**This guide specification was issued January 2014 and may be superseded without notice at any time. Therefore, please confirm that this specification is still current and has not been superseded by checking at** [**www.cetco.com**](http://www.cetco.com) **or by calling 1-800-527-9948.**

***CAST-IN-PLACE CONCRETE CONSTRUCTION SPECIFICATION***

**This guide specification has been prepared according to the principles established in the Manual of Practice published by the Construction Specification Institute and is intended for use with cast-in-place concrete structures. This specification is not intended for use with shotcrete, masonry block, or precast concrete construction. Contact CETCO regarding installation and application guidelines for Ultraseal XP Waterproofing System when used with below-ground shotcrete, or precast concrete construction. CETCO, Building Materials Group – 1- 847-851-1800.**

**This master guide specification contains work sections in PART 3 – Execution – pertaining to both property line construction and backfilled foundation wall construction. Therefore, PART 3 should be edited to only include work sections specific to the job site conditions required on the project.**

SECTION 071700 - January 2014 (Supersedes All Previous Versions)

**ULTRASEAL® XP WATERPROOFING SYSTEM**

**WITH AQUADRAIN PREFABRICATED DRAINAGE COMPOSITE**

**MASTER GUIDELINE SPECIFICATION FOR CAST-IN-PLACE CONCRETE**

**PART 1 - GENERAL**

1.01 RELATED DOCUMENTS

A. All of the Contract Documents, including General and Supplementary Conditions, and Division 1 General requirements, apply to the work of this section.

1.02 WORK SUMMARY

A. The work of this section includes, but is not limited to the furnishing and installing the following materials, per project specifications and drawings, or as directed by waterproofing manufacturer:

1. ULTRASEAL XP waterproofing membrane with all applicable accessory products.

 2. Aquadrain® Prefabricated drainage composite and Aquadrain Base Drain

1.03 RELATED SECTIONS

A. Other specification Sections which directly relate to the work of this section include, but are not limited to, the following:

 1. Division 2: Subsurface and Geotechnical Investigations

 2. Division 3: Waterstops

 3. Division 5: Expansion Joint Products

 4. Division 7: Joint Treatment/ Sealants, Flashing and sheet metal, and Insulation

 5. Division 22: Deck and Floor Drains and other Mechanical Penetrations

 6. Division 26: Conduit and other Electrical Penetrations

 7. Division 31: Earthwork, Excavation and Fill, Shoring,

 8. Division 33: Geocomposite Foundation Drainage

1.04 SYSTEM DESCRIPTION

1. Provide waterproofing system and prefabricated drainage composite system to prevent the passage of liquid water and install without defects, damage or failure. Waterproofing shall be a active-polymer XP technology with all applicable accessory products.

1.05 SUBMITTALS

A. General: Prepare and submit specified submittals in accordance with "Conditions of the Contract" and Division 1 Submittals Sections.

B. Product Data: Submit manufacturer’s product data, with complete general and specific installation instructions, recommendations, and limitations.

C. Product Samples: Submit representative samples of the following for approval:

 1. ULTRASEAL XP waterproofing membrane

 2. Aquadrain 100BD Base Drain and Aquadrain 15XP Prefabricated drainage composite

D. Waterproofing Material and Labour Warranty: At time of bid, submit a sample copy of the Manufacturer’s Waterproofing warranty complete with all coverages, limitations, and conditions.

E. Material Certificates: Submit certificate(s) signed by manufacturer certifying materials comply with specified performance characteristics and physical requirements. Submit certification that waterproofing system and components, drainage and protection materials are supplied by a single-source manufacturer.

F. Contractor Certificate: At time of bid, submit written certification that installer has current Approved Applicator status with waterproofing material manufacturer.

1.06 QUALITY ASSURANCE

A. Installer Qualifications: Installing company should have at least three (3) years experience in work of the type required by this section, who can comply with manufacturer's warranty requirements, and who is an Approved Applicator as determined by waterproofing/drainage system manufacturer.

B. Manufacturer Qualifications: Waterproofing membranes and all accessory products shall be provided by a single manufacturer with a minimum of 30 years experience in the direct production and sales of waterproofing systems. Manufacturer shall be capable of providing field service representation during construction, approving an acceptable installer, and recommending appropriate installation methods.

C. Pre-Installation Conference: A pre-installation conference shall be held prior to commencement of field installation to establish procedures to maintain required working conditions and to coordinate this work with related and adjacent work. Verify that final waterproofing and waterstop details comply with waterproofing manufacturer's current installation requirements and recommendations. Pre-con meeting attendees should include representatives for the owner, architect, inspection firm, general contractor, waterproofing contractor, concrete contractor, excavating/backfill contractor, and mechanical and electrical contractors if work penetrates the waterproofing.

D. Materials: Obtain waterproofing membrane with accessory products and prefabricated drainage materials from a single manufacturer to assure material compatibility.

E. Independent Inspection: Owner shall make all arrangements and payments for an independent inspection service to monitor waterproofing material installation compliance with the project contract documents and manufacturer’s published literature and site specific details. Independent Inspection Firm shall be an approved company participating with the waterproofing manufacturer’s Certified Inspection Program. Inspection service shall produce reports and digital photographs documenting each inspection. Reports shall be made available in a timely manner to the Contractor, waterproofing installer, waterproofing material manufacturer, and Architect. Inspections should include substrate examination, beginning of waterproofing installation, periodic intervals, and final inspection prior to concrete or backfill placement against the waterproofing.

F. Water Sample Test: Waterproofing contractor shall supply project site water sample to waterproofing membrane manufacturer for analysis. Manufacturer shall conduct test free of charge. Contractor is responsible for collection and shipment of 2 liters (64 fluid ounces) of actual site water and completing water sample submittal form. Water sample should be shipped in uncontaminated, sealed plastic container to:CETCO, 2870 Forbs Ave, Hoffman Estates, IL 60192, Attn: BMG Field Services. Also provide project name, city and state along with return address to forward test results.

1.07 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery and Handling: Deliver materials in factory sealed and labeled packaging. Sequence deliveries to avoid delays, while minimizing on-site storage. Handle and store following manufacturer's instructions, recommendations and material safety data sheets. Protect from construction operation related damage, as well as, damage from weather, excessive temperatures and prolonged sunlight. Remove damaged material from site and dispose of in accordance with applicable regulations.

1. Storage: Do not double-stack pallets during shipping or storage. Protect waterproofing materials from moisture, excessive temperatures and sources of ignition. Provide cover, top and all sides, for materials stored on-site, allowing for adequate ventilation.

1.08 PROJECT CONDITIONS

1. Substrate Condition: Proceed with work only when substrate construction and preparation work is complete and in condition to receive waterproofing system. All plumbing, electrical, mechanical and structural items to be under or passing through the waterproofing shall be positively secured in their proper positions prior to waterproofing system installation. Substrate preparation shall be per waterproofing manufacturer’s guidelines.
2. Weather Conditions: 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 in areas of standing or active water; or over ice and snow. Though exposure to precipitation and ground water seepage typically will not adversely affect ULTRASEAL XP, the General Contractor shall maintain site conditions to remove standing water from precipitation or ground water seepage in a timely manner. Should ULTRASEAL XP be subjected to pre-hydration as a result of prolonged immersion, inspection of the material and written acceptance from CETCO is required prior to concrete or backfill placement.

1.09 WARRANTY

1. Warranty eligibility for the project must be validated by Manufacturer, confirming acceptance of the installation and independent inspection reports are in accordance with the manufacturer’s quality assurance program requirements.
2. **Waterproofing Material and Labour Warranty**: 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 ten (10) year non-prorated warranty, covering both materials and labour. Issuance of Manufacturer's Waterproofing Warranty requires the following: (1) Waterproofing System products and drainage composite products shall have been provided by a single manufacturer; (2) Installation of waterproofing products and prefabricated drainage composite by Manufacturer's Approved Applicator in full accordance with 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 XP must be installed in all applicable concrete cold pour construction joints, including around applicable penetrations. Manufacturer's warranty shall be independent from any other warranties made by the Contractor under requirements of the Contract Documents and may run concurrent with the other warranties.

**PART 2 - PRODUCTS**

2.01 MANUFACTURER

A. Provide ULTRASEAL XP waterproofing membrane and applicable accessories as manufactured by Colloid Environmental Technologies Company (CETCO), 2870 Forbs Ave, Hoffman Estates, IL 60192, USA. Phone: Toll Free (800) 527-9948 or (847) 851-1800; Web-site: <http://www.cetco.com>.

2.02 MATERIALS

A. ULTRASEAL XP - ACTIVE POLYMER WATERPROOFING MEMBRANE

1. ULTRASEAL XP MEMBRANE: Thick composite membrane consisting of an active XP polymer integrally bonded to a geomembrane liner. Roll size: 1.2 m x 7.62 m (4’ x 25’).

 ULTRASEAL XP performance properties:

|  |  |  |
| --- | --- | --- |
|  PROPERTY  | TEST METHOD | TYPICAL VALUE |
| Hydrostatic Pressure Resistance | ASTM D 5385 mod. | 70m (231 ft.) |
| Elongation at Break | EN ISO 527 | 25% |
| Peel Adhesion to Concrete | ASTM D903 (mod) | 1.7N/m (15 lbs/in) |
| Puncture Resistance | EN ISO 12236 | 3.0kN (674.4 lbs) |
| Low Temperature Flexibility | ASTM D1970 | Unaffected at -32°C (-25°F) |
| Tensile Strength | EN ISO 527 | 8.0 N/mm2 (1160 psi) |

B. ACCESSORY WATERPROOFING PRODUCTS: All accessory waterproofing materials shall be provided by the waterproofing manufacturer or shall have manufacturer’s written approval for substitution.

1. SEAL-X XP: Trowel grade detailing mastic

2. SeamTape®: sealant tape for membrane overlaps.

3. Termination Bar: Min. 3mm (1/8”) thick by 25mm (1”) wide stainless steel or aluminum termination bar with pre-punched holes punched at 150 mm (6”) on center for fastening.

4. Cementitious Wall Board: 12mm (1/2”) thick cementitious board for protection of waterproofing during the removal of metal soldier pile cap and top lagging boards.

5. CORETEX XP – A low permeable geotextile waterproofing material that utilizes XP Polymer Core technology.

6. CETSEAL – single-component polyether general sealant and adhesive

7. TB-BOOTS – pre-formed, single piece thermoplastic cover for tie-back heads and soil nails. Three sizes available: TB-6SN, TB-8, and TB-10.

8. ENVIROSHEET – self-adhering membrane used for ground-level and through-wall detailing.

C. BASE AND SHEET DRAINAGE COMPOSITE

Aquadrain® drainage composite by CETCO shall be used where specified to promote positive drainage. Use base drain accessory connectors and outlets as required.

1. Aquadrain® 15XP Drainage Sheet– Roll of a three-dimensional polypropylene drainage core with a nonwoven geotextile adhered to one side to allow water passage while restricting soil particles. Composite includes a thin polyethylene sheet on the back of the drainage core.

2. Aquadrain® 100BD Base Drain –Base drain composite designed to collect water from sheet composite drainage and then discharge the water to proper sump system or gravity to daylight.

**PART 3- EXECUTION contains work sections pertaining to both zero-lot line construction and backfilled foundation wall construction. Therefore, PART 3 should be edited to only include work sections specific to the job site conditions required on the project. Sections 3.01, 3.02, and 3.03 pertain to all applications. Section 3.04 through Section 3.11 pertain only to zero-lot line construction. Sections 3.04B, through Section 3.10B pertain only to backfilled cast-in-place concrete wall applications.**

**PART 3 – EXECUTION**

A. Comply with contract documents and manufacturer's product data, including product application and installation instructions.

3.01 SUBSTRATE INSPECTION AND CONDITIONS

A. The installer, with the Owner’s Independent Inspector present, shall examine conditions of substrates and other conditions under which this section work is to be performed and notify the contractor, in writing, of circumstances detrimental to the proper completion of the work. Do not proceed with work until unsatisfactory conditions are corrected and are acceptable for compliance with manufacturer's warranty requirements. General substrate conditions acceptable for the waterproofing installation are listed below. For conditions not covered in this Section, contact the waterproofing manufacturer for guidance.

B. CONCRETE BLINDING LAYER: Concrete blinding layers should have a float finish to provide a planar surface; without sharp angular depressions, voids or raised features.

C.. COMPACTED SOIL OR GRAVEL SUB-GRADE: Sub-grade shall be compacted to a minimum Modified Proctor compaction of 85% or greater as specified by civil/geotechnical engineer. The finished sub-grade surface shall be well-leveled, uniform, free of debris and standing water or ice. Aggregate sub-grades shall consist of 19mm (3/4”) stone or smaller and rolled flat, free from any protruding sharp edges. If substrate consists of large aggregate, place a high-strength geotextile layer over the aggregate and then provide several centimeters of compacted soil or sand for uniform support and containment of waterproofing sheets. Specific sub-grade preparation shall be approved by the project’s civil or geotechnical engineer.

D. 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 25mm (1”). Gaps in excess of 25mm (1”) should be filled with cementitious grout, compacted soil, extruded polystyrene 137.9 kN/m² (20psi) or CETCO approved polyurethane spray foam. Do not use plywood or other surface treatment over large lagging gaps that leave the cavity void behind them. In areas where lagging gaps are 63mm (2.5”) or less, Aquadrain sheet drainage can be installed over lagging to provide uniform surface to mount the waterproofing without requirement of filling gaps. Aquadrain sheet and 100BD base drain system should be connected to an operative water discharge system. All lagging board nails and other mechanical projections shall be removed or pounded 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 150mm (6”) to both sides of the steel piling.

E. 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.

F. 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.

G. CONCRETE: Concrete to be waterproofed shall be properly placed and consolidated. Reinforced structural slabs should be a minimum of 150mm (6”) thick when placed on concrete blinding~~.~~ Reinforced concrete slab(s) on compacted grade shall be a minimum of 100mm (4”) thick. When hydrostatic conditions exist, install Ultraseal XP under all footings, elevator pits and ground beams. Cast-in-place concrete to receive waterproofing shall be of sound structural grade with a smooth finish, free of debris, oil, grease, laitance, dirt, dust, or other foreign matter which will impair the performance of the waterproofing and drainage system and which do not comply with manufacturer's warranty requirements. Ultraseal XP can be installed on green structural concrete as soon as the forms are removed provided the contractor gains written approval from project structural engineer listing any site specific concrete curing time requirement. Do not apply Ultraseal XP waterproofing directly over lightweight insulating concrete, wood, or steel decking.

* + - 1. Remove dirt, debris, oil, grease, cement laitance, or other foreign matter which will impair or negatively affect the performance of the waterproofing and drainage system.
			2. Protect adjacent work areas and finished surfaces from damage or contamination from waterproofing products during installation operations.
			3. Form fins, ridges, ponding ridges and other protrusions should be level and smooth with concrete surface.
			4. Honeycombing, aggregate pockets, tie-rod holes and other voids shall be completely filled with non-shrink cementitious grout and level with monolithic concrete surface.
			5. Horizontal deck or roof concrete surfaces should be sloped for positive drainage to the deck drains or the perimeter edges. Deck drain positions should be designed with an appropriate sump depression surrounding the drain.
			6. Precast concrete deck units shall be installed and secured to structural supports in accordance with the concrete panel manufacturer’s requirements and industry practice. All joints between precast units shall be completely grouted and flush with deck. Any differential in elevation between precast units shall be feathered for a smooth transition.

7. All expansion joints should receive applicable expansion joint sealant product prior to the installation of the ULTRASEAL XP Waterproofing System.

NOTE: Related work to be completed under Division 3. WATERSTOP XP shall be installed in all applicable vertical and horizontal concrete construction cold pour joints and around applicable penetrations, structural members, and tie-rod form holes that extend through the wall. Refer to WATERSTOP XP product literature for further installation procedures and guidelines.

3.02 SURFACE PREPARATION

A. Remove dirt, debris, oil, grease, cement laitance, or other foreign matter which will impair or negatively affect the performance of the waterproofing and drainage system.

B. Protect adjacent work areas and finish surfaces from damage or contamination from waterproofing products during installation operations.

3.03 GENERAL INSTALLATION GUIDELINES

A. Property Line Walls, install ULTRASEAL XP membrane with the geotextile side in the direction to receive concrete pour; white liner side outward against retaining wall. Overlap ULTRASEAL XP membrane edges minimum 100mm (4”). Underslab, install ULTRASEAL XP with the white liner side facing down. Overlap ULTRASEAL XP membrane edges minimum 100 mm (4”)~~.~~ Backfilled walls and roofs of earth covered structures, install ULTRASEAL XP with the white liner side outward, away from the concrete, facing the installer. For backfilled walls overlap ULTRASEAL XP membrane edges a minimum 50mm (2”) and tape overlaps with CETCO Seamtape.

B. Expansion Joints: Ultraseal waterproofing is not an expansion joint filler or sealant, but may be used as an expansion joint cover over a properly installed expansion joint material placed during substrate preparation.

3.04 AQUADRAIN DRAINAGE COMPOSITE (Non-Hydrostatic Applications)

1. At the base of the lagging wall, install Aquadrain 100BD base-drain horizontally oriented with the open core edge up and the 50mm (2”) fabric flap side away from the lagging wall. Secure the bottom edge of Base Drain to the lagging wall with washer-head fasteners every few feet. Use couplers and corner fittings, as required, to form a continuous Base Drain installation. Install discharge outlet fittings to connect with discharge pipes as required for the project. Weep discharge pipes stubbed into Base Drain or Aquadrain sheet without proper discharge connection fittings is not acceptable.

B. Install the bottom course of Aquadrain sheet drainage (geotextile side against the lagging wall) with the sheet drain bottom edge fabric flap tucked behind the top edge of the Base Drain against the lagging to prevent the passage of soil into the core at the connection. Bottom edge of Sheet Drain core should be in contact with open top core edge of Base Drain. Place the 50mm (2”) fabric flap of the Base Drain over the back of the Sheet Drain core and secure it with tape to maintain flap position. Secure the top edge of Base Drain to the lagging wall with washer-head fasteners at 600mm (24”) on center.

C. Install subsequent courses of Aquadrain sheet drainage to within 300mm (12”) of finished grade or as shown on the project drawings. Tightly abut adjoining sheet drain core edges and tuck the extra fabric flaps behind the adjacent roll edge to prevent soil from entering the sheet drain. Secure sheet drain to lagging wall with washer-head fasteners. Where drainage sheet panels are installed overlapped, bottom edge of higher course shall be installed to the outside of the lower course to shed water like a roof shingle.

D. Prior to installing drainage composite near grade, install 12mm thick cementitious wall board centered over metal soldier pile from finished grade elevation to specified depth of soldier pile removal. Cementitious wall board will protect drainage and waterproofing when top of soldier pile is excavated and removed. Remove cementitious board with removal of soldier pile top and lagging.

E. Around penetrations and tie-back heads, cut sheet drainage composite to fit and wrap extra filter fabric around open core edge to prevent soil from entering core.

F. At the top of the sheet drain installation, wrap the filter fabric flap behind the exposed top core edge to prevent intrusion of soil into the core and secure sheet drain to wall with termination bar fastened at 300mm (12”) on center with the fabric wrapped.

 Note: Specify Aquadrain sheet composite and base drain for non-hydrostatic site conditions for collection and transport of water. Aquadrain system shall be connected to an operable drain discharge system.

3.05 SLAB TO PROPERTY LINE SHORING WALL TRANSITION COURSE

A. At base of shoring wall, install ULTRASEAL XP corner transition sheet horizontally oriented (white geomembrane liner against shoring wall; geotextile side facing installer) with the bottom edge extending out onto the horizontal substrate a minimum 300mm (12”) and the top edge of the sheet extending a minimum 300mm (12”) above the finished slab elevation. Secure ULTRASEAL XP sheet to shoring wall through the Aquadrain with washer-head fasteners at maximum 600mm (24”) on center. Overlap edges of ULTRASEAL XP sheets a minimum 100mm (4”).

B. If the slab thickness is greater than 600mm (24”). install a second full sheet or cut strip of ULTRASEAL XP horizontally oriented on the shoring wall to meet the 300mm (12”) requirement above of the top slab elevation. Overlap top edge of previous sheet and edges of adjacent sheets a minimum 100mm (4”)~~.~~

3.06 UNDER SLAB INSTALLATION

A. Reinforced structural foundation slabs should be a minimum of 150mm (6”) thick when placed on a concrete blinding layer. Reinforced concrete slab(s) on compacted grade shall be a minimum of 100mm (4”) thick. Install ULTRASEAL XP 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.

B. Install underslab ULTRASEAL XP membrane extending to base of shoring wall (geotextile side up) fully overlapping the 300mm (12”) horizontal tail of the ULTRASEAL XP corner transition sheet installed per Section 3.05 Work. Secure corner edge of membrane with washer-head fasteners or pneumatic staples at 300mm (12”) on center.

C. Place ULTRASEAL XP directly on properly prepared substrate (poly liner side down; geotextile side up facing installer) with adjoining edges overlapped a minimum of 100mm (4”). Stagger sheet end seams a minimum of 600mm (24”)~~.~~ Mechanically fasten or staple ULTRASEAL XP at 300mm (12”) on center to prevent movement from construction operations or concrete placement. When the slab is poured in sections, extend ULTRASEAL XP a minimum 300mm (12”) beyond the slab edge to enable proper overlapping.

D. Install waterproofing system at all grade beams, pile caps, and other detail areas in accordance with manufacturer’s detail for specific project condition(s).

E. Slab Penetrations: For all pipe, rebar, structural or other penetrations install waterproofing system in accordance with manufacturer’s standard detail for specific project condition(s).

F. Inspect finished ULTRASEAL XP installation and repair any damaged material prior to concrete slab placement.

NOTE: Related work to be completed under Division 3. WATERSTOP XP shall be installed in all slab joints, around applicable slab penetrations and structural members. Refer to WATERSTOP XP product literature for further installation procedures and guidelines.

3.07 WOOD LAGGING WALL INSTALLATION

A. Install a strip of ULTRASEAL XP over all soldier piles with raised lagging hanger bolts, form tie rods, or other irregular surface. ULTRASEAL XP strip should extend a minimum 150mm (6”) to both sides of the piling. Apply SEAL-X XP minimum 6mm (0.25”)thick by 50mm (2”) to ULTRASEAL XP strip surface along both side edges of the soldier pile.

B. Starting at the base corner, install base course of ULTRASEAL XP (horizontally oriented) to lagging wall over the previously installed sheet drainage and corner transition ULTRASEAL XP course (Section 3.04 and 3.05 Work). Secure sheet edges to shoring wall with washer-head fasteners placed at maximum 600mm (24”) on center around sheet edge. Overlap adjacent ULTRASEAL XP sheet edges a minimum 100mm (4”)~~.~~

C. After the bottom horizontal course, ULTRASEAL XP sheets can be installed either vertically or horizontally oriented. Continue ULTRASEAL XP installation up wall to finished ground elevation detail, staggering all sheet roll ends of adjacent courses a minimum 300mm (12”)~~.~~ Do not allow horizontal ULTRASEAL XP overlap joints to run at same elevation as the concrete pour lift joints; extend membrane past a minimum 150mm (6”)~~.~~ Overlap adjacent ULTRASEAL XP sheet edges a minimum 100mm (4”) .

1. Tie-Back Heads: For all tie-back heads and soil nails, install waterproofing system with applicable size TB-Boot in accordance with 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).

D. Penetrations: For all pipe, rebar, structural and other penetrations install waterproofing system in accordance with manufacturer’s detail for specific project condition(s).

E. Inspect finished ULTRASEAL XP installation and repair any damaged material prior to concrete placement.

3.08 LAGGING WALL EXCAVATION, GRADE TERMINATION AND BACKFILL

A. Coordinate with excavation and backfill operations conducted under Division 31 Work to remove the top few wood lagging timbers and top end of the metal soldier piles per local building code or project requirements. Identify and repair any waterproofing and drainage sheet damaged by excavation and removal of soldier pile heads and lagging. Where excavated, fasten all exposed ULTRASEAL XP overlap seams at maximum 600mm (24”) on center and apply CETCO SeamTape centered along overlap seams.

B. Terminate ULTRASEAL XP membrane 300mm (12”) below finished grade elevation secured with washer-head fasteners at maximum 300mm (12”) on center to exterior surface of concrete wall. Per manufacturer’s detail for specific project condition(s), install ENVIROSHEET membrane to primed concrete substrate with bottom edge overlapping top edge of ULTRASEAL XP membrane minimum 100mm (4”)~~.~~ Overlap all roll ends a minimum 100mm (4”) (to form a continuous grade flashing. Height of flashing shall be per project details and specifications. Install a rigid termination bar along the top edge of ENVIROSHEET; fastened at maximum 300mm (12”) on center. Complete ground-level termination detail with tooled bead of CETSEAL along the top edge, at all penetrations through the flashing, and all exposed overlap seams.

C. Backfill shall be placed and compacted to minimum 85% Modified Proctor density 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. Backfill shall consist of compactable soil or angular aggregate 19mm (3/4”) or less free of debris, sharp objects, and stones larger than 19mm (3/4”). Care should be used during backfill operation to avoid damage to the waterproofing system. If damage occurs, cease backfilling and report damage. Damaged waterproofing must be repaired per manufacturer’s guidelines.

3.09 METAL SHEET PILING RETENTION WALLS

A. Trowel 12mm (1/2”) thick layer of SEAL-X XP along all sheet piling interlocks. Any areas of water seepage at the interlocks can be sealed prior to ULTRASEAL XP installation by injecting Bentogrout to the outside of the sheet piling interlocks.

B. Cut the underslab ULTRASEAL XP to tightly contour with the metal sheet piling wall. Then apply 38mm (1.5”) fillet of SEAL-X XP on top of the ULTRASEAL XP along the property line wall. Then install the base shoring wall ULTRASEAL XP sheet overlapping the underslab ULTRASEAL XP sheet a minimum 300mm (12”). Cut the bottom edge of the shoring wall sheet at piling transitions to allow the bottom strips to lay flat onto the underslab ULTRASEAL XP. Finally, apply SEAL-X XP at the cut ULTRASEAL XP membrane edges extending outward from the shoring wall for a minimum of 150mm (6”).

C. Starting at the base corner, install course of ULTRASEAL XP (horizontally oriented) to metal sheet piling wall over the previously installed sheet drainage and corner transition ULTRASEAL XP course. Secure sheet edges to shoring wall with washer-head fasteners placed at maximum 600mm (24”) on center around sheet edge.

D. After the bottom horizontal course, ULTRASEAL XP sheets can be installed either vertically or horizontally oriented. Continue ULTRASEAL XP installation up wall to finished grade elevation detail, staggering all sheet roll ends of adjacent courses a minimum 300mm (12”)~~.~~ Do not allow horizontal ULTRASEAL XP overlap joints to run at same elevation as the concrete pour lift joints; extend membrane past a minimum 150mm (6”). Overlap adjacent ULTRASEAL XP sheet edges a minimum 100mm (4”).

1. Tie-Back Heads: For all tie-back heads and soil nails, install waterproofing system with applicable size TB-Boot in accordance with 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).

F. Penetrations: For all pipe, rebar, structural and other penetrations install waterproofing system in accordance with manufacturer’s detail for specific project condition(s).

G. Terminate ULTRASEAL XP membrane 300mm (12”) below finished ground level secured with washer-head fasteners at maximum 300mm (12”) on center to exterior surface of concrete wall. Per manufacturer’s detail for specific project condition(s), install ENVIROSHEET membrane to primed concrete substrate with bottom edge overlapping top edge of ULTRASEAL XP membrane minimum 100mm (4”)~~.~~ Overlap all roll ends a minimum 100mm (4”) to form a continuous flashing. Height of flashing shall be per project details and specifications. Install a rigid termination bar along the top edge of ENVIROSHEET; fastened at maximum 300mm (12”) on center~~.~~ Complete ground-level termination detail with tooled bead of CETSEAL along the top edge, at all penetrations through the flashing, and all exposed overlap seams.

H. Inspect finished ULTRASEAL XP installation and repair any damaged material prior to concrete placement.

3.10 CUT ROCK FACE OR AUGER CAST CAISSON RETENTION WALLS

A. Cut rock face or auger cast caisson wall should be sufficiently planar to provide adequately smooth surface to apply ULTRASEAL XP. ULTRASEAL XP will conform to large gradual change in planes (e.g. around caisson column) but should not be installed over sharp surface deflections or voids. Deflections/voids should be filled with cementitious material to create suitable substrate for waterproofing installation.

B. Install ULTRASEAL XP wall transition course at base of cut face rock or auger cast caisson wall per Section 3.05 instructions.

C. Starting at the base corner, install course of ULTRASEAL XP (horizontally oriented) to the shoring wall over the previously installed sheet drainage and ULTRASEAL XP corner transition course (Section 3.04 and 3.05 Work). Secure sheet edges to shoring wall with washer-head fasteners placed a maximum 600mm (24”) on center around sheet edge. Overlap adjacent ULTRASEAL XP sheet edges a minimum 100mm (4”)~~.~~

D. After the bottom horizontal course, ULTRASEAL XP sheets can be installed either vertically or horizontally oriented. Continue ULTRASEAL XP installation up wall to finished grade elevation detail, staggering all sheet roll ends of adjacent courses a minimum 600mm (24”)~~.~~ Do not allow horizontal ULTRASEAL XP overlap joints to run at same elevation as the concrete pour lift joints; extend membrane past a minimum 150mm (6”)~~.~~ Overlap adjacent ULTRASEAL XP sheet edges a minimum 100mm (4”)~~.~~

E. Tie-Back Heads: For all tie-back heads and soil nails, install waterproofing system with applicable size TB-Boot in accordance with 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).

F. Penetrations: For all pipe, rebar, structural and other penetrations install waterproofing system in accordance with manufacturer’s detail for specific project condition(s).

G. Terminate ULTRASEAL XP membrane 300mm (12”) below finished ground level secured with washer-head fasteners at maximum 300mm (12”) on center to exterior surface of concrete wall. Per manufacturer’s detail for specific project condition(s), install ENVIROSHEET membrane to primed concrete substrate with bottom edge overlapping top edge of ULTRASEAL XP membrane minimum 100mm (4”)~~.~~ Overlap all roll ends a minimum 100mm (4”) to form a continuous flashing. Height of flashing shall be per project details and specifications. Install a rigid termination bar along the top edge of ENVIROSHEET; fastened at maximum 300mm (12”) on center~~.~~ Complete grade termination detail with tooled bead of CETSEAL along the top edge, at all penetrations through the flashing, and all exposed overlap seams.

H. Inspect finished ULTRASEAL XP installation and repair any damaged material prior to concrete placement.

3.11 CLEAN UP

1. In areas where adjacent finished surfaces are soiled by work of this Section, consult manufacturer of surfaces for cleaning advice and conform to their recommendations and instructions. Remove all tools, equipment and remaining product on-site. Dispose of section work debris and damaged product following all applicable regulations.

***The following Sections 3.04B, through Section 3.10B pertain only to backfilled cast-in-place concrete wall applications.***

3.04B SLAB / BACKFILLED WALL FOOTING EDGE TRANSITION COURSE

A. Inside the slab/footing form edge, secure ULTRASEAL XP sheet horizontally oriented (poly side down; geotextile facing installer) to the top inside edge of the exterior slab/footing form with the sheet conforming to the interior form surfaces and then extending out onto the horizontal slab substrate a minimum 300mm (12”)~~.~~ Overlap edges of adjacent ULTRASEAL XP sheets a minimum 100mm (4”) and secure to prevent sheet movement during construction or concrete placement.

3.05B UNDER SLAB INSTALLATION

A. Install ULTRASEAL XP 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.

1. Install ULTRASEAL XP membrane (poly side down; geotextile side up) extending to interior edge of footing / slab edge, fully overlapping the 300mm (12”) horizontal tail of the ULTRASEAL XP slab edge sheet installed in Section 3.04B. Overlap edges of adjacent ULTRASEAL XP sheets a minimum 100mm (4”) and secure to prevent sheet movement during construction or concrete placement.
2. Place ULTRASEAL XP directly on properly prepared substrate (poly side down; geotextile side up facing installer) with adjoining edges overlapped a minimum of 100mm (4”). Stagger sheet end seams a minimum of 600mm (24”). Mechanically fasten or staple ULTRASEAL XP at 300mm (12”) on center to prevent movement from construction operations or concrete placement. When the slab is poured in sections, extend ULTRASEAL XP a minimum 300mm (12”) beyond the slab edge to enable proper overlapping.
3. Install waterproofing system at all grade beams, pile caps, and other detail areas in accordance with manufacturer’s detail for specific project condition(s).
4. Slab Penetrations: For all pipe, rebar, structural or other penetrations install waterproofing system in accordance with manufacturer’s standard detail for specific project condition(s).
5. Inspect finished ULTRASEAL XP installation and repair any damaged material prior to concrete slab placement.

NOTE: Related work to be completed under Division 3. WATERSTOP XP shall be installed in all slab joints, around applicable slab penetrations and structural members. Refer to WATERSTOP XP product literature for further installation procedures and guidelines.

3.06B BACKFILLED CAST-IN-PLACE CONCRETE WALLS

A. Trowel continuous 38mm (1.5”) fillet of SEAL-X XP along the wall/footing intersection.

B. Trowel 19mm (3/4”) thick, continuous SEAL-X XP fillet at all inside wall corner transitions. Trowel SEAL-X XP over form-tie pockets/patches and any slightly irregular concrete surface honeycomb areas.

C. Starting at the base of the wall, install ULTRASEAL XP sheet horizontally (white poly side facing installer) covering the SEAL-X XP cant and extending onto the footing a minimum of 150mm (6”). For hydrostatic conditions, cover the entire footing and overlap waterproofing membrane from underslab work a minimum of 150mm (6”). Attach ULTRASEAL XP using washer-headed mechanical fasteners at maximum 600mm (24”) on center and tape overlap with CETCO Seamtape. Overlap all adjacent sheet edges a minimum 50mm (2”). Stagger all vertical overlap seams a minimum of 300mm (12”). Tape all membrane overlap seams with CETCO Seamtape.

D. After the bottom horizontal course, ULTRASEAL XP sheets can be installed either vertically or horizontally oriented. Continue ULTRASEAL XP installation up wall to finished ground elevation detail, staggering all sheet roll ends of adjacent courses a minimum 300mm (12”). Do not allow horizontal ULTRASEAL XP overlap joints to run at same elevation as the concrete pour lift joints. Overlap all adjacent ULTRASEAL XP sheet edges a minimum 50mm (2”) and secure with washer-head fasteners at maximum 600mm (24”) on center. Tape all membrane overlap seams with CETCO Seamtape.

E. Penetrations: For all pipe, rebar, structural and other penetrations install waterproofing system in accordance with manufacturer’s detail for specific project condition(s).

F. Terminate ULTRASEAL XP membrane 300mm (12”) below finished ground level secured with washer-head fasteners at maximum 300mm (12”) on center to exterior surface of concrete wall. Per manufacturer’s detail for specific project condition(s), install ENVIROSHEET membrane to primed concrete substrate with bottom edge overlapping top edge of ULTRASEAL XP membrane minimum 100mm (4”). Overlap all roll ends a minimum 100mm (4”) to form a continuous flashing. Height of flashing shall be per project details and specifications. Install a rigid termination bar along the top edge of ENVIROSHEET; fastened at maximum 300mm (12”) on center~~.~~ Complete ground-level termination detail with tooled bead of CETSEAL along the top edge, at all penetrations through the flashing, and all exposed overlap seams.

G. Inspect finished ULTRASEAL XP installation and repair any damaged material prior to backfill placement. Assure that ULTRASEAL XP is not displaced during backfill placement or soil compaction.

3.07B PREFABRICATED DRAINAGE COMPOSITE INSTALLATION (Non-Hydrostatic Walls)

A. At the base of the wall, place Aquadrain Base-Drain horizontally oriented with the open core side up and the 50mm (2”) flap of fabric side tight against the wall over the previously installed ULTRASEAL XP waterproofing using wash-head mechanical fasteners or general construction adhesive. The 50mm (2”) fabric flap along the top edge of Base Drain should be tightly secured against the wall. Use Base Drain accessory fittings, as required, to form a continuous installation. Install Base Drain discharge outlet fittings to connect to discharge pipes as required for the project.

B. Install the bottom course of Aquadrain sheet drainage (plastic core side against the wall) with the drain sheet bottom core edge in contact with open top core edge of Base Drain. Secure sheet drain to wall with washer-head fasteners. Secure extra fabric flap of sheet drain extending down the top front edge of Base Drain to prevent the passage of soil into the core at the connection.

C. Install subsequent courses of Aquadrain sheet drainage to within 300mm (12”) of finished ground elevation or as shown on the project drawings. Tightly abut adjoining sheet drain core edges together and secure the extra fabric flaps over the front of adjacent roll edges to prevent soil from entering the sheet drain. Secure sheet drain to wall with washer-head fasteners. Where drainage sheet panels are installed overlapped, bottom edge of higher course shall be installed to the outside of the lower course to shed water like a roof shingle.

D. Around penetrations and tie-back heads, cut sheet drainage composite to fit and wrap extra filter

fabric around open core edge to prevent soil from entering core.

F. At the top of the sheet drain installation, wrap the filter fabric flap behind the exposed top core edge to prevent intrusion of soil into the core and secure sheet drain to wall with termination bar fastened at 300mm (12”) on center.

3.08B INSULATION

A. Always apply ULTRASEAL XP waterproofing directly to properly prepared structural concrete substrates. Insulation, if used, should be installed to the exterior of the waterproofing. Do not apply ULTRASEAL XP waterproofing over lightweight insulating concrete.

3.09B BACKFILL EXCAVATED CAST-IN-PLACE CONCRETE WALLS

1. Backfill shall be placed and compacted to minimum 85% Modified Proctor density 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. Backfill shall consist of compactable soil or angular aggregate 19mm (3/4”) or less) free of debris, sharp objects, and stones larger than 19mm (3/4”). Care should be used during backfill operation to avoid damage to the waterproofing system. If damage occurs, cease backfilling and report damage. Damaged waterproofing must be repaired per manufacturer’s guidelines.

3.10B CLEAN UP

A. In areas where adjacent finished surfaces are soiled by work of this Section, consult manufacturer of surfaces for cleaning advice and conform to their recommendations and instructions. Remove all tools, equipment and remaining product on-site. Dispose of section work debris and damaged product following all applicable regulations.

 End of Section 071700