

# **TECHNICAL REQUIREMENTS**

## **DIVISION V**

### **STRUCTURES**

Standard Construction Specifications  
City of Corvallis, Oregon

# **TECHNICAL/REQUIREMENTS**

## **DIVISION V - STRUCTURES**

### **V.1 SLOPE PROTECTION**

#### **V.1.A.00 DESCRIPTION/SCOPE**

This section covers work necessary for slope paving, placing riprap as slope protection, and/or other methods of slope protection as hereinafter specified.

#### **V.1.B.00 DEFINITIONS**

##### **V.1.B.01 SLOPE PAVING**

Slope paving shall consist of precast cement concrete blocks, poured portland cement concrete, pneumatically placed portland cement concrete, or asphaltic concrete paving, constructed on prepared slopes.

##### **V.1.B.02 RIPRAP**

Riprap shall consist of broken stone, wire enclosed stone, grouted stone, or sacked concrete, constructed on prepared slopes, filter blankets, or other places, as specified.

##### **V.1.B.03 WIRE ENCLOSED STONE (GABION)**

Wire enclosed stone shall consist of rectangular compartments of wire mesh material filled with stones.

##### **V.1.B.04 FILTER BLANKET**

Filter blankets shall consist of one or more layers of graded material placed on a prepared slope prior to placing the riprap thereon to prevent underlying material from passing through the riprap.

#### **V.1.C.00 MATERIALS**

##### **V.1.C.01 PAVING BLOCKS**

Precast cement concrete blocks shall conform to ASTM C90 for hollow block and C145 for solid block, Grade N II. Blocks may be manufactured with integral spacer devices that will provide required 1/2" mortar joint.

##### **V.1.C.02 PORTLAND CEMENT CONCRETE**

Portland cement concrete materials shall conform to the requirements of Section

## II.5.C.00, MATERIALS.

### V.1.C.03 ASPHALTIC CONCRETE

Asphaltic concrete materials shall conform to the requirements of Section II.4.C.00, MATERIALS.

### V.1.C.04 RIPRAP PROTECTION

Riprap will conform to the provisions of *Oregon Standard Specifications for Construction, Section 00390, Riprap Protection.*

### V.1.C.05 WIRE ENCLOSED STONE

#### V.1.C.05.1 STONE

Wire enclosed stone shall be hard, durable, crushed, quarried, or natural stone having an apparent specific gravity of not less than 2.4. The absorption shall not exceed 4%, unless otherwise specified. The stone shall be free of weak laminations and cleavages and shall be of a quality that will not disintegrate on exposure to water or weathering. For wire enclosed stone aggregate, round or angular stones shall be used and not less than 95% of the stone shall be retained on a screen or wire having 2" square openings.

#### V.1.C.05.2 WIRE

Wire mesh fabric, high tensile steel fasteners and lacing wire shall conform to the provisions of *Oregon Standard Specifications for Construction, Section 00398.14, Wire Mesh Materials.*

### V.1.C.06 GROUT

Grout shall consist of one part portland cement and three parts clean, well-graded sand which will pass a 1/8" screen, thoroughly mixed with water to produce a thick, creamy consistency.

### V.1.C.07 FILTER BLANKET

Filter blanket material shall be composed of tough, durable particles of gravel or rock of a thickness and gradation designated. Filter blanket material shall conform with the provisions of *Oregon Standard Specifications for Construction, Section 00390.13, Filter Blanket.* The particles shall be reasonably free from thin, flat, and elongated pieces, and containing no organic matter nor soft, friable particles in excess of those approved by the Engineer.

## V.1.D.00 CONSTRUCTION

### V.1.D.01 PREPARATION

Preparation shall include removal of brush, trees, stumps and other organic material from slopes to be protected by riprap and dress to a smooth surface. Remove all unsuitable material to the depth shown or directed and replace with approved material. Compact filled areas as specified in Section II.1, Earthwork.

Provide riprap protection as early as the structure foundation construction permits. Prepare the surfaces to be protected as shown. Maintain the trench slopes, riprap geotextile or filter blanket until the riprap is placed.

Where unsuitable material exists, it shall be removed to a depth as specified or as directed by the Engineer and replaced with material as approved by the Engineer and compacted to a density as directed.

#### V.1.D.02 PAVING BLOCKS

Paving blocks shall be placed in such a manner that they rest firmly and evenly against the slope. The blocks shall be placed in horizontal parallel courses and successive courses shall break joints with the preceding course to form a running bond. Joints between blocks shall be neatly grouted.

#### V.1.D.03 POURED PORTLAND CEMENT CONCRETE

Portland cement concrete shall be placed in such a manner so as to form a dense, impervious, and uniform surface. Unless otherwise specified, the thickness shall be a minimum of 4" and the concrete shall develop a 28-day minimum compressive strength of 3000 psi.

When reinforcement is required, wire mesh shall be utilized. The wire mesh shall lap a minimum of one mesh spacing with the laps fastened securely at the ends. The wire mesh reinforcement shall be placed to provide a minimum of 1 1/4" of concrete cover. Curing and testing operations shall conform to the applicable sections of Section II.5, PORTLAND CEMENT CONCRETE (PCC) PAVEMENT.

#### V.1.D.04 PNEUMATICALLY PLACED PORTLAND CEMENT CONCRETE

Before placement of any portion of pneumatically placed concrete, the Contractor shall obtain the Engineer's approval as to the type of equipment and method of operation to be used.

Where reinforcement is required, it shall conform with the requirements of Section V.1.D.03, POURED PORTLAND CEMENT CONCRETE.

#### V.1.D.05 ASPHALTIC CONCRETE SLOPE PAVING

A prime coat shall be applied to the prepared slope surface prior to paving with the hot asphaltic concrete mix, the class as specified. The asphaltic concrete shall be placed and compacted on the slope in such a manner so as to form a compact, dense, and impervious

pavement with a uniform plane surface. The thickness of the slope paving shall be as specified. After each lift of asphaltic concrete has been spread, struck off, and surface defects and other irregularities remedied, the mix shall be thoroughly and uniformly compacted in conformance with Section II.4.D.10, COMPACTION AND DENSITY.

#### V.1.D.06 RIPRAP PROTECTION

Riprap construction will conform with provisions of *Oregon Standard Specifications for Construction, Section, Section 00390, Riprap Protection.*

#### V.1.D.07 WIRE ENCLOSED STONE

Wire enclosure segments shall be hand or machine formed to the dimensions as specified. The enclosures shall be placed, laced, and filled to provide a uniform, dense, protective coating, shaped and located as approved by the Engineer.

Each wire enclosure shall be tied to adjoining wire enclosures along all contacting edges at intervals of 6". Where manufacturer's enclosures are specified or used, installation shall conform to the manufacturer's specifications unless otherwise specified.

#### V.1.D.8 FILTER BLANKET

When specified, a filter blanket shall be placed on a prepared area to the full thickness of each layer in one operation, using methods which will not cause segregation of particle sizes within the layer. The surface of the finished layer shall be reasonably even and free from mounds or irregularities.

### V.1.E.00 TESTING

### V.1.F.00 MEASUREMENT AND PAYMENT

#### V.1.F.01 MEASUREMENT

##### V.1.F.01.1 MEASUREMENT BY SQUARE YARD

As listed herein in Section V.1.F.02, PAYMENT, and as specified, quantities for slope protection will be measured on a square yard basis in place. The measurement will be based upon the top surface length and width, up to the specified length and width, of the slope protection measured to the nearest 0.1 feet and the area measured to the nearest square yard.

##### V.1.F.01.2 MEASUREMENT BY CUBIC YARD

As listed herein in Section V.1.F.02, PAYMENT, and as specified, quantities for slope protection will be measured on a cubic yard basis. The measurement will be based on a cross section of properly placed protection in place on the designated areas and to the lines and grades as specified to the nearest 0.1 feet and the volume measured to the nearest cubic

yard.

#### V.1.F.01.3 MEASUREMENT BY TON

As listed herein in Section V.1.F.02, PAYMENT, and as specified, quantities for slope protection will be measured on a ton basis, to the nearest 0.1-ton, up to the specified amount of slope protection. Material receipts showing certified scale weights will be required from the Contractor.

#### V.1.F.02 PAYMENT

##### V.1.F.02.1 GENERAL

Payment for the following listed items which may appear in the bid Proposal and for other bid items which may become applicable to slope protection performed on the contract work under Section V.1, SLOPE PROTECTION, by reason of Special Provisions, shall be understood to comprise full and complete compensation for all labor, equipment, tools, materials, and incidentals necessary for all of the contract work as specified under or covered by this Section.

When neither specified or listed in the Proposal for separate payment, any and all work specified for performance under or covered by this Section will be considered as incidental work for which no separate payment will be made.

##### V.1.F.02.2 PAYMENT ON LUMP SUM BASIS

When shown in the proposal, payment will be made on a lump sum basis and this payment will include full compensation for all work and materials necessary for slope protection within the limits shown and as specified.

V.1.F.02.3 PAY ITEMS

Pay Item	Unit of Measure	Accuracy of Measure
Paving Block Slope Protection	Square Yards	1.0
Poured Portland Cement Concrete Slope Protection	Square Yards	1.0
Pneumatically Placed Portland Cement Concrete Slope Protection	Square Yards	1.0
Asphaltic Concrete Slope Protection	Square Yards Tons	1.0 0.1
Riprap Protection	Square Yards Cubic Yards Tons	1.0 1.0 0.1
Wire Enclosed Stone	Square Yards	1.0
Filter Blanket	Square Yards	1.0

**V.2 SURVEY MONUMENTS AND CONTROL**

**V.2.A.00 DESCRIPTION/SCOPE**

This section covers work necessary for the installation of survey monument structures, benchmarks, and other survey control as specified hereinafter.

**V.2.B.00 DEFINITIONS**

V2.B.01 PROFESSIONAL LAND SURVEYOR (PLS)

Responsible professional in charge of installation of survey monuments, and filing surveys with Benton County. The PLS shall communicate all duties charged to their responsibility with the Engineer.

V.2.B.02 SURVEY MONUMENT

An object of durable nature that will not be affected by the normal surrounding activity. All iron rods shall have an aluminum cap and be set by a licensed surveyor after

substantial completion of construction per ORS 209.150. Includes other objects as described by legal document filed with Benton County to establish public or private boundary. Monuments include benchmarks and control points.

Monuments not identified for demolition that become disturbed or removed by the Contractor shall be re-established by a PLS at no additional cost to the City.

#### V.2.B.03 SURVEY MONUMENT BOX

##### V.2.B.03.1 TYPE I/TYPE II

Protective box installed over a survey monument located in new street construction with a PCC encasement required. Refer to Std. Dtl 520.

##### V.2.B.03.2 TYPE III/TYPE IV

Protective box installed over a survey monument located in street scheduled for resurfacing as opposed to full street reconstruction. PCC encasement required as directed by the Engineer. Refer to Std. Dtl 520.

##### V.2.B.03.3 TYPE VI

A protective box installed over an existing valve box and survey monument. Refer to Std. Dtl. 521.

##### V.2.B.03.4 TYPE VII

A protective box installed over a survey monument located within sidewalk or other PCC pads. Refer to Std. Dtl. 522.

#### V.2.B.04 VERTICAL CONTROL

A City, County, State or Federal monument used to establish vertical control. Extreme care shall be taken to preserve these structures.

#### V.2.B.05 HORIZONTAL CONTROL POINTS

A City, County, State or Federal monument used to establish horizontal control. Extreme care shall be taken to preserve these structures.

#### V.2.B.06 SEALANT

A waterproofing material used to prohibit infiltration of surface water around a Type V survey monumentation.

### V.2.C.00 MATERIALS

#### V.2.C.01 SURVEY MONUMENT

5/8" x 30" iron rod with an aluminum cap and plastic insert  
Surv-Kap®  
Berntsen®  
Or approved equal

#### V.2.C.02 SURVEY MONUMENT BOXES

Type I, II, III, and IV boxes shall be Olympic Foundry Inc., Part No. M1001, or approved equal.

Type VI box shall be Olympic Foundry Inc., Part No. M1035, or approved equal.

Type VII box shall be Olympic Foundry Inc., Part No. M1016, or approved equal.

#### V.2.C.03 VERTICAL CONTROL

Domed Brass/Bronze Cast Marker (lead-free)  
Surv-Kap®  
Berntsen®  
Or approved equal

Temporary benchmarks shall consist of materials not to be confused with materials used for permanent benchmarks.

#### V.2.C.04 HORIZONTAL CONTROL POINTS

Center Marked Brass/Bronze Cast Marker (lead-free)  
Surv-Kap®  
Berntsen®  
Or approved equal

Temporary control points shall consist of materials not to be confused with materials used for permanent horizontal control.

#### V.2.C.05 SEALANT

Survey monument sealant shall be the same as used for traffic detection loop sealant in accordance with Section II.10.C.09 TRAFFIC SIGNAL INDICATOR MATERIAL, MOUNTING HARDWARE, HEADS, AND DETECTION DEVICES.

### V.2.D.00 CONSTRUCTION

#### V.2.D.01 SURVEY MONUMENT BOX

#### V.2.D.01.1 TYPE I, II, III, IV, VI, and VII

Installation shall follow final lift of asphalt. Street saw cut lines shall be marked by an Oregon licensed PLS. All saw cutting and spoils shall be removed by the Contractor.

The PLS shall stake the location for the center of the monument box prior to the Contractor's installation of the monument box and PCC encasement to finish grade. Following the installation of the monument box and PCC encasement, the PLS shall set, and check the position of the monument for correct location prior to filing the record of survey per ORS 209.250.

The PCC encasement shall be oriented as a diamond to the flow of traffic. Requirements for PCC shall be in accordance with Section II.5 PORTLAND CEMENT CONCRETE (PCC) PAVEMENT.

The crushed aggregate placed prior to setting of the monument box shall be hand-tamped to provide an even rock base for the box to sit upon.

Washed sand shall be placed around the monument inside of the monument box to a point ½ inch from the bottom of the aluminum cap.

#### V.2.D.01.2 TYPE V

All iron rods installed by the PLS without the use of a monument box shall be set ¼ inch below the finish grade, or flush with the surface. Sealant shall be placed around the aluminum cap to prevent surface water infiltration from the street surface to the base structure of the street. Sealant shall be installed per manufacturer's recommendations.

Monuments shall be set after substantial completion of construction. Refer to Standard Details 510, 511, 512 and 513.

#### V.2.D.02 CONTROL POINTS

Establishment of the vertical and/or horizontal control shall be conducted by the PLS and provided to the City. Provide all Benton County recorded documents to the City.

#### V.2.D.02.1 BENCHMARK - VERTICAL CONTROL

Locations for benchmarks shall be pre-approved by the Engineer.

For benchmarks installed within freshly poured PCC, Contractor shall notify the Engineer prior to the pour. Engineer will coordinate placement of the benchmark with the PLS. The benchmark shall be installed in such a way as to allow for a survey rod to contact the benchmark without interference from the adjacent PCC and monument box.

#### V.2.D.02.2 HORIZONTAL CONTROL POINT

Locations for control points shall be pre-approved by the Engineer.

#### V.2.D.03 TOLERANCES – DRAFT DELIVERABLES.

#### V.2.E.00 TESTING

PCC testing shall be in accordance with the requirements of Section II.5.E.00, TESTING.

Acceptance of hand-tamped aggregate base associated with monument box installations shall be visually approved by the Engineer.

Communication With the Surveyor - The Engineer has the right to communicate directly with the surveyor.

All survey maps and legal descriptions required for filing with Benton County shall be submitted first to the Engineer for review.

#### V.2.F.00 MEASUREMENT AND PAYMENT

##### V.2.F.01 MEASUREMENT

All measurement for monument box, monument, benchmark and control point installations shall be lump sum unless otherwise identified by the Bid Proposal. Measurement for all non lump sum bid items pertaining to the items listed above shall apply to the following sub-sections below. When the PLS is not a representative of the City, all work associated with the setting of the monumentation and filing of the required records with Benton County shall be the sole responsibility of the Contractor.

##### V.2.F.01.1 SURVEY MONUMENT BOX

Measurement and payment based on a per each basis shall include all materials and labor associated with the installation as specified within these standard specifications and details. When the PLS is not a representative of the City, all work associated with the setting of the monumentation and filing of the required records with Benton County shall be the sole responsibility of the Contractor.

##### V.2.F.02 PAYMENT

##### V.2.F.02.1 GENERAL

Payment for the following listed items which may appear in the bid Proposal and other bid items which may become applicable to pavement marking installations performed on the contract work under Section V.2, SURVEY MONUMENTS AND CONTROL, by reason of Special Provisions, shall be understood to comprise full and complete compensation for all labor, equipment, tools, materials, and incidentals necessary for all of the contract work

as specified under or covered by this Section.

When neither specified or listed in the Proposal for separate payment, any and all work specified for performance under or covered by this Section will be considered as incidental work for which no separate payment will be made.

Pay Item	Unit of Measure	Accuracy of Measure
Survey Monument Box	LS	1.0
Survey Monument Box	EA	1.0
Survey Monument	LS	1.0
Benchmark – Vertical Control	LS	1.0
Horizontal Control Point	LS	1.0

### **V.3 BICYCLE STRUCTURES**

#### **V.3.A.00 DESCRIPTION/SCOPE**

This section covers work necessary for the installation of bicycle racks and shelters as specified hereinafter.

#### **V.3.B.00 DEFINITIONS**

##### **V.3.B.01 DEVELOPMENT SERVICES DIVISION**

The City’s governing authority for all structural building permits as applies to all covered bicycle shelter designs. Permitting and inspection for bicycle shelters shall be conducted through this City Division.

#### **V.3.C.00 MATERIALS**

##### **V.3.C.01 BIKE RACK**

Contractor shall submit shop drawings for approval prior to fabrication. Shop drawings shall specify geometry, materials, hardware and finish in accordance with Std. Detail 503.

##### **V.3.C.02 BIKE SHELTER**

Contractor shall submit shop drawings for approval prior to fabrication. Shop drawings shall specify geometry, materials, hardware and finish in accordance with Std. Detail 503A and approved structural permit issued by the City’s Development Services Division.

**V.3.D.00 CONSTRUCTION**

Contractor shall prepare all base and bearing surfaces in accordance with the various sections of the Standards. Concrete surfaces either existing or newly constructed shall be adequately prepared and/or cured to receive mounting hardware associated with bike rack installations.

Construction of bicycle shelter footings, steel members and roofing shall meet the requirements as specified in the Plans and any special provisions as required by the associated building permit.

**V.3.E.00 TESTING**

Contractor shall facilitate all special inspections for installation of bike shelters to satisfy building permit requirements, including by not limited to the following;

- PCC compressive strength testing
- Structural welding
- Finish

**V.3.F.00 PAYMENT**

**V.3.F.01 GENERAL**

Payment for the following listed items which may appear in the bid Proposal and other bid items which may become applicable to pavement marking installations performed on the contract work under Section V.3, BICYLCE STRUCTURES, by reason of Special Provisions, shall be understood to comprise full and complete compensation for all labor, equipment, tools, materials, and incidentals necessary for all of the contract work as specified under or covered by this Section.

When neither specified or listed in the Proposal for separate payment, any and all work specified for performance under or covered by this Section will be considered as incidental work for which no separate payment will be made.

Pay Item	Unit of Measure	Accuracy of Measure
Bicycle Rack	EA	1.0
Bicycle Structure	LS	1.0