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:
1. Blindside sheet waterproofing.
   a. Vertical Applications: Membrane applied against soil retention system prior to placement of concrete foundation walls;
   b. Horizontal Applications: Membrane applied on prepared subbase prior to placement of concrete slabs.

B. Related Requirements:
1. Division 1 Section “Sustainable Design Requirements” for all materials.
2. Division 7 Section "Expansion Control" for plaza- or foundation-wall expansion-joint assemblies that interface with waterproofing.

1.3 QUALITY ASSURANCE

A. The work of this section shall be performed by a company which specializes in the type of below grade sheet waterproofing 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 below grade sheet waterproofing specified in this section, with a minimum of 20 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 entity that employs installers and supervisors who are trained and approved by waterproofing manufacturer.

D. 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.

1.4 ACTION SUBMITTALS

A. Submit the following according to Conditions of the Construction Contract and Division 1 Specification Sections.

B. Product Data: For each type of product.
1. Include construction details, material descriptions, and tested physical and performance properties of waterproofing.
2. Include manufacturer's written instructions for evaluating, preparing, and treating substrate.
3. Include written acceptance of soils report including any noted contaminants.

C. LEED Submittals:
1. MR4 – List of Proposed materials with recycled content: 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.
2. Product Certificates for Credit MR 5: For products and materials required to comply with requirements for regional materials, certificates indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating distance to Project, cost for each regional material, and fraction by weight that is considered regional.
3. MRc4 – List all materials with recycled content indicating material cost broken out by post-industrial (pre-consumer) and post-consumer content. Only include data for materials permanently installed on the project site.

D. Shop Drawings: Show locations and extent of waterproofing and details of substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, coordination of waterstops, and other termination conditions.

E. Samples: For each exposed product and for each color and texture specified, including the following products:
1. 8-by-8-inch (200-by-200-mm) square of waterproofing and flashing sheet.
2. 4-by-4-inch (100-by-100-mm) square of drainage panel.
3. 12-by-12-inch square showing typical joint configuration between sheets.

F. 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.

G. 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.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Sample Warranties: For special warranties.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Comply with General Conditions and Division 1 Section “Product Requirements”.

1.7 FIELD CONDITIONS

A. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate.
1. Do not apply waterproofing in snow, rain, fog, or mist.

B. Perform work only when existing and forecasted weather conditions are within the guidelines established by the manufacturer of the waterproofing materials. Do not apply waterproofing materials into standing or active water; over ice and snow. Contractor shall maintain site conditions to remove standing water from precipitation or ground water seepage in a timely manner. Should below grade sheet waterproofing be subjected to prehydration as a result of prolonged immersion (prior to completion and final detailing), inspection of the material and written acceptance from manufacturer is required prior to concrete or backfill placement.

C. Maintain adequate ventilation during preparation and application of waterproofing materials.

1.8 WARRANTY

A. Comply with General Conditions and Division 1 Section “Product Requirements”.

B. Manufacturer's Warranty: Manufacturer's special labor and materials warranty in which manufacturer agrees to furnish replacement waterproofing material for waterproofing that does not comply with requirements or that fails to remain watertight within specified warranty period.
1. Upon installation completion and manufacturer acceptance of the work required by this section, the waterproofing materials manufacturer will provide to the project Owner, a written fifteen (15) year non-prorated waterproofing warranty, covering both materials and labor. Issuance of Manufacturer's Waterproofing Warranty requires the following: (1) Waterproofing system products shall have been provided by a single manufacturer; (2) Installation of waterproofing products by Manufacturer's Approved Applicator in full accordance with the manufacturer’s quality assurance program requirements; (3) installation inspected by an approved and trained Independent Inspection Firm participating with the waterproofing manufacturer’s Certified Inspection Program; (4) In Division 3 work, Waterstop manufactured and supplied by the waterproofing membrane manufacturer must be installed in all applicable concrete construction joints and around applicable penetrations Manufacturer’s Waterproofing Warranty shall be independent from and any other warranties made by the Contractor under requirements of the Contract Documents and may run concurrent with the other warranties.
1. Warranty Period: 15 years from date of Substantial Completion.

D. Installer's Special Warranty: Specified form, signed by Installer, covering Work of this Section, for warranty period of two years.

1.9 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.
1. Review waterproofing requirements including surface preparation, substrate condition and pretreatment, minimum curing period, forecasted weather conditions, special details and sheet flashings, installation procedures, testing and inspection procedures, and protection and repairs.

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 ACCEPTABLE MANUFACTURERS

A. Products of the manufacturers specified in this section establish the minimum functional, aesthetic and quality standards required for work of this section.

B. Substitutions: Comply with Division 1 Section “Product Requirements” using form in Division 1 Section “Substitution Request Form”.

2.3 MATERIALS, GENERAL

A. Source Limitations for Waterproofing System: Obtain waterproofing materials, protection course, and molded-sheet drainage panels from single source from single manufacturer.

B. Recycled Content: For materials containing post-industrial (pre-consumer) and/or post-consumer recycled content, contractor shall document the cost and percentage (by weight) of each material broken out by post-industrial (pre-consumer) and post-consumer content.

C. Regional Content: For material that is extracted, harvested or recovered as well as manufactured within 500 miles of the project site – 101 First Street, San Francisco, CA, contractor shall document the cost and percentage (by weight) of each material that is regional.

2.4 BLINDSIDE SHEET WATERPROOFING

A. Provide one of the products listed below.

B. Bonded HDPE Sheet for Blindside Vertical Applications: Uniform, flexible, multilayered-composite sheet membrane consisting of either a HDPE film coated with a pressure-sensitive adhesive and protective release liner, total 32-mil (0.8-mm) thickness, or an HDPE film coated with a modified asphalt layer and a nonwoven geotextile-fabric final layer, total 73-mil (1.9-mm) thickness; with the following physical properties:
1. Products: Subject to compliance with requirements, provide the following:
   a. Grace Construction Products; W.R. Grace & Co. -- Conn; Preprufe 160R with Preprufe Tie-Back Covers.
2. Tensile Strength, Film: 4000 psi (27.6 MPa) minimum; ASTM D412.
3. Low-Temperature Flexibility: Pass at minus 10 deg F (minus 23 deg C); ASTM D1970.
4. Peel Adhesion to Concrete: 5 lbf/in. (875 N/m) minimum; ASTM D903, modified.
5. Lap Adhesion: 2.5 lbf/in. (440 N/m) minimum; ASTM D1876, modified.
6. Hydrostatic-Head Resistance: 231 feet (70 m); ASTM D5385, modified.
7. Puncture Resistance: 100 lbf (445 N) minimum; ASTM E154.
8. Water Vapor Permeance: 0.01 perms (0.6 ng/Pa x s x sq. m) maximum; ASTM E96/E 96M, Water Method.
9. Water Absorption: 0.5 percent maximum; ASTM D570.

C. Bonded HDPE or Polyethylene Sheet for Blindside Horizontal Applications: Uniform, flexible, multilayered-composite sheet membrane consisting of either an HDPE film coated with pressure-sensitive adhesive and protective release liner, total 46-mil (1.2-mm) thickness, or a cross-laminated film of low- and medium-density polyethylene, coated with a modified asphalt layer and a nonwoven geotextile-fabric final layer, total 95-mil (2.4-mm) thickness; with the following physical properties:
1. Products: Subject to compliance with requirements, provide the following:
   a. Grace Construction Products; W.R. Grace & Co. -- Conn; Preprufe 300R.

2. Tensile Strength, Film: 2000 psi (13.8 MPa) minimum; ASTM D412.
3. Low-Temperature Flexibility: Pass at minus 10 deg F (minus 23 deg C); ASTM D1970.
4. Peel Adhesion to Concrete: 5 lbf/in. (875 N/m) minimum; ASTM D903, modified.
5. Lap Adhesion: 2.5 lbf/in. (440 N/m) minimum; ASTM D1876, modified.
6. Hydrostatic-Head Resistance: 231 feet (70 m); ASTM D5385, modified.
7. Puncture Resistance: 200 lbf (890 N) minimum; ASTM E154.
8. Water Vapor Permeance: 0.01 perms (0.6 ng/Pa x s x sq. m) maximum; ASTM E96/E 96M, Water Method.
9. Water Absorption: 0.5 percent maximum; ASTM D570.

D. PVC Sheet for Blindside Vertical and Horizontal Applications:
1. 60 mil (1.5 mm) nominal thick PVC, Elvaloy KEE thermoplastic membrane reinforced with a 5.0 oz. weft inserted knit polyester fabric integrally bonded to an Active Polymer Core (APC). With the following physical properties:

Physical Properties		
Property	**Test Method**	**Typical Value**
		CoreFlex 60
Membrane Composite Thickness	ASTM D751	150 mil (3.8 mm)
Hydrostatic Pressure Resistance (min 1 hour @ 100 psi)	ASTM D5385	231 ft (70 m)
Puncture Resistance	ASTM D4833	224 lbs (996 N)
Tensile Strength	ASTM D751	549 lbs (2,442 N)
Bonded Seam Strength	ASTM D751	705 lbs (3,136 N)
Peel Adhesion to Concrete	ASTM D903 (mod)	10 lbs/in (1,751 N/m)
Methane Permeability	ASTM D1434	25 mL (STP)/m^2/day
Oil Resistance	ASTM D543	Passed
Micro organism Resistance	ASTM D4068-88	Passed
Environmental Stress Cracking	ASTM D1693	Passed
Water Vapor Retarder	ASTM E1745	Class A
Water Vapor Transmission	ASTM E96	0.1 perms (0.036 gr/m/hr)
Tensile Strength	ASTM E154	387 lbf/in (68 kN/m)
Puncture Resistance	ASTM D1709	12.0 lbs (5,500 grams)* *Maximum of Test Equipment

1. Products: Subject to compliance with requirements, provide the following:
a. Cetco; Coreflex.

E. Sealant, Mastic, Adhesives, Detail Tape and Flashing Membranes: Sealants, liquid mastic, adhesives, adhesive tapes, and flashing membranes recommended by waterproofing manufacturer for transitions and terminations.

2.5 AUXILIARY MATERIALS

A. General: Furnish auxiliary materials recommended by waterproofing manufacturer for intended use and compatible with sheet waterproofing, providing single source responsibility.
1. Furnish liquid-type auxiliary materials that comply with VOC limits of authorities having jurisdiction.

B. Primer: Liquid primer recommended for substrate by sheet-waterproofing material manufacturer.

C. Surface Conditioner: Liquid, waterborne surface conditioner recommended for substrate by sheet-waterproofing material manufacturer.

D. Liquid Membrane: Elastomeric, two-component liquid, cold fluid applied, of trowel grade or low viscosity.

E. Substrate Patching Membrane: Low-viscosity, two-component, modified asphalt coating.

F. Metal Termination Bars: Aluminum bars, approximately 1 by 1/8 inch (25 by 3 mm) thick, predrilled at 6-inch (152 mm) centers.

G. Fasteners and Washers: To secure membrane to shoring prior to placement of concrete foundation. Provide active or passive waterstops as recommended by waterproofing membrane manufacturer for expansion joints, and additional protection at construction joints.

H. Waterstop: For non-moving concrete construction joints.

I. Preformed Soil Retention Wall Tieback Cover: Tieback Cover as a prefabricated detail for soil retention wall tiebacks.

J. Preformed Inside and Outside Corners.

K. Tape for covering cut edges, roll ends, penetrations and detailing.

L. Miscellaneous Materials: accessories specified or acceptable to manufacturer of pre-applied waterproofing membrane.

M. Protection Course: ASTM D6506, semirigid sheets of fiberglass or mineral-reinforced-asphaltic core, pressure laminated between two asphalt-saturated fibrous liners and as follows:
1. Thickness: 1/8 inch (3 mm), nominal.
2. Adhesive: Rubber-based solvent type recommended by waterproofing manufacturer for protection course type.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the waterproofing.
1. Verify that concrete has cured and aged for minimum time period recommended in writing by waterproofing manufacturer.
2. Verify that substrate is visibly dry and within the moisture limits recommended in writing by manufacturer. Test for capillary moisture by plastic sheet method according to ASTM D4263.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SURFACE PREPARATION

A. Clean, prepare, and treat substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrates for waterproofing application.

B. Surface preparation for Bonded HDPE sheet waterproofing.
1. It is essential to create a sound and solid substrate to eliminate movement during the concrete pour. Substrates must be regular and smooth with no gaps or voids greater than 0.5 in. (12 mm). Grout around all penetrations such as utility conduits, etc. for stability.
   a. Horizontal Surfaces - The substrate must be free of loose aggregate and sharp protrusions. Avoid curved or rounded substrates. When installing over earth or crushed stone, ensure substrate is well compacted to avoid displacement of substrate due to traffic or concrete pour. The surface does not need to be dry, but standing water must be removed.
   b. Vertical Surfaces - Use concrete, plywood, insulation or other approved facing to sheet piling to provide support to the membrane. Board systems such as timber lagging must be close butted to provide support and not more than 0.5 in. (12 mm) out of alignment.

C. Surface preparation for PVC sheet waterproofing.
1. Working Mud Slab: Working concrete mud slabs should have a float finish to provide a planar surface; without sharp angular depressions, voids or raised features.
2. Compacted Soil Or Gravel Sub-Grade: Sub-grade shall be compacted to a minimum relative compaction of 85% or greater as specified by civil/geotechnical engineer. The finished surface shall be smooth, uniform, free of debris and standing water or ice. Aggregate sub-grades shall consist of ¾" (19 mm) stone or smaller and rolled flat, free from any protruding sharp edges. Specific sub-grade preparation shall be designed by a qualified civil or geotechnical engineer. For compacted soil or gravel sub-grade a flat, ridged piece of plywood or sheet metal wide enough to accommodate the welding equipment must be placed under the membrane overlap in order to run the welding equipment. Several may be used in-line to insure that the equipment always runs on the ridged planar surface.

3. Wood Timber Shoring: Wood lagging shoring should extend to the lowest level of the waterproofing installation with any voids or cavities exterior of the lagging timbers filled with compacted soil or cementitious grout. Interior surface of lagging boards should be planar and tight together with gaps less than 1" (25 mm). Gaps in excess of 1" should be filled with cementitious grout, compacted soil, extruded polystyrene (20 psi min.) or CETCO approved spray polyurethane foam. Do not use plywood or other surface treatment over large lagging gaps that leave the cavity void. (In areas where lagging gaps are 2-1/2" (63 mm) or less, Aquadrain sheet drain may be placed over lagging gaps to provide a suitable substrate for the CoreFlex 60 membrane.) All lagging board nails and other mechanical projections shall be removed or pounded in flush. Install a protection material over all soldier piles with raised lagging hanger bolts, form tie rods, or other irregular surface; protection material should extend a minimum 6" (150 mm) to both sides of the steel piling.
4. Metal Sheet Piling Shoring Wall: Metal sheet pile shoring requires minimum ½" (12 mm) plywood fastened to create a flat surface for membrane installation. Install plywood with all edges tightly abutted and all fasteners flush with plywood surface. All void spaces between the plywood and the sheet piling must be filled with compacted earth or concrete. Any areas of water seepage at the sheet piling interlocks can be sealed prior to waterproofing installation by injecting Bentogrout to the outside of the sheet piling interlocks.
5. Cut Rock Face Or Auger Cast Caisson Shoring Walls: Interior surface of cut rock and concrete auger pile retention walls should be planar without irregular surface conditions, voids, and sharp transitions that would leave a void space to the outside of the drainage and waterproofing installation. Irregular rock, void pockets, cracks, sharp concave transitions should be completely filled or smoothed with cementitious grout, shotcrete, or other approved solid material.
6. Mechanical Or Other Penetrations: Mechanical, structural, or architectural materials that will pass through the plane of the waterproofing membrane shall be properly installed and secured in their final position prior to installation of the waterproofing system.
7. Shoring Wall Bracing: Whenever possible, shoring wall bracing shall be constructed with circular pipe elements in lieu of steel H-Piles or other irregular fixture if bracing is not removed prior to waterproofing system installation. Circular steel pipe elements provide a more uniform surface to detail with the waterproofing.

3.3 APPLICATION OF BONDED HDPE SHEET WATERPROOFING

A. Installation, Horizontal Applications:
   1. Strictly comply with installation instructions in manufacturer's published literature, including but not limited to, the following:
      a. Place the membrane HDPE film side to the substrate with the clear plastic release liner facing towards the concrete pour. End laps should be staggered to avoid a build-up of layers.
      b. Leave the plastic release liner in position until overlap procedure is completed.
      c. Accurately position succeeding sheets to overlap the previous sheet 3 in. (75 mm) along the marked selvedge. Ensure the underside of the succeeding sheet is clean, dry and free from contamination before attempting to overlap.
      d. Peel back the plastic release liner from between the overlaps as the two layers are bonded together. Ensure a continuous bond is achieved without creases and roll firmly with a heavy roller.
      e. Completely remove the plastic liner to expose the protective coating. Any initial tack will quickly disappear.

B. Installation, Vertical Applications:
   1. Strictly comply with installation instructions in manufacturer's published literature, including but not limited to, the following:
      a. Mechanically fasten the membrane vertically using fasteners appropriate to the substrate with the clear plastic release liner facing towards the concrete pour. The membrane may be installed in any convenient length.
      b. Fastening through the selvedge using a small and low profile head fastener so that the membrane lays flat and allows firmly rolled overlaps.
      c. Immediately remove the plastic release liner.
      d. Ensure the underside of the succeeding sheet is clean, dry and free from contamination before attempting to overlap.
      e. Roll firmly to ensure a watertight seal.
      f. Overlap all roll ends and cut edges by a minimum 3 in. (75 mm) and ensure the area is clean and free from contamination, wiping with a damp cloth if necessary.
      g. Allow to dry and apply Preprufe Tape LT (or HC in hot climates) centered over the lap edges and roll firmly.
      h. Immediately remove printed plastic release liner from the tape.

3.4 APPLICATION OF PVC SHEET WATERPROOFING

A. Slab To Zero Lot Line Shoring Wall Transition Course:
   1. At base of shoring wall, install waterproofing sheet horizontally oriented with the thermoplastic membrane offset edge side up (APC geotextile side inward facing installer; yellow side toward shoring wall); position the bottom thermoplastic edge extending out onto the horizontal substrate a minimum 12" (300 mm). Approximately 1-1/2" (38 mm) down from the top edge, secure the thermoplastic membrane offset to the shoring wall with washer-head mechanical fasteners spaced a maximum of 24" (600 mm) on center. Install adjacent membrane sheets with the thermoplastic membrane and APC layers overlapped a minimum 4" (100 mm). Assemble and weld laps per Sections 3.03 and 3.04; secure any loose or peeled APC layer material with continuous bead of sealant.
   2. Install membrane horizontally oriented on the shoring wall to position the top thermoplastic membrane edge a minimum 18" (450 mm) above of the top slab elevation. For thick slabs this minimum 18" (450mm) requirement can be met by installing additional membrane courses oriented horizontally. Overlap all adjacent membrane edges a minimum 4" (100 mm); assemble and weld laps per Sections 3.03 and 3.04; secure any loose or peeled APC layer material with continuous bead of sealant.
   3. Weld a CoreDisc or equivalent size CoreFlash NR reinforcement piece centered over the welded membrane overlap directly at the point where the CoreFlex 60 membrane transitions from the horizontal to the shoring wall.

B. Under Slab Installation:
   1. Reinforced structural foundation slabs should be a minimum of 6" (150 mm) thick where sheet waterproofing is installed. Install under all footings, elevator pits and grade beams when hydrostatic conditions exists or are anticipated per the historical high ground water elevation reported in the project's geotechnical documents.
   2. Place sheet waterproofing directly on properly prepared mud slab substrate (APC geotextile side facing up; yellow side down) with adjoining thermoplastic membrane edges overlapped a minimum of 4" (100 mm). Assemble and weld laps; secure any loose or peeled APC layer material with continuous bead of sealant. When the slab is poured in sections, extend sheet waterproofing a minimum 12" (300 mm) beyond the slab section edge to enable proper membrane overlapping. At the slab perimeter overlap the corner transition sheet a minimum 4" (100 mm); assemble and weld laps.
   3. Slab Penetrations: For all pipe, rebar, structural or other penetrations install waterproofing system per manufacturer's standard detail for specific project condition(s).
   4. Grade Beams: Install sheet waterproofing under the entire grade beam by lining the form work prior to placing the reinforcing steel. Line the grade beam formwork with sheet waterproofing prior to placement of reinforcing steel. Leave a minimum 12" (300 mm) of sheet waterproofing at the top of the form to tie into under slab waterproofing. Overlap adjacent membrane edges a minimum 4" (100 mm); assemble and weld laps.
   5. Inside and Outside Corners: Install sheet waterproofing membrane per manufacturer's standard detail with applicable universal corner piece welded.
   6. Inspect finished sheet waterproofing installation and repair any damaged material prior to concrete slab placement.
   7. Note: Related work to be completed under Division 3. Waterstop-RX shall be installed in all slab joints, around applicable slab penetrations and structural members. Refer to Waterstop-RX Product Manual for further installation procedures and guidelines.

C. Shoring Retention Wall Installation:
   1. Shoring retention wall shall be prepared per Section 3.2 guidelines prior to installation.
   2. Apply sheet waterproofing membrane in standard roll size or longest workable cut length. At base of shoring wall, install sheet welded to top edge of corner transition sheet. Install sheets horizontally oriented with the thermoplastic membrane offset edge side up (APC geotextile side inward facing installer; yellow side toward shoring wall). Approximately 1-1/2" (38 mm) down from the top edge, secure the thermoplastic membrane offset to the shoring wall with washer-head mechanical fasteners spaced maximum 24" (600 mm) on center; refrain from placing a fastener within 6" (150 mm) of each roll end. Install subsequent sheets in vertical sequence up wall with membrane roll ends matched to within 1" (25 mm); trim roll ends as applicable to meet the 1" (25 mm) tolerance. Assemble and weld membrane overlaps per Sections 3.03 and 3.04; secure any loose or peeled APC layer material with continuous bead of sealant. Extend membrane installation minimum 12" (300 mm) above planned concrete lift joints to provide access.
   3. At both roll ends, install a minimum 9" (450 mm) wide strip of flashing extending up the face of the lagging wall from the top of the corner transition sheet to the grade elevation detail. Tuck edge of flashing strip behind the roll edge a minimum 4" (100 mm) and secure flashing strip with washer-head fasteners along both edges staggered each side 3-ft (0.9m) or less. Do not secure flashing strip fastened through membrane. As applicable, overlap flashing membrane strip edges a minimum 4" (100 mm) and weld to provide continuous strip.

4. Install adjacent membrane sheets overlapping flashing strip with rolls ends closely matched to 1" (25 mm) of adjacent roll end. Hot air weld both matched roll ends to the strip; both welds must be inside of all strip fasteners. Finish strip welding by hot air welding a CoreDisc or CoreFlash NR patch to all T-Joints per Section 3.04. Complete flashing strip detail by installing a minimum 9" (450 mm) wide strip of Cortex overlapping the welded strip. Cortex strip shall extend a minimum 4" (100 mm) over both membrane edges and be secured with sealant.
5. Alternate Membrane Installation: Install adjacent membrane sheets horizontally oriented with roll ends of subsequent membrane courses staggered minimum 12" (300 mm). Assemble and weld membrane overlaps. Extend membrane installation minimum 12" (300 mm) above planned concrete lift joints to provide access. Detail T-Joints with CoreDisc or CoreFlash NR patch. Secure any loose or peeled APC layer material with continuous bead of sealant.
6. Continue membrane installation up shoring wall to project grade detail elevation. Secure top membrane edge with washer-head mechanical fasteners maximum 12" (300 mm) on center.
7. Tie-Back Heads: Install applicable size TB-Boot tie-back head cover with welding collar flange per manufacturer's detail for specific project condition(s). For irregular shoring wall conditions at tie-backs or oversize tie-back heads consult manufacturer for alternate detail for specific project condition(s).
8. Wall Penetrations: For all pipe, rebar, structural and other penetrations install system per manufacturer's detail for specific project condition(s).
9. Inside and Outside Corners: Install membrane with welded universal corner piece per manufacturer's detail for specific project condition(s).
10. Inspect completed system installation and repair any damaged material prior to concrete placement.

D. Shoring Wall Excavation, Grade Termination and Backfill:
1. Coordinate work with excavation and backfill operations conducted under Division 31 by others to remove the top elements of the shoring retention wall per local building code or as specified in the contract documents. Identify and repair any waterproofing and drainage sheet damaged by excavation and removal of the top shoring retention wall elements.
2. Terminate membrane 12" (300 mm) below finished grade elevation with washer-head fasteners maximum 12" (300 mm) on center.
3. Install flashing membrane with bottom edge overlapping membrane a minimum 4" (100 mm); use adhesive to adhere flashing membrane continuously to substrate (except for top 2" (50 mm)). Secure bottom edge of flashing to membrane with a continuous thermoplastic weld per manufacturer's guidelines. Overlap adjacent flashing roll ends a minimum 4" (100 mm) and seal with continuous thermoplastic weld.
4. Terminate top edge of flashing membrane at elevation per project details and specifications. Apply sealant 2" x 90 mil thick behind the top, non-adhered edge of flashing. Then secure top edge of flashing with termination bar fastened into substrate maximum 12" (300 mm) on center. Complete grade termination detail with tooled bead of sealant along the top edge, at all penetrations through the flashing, and all exposed overlap seams. Counter flash or cover the termination per project specifications.
5. Inspect finished membrane/flashing termination and repair any damaged material. After installed it is the responsibility of the General Contractor to insure that the membrane and system components are protected and not penetrated or damaged. Keep membrane free of dirt and debris, and traffic until protection or topping material is in place.

E. Backfill:
1. Backfill shall be placed promptly after waterproofing has been installed. Closely coordinate with contractor responsible for Backfill work by informing them each time a waterproofed area is ready for backfill. Care should be used during backfill operation to avoid damage to the waterproofing system. Backfill operations shall follow generally accepted practices for placement and compaction. Backfill should be added in 6" to 12" (150 - 300 mm) lifts and compacted to a minimum 85% Modified Proctor density. If gravel backfill, specify angular aggregate <3/4" (18mm) with fines.

3.5 FIELD QUALITY CONTROL

A. Owner will engage a site representative qualified by waterproofing membrane manufacturer to inspect substrate conditions, surface preparation, membrane application, flashings, protection, and drainage components, and to furnish daily reports to Architect.

3.6 PROTECTION, REPAIR, AND CLEANING

A. Do not permit foot or vehicular traffic on unprotected membrane.

B. Protect waterproofing from damage and wear during remainder of construction period.

C. Correct deficiencies in or remove waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.

D. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION