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**CITY OF REDMOND, OREGON**

**2010 STANDARD SPECIFICATIONS**

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**DIVISION V - STRUCTURES**

**512 RAILING, FENCING, AND GATES**

**512.1.00 DESCRIPTION**

**512.1.01 GENERAL**

This work consists of furnishing and installing fences, gates, and gateways of chain link fabric, woven wire fabric, barbed wire, or combinations thereof, in reasonably close conformity to the lines and grades shown or directed by the Engineer. Minimum general standards for fencing shall be as set forth in Section 01050 of the Oregon Standard Specifications for Construction, current edition.

All dimensions shown on the plans are horizontal and vertical measurement. Actual quantities required for the installation may be greater depending on the slope of the terrain. All fenced areas shall have at least one gate.

**512.1.02 CERTIFICATION**

The Contractor shall furnish material certifications for all fencing materials.

**512.2.00 MATERIALS**

**512.2.01 POSTS, RAILINGS, BRACES, AND APPURTENANCES**

Unless otherwise specified, all posts, railings, and similar structural elements shall be standard weight galvanized tubular steel posts conforming to the requirements for AASHTO M 181, having not less than 1.6 oz. galvanizing per SF. Posts and railings shall conform to the following schedule:

Railings and Gates	1.625.inch diameter (1-5/8")
Lind Posts	2.375 inch diameter (2 3/8")
Corner and End Posts	2.875 inch diameter (2 7/8")

**Gate Posts**

Gate swing 2/5' to 6.0'	3.00 inch diameter
Gate swing > 6.0'	4.00 inch diameter

Tubular posts shall be fitted with a snug-fitting, galvanized metal cap.

### **512.2.01A STEEL**

Steel shall be galvanized in accordance with the requirements of ASTM A153, unless otherwise specified. Shapes, plates, and bars shall conform to the requirements of ASTM A36.

Tubing shall conform to the requirements of ASTM A500, Grade B, ASTM 501 or ASTM A53, Grade B, unless otherwise specified.

Posts shall conform to the requirements of ASTM A27, Grade 65-35, unless otherwise specified.

Nuts, bolts, and washers shall conform to the requirements of ASTM A307, Grade A.

## **512.2.02 FENCING**

### **512.2.02A CHAIN LINK**

Chain link fabric, ties, and tension wire shall conform to the requirements of AASHTO M181 supplemented and modified as follows:

Fabric may be zinc-coated steel meeting Type 1, Class D coating requirement, aluminum-coated steel, or aluminum alloy. Use only one type on any Project.

Wire fabric ties, wire ties, and hog rings may be zinc-coated steel wire, aluminum coated steel, or aluminum alloy as elected, regardless of the type of wire fabric used.

Use ductile, zinc-coated steel meeting the coating requirements of ASTM A 641/A 641 M, Class 1 for wire fabric ties, wire ties, and hog rings. Aluminum coated steel wire fabric ties, wire ties, and hog rings shall be coated with at least 0.30 ounce per square foot.

#### **512.2.02A(1) VINYL COATED CHAIN LINK**

Vinyl clad chain link fabric shall conform to AASHTO M181, Type IV. The thickness of the coating shall not be included in the gauge rating of the fabric.

#### **512.2.02A(2) SCREENED CHAIN LINK**

In addition to the above requirements for fabric, the screening shall be "View Gard" or an approved equal. Fabric shall be 9 gauge galvanized wire woven in 3-1/2 inch by 5-1/2 inch diamond mesh. Top and bottom selvage shall be knuckle finished. The screening shall be vinyl slats, approximately 5/16" x 2-3/8", in an approved color. The slats shall be inserted vertically and shall be securely fastened to the wire fabric with stainless steel staples and a bottom locking slat.

### **512.2.02B BARBED WIRE**

Barbed wire shall be two-strand and either 12-1/2 gauge or 15-1/2 gauge with 4-point barbs spaced a 5-inch intervals conforming to the requirements of AASHTO M 280 (ASTM A 121). Galvanizing shall be Class 3. All barbed wire installed on a Project shall be new or like new, and of the same gauge, unless otherwise approved by the Engineer.

### **512.2.02C BOTTOM TENSION WIRE**

The bottom tensioning wire shall be 7 gauge spring wire with Class 2 coating, unless otherwise specified.

## **512.3.00 CONSTRUCTION**

### **512.3.01 GENERAL**

Materials removed under these provisions, including excess excavation, brush, stumps, and debris, shall be disposed of by the Contractor in a manner satisfactory to the Engineer.

### **512.3.02 FENCE**

Fencing shall be 6 feet high, unless otherwise specified or shown on the plans.

The fence lines designated by the design engineer or City Engineer shall be cleared, grubbed, or otherwise prepared by the Contractor such that the grade shall not vary by more than 6 inches in any 15 foot run. All shrubs, brush, logs, down timber, snags, rocks and other obstacles, including trees up to 6-inches in diameter, which interfere with the fence within 36 inches of the line, shall be removed and disposed of as directed by the Engineer. Trees having diameters greater than 6 inches will normally be preserved by varying the fence alignment to pass by them. As much as possible, the fence shall be erected on natural ground, with the bottom of the fence fabric following the ground contours, with no less than one inch nor more than six inches clearance from the ground surface. Fill or excavate ground surface irregularities that interfere with maintaining the specified ground clearance. Grading shall leave a neat, natural appearance.

All posts shall be set firmly in the ground or in concrete footings as applicable. Excavate for concrete footings to reasonably neat lines, but not less than the specified dimensions and depths in soil, or not less than 18 inches deep in rock. When drilling into solid rock, the Contractor may shorten the post depth such that a minimum of 12 inches of the post is grouted into the rock. Prevent disturbance of original ground at the sides and bottom of the excavation. Footings shall have dimensions not less than dimensions shown on the standard plan, and shall fill the excavated areas and contact firm soil at the sides and bottom. Typically, posts will have a minimum 3 feet of set in excavated soil. Reasonable variation in depths will be permitted and posts may be appropriately shortened or left slightly high, as approved by the Engineer, to avoid unnecessary penetration or excavation in rock or to obtain desired grades along the fence. Concrete shall be cast – in-place and tamped around the posts and brace ends with the posts and braces firmly held in proper position. The surface of the concrete shall be struck off and sloped to a smooth surface at the ground level, and the concrete shall be allowed to cure for at least 5 days before the posts and braces are subjected to strain.

Line posts shall be set along the line of the fence, between end, corner, and gate posts, and typically at the spacing called for on the plans. In some cases, line posts may be set at greater spacing not exceeding 25% greater than called out, or at closer spacing if directed or approved by the Engineer. The intent of this provision is for the actual number of line posts installed to be equal to the number required for typical spacing. The height of the posts above the ground shall not exceed the design height of the fence by more than 3 inches.

Intermediate end posts shall be set in the line of new fence at each summit and at each valley in the grade of the fence where the algebraic difference in the grades of adjoining panels of fence exceeds 30%, and at other points located along the fence line to break the fence construction into approximately equal runs not exceeding the applicable length of runs shown. Corner posts shall be set at angle points in fence alignment where the alignment of adjoining panels of fence changes direction by 20 degrees or more.

Metal post braces shall be firmly attached to metal end posts, intermediate end posts, corner posts, and gate posts, and shall be set in concrete footings when indicated on the plans. Corner posts and intermediate end posts shall be provided with two braces, one each way from the post in the main lines of the fence. End posts and gate posts shall be provided with one brace in the line of the fence as called for on the plans.

Tensioning wire shall be attached to end, gate and corner posts by bands and clamps. Top tension wire shall be either threaded through line post loop caps or held in open slots therein in such a manner as to limit vertical movement. Bottom tension wire shall be tied or attached to line posts by ties or clamps to prevent vertical movement.

Expansion sleeves or couplings in longitudinal top and bottom rails shall be provided at spacing not exceeding 200 feet. Tension wires shall be provided with one turnbuckle or one ratchet take-up in each run of fence.

Place fabric and wire on the face of the post designated by the Engineer. On curved alignment, place the fabric and wire on the face of the post against which the normal pull of the fabric and wire will be exerted. Attach fence fabric and barbed wire to each post according to recognized standard practice for fence construction. Use care in stretching woven wire fabric so the pull is evenly distributed over the longitudinal wires and not more than one-half of the original depth of the tension curves is removed.

Fabric shall be fastened to end, gate, and corner posts, and to gate frames as indicated on the plans. Fabric shall be attached to line posts with wire ties at top and bottom and at intermediate spacing not exceeding 18 inches. Fabric shall be attached to top and bottom rails and to longitudinal tension wire with metal bands or tie wires spaced as detailed, but in no case greater than 24 inches apart.

Splices of fabric and splices of separate lines of wire between posts will be permitted provided that not more than two fabric or separate wire splices, spaced at least 50 feet apart, occur in any one run of fence. Fabric splices shall be with spiral pickets of specified chain link fabric material. Splices of tension wire and barbed wire shall be of the wrap or telephone type with each end wrapped around the other for not less than six complete turns.

In final position, the fabric and barbed wire shall be free from warp and sag, and appearance shall reflect first class workmanship in every detail.

### **512.3.03 GATES**

Gate openings shall be cleared and graded to permit the swing gate to open in a horizontal plane for a minimum of 90 degrees in each direction. Roll gates shall be graded for smooth level operation.

Gates shall be constructed to reflect high quality workmanship. Wire splices shall develop the full strength of the wire, and the finished work shall provide a taught and well-aligned closure of the opening capable of being readily opened and closed by hand.

#### **512.3.03A SWING GATES**

Swing gates shall be hinged in a manner to prevent removal of the gate without proper tools. Firmly attach the fittings to the gates and posts. Set each single gate to swing freely inward and outward in a plane so it can be fastened securely in its latch holder, or in the case of

double gates, in its latch holder and gate stops. Set double gates on their respective hinge pintles to provide a common horizontal plane in which each single gate swings.

#### **512.3.03B ROLL GATES**

Roll gates shall be installed in accordance with the plans and manufacturers details and recommendations.

#### **512.3.04 REMOVING AND REBUILDING FENCE**

Remove and rebuild existing fences as shown or directed. Construct fences to approximately the same condition as the original fence. Salvage the materials in existing fences to be removed and rebuilt and incorporate in the rebuilt fences. Replace fence materials damaged beyond reuse at no additional cost to the Owner. Firmly reset posts to the staked alignment. Post spacing and the number of wires to be strung shall be the same as the original fence. Furnish new staples or clips to fasten the wires to the posts.

#### **512.4.00 MEASUREMENT AND PAYMENT**

Payment for fencing, barbed wire, and gates shall be as listed in the Bid Schedule. The price bid shall include full compensation for furnishing all materials, equipment, tools, labor and incidentals necessary to construct fencing and gates complete and in-place.

#### **512.4.01 FENCING**

Measurement and payment for fencing shall be on a lineal foot basis, less gate openings, to the nearest foot, for the type and height of fence specified and constructed.

#### **512.4.02 BARBED WIRE**

Measurement and payment for barbed wire shall be on a lineal foot basis to the nearest foot measured along the fence line for the type of fence specified and constructed.

#### **512.4.03 GATES**

Measurement and payment for gates shall be on a per each basis for the type and length of gate specified and constructed. Barbed wire on gates shall be paid for under the Barbed Wire pay item.

#### **512.4.04 REMOVING AND REBUILDING FENCE**

When listed in the schedule of Bid Items, measurement and payment for rebuilding fence shall be on a lineal foot basis at the unit bid price. Payment shall be full compensation for all work, including any new materials necessary to complete the rebuilding of the fence.

#### **512.4.04 LUMP SUM BASIS**

When listed in the schedule of Bid Items as a Lump Sum Amount, payment for fencing, gates, and barbed wire shall be paid as a lump sum for the type and length of fence specified and installed. Payment shall be compensation for all materials, equipment, tools, labor, and incidentals required to construct fences.

#### **512.4.05 CLEARING AND GRUBBING**

No separate payment shall be made for clearing and grubbing fence lines, gate openings, or areas necessary to install fencing. This work shall be considered incidental to fence construction.

#### **512.4.06 INCIDENTAL BASIS**

When not listed in the Schedule of Bid Items as a separate pay item, construction, removal, or replacement of fences, wire, gates, and related work shall be considered incidental to the completion of other work specified in the Contract.

## **513 GRAVITY IRRIGATION SYSTEM - CANAL CROSSINGS, HEADWALLS AND WINGWALLS**

### **SCOPE**

This work consists of construction of concrete structures for the Central Oregon Irrigation District's canal system. Structures shall be constructed in accordance with this specification at the locations shown on the Drawings or designated by the Engineer, and in conformity to the lines, grades, dimensions, and designs shown on the drawings or established by the Engineer.

### **513.2.0 MATERIALS**

#### **513.2.01 PORTLAND CEMENT CONCRETE**

Furnish Portland Cement Concrete mix in general conformance with Oregon Standard Specifications for Construction, Section 02001. Contractor shall submit a Current Mix Design for review and acceptance by the Engineer a minimum of one week prior to concrete placement.

Portland Cement Concrete shall be Structural Concrete (Option A), Class 3000, with a compressive strength of 3,000 psi at 28 days in accordance with ASTM C-31 and C-39. Furnish only Type I or II Portland cement for structural concrete. Concrete shall contain no additives to cause rapid heating or setting. Entrained air shall be a required additive in the amount of 5 per cent, plus or minus one percent. Slump shall not exceed 4 inches at the time of placement in accordance with ASTM C-143.

Concrete shall be placed within 90 minutes of water being added to the batch mix.

#### **513.2.02 REINFORCING STEEL**

Reinforcement for concrete shall be in conformance with Oregon Standard Specifications Section 02510. Steel bars shall be ASTM A 615/A 615M, Grade 60 deformed bars, except where otherwise indicated or designated by the Engineer. Tie wire shall be minimum 16 gauge.

### **513.3.0 WORKMANSHIP**

#### **513.3.01 PREPARATION OF BASE**

Areas on which concrete structures are to be constructed shall be brought to proper lines and grades, and the base compacted to not less than 95% of the maximum density, at optimum moisture content, as determined by ASTM D-698. The base shall be firm and moist at the time concrete is placed.

#### **513.3.02 WEATHER PRECAUTIONS**

##### **513.3.02A COLD WEATHER**

Base must be free of ice, snow, and frozen material. Remove ice and snow from all forms, reinforcing steel and embedded items. Raise temperature of all surfaces in contact with the concrete to above 40 degrees F prior to concrete placement. Minimum concrete temperature for 72 hours after placement is 55 degrees F. Minimum air temperature during first 24 hours after removal of protection is 50 degrees F. The use of salts or chemical admixtures to prevent concrete freezing is prohibited.

Do not permit temporary heaters to locally over-heat or over-dry concrete. Contractor assumes all responsibility, including costs for testing suspected frozen concrete. Freeze-damaged concrete shall be removed and replaced at no additional cost to the Owner.

#### **513.3.02B HOT WEATHER**

When the air temperature exceeds 90 degrees F, and when winds exceed 20 mph, place concrete in accordance with the following requirements: Maximum concrete temperature at the time of placement shall be 75 degrees F. Mix concrete for the minimum amount of time and place immediately thereafter. Sprinkle forms, reinforcing steel, embedded items and subgrade with cool water immediately prior to concrete placement. Protect unstripped formwork and exposed concrete surfaces against excessive drying by spraying with water or other approved method. Contractor assumes all responsibility, including costs for testing suspected damaged concrete. Contractor shall remove and replace any damaged concrete at no additional cost to the Owner,

#### **513.3.03 CONCRETE FORMS.**

Concrete shall be placed in suitable forms of sufficient strength to resist springing during depositing and consolidating concrete. Forms shall comply with the requirements of the Uniform Building Code, and applicable State and Federal Safety regulations. The Contractor is solely responsible for the adequacy of the forms.

Forms for all concrete shall be, at a minimum, 5/8-inch DFPA "Plyform". Thinner plywood or metal may be used for aligning more substantial forms. Foundation and footing forms shall be constructed with 2-inch nominal stock. Curved walls may be formed in straight segments, each segment not to exceed two feet in length. Coat contact surfaces of forms with new, stainless form oil. Temporary openings at the base of wall forms shall be provided to facilitate cleaning and inspection before placement of concrete. External corners shall have 3/4-inch chamfer unless noted otherwise.

Form ties shall be "Snap-Ty", "Snap-ins", or other of similar design and adjustable length. Twisted wire ties or wood spacers are not allowed. Ties shall be arranged so that when forms are removed, metal will be one inch from concrete surface.

Prior to concrete placement, all wood chips, sawdust, wire, and other construction debris and extraneous matter shall be removed from the interior of the forms. Temporary struts, stays and braces used to hold forms shall be removed from the inside of the forms and not buried in the concrete.

Forms shall not be removed without approval of the Engineer, or in such a manner as to cause damage to concrete. In no case shall forms be removed before 72 hours after placement.

#### **513.3.04 REINFORCING STEEL PLACEMENT**

Cleaning, bending, and placement of reinforcing bars shall be in accordance with requirements of the American Concrete Institute Building Code (ACI 318). Furnish and install tie and support bars, as required, detailed to length, whether or not specifically shown on drawings.

The Contractor shall submit four (4) copies of shop drawings and detailed reinforcement plans, prepared in accordance with ACI Manual of Standard Practice for Detailing Reinforced Concrete Structures, to the Engineer prior to fabrication of steel bars.

Do not cut or bend reinforcement before shop drawings are reviewed and approved by the Engineer.

Reinforcement shall be clean and free of loose rust, scale, paint, grease, or other coating that would reduce the bond to the concrete. Spacers, chairs, ties, or other devices necessary for properly placing, spacing, supporting, and fastening reinforcement in place shall be included so that the reinforcing steel is adequately supported and held in proper position prior to concrete placement.

#### **513.3.05 WALL FINISH**

After removal of forms, repair or patch all honeycombs, tie holes, and other defects in concrete. Repair surface defects and defective areas in conformance with ACI 301.

After corrections of surface defects, remove all fins and smooth out corrections, and rub all patched surfaces to obtain the same color as surrounding concrete.

#### **513.3.06 SURFACE FINISH**

Surfaces shall be finished to a smooth and uniform texture by troweling and floating, and, if so directed by the Engineer, by cross-brooming or burlap-finishing. The surface shall be ground smooth and sacked with the tie holes filled. Edges shall have a 3/4-inch chamfer.

The finished surface of the concrete shall not vary by more than 0.02 foot from the edge of a 10 foot straight edge, except at grade changes. Irregularities exceeding the above limit shall be corrected in a manner directed by the Engineer. The completed surface shall be uniform in color and free of surface blemishes and tool marks.

All surfaces that will be exposed to weather and normally level shall be sloped for drainage. Slopes shall conform to the following, unless otherwise indicated on the drawings:

- a. Narrow surfaces, such as tops of walls: 3/8 inch per foot.
- b. Broader surfaces, such as platforms, decks, and slabs: 1/8 inch per foot.
- c. Thicknesses of slabs shall not be less than the indicated thickness at any point regardless of slope requirement.

#### **513.3.07 CURING**

After concrete has been placed and finished as specified, it shall be cured:

- a) By application of a white pigmented liquid membrane-forming compound applied uniformly to damp concrete by pressure spray method, or
- b) By keeping the concrete protected and constantly moist for at least 72 hours.

#### **513.3.08 PROTECTION**

The completed concrete surface shall be protected from damage until the project is accepted. The Contractor shall repair damaged concrete, and clean concrete discolored or stained during construction. Surfaces that are damaged shall be removed and reconstructed for the entire length between regular construction joints. Removed portions shall be properly disposed of off the project site by the Contractor at no additional cost to the Owner.

#### **513.3.09 DEFECTIVE WORK**

Any concrete not formed as shown on the drawings, out of alignment or level, or having a non-repairable defective surface shall be removed by the Contractor, unless approval to patch the defective area is granted by the Engineer.



When permission is granted to patch, the following operations should be performed as soon as possible after form removal and before concrete surface is allowed to thoroughly cure. Chip out defective area to one-inch minimum depth with perpendicular edges. Wet surface and compact in place the same mix as the concrete used omitting the coarse aggregate. Screed slightly higher than the surrounding surface and finish to match.

Fill holes left by the withdrawal of rods or ties solidly with mortar or approved silicone sealer, and wipe smooth to form a watertight seal.

#### **513.4.0 MEASUREMENT AND PAYMENT**

Payment for all work described in this section shall be the Lump Sum amount listed and stated on the Bid Schedule in the proposal. Payment shall be full compensation for furnishing all labor, materials, tools, equipment, and incidentals necessary to construct the work as shown and specified.

## **514 GRAVITY IRRIGATION SYSTEM - CANAL CROSSINGS**

### **514.1.00 DESCRIPTION**

This work consists of construction of culverts, utility ducts and sleeves, and fencing for the Central Oregon Irrigation District or other canal system.

### **514.2.00 MATERIALS**

#### **514.2.01 EXCAVATION AND BACKFILL**

Trench Excavation, bedding, and backfill shall conform to Division I – Section 101. Trench Backfill to be Class “B”.

#### **514.2.02 CULVERT PIPE**

Culvert Pipe shall meet the requirements of the plans for size and type. Minimum general standards for culvert pipe shall be as set forth in *Oregon Standard Specifications for Construction*, Section 02420

Pipe shall be galvanized corrugated steel pipe conforming to the requirements of AASHTO M 36. The outside of the pipe shall be marked on both ends to clearly designate the centerline of the top of the pipe joint. Culvert pipe shall meet H-20 live loading requirements and be zinc coated.

Corrugated steel pipe shall be manufactured of not less than 16-gauge sheet steel and furnished in single lengths when practicable. Provide manufacturer’s standard watertight coupling bands with similar protective coating and galvanized steel bolts.

##### **514.2.02A CULVERT PIPE, ALTERNATE MATERIAL**

Culvert pipe shall be helical corrugated aluminum alloy pipe conforming to AASHTO M 196. Corrugated aluminum pipe shall be manufactured of not less than 14-gauge sheet aluminum conforming to ASTM B 209. Provide manufacturer’s standard coupling bands.

#### **514.2.03 UTILITY DUCTS**

Ducts shall be 4-inch Schedule 40 PVC pipe conforming to ASTM D 1785 with solvent welded joints. Pipe shall be gray or white in color.

#### **514.2.04 FENCE**

Fencing shall be in conformance with Section 512.2.02A CHAIN LINK FENCE.

### **514.3.00 WORKMANSHIP**

#### **514.3.01 INSTALLATION OF CULVERT PIPE**

Install culvert pipe to proper line and grade by a method approved by the Engineer. Inspect pipe before installing in trench and remove any damaged or defective pipe from the job, and replace at no additional cost to the Owner.

Begin laying pipe at the lowest end of the culvert. Thoroughly clean the ends of the pipe. Lay corrugated metal pipe culverts and connect sections in conformance with the manufacturer's written instructions. Repair all damaged areas of protective coating with material similar to the original, and permit to dry or solidify before backfilling. Provide temporary diversion of stream flow as necessary to permit the installation of the pipe in dry trench conditions.

#### **514.3.02 INSTALLATION OF UTILITY DUCTS**

Install utility ducts at the locations shown on the plans or as directed by the Engineer. Lay pipe with minimum 1% uniform slope to provide for drainage. Minimum depth of cover over ducts shall be 30 inches.

#### **514.3.03 FENCE**

Install fencing in conformance with Section 512.3.02.

### **514.4.00 MEASUREMENT AND PAYMENT**

#### **514.4.01 CULVERT PIPE**

Measurement and payment for culvert pipe shall be on a per foot basis, measured horizontally to the nearest unit foot. Payment shall be based on the unit price stated in the Bid Schedule of the Proposal. Payment shall include compensation for all materials, labor, equipment, excavation and backfill, and incidentals necessary to install the pipe as shown complete and in place.

When neither specified nor listed in the Bid Schedule for separate payment, culvert pipe shall be considered incidental work for which no separate payment will be made.

#### **514.4.02 UTILITY DUCTS/CONDUIT BANK CROSSING**

Measurement for Utility Ducts/ Conduit Bank Crossing shall be on a lineal foot basis, measured horizontally to the nearest unit foot, for the entire bank of 4 or more conduits as sized and shown on the plans.

Payment for Utility Duct/Conduit Bank Crossing shall be based on the unit price per lineal foot stated in the Bid Schedule in the Proposal. Payment shall include compensation for all materials, labor, equipment, excavation and backfill, and incidentals to install the utility conduit banks complete and in place as shown on the plans.

When neither specified nor listed in the Bid Schedule for separate payment, Utility Duct banks shall be considered incidental work for which no separate payment will be made.

#### **514.4.03 FENCE**

Measurement and payment for fencing shall be as specified in Section 512.4.00.

## **515 CANAL UTILITY CROSSINGS**

### **SCOPE**

This work consists of construction of a utility pipeline crossing of an irrigation canal.

### **515.2.00 MATERIALS**

#### **515.2.01 CONCRETE**

Concrete for cut-off walls shall conform to the requirements of Section 513.

#### **515.2.02 WATERSTOP**

Material for waterstop shall conform to the requirements for Concrete Trench Backfill as specified in Division I, Section 101.2.02F of the City of Redmond Standards and Specifications.

#### **515.2.03 COBBLE**

Cobble material shall be uniformly graded rounded or crushed rock, sized from two-inch to six-inch, and be supplied from a source that meets the durability requirements of *Oregon Standard Specifications for Construction*, Section 02630.10 (c), when tested in accordance with ODOT TM 208.

#### **515.2.04 RIPRAP**

Riprap material shall be Class 50 (English Units) conforming to *Oregon Standard Specifications for Construction*, Section 00390.11.

### **515.3.0 WORKMANSHIP**

#### **515.3.01 GENERAL**

Canal Crossings shall conform to the latest standards and specifications of the Central Oregon Irrigation District, or other authority having jurisdiction. Details and dimensions of construction shall conform to the standard details shown in the plans or referred to in these specifications. Workmanship and installation shall comply with applicable sections of Division I, Trench Excavation, Bedding and Backfill for shoring, sheeting, bracing, compaction equipment, concrete backfill, blasting, settlement, and repair of damage.

Work shall be completed and ready for use in a schedule to allow uninterrupted function and operation of the canal.

#### **515.3.02 CONCRETE STRUCTURES**

Concrete structures shall be constructed on prepared foundations and conform to the dimensions shown and indicated on the drawings. Reinforcing steel shall be placed as indicated on the plans or approved shop drawings, and inspected and approved by the Engineer prior to concrete placement.

Concrete mix design shall be as specified and approved by the Engineer or Authority having jurisdiction over the canal.

### **515.3.03 EMBANKMENTS**

Riprap embankments shall be formed to match the existing canal banks as determined by the Central Oregon Irrigation District. Compact all subgrade materials supporting structures and all backfill and embankment materials to 95 per cent of maximum density at optimum moisture content as determined by ASTM D 698.

### **515.3.04 UNCLASSIFIED EXCAVATION**

**515.3.04A** The Contractor shall complete all excavations for structures and structure footings to the lines and grades or elevations shown on the plans, or as staked by the Engineer. The excavation shall be of sufficient size to permit the full width and length of the bottoms of footings, and shall be considered as approximate only. The Engineer may order, in writing, changes in dimensions or elevations of footings necessary to secure a satisfactory foundation.

Boulders, logs, saturated silt, and other objectionable materials encountered in the excavation shall be removed and disposed of in a manner satisfactory to the Engineer. All rock or other hard foundation material shall be cleaned of all loose material, including disintegrated rock and thin strata, and cut to a firm surface, either level or stepped as directed by the Engineer. All seams and crevices shall be cleaned out and grouted. When concrete is to be placed on a surface other than solid rock, special care shall be taken not to disturb the bottom of the excavation, and final grade shall not be cut until immediately prior to reinforcement and concrete placement.

**515.3.04B** The Contractor shall install and construct all bracing, shoring or sheeting necessary to protect the excavation and structure as required for safety and conformance to governing laws and regulations. Unless otherwise provided or approved by the Engineer, all bracing, shoring and sheeting used for the construction shall be removed by the Contractor after completion of the structure and before backfilling.

**515.3.04C** The Contractor shall notify the Engineer when each excavation is completed to the depths and dimensions specified or directed by the Engineer to determine the character of the foundation materials. Reinforcing steel and concrete may only be placed after the Engineer has inspected and accepted the foundation.

### **515.4.00 MEASUREMENT AND PAYMENT**

#### **515.4.01 CANAL CROSSING**

Canal Crossings shall be measured on a Lump Sum basis to the limits and dimensions shown on the standard detail, or as shown on the plans. No separate measurement will be made for excavation, reinforcement, concrete, or other materials necessary to construct the canal crossing complete and in place, except where the depth or width of the structure exceeds the standard detail by more than 20 per cent.

#### **515.4.02 PAYMENT**

Payment shall be made on a Lump Sum basis as stated in the Bid Schedule. Payment shall be compensation for all materials, including the utility pipeline and appurtenances, labor, equipment, tools, and incidentals necessary to construct the work complete in place.