

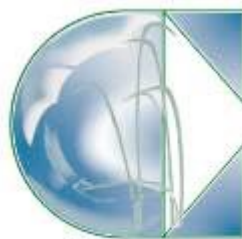
# **POINDEXTER SLOUGH FISH HABITAT IMPROVEMENT PROJECT PROJECT SPECIFICATIONS**

**PREPARED FOR:**



**Beaverhead Watershed Committee  
201 North Parkview Court  
Dillon, MT 59725**

**PREPARED BY:**



**CONFLUENCE**

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**May 2013**

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Bidding and Contract Requirements are according to Montana Public Works Standard Specifications, Fifth Edition, March 2003, with 2006 Addendum (MPWSS).

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**DIVISION 1:**

**GENERAL  
REQUIREMENTS**

## **PART 1 - GENERAL**

### **1.1 WORK INCLUDED:**

**Poindexter Slough Fish Habitat Improvements**, covered by this Contract, generally consists of:

#### **Phase 1**

- a. Removal of Existing Headgate and Construction of new headgate at upstream extent of Poindexter Slough (Station 0+00).
- b. Restoration of Reach 1 of Poindexter Slough (Station 0+38 – 15+00), including: channel widening, excavation of 13 pools, transplanting of sod mats and willows.
- c. Restoration of Reach 2a of Poindexter Slough (Station 15+00 – 80+00), including: excavation of 47 pools, regrading of 278 feet of channel, transplanting of sod mats and willows.
- d. Construction of 2 Hardened Crossings (Stations 26+62 and 53+00)

#### **Phase 2**

- e. Restoration of Reach 2b of Poindexter Slough (Station 80+00 – 120+00), including: excavation of 30 pools, transplanting of sod mats and willows.
- f. Restoration of Reach 3 of Poindexter Slough (Station 120+00 – 13+973), including: channel narrowing, regrading with fill, excavation of 14 pools, transplanting of sod mats and willows.
- g. Removal of existing Dillon Canal headgate and construction of new headgate for the Dillon Canal. (Station 139+73)
- h. Removal of existing pin and plank structure at Dillon Canal diversion and construction of new pin and plank structure at the Dillon Canal diversion. (Station 139+73)

#### **Phase 3**

- i. Restoration of Reach 4a of Poindexter Slough (Station 13+973 - 19+490), including: channel narrowing, excavation of 29 pools, transplanting of sod mats and willows.
- j. Restoration of Reach 4b of Poindexter Slough (Station 19+490 – 251+04), including: channel narrowing, regrading of 5,614 feet of channel, excavation of 46 pools, transplanting of sod mats and willows.
- k. Construction of 1 hardened channel crossings. (Station 210+50)

### **1.2 CONTRACTOR USE OF PREMISES:**

Confine operations to the site of the proposed Work within the access limits provided and shown on the drawings or as approved by the OWNER.

It shall be understood that the responsibility for protection and safekeeping of equipment and materials on or near the site will be entirely that of the CONTRACTOR and that no claim shall be made against the OWNER by reason of any act of an employee or trespasser whether OWNER has paid CONTRACTOR for equipment or materials in storage or not. It shall be further understood

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that should any occasion arise necessitating access by the OWNER to the sites occupied by these stored materials and equipment, the CONTRACTOR owning or responsible for the stored materials or equipment shall immediately remove same. No materials or equipment may be placed upon the property of the OWNER until the OWNER has agreed to the location contemplated by the CONTRACTOR to be used for storage. The CONTRACTOR shall be solely responsible for obtaining and shall pay all costs in connection with any additional work area, storage sites, access to the site, or temporary right-of-way which may be required for proper completion of the Work.

No camping is allowed within access limits without express written consent of OWNER and landowner.

No loose pets are allowed on site.

No discharging of firearms is allowed on site.

### 1.3 EQUIPMENT CLEANING REQUIREMENTS:

The CONTRACTOR will wash all earthwork equipment to remove seeds, roots, and rhizomes from the equipment prior to initial transport to the site in order to prevent the spread of noxious weeds to the site. (This is not meant to apply to service or employee vehicles that will stay on the roadway traveling frequently in and out of the Project area.) All earthwork equipment shall be pressure cleaned and be completely free of soil, seeds, vegetative matter, or other debris that could contain or hold seeds prior to the initial arrival to the construction site.

Equipment shall be considered free of soil, seeds, and other such debris when a visual inspection by the OWNER or ENGINEER does not disclose such material. Visual inspection shall include the complete exterior including but not limited to undercarriages, tires, wheel wells and grill works. Disassembly of equipment components or specialized inspection tools are not required.

All CONTRACTOR equipment will arrive at the work site clean and weed-free. The CONTRACTOR will periodically inspect and verify that equipment is arriving free of soil and debris capable of transporting noxious weed seeds, roots, or rhizomes.

Equipment will not be sprayed with herbicide chemicals as a preventative measure. Many herbicides target a wide range of vegetation and using herbicides in this way may harm desirable vegetation.

The CONTRACTOR will also thoroughly clean and inspect seeding equipment prior to conducting seeding activities.

### 1.4 FIELD CHECK OF EXISTING STRUCTURES:

The dimensions and elevations of existing structures and locations of existing fences, pipelines, conduits, cables, and equipment shown on the drawings were taken for the most part from available records and survey data and are not guaranteed for accuracy.

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It shall be the responsibility of the CONTRACTOR to check all dimensions and elevations of existing structures, pipelines, conduits, cables, equipment, or other existing items, both above and below ground, affected by or affecting the Work under this contract, prior to the start of construction or ordering materials and equipment affected thereby.

The CONTRACTOR's attention is directed to the Instructions to Bidders, which requires that each BIDDER visit the site of the Work to familiarize itself with the arrangement and condition of existing construction that is to be connected to or that is to remain in place.

**1.5 SITE ACCESS:**

Site access shall be provided in accordance with the “Equipment Access and Staging Plan” in the associated design documents. The CONTRACTOR shall be responsible for determining the adequacy of all roads, culverts, and bridges used in moving or gaining access for equipment and materials to the construction site. The CONTRACTOR shall provide alternative methods of access, such as a temporary crossing for any equipment that exceeds the structural limits of existing facilities.

**PART 2 - PRODUCTS**

**2.1 TEMPORARY BUILDINGS:**

A. All expenses for utilities, security and waste disposal are the responsibility of the CONTRACTOR.

B. Provide the name and telephone number of a representative who may be contacted after hours in case of emergency.

**PART 3 - EXECUTION NONE**

**END OF SECTION 01010**

**PART 1 - GENERAL**

**1.1 WORK INCLUDED:**

OWNER has established primary control with control points adjacent to the Work as shown in the Contract Documents. OWNER shall develop and make all detailed surveys needed for construction such as slope stakes, batter boards, and other working points, lines, and elevations for all other work on this project.

**1.2 PRESERVATION OF REFERENCE POINTS:**

Carefully preserve bench marks, reference points, lot corners, section corners, and stakes (other than those specifically designated for removal on the Drawings) and in case of destruction the CONTRACTOR shall be charged for the resetting of such points and shall be responsible for any mistakes that may be caused by their unnecessary loss or disturbance.

**PART 2 - PRODUCTS NONE**

**PART 3 - EXECUTION NONE**

**END OF SECTION 01050**

**PART 1 - GENERAL**

**1.1 WORK INCLUDED:**

Except as otherwise noted, the OWNER will, obtain, and pay for all requisite permits to work within the project watercourse. It is the responsibility of the CONTRACTOR to maintain, and proceed in conformity with all required permits for the Work.

The following permits will be the responsibility of the CONTRACTOR:

- a. Montana Pollution Discharge Elimination System Construction Dewatering General Permit'

The following permits will be the responsibility of the OWNER:

- b. US Army Corps of Engineers 404 permit
- c. Beaverhead County Conservation District 310 Permit
- d. DEQ 318 Authorization
- e. DEQ 410 Certification

CONTRACTOR represents it will perform all work in strict accordance with all Permit requirements, and will fully cooperate and timely comply with all directions of OWNER or other responsible agencies related to the Permit requirements.

CONTRACTOR represents by submitting its Bid that it has familiarized itself with all Permit requirements and will strictly comply therewith. Any fines, penalties, or other costs incurred by the OWNER arising out of or relating to the Work and/or the Permits therefore will be fully repaid to the OWNER by the CONTRACTOR.

CONTRACTOR shall obtain copies of all Permits necessary for the completion of the Work. Any costs associated Permits that must be obtained by CONTRACTOR shall be included as part of the Contract Price and no change order will be issued to increase the Contract Price because of costs associated with Permits. Prior to proceeding with the work authorized by the Permit, the CONTRACTOR shall supply to the OWNER a copy of all Permits obtained. CONTRACTOR must comply with all Permits regardless of whether or not the Permit is held in its name. CONTRACTOR shall perform all compliance testing required by the permits.



1.2 SUBMITTALS:

A. Copies of all permits obtained by CONTRACTOR.

B. Results of compliance testing shall be submitted to ENGINEER for OWNER's records.

**PART 2 - PRODUCTS NONE**

**PART 3 - EXECUTION NONE**

**END OF SECTION 01060**

## **PART 1 - GENERAL**

### **1.1 SECTION INCLUDES:**

Procedures for work-related submittals as required in these specifications.

### **1.02 SUBMITTALS:**

A. Progress Schedule as required herein.

B. Operation and Maintenance Instructions as required herein.

C. Submittal Schedule. Submit within 15 days of Notice to Proceed (NTP).

D. Submittal requirements are summarized at the end of this section.

### **1.3 DEFINITIONS:**

A. Product Data: Includes standard printed information on materials products, and systems not specifically prepared for the Work, and the designation of selections from among various choices printed therein.

B. Shop Drawings: Includes specifically prepared technical data for the Work. May include drawings, diagrams, performance curves, data sheets, schedules, templates, patterns, reports, calculations, instructions, measurements and similar information not in standard printed form for general application to other contracts.

C. Samples: Include both fabricated and unfabricated physical examples of materials, products and units of Work: both as complete units and as smaller portions of units of Work; either for limited visual inspection or (where indicated) for more detailed testing and analysis.

D. Miscellaneous Submittals: Are generally non-administrative and relate directly to the Work. Examples are construction permits, Stormwater Pollution Prevention Plan (SWPPP), Spill Prevention, Control and Countermeasure Plan (SPCC), warranties, maintenance agreements, workmanship bonds, project photographs, survey data and reports, physical work records, quality testing and certifying reports, copies of industry standards, records, drawings, field measurement data, operation and maintenance materials, overrun stock, and similar information, devices, and materials applicable to the Work.

E.CONTRACTOR Review and Approval: Coordinate all submittals and review each for accuracy, completeness, and compliance with contract requirements and indicate CONTRACTOR approval thereon as evidence of such coordination and review. Items submitted to ENGINEER without evidence of CONTRACTOR approval will be returned for resubmission.

F.Sequencing and Scheduling:

1. Prepare submittal schedule to coordinate with construction sequencing and scheduling, including allowance for review time.
2. Coordinate preparation and processing of submittals with performance of the Work so that the submittal-review process does not delay Work.
3. Coordinate and sequence different categories of submittals for the same Work, and for interfacing units or Work, so that one will not be delayed for coordination with another.
4. Make all submittals far enough in advance of scheduled installation dates to provide all time required for review, for possible revisions and resubmittals, and for placing orders and securing delivery.

**PART 2 - PRODUCTS - NONE**

**PART 3 - EXECUTION**

3.1 SUBMITTAL PROCEDURE:

Submit as specified in Division 0 and as follows:

A.Date and Number: At least 10 days prior to needing approval unless otherwise specified, forward to ENGINEER all items required by the individual sections of the specifications. Unless a different number is called for in the individual sections, submit six copies of each shop drawing, six copies of all operation and maintenance instructions, and four specimens of each sample requested, of which all but two copies will be retained by ENGINEER. The other copies will be returned to CONTRACTOR along with ENGINEER comments. If CONTRACTOR wants more than two copies returned, submit the number of additional copies desired.

B.Submittal Identification: Use specification reference number, and sequence accordingly, by number. Also, use letters of the alphabet for resubmittals. For example, 03300-01, 03300-02 and 03300-03 would be the first three submittals related to Section 03300 Cast-In-Place-Concrete. 03300-02a would be the number assigned to the first resubmittal of 03300-02, if required.

C. Cover Letter: Transmit all submittals with a cover letter identifying the project and the portion of the project (submittal identification) to which it applies. Transmit submittals that are related to or affect each other simultaneously as a package to facilitate a coordinated review. Uncoordinated submittals will be rejected. The ENGINEER reserves the right to require submittals in addition to those called for in individual sections.

### 3.2 ENGINEER'S APPROVAL:

The ENGINEER will indicate approval or disapproval of each submittal and, if not approved, will indicate reasons therefor. Any work done prior to approval is at CONTRACTOR's own risk. Approvals do not relieve the CONTRACTOR from responsibility for complying with the requirements of this Contract. If submittals show variations from Contract requirements, describe such variations in writing, within the aforementioned cover letter at the time of submission. Approval of such variation(s) will be accompanied with a Contract Modification involving price and time. Minor variations not involving a change in price or time of performance will not be issued a modification.

### 3.3 REQUIRED SUBMITTALS:

A. Suppliers and Subcontractors: Provide an updated list of all suppliers and subcontractors to be used on the project, at the pre-construction conference. Provide a final list at project closeout.

B. Certificates: For those items called for in individual sections, furnish certificates from manufacturers, suppliers, or others certifying that materials or equipment being furnished under the Contract comply with the requirements of these specifications.

**END OF SECTION 01300**

**DIVISION 2:**

**SITework**

## **PART 1 - GENERAL**

### **1.1 DESCRIPTION:**

This work consists of furnishing and placing a geotextile fabric as a permeable separator between dissimilar materials, such as between subgrade and subbase/base, subgrade and gabions, permanent erosion control measure, sediment control device or subsurface drainage fabric, and to aid in stabilizing poor subgrade soils.

### **1.2 SUBMITTALS:**

A. Manufacturer's specifications that include at a minimum the properties contained in Table 02070-1.

B. Geotextile samples.

## **PART 2 - PRODUCTS**

### **2.1 FILTER FABRIC**

A. Filter fabric geotextile shall be Propex Geotex 801 or approved equal that meets the average roll values in Table 02070-1.

### **2.2 PHYSICAL AND CHEMICAL REQUIREMENTS:**

Fibers used in the manufacture of geotextiles, and the threads used in joining geotextiles by sewing, shall consist of long-chain synthetic polymers, composed of at least 85% by weight polyolefins, polyesters, or polyamids. They must be formed into a network so the filaments on yarns retain dimensional stability relative to each other, including selvages. All non-woven geotextile shall be needle punched. Heat-bonded or resin-bonded geotextiles shall not be used. Geotextile materials shall meet the physical requirements of Table 02070-1.

<b>TABLE 02070-1</b>			
<b>Non-woven Geotextile Filter Fabric Minimum Average Roll Values</b>			
Property	Test Method	Value	Units
Tensile Strength	ASTM D 4632 Grab test	205	lbs
Puncture Strength	ASTM D 4833	525	lbs
Elongation at Failure	ASTM D 4632	≥50	%
Trapezoidal Tear	ASTM D 4533	80	lbs
Ultraviolet light (% residual tensile strength)	ASTM D 4355 150-hr exposure	70	%
Permittivity	ASTM D 4491	1.5	sec <sup>-2</sup>
Water Flow Rate	ASTM D 4491	110	gal/min/ft <sup>2</sup>
Apparent Opening Size	ASTM D 4751	#80 max.	U.S. Sieve Size

### 2.3 CERTIFICATION:

Submit product certification stating the name of the manufacturer, the chemical composition of the filaments or yarns, and other information fully describing the geotextile. Mismatching or misrepresentation by the manufacturer is reason to reject the geotextile under these specifications.

Label the fabric and its container with the manufacturer's name fabric type or trade name, lot number, and quantity.

### 2.4 SHIPMENT AND STORAGE:

During shipment and storage, protect the fabric from direct sunlight, ultra-violet rays, temperatures exceeding 140 F (60 C), mud, dust, and debris. Keep the fabric in the manufacturer's wrapping until just before use. Include in each shipping document a certification that the geotextile meets the manufacturer's certificate and guarantee previously submitted.

## **PART 3 - EXECUTION**

### 3.1 GENERAL:

Replace or repair all geotextile that is torn, punctured, or muddy. Remove the damaged material and place a patch of the same type of geotextile overlapping 3 feet (0.9m) beyond the damaged area.

### 3.2 FILTER FABRIC APPLICATIONS:

Store, handle, and deploy filter fabric in accordance with manufacturer recommendations and as specified herein. Place filter fabric between the prepared subgrade and gabion revetments or riprap, geocell cellular confinement, and other locations as shown on the Drawings. Subgrades will be subject to approval by the ENGINEER prior to placement of filter fabric. Place filter fabric by unrolling the fabric from the top of the slopes to the toe areas. Overlap successive geotextile sheets in such a manner that the upstream sheet is placed over the downstream sheet

and/or up slope over down slope. Overlap adjacent seams a minimum of 2 feet when over compacted subgrade (e.g., upstream face of dam and compacted subgrade soils on stilling basin sides). Make seam overlaps 3 feet in areas of poor subgrade compaction (e.g., under stilling basin bottoms). Provide a minimum offset of 5 feet between adjacent roll ends. Anchor fabric or otherwise hold firmly in place to prevent movement during construction. Pins or other methods that puncture the fabric are not allowed. Place filter fabric and secure against the prepared subgrade surfaces such that the geotextile is in continuous (smooth) contact between the geotextile and subgrade with no void areas or wrinkles.

**END OF SECTION 02070**



## **PART 1 - GENERAL**

### **1.1 SECTION INCLUDES:**

**A. Clearing:** Removal of trees, shrubs, brush, branches, downed timber, weeds, tall grass, and similar vegetation.

**B. Grubbing:** Removal of rocks, boulders, stumps, roots, and other vegetation below ground level, including debris and existing structures.

## **PART 2 - PRODUCTS NONE**

## **PART 3 - EXECUTION**

### **3.1 REQUIREMENTS:**

#### **A. Clearing:**

1. Remove all trees, shrubs, brush, grass, weeds and other vegetation in conflict with the Work.
2. Perform all clearing in a safe, prudent and lawful manner and only within the construction limits indicated on the Drawings. Clear adjacent to cut or fill sections to a minimum distance of 3 feet outside of slope lines.
3. Brush and small trees may be mowed or chipped, removed and stockpiled as part of topsoil stripping, and incorporated into the topsoil for reclamation. Do not compost noxious weeds and associated soil.

#### **B. Grubbing:**

1. Remove all rocks, boulders, and vegetation below ground level, all debris, pipes, structures, pavements, base course, fences and other obstructions left within the work limits after clearing, unless designated to remain.
2. Remove all tree stumps. Remove all roots larger than 1/2-inch in diameter.

3. Perform grubbing in advance of grading operations. Backfill holes created by removal of stumps and boulders with native materials.

C. Disposal: Unless indicated otherwise, dispose of all material removed as a result of clearing and grubbing off-site in a legal manner according to local, State, Tribal, and Federal regulations.

### 3.2 PROTECTION:

A. Protect all trees, structures, utilities and other features beyond areas to be cleared.

B. Do not trespass beyond construction limits.

C. Do not remove trees from the site without the approval of ENGINEER.

**END OF SECTION 02110**

## **PART 1 - GENERAL**

### 1.1 SECTION INCLUDES:

A. Dewatering

B. Stream Diversion

### 1.2 SUBMITTALS: Dewatering Permit and Plan

## **PART 2 - PRODUCTS NONE**

## **PART 3 - EXECUTION**

### 3.1 GENERAL:

A. Design, install, test, operate, maintain and monitor dewatering and stream diversion facilities. Collect discharge water from dewatering and stream diversion systems, and convey water to discharge points as instructed by ENGINEER.

B. Keep all excavations dry and free from water during construction and the placement of materials during construction of headgates and pin/plank structures.

### 3.2 DEWATERING:

A. Furnish all necessary labor, equipment, pumps and incidentals necessary to dewater the project site during construction.

B. Before excavating to final grade for structures, bring the water level to an elevation at least 1 foot below the bottom of the structures. Maintain this water level until the structures are completed, and backfill has been placed around the structures.

C. Control pumping operations so that the groundwater level rises and lowers slowly and uniformly.

D. Groundwater levels may fluctuate due to seasonal conditions.

### 3.3 STREAM DIVERSION:

A. Keep the construction area free from water by pumped dewatering, berming, coffer-damming, sheet piles, or by other methods or combinations thereof.

### 3.4 PROTECTION:

A. Provide sufficient protection at all times to ensure the safety of personnel, equipment and materials, and the public for activities relating to dewatering and diversion.

### 3.5 DISCHARGE OF WATER:

A. Do not allow water resulting from dewatering and diversion activities to be discharged or disposed of in such a manner as to damage project or adjacent property.

B. Discharge water in compliance with construction permits and all applicable laws and regulations.

### 3.6 EXISTING STRUCTURES:

A. Conduct dewatering and diversion activities in a manner to avoid damage to existing structures.

B. CONTRACTOR is responsible for repairing all structures damaged as a result of the dewatering and diversion.

C. No additional payment will be made to CONTRACTOR for repairing any structures damaged by dewatering and/or diversion.

### 3.7 CLEANUP:

A. Upon completion of project tasks requiring temporary dewatering and diversion facilities specified herein, remove all such facilities, grade, and restore all disturbed areas to their original condition, and in accordance with these specifications.

B. No berms, excavations for dewatering, or similar features are allowed to remain at the completion of restoration.

C. All restoration is subject to approval by the ENGINEER.

**END OF SECTION 02140**

## **PART 1 - GENERAL**

### **1.1 SECTION INCLUDES:**

A. Reclamation and seeding requirements: all areas disturbed as part of the construction of structures shall be reclaimed and seeded.

### **1.2 SUBMITTALS:**

A. Seed: Submit seed certifications for approval at least 7 days prior to any seeding. Provide seed mixture in containers showing percentage of pure live seed, seed mix, year of production, net weight, date of packaging, and location of packaging. Provide weed free certification statement from seed supplier. Provide seed certifications with each delivery.

## **PART 2 - PRODUCTS**

### **2.1 TOPSOIL:**

A. Topsoil: Excavated from site and free of excess vegetation.

- 1 Obtain topsoil from that stockpiled during stripping operations, free of excess vegetation, metal, glass, plastic, and not containing gravel or pieces of wood larger than 3 inches.

### **2.2 SEED:**

A. Native Grass Seed Shall Be:

<b>Species</b>	<b>Scientific Name</b>	<b>Approx #/ac.</b>
Andropogon gerardii	Big Bluestem	2
Bouteloua gracilis	Blue Grama	1
Buchloe dactyloides	Buffalo grass	1.5
Elymus lanceolatus	Streambank wheatgrass	2
Idaho fescue	Festuca idahoensis	1.5
Koeleria macrantha	Junegrass	1
Leymus cinereus	Basin Wildrye	2
Panicum virgatum	Switchgrass	2
Pascopyrum smithii	Western wheatgrass	3
Pseudoroegneria spicata	Bluebunch wheatgrass	2

B.All seed shall comply with and be labeled in accordance with the Montana Seed Law. Seed shall have been grown in the North American Continent, in an area having climatic conditions and elevation similar to area of use. All seed should be of standard grade. The seed may be rejected by the ENGINEER if the point of origin and production is not suitable.

C.Unacceptable Weeds: Dandelion, Jimsonweed, Quackgrass, Knapweed, Horsetail, Morning Glory, Rush Grass, Mustard, Leafy Spurge, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Bermuda Grass, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, and Perennial Sorrel.

## **PART 3 - EXECUTION**

### **3.1 SUBSTRATE PREPARATION**

A.Eliminate uneven areas and low spots.

B.Remove debris, roots, branches, stones, in excess of 3 inches in size. Remove subsoil contaminated with petroleum products.

C.Scarify subgrade to depth of 3 inches where topsoil is scheduled. Scarify in areas where equipment is used for hauling and spreading topsoil and has compacted subsoil.

### **3.2 PLACING TOPSOIL:**

A.Place topsoil in areas disturbed by the Work to a nominal compacted depth of 4 inches. Place topsoil during dry weather.

B.Fine grade topsoil eliminating rough or low areas. Maintain profiles and contour of subgrade and blend into native adjacent areas.

C.Remove roots, weeds, rocks and foreign material while spreading.

D.Manually spread topsoil close to trees and plants to prevent damage.

E.Lightly compact placed topsoil.

F.Waste surplus subsoil and topsoil on site.

G.Leave stockpile area and site clean and raked, ready to receive landscaping.

H.Tolerances: Top of Topsoil: Plus or minus 1/2 inch.

I.Protection: Protect landscaping and other features remaining as final work, protect fences and existing utilities.

### **3.3 SEEDING:**

A. Grass seed shall be sown at the rate of 18 pounds pure live seed per acre on native grass areas using broadcast methods specified in the seed table in section 2.02. The drill seed rate is half the broadcast application rate. Seeding by hand or mechanical broadcasting will be permitted on areas inaccessible to drills or impractical to seed by other prescribed methods as approved by the Engineer. Seed shall be lightly tilled by rake or other means into first inch of topsoil depth. Solid rock embankments may be left exposed where erosion will not become an issue. The ENGINEER shall be the final authority in deciding where seeding shall occur.

B.Planting Season: Between September 15 and May 15.

C.Do not sow immediately following rain, when ground is too dry, or during windy periods. Wind speed should not exceed 5 mph.

D.All disturbed areas shall be fertilized and seeded unless otherwise directed.

### 3.4 EROSION CONTROL:

Erosion Control measures are shall be provided in the SWPPP.

### 3.06 CLEANUP OF AREA:

A. Upon completion of the work, clear the entire project site of all debris. Present ground surface with smooth, uniform slopes and with a neat, workmanlike appearance. Repair or replace any utilities, structures, landscaping, grass areas, etc. that are damaged due to negligence of the CONTRACTOR, at no expense to the OWNER.

**END OF SECTION 02910**

## **PART 1 - GENERAL**

### **1.1 DESCRIPTION:**

Work shall consist of furnishing all equipment, materials, labor and performing all operations in connection with construction of the stream restoration as shown on the drawings.

### **1.2 REFERENCES:**

USDA – NRCS CONSTRUCTION SPECIFICATION MT-582-1

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS:**

Construction materials shall conform to the requirements shown on the drawings, or as specified.

- A. Sod Mats: Viable sod with a minimum thickness of 8 inches for sedge species and 6 inches for grass species shall be placed where indicated on the drawings. Sod shall originate from a similar hydrologic and climatic regime as the zone being sodded to ensure plant species suitability and viability. Sod borrow areas are depicted on the drawings. Additional borrow areas may be determined by the ENGINEER.
- B. Shrub Transplants: Woody Shrubs shall consist of native willow species located adjacent to the channel. Shrubs shall range in height from 4 to 12 feet.
- C. Channel Gravels: Native gravels consisting of sorted gravels, sand, and cobbles shall be used in-stream channel regrading and pool/riffle creation.
- D. Fine Sediment / Silts: Fine silt sediments deposited within the channel.

## **PART 3 – EXECUTION**

### **3.1 EXCAVATION:**

- A. All excavation shall be classified as common excavation or rock excavation. Common excavation shall be defined as excavation of all materials that can be excavated, loaded, transported, and unloaded by use of heavy ripping equipment and wheel-tractor scrapers with pusher tractors. Also excavated material that can be dumped into place or loaded onto hauling equipment by means of excavators having a rated capacity of one cubic yard shall be classified as common excavation. The equipment shall be equipped with attachments (such as shovel, bucket, backhoe, backhoe with thumb) appropriate to the character of the materials



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and the site conditions.

- B. Excavated materials shall be used in the construction of required permanent earthfill as shown on the drawings or as specified. The contractor shall not waste or otherwise dispose of suitable excavated materials. All surplus or unsuitable excavated materials shall be disposed of by the Contractor as directed by the ENGINEER and in accordance to applicable laws and regulations, or as shown on the drawings.

3.2 STRIPPING AND TRANSPLANTING STRIPPED MATERIALS:

- A. Stripping consists of excavating the top layer of soil that contains sod, vegetation, roots, and organic matter. Stripping is required at all sites upon which embankments and fills used to impound or prevent the seepage of water are to be constructed and at required excavations and borrow areas. Stripping shall be to sufficient depth to expose subsoil reasonably free of roots and organic matter.
- B. Materials suitable for use in sodding, sod mats and transplanting, or other plantings shall be used for such purposes in the construction of the project to the fullest extent practical prior to the import of materials from off site. The materials shall be stripped, transported, and placed immediately in one operation to the fullest extent practical. Any materials requiring salvage and stockpiling for sodding, transplanting, or other plantings at a later date shall be kept viable by cooling, moistening, or other measures as needed.

3.3 TRANSPLANTING SOD MATS

- A. Sod mats shall be transplanted in accordance with the drawing. The sod shall be set firmly in place to ensure complete contact with the base material. Sod shall be placed to cover the entire required surface with minimal voids or loose and protruding edges that would likely be dislodged by flowing water. Immediately after placement the sod shall be thoroughly wetted.

3.4 TRANSPLANTING SHRUBS

- A. Transplants shall be selected and placed as indicated on the drawing and where indicated on drawings, shall be placed at a density of not less than 1 shrub per 10 linear feet of stream bank. Shrubs shall be placed in a manner to appear “natural”. Even spacing of transplanted shrubs shall be avoided. Shrubs placement shall be directed by ENGINEER.
- B. The transplants shall originate from a hydrologic and climatic regime similar to that of the planting site to ensure plant suitability and viability. Transplants for clump plantings shall be harvested in such a manner that most of the root structure and associated soil is retained as a unit (clump). The clump shall be transported and planted directly into a site prepared for the clump planting. Repetitive handling, loading, unloading, and transport of the clump that damages the integrity of the root-soil mass or reduces the viability of the plants shall not be permitted.

DIVISION 2 – SITE WORK  
SECTION 02950 – OPEN CHANNEL STREAM WORK

- C. Clump plantings shall be pruned to remove 10 to 50 percent of the vegetation of each stem in lieu of thinning. The pruning operation shall ensure that the majority of the flowering parts of the clump plantings are removed.
- D. Transplants shall be thoroughly wetted immediately after placement.
- E. Root balls must be placed at a depth that reaches the low water table elevation as directed by ENGINEER.
- F. Backfill will be placed around willow transplants to ensure proper root contact with soils and reduce desssication. Suitable backfill materials include topsoil and vegetated sod mats. Backfill guidance will be provided by ENGINEER.

3.5     IN-STREAM CHANNEL EXCAVATION/EARTHFILL

- A. In-stream channel excavation/fill including channel grading and pool/riffle construction shall be conducted as shown on the drawings and directed by the ENGINEER. Fine sediments / silts shall be excavated for use in overbank areas.

3.6     COMPACTION:

- A. For clean sands, gravel, and cobble fill materials, no compaction other than that obtained by placement is required, unless compaction is needed to ensure void areas are completely filled. Such may be needed to ensure voids are filled beneath and alongside log and rock structures.
- B. Sand, silt, and clay fill materials shall be smoothed and shaped in lifts no thicker than 8 inches prior to compaction. Compaction shall be obtained by a minimum of 2 passes over the entire surface with weighted-wheeled excavation equipment, manually-directed power tampers, or 2 blows with the back of an excavator bucket with a force that produces compaction comparable to that developed by wheeled excavation equipment. The top 4 inches of surfaces to be seeded or sodded shall not require compaction in addition to that obtained in the smoothing and shaping operation.

**END OF SECTION 02950**

**DIVISION 3:**

**CONCRETE**

**PART 1 - GENERAL**

1.1 SECTION INCLUDES:

A. Concrete Formwork with shoring, bracing, and anchorage.

B. Openings for other Work.

C. Form accessories.

D. Form stripping.

1.2 REFERENCES:

A. ACI 117 & 117R: Standard Tolerances for Concrete Construction and Materials.

B. ACI 301: Specifications for Structural Concrete.

C. ACI 347: Recommended Practice for Concrete Formwork.

D. PS-1: Construction and Industrial Plywood.

1.3 SUBMITTALS:

A. Conform with Section 01300 - Submittals

1.4 DESIGN REQUIREMENTS:

A. Design and construct formwork, shoring, and bracing to conform to code requirements.

B. Design and construct formwork such that resultant concrete will conform to required shapes, lines, and dimensions.

## 1.5 QUALITY CONTROL:

A. Conform to ACI 301 and recommendations of ACI 347 except as modified by these specifications.

B. Conform to tolerances specified in ACI 117 except as modified by these specifications.

## 1.6 REGULATORY REQUIREMENTS:

A. Conform to applicable local municipal, state, and federal building code requirements.

## **PART 2 - PRODUCTS**

### 2.1 FORM MATERIALS:

A. Plywood: B-B concrete-form plywood, exterior-grade mill-oiled and edge-sealed, high-density overlaid, or equivalent smooth-form liner for smooth-form or rubbed finish.

B. Glass Fiber-Fabric Reinforced Plastic Forms: Matched, tight fitting, stiffened to support concrete loads without deflection exceeding structural tolerances and finished appearance.

C. Lumber: Fir species; No. 2 grade or better; with grade stamp clearly visible.

D. Steel: Minimum 16-gauge sheet, well-matched, tight fitting, stiffened to support concrete load without deflection exceeding structural tolerances and finished appearance.

### 2.2 FORMWORK ACCESSORIES:

A. Form Ties: Removable snap-off type, galvanized-metal, fixed-length, cone-type, with waterproofing washer, free of defects that could leave holes larger than 1 1/4 inch (32mm) in concrete surface.

B. Form-Release Agent: Colorless, does not contain diesel, stain concrete, absorb moisture, or impair natural bonding or color characteristics of coating.

C. Chamfer Strips: Rigid plastic or wood strip, 3/4 x 3/4 inch, practical lengths, unless otherwise shown.

D. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Sized as required and of sufficient strength and character to maintain formwork in-place while placing concrete.

## **PART 3 - EXECUTION**

### 3.1 INSPECTION:

A. Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with Drawings.

### 3.2 CONCRETE PLACED AGAINST EARTH OR ROCK:

A. Scarify, Moisten, and Compact top 12” of native subgrade against which concrete will be placed.

B. Where unsuitable material is encountered against which concrete will be placed, the ENGINEER will direct the excavation of unsuitable materials. Replace unsuitable materials with Structural Fill in accordance with Section 02300.

C. When placing concrete against rock is indicated or permitted, rock face shall be sound and no rock shall extend inside the concrete lines indicated.

### 3.3 FORMWORK:

A. Erect formwork, shoring and bracing to achieve design requirements in accordance with requirements of ACI 301.

B. Provide bracing to ensure stability. Shore or strengthen formwork that is subject to overstressing by construction loads.

C. Arrange and assemble to permit dismantling, stripping of forms and removal of principal shores. Do not damage concrete during stripping.

D. Align joints and make tight to prevent leakage of mortar. Keep form joints to a minimum.

E. Provide chamfer strips on all external corners including tops of walls, unless indicated otherwise.

### 3.4 FORM-RELEASE AGENT:

A. Apply form-release agent in accordance with manufacturer's recommendations.

B. Apply prior to placement of reinforcing steel, anchoring devices and embedded items.

C. Place concrete within 14-calendar days of applying form-release agent to form. If concrete is not placed within 14-calendar days, remove forms and reapply form-release agent.

D. Do not apply form-release agents that may affect concrete surfaces that are scheduled to receive special finishes, such as crystal-forming waterproofing. Soak contact surfaces of untreated forms with clean water. Keep surfaces wet prior to placing concrete.

### 3.5 INSERTS, EMBEDDED PARTS AND OPENINGS:

A. Provide formed openings where required for items to be embedded in or pass through

concrete work.

B. Locate and set in-place items that will be cast directly into concrete.

C. Coordinate work of other sections in forming and placing openings, sleeves, bolts, anchors and other inserts.

D. Install accessories conforming to manufacturer's instructions, straight, level, and plumb. Secure all embedded items before placing concrete. Ensure that items are not disturbed during concrete placement. Fill voids with readily removable material to prevent entry of concrete.

E. Provide temporary ports or openings in forms where required to facilitate cleaning of joint surfaces and inspection. Locate openings at bottom of forms to allow water to drain.

F. Close temporary openings with tight-fitting panels flush with inside face of forms and neatly fitted so joints will not be apparent in exposed-concrete surfaces.

### 3.6 FORM CLEANING:

A. Clean and remove foreign matter from within forms as erection proceeds.

B. Clean formed cavities of debris prior to placing concrete.

C. Flush between forms with water or compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.

D. During cold weather, remove ice and snow from within forms. Do not use de-icing salts. Do not use water to clean out forms unless formwork and concrete construction proceed within heated enclosure. Use compressed air or other means to remove foreign matter.

### 3.7 FORMWORK TOLERANCES:

A. Construct formwork to maintain tolerances required by ACI 301.

### 3.8 FIELD QUALITY CONTROL:

A. Inspect erected forms, shoring, and bracing to ensure that Work conforms to design, and that supports, fastenings, wedges, ties, and items are secure.

### 3.9 FORM REMOVAL:

A. Remove forms in a manner that will not damage concrete.

B. Do not wedge pry bars, hammers or tools against finished concrete surfaces scheduled for exposure to view.

C. Store forms in a manner that surfaces to be in contact with fresh concrete will not be damaged. Discard damaged forms.

D. Forms for walls, columns, and sides of beams and girders may be removed no less than the following number of days after concrete placement provided that the forms do not support slabs or beam soffits:

- 1 Lifts under 15 feet: 1 day (24 hours)

E. Limit construction loads on new concrete structures at all times to those that can be carried safely by the developed strength of the structure, and by formwork and shoring in-place at time of loading.

**END OF SECTION 03100**



## **PART 1 - GENERAL**

### 1.1 SECTION INCLUDES:

A. Reinforcing Steel Bars

B. Accessories

### 1.2 REFERENCES:

A.ACI 301 Specifications for Structural Concrete

B.ACI 315 Details and Detailing of Concrete Reinforcement.

C.ACI 318R Building Code Requirements for Structural Concrete.

D.ASTM A 615 Specification for Deformed and Plain Billet Steel Bars for Concrete Reinforcement.

E.CRSI Manual of Standard Practice.

### 1.3 SUBMITTALS: None

## **PART 2 - PRODUCTS**

### 2.1 REINFORCEMENT:

A. ASTM A615, 60-ksi yield grade, deformed billet steel bars.

### 2.2 ACCESSORY MATERIALS:

A. Tie Wire: Minimum 16-gauge annealed-type.

B. Chairs, Bolsters, Bar Supports, and Spacers: Sized and shaped for strength and support of reinforcement during concrete placement conditions, in accordance with CRSI Manual of Standard Practice.

### 2.3 FABRICATION:

A. Fabricate concrete reinforcement in accordance with ACI 315.

## **PART 3 - EXECUTION**

### **3.1 PLACEMENT:**

A. Place, support, and secure reinforcement against displacement. Do not deviate from required position.

B. Accommodate formed openings.

C. Surface condition of reinforcement: Before placing concrete, clean reinforcement of loose rust and other substances including, but not limited to, dried mortar, dried concrete, mud, ice, snow. Remove rust by vigorous rubbing with burlap cloth or wire brushing. Remove dried mortar and concrete by sandblasting or hammering.

D. Place reinforcement in accordance with Drawings, and CRSI 65 - Recommended Practice for Placing Reinforcing Bars.

E. See Drawings, General Notes and Details, for reinforcement cover requirements.

F. Splice reinforcing bars by lapping and securely wiring together. Splice locations, other than those indicated, are subject to approval and requirements of ACI 318. Do not use mechanical splices.

### **3.2 QUALITY CONTROL:**

A. Install concrete reinforcement in accordance with CRSI Manual of Standard Practice.

B. When concrete reinforcement is in place, notify ENGINEER and provide sufficient time for an inspection prior to placing concrete. Concrete placed without an inspection and approval of reinforcing steel will be rejected and removed.

C. Inspection of reinforcing steel by ENGINEER or OWNER prior to concrete placement does not relieve the CONTRACTOR of its responsibility to conform to the Drawings and Specifications.

**END OF SECTION 03200**

DIVISION 3 - CONCRETE  
SECTION 03300 - CAST-IN-PLACE CONCRETE

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**PART 1 - GENERAL**

1.01 SECTION INCLUDES:

A. Structural Concrete

1.02 REFERENCES:

A. Reference to standards, specifications, and codes herein are to mean the latest revisions.

B. Comply with the provisions of the following standards, specifications, reports and codes except where different requirements are shown or specified:

- |     |                    |   |
|-----|--------------------|---|
| 1.  | ACI 117 and 117R   | Standard Specifications for Tolerances for Concrete             |
| 2.  | ACI 301            | Specifications for Structural Concrete                          |
| 3.  | ACI 302.1R         | Guide for Concrete Floor and Slab Construction                  |
| 4.  | ACI 304R           | Guide for Measuring, Mixing, Transporting, and Placing Concrete |
| 5.  | ACI 304.2R         | Placing Concrete by Pumping Methods                             |
| 6.  | ACI 304.4R         | Placing Concrete with Belt Conveyors                            |
| 7.  | ACI 305R           | Hot Weather Concreting  |
| 8.  | ACI 306.1 and 306R | Cold Weather Concreting   |
| 9.  | ACI 308R           | Guide to Curing Concrete  |
| 10. | ACI 309R           | Guide for Consolidation of Concrete                             |
| 11. | ACI 318R           | Building Code Requirements for Structural Concrete              |
| 12. | ASTM C 33          | Specifications for Concrete Aggregates                          |
| 13. | ASTM C 94          | Specifications for Ready-Mixed Concrete                         |
| 14. | ASTM C 150         | Specifications for Portland Cement                              |

- |     |             |  |
|-----|-------------|--|
| 15. | ASTM C 171  | Specification for Sheet Materials for Curing Concrete  |
| 16. | ASTM C 227  | Test Method for Potential Alkali Reactivity of Cement-Aggregate Construction (Mortar-Bar Method)                               |
| 17. | ASTM C 231  | Air Content of Freshly Mixed Concrete by the Pressure Method   |
| 18. | ASTM C 260  | Specifications for Air Entraining Admixtures for Concrete  |
| 19. | ASTM C 309  | Specification for Liquid Membrane-Forming Compounds for Curing Concrete  |
| 20. | ASTM C 494  | Specifications for Chemical Admixtures for Concrete  |
| 21. | ASTM C 618  | Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as A Mineral Admixture in Portland Cement Concrete |
| 22. | ASTM C 881  | Specification for Epoxy-Resin-Base Bonding Systems for Concrete  |
| 23. | ASTM C 1064 | Temperature of Freshly Mixed Concrete  |

### 1.3 DEFINITIONS:

A. Joints: Discontinuities that are purposely placed in concrete - to facilitate construction, to allow for the placement of subsequent concrete, to reduce relative displacements, to reduce initial shrinkage stresses and cracks, and to permit the installation of embedded metalwork.

B. Construction Joint: A joint generally made in concrete to facilitate construction. Surface preparation and/or an agent is required to create a bond between concrete placements. All construction joint locations are subject to approval by the ENGINEER.

C. Control Joint: A joint placed in concrete to allow volumetric shrinkage of a monolithic unit or slabs between monolithic units. Reinforcement is continuous, without bond. A bond breaker may be required if shown on Drawings.

D. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements. The ENGINEER will determine defective concrete in all cases.

E. Structural Concrete: Concrete containing steel reinforcement.

### 1.4 SUBMITTALS:

A. Conform to Section 01300 - Submittals

B. Proposed Mix Designs: Submit in accordance with ACI 301 at least 15 calendar days prior to first-scheduled concrete placement. Provide 28-day strength data for structural concrete and 56-day strength data for mass concrete where mix was used for previous projects within the last year, or minimum 28-day strengths for a new mix. Include laboratory test results, mill test reports, or certificates of compliance for each material used in concrete mixes.

C. Batch Plant Certification and equipment data for proportioning, mixing and transporting concrete. Certification for onsite batch plant or ready-mix plant must conform to ASTM C 94. Manual batching not permitted.

D. Certification tests for water and aggregates, conforming to these specifications.

E. Mill certification tests and delivery certificates for Portland cement, fly ash and admixtures.

F. Product data for joint materials, admixtures, curing materials, sealant, hardeners, bonding agents, and other concrete-related materials that are required or proposed.

G. Manufacturer's data for non-shrink grout and admixtures.

H. Samples of concrete-related materials, if requested.

I. Procedures for hot- and cold-weather concreting, when such conditions are anticipated.

#### 1.05 QUALITY CONTROL:

A. Maintain quality control of materials and concrete work as specified herein.

B. Workmanship: CONTRACTOR accepts full responsibility for the quality of the work and for correction of concrete work that does not conform to specified requirements, including strength, tolerances, and finishes.

#### 1.6 SEQUENCING AND SCHEDULING:

A. Provide at least 48 hours notice to ENGINEER and OWNER prior to each concrete placement.

B. Notify subcontractors/crafts so they may deliver anchors for their work. Obtain assistance from subcontractors/crafts in setting anchors if required.

C. Perform an immediate inspection of concrete surfaces upon removal of forms.

D. Notify ENGINEER upon discovery of any honeycombing, foreign-embedded items or other defective concrete.

#### 1.7 PRODUCT DELIVERY, STORAGE AND HANDLING:

A. Portland Cement and Fly Ash: Store cement and fly ash in separate watertight buildings, bins, or silos.

B. Admixtures: Store admixtures in a manner to prevent contamination. Protect admixtures from extreme temperatures which would adversely affect their characteristics or performance.

C. Aggregate: Maintain and work stockpiled aggregate in a manner to prevent segregation and contamination with other materials or with other sizes of aggregate.

D. Rejected Concrete: Concrete that fails to meet specification requirements will be rejected. Dispose of rejected concrete in an acceptable manner.

#### 1.8 PROJECT RECORD DOCUMENTS:

A. Provide documentation according to Section 01700 - Contract Closeout.

B. Accurately record locations of embedded utilities and components that will be concealed from view.

## **PART 2 - PRODUCTS**

### 2.1 CONCRETE MATERIALS:

A. Cement: ASTM C 150 Portland, Type V; Gray color.

B. Fly Ash: ASTM C 618 Class F or C for all concrete. Use fly ash in all concrete work from the same source and class as that used when determining concrete-mix proportions.

C. Aggregates:

1. Fine and coarse aggregates: conform to ASTM C 33, of such quality that any silica-alkali reactivity will not cause deleterious expansion to grout, concrete or mortar.
2. Percent expansion <0.20% at 6 months in accordance with ASTM C 227.
3. Coarse aggregates: crushed rock/gravel; washed, well-graded.
4. Fine aggregates: containing less than 0.5 percent coal and lignite.

D. Water: Clean and free from injurious amounts of oils, acids, alkalis, salts, organic materials, or other substances deleterious to concrete or reinforcement, in accordance with ASTM C 94.

E. Grouts:

1. Use specified fine aggregates, with maximum sizes no larger than half the size of openings where grout is to be placed.
2. Non-Shrink Grout: Proprietary, premixed non-ferrous, minimum 5000-psi

compressive strength at 28 days - Master Builder's Masterflow 713; Euclid Chemical Co. EucoNS; Five Star Grout; Burke Non-Ferrous-Non-Shrink Grout; or equal.

3. Dry-pack grout: One part cement to two parts sand, with sufficient water to thoroughly moisten ingredients designed for zero slump, 28-day compressive strength of 4000-psi; or dry-pack formulation of specified non-shrink grout.

F. Adhesive: Use Hilti HY 150 or approved equal adhesive to adhesive embed all rebar where applicable. Install per manufacturer's recommendation.

## 2.2 ADMIXTURES:

A. Air Entrainment: Required for all concrete. Conform to ASTM C 260.

B. Other Admixtures: Use only when approved by ENGINEER and at no additional cost to OWNER. Conform to ASTM C 494:

1. Accelerators: for cold weather. Approval does not relax cold-weather placement requirements. Calcium chloride is prohibited.
2. Set-retarders or stabilizers: for hot weather. Approval does not relax hot-weather placement requirements.
3. Water reducers: Type D or G Hi Range or Hi Plus normal range to achieve workability without exceeding specified water/cement ratio and slump.
4. Super-plasticizers, Type F or Type G: for concrete placements around embeds or heavily reinforced areas.

## 2.3 ACCESSORY MATERIALS:

A. Bonding Agent: Provide Epoxy Resin Bonding Agent meeting the requirements of ASTM C881, Type V for use in applications for bonding freshly mixed concrete to hardened concrete.

B. Adhesive Anchors: Hilti HVA adhesive anchor or approved equal. Install per manufacturer's recommendation.

C. Expansion Anchors: Stainless Steel Hilti Kwik Bolt II expansion anchor or approved equal. Install per manufacturer's recommendation.

D. Curing Materials:

1. Liquid membrane-forming type: ASTM C 309, Type 2, Class A or B, pigmented.
2. Curing paper, polyethylene film, or polyethylene-coated burlap conforming to ASTM C 171.
3. Absorptive burlap cloth: made from Jute or Kenaf, approximately 9 ounces per square yard, complying with AASHTO M 182, Class 3 or 4.

4. Tarpaulins: FS K-P-146.
5. Water: Clean and free from injurious amounts of oils, acids, alkalis, salts, organic materials, or other substances deleterious to concrete or reinforcement, in accordance with ASTM C 94.

## 2.4 CONCRETE MIX:

A. General: Composed of cement, fly ash, fine aggregate, coarse aggregate, water and admixtures mixed well and to the proper consistency.

B. Structural Concrete: Designed for general use in severe exposure. Used for concrete floors and walls.

1. 28-day Compressive Strength >4000-psi
2. Fly Ash (required) 15% to 25% of the total cementitious content, by weight
3. Slump 1 to 4 inches, at point of placement
4. Entrained air 5-7%, at point of placement
5. Maximum-size aggregate 3/4 inch
6. Maximum water/cement ratio 0.42, exclusive of aggregate-absorbed water
7. Minimum Cementitious content 611 lbs/cy (6.5 sack)  
(cement + fly ash)

## 2.5 CONCRETE CONSOLIDATION EQUIPMENT:

A. Flexible, electric - or pneumatic-drive immersion-type vibrators with an operating speed of 7,000 Hz (vibrations per second) when immersed.

B. Provide backup power and vibrators at all times in the event of equipment failure. Two or more vibrators are required for quantities of 4 cubic yards or more deposited at one time.

C. Provide vibrators with at least 3-foot radius of influence for mass-concrete placements.

D. Provide consolidation equipment and backup a minimum of 48 hours prior to first placement.

# **PART 3 - EXECUTION**

## 3.1 EXAMINATION:

A. Verify that joint locations conform to the approved drawings.



B. Verify concrete-cover requirements for reinforcement.

C. Verify that anchors, seats, plates, reinforcing steel, embeds, openings, and other items to be cast into concrete are accurately placed, securely positioned, and will not cause hardship when placing concrete.

D. Verify appropriate mix design for designated placement.

E. Verify that structural concrete temperatures during placement are not more than 75° F, and not less than 40° F.

### 3.2 PREPARATION:

A. Prepare Surfaces for Concrete:

1. Remove water, ice, snow and mud.
2. Remove hardened concrete, wood chips, ice, snow and other debris from between forms.
3. Moisten absorptive foundations against which concrete will be placed. Do not allow water to pond. Remove excess water.

### 3.3 MIXING AND PLACING CONCRETE:

A. Select proportions for normal-weight concrete in accordance with ACI 301 Method 1.

B. Mix and deliver in accordance with ASTM C 94.

C. Place in accordance with ACI 304R and ACI 318.

D. Ensure reinforcement, inserts, and embedded parts are not disturbed during concrete placement.

E. Maintain Records of Concrete Placement: Date, location, quantity, air temperature, and test samples taken. Provide a copy of all batch tickets during placement.

F. Place concrete in uniform horizontal lifts between predetermined construction joints.

G. Deposit concrete as close as practical to its final position. Do not drop concrete more than 3 ft. Do not use vibrators to move concrete.

H. Provide sufficient capacity, personnel, and equipment to deliver and place concrete without delay; do not permit cold joints to occur.

I. Discharge concrete into forms within 90 minutes of introduction of water to the cement and aggregates. Concrete more than 90 minutes old will be rejected and will not be used in the Work.

J. Do not add water to the concrete after initial introduction of mixing water to batch except as specified.

K. Tempering water may be added to batch on arrival at placement when concrete slump is less than specified. However:

1. Do not exceed design water content and specified slump.
2. Do not add water to concrete after this tempering.
3. Continue mixing at specified mixing speed for a minimum of 30 revolutions after addition of tempering water.

L. Place concrete in continuous horizontal layers, the thickness not exceeding 24 inches.

M. Concrete placed on slopes: begin placement at lowest point and proceed upward.

### 3.04 DELIVERY OF CONCRETE:

A. Deposit concrete as near as practical to its final position by use of buckets, chutes, conveyors, or concrete pumps.

B. The use of aluminum pipe or aluminum chutes for delivery of concrete is not permitted.

C. Use concrete buckets with steep-sloping walls capable of promptly discharging concrete at the specified slump. Ensure dumping mechanism is capable of discharging, at one location, repeated small portions of concrete from a full bucket.

D. Use buckets and conveyors with drop chutes or tremies whenever the concrete must be dropped more than 3 feet to the placing surface.

E. Equip conveyors with proper discharge control to prevent segregation or separation of ingredients as recommended in ACI 304.4R.

F. Pump concrete in accordance with recommended practices in ACI 304.2R. Equip concrete pumps with slicklines having a minimum diameter of 5 inches capable of transporting concrete containing a maximum amount of coarse aggregate and a minimum amount of sand, cement, fly ash, and water.

G. Buckets, chutes, hoppers, pumps, transit mix trucks, and other equipment shall readily handle and place low-slump concrete. Replace inadequate transporting and delivery equipment with acceptable equipment.

### 3.5 CONSOLIDATION:

A. Consolidate to the maximum practical density, free from voids, pockets of coarse aggregate, entrapped air. Consolidate snugly against forms and around embeds.

B. Exercise care to avoid segregation when placing and consolidating concrete around

embeds and in heavily reinforced areas.

C. Immediately after depositing, consolidate concrete by means of mechanical vibrators in a near-vertical position and in accordance with ACI 309R. Penetrate and re-vibrate the upper portion of the underlying layer.

D. Do not place vibrator against reinforcing or forms or use vibrator to transport concrete.

### 3.06 CONCRETE JOINTS:

A. Construction Joints: Bond is required at all construction joints unless otherwise designated.

1. Locate construction joints to least impair structure strength. Locate horizontal joints in walls at the tops of footings or grade slabs. Place haunches at the same time as slabs.
2. Provide longitudinal keys as indicated.
3. Prepare construction joint surfaces for bonding by sandblasting, brushing together with high-pressure water jetting, or high-pressure air together with water jetting to thoroughly clean the joint surface of all laitance, loose aggregate, or damaged concrete:
  - a. Expose coarse aggregate in existing concrete to full amplitude of 1/4 inch with two occurrences of full amplitude for each linear foot measured. Do not undercut aggregate.
  - b. Use mechanical cutting, sandblasting, or high-pressure air/water jetting of hardened (not green) concrete.
  - c. Where mechanical methods are used to roughen surface, clean surface by sandblasting and water jetting surface after roughening. Use pressure of at least 6000-psi for air/water jetting. All methods are subject to ENGINEER approval.
  - d. Clean surfaces of loose or defective concrete, coatings, sand, curing compound, and other foreign material.
  - e. Wash concrete surfaces thoroughly with water or air-water jets after cleanup and again at last opportunity before placing concrete.
  - f. Prepare surface to a saturated-surface-dry condition before placing concrete.

B. Timing/Sequencing of Joints: Do not place structural or mass concrete against a previous placement until the previous concrete has undergone volumetric changes for a period of at least 5 days.

### 3.7 CONCRETE FINISHING:

A. Buried Concrete:

1. Flatwork and unformed surfaces: Floated finish as defined in ACI 301.
2. Walls and formed surfaces: Smooth-form finish as defined in ACI 301.

B. Exposed Concrete:

1. Flatwork and unformed surfaces: Light-broom-finish:
  - a. First provide troweled finish as defined in ACI 301, and lightly broom surface immediately thereafter with a stiff-bristle brush/broom. Broom after the surface has set sufficiently so that individual bristles do not striate the surface more than 1/16-inch deep.
  - b. Brush/broom water-conveying surfaces parallel with the direction of flow.
  - c. Brush/broom treading surfaces in parallel strokes at right angles to the typical direction of traffic.
2. Walls and formed surfaces: Smooth-rubbed finish no later than the day following formwork removal as defined in ACI 301.

3.8 TOLERANCES:

A. Follow recommendations of ACI 301 and ACI 117R for allowable variations from specified lines, grades, and dimensions, and allowable magnitude of surface irregularities.

3.9 CURING:

A. Cure fresh, unformed surfaces **immediately after finish**, and formed surfaces immediately following form removal/finish, **for a minimum of 14 days** as follows:

1. Furnish all materials and perform all work required for curing concrete.
2. Cure concrete either by water curing or by the use of clear or translucent liquid membrane-forming curing compound with a fugitive dye.
3. Water-cure surface of construction joints or cure with polyethylene film. Immediately prior to placement of concrete or mortar on or against these surfaces, prepare concrete as specified for construction joints.
4. Cure contraction-joint surfaces and control-joint surfaces by the use of liquid membrane-forming curing compound. Remove all extraneous concrete accretions and other foreign materials from the surfaces of contraction joints and control joints to provide a smooth, clean surface prior to application of curing compound.
5. Treat all concrete surfaces to prevent loss of moisture from the concrete until the required curing period has elapsed or until immediately prior to placement of other concrete or backfill against those surfaces. Allow only sufficient time to prepare

construction joint surfaces and to bring them to a saturated surface-dry condition between discontinuance of curing and covering with fresh concrete.

6. Treat unformed concrete surfaces as soon as they have been finished, or have attained a dull appearance free from bleed water and moist sheen.
7. Remove forms after the concrete has hardened sufficiently to prevent structural collapse or other damage by careful form removal (see Section 3100 – Concrete Formwork for the minimum number of days required for concrete hardening of various structural elements). Keep all concrete surfaces continuously moist after form removal until initiation of curing. Where required, repair all minor surface imperfections immediately after form removal. Keep minor repair areas continuously moist and complete surface repairs within 24 hours after form removal. Immediately initiate cure to repair areas by the applicable method specified herein.
8. During periods of hot weather when the average maximum air temperature for three (3) consecutive days, as measured at the placement or the ENGINEER's site office, is anticipated to exceed 80 F, water cure all concrete. The use of curing compound will not be permitted during such periods. Maintain water curing for the specified period or until the average maximum air temperature for three (3) consecutive days is less than 80 F. When water curing is no longer required under this provision, complete curing in accordance with specified methods.

#### B. Water Curing:

1. Keep water-cured concrete wet for at least 14 days from the time the concrete has attained sufficient set to prevent detrimental effects to its surfaces. Keep concrete surfaces wet by covering with water-saturated material; by using a system of perforated pipes, mechanical sprinklers, or porous hose; or by other methods that will ensure that all surfaces are continuously (not periodically) wet.

#### C. Curing with Liquid Membrane-forming Curing Compound:

1. Apply liquid membrane-forming curing compound to designated concrete surfaces. Reapply curing compound as necessary to maintain a continuous, water-retaining film on the surface for 28 days. Mix thoroughly and apply spray to concrete surfaces in a two-coat application. Apply second coat immediately after the application of the initial coat and at a 90 degree angle to the initial coat, to provide a continuous, uniform film. Apply approximately equal coverage rate for each coat, not to exceed 150 ft<sup>2</sup>/gal total coverage. Decrease coverage rate on rough surfaces, as necessary to obtain the required continuous film. Take special care to ensure ample coverage at edges, corners, and rough surfaces. Keep curing compound off reinforcing steel. Use pressurized spray equipment that atomizes the curing-compound material during application, and that continuously agitates the material during application. Application of curing compound with rollers or brushes is not permitted.
2. In order to assure bond of curing compound, remove excessive form oil from concrete surfaces by washing with a solution of trisodium phosphate, followed by a thorough rinsing of the surfaces with clear water. The trisodium phosphate wash is

required when the ENGINEER determines that the amount of form oil on the concrete will impair the bond of the curing compound or when surfaces are exposed to view.

3. Keep formed concrete surfaces continuously moist, where curing compound is to be applied, by repeated light spraying with water until immediately prior to application of curing compound. Apply curing compound as soon as the surface film of moisture has disappeared, but while the concrete still has a damp appearance.
4. After application of the curing compound has been completed and the coating is dry to touch, perform all remaining required concrete repairs without delay in accordance with repair of concrete. Moisten completed repairs and coat with curing compound in accordance with the foregoing requirements.

#### D. Protection of Curing Medium:

1. Maintain curing compound treatment to provide a moisture-proof membrane for curing concrete for the minimum period specified. Repair curing compound that is damaged, or that peels from concrete surfaces within 28 days after application, without delay by moistening the concrete and applying additional compound in an acceptable manner.
2. Sustain polyethylene film curing for at least 14 days. Protect polyethylene film as necessary to keep it intact, and the concrete surface kept moist for the full curing period.
3. Where foot traffic or other construction activity is necessary on concrete being cured by curing compound or polyethylene film, protect the curing membrane by covering it with sand, earth or other approved means. Do not place protective covering on curing compound until dry.

E. Remove and clean bonding concrete surfaces of all curing chemicals and materials after the cure period is complete.

F. Failure to cure concrete in strict accordance with these specifications will constitute defective concrete. CONTRACTOR is responsible for engineering and administrative costs for evaluation, design, inspection, and observation of corrective measures associated with defective concrete.

#### 3.10 PROTECTION:

A. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

B. Protect all concrete against damage until final acceptance. Do not load concrete or place backfill against concrete until the concrete has reached a compressive strength of 3000 psi and has been cured for at least seven days, as directed by the ENGINEER.

C. Protect fresh concrete against freezing temperatures; hot weather; damage from rain; equipment damage; contamination from foreign materials; and damage from foot traffic until the

concrete has hardened. Provide methods of protection from hot and cold weather in accordance with the recommendations of ACI 305R and ACI 306R, except as otherwise specified herein. When freezing temperatures or precipitation appear imminent, immediately make ready at the placement site all materials that may be required for protection of concrete. The ENGINEER may delay placement of concrete until adequate provisions for protection against weather are made, at no additional cost to OWNER. Keep concrete curing membranes intact, and maintain other curing materials and processes as necessary to ensure continuous curing for the minimum specified curing time.

### 3.11 INSTALLATION OF GROUT A.

General:

1. Inspect concrete surfaces to receive grout to ensure they are free of ice, frost, dirt, grease, oil, curing compounds and all loose material that could affect bond or performance.
2. Cure new concrete surfaces to their design strength.
3. Inspect base plates, anchor bolts and other materials to be grouted and remove rust, oil or other deleterious substances.

B. Cement Grout/Dry-Pack Grout: Clean contact surface of loose or foreign material to insure bond between grout and surface.

1. Flush with water and dry to a surface-dry condition immediately prior to placing the grout.
2. Provide mortar-tight forms at locations where grout could escape. Completely fill all spaces, tightly pack or consolidate grout. Moist-cure and do not allow any load on grout for 72 hours following placement, unless otherwise approved. Use cement grout within 30 minutes after preparation.

C. Non-Shrink Grout: Conform to grout manufacturer's instructions for physical or environmental limitations, and for mixing and placing requirements.

1. Roughen concrete surfaces to which the grout will bond.
2. Clean concrete surfaces of all laitance, loose or defective concrete, coatings, and other foreign material, followed by thorough washing with water. Saturate surface for 24 hours. If a delay occurs before placing grout, lubricate surface again with water immediately before placing grout.
3. Place grout to a full and complete contact between concrete surfaces, surfaces of base plates or otherwise indicated.

### 3.12 FIELD QUALITY CONTROL:

- A. Follow recommendations of ACI 301.
- B. Conform to ACI 305R when concreting during hot weather.
- C. Conform to ACI 306R when concreting during cold weather.
- D. Maintain one copy of each of the above ACI documents on site.
- E. Acquire cement from same source for all Work unless otherwise approved.
- F. Acquire aggregate from same source for all Work unless otherwise approved.
- G. Acquire fly ash from same source for all Work unless otherwise approved.
- H. ENGINEER will test concrete materials to determine conformance with specification requirements. Concrete Testing will generally consist of the following:
  - 1. A set of at least three concrete test cylinders cast for approximately each 50-cy placed, or at least once each day that concrete is placed. Make test cylinders in accordance with ASTM C 31 and tested in accordance with ASTM C 39.
  - 2. Take one slump test for each truck and for each set of test cylinders. Determine slump at point of placement in accordance with ASTM C 143.
  - 3. Take one air-entrainment and one temperature test for each truck and for each set of cylinders in accordance with ASTM C 231 and ASTM C 1064.
  - 4. Perform one unit weight/yield test for each set of cylinders in accordance with ASTM C 138.

### 3.13 PATCHING:

- A. Patch imperfections as directed, and in accordance with ACI 301.
- B. Complete minor surface repairs and patching of irregularities greater than 3/4" in any direction by burlap-sack rubbing or surface grinding, within 2 hours of form removal.
- C. Fill recesses resulting from removal of tie rods with dry pack or other acceptable material unless the recesses are to be covered by concrete.
- D. Honeycombing or embedded debris in concrete is considered defective concrete and therefore not treatable as a minor repair.

### 3.14 DEFECTIVE CONCRETE:

- A. Make proposal to ENGINEER and OWNER for procedure and product to repair defective concrete.
- B. Perform repair work as determined and directed by ENGINEER.



C. Do not patch, fill, touch up, repair or replace defective concrete without prior, written approval from ENGINEER for each individual area.

**3.15 REPAIR OF DEFECTIVE CONCRETE:**

A. Repair concrete in accordance with recommendations as contained in ACT 546R.

B. Complete dry-pack concrete placement less than 10 inches in dimension, and Portland cement mortar repairs within 7 days of the original concrete placement or utilize epoxy-resin bonding systems.

C. Replace concrete measuring more than 10 inches in dimension and repairs within 15 days of the original placement.

D. Complete repairs involving epoxy-resin systems after 7 days and before 60 days from the original placement.

E. When concrete surfaces are repaired with epoxy-bonded epoxy mortar, lightly grind the surfaces of the finished epoxy mortar, in areas visible to the public, or otherwise prepare to eliminate gloss and produce a surface color and texture that closely matches the surrounding concrete surfaces.

**END OF SECTION 03300**

**DIVISION 5:**

**METALS**

**PART 1 – GENERAL**

**1.1 SUMMARY**

- A. This section includes the following metal fabrications:

Deck Frame / Handrails  
Debris Rack

**1.2 REFERENCES**

- A. American Society of Testing and Materials (ASTM)

A27 Specification for Steel Castings, Carbon, for General Application

A36 Specification for Structural Steel

A167 Specification for Stainless and Heat-Resisting Chromium-Nickel Steel  
Plate, Sheet and Strip

A276 Specification for Stainless and Heat-Resisting Steel Bars and Shapes

A307 Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile  
Strength

A500 Specification for Cold-Formed Welded and Seamless Carbon Steel  
Structural Tubing in Rounds and Shapes

- B. American Welding Society (AWS)

D1.1 Structural Welding Code - Steel

D1.3 Structural Welding Code - Sheet Steel

- C. Federal Specifications (FS)

FF-B-561 Bolts, Screw, Lag

FF-W-84 Washers, Lock (Spring)

FF-W-92 Washer, Flat (Plain)

TT-P-645 Primer, Paint, Zinc Chromate, Alkyd Type

SSPC-PA 1 Paint Application Specification No. 1

SSPC Paint 20 Paint Specification No. 20 Zinc-Rich Primers (Type I, "Inorganic," and  
Type II, "Organic")

SSPC-SP1 Surface Preparation Specification No. 1 "Solvent Cleaning"

SSPC-SP2	Surface Preparation Specification No. 2 "Hand-Tool Cleaning"
SSPC-SP3	Surface Preparation Specification No. 3 "Power Tool Cleaning"
SSPC-SP7	Surface Preparation Specification No. 7 "Brush-Off Blast Cleaning"

### 1.3 SUBMITTALS

General: Submit the following in accordance with Conditions of Contract.

- A. Product Data: Submit product data for products used in metal fabrications, including paint products and fasteners.

### 1.4 QUALITY ASSURANCE

- A. Codes and Standards: Comply with provisions of the following, except as otherwise indicated. Where conflicts occur, comply with the more stringent requirements.

1. ANSI 14.3
2. AWS D1.1 and D1.3
3. NFPA 101

- B. Fabricator Qualifications: Firm experienced in successfully producing metal fabrications similar to that shown on the drawings, with sufficient production capacity to produce required units without causing delay in the work.

- C. Qualify welding processes and welding operators in accordance with AWS D1.1 and D1.3.

Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

- D. All materials used shall be free of lead, and asbestos fibers.

- E. Use of damaged items is prohibited.

### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to the job site in good condition and properly protected against damage to finished surfaces.

- B. Storage on Site: Store materials in a location and in a manner to avoid damage. Stacking shall be done in a way which will prevent bending.

Store metal components and materials in a clean, dry location. Cover with waterproof paper, tarpaulin or polyethylene sheeting in a manner that will

permit circulation of air inside the cover.

- C. Keep handling on-site to a minimum. Exercise care to avoid damage to finishes of material.

## 1.6 PROJECT CONDITIONS

Field Measurements: Check actual locations of structures and other construction to which metal fabrications must fit, by accurate field measurements before fabrication; show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay of work.

Where field measurements cannot be made without delaying the work, guarantee dimensions and proceed with fabrication of products without field measurements. Coordinate construction to ensure that actual opening dimensions correspond to guaranteed dimensions. Allow for trimming and fitting.

## **PART2-PRODUCTS**

### 2.1 FERROUS METALS

A. Metal Surfaces, General: Form metal fabrications exposed to view upon completion of the work, provide materials selected for their surface flatness, smoothness, and freedom from surface blemishes. Do not use materials whose exposed surfaces exhibit pitting, seam marks, roller marks, rolled trade names, roughness, and, for steel sheet, variations in flatness exceeding those permitted by referenced standards for stretcher-leveled sheet.

B. Steel Plates, Shapes, and Bars: ASTM A36.

### 2.2 STAINLESS STEEL

A. Bar Stock: ASTM A276, Type 302 or 304.

B. Plate: ASTM A167, Type 302 or 304 304.

### 2.03 FASTENERS

A. Provide zinc-coated fasteners for decking. All other fasteners shall be stainless steel. Suspect/counterfeit bolts will not be accepted and will be replaced at Contractor's expense.

### 2.4 FINISH

A.

## 2.5 FABRICATION, GENERAL

- A. Form metal fabrications from materials of size, thickness, and shapes indicated but not less than that needed to comply with performance requirements indicated. Work to dimensions indicated or accepted on shop drawings, using proven details of fabrication and support. Use type of materials indicated or specified for various components of each metal fabrication.
- B. Remove sharp or rough areas.
- C. Weld corners and seams continuously to comply with AWS recommendations and the following:
  - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  - 2. Obtain fusion without undercut or overlap.
  - 3. Remove welding flux immediately.
  - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and contour of welded surface matched those adjacent.
- D. Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- E. Cut, reinforce, drill and tap miscellaneous metal work as indicated to receive finish hardware, screws, and similar items.

## 2.09 ROUGH HARDWARE

Furnish bent or otherwise custom fabricated bolts, plates, anchors, hangers, dowels, and other miscellaneous steel and iron shapes as required. Fabricate items to sizes, shapes, and dimensions required.

## 2.23 FINISHES

- A. General: Comply with NAAMM AMP 500 "Metal Finishes Manual" for recommendations relative to application and designations of finishes.
- B. Finish metal fabrications after assembly.

## 2.24 STEEL AND IRON FINISHES

- A. General: Shop-paint uncoated surfaces of metal fabrications, except those to be embedded in concrete or masonry or to receive sprayed-on fireproofing, surfaces and edges to be welded, and galvanized surfaces, unless otherwise indicated. Comply with requirements of SSPC-PA 1 for shop painting.
- B. Surface Preparation for Shop Priming: Prepare uncoated ferrous metal surfaces to comply with minimum requirements indicated below.
  - 1. Remove oil, grease and similar contaminants in accordance with SP-1, "Solvent Cleaning".
  - 2. Remove loose rust, scale, spatter, slag and other deleterious materials in accordance with SSPC, utilizing the following methods as required:
    - SP-2 "Hand-Tool Cleaning" SP-
    - 3 "Power-Tool Cleaning"
    - SP-7 "Brush-Off Blast Cleaning"
- C. Painting: Immediately after surface preparation, apply structural steel primer paint in accordance with manufacturer's instructions and at a rate to provide dry film thickness of not less than 3.0 mils (0.076 mm). Use painting methods that result in full coverage of joints, corners, edges, and exposed surfaces. Apply 2 coats of paint to surfaces that are inaccessible after assembly or erection.

## **PART 3 - EXECUTION**

### 3.1 PREPARATION

- A. Coordinate and furnish anchorages, drawings, diagrams, templates, instructions, and directions for installation of anchorages, including concrete inserts, sleeves, anchor bolts, and miscellaneous items having integral anchors that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to project site.

### 3.2 INSTALLATION, GENERAL

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction.
- B. Cutting, Fitting and Placement: Perform cutting, drilling, and fitting required for installation of miscellaneous metal fabrications. Set metal fabrication accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- C. Provide temporary bracing or anchors in formwork for items that are to be built into concrete masonry or similar construction.
- D. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints, but cannot be shop-welded because of shipping size limitations. Do not weld, cut, or abrade the surfaces of exterior units which have been hot-dip galvanized after fabrication, and are intended for bolted or screwed field connections.
- E. Field Welding: Comply with AWS Code for procedures of manual shielded metal-arch welding, appearance and quality of welds made, methods used in correcting welding work, and the following:
  - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  - 2. Obtain fusion without undercut or overlap.
  - 3. Remove welding flux immediately.
  - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and contour of welded surfaces matches those adjacent.
- F. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint or zinc chromate primer.

### 3.3 ADJUSTING AND CLEANING

- A. Touch-Up Painting of Steel Items: Immediately after erection, clean field welds, bolted connections, abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 requirements for touch-up of field painted surfaces.

Apply by brush or spray to provide a minimum dry film thickness of 3.0 mils (0.076 mm).

END OF SECTION



## **PART 1 - GENERAL**

### 1.1 DESCRIPTION:

#### A. Water Control Gate

### 1.3 SUBMITTALS:

- A. Shop Drawings: Indicate materials, sizes, styles, fabrication, anchorage and installation details for headgates.

## **PART 2 - PRODUCTS**

### 2.01 MATERIALS:

The gates shall be Waterman QAP R-10 f-y or approved equal. The gates shall provide a minimum seating head of 10 feet. The Gates shall be self-contained, with yoke and bench stand operators, in accordance with the requirements of these specifications. Specific gate design and configuration shall be as shown on plans.

- A. Frame and Guides: The gate frame shall be a rigid, welded unit, composed of the guide rails, cross bars, and headrails (self-contained only), with a clear opening the same size as the waterway, unless otherwise specified. They shall be flatback, spigotback, or embedded type as directed on the plans or gate schedule.

The guides shall be of extruded aluminum incorporating a dual slot design. The primary slot will accept the plate of the slide (disc) and the secondary slot will be sufficiently wide to accept the reinforcing ribs of the disc. The guides shall be designed for maximum rigidity, having a weight of not less than three pounds per foot. The guides will be of sufficient length to support two-thirds (X\c) the height of the slide, when the gate is fully open.

On self-contained gates, where the guides extend above the operating floor, they shall be sufficiently strong so that no further reinforcing will be required. The yoke to support the operating device shall be formed by members welded or bolted at the top of the guides. The arrangement of the yoke shall be such that the disc and stem can be removed without disconnecting the yoke.

The yoke shall be sufficiently strong to support the lift forces when subjected to a load of 80 pound pull on the operator.

Additional members will be added to the frame as specified in this specification, for flushbottom closure, spigots, and "J" bulb seals. Holes will be provided for anchor bolts for flatback and spigotback models.

- B. Slide Cover: The slide cover shall be plate reinforced with structural aluminum shapes welded to the plate. The slide cover shall not deflect more than 1/360 of the span of the gate under maximum head. Reinforcing ribs shall extend to the guides so that the seating surface of the guide is reinforced. The stem connection shall be either the clevis type, with structural members welded to the slide and a bolt to act as pivot pin, or a threaded and bolted (or keyed) thrust nut supported in welded nut pocket. The pocket and yoke of the gate shall be capable of taking at least twice the rated thrust output of the operator at 40 pounds pull.
- C. Stem: The stems shall be type 304 or 316 stainless steel of suitable length and ample strength for the intended service. The stem diameter shall be capable of withstanding twice the rated output of the operator at 40 pound pull, and shall be supported such that L/r ratio for the unsupported part of the stem shall not exceed 200.
- D. Operators: Manually operated lifting mechanisms shall be as indicated on the plan drawings or in the gate schedule. Handwheel type lifts shall be without gear reduction. Each type shall be furnished with a threaded bronze lift nut to engage the threaded portion of the stem. The lift nut shall be flanged and supported on non-metallic thrust washers, ball or roller bearings to take the thrust developed during opening and closing of the gate. When indicated, all operators shall be furnished with either a graduated, pipe stem cover with a counter type position indicator to show the Flushbottom Closure. When indicated on the plans or in the gate schedule, gates shall resilient neoprene seal with a minimum width of exposed face of the invert and shall extend to the depth of the primary slot. Gates shall be furnished complete with ultra high molecular contact the slide face. For aluminum gates, ultra high molecular weight bearing strips securely lock the seat in place.

#### Frames and Slides

Aluminum - ASTM B-209 and ASTM B-211 Alloy 6061-T6

#### Rails and Yokes

Aluminum - ASTM B-209 and ASTM B-211 Alloy 6061-T6

#### Fasteners and Anchor Bolts

Stainless steel - ASTM F-593 and 594

Stainless steel - ASTM A-276 Type 304 or 316

#### Stems

Stainless steel - ASTM A-276 Type 304, or 316

#### Flushbottom Seals and "J" Bulb Seals

Rubber - ASTM D-2000 BC610-615 or other suitable composition

#### Finish

Mill finish on aluminum with standard shopcoat paint on lift

## **PART 3 – EXECUTION**

### **3.1 INSTALLATION:**

- A. Water control gates shall be installed in accordance with design drawings and manufacture's installation manual.

### **3.2 OPERATIONAL TESTS:**

- A. After the gate and hoist (or lift) have been installed, they shall be cleaned, lubricated and Otherwise serviced by the Contractor in accordance with the manufacturer's instructions. The Contractor shall test the gate and hoist by operating the system several times throughout its full range of operation and shall make any changes and adjustments necessary to insure the satisfactory operation of the gate system.

**END OF SECTION 05950**