

Spencer's Boat Yard Boat Slip and Seawall Repairs
TECHNICAL SPECIFICATIONS PACKAGE



City of Key West

I hereby certify that this specifications package has been properly prepared by me, or under my responsible charge, in accordance with procedures adopted by the Florida Department of Transportation.

This item has been digitally signed and sealed by Thomas M. Waits, P.E. on the date adjacent to the seal. Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.

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PART 1: GENERAL

1. SECTION INCLUDES

- 1.1 The section includes information about all system components used in the construction of Truline hybrid sheet piling system.
- 1.2 This section covers installation recommendations of the system and its components.

2. SUBMITTALS

- 2.1 Installers Qualifications and list of equipment.
- 2.2 Product data sheets and testing results.
- 2.3 Truline polymer U-channel and assembly parts.
- 2.4 Concrete. Submit proposed mix proportions and samples of proposed materials. Product data and safety literature for all admixtures proposed for the mix. Delivery tickets compliant with requirements of ASTM C94 for each delivery batch of ready-mixed concrete. Ticket information shall include: class of concrete, water cement ratio, time of loading, truck ID number, all admixtures used, and quantity.
- 2.5 Reinforcement mill tests, shop drawings and accessories (plastic centralizers, chairs etc.) in accordance with ACI 315 and plan provisions.
- 2.6 Tie-downs and accessories (if any).
- 2.7 Back-fill soils laboratory analysis.

3. QUALITY ASSURANCE

- 3.1 Installers Qualifications. The hybrid sheet piling installer shall have minimum three (3) successful projects that include installation of sheet piling systems of a similar size, installation depth and project conditions (soils, ground waters, exposed height) similar to the current project.
- 3.2 Installation Tolerances.
 - 3.2.1 Deviation from plumb (vertical) - shall not exceed 1/4 inch per foot of exposed sheet pile, but not more than 4 inches total unless otherwise specified on the drawing.
 - 3.2.2 Deviation from location of top of pile (horizontal) - shall not exceed 4 inches unless otherwise specified on the drawing.

PART 2: PRODUCTS

4. GENERAL

- 4.1 All polymer piling shall be new material without any damage to any exposed sides or interlocking system.
- 4.2 Polymer piling system shall be fabricated in such manner that allows continuous interlock between the individual segments throughout the entire length of pile when installed in place.
- 4.3 Polymer piling system shall provide and serve as stay-in-place form for fill material (cast-in-place concrete). No additional forming work shall be required for fill concrete.

5. MATERIALS

- 5.1 Polymer U-channel sheet piles and accessories.
 - 5.1.1 Sheet piles and all system parts shall be manufactured out of durable co-extruded rigid vinyl material formulated for exterior weather-ability and high impact resistance, UV-resistant against fading and discoloration in harsh marine environments, non-chalking, chemically resistant, non-corrosive.
 - 5.1.2 Outer layer shall be UV-resistant virgin vinyl compound.
 - 5.1.3 Inner layer shall be post-industrial recycled vinyl.
 - 5.1.4 Nominal thickness of a single layer of a two layer system shall be 0.27in.
 - 5.1.5 Polymer modulus of Elasticity (E) shall be no less than 380,000 psi.
 - 5.1.6 Tensile Strength shall be no less than 6,300 psi.
 - 5.1.7 Impact Strength shall be no less than 850.2 in*lbs.
 - 5.1.8 Product manufacturer shall provide minimum 50-year limited warranty on the polymer parts.
 - 5.1.9 System manufacturer shall be Truline LLC or Engineer of Record (EOR) approved equal.
- 5.2 Concrete mixes.
 - 5.2.1 Concrete shall be Class IV (5500 psi) FDOT mix in accordance with FDOT Standard Specification 346 and any plan provisions.
 - 5.2.2 Clean, potable water.
 - 5.2.3 Portland cement shall be ASTM C150 / C150M Type II.
 - 5.2.4 Fine and coarse aggregate shall be in accordance to ASTM C33 / C33M.
 - 5.2.5 Air-Entraining Admixtures shall be in accordance with ASTM C260 / C260M.
 - 5.2.6 High range water-reducing admixtures shall be in accordance with C494 / C494M.
 - 5.2.7 Fly Ash use in concrete mix shall be in accordance with ASTM C618-12a.
 - 5.2.8 Silica Fume shall meet the requirements of ASTM C1240.
- 5.3 Reinforcement.

- 5.3.1 Reinforcement shall be in accordance with the structures plans general notes.
- 5.3.2 Reinforcement supports shall be either all-plastic or stainless steel construction.
- 5.4 Backfill Soils.
 - 5.4.1 Soils used for a backfill of the sheet pile system or its components shall be free of muck, clay, rocks larger than 3 inches, large roots, wood debris, and other organic materials.
 - 5.4.2 Only well draining soils shall be used for backfill.
 - 5.4.3 Backfill soil mechanical characteristics shall be equivalent to the existing soils as detailed in the geotechnical report and used for calculations. The backfill soil's laboratory analysis shall be submitted and approved by the EOR prior to placement.

PART 3: EXECUTION

6. GENERAL

- 6.1 Earthwork in the vicinity of sheet pile system installation shall be completed prior to sheet pile installation to the maximum extent practical.
- 6.2 Utilities, buildings, structures, pavements, landscaping and any other features located in the vicinity of the Truline hybrid sheet pile system installation shall be protected from possible damage created by the earthwork operations.
- 6.3 Topsoils, debris, vegetation, pavements and other obstructions shall be removed from the site prior to the installation commencing.
- 6.4 Erosion and sedimentation control features such as silt fences, turbidity barrier, inlet and stream protection devices and BMPs shall be installed prior to installation start and shall be maintained throughout the construction and restoration operations.

7. STORAGE AND HANDLING

- 7.1 Composite sheet pile system components shall be stored on a level, sound ground and supported in such manner that protects individual U-channels and other parts from bending, impact damage, abrasive damage, open fire, excessive heat, paints, solvents etc.
- 7.2 Any damaged U-channels, end caps and other components shall be discarded, and only undamaged components shall be placed into final position.
- 7.3 Care must be taken during loading, unloading and handling of U-channel bundles and individual components. Depending on the total length of the sheets, intermediate supports may be required to prevent permanent damage.
- 7.4 Backfill soil stockpiles shall be stored away from excavation edges, environmentally sensitive areas and water bodies to minimize soil erosion.
- 7.5 Dewatering activities shall comply with plan provisions and local DEP requirements.

8. SUBGRADE CONDITIONS

- 8.1 If during the Truline hybrid sheet pile system installation it is discovered that subgrade conditions substantially vary from those described in construction plans or geotechnical investigation report, all installations shall be stopped, and the Engineer of Record (EOR) shall be notified. No further installation work shall be performed unless the condition is approved by the EOR.

9. INSTALLATION

9.1 Truline Hybrid Sheet Piles Installation.

- 9.1.1 Due to shallow soft limestone, excavation is required to ensure vinyl sheets are not damaged or deformed during installation.
- 9.1.2 Excavate a trench to an elevation of -8.0 NGVD (1929) in the location of the proposed wall utilizing overlapping auger holes. The maximum allowed auger diameter is 1'-8".
- 9.1.3 Install a driving guide to establish the front of the wall and the proper elevation.
- 9.1.4 Prior to driving the first part, pre-attach the Truline male end cap to the Truline U-channel. Slide the parts in place and fasten with coarse thread deck screws at 24" spacing to the Truline U-channel. This will close the open end of the first U-channel and provide a rigid box to drive. To maintain hook spacing, always construct the wall so that the closed end of the u- channel is the leading edge.
- 9.1.5 Set the first Truline U-channel into position, oriented with a closed side of a U-channel in the direction of installation. Drive the Truline U-channel to the required depth within the excavated trench.
- 9.1.6 U-channels shall remain plumb in all directions.
- 9.1.7 Set the next Truline U-channel's dual interlocks into the prior U-channel's dual interlocks and drop the piles into place, continuing to drive with equipment to required depth. If corner/radius parts are needed to navigate any radius or angle, the same procedure applies.
- 9.1.8 When driving the final Truline U-channel, pre-attach the Truline female end cap to the U-channel using the same method as described above for the first U-channel. Set into place and drive to the required depth.
- 9.1.9 Care shall be taken during pile driving to prevent any damage to piles, splitting, breaking, separating of interlocks, etc.
- 9.1.10 Installation Tolerances. Deviation from plumb (vertical) - shall not exceed 1/4 inch per foot of exposed sheet pile, but not more than 4 inches total unless otherwise specified by the plan drawings. Deviation from location of top of pile (horizontal) - shall not exceed 4 inches unless otherwise specified by the plan drawings.

9.2 Reinforcement placement.

- 9.2.1 Reinforcement installation shall be documented and reported to the EOR for approval before depositing concrete.
- 9.2.2 Splice laps shall be as indicated on the approved shop drawings and in compliance with the requirements of ACI 318 and ACI 315.
- 9.2.3 Dowels shall be of the same size and bar type as the rebar to which they lap, unless otherwise is indicated on the plans.

9.3 Fill of Truline cells.

- 9.3.1 Employ the Truline Airlift or EOR approved equal to remove the soil from within the Truline U-channel as detailed in plans.

- 9.3.2 If the concrete is to be placed underwater, it must be placed from the bottom up keeping the end of the pump line submerged under the concrete surface. It is not permitted to allow the concrete to free fall through water.
- 9.3.3 Concrete class shall be as described in these specifications, unless otherwise specified by the EOR.
- 9.3.4 Standard concrete pumping equipment shall be used for concrete depositing.
- 9.3.5 The EOR may deem that other fills such as stone, recycled concrete, sand, etc. are suitable based on the project specifications and material availability.
- 9.4 Top Cap.
 - 9.4.1 Install the top cap as shown on plans prior any backfill placement unless otherwise is approved by the EOR.
- 9.5 Wales.
 - 9.5.1 If shown on the project drawings, wales should be applied to the exterior face of the Truline retaining wall so that the entire bearing surface of the wale is pushing on the wall.
- 9.6 Tie Rods & Deadman/Anchor Systems.
 - 9.6.1 If shown on the project drawings, install tie rods & deadman or anchor systems.
 - 9.6.2 In the case where the top cap is a structural member made from reinforced concrete, the tie rods are embedded into the top cap with hooks as detailed in the structures plans.
 - 9.6.3 Placing the tie rod through the wall: A hole should be drilled through the structural member and both walls of the Truline sheet pile so that the tie rod can be inserted through the assembly.
 - 9.6.4 Deadman shall be buried in the soil beyond its natural failure plane.
 - 9.6.5 Tie rods shall be fastened to the deadman similar to embedding in the concrete top cap.
- 9.7 Flowable Fill
 - 9.7.1 Flowable fill shall be used to fill the void between existing and proposed walls for all wall segments where existing wall is to remain. Flowable fill shall be designed and installed in accordance with FDOT Standard Specification 121.
 - 9.7.2 The mix design shall be for an extremely aggressive environment and utilizing an anti-washout additive. Mix design must be submitted to EOR for approval.
 - 9.7.3 Flowable fill shall be placed utilizing a tremie. Install after curing of concrete for the wall in-fill and before pouring of the top cap.
- 9.8 Backfill.
 - 9.8.1 Backfill soils shall be placed on compacted and stabilized sub-grades free of top soils, vegetation, debris, standing water and mud.
 - 9.8.2 Backfill shall be placed in lifts of 6-8 inches and compacted to 95% of Standard Proctor Test, unless otherwise is specified by the EOR.
 - 9.8.3 Placement and compaction of the backfill soils shall be performed after curing of concrete for the wall in-fill and deadmans is complete (28 days from placement) unless otherwise is approved by the EOR.

9.8.4 Compaction and placement of the backfill shall be performed with small vibratory equipment. The system is not intended to support large construction equipment nor vehicular traffic unless specifically approved by the EOR.

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