

Special Specification 4148

Construct Bulkhead



1. DESCRIPTION

Furnish and construct new bulkheads as show in the plans.

2. MATERIALS

Furnish materials in accordance with the plans and the following:

- Item 400, "Excavation and Backfill for Structures"
- Item 407, "Steel Piling"
- Item 420, "Concrete Substructures"
- Item 421, "Hydraulic Cement Concrete"
- Item 423, "Retaining Walls"
- Item 440, "Reinforcement for Concrete"
- Item 441, "Steel Structures."

Coat steel sheet and pipe piling for marine-grade immersion service in accordance with the requirements of Item 407.

Furnish steel that meets ASTM A572 Grade 50 for walers, stiffeners, and miscellaneous structural steel. Coat walers and waler stiffeners with a marine-grade immersion coating system recommended by the manufacturer for marine, immersion service, and meeting the requirements of NORSOK Standard M-501, Coating System NO. 7. Submit product data sheets and obtain approval for the coating system before performing the work. Block off areas to be field welded before coating. Field apply and repair coatings as recommended by the manufacturer.

Furnish threaded bars for tie rods that meet ASTM A615 Grade 75. Furnish tie rods complete with accessories and in the standard product line of the manufacturer. Assure that the mechanical couplers conform to the requirements of Item 440, "Reinforcement for Concrete." Tension components must suit the type and size of the bar and be able to develop 100% of the bar's ultimate strength. Galvanize tie rods, connectors, eyes, pins, and mechanical couplers in accordance with Item 445, "Galvanizing."

Use standard heavy duty hex head or spherical hex head anchor nuts conforming to ASTM A563 and designed for use with the type of all-thread bar shown on the plans. Assure that the anchor nuts develop 125% of the yield strength and 100% of the ultimate tensile strength of the all-thread bars.

Use hardened steel washers conforming to ASTM F436 and galvanized them in accordance with Item 445, "Galvanizing."

Skyline Steel and DYWIDAG Systems are acceptable manufacturers for the threaded bar and accessories. Other manufacturers can be substituted with approval by the Engineer. The substitute material and system must meet or exceed the requirements of this Item and the requirements for the material and underwater installation listed in Skyline Steel or DYWIDAG literature.

Furnish non-shrink grout for prestressed ground anchor assembly that conforms to the requirements of DMS-4675, "Cementitious Grouts and Mortars for Miscellaneous Applications."

Use crushed stone behind bulkheads that meets the requirements for Drainage Aggregate per Article 2.4.3, "Drainage Aggregate" of Item 423, "Retaining Walls."

3. CONSTRUCTION

Use construction methods, workmanship, equipment, and materials conforming to the various Standard Specification Items which normally govern items of work under this contract and to the details shown in the plans. Follow the sequence of construction shown in the plans to ensure stability of existing bulkhead.

- 3.1. **Excavation and Backfill.** Excavation methods and backfill must be constructed in accordance with Item 400, "Excavation and Backfill for Structures."
- 3.2. **Tie Rods.** Verify that tie rods and accessories have been installed in accordance with the manufacturer's recommendations and are free from damage to ensure the assembly is able to develop the full design strength. Sufficiently support the tie rods without slack before tightening.
- 3.3. **Concrete Cap.** Construct the concrete cap in accordance with Item 420, "Concrete Substructures." Concrete must gain full 28-day design strength as shown in the plans before transfer of loads from prestressed ground anchors if applicable.
- 3.4. **Steel Pipe Piles.** Fit steel pipe piles for bulkheads with toe protection comprised of a pile section or premanufactured shoe. Assure that the toe protection meets the following requirements:
- Steel grade of the toe protection is to be greater than or equal to the steel pipe pile,
 - The outside diameter equal to the inner diameter of the pile and an inner diameter of at least 1 in., but no more than 2 in. less than the inside diameter of the pile,
 - A length of at least 12 in. but no more than 24 in., and
 - A bevel at the end which is outward facing.

Weld the toe protection to the pile with a full penetration weld or in accordance with supplier's instructions.

Shop weld stiffeners and attachments for walers unless shown otherwise on the plans. Perform field welds to steel piling according to Item 448, "Structural Field Welding."

Cast concrete fill for tie rod connection to steel pipe pile monolithically with the concrete cap. The Contractor must include the method of forming the concrete fill in the shop drawings for the bulkhead.

- 3.5. **Shop Drawings.** Provide detailed shop drawings for the components of the bulkhead before fabrication.

4. MEASUREMENT

This Item will be measured will be by the square foot of acceptable bulkhead in place to the desirable elevation. When the Contractor elects to drive the bulkhead piling in deeper than required to meet the specified elevations required by the plans or the elevation authorized by the Engineer, no measurement will be made on that portion below the elevation required.

5. PAYMENT

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit bid price for "Construct Bulkhead" by type as shown in the plans. The price bid is full compensation for jetting, pilot holes, alignment holes, driving piling, concrete cap,

concrete fill, removal of existing riprap, removal and reconstruction of the existing cap, coatings, reinforced tips, connecting tie rods, walers, stiffeners, structural steel, fabrication, galvanizing, crushed stone aggregate, relocation of electrical conduits, materials, tools, equipment, labor, and incidentals for the bulkhead type, complete and in place.