 inches, except members with ends exposed in finished work.
- B. Ease edges of lumber less than 1 inch in nominal thickness to 1/16-inch radius and edges of lumber 1 inch or more in nominal thickness to 1/8-inch radius.
- C. Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication.

- D. Fabricate exterior architectural woodwork to dimensions, profiles, and details indicated.
 - 1. Ease edges to radius indicated for the following:
 - a. Edges of Solid-Wood (Lumber) Members: 1/16 inch unless otherwise indicated.
- E. Complete fabrication, including assembly, to maximum extent possible before shipment to Project site.
 - 1. Disassemble components only as necessary for shipment and installation.
 - 2. Where necessary for fitting at site, provide allowance for scribing, trimming, and fitting.
 - 3. Notify Architect seven days in advance of the dates and times exterior architectural woodwork fabrication will be complete.
 - 4. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled.
 - a. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting.
 - b. Verify that parts fit as intended, and check measurements of assemblies against field measurements indicated on approved Shop Drawings before disassembling for shipment.

2.5 SHOP FINISHING

- A. Finish exterior architectural woodwork as indicated on Drawings at fabrication shop. Defer only final touchup, cleaning, and polishing until after installation.
- B. Preparation for Finishing: Comply with the Architectural Woodwork Standards for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing exterior architectural woodwork, as applicable to each unit of work. Finish all sides and cut ends.
- C. Transparent Finish: Comply with Section 099100 "Painting and Coating."

2.6 FASTENERS

- A. General: Provide fasteners of size and type indicated, acceptable to authorities having jurisdiction, and that comply with requirements specified in this article for material and manufacture.
 - 1. Use stainless steel fasteners unless otherwise indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine finish carpentry materials before installation. Reject materials that are wet, moisture damaged, and mold damaged.

- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrates of projections and substances detrimental to application.
- B. Prime lumber and moldings to be painted, including both faces and edges, unless factory primed.
 - 1. Cut to required lengths and prime ends.
 - 2. Comply with requirements in Section 099113 "Exterior Painting."

3.3 INSTALLATION, GENERAL

- A. Do not use materials that are unsound, warped, improperly treated or finished, inadequately seasoned, or too small to fabricate with proper jointing arrangements.
 - 1. Do not use manufactured units with defective surfaces, sizes, or patterns.
- B. Install exterior finish carpentry level, plumb, true, and aligned with adjacent materials.
 - 1. Use concealed shims where necessary for alignment.
 - 2. Scribe and cut exterior finish carpentry to fit adjoining work.
 - 3. Refinish and seal cuts as recommended by manufacturer.
 - 4. Install to tolerance of 1/8 inch in 96 inches for level and plumb. Install adjoining exterior finish carpentry with 1/32-inch maximum offset for flush installation and 1/16-inch maximum offset for reveal installation.
 - 5. Coordinate exterior finish carpentry with materials and systems in or adjacent to it.
 - 6. Provide cutouts for mechanical and electrical items that penetrate exterior finish carpentry.

3.4 REPAIR

- A. Repair damaged and defective exterior architectural woodwork, where possible, to eliminate functional and visual defects and to result in exterior architectural woodwork being in compliance with requirements of the Architectural Woodwork Standards for the specified grade.
- B. Where not possible to repair, replace defective woodwork.

3.5 CLEANING

- A. Clean exterior finish carpentry on exposed and semiexposed surfaces.
- B. Touch up factory-applied finishes to restore damaged or soiled areas.

3.6 PROTECTION

- A. Protect installed products from damage from weather and other causes during construction.

- B. Remove and replace finish carpentry materials that are wet, moisture damaged, and mold damaged.
 - 1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION

SECTION 062023- INTERIOR FINISH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Interior trim.
- B. Related Requirements:
 - 1. Section 017419 "Construction Waster Management and Disposal".
 - 2. Section 018113 "Sustainable Design Requirements".
 - 3. Section 018119 "Construction Indoor Air Quality Requirements".
 - 4. Section 061000 "Rough Carpentry" for furring, blocking, and other carpentry work not exposed to view.
 - 5. Section 079200 "Interior Joint Sealants".
 - 6. Section 099100 "Painting and Coating" for priming and backpriming of interior finish carpentry.

1.3 DEFINITIONS

- A. MDF: Medium-density fiberboard.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials, dimensions, profiles, textures, and colors and include construction and application details.
 - 1. Include data for wood-preservative treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained. Include chemical-treatment manufacturer's written instructions for finishing treated material.
 - 2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced before shipment to Project site to levels specified.
- B. Samples: For each exposed product and for each color and texture specified.
- C. LEED Submittals: The Owner requires the Contractor to implement practices and procedures to meet the project's environmental performance goals, which include conformance with California Green Building Code (CAL Green) and achieving LEED v4 Platinum Certification. The requirements related to these goals are defined in the Articles below and represent a combination of sustainability performance criteria necessary to comply with the California Green

Building Code and achieve LEED certification goals. The Contractor shall ensure that the requirements related to these goals are implemented to the fullest extent.

1. LEED MR Credit 2 - BPDO – Environmental Product Declarations (EPD) Submittal - EPD/LCA Documentation: Provide a publicly available Environmental Product Declaration in conformance with standards listed and described in Section 018113.
2. LEED EQ Credit 2 - Low-Emitting Materials Submittal - Formaldehyde Documentation: Provide a product data sheet or manufacturer affidavit affirming product compliance with CARB ATCM 17 CCR 93120 as defined in Section 018113.
3. LEED EQ Credit 2 - Low-Emitting Materials Submittal - VOC Content Documentation: For adhesive products, provide a product data sheet or third-party certificates indicating the VOC content of the product (less water and exempt solids). Provide documentation indicating the anticipated volume of product use (liters).
4. LEED EQ Credit 2 - Low-Emitting Materials Submittal - VOC Emissions (General) Documentation: Provide a product data sheet or third-party certificates demonstrating testing and compliance with CDPH Standard Method v1.1-2010. Please reference Section 018113 for more details.
5. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials Submittal - FSC Documentation: Provide an FSC Chain of Custody (COC) certificate, an FSC Chain of Custody transfer certifications for any vendors supplying but not modifying product components and invoices itemizing each wood product. Please reference Section 018113 for more details.
6. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials Submittal - Regional Sourcing Documentation: Provide a product data sheet or manufacturer affidavit demonstrating regional sourcing as defined in Section 018113.
7. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials Submittal - Recycled Content Documentation: Provide a product data sheet or manufacturer affidavit noting the pre-consumer (post-industrial) and post-consumer recycled content value of the product or product components in accordance with requirements described in Section 018113.
8. LEED MR Credit 4 - BPDO – Material Ingredients Submittal - Ingredient Reporting Documentation: For adhesives, provide a publicly available material ingredient inventory as defined in Section 018113.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber, plywood, and other panels flat with spacers between each bundle to provide air circulation.
 1. Protect materials from weather by covering with waterproof sheeting, securely anchored.
 2. Provide for air circulation around stacks and under coverings.
- B. Deliver interior finish carpentry materials only when environmental conditions comply with requirements specified for installation areas. If interior finish carpentry materials must be stored in other than installation areas, store only where environmental conditions comply with requirements specified for installation areas.

1.6 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install interior finish carpentry materials until building is enclosed and weatherproof, wet-work in space is completed and nominally dry, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Do not install finish carpentry materials that are wet, moisture damaged, or mold damaged.
 - 1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with applicable rules of any rules-writing agency certified by the American Lumber Standard Committee's (ALSC) Board of Review. Grade lumber by an agency certified by the ALSC's Board of Review to inspect and grade lumber under the rules indicated.
 - 1. Factory mark each piece of lumber with grade stamp of grading agency.
 - 2. For exposed lumber, mark grade stamp on end or back of each piece, or omit grade stamp and provide certificates of grade compliance issued by grading agency.
- B. MDF: ANSI A208.2, Grade 130.

2.2 LEED REQUIREMENTS

- A. LEED MR Credit 2 - BPDO – Environmental Product Declarations (EPD) - EPD/LCA Requirement: The product shall have documented a publicly available Environmental Product Declaration in conformance with standards listed and described in Section 018113.
- B. LEED EQ Credit 2 - Low-Emitting Materials - Formaldehyde Requirement: The product shall contain no added formaldehyde (NAF) resins or use ultra-low-emitting formaldehyde (ULEF) resins as defined in Section 018113.
- C. LEED EQ Credit 2 - Low-Emitting Materials - VOC Content Limit Requirement: Adhesives shall not contain VOC content limits (less water and exempt solids) in excess of those listed in Section 018113, Appendix C.
- D. LEED EQ Credit 2 - Low-Emitting Materials - VOC Emissions (General) Requirement: The product shall demonstrate testing and compliance with CDPH Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, Version 1.1-2010, using the appropriate exposure scenario.
- E. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials - FSC Requirement: The product must be certified by the Forest Stewardship Council and demonstrate a continuous Chain-of-Custody from extraction to installation.

- F. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials - Regional Sourcing Preferment: Preference shall be given to products that can demonstrate regional sourcing as defined in Section 018113.
- G. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials - Recycled Content Preferment: Preference shall be given to products that demonstrate high recycled content values as a percentage of the product determined by weight. Recommended recycled content targets by product are included in Section 018113, Appendix E.
- H. LEED MR Credit 4 - BPDO – Material Ingredients - Ingredient Reporting Preferment: Preference shall be given to adhesive products with a publicly available material ingredient inventory as defined in Section 018113.

2.3 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. Preservative Treatment by Pressure Process: AWP A U1; Use Category UC1.
 - 1. Kiln dry lumber and plywood after treatment to a maximum moisture content of 19 and 18 percent, respectively.
 - 2. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
 - 3. For exposed items indicated to receive transparent finish, do not use chemical formulations that contain colorants or that bleed through or otherwise adversely affect finishes.
 - 4. Do not use material that is warped or does not comply with requirements for untreated material.
 - 5. Mark lumber with treatment-quality mark of an inspection agency approved by the ALSC's Board of Review.
 - a. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece or omit marking and provide certificates of treatment compliance issued by inspection agency.
 - 6. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.
 - a. For exposed plywood indicated to receive a stained or natural finish, mark back of each piece.
 - 7. Application: Where indicated on Drawings.

2.4 INTERIOR TRIM

- A. Lumber Trim for Opaque Finish (Painted Finish):
 - 1. Species and Grade: White woods; WWP A D Select.
 - 2. Maximum Moisture Content: 19 percent with at least 85 percent of shipment at 12 percent or less.
 - 3. Finger Jointing: Not allowed.
 - 4. Face Surface: Surfaced (smooth).
 - 5. Optional Material: Primed MDF of same actual dimensions as lumber indicated may be used in lieu of lumber.

2.5 MISCELLANEOUS MATERIALS

- A. Fasteners for Interior Finish Carpentry: Nails, screws, and other anchoring devices of type, size, material, and finish required for application indicated to provide secure attachment, concealed where possible.
- B. Glue: Aliphatic-resin, polyurethane, or resorcinol wood glue recommended by manufacturer for general carpentry use.
- C. Paneling Adhesive: Comply with paneling manufacturer's written instructions for adhesives.

2.6 FABRICATION

- A. Back out or kerf backs of the following members, except those with ends exposed in finished work:
 - 1. Interior standing and running trim.
- B. Ease edges of lumber less than 1 inch in nominal thickness to 1/16-inch radius and edges of lumber 1 inch or more in nominal thickness to 1/8-inch radius.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine finish carpentry materials before installation. Reject materials that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrates of projections and substances detrimental to application.
- B. Before installing interior finish carpentry, condition materials to average prevailing humidity in installation areas for a minimum of 24 hours unless longer conditioning is recommended by manufacturer.

3.3 INSTALLATION, GENERAL

- A. Do not use materials that are unsound; warped; improperly treated or finished; inadequately seasoned; too small to fabricate with proper jointing arrangements; or with defective surfaces, sizes, or patterns.
- B. Install interior finish carpentry level, plumb, true, and aligned with adjacent materials.
 - 1. Use concealed shims where necessary for alignment.

2. Scribe and cut interior finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
3. Where face fastening is unavoidable, countersink fasteners, fill surface flush, and sand unless otherwise indicated.
4. Install to tolerance of 1/8 inch in 96 inches for level and plumb. Install adjoining interior finish carpentry with 1/32-inch maximum offset for flush installation and 1/16-inch maximum offset for reveal installation.
5. Coordinate interior finish carpentry with materials and systems in or adjacent to it. Provide cutouts for mechanical and electrical items that penetrate interior finish carpentry.

3.4 STANDING AND RUNNING TRIM INSTALLATION

- A. Install trim with minimum number of joints as is practical, using full-length pieces from maximum lengths of lumber available.
 1. Do not use pieces less than 24 inches long, except where necessary.
 2. Stagger joints in adjacent and related standing and running trim.
 3. Miter at returns, miter at outside corners, and cope at inside corners to produce tight-fitting joints with full-surface contact throughout length of joint.
 4. Use scarf joints for end-to-end joints.
 5. Plane backs of casings to provide uniform thickness across joints where necessary for alignment.
 6. Match color and grain pattern of trim for transparent finish (stain or clear finish) across joints.
 7. Install trim after gypsum-board joint finishing operations are completed.
 8. Install without splitting; drill pilot holes before fastening where necessary to prevent splitting.
 9. Fasten to prevent movement or warping.
 10. Countersink fastener heads on exposed carpentry work and fill holes.

3.5 ADJUSTING

- A. Replace interior finish carpentry that is damaged or does not comply with requirements.
 1. Interior finish carpentry may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.
- B. Adjust joinery for uniform appearance.

3.6 CLEANING

- A. Clean interior finish carpentry on exposed and semiexposed surfaces.
- B. Restore damaged or soiled areas and touch up factory-applied finishes if any.

3.7 PROTECTION

- A. Protect installed products from damage from weather and other causes during construction.

- B. Remove and replace finish carpentry materials that are wet, moisture damaged, and mold damaged.
 - 1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION

SECTION 064023 - INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Engineering and fabrication of Acoustical Wood Panel Ceilings in Council Chamber Ceilings, Council Chamber Lobby, and Level 1 Elevator Lobby/Reception.
 - 2. Shop finishing of interior architectural woodwork.
 - 3. Flush wood paneling for wall and ceilings, including curved wall paneling and wood paneled frames.
 - 4. Wood furring, blocking, shims, and hanging strips for installing flush wood paneling that is not concealed within other construction.
 - 5. Shop finishing of flush wood paneling.
 - 6. Wood-veneer-faced architectural cabinets.
 - 7. Wood furring, blocking, shims, and hanging strips for installing architectural cabinets that are not concealed within other construction.
 - 8. Shop finishing of architectural cabinets.
 - 9. Reception and Council Chamber decorative wall panels.
 - 10. Wood-veneer-faced laminated finish at Central Stair.
 - 11. Wood interior door and window storefront frames.
 - 12. Wood veneer and solid hardwood trims and frames in finish applications.
- B. Related Requirements:
 - 1. Section 017419 "Construction Waster Management and Disposal".
 - 2. Section 018113 "Sustainable Design Requirements".
 - 3. Section 018119 "Construction Indoor Air Quality Requirements".
 - 4. Section 057000 "Decorative Metal" for aluminum honeycomb panel used as reinforcing backing adhered to wood acoustical panel in the Council Chamber.
 - 5. Section 057100 "Decorative Metal Stairs" for wood paneling.
 - 6. Section 061000 "Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing interior architectural woodwork that are concealed within other construction before interior architectural woodwork installation.
 - 7. Section 062023 "Interior Finish Carpentry" for interior carpentry exposed to view that is not specified in this Section.
 - 8. Section 125190 "Salvaged Tree Preparation and Custom Furniture".

1.3 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections, to ensure that interior architectural woodwork can be supported and installed as indicated.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.5 ACTION SUBMITTALS

- A. Product Data: For the following:

1. Anchors.
2. Adhesives.
3. Shop finishing materials.
4. Wood-Preservative Treatment:
 - a. Include data and warranty information from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.
 - b. Indicate type of preservative used and net amount of preservative retained.
 - c. Include chemical-treatment manufacturer's written instructions for finishing treated material and manufacturer's written warranty.
5. Fire-Retardant Treatment: Include data and warranty information from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.
6. Waterborne Treatments: For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

- B. Shop Drawings:

1. Include plans, elevations, sections, and attachment details.
2. Show large-scale details.
3. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
4. Show locations and sizes of cutouts and holes for items installed in architectural cabinets.
5. Show veneer leaves with dimensions, grain direction, exposed face, and identification numbers indicating the flitch and sequence within the flitch for each leaf.
6. Apply WI Certified Compliance Program label to Shop Drawings.
7. Shop Drawings for Council Chamber Ceiling shall be stamped and signed by the Professional Engineer responsible for their preparation.

- C. Samples: For each exposed product and for each shop-applied color and finish specified.

1. Size:
 - a. Panel Products: 12 inches by 12 inches, including both flat and curved wall panels.
 - b. Lumber Products: Not less than 5 inches wide by 12 inches long, for each species and cut, finished on one side and one edge.

- D. Samples for Verification: For the following:

1. Lumber for Transparent Finish: Not less than 5 inches wide by 24 inches long, for each species and cut, finished on one side and one edge.

- E. Mock-ups: For the following:

1. Laid-up panels of millwork desk fronts (both flat and curved).

2. Laminated central stair cladding.
3. Council Chamber and Level 1 Reception ceiling acoustical panels, ceiling edge trims, and wood triangular frames.
4. Hardwood interior store front door and window frames.
5. All mock-ups are to include representative sample of associated reveal joints.

F. LEED Submittals: The Owner requires the Contractor to implement practices and procedures to meet the project's environmental performance goals, which include conformance with California Green Building Code (CAL Green) and achieving LEED v4 Platinum Certification. The requirements related to these goals are defined in the Articles below and represent a combination of sustainability performance criteria necessary to comply with the California Green Building Code and achieve LEED certification goals. The Contractor shall ensure that the requirements related to these goals are implemented to the fullest extent.

1. LEED MR Credit 2 - BPDO – Environmental Product Declarations (EPD) Submittal - EPD/LCA Documentation: Provide a publicly available Environmental Product Declaration in conformance with standards listed and described in Section 018113.
2. LEED EQ Credit 2 - Low-Emitting Materials Submittal - Formaldehyde Documentation: Provide a product data sheet or manufacturer affidavit affirming product compliance with CARB ATCM 17 CCR 93120 as defined in Section 018113.
3. LEED EQ Credit 2 - Low-Emitting Materials Submittal - VOC Content Documentation: For adhesive products, provide a product data sheet or third-party certificates indicating the VOC content of the product (less water and exempt solids). Provide documentation indicating the anticipated volume of product use (liters).
4. LEED EQ Credit 2 - Low-Emitting Materials Submittal - VOC Emissions (General) Documentation: Provide a product data sheet or third-party certificates demonstrating testing and compliance with CDPH Standard Method v1.1-2010. Please reference Section 018113 for more details.
5. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials Submittal - FSC Documentation: Provide an FSC Chain of Custody (COC) certificate, an FSC Chain of Custody transfer certifications for any vendors supplying but not modifying product components and invoices itemizing each wood product. Please reference Section 018113 for more details.
6. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials Submittal - Regional Sourcing Documentation: Provide a product data sheet or manufacturer affidavit demonstrating regional sourcing as defined in Section 018113.
7. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials Submittal - Recycled Content Documentation: Provide a product data sheet or manufacturer affidavit noting the pre-consumer (post-industrial) and post-consumer recycled content value of the product or product components in accordance with requirements described in Section 018113.
8. LEED MR Credit 4 - BPDO – Material Ingredients Submittal - Ingredient Reporting Documentation: For adhesives, provide a publicly available material ingredient inventory as defined in Section 018113.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For architectural woodwork manufacturer and Installer.

- B. Qualification Data: For professional engineer who is engineering the Acoustical Wood Panel Ceilings.
- C. Calculations: For the Council Chamber Ceiling. Shall be stamped and signed by a Professional Engineer licensed in the State of California.
- D. Product Certificates: For the following:
 - 1. Composite wood and agrifiber products.
 - 2. Adhesives.
 - 3. Wood veneer-faced acoustical panels.
- E. Evaluation Reports: For fire-retardant-treated wood materials, from ICC-ES.
- F. Field quality-control reports.

1.7 CLOSEOUT SUBMITTALS

- A. Quality Standard Compliance Certificates: WI Certified Compliance Program certificates.

1.8 QUALITY ASSURANCE

- A. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
 - 1. Build mockups of typical interior architectural woodwork as shown on Drawings.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Owner specifically approves such deviations by Change Order.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Comply with the North American Architectural Woodwork Standards (NAAWS), Section 2.
- B. Do not deliver interior architectural woodwork until painting and similar finish operations that might damage woodwork have been completed in installation areas.
- C. Do not deliver cabinets until painting and similar finish operations that might damage architectural cabinets have been completed in installation areas. Store cabinets in installation areas or in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.
- D. Store woodwork in installation areas or in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.
 - 1. Handle and store fire-retardant-treated wood to comply with chemical treatment manufacturer's written instructions.

1.10 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install interior architectural woodwork until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 43 and 70 percent during the remainder of the construction period.
- B. Field Measurements: Where interior architectural woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings.
 - 1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being concealed by construction, and indicate measurements on Shop Drawings.
- C. Established Dimensions: Where interior architectural woodwork is indicated to fit to other construction, establish dimensions for areas where woodwork is to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.11 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that architectural woodwork can be supported and installed as indicated.

PART 2 - PRODUCTS

2.1 LEED REQUIREMENTS

- A. LEED MR Credit 2 - BPDO – Environmental Product Declarations (EPD) - EPD/LCA Requirement: The product shall have documented a publicly available Environmental Product Declaration in conformance with standards listed and described in Section 018113.
- B. LEED EQ Credit 2 - Low-Emitting Materials - Formaldehyde Requirement: The product shall contain no added formaldehyde (NAF) resins or use ultra-low-emitting formaldehyde (ULEF) resins as defined in Section 018113.
- C. LEED EQ Credit 2 - Low-Emitting Materials - VOC Content Limit Requirement: Adhesives shall not contain VOC content limits (less water and exempt solids) in excess of those listed in Section 018113, Appendix C.
- D. LEED EQ Credit 2 - Low-Emitting Materials - VOC Emissions (General) Requirement: The product shall demonstrate testing and compliance with CDPH Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, Version 1.1-2010, using the appropriate exposure scenario.
- E. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials - FSC Requirement: The product must be certified by the Forest Stewardship Council and demonstrate a continuous Chain-of-Custody from extraction to installation.

- F. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials - Regional Sourcing Preferment: Preference shall be given to products that can demonstrate regional sourcing as defined in Section 018113.
- G. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials - Recycled Content Preferment: Preference shall be given to products that demonstrate high recycled content values as a percentage of the product determined by weight. Recommended recycled content targets by product are included in Section 018113, Appendix E.
- H. LEED MR Credit 4 - BPDO – Material Ingredients - Ingredient Reporting Preferment: Preference shall be given to adhesive products with a publicly available material ingredient inventory as defined in Section 018113.

2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Frames: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings indicated on Drawings, based on testing at positive pressure according to NFPA 252 or UL 10C.
 - 1. Smoke- and Draft-Control Assemblies: Listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing according to UL 1784 and installed in compliance with NFPA 105.
- B. Fire-Rated, Borrowed-Lite Assemblies: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9.
- C. Acoustical Wood Panel Ceilings:
 - 1. Deflection: Not greater than L/360.

2.3 ARCHITECTURAL WOODWORK, GENERAL

- A. Quality Standard: Unless otherwise indicated, comply with the North American Architectural Woodwork Standards (NAAWS) for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements.
 - 1. Provide labels and certificates from WI certification program indicating that woodwork complies with requirements of grades specified.
 - 2. The Contract Documents contain requirements that are more stringent than the Architectural Woodwork Standards. Comply with Contract Documents and North American Architectural Woodwork Standards (NAAWS).
- B. Species and Finish: All visible architectural woodwork is to be Clear Finish Douglas Fir Grade AA to match Architect's Sample.
 - 1. Exception: Clear finish reclaimed redwood benches as indicated in the drawings and included in Section 125190 "Salvaged Tree Preparation and Custom Furniture".

2.4 CABINETS, GENERAL

- A. Quality Standard: Unless otherwise indicated, comply with the North American Architectural Woodwork Standards (NAAWS) for grades of architectural cabinets indicated for construction, finishes, installation, and other requirements.
 - 1. Provide labels and certificates from WI certification program indicating that woodwork and installation complies with requirements of grades specified.
 - 2. The Contract Documents contain requirements that are more stringent than the referenced woodwork quality standard. Comply with requirements of Contract Documents in addition to those of the referenced quality standard.

2.5 WOOD CABINETS FOR TRANSPARENT FINISH

- A. North American Architectural Woodwork Standards (NAAWS) Grade: Premium.
- B. Type of Construction: Frameless.
- C. Door and Drawer-Front Style: Flush overlay.
- D. Wood for Exposed Surfaces: Douglas Fir veneer.
 - 1. Blueprint Matching: Comply with veneer and other matching requirements indicated for blueprint-matched paneling.
 - 2. Cut: Rift cut.
 - 3. Grain Direction: Vertically for drawer fronts, doors, and fixed panels, and as indicated on Drawings.
 - 4. Matching of Veneer Leaves: Slip match.
 - 5. Veneer Matching within Panel Face: Center-balance match.
 - 6. Veneer Matching within Room: Provide cabinet and other required veneers in each room or other space from a single flitch with doors, drawer fronts, and other surfaces matched in a sequenced set with continuous match where veneers are interrupted perpendicular to the grain.
- E. Semi-exposed Surfaces:
 - 1. Surfaces Other Than Drawer Bodies: Thermoset decorative panels.
 - a. Edges of Thermoset Decorative Panel Shelves: PVC or polyester edge banding.
 - 2. Drawer Subfronts, Backs, and Sides: Solid-hardwood lumber, same species indicated for exposed surfaces.
 - 3. Drawer Bottoms: Hardwood plywood.
- F. Dust Panels: 1/4-inch plywood or tempered hardboard above compartments and drawers unless located directly under tops.
- G. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.
 - 1. Join subfronts, backs, and sides with glued rabbeted joints supplemented by mechanical fasteners or glued dovetail joints.

2.6 WOOD MATERIALS

- A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.
 - 1. Do not use plain-sawn softwood lumber with exposed, flat surfaces more than 3 inches wide.
 - 2. Wood Moisture Content: 8 to 13 percent.
- B. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.
 - 1. MDF: ANSI A208.2, Grade 130.
 - 2. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1.
 - 3. Thermoset Decorative Panels: Particleboard or MDF finished with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD 3, Grade VGL, for Test Methods 3.3, 3.4, 3.6, 3.8, and 3.10.

2.7 CABINET HARDWARE AND ACCESSORIES

- A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets except for items specified in Section 087100 "Door Hardware."
- B. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 170 degrees of opening, self-closing.
- C. Back-Mounted Pulls: BHMA A156.9, B02011.
- D. Wire Pulls: Refer to Finish Schedule on Drawings.
- E. Catches: Push-in magnetic catches, BHMA A156.9, B03131.
- F. Adjustable Shelf Standards and Supports: BHMA A156.9, B04071; with shelf rests, B04081.
- G. Shelf Rests: BHMA A156.9, B04013; two-pin plastic with shelf hold-down clip.
- H. Drawer Slides: BHMA A156.9.
 - 1. Grade 1 and Grade 2: Side mounted and extending under bottom edge of drawer.
 - a. Type: Full extension.
 - b. Material: Zinc-plated steel with polymer rollers.
 - 2. Grade 1HD-100 and Grade 1HD-200: Side mounted; full-extension type; zinc-plated-steel, ball-bearing slides.
 - 3. For drawers not more than 3 inches high and not more than 24 inches wide, provide Grade 1.
 - 4. For drawers more than 3 inches high, but not more than 6 inches high and not more than 24 inches wide, provide Grade 1HD-100.
 - 5. For drawers more than 6 inches high or more than 24 inches wide, provide Grade 1HD-200.
 - 6. For computer keyboard shelves, provide Grade 1HD-100.
 - 7. For trash bins not more than 20 inches high and 16 inches wide, provide Grade 1HD-200.

- I. Slides for Sliding Glass Doors: BHMA A156.9, B07063; aluminum.
 - J. Slides for Pocket Doors: Hafele Accuride 123 Sliding Door System or equal.
 - K. Door Locks: BHMA A156.11, E07121.
 - L. Drawer Locks: BHMA A156.11, E07041.
 - M. Door and Drawer Silencers: BHMA A156.16, L03011.
 - N. Grommets for Cable Passage: 2-inch OD, molded-plastic grommets and matching plastic caps with slot for wire passage.
 - 1. Color: Black.
 - O. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.
 - 1. Satin Stainless Steel: BHMA 630.
 - P. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.
 - Q. Retractable pocket door slide for cabinet doors.
 - 1. Accuride 123 Pocket Door Slide.
- 2.8 INTERIOR STANDING AND RUNNING TRIM, AND REVEAL CLOSURES, FOR TRANSPARENT FINISH
- A. North American Architectural Woodwork Standards (NAAWS) Grade: Premium.
 - B. Hardwood Lumber: Split species shall not be allowed. Mill wood to the following requirements:
 - 1. Species: Douglas Fir.
 - 2. Cut: Rift cut.
 - 3. Wood Moisture Content: 8 to 13 percent.
- 2.9 HARDWOOD SHEET MATERIALS
- A. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of the North American Architectural Woodwork Standards (NAAWS) for each type of interior architectural woodwork and quality grade specified unless otherwise indicated.
 - 1. Medium-Density Fiberboard (MDF): ANSI A208.2, Grade 130.
- 2.10 COUNCIL CHAMBER CEILING AND HEAD WALL, COUNCIL CHAMBER LOBBY CEILING, CITY HALL LEVEL 1 RECEPTION CEILING AND BACK WALL
- A. Contractor shall fully engineer assembly.
 - B. Finished ceiling and wall assemblies are made of acoustical wood panels (Soundply RF M-25 by Navy Island or approved equal) with manufacturer's recommended support clips and hardwood veneer trim and frame elements. all wood to be clear finish Douglas fir to match architect's sample. Where edges are visible, panels shall have 1 inch wide edge banding.

- C. Ceiling support is from light gauge metal C and hat channel framing, light gauge metal soffit framing, or from slotted metal channel framing. Wall finish support is from framed, gypsum-clad partition, or from light gauge metal framing with furring.

2.11 RECEPTION WALL DECORATIVE PANEL

- A. Three-dimensional, textured panel with MDF core, mounted where shown on Drawings.
 - 1. Basis-of-Design: 3Form, modular profile panels. Refer to Finish Schedule on Drawings.
 - a. Style: Trig.
 - b. Finish: Enamel White.

2.12 FIRE-RETARDANT-TREATED WOOD MATERIALS

- A. Fire-Retardant Fiberboard: Medium-density fiberboard (MDF) and plywood panels complying with ANSI A208.2, made from softwood fibers, synthetic resins, and fire-retardant chemicals mixed together at time of panel manufacture, to achieve flame-spread index of 25 or less and smoke-developed index of 200 or less according to ASTM E84.

2.13 MISCELLANEOUS MATERIALS

- A. Furring, Blocking, Shims, and Nailers: Fire-retardant-treated softwood lumber, kiln-dried to less than 15 percent moisture content.
- B. Provide self-drilling screws for metal-framing supports, as recommended by metal-framing manufacturer.
- C. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage.
 - 1. Provide metal expansion sleeves or expansion bolts for post-installed anchors.
 - 2. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.
- D. Installation Adhesive: Product recommended by fabricator for each substrate for secure anchorage.

2.14 FABRICATION

- A. Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication.
- B. Fabricate interior architectural woodwork to dimensions, profiles, and details indicated.
 - 1. Ease edges to radius indicated for the following:
 - a. Edges of Solid-Wood (Lumber) Members: 1/16 inch unless otherwise indicated.
 - b. Edges of Rails and Similar Members More Than 3/4 Inch Thick: 1/8 inch.
- C. Complete fabrication, including assembly, to maximum extent possible before shipment to Project site.

1. Disassemble components only as necessary for shipment and installation.
2. Where necessary for fitting at site, provide allowance for scribing, trimming, and fitting.
3. Notify Architect seven days in advance of the dates and times interior architectural woodwork fabrication will be complete.
4. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled.
 - a. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting.
 - b. Verify that parts fit as intended, and check measurements of assemblies against field measurements indicated on approved Shop Drawings before disassembling for shipment.

2.15 SHOP PRIMING

- A. Preparations for Finishing: Comply with the North American Architectural Woodwork Standards (NAAWS) for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing interior architectural woodwork, as applicable to each unit of work.
- B. Interior Architectural Woodwork for Transparent Finish: Shop-seal concealed surfaces with required pretreatments and first coat of finish as specified in Section 099100 "Painting and Coating."

2.16 SHOP FINISHING

- A. General: Finish architectural cabinets at manufacturer's shop as specified in this Section. Defer only final touchup, cleaning, and polishing until after installation.
- B. General: Shop finish transparent-finished architectural cabinets at manufacturer's shop as specified in this Section.
- C. Preparation for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing architectural cabinets, as applicable to each unit of work.
 1. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of cabinets.
- D. Transparent Finish:
 1. North American Architectural Woodwork Standards (NAAWS) Grade: Premium.
 2. Finish: System - 5, conversion varnish.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before installation, condition interior architectural woodwork to humidity conditions in installation areas for not less than 72 hours prior to beginning of installation.

- B. Before installing interior architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming of concealed surfaces.

3.2 INSTALLATION

- A. Grade: Install interior architectural woodwork to comply with same grade as item to be installed.
- B. Assemble interior architectural woodwork and complete fabrication at Project site to the extent that it was not completed during shop fabrication.
- C. Install interior architectural woodwork level, plumb, true in line, and without distortion.
 - 1. Shim as required with concealed shims.
 - 2. Install level and plumb to a tolerance of 1/8 inch in 96 inches.
- D. Scribe and cut interior architectural woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- E. Fire-Retardant-Treated Wood Materials: Install fire-retardant-treated wood to comply with chemical treatment manufacturer's written instructions, including those for adhesives used to install woodwork.
- F. Anchor interior architectural woodwork to anchors or blocking built in or directly attached to substrates.
 - 1. Secure with countersunk, concealed fasteners and blind nailing.
 - 2. For shop-finished items, use filler matching finish of items being installed.

3.3 CABINET INSTALLATION

- A. North American Architectural Woodwork Standards (NAAWS) Grade: Install cabinets to comply with quality standard grade of item to be installed.
- B. Assemble cabinets and complete fabrication at Project site to extent that it was not completed in the shop.
- C. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing. Use fine finishing nails[or finishing screws] for exposed fastening, countersunk and filled flush with cabinet surface.
 - 1. For shop-finished items, use filler matching finish of items being installed.
- D. Install cabinets level, plumb, and true in line to a tolerance of 1/8 inch in 96 inches using concealed shims.
 - 1. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
 - 2. Install cabinets without distortion so doors and drawers fit openings and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
 - 3. Maintain veneer sequence matching of cabinets with transparent finish.

4. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches o.c. with [No. 10 wafer-head screws sized for not less than 1-1/2-inch penetration into wood framing, blocking, or hanging strips] [No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish] [toggle bolts through metal backing or metal framing behind wall finish].
- E. Shop Finishes: Touch up finishing after installation of architectural cabinets. Fill nail holes with matching filler.
 1. Apply specified finish coats, including stains and paste fillers if any, to exposed surfaces where only sealer/prime coats are shop applied.

3.4 WOOD PANELING INSTALLATION

- A. Grade: Install paneling to comply with quality standard grade of paneling to be installed.
- B. Install paneling level, plumb, true in line, and without distortion. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches. Install with no more than 1/16 inch in 96-inch vertical cup or bow and 1/8 inch in 96-inch horizontal variation from a true plane.
 1. For flush paneling with revealed joints, install with variations in reveal width, alignment of top and bottom edges, and flushness between adjacent panels not exceeding 1/32 inch.
- C. Anchor paneling to supporting substrate with concealed panel-hanger clips.
 1. Do not use face fastening unless covered by trim or otherwise indicated.
- D. Complete finishing work specified in this Section to extent not completed at shop or before installation of paneling. Fill nail holes with matching filler where exposed.
- E. Apply specified finish coats, including stains and paste fillers if any, to exposed surfaces where only sealer/prime coats are shop applied.

3.5 FIELD QUALITY CONTROL

- A. Inspections: Provide inspection of installed Work through WI's Certified Compliance Program certifying that woodwork, including installation, complies with requirements of the North American Architectural Woodwork Standards (NAAWS) for the specified grade.
 1. Inspection entity shall prepare and submit report of inspection.

3.6 REPAIR

- A. Repair damaged and defective interior architectural woodwork, where possible, to eliminate functional and visual defects and to result in interior architectural woodwork being in compliance with requirements of North American Architectural Woodwork Standards (NAAWS) for the specified grade.
- B. Where not possible to repair, replace defective woodwork.

- C. Shop Finish: Touch up finishing work specified in this Section after installation of interior architectural woodwork.
 - 1. Fill nail holes with matching filler where exposed.
 - 2. Apply specified finish coats, including stains and paste fillers if any, to exposed surfaces where only sealer/prime coats are shop applied.

3.7 CLEANING

- A. Clean interior architectural woodwork on exposed and semi-exposed surfaces.

END OF SECTION

SECTION 064116 PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Plastic-laminate-clad architectural cabinets.
 - 2. Plastic-laminate-clad architectural custom lockers.
 - 3. Plastic-laminate-clad architectural custom open shelving.
 - 4. Wood furring, blocking, shims, and hanging strips for installing plastic-laminate-clad architectural cabinets that are not concealed within other construction.
- B. Related Requirements:
 - 1. Section 017419 "Construction Waster Management and Disposal".
 - 2. Section 018113 "Sustainable Design Requirements".
 - 3. Section 018119 "Construction Indoor Air Quality Requirements".
 - 4. Section 061000 "Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing cabinets that are concealed within other construction before cabinet installation.
 - 5. Section 079200 "Interior Joint Sealants".
 - 6. Section 123661 "Solid Surfacing Countertops".

1.3 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to support loads imposed by installed and fully loaded cabinets.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include data for fire-retardant treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.
- B. Shop Drawings:
 - 1. Include plans, elevations, sections, and attachment details.
 - 2. Show large-scale details.
 - 3. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
 - 4. Show locations and sizes of cutouts and holes for items installed in plastic-laminate architectural cabinets.

5. Apply WI Certified Compliance Program label to Shop Drawings.
- C. Samples for Verification: For the following:
1. Plastic Laminates: 8 by 10 inches, for each type, color, pattern, and surface finish required.
 - a. Provide one sample applied to core material with specified edge material applied to one edge.
 2. Thermoset Decorative Panels: 8 by 10 inches, for each color, pattern, and surface finish.
 - a. Provide edge banding on one edge.
 3. Corner Pieces:
 - a. Cabinet-front frame joints between stiles and rails and at exposed end pieces, 18 inches high by 18 inches wide by 6 inches deep.
 - b. Miter joints for standing trim.
 4. Cabinet Hardware and Accessories: One full-size unit for each type and finish, including all exposed hardware, drawer glides, adjustable shelving pins, grommets, and door hinges.
- D. LEED Submittals: The Owner requires the Contractor to implement practices and procedures to meet the project's environmental performance goals, which include conformance with California Green Building Code (CAL Green) and achieving LEED v4 Platinum Certification. The requirements related to these goals are defined in the Articles below and represent a combination of sustainability performance criteria necessary to comply with the California Green Building Code and achieve LEED certification goals. The Contractor shall ensure that the requirements related to these goals are implemented to the fullest extent.
1. LEED MR Credit 2 - BPDO – Environmental Product Declarations (EPD) Submittal - EPD/LCA Documentation: Provide a publicly available Environmental Product Declaration in conformance with standards listed and described in Section 018113.
 2. LEED EQ Credit 2 - Low-Emitting Materials Submittal - VOC Content Documentation: For adhesive products, provide a product data sheet or third-party certificates indicating the VOC content of the product (less water and exempt solids). Provide documentation indicating the anticipated volume of product use (liters).
 3. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials Submittal - Regional Sourcing Documentation: Provide a product data sheet or manufacturer affidavit demonstrating regional sourcing as defined in Section 018113.
 4. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials Submittal - Recycled Content Documentation: Provide a product data sheet or manufacturer affidavit noting the pre-consumer (post-industrial) and post-consumer recycled content value of the product or product components in accordance with requirements described in Section 018113.
 5. LEED MR Credit 4 - BPDO – Material Ingredients Submittal - Ingredient Reporting Documentation: For adhesives, provide a publicly available material ingredient inventory as defined in Section 018113.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer and Installer.
- B. Product Certificates: For the following:
 - 1. Composite wood and agrifiber products.
 - 2. Thermoset decorative panels.
 - 3. High-pressure decorative laminate.
 - 4. Adhesives.
- C. Evaluation Reports: For fire-retardant-treated materials, from ICC-ES.
- D. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

- A. Quality Standard Compliance Certificates: WI Certified Compliance Program certificates.

1.7 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.
 - 1. Manufacturer's Certification: Licensed participant in WI's Certified Compliance Program.
- B. Installer Qualifications: Manufacturer of products and Licensed participant in WI's Certified Compliance Program.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver cabinets until painting and similar finish operations that might damage architectural cabinets have been completed in installation areas. Store cabinets in installation areas or in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.9 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature and relative humidity at levels planned for building occupants during the remainder of the construction period.
- B. Field Measurements: Where cabinets are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 - 1. Locate concealed framing, blocking, and reinforcements that support cabinets by field measurements before being enclosed/concealed by construction, and indicate measurements on Shop Drawings.

- C. Established Dimensions: Where cabinets are indicated to fit to other construction, establish dimensions for areas where cabinets are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.1 LEED REQUIREMENTS

- A. LEED MR Credit 2 - BPDO – Environmental Product Declarations (EPD) - EPD/LCA
Preferment: Preference shall be given to products with a publicly available Environmental Product Declaration in conformance with standards listed and described in Section 018113.
- B. LEED EQ Credit 2 - Low-Emitting Materials - VOC Content Limit Requirement: Adhesives shall not contain VOC content limits (less water and exempt solids) in excess of those listed in Section 018113, Appendix C.
- C. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials - Regional Sourcing Preferment: Preference shall be given to products that can demonstrate regional sourcing as defined in Section 018113.
- D. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials - Recycled Content Requirement: The product or product components shall meet or exceed the maximum recycled content percentages as listed for the product or component type in Section 018113, Appendix E, in accordance with standards listed in Section 018113.
- E. LEED MR Credit 4 - BPDO – Material Ingredients - Ingredient Reporting Preferment: Preference shall be given to adhesive products with a publicly available material ingredient inventory as defined in Section 018113.

2.2 PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS

- A. Quality Standard: Unless otherwise indicated, comply with the Architectural Woodwork Standards for grades of cabinets indicated for construction, finishes, installation, and other requirements.
 - 1. Provide labels and certificates from WI certification program indicating that woodwork and installation complies with requirements of grades specified.
 - 2. The Contract Documents contain requirements that are more stringent than the referenced quality standard. Comply with requirements of Contract Documents in addition to those of the referenced quality standard.
- B. Architectural Woodwork Standards Grade: Custom.
- C. Type of Construction: Frameless.
- D. Door and Drawer-Front Style: Flush overlay.
- E. High-Pressure Decorative Laminate: Refer to Finish Schedule on Drawings.
- F. Laminate Cladding for Exposed Surfaces (including surfaces in recesses for knee space and refrigerators):

1. Horizontal Surfaces: Grade HGS.
2. Edges: ABS to match plastic laminate.

G. Materials for Semiexposed Surfaces:

1. Surfaces Other Than Drawer Bodies: Thermoset decorative panels.
 - a. Edges of Thermoset Decorative Panel Shelves: PVC or polyester edge banding.
 - b. For semiexposed backs of panels with exposed plastic-laminate surfaces, provide surface of high-pressure decorative laminate, NEMA LD 3, Grade VGS.
2. Drawer Sides and Backs: Solid-hardwood lumber.
3. Drawer Bottoms: Hardwood plywood.

H. Dust Panels: 1/4-inch plywood or tempered hardboard above compartments and drawers unless located directly under tops.

I. Concealed Backs of Panels with Exposed Plastic-Laminate Surfaces: High-pressure decorative laminate, NEMA LD 3, Grade BKL.

J. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.

1. Join subfronts, backs, and sides with glued rabbeted joints supplemented by mechanical fasteners or glued dovetail joints.

2.3 PLASTIC-LAMINATE-CLAD ARCHITECTURAL CUSTOM LOCKERS

A. Panel Product:

1. Comply with requirements of the "Architectural Woodwork Standards – Section 4 Sheet Products" requirements for hardwood and softwood veneers.
2. Medium-Density Fiberboard (MD): ANSI A 208.2.
 - a. Formaldehyde Emission Levels: Comply with formaldehyde emission requirements of ANSI A 208.2.
 - b. Non-Formaldehyde Fire-Retardant Fiberboard: Board tested for flame spread of 25 or less and for smoke developed of 200 or less per ASTM E 84 by UL, Warnock Hersey, or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify with appropriate markings of applicable testing and inspecting agency.

B. Plastic Laminate:

1. High-Pressure Decorative Laminate: ANSI / NEMA LD 3.

C. Doors: Flat Panel.

1. Finish: Plastic laminate.
2. Color: As selected by Architect.

D. Locker Size:

1. As shown on Drawings.

E. Frame:

1. Thickness: 3/4 inch thick Medium-Density Fiberboard.
2. Finish: Thermo fused melamine.
3. Exposed Edges: 2 mm PVC edge banding in color to match locker doors.

- F. Furring, Blocking, Shims, and Hanging Strips:
 - 1. Softwood or hardwood lumber, kiln dried to less than 15 percent moisture content.
- G. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage.
 - 1. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as indicated on Drawings.
 - 2. Provide toothed-steel or lead-expansion sleeves for drilled-in-place anchors.
 - 3. Provide neoprene isolation at wall attachment for acoustics.
- H. Hardware:
 - 1. Frameless Hinges (European Type): Fully concealed, nickel-plated steel, with not less than 125 degrees of opening, slow-closing, with closure silencers and/or resilient bumpers.
 - a. Provide two hinges for doors 900 mm high and less.
 - b. Provide three hinges for doors more than 900 mm high.
 - 2. Exposed Hardware Finishes: Unless otherwise indicated, provide finish that complies with BHMA A156.18 for BHMA finish number indicated on Drawings.
- I. Lock: Electronic combination keypad.
 - 1. Digilock Range Keypad Bolt.
 - a. Front unit body: Vertical.
 - b. Finish: Brushed nickel and black.
 - c. Rear unit: Deadbolt.
- J. Miscellaneous:
 - 1. Number Plates:
 - a. Manufacturer's standard etched, embossed, or stamped, nonferrous metal number plates with numerals not less than 3/8 inch high.
 - b. As required, number lockers in sequence as reviewed by Architect.
 - c. Attach plates to each locker door, near top, centered, with at least 2 fasteners of same finish as number plate.
 - 2. Finished End Panels:
 - a. To match door.

2.4 PLASTIC LAMINATE CLAD SHELVES

- A. Unless indicated otherwise, furnish and install plastic laminate on all edges of shelving. Plastic laminate shall be as scheduled and be a minimum of 0.050" thick.
 - 1. All shelving shall be 3/4" thick, 45-pound medium density particleboard.
 - 2. Adhesives to be non-flammable contact, semi-rigid or polyvinyl cement. Follow adhesive manufacturer's recommendations.

2.5 WOOD MATERIALS

- A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.
 - 1. Wood Moisture Content: 8 to 13 percent.
- B. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.

1. Medium-Density Fiberboard (MDF): ANSI A208.2, Grade 130.
2. Thermoset Decorative Panels: Particleboard or MDF finished with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD 3, Grade VGL, for Test Methods 3.3, 3.4, 3.6, 3.8, and 3.10.

2.6 CABINET HARDWARE AND ACCESSORIES

- A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets. Refer to Finish Schedule on Drawings.
- B. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 135 degrees of opening, self-closing.
- C. Back-Mounted Pulls: BHMA A156.9, B02011.
- D. Wire Pulls: Back mounted, solid metal.
- E. Catches: Magnetic catches, BHMA A156.9, B03141.
- F. Adjustable Shelf Standards and Supports: BHMA A156.9, B04071; with shelf rests, B04081.
- G. Drawer Slides: BHMA A156.9.
 1. Grade 1 and Grade 2: Side mounted[*and extending under bottom edge of drawer*].
 - a. Type: Full extension.
 - b. Material: Zinc-plated steel with polymer rollers.
 2. Grade 1HD-100 and Grade 1HD-200: Side mounted; full-extension type; zinc-plated-steel ball-bearing slides.
 3. For drawers not more than 3 inches high and not more than 24 inches wide, provide Grade 1.
 4. For drawers more than 3 inches high, but not more than 6 inches high and not more than 24 inches wide, provide Grade 1HD-100.
 5. For drawers more than 6 inches high or more than 24 inches wide, provide Grade 1HD-200.
 6. For computer keyboard shelves, provide Grade 1HD-100.
 7. For trash bins not more than 20 inches high and 16 inches wide, provide Grade 1HD-200.
- H. Door and Drawer Silencers: BHMA A156.16, L03011.
- I. Grommets for Cable Passage: 1-1/4-inch OD, stainless steel grommets and matching caps with slot for wire passage. No. 4 finish.
- J. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.
 1. Satin Stainless Steel: BHMA 630.
- K. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

2.7 MISCELLANEOUS MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln-dried to less than 15 percent moisture content.
- B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.

2.8 FABRICATION

- A. Fabricate architectural cabinets to dimensions, profiles, and details indicated.
- B. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
 - 1. Notify Architect seven days in advance of the dates and times architectural cabinet fabrication will be complete.
 - 2. Trial fit assemblies at manufacturer's shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements before disassembling for shipment.
- C. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.
- D. Install glass to comply with applicable requirements in Section 08 8000 "Glazing" and in GANA's "Glazing Manual."
 - 1. For glass in frames, secure glass with removable stops.
 - 2. For exposed glass edges, polish and grind smooth.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before installation, condition cabinets to humidity conditions in installation areas for not less than 72 hours.

3.2 INSTALLATION

- A. Architectural Woodwork Standards Grade: Install cabinets to comply with quality standard grade of item to be installed.

- B. Assemble cabinets and complete fabrication at Project site to extent that it was not completed in the shop.
- C. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with wafer-head cabinet installation screws.
- D. Install cabinets level, plumb, and true in line to a tolerance of 1/8 inch in 96 inches using concealed shims.
 - 1. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
 - 2. Install cabinets without distortion so doors and drawers fit openings and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
 - 3. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches o.c. with No. 10 wafer-head screws sized for not less than 1-1/2-inch penetration into wood framing, blocking, or hanging strips.

3.3 FIELD QUALITY CONTROL

- A. Inspections: Provide inspection of installed Work through WI's Certified Compliance Program certifying that woodwork, including installation, complies with requirements of the Architectural Woodwork Standards for the specified grade.
 - 1. Inspection entity shall prepare and submit report of inspection.

3.4 ADJUSTING AND CLEANING

- A. Repair damaged and defective cabinets, where possible, to eliminate functional and visual defects. Where not possible to repair, replace architectural cabinets. Adjust joinery for uniform appearance.
- B. Clean, lubricate, and adjust hardware.
- C. Clean cabinets on exposed and semi-exposed surfaces.

END OF SECTION

SECTION 066000 - PLASTIC FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Plastic fabrications, complete, as shown and specified.
- B. Related Requirements:
 - 1. Section 017419 "Construction Waste Management and Disposal".
 - 2. Section 018113 "Sustainable Design Requirements".
 - 3. Section 018119 "Construction Indoor Air Quality Requirements".

1.3 ACTION SUBMITTALS

- A. Product Data: Manufacturer's specifications, data, and installation instructions.
- B. Shop Drawings:
 - 1. Submit large-scale drawings at not less than 3 in. = 1 ft. for the fabrication and installation of assemblies that are not completely shown by manufacturer's data sheets.
 - 2. Show construction of various parts, methods of joining, thicknesses of plastics, profiles of surfaces, reinforcing anchorage, and supports. Include information regarding concealed and exposed joints, sizes and locations of fastenings.
 - 3. Interfaces: Where items must fit and coordinate with finished surfaces or construction spaces, take measurements at project Site and not from Drawings.
- C. Samples: Provide minimum 6 in. square sample of each type of Decorative Plastic Panel specified. Provide full-size samples of each type of hardware.
- D. Test Reports: Submit product test reports from a qualified independent 3rd party testing agency indicating each type and class of panel system complies with the project performance requirements, based on comprehensive testing of current products. Previously completed test reports will be acceptable if for current manufacturer and indicative of products used on this project. Test reports required are:
 - 1. Rate of Burning (ASTM D 635)
 - 2. Self-Ignition Temperature (ASTM D 1929)
 - 3. Density of Smoke (ASTM D 2843)
 - 4. Flame spread and Smoke developed testing (ASTM E 84)
 - 5. Room Corner Burn Test (NFPA 286)
 - 6. Extent of Burning (UL 94)
 - 7. Impact strength (ASTM D 3763)
 - 8. Safety glazing impact resistance (ANSI Z97.1-2004)
 - 9. UPIIT Test for Combustion Product Toxicity

10. Dynamic environmental testing (ASTM standards D 5116 and D 6670)

1.4 QUALITY ASSURANCE

A. Manufacturer's Qualifications:

1. Materials and systems shall be manufactured by a company continuously and regularly employed in the manufacture of specified materials for a period of at least five (5) consecutive years and which can show evidence of those materials being satisfactorily used on at least six (6) projects of similar size, scope and location. At least three (3) of the projects shall have been successful for use five (5) years or longer.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver Plastic Fabrications, systems and specified items in manufacturer's standard protective packaging.
- B. Do not deliver Plastic Fabrications, system, components and accessories to Project site until areas are ready for installation.
- C. Store materials in a flat orientation in a dry place that is not exposed to exterior elements.
- D. Handle materials to prevent damage to finished surfaces. Provide protective coverings to prevent damage or staining following installation for duration of project.
- E. Before installing Plastic Fabrications, permit them to reach room temperature.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install Solid Polymer Fabrications until spaces are enclosed and weatherproof, and ambient temperatures and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1.7 WARRANTY

- A. Manufacturer's Special Warranty on Plastic Fabrications: Manufacturer's standard form agreeing to repair or replace units that fail in material or workmanship within the specified warranty period.
- B. Warranty Period: 2 years after the date of substantial completion.
- C. The warranty shall not deprive the owner of other rights or remedies the Owner may have under other provisions of the Contract Documents and is in addition to and runs concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Decorative Plastic Panels: 3Form Varia Ecoresin to be backlit.

1. Thickness: 1/4 inch.
2. Finish: Vellum F04.
3. Style: Powder D03.

B. Material Attributes:

1. Engineered polyester resin
2. Sheet Size: Maximum 4' x 10'

C. Sheet minimum performance attributes:

1. Rate of Burning (ASTM D 635). Material must attain CC1 Rating for a nominal thickness of 1.5 mm (0.060 in.) and greater.
2. Self-Ignition Temperature (ASTM D 1929). Material must have a Self-ignition temperature greater than 650°F.
3. Density of Smoke (ASTM D 2843). Material must have a smoke density less than 75%.
4. Flame spread and Smoke developed testing (ASTM E 84). Material must be able to meet a level of Class B (Flame spread between 26 and 75; smoke less than 450) at thickness of 1 inch.
5. Room Corner Burn Test (NFPA 286). Material must meet Class B criteria at 1/4 inch thickness as described by the 2003 International Building Code.
6. Extent of Burning (UL 94). Must submit UL card.
7. Impact strength. Minimum impact strength test as measured by ASTM D 3763 of 20 ft. lbs. (for durability, shipping, installation, and use).
8. Safety Glazing. Material must attain a Class A impact rating in accordance with ANSI Z97.1-2004 at 1/8" thickness.
9. UPIIT Test for Combustion Product Toxicity: Product must be recorded as "not more toxic than wood".
10. Dynamic environmental testing (ASTM standards D 5116 and D 6670). Panels must not have detectable VOC off-gassing agents and must be have Greenguard Indoor Air Quality certified.

2.2 ACCESSORIES

- A. General: Provide products of material, size, and shape required for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Cleaner: Type recommended by manufacturer.
- C. Fasteners: Use screws designed specifically for plastics. Self-threading screws are acceptable for permanent installations. Provide threaded metal inserts for applications requiring frequent disassembly such as light fixtures. Provide stainless steel wire and fasteners as required to adequately support hanging panels.

2.3 HARDWARE

- A. Hardware: Hardware as required to achieve installation shown in architectural details.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Examine areas and conditions under which plastic fabrication items are to be installed. Give written notification of conditions detrimental to the proper and timely completion of Work. Do not proceed with Work until conditions are satisfactory.

3.2 PREPARATION

- A. Field Measurements and Conditions: Verify in field, as required, for Work fabricated to fit Project conditions. Pre-drill holes in decorative plastic panels, as recommended by manufacturer. Where panels are aligned in continuous runs, provide lap joints between panels to prevent light leaks between panels.

3.3 INSTALLATION

- A. General: Set work accurately in location, alignment, and elevation; plumb, level, true, and free of rattle or vibration where expansion-contraction tolerances are required; measured from established lines and levels.
- B. Protection: Protect plastic and hardware from damage to surface, profiles, and shape.

END OF SECTION

SECTION 066116 – SOLID SURFACE FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Solid-surface-material countertops and backsplashes.
 - 2. Laboratory countertops and backsplashes.
 - 3. Interior wall panels and wall base.
- B. Related Sections:
 - 1. Section 017419 "Construction Waster Management and Disposal".
 - 2. Section 018113 "Sustainable Design Requirements".
 - 3. Section 018119 "Construction Indoor Air Quality Requirements".
 - 4. Section 061000 "Rough Carpentry" for plywood substrate.

1.3 ACTION SUBMITTALS

- A. Product Data: For countertop materials, wall base, and decorative wall and ceiling finishes.
- B. Shop Drawings:
 - 1. For countertops: Show materials, finishes, edge and backsplash profiles, methods of joining, and cutouts for plumbing fixtures.
 - 2. For wall base, show materials, finishes, edge profiles, inside and outside corners, and methods of joining.
 - 3. For wall and ceiling finishes. Show materials, finishes, edges, inside and outside corners, cutouts for signage and elevator accessories. Provide calculations and details for support elements stamped by a registered California engineer; calculations to include panel sizes and thicknesses, support clips, shims, attachments, wall blocking and metal stud framing.
- C. Samples for Verification: For the following products:
 - 1. Countertop material, 6 inches square.
 - 2. One full-size solid-surface-material countertop, with front edge and backsplash, 8 by 10 inches, of construction and in configuration specified.
 - 3. One full-size quartz agglomerate countertop, with front edge and backsplash, 8 by 10 inches, of construction and in configuration specified.
 - 4. One 6 inch by 6 inch by 12 inch long sample of fabricated corner as shown on Detail 12/3-A9.7.2 SOLID SURFACE CORNER DETAIL.

5. Provide compatible, color-matched, sealant, at locations called-out in Drawings and details,
- D. LEED Submittals: The Owner requires the Contractor to implement practices and procedures to meet the project's environmental performance goals, which include conformance with California Green Building Code (CAL Green) and achieving LEED v4 Platinum Certification. The requirements related to these goals are defined in the Articles below and represent a combination of sustainability performance criteria necessary to comply with the California Green Building Code and achieve LEED certification goals. The Contractor shall ensure that the requirements related to these goals are implemented to the fullest extent.
 1. LEED MR Credit 2 - BPDO – Environmental Product Declarations (EPD) Submittal - EPD/LCA Documentation: Provide a publicly available Environmental Product Declaration in conformance with standards listed and described in Section 018113.
 2. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials Submittal - Regional Sourcing Documentation: Provide a product data sheet or manufacturer affidavit demonstrating regional sourcing as defined in Section 018113.
 3. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials Submittal - Recycled Content Documentation: Provide a product data sheet or manufacturer affidavit noting the pre-consumer (post-industrial) and post-consumer recycled content value of the product or product components in accordance with requirements described in Section 018113.
 4. LEED MR Credit 4 - BPDO – Material Ingredients Submittal - Ingredient Reporting Documentation: Provide a publicly available material ingredient inventory as defined in Section 018113.

1.4 PROJECT CONDITIONS

- A. Field Measurements: Verify dimensions of countertops by field measurements before countertop fabrication is complete.

1.5 COORDINATION

- A. Coordinate locations of utilities that will penetrate countertops or backsplashes.

PART 2 - PRODUCTS

2.1 LEED REQUIREMENTS

- A. LEED MR Credit 2 - BPDO – Environmental Product Declarations (EPD) - EPD/LCA Preferment: Preference shall be given to products with a publicly available Environmental Product Declaration in conformance with standards listed and described in Section 018113.
- B. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials - Regional Sourcing Preferment: Preference shall be given to products that can demonstrate regional sourcing as defined in Section 018113.
- C. LEED MR Credit 3 - BPDO – Sourcing of Raw Materials - Recycled Content Preferment: Preference shall be given to products that demonstrate high recycled content values as a

percentage of the product determined by weight. Recommended recycled content targets by product are included in Section 018113, Appendix E.

- D. LEED MR Credit 4 - BPDO – Material Ingredients - Ingredient Reporting Preferment: Preference shall be given to products with a publicly available material ingredient inventory as defined in Section 018113.

2.2 SOLID-SURFACE-MATERIAL COUNTERTOPS

- A. Basis-of-Design: Refer to Finish Schedule on Drawings.
- B. Configuration: Provide countertops with the following front and backsplash style:
 - 1. Front: Straight, slightly eased at top, 3/4-inch thick with apron, 3 inches high.
 - 2. Backsplash: Straight, slightly eased at corner, unless otherwise shown.
 - 3. Endsplash: Matching backsplash.
- C. Countertops: 3/4-inch-thick, solid surface material with front edge built up with same material.
- D. Backsplashes: 1/2-inch-thick, solid surface material.
- E. Fabrication: Fabricate tops in one piece with shop-applied edges and backsplashes, unless otherwise indicated. Comply with solid-surface-material manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.
 - 1. Fabricate with loose backsplashes for field assembly.

2.3 QUARTZ AGGLOMERATE COUNTERTOPS

- A. Basis-of-Design: Refer to Finish Schedule on Drawings.
- B. Configuration: Provide countertops with the following front and backsplash style:
 - 1. Front: Straight edge, 3/4-inch, with apron, **3 inches high.**
 - 2. Backsplash: Straight, slightly eased at corner, unless otherwise shown.
 - 3. Endsplash: Matching backsplash.
- C. Countertops: 3/4-inch- thick, quartz agglomerate with front edge built up with same material.
- D. Backsplashes: 1/2-inch-thick, quartz agglomerate.
- E. Fabrication: Fabricate tops in one piece with shop-applied edges and backsplashes, unless otherwise indicated. Comply with quartz agglomerate manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.
 - 1. Fabricate with loose backsplashes for field assembly.

2.4 LABORATORY COUNTERTOPS

- A. Basis of Design: Wilsonart “Durcon.” Epoxy resin laboratory worksurface.

2.5 COUNTERTOP MATERIALS

- A. Plywood: Exterior softwood plywood complying with DOC PS 1, Grade C-C Plugged, touch sanded.
- B. Adhesives: Adhesives shall not contain urea formaldehyde.
- C. Solid Surface Material: Homogeneous solid sheets of filled plastic resin complying with ANSI SS1.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Avonite Surfaces.
 - b. E. I. du Pont de Nemours and Company.
 - c. Formica Corporation.
 - d. Wilsonart International.
 - 2. Type: Provide Standard Type, unless Special Purpose Type is indicated.
 - 3. Colors and Patterns: As selected by Architect from manufacturer's full range.
- D. Quartz Agglomerate Wall: Basis-of-Design: Refer to Finish Schedule on Drawings 3-AF1.1, and Interior Wall Finish Assembly Z300 on sheet 3-A9.7.0. For configuration, installation, and dimensional requirements, refer to plans, elevations, and details.

2.6 WALL BASE

- A. As indicated on finish plans, elevations and details, and as scheduled in finish drawings. Thickness and height as indicated in details. Lengths to be as long as possible, minimizing joint lines in the wall base. Square corners, polished top and front faces.

2.7 DECORATIVE WALL AND CEILING FINISHES

- A. As indicated on finish plans, elevations, and details, and as scheduled in finish drawings. Thickness and panel sizes and openings as indicated in elevations and details, and as engineered in shop drawings. Square corners, all visible faces to be polished.

PART 3 - EXECUTION

3.1 GENERAL

- A. Manufacturer's Instructions: Prepare substrates and install the work, including components and accessories in accordance with the manufacturer's instructions, except where more stringent requirements are shown or specified. Examine the areas to receive the Work and remedy detrimental conditions.
- B. Field Dimensions: Verify dimensions and conditions in field and adjust solid surfacing in the shop to accommodate field conditions.

- C. Examine substrates to receive solid surface material countertops and conditions under which countertops will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of countertops.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 COUNTERTOP INSTALLATION

- A. Install countertops level to a tolerance of 1/8 inch in 8 feet. Do not exceed 1/64-inch difference between planes of adjacent units.
- B. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Pre-drill holes for screws as recommended by manufacturer. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
- C. Fasten subtops to cabinets by screwing through subtops into cornerblocks of base cabinets. Shim as needed to align subtops in a level plane.
- D. Secure countertops to subtops with adhesive according to solid surface material manufacturer's written instructions. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
- E. Bond joints with adhesive and draw tight as countertops are set. Mask areas of countertops adjacent to joints to prevent adhesive smears.
 - 1. Install metal splines in kerfs in countertop edges at joints where indicated. Fill kerfs with adhesive before inserting splines and remove excess immediately after adjoining units are drawn into position.
 - 2. Clamp units to temporary bracing, supports, or each other to ensure that countertops are properly aligned and joints are of specified width.
- F. Install backsplashes and endsplashes to comply with manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.
 - 1. Install backsplashes and end splashes by adhering to wall and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears.
- G. Install aprons to backing and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears. Fasten by screwing through backing. Predrill holes for screws as recommended by manufacturer.
- H. Complete cutouts not finished in shop. Mask areas of countertops adjacent to cutouts to prevent damage while cutting. Make cutouts to accurately fit items to be installed, and at right angles to finished surfaces unless beveling is required for clearance. Ease edges slightly to prevent snipping.
 - 1. Seal edges of cutouts in particleboard subtops by saturating with varnish.
- I. Apply sealant to gaps at walls; comply with Section 079200 "Joint Sealants."

3.3 WALL AND CEILING INSTALLATION

- A. Install solid surface wall panels with supports as detailed. Panels are to be mechanically supported by steel support clips fit to routed recesses in panels, and permanently attached by applying epoxy or non-shrink grout to connections. Install to a tolerance of 1/8 inch in 8'-0".
- B. Install solid surface wall base with latex thinset.
- C. Cutouts in wall panels shall be clean and neat, with no visible cuts beyond required openings. Coordinate with associated trades (including, but not limited to, elevator, signage, and fire protection equipment, etc.) to dimension and prepare required openings. All visible cut edges are to be polished to match finish face of panel.

3.4 ADJUSTING AND CLEANING

- A. Defective Work: Touch-up, refinish, or replace damaged, stained, scratched, or otherwise disfigured portions of the Work to the satisfaction of the Architect.
- B. Cleaning: Following completion of installation, clean both inside and outside surfaces of Solid Surfacing.

3.5 PROTECTION

- A. General: Protect Solid Surfacing against damage until Work is accepted.

END OF SECTION