
PART 1 GENERAL**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
1. Access flooring panels and understructure.
 2. Floor panel coverings.
 3. Underfloor air distribution.
 4. Underfloor wiring raceway.
 5. Accessories necessary for a complete installation.
- B. Access flooring for tenant areas shall be stocked on the floor for installation by others at the time of tenant buildout.
1. Install access flooring in all other scheduled locations.
- C. Related Sections include the following:
1. Division 1 Section "Sustainable Design Requirements" for additional LEED requirements.
 2. Division 1 Section "Construction Waste Management" for additional LEED requirements.
 3. Division 9 Section "Concrete Floor Sealer" for concrete floor sealer.
 4. Division 9 Section "Carpet Tile" for carpet tiles applied over access flooring panels.
 5. Division 15 Section "Air Terminal Units" for variable-air-volume diffusers.
 6. Division 15 Section "Testing, Adjusting, and Balancing" for pressure testing of underfloor plenum.
 7. Division 16 Section "Grounding and Bonding" for connection to ground of access flooring understructure.

1.3 DEFINITION

- A. ESD: Electrostatic discharge. The transfer of electric charge between bodies at different potentials.
- B. UFAD: Under-floor air distribution.
- C. RAF: Raised access flooring.

1.4 QUALITY ASSURANCE

- A. The work of this section shall be performed by a company which specializes in the type of access flooring work required for this Project, with a minimum of 5 years of documented successful experience and shall be performed by skilled workmen thoroughly experienced in the necessary crafts.
1. Work shall be performed in compliance with Owner's insurance underwriters' requirements and UL approvals and testing for materials, assemblies and procedures.
- B. Manufacturer shall specialize in manufacturing the type of access flooring specified in this section, with a minimum of 5 years of documented successful experience, and have the facilities capable of meeting all requirements of Contract Documents as a single-source responsibility and warranty.
- C. Installer Qualifications: An employer of workers trained and approved by manufacturer having minimum 5 years documented experience.
- D. Source Limitations: Obtain access flooring system through one source from a single manufacturer.
- E. Regulatory Requirements:
1. Fabricate and install access flooring to comply with NFPA 75 requirements for raised flooring.
 2. Building Code: Comply with applicable requirements of the 2012 IBC for interior finishes.
 3. Ceilings & Interior Systems Construction Association (CISCA) Recommended Test Procedures for Access Floors.
- F. Provide floor panels that are clearly and permanently marked on their underside with panel type and concentrated-load rating.

- G. Testing Agency Qualifications: Independent testing agency having minimum of 5 years experience testing access floor components in accordance with CISCA Recommended Test Procedures.
- H. Commissioning: Include start up and adjusting and commissioning of UFAD RAF in mechanical start up, adjusting, and commissioning activities.
- I. Mock Up: Given that underfloor air distribution raised access floor is a combination of components that must be carefully interfaced for efficient operation and that no industry standard or testing techniques exist for testing underfloor air plenums, mock ups will be tested for functions of UFAD RAF as an air supply duct or plenum.
1. Construct full room size mockup for each type of RAF assembly to test the structural integrity, efficiency, and functions of UFAD RAF as an air supply duct or plenum for air tight conditions. In addition, mock ups will serve to verify RAF selections, to demonstrate aesthetic effects, to set quality standards for materials and execution, and to demonstrate commitment to an integrated design.
 - a. Demonstrate preparation of floor slab, installation of panel system with air distribution and electrical components, sealing of joints and panel seams to prevent air leakage, and water and dust infiltration into plenum area, acoustic and vibration issues, location of diffusers, maximum unducted distance entry from point of air supply into plenum to most distant air diffuser, return air pathways to AHU.
 2. Mockup Testing for Air Leakage: Test each mock up for air leakage between panels.
 - a. Provide test fan with the capability of supplying various airflow quantities from shutoff to 120% of design airflow quantity required for the mock up test and driven by a variable speed inverter.
 - 1) Install test fan with an airflow test station and the supply duct connected into the plenum with an adhesive sealed pressure tight connection.
 - b. Insert static pressure sensor controller into the plenum and calibrate against a calibrated static pressure sensor immediately adjoining it.
 - 1) Arrange controller to control the speed of the test fan.
 - c. Install UFAD plenum complete with a representative number of supply diffusers, electrical power outlets, and voice/data outlets.
 - 1) Set supply diffusers, whether automatically or manually controlled, in the fully closed design position.
 - d. Operate fan to hold the test pressure in the plenum.
 - 1) The test pressure shall be the design operating static pressure for the system.
 - e. Operate system for 24 hours, with the measured static pressure (in. w.g.) and airflow rate (CFM) recorded 24 times (nominally each hour).
 - 1) The sum of the 24 flow rates (CFM) shall be divided by 24.
 - 2) This average value will be considered the leakage.
 - f. With the test fan off, the floor panel and edge joints, tightly seal the supply air diffusers and the cable floor connectors with mastic and sealant taping, and repeat test for 24 hours with hourly readings, and the method of averaging repeated.
 - 1) Subtract second leakage test rate from the first leakage test rate.
 - g. Compare leakage to allowable rates specified.
 - 1) If rates exceed specified values, inspect using test smoke if necessary to determine sources or causes of the leakage.
 - 2) Take appropriate corrective action and retest, repeating test process until the rates are within specified range.
 - h. Incorporate systemic corrections required to bring mockup into compliance with the test limits into construction process and procedures for UFAD plenums.
- J. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."
1. Review connection with mechanical and electrical systems.
 2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
- K. Manufacturer's identification tags or marks are not acceptable on surfaces which will remain exposed to view after installation.
1. Evidence of "patching" after removal of tags or marks is not acceptable.

1.5 PERFORMANCE REQUIREMENTS

- A. Performance Requirements, General: Provide access flooring systems that comply with the following requirements:
1. Access flooring systems are proprietary portable systems composed of modular floor panels on elevated supports (understructures) forming accessible underfloor cavities (air spaces) to accommodate electrical and mechanical services.
 2. Access flooring systems comply with performance requirements specified as determined by testing manufacturers' current standard products representing those indicated for this Project.
- B. Structural Performance per CISCA A/F: Provide access flooring systems capable of supporting the following loads, within limits and under conditions indicated, as demonstrated by testing according to the referenced procedures in Ceilings and Interior Systems Construction Association's (CISCA) "Recommended Test Procedures for Access Floors." This publication and its procedures are referenced elsewhere in this Section as CISCA A/F.
1. Concentrated Loads, Top Deflection: Provide floor panels, including those with cutouts, capable of withstanding specified concentrated design loads indicated for use, with a top surface deflection under load and a permanent set not to exceed values shown below:
 - a. Imposed Load: 1250 lbs. (without stringers).
 - 1) Deflection: 0.10".
 - 2) Set: 0.010".
 - b. Imposed Load: 2000 lbs. (with stringers).
 - 1) Deflection: 0.10".
 - 2) Set: 0.015".
 - c. Imposed Load: 1500 lbs. (without stringers).
 - 1) Deflection: 0.10".
 - 2) Set: 0.010".
 2. Ultimate Loads: Provide access flooring systems capable of withstanding a minimum ultimate concentrated load equal to value obtained by multiplying specified concentrated floor panel design load by a factor of 2.5 without failing according to CISCA A/F, Section II Ultimate Loading.
 - a. Failure is defined as the point at which access flooring system will not take any additional load.
 3. Rolling Loads: Provide access flooring systems capable of withstanding rolling loads of the following magnitude, with a combination of local and overall deformation not to exceed 0.040 inch after exposure to rolling load over CISCA A/F Path A or B, whichever path produces the greatest top surface deformation, according to CISCA A/F, Section III Rolling Loads.
 - a. Rolling Load Test for 1250 lbf floor panel (without stringers).
 - 1) Imposed Load: 1200 lbs. for 10 passes and 800 lbs. for 10,000 passes must endure without deformation.
 - b. Rolling Load Test for 2000 lbf floor panel (with stringers).
 - 1) Imposed Load: 2000 lbs. for 10 passes and 1750 lbs. for 10,000 passes must endure without deformation.
 - c. Rolling Load Test for 1500 lbf floor panel (without stringers).
 - 1) Imposed Load: 1500 lbs. for 10 passes and 1250 lbs. for 10,000 passes must endure without deformation.
 4. Stringer Load Testing: Provide stringers, without panels in place, capable of withstanding specified concentrated load at center of span with a permanent set not to exceed 0.010 inch, as determined per CISCA A/F, Section IV. Stringer Load Testing.
 5. Pedestal Axial Load Test: Provide pedestal assemblies, without panels or supports in place, capable of withstanding a 5000 lbf axial load per pedestal, according to CISCA A/F, Section V, Pedestal Axial Load Test.
 6. Pedestal Overturning Moment Test: Provide pedestal assemblies, without panels or supports in place, capable of withstanding an overturning moment per pedestal of 1000 lbf x inches according to CISCA A/F, Section VI, *Pedestal Overturning Moment Test*.
- C. Cut Floor Panel Load Performance: Panel with a round cutout shall be capable of withstanding without failure, a concentrated load applied through a 1 inch diameter steel indenter placed anywhere on the panel of 1.5 times the Concentrated Load Performance specified.
- D. Floor Panel Impact Load Performance: Provide access flooring system capable of withstanding an impact load when dropped from 36 inches onto a 1 sq. in. area located anywhere on panel, without failing. Failure is defined as collapse of access flooring system.
1. 1250 psi floor panel, 2000 psi floor panel and 1500 psi floor panel: Must endure 150 lb. impact load without failing.

- E. Combustibility: Provide access floor assembly with noncombustible components complying with compliance with requirements of ASTM E 136 *Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 degrees C.*
- F. Air Leakage: Comply with CISCA A/F Section X, *Air Leakage.*
 - 1. Bare Floor Surface: With static pressure of 0.05 in. w.g. (water gauge) in floor cavity average leak rate through seams of bare panels, maximum 0.5 CFM per linear ft.
 - a. Note: One linear foot of panel seam length is equivalent to one square foot of floor area.
 - 2. Floor Surface with Off Module, Adhesive Applied Carpet Tile: With static pressure of 0.05 in w.g. in floor cavity average leak rate through panel seams shall be no greater than 0.030 CFM per linear ft.

1.6 SUBMITTALS

- A. Submit the following according to Conditions of the Construction Contract and Division 1 Specification Sections.
- B. Product Data: Technical data and supporting test data for each type of product indicated.
- C. Shop Drawings: Include layout of access flooring system and relationship to adjoining Work based on field-verified dimensions.
 - 1. Details and sections with descriptive notes indicating materials, finishes, fasteners, typical and special edge conditions, accessories, and understructure.
 - a. Submit Drawings showing raised floor panel layout including starting point of installation.
 - b. Show edge details of ramps, steps, handrails, and anchoring of pedestal bases to subfloor.
 - 2. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - 3. Floor Loading Plan: Shall clearly indicate but not be limited to interim stocking of palletized tiles and relocation of areas to accommodate ongoing work activities consistent with the capacity of the structure.
 - 4. Coordinate pedestal locations with all under-floor services.
 - 5. First shop drawing plan submittal shall only show exact grid locations for electrical/teldata whips.
 - a. Second shop drawing plan submittal will be issued after Tenant Improvement plans and specifications are issued and shall show exact grid locations of both air diffusers and electrical/teldata outlets.
- D. Samples: For each type of flooring material and exposed finish indicated, provide one complete full size floor panel, pedestal, and understructure unit for each type of access flooring system required.
- E. LEED Submittals:
 - 1. Credit MR 2.1 and 2.2: Waste management plan complying with Division 1 Section "Construction Waste Management.
 - 2. Product Data for Credit EQ 4.1: For pedestal installation adhesive, including printed statement of VOC content.
 - 3. Credit MR 4.1 and 4.2: List of proposed materials with recycled content.
 - a. Indicate projected materials cost, projected post-industrial (pre-consumer) recycled content, and projected post-consumer recycled content for each product projected to have recycled content.
 - 4. Product Data for Credit EQ 4.3: For carpet and installation adhesive, documentation indicating compliance with specified requirements.
 - 5. Credit MR 5.1 and 5.2: List of proposed regionally extracted, processed, and manufactured materials.
 - a. Identify each projected regionally manufactured material that is also projected to have been extracted, harvested or recovered within 500 miles of the project, its projected source and projected materials cost.
- F. Product Certificates: For each type of access flooring system, signed by product manufacturer.
- G. Qualification Data: For Installer.
- H. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, or performed by access flooring manufacturer and witnessed by a qualified testing agency, for each type of flooring material and exposed finish.
- I. Operations, Maintenance, and Housekeeping Manual. Submit hardcopy in 3 ring binder with electronic copy on CD-ROM in PDF format.
- J. Commissioning: Submit commissioning report.

- K. Hazardous Materials Notification: In the event no product or material is available that does not contain asbestos, PCB or other hazardous materials as determined by the Owner, a "Material Safety Data Sheet" (MSDS) equivalent to OSHA Form 20 shall be submitted for that proposed product or material prior to installation.
- L. Asbestos and PCB Certification: After completion of installation, but prior to Substantial Completion, Contractor shall certify in writing that products and materials installed, and processes used, do not contain asbestos or polychlorinated biphenyls (PCB), using format in Article 3 of General Conditions.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Comply with General Conditions and Division 1 Section "Product Requirements."

1.8 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install access flooring until spaces are enclosed, subfloor has been sealed, ambient temperature is between 40 and 90 deg F (4 and 32 deg C), and relative humidity is not more than 70 percent, 24 hours a day during and after installation.
- B. Field Measurements: Check actual locations of walls and other construction to which access flooring must fit by accurate field measurements before preparing Shop Drawings.
 1. Show recorded measurements on Shop Drawings.
 2. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.9 COORDINATION

- A. Coordinate location of mechanical and electrical work in underfloor cavity to prevent interference with access flooring pedestals.
- B. Mark pedestal locations on subfloor by use of a grid, with a module equal to width of five floor panels in both directions, to enable mechanical and electrical work to proceed without interfering with access flooring pedestals.
- C. Proceed with installation only after completion of other construction within affected spaces.
- D. Coordinate installation of system with various other trades as required for completion of the system and surrounding spaces.

1.10 WARRANTY

- A. Comply with General Conditions and Division 1 Section "Product Requirements" agreeing to repair or replace specified materials or Work that has failed within the warranty period.
- B. Submit written warranty in which manufacturer agrees to repair or replace components of raised access panel with underfloor air distribution that fail in materials or workmanship within specified warranty period.
 1. Failures include, but are not limited to, the following:
 2. Air leakage exceeding allowable maximum rate specified.
 - a. Deterioration of assembly components beyond normal wear.
 3. Warranty Period: Five years from date of Substantial Completion.

1.11 EXTRA MATERIALS

- * A. Provide 2,000 sq. ft. of standard field panels and understructure components to support them packaged with protective covering for storage and identified with labels clearly describing contents.
- *

1.12 SYSTEM DESCRIPTION

- A. Access Flooring System: Assemblies composed of modular floor panels on pedestals with or without stringers.

PART 2 PRODUCTS

2.1 UNAUTHORIZED MATERIALS

- A. Materials and products required for work of this section shall not contain asbestos, polychlorinated biphenyls (PCB) or other hazardous materials identified by the Owner.

2.2 FLOOR PANELS AND UNDERSTRUCTURE

- A. Manufacturer: Subject to compliance with requirements, provide products by:
1. Haworth, Inc.
- B. Other manufacturers considered:
1. ASM Modular Floors, Inc.
 2. Tate Access Floors, Inc.
 3. Camino Modular.
- C. Access Floor System: Multiple types of raised access floor assemblies are required for the work, including, but not limited to: 1250 psi/1500psi, or 2000 psi.
1. Location of each type is indicated on the drawings and specifications.
 2. Access floor system contains 58% recycled content.
- D. Floor Panels: Provide TecCrete modular panels complying with requirements that one person, using a portable lifting device, can interchange with field panels without disturbing adjacent panels or understructure:
1. Nominal Panel Size: 24 inches by 24 inches by 1-1/8" thick for the 1250 lbf panel or 1-1/2" thick for the 1500 lbf and 2000 lbf panel.
 2. Fabrication Tolerances: Fabricate panels to tolerances with squareness tolerances expressed as the difference between diagonal measurements from corner to corner:
 - a. Size and Squareness: Plus or minus 0.015 inch of required size, with a squareness tolerance of plus or minus 0.015 inch, unless tolerances are otherwise indicated for a specific panel type.
 - b. Flatness: Plus or minus 0.020 inch, measured on a diagonal on top of panel.
 - c. Panel squareness ± 0.015 " or less.
 - d. Panel interchangeability – all panels, except those modified to meet special conditions, shall be interchangeable.
 - e. Finished installation shall be level within ± 0.060 " in 10 feet and ± 0.100 " for the entire floor.
 3. Panel Attachment to Understructure: Varies by assembly.
 - a. Comply with manufacturer written instructions for each system.
 - b. By gravity.
 - c. By bolting to pedestal head.
 - 1) Provide panels with holes drilled in corners to align precisely with threaded holes in pedestal heads and to accept countersunk screws with heads flush with top of panel.
 - 2) Provide fasteners held captive to panels.
- E. Lightweight Concrete Filled, Formed Steel Panels: Fabricated with die cut flat top sheet and die formed and stiffened bottom pan formed from cold rolled steel sheet joined together by resistance welding to form an enclosed assembly, with metal surfaces protected against corrosion by factory applied finish.
1. Fully grout internal spaces of completed units with lightweight high-strength concrete fill.
 2. Panel Finish: Bare Panel;
 - a. Finished grade at locations where subsequent flooring materials will not be applied.
 - b. Standard grade at locations where subsequent flooring materials will be applied.
- F. Pedestals: Assembly consisting of base, column with provisions for height adjustment, and head (cap); made of steel.
1. Base: Square or circular base with not less than 103 sq. cm of bearing area.
 2. Column: Of height required to bring finished floor to elevations indicated.
 - a. Weld to base plate.
 3. Provide vibration proof leveling mechanism for making and holding fine adjustments in height over a range of not less than 51 mm and for locking at a selected height, so deliberate action is required to change height setting and vibratory displacement is prevented.
 4. Head: Designed to support understructure system indicated.
 - a. Provide sound deadening pads or gaskets at contact points between heads and panels.
 - b. Provide head with four holes aligned with holes in floor panels for bolting of panels to pedestals.
 5. Pedestal assembly shall provide an adjustment range of +/- 1" when finished floor height is 6" or more adjustable at 1/64" increments.
- G. Stringer Systems: Modular steel stringer systems made to interlock with pedestal heads and form a grid pattern placing stringers under each edge of each floor panel and a pedestal under each corner of each floor panel.
1. Protect steel components with manufacturer's standard galvanized or corrosion-resistant paint finish.

2. Bolted Stringers: System of main and cross stringers connected to pedestals with threaded fasteners accessible from above.
 3. Provide continuous gasket at contact surfaces between panel and stringers to deaden sound, to seal off underfloor cavity from above, and to maintain panel alignment and position.
 4. Provide stringers where required.
- H. Underfloor Air Distribution: Refer to mechanical drawings and specifications.
- I. Floor Panel Covering: Provide bare panels without factory applied floor coverings on traffic surfaces, where indicated to receive carpet tile, and at tenant lease areas.
1. Provide floor coverings of type indicated that are laminated by access flooring manufacturer to tops of floor panels.
 2. Floor coverings, Re: Finish Schedule.
- J. Adhesives: Adhesive recommended by manufacturer for bonding pedestal bases to subfloor.
1. Provide adhesive with a low VOC content limit to be 50 g/L.
- K. Post Installed Anchors: For anchoring pedestal bases to subfloor, provide 4 post installed expansion anchors made from carbon steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5 (5microns) for Class SC 1 service condition (mild), with the capability to sustain, without failure, a load equal to 1.5 times the loads imposed by pedestal overturning moment on fasteners, determined by testing per ASTM E 488, conducted by a qualified independent testing agency.
- L. Cutouts: Provide cutouts in floor panels for swirl diffusers and service outlets.
1. Provide reinforcement or additional support, if needed, to make panels with cutouts comply with standard performance requirements.
 2. Number of 2' x 2' Floor Panels with Cutouts:
 - a. Round cutouts for swirl diffuser: Provide unit cost allowance per cutout.
 - b. Round cutouts for electrical/data box: Provide unit cost allowance per cutout.
 3. Size and Shape of Cutouts: Coordinate size for swirl diffuser or electrical/data box with manufacturer.
 4. Location of Cutouts on a Panel: Located in the center of a quadrant.
 5. Trim edge of cutouts with plastic molding.
 6. Fit cutouts with grommets in sizes indicated or, if size of cutouts exceeds maximum grommet size available, trim edge of cutouts with plastic molding having tapered top flange. Furnish removable covers for grommets.
 7. Provide foam rubber pads for sealing annular space formed in cutouts by cables.
- M. Cavity Dividers: Provide metal dividers located where indicated or required by Code to divide underfloor cavities.
- N. Plenum Dividers: Provide manufacturer's standard metal dividers located where indicated to divide underfloor cavities.
1. Locate where indicated on Architectural and/or MEP documents.
 2. Provide precut holes coordinated with Division 15 Contractor where required.
- O. Vertical Closures (Fascia): Where underfloor cavity is not enclosed by abutting walls or other construction, provide metal closure plates with standard finish.
- P. Ramps: Ramp construction of width and slope indicated but not steeper than 1:12, with raised disc or textured rubber or vinyl floor coverings, and of same materials, performance, and construction requirements as access flooring.
- Q. Panel Lifting Device: Portable lifting device of type required for specified panels.
1. Provide one lifting devices per room of each type required.
- R. Perimeter Support: Where indicated, provide supporting panel edge and forming transition between access flooring and adjoining floor coverings at same level as access flooring.
- S. Air Strip Gaskets: For exposed concrete panel conditions (between each pane).
- T. Fabrication Tolerance:
1. Floor panel flatness measured on a diagonal: Plus or minus 0.035 inch.

2. Floor panel flatness measured along edges: Plus or minus 0.025 inch.
3. Floor panel width or length of required size: Plus or minus 0.010 inch.
4. Floor panel squareness tolerance: Plus or minus 0.015 inch.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer and manufacturer's representative present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
 1. Verify that substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, foreign deposits, and debris that might interfere with adhesive attachment of pedestals.
 2. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. Verify concrete slab has been cleaned and sealed and is ready to receive RAF. Refer to Division 9 Section "Concrete Sealer".
 1. The concrete sealer and pedestal adhesive must be chemically compatible with each other.
- C. Preinstallation Adhesive Field Test: Before installing pedestals, field test their adhesion to subfloor surfaces as follows:
 1. In areas representative of each subfloor surface, set typical pedestal assemblies in same adhesive and methods required for completed work.
 2. Allow test installation to cure for 30 days, with a pressure of 25 lbf applied vertically to pedestals during this period.
 3. After curing, apply lateral load against a straight steel bar inserted 2 inches into pedestal stems. Measure the force needed to cause adhesive failure of pedestal base.
 4. Proceed with installation only after tests show compliance with performance requirement specified for pedestals' capability to resist overturning moment.

3.2 PREPARATION

- A. Lay out floor panel installation to keep the number of cut panels at floor perimeter to a minimum. Avoid using panels cut to less than 6 inches.
- B. Locate each pedestal, complete any necessary subfloor preparation, and vacuum clean subfloor to remove dust, dirt, and construction debris before beginning installation.
- C. Examine structural subfloor for unevenness, irregularities, and dampness that affect quality and execution of the work. Do not proceed with installation until structural subfloor surfaces are level, clean, and dry.
- D. Verify dimensions on Contract Drawings, including level of interfaces including abutting floor, ledges, and doorsills.
- E. Thoroughly clean concrete slab and seal with concrete sealer specified in Division 9 Section "Concrete Sealer" prior to installation of RAF and after gypsum board installation, underfloor air distribution, plumbing, and electrical work is completed.

3.3 INSTALLATION

- A. Pedestal locations shall be established from approved shop drawings and marked by use of a 10' by 10' grid on concrete subfloor so that mechanical and electrical work can be installed without interfering with pedestal installation.
- B. Prohibit traffic, except that of access floor Installer, on access floor areas for 24 hours after pedestal installation to allow pedestal adhesive to set. Do not allow removal of access floor panels for 72 hours after panel installation.
- C. Installation of access floor shall be coordinated with other trades to maintain the integrity of the installed system.
 1. Traffic shall not be permitted on any floor area for 24 hours to allow the pedestal adhesive to set.
- D. Dust-or-debris-producing operations by other trades shall not be allowed in areas where access floor is being installed to ensure proper bonding of pedestals to subfloor.

- E. Install access flooring system and accessories under supervision of the access flooring manufacturer's authorized representative to produce a rigid, firm installation that complies with performance requirements and is free of vibration, rocking, rattles, and squeaks.
- F. Set pedestals in adhesive as recommended by the access flooring manufacturer to provide full bearing of the pedestal base on the subfloor.
 - 1. Where required by conditions, seismic designation, or manufacturer, attach pedestals to subfloor by postinstalled expansion anchors.
- G. Lay out floor panel installation to keep the number of cut panels at the floor perimeter to a minimum.
 - 1. Scribe perimeter panels to provide a close fit with adjoining construction with no voids greater than 1/8" where panels abut vertical surfaces.
 - 2. To prevent dusting, seal cut edges of filled formed-steel panels with sealer recommended by panel manufacturer.
 - 3. Connect grounding strips embedded in static-conductive floor covering to connector clips attached to pedestals at intervals needed to comply with performance requirements for electrical resistance of floor covering.
 - 4. Attach one grounding continuity connector to each access floor panel laminated with static-conductive floor covering to comply with performance requirements for electrical resistance of floor covering.
- H. Partially complete floors shall be braced against shifting to maintain integrity of the installed system.
- I. Additional pedestals shall be provided as needed to support panels where floor is disrupted by columns, walls and cutouts.
- J. Understructure shall be aligned such that all uncut panels are interchangeable and fit snugly but do not bind when placed in alternate positions.
- K. Secure stringers to pedestal heads according to the access flooring manufacturer's instructions.
- L. Scribe underfloor-cavity dividers to closely fit against subfloor surfaces and seal with mastic to maintain plenum effect within underfloor cavity.
- M. Scribe vertical closures to closely fit against subfloor and adjacent finish floor surfaces.
 - 1. Set in mastic and seal to maintain plenum effect within underfloor cavity.
- N. Clean dust, dirt, and construction debris caused by floor installation, including vacuuming the subfloor area, as installation of floor panels proceeds.
- O. Cut and trim access flooring and perform other dirt-or-debris-producing operations as remotely as possible from installation area and to prevent contamination of subfloor under access flooring already installed.
- P. Attach pedestals to subfloor by post installed mechanical anchors.
 - 1. Adjust pedestals to permit top of installed panels to be set flat, level, and to proper height.
 - 2. Secure stringers to pedestal heads according to access flooring manufacturer's written instructions.
- Q. Underfloor Air Delivery Cavities:
 - 1. Air Tightness: Prior to commencement of the RAF installation, seal walls mounted to slab in areas to receive raised floors at wall slab line to maintain air tightness.
 - a. Seal air duct, conduit, cabling and piping penetrations through cavity walls, plenum dividers and slab.
 - b. Seal utility penetrations cut into access floor cavity during and after completion of floor installation.
 - 2. Seal access floor as necessary at identified locations to maintain air tightness: access floor perimeter at slab to ceiling walls, fire walls and columns; fascia edge constructions; fire barriers below door thresholds; access floor curb connections.
 - a. Seal penetrations cut into access floor panels for utilities.
 - 3. Seal cable and wire openings with approved, removable cable cutout seal or air grommets.
 - 4. Provide knock out service plate location for RAF recessed power distribution boxes appropriately filled or blanked to prevent uncontrolled and or excessive air leakage from the supply plenum.

- R. Sealing of Air Cavities: Seal underfloor air cavities at three specific times: prior to, during, and upon completion of access floor installation.
1. Comply with manufacturer's written instructions for sealing cavities to prevent dust and construction debris from entering cavities.
 2. Verify cavity sealing requirements are identified and maintained.
 3. Inspect work of installers of other work to ensure cavity sealing requirements are maintained.
 4. Replace or repair seals when disturbed by others.
 5. Success of underair distribution system is dependent on maintaining sealed air cavities.
 6. Make sure that every slab-to-ceiling wall fits tightly and is correctly sealed at the slab-line before access flooring is installed.
 - a. Irregular wall surfaces may require gaskets, caulking, or tape to properly seal access floor-to-wall connections.
 7. Completely seal cavity seams where walls rest on subfloors, and where access flooring connects with slab-to-ceiling walls, columns and other obstructions.
 8. All utility access points such as openings for air ducts, conduits, cables, and pipes must be carefully sealed.
 - a. All openings in building elements for plumbing, electricity and voice/data cabling must be sealed by the trades that do those installations and must be inspected before access floors are installed.
 9. Carpet installer must ensure proper air sealing by fitting carpets snugly against walls and other vertical surfaces, and by consistently overlapping floor panel joints with carpet tiles.
 - a. Extend carpet tiles all the way to the wall, carefully fitting perimeter panels, and tightly installing wall bases.
 10. Air Strip Gaskets: Provide Air Strip Gaskets for all Janitor Rooms, Air Handling Unit Rooms, Electric Rooms, Telecom Rooms, Storage Rooms and any other room with bare panels not scheduled to be covered by finish materials.
- S. Install flooring panels securely in place, properly seated with panel edges flush.
1. Do not force panels into place.
- T. Scribe perimeter panels to provide a close fit with adjoining construction with no voids greater than 3 mm where panels abut vertical surfaces.
- U. Final Cleaning and Sealing of RAF: Clean dust, dirt, and construction debris caused by floor installation, including vacuuming subfloor area, as installation of floor panels proceeds and at the conclusion of installation and prior to installation of floor covering.
1. Systematically remove each panel for verification of conditions and for final underfloor cleaning.
 2. Reseal concrete slab with concrete sealer specified in Division 9 Section "Concrete Sealer" after inspection and final cleaning to capture residual dirt or dust that can not be removed.
 3. Verify penetrations are properly sealed.
 4. Replace each panel and seal air cavities.
- V. Installation Tolerance: Level installed access flooring to within plus or minus 0.062 inch (1.6 mm) of true level over 10 feet (3 m) in any direction and plus or minus 0.125 inch (3.2 mm) over entire access floor area.
1. Where additional deviation from true level is required to meet elevations of door sills, curbs or other structures, obtain approval of Architect and Owner's representative.
- W. Install access flooring without change in elevation between adjacent panels and within tolerances:
1. Plus or minus 1.5 mm in any 3 m distance.
 2. Plus or minus 3 mm from a level plane over entire access flooring area.

3.4 MODULAR WIRING

- A. Coordinate with electrical subcontractor for the installation of modular wiring by electrical subcontractor if required.

3.5 ADJUSTING, CLEANING, AND PROTECTION

- A. Prohibit traffic on access flooring for 24 hours and removal of floor panels for 72 hours after installation to allow pedestal adhesive to set.
- B. After completing installation, vacuum clean access flooring and cover with continuous sheets of reinforced paper or plastic. Maintain protective covering until time of Substantial Completion.
- C. Replace access flooring panels that are stained, scratched, or otherwise damaged or that do not comply with specified requirements.

3.6 FIELD QUALITY CONTROL

- A. Perform and certify testing of permanent building floor plenums by an approved Testing, Adjusting, and Balancing agency.
1. Coordinate plenum testing with specified mechanical requirements.
 2. Perform test after the concrete surfaces of the plenum have been sealed, and mechanical and electrical devices, equipment, cables, racks, diffusers, power connectors and voice/data connectors and floor finishes are installed.
 3. Verify permanent air handling system are installed, inspected and successfully tested.
 4. Verify static pressure sensing component of the BAS has been installed and calibrated before the test.
 - a. Install an independent, calibrated static pressure gauge shall be installed adjacent to each permanent sensor.
 5. Close each supply air diffusers, automatically and manually controlled types, to minimum design positions and operate fan on pressure control, controlling at design static pressure in the plenum for 24 hours.
 6. During the test, read and record the supply air quantity (CFM) and the static pressure approximately once each hour (time noted) for 24 hours.
 - a. Add the flows for each hour and divide by 24 to obtain the total leakage.
 7. If the total leakage exceeds the allowable maximum, inspect UFAD RAF and test with test smoke if necessary and repair or correct assembly.
 - a. Retest system until the rates are within specified values.
- B. Upon completion of testing and commissioning UFAS RAF, perform testing, adjusting, and balancing in accordance with mechanical specifications.

3.7 INSTRUCTION AND DEMONSTRATION

- A. Provide minimum 2 hours of instruction to Owner's facility manager and maintenance staff demonstrating recommended operation and maintenance procedures, typical repair and correction procedures, and housekeeping recommendations.

3.8 SCHEDULE OF LOCATIONS

- A. See Drawings and Finish Schedule for schedule of locations.

3.9 ACCESS FLOORING TYPES

- A. Type **AF-1**: (Nominal 12" height – see architectural details for finishes and height).
1. 1250 psi.
 2. Location: Typical Tenant Lease Areas.
- B. Type **AF-2**: (Nominal 12" height – see architectural details for finishes and height).
1. 2000 psi.
 - a. Alternate AF-2A : 1500 psi.
 - b. Alternate AF-2B : 1250 psi.
 2. Location: Areas within core.

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END OF SECTION