

5. When trenches are not to be placed under sidewalks or driveways, the backfill shall match the elevation of the surrounding ground, including a matching depth of top soil, mulch, and/or sod if necessary to restore the trench area to its prior condition.
6. Contractor shall use joint trench where possible.

Backfill shall be carefully placed so that the backfilling operation will not disturb the conduit in any way. The backfill shall be thoroughly mechanically tamped in eight-inch (8") layers with each layer compacted to ninety-five percent (95%) of maximum density in traveled ways, and ninety percent (90%) of maximum density elsewhere at optimum soil moisture content.

Bank run gravel for backfill shall conform to Section 2.01 of the Standard Specifications. Bedding material shall conform to Section 2.01 of the Standard Specifications.

All trenches shall be properly signed and/or barricaded to prevent injury to the public. All traffic control devices to be installed or maintained in accordance with Part VI of the Manual on Uniform Traffic Control Devices for Streets and Highways, latest edition, and as specified elsewhere in these Specifications.

All conduits installed by boring shall use a surface launched steerable drilling tool. Drilling shall be accomplished using a high-pressure fluid jet toolhead. The drilling fluid shall be used to maintain the stability of the tunnel, reduce drag on the conduit, and provide backfill between the conduit and tunnel. A guidance system which measures the depth, lateral position, and roll shall be used to guide the toolhead when creating the pilot hole. Once the pilot hold is established, a reamer and swivel shall be used to install the conduit. Reaming diameter shall not exceed 1.5 times the diameter of the conduit being installed. Conduit which is being pulled into the tunnel shall be protected and supported so that it moves freely and is not damaged during installation. Excess drilling fluid and spoils shall be disposed of off-site at a legal disposal site obtained and paid for by the Contractor. Drilling fluid returns (caused by fracturing of formation) at locations other than the entry and exit points shall be minimized. Any drilling fluid that surfaces through fracturing shall be cleaned up immediately. Mobile spoils removal equipment capable of quickly removing spoils from entry or exit pits and areas with returns caused by fracturing shall be used as necessary during drilling operations.

### **8-20.3(4) Foundations**

Section 8-20.3(4) is supplemented with the following:

Foundations for the Pedestrian Push Button (PPB) Poles shall conform to the detail on the Plans.

Pole foundations within the sidewalk area shall be constructed in a single pour to the bottom of the cement concrete sidewalk. The sidewalk shall be constructed in a separate pour.

Pole foundations not within the sidewalk area shall incorporate a 3-foot by 3-foot by 4-inch thickness cement concrete pad set flush with the adjacent ground. Where the pad abuts a

sidewalk, the pad shall extend to the sidewalk and the top of the pad shall be flush with the sidewalk. A construction joint shall be provided between the two units.

### **8-20.3(5) Conduit**

Section 8-20.3(5) is supplemented with the following:

*(March 16, 2011 \*\*\*\*\*)*

All conduits for signal cable, illumination circuits, and interconnect systems under roadways and driveways shall be rigid galvanized steel or Schedule 80 polyvinyl chloride (PVC). Schedule 40 PVC may be used when not under the roadway or driveways.

All conduits shall have a minimum buried depth of twenty-four inches (24"). PVC conduit ends shall have bell end PVC bushings.

All conduits for signal cable raceways under roadways or driveways shall be rigid galvanized steel or Schedule 80 polyvinyl chloride (PVC). Rigid steel or Schedule 80 PVC conduit shall be used for all road crossings whether they are signal, detector or illumination cable. Schedule 40 PVC conduits may be used for detector lead-ins or illumination. Whenever PVC conduit is used a ground wire shall be provided.

All conduit trenches shall be straight and as narrow in width as is practical to provide a minimum of pavement disturbance.

When conduit risers are installed, they shall be attached to the pole every 4 feet and shall be equipped with weather heads.

Conduit for the service wires between the Puget Sound Energy pole and the service panel and all above ground conduit shall be hot-dip galvanized rigid steel.

All conduits shall be clearly labeled at each junction box, handhole, vault or other utility appurtenance. Labeling shall be permanent and shall consist of the owner/type name and a unique conduit number or color. The owner name shall be approved by the Engineer prior to starting work. The recommended owner/type abbreviations are:

PSE – Puget Sound Energy  
QWEST – Qwest  
COMCAST(AT&T)/C – Cable  
COMCAST(AT&T)/F – Fiber  
SIC – City Signal Interconnect  
City Spare – City spares  
Cobra – COBRA luminaire system

Section 8-20.3(5) is supplemented with the following:

*(August 10, 2009 WSDOT NWR)*

### **Conduit Seal, Detectable Tape and Location Wire**

Upon installation of wiring, all conduits entering pad mounted cabinets, all conduit entering ITS hubs, and all ITS conduit 2 inches in diameter or larger shall be sealed with an

approved mechanical plug at both ends of the conduit run. Installation of mechanical plugs shall conform to the manufacturer's recommendations. Upon installation of wiring at other locations, conduit shall be sealed with duct seal. Upon installation of the pull string, spare conduit shall be plugged.

A pull string rated for 200 lbs. or greater shall be installed in all spare conduits.

Detectable underground warning tape shall be placed 12-inches above all innerduct installed in trenches.

Location 14 AWG stranded orange USE insulated wire shall be placed in conjunction with all innerduct installed in trenches. The location wire shall be placed directly above the conduit containing innerduct in single conduit installations or between the conduits containing innerduct in multiple conduit installations.

Location wire routed into pull boxes or cable vaults shall be attached to the "C" channel or the cover hinge bracket with stainless steel bolts and straps. A 1-foot loop of locate wire shall be provided above the channel as shown in the Plans.

*(October 16, 2006 WSDOT NWR)*

### **Boring**

In addition to the requirements for boring with casing, the Contractor shall submit to the Engineer for approval a pit plan and a proposed method of boring that includes, but is not limited to, the following:

- 1) A pit plan depicting:
  - a) Protection of traffic and pedestrians.
  - b) The dimension of the pit.
  - c) Shoring, bracing, struts, walers or sheet piles.
  - d) Type of casing.
  
- 2) The proposed method of boring, including:
  - a) The boring system.
  - b) The support system.
  - c) The support system under and at the bottom of the pit.

The shoring and boring pit plan shall be prepared by and bear the seal and signature of a Washington State licensed Professional Civil Engineer.

Installed casing pipe shall be free from grease, dirt, rust, moisture and any other deleterious contaminants.

Commercial concrete meeting the requirements of Section 6-02.3(2)B may be used to seal the casing.

### **8-20.3(6) Junction Boxes, Cable Vaults, and Pull Boxes**

Section 8-20.3(6) is supplemented with the following:

*(March 13, 2012 \*\*\*\*\*)*

Unless otherwise noted in the Plans or approved by the Engineer, junction boxes, cable vaults and pull boxes shall not be placed within the traveled way or shoulders.

All junction boxes, cable vaults, and pull boxes placed within the traveled way or paved shoulders shall be heavy-duty.

Junction boxes shall not be located within the traveled way, wheelchair ramps, or driveways, or interfere with any other previous or relocated installation. The lid of the junction box shall be flush with the surrounding area and be adequately supported by abutting pavements or soils.

Junction boxes, cable vaults and pull boxes which are placed within the sidewalk shall have slip resistant lids which meet the requirements of Americans with Disabilities Act (ADA) and Public Right-of-Way Accessibility Guideline (PROWAG). Approved products are:

- 1.) Mebac1 (their most aggressive surface) manufactured by IKG Industries
- 2.) SlipNOT Grade 3-coarse manufactured by W.S. Molnar Company.

Approved slip resistant surfaces shall have coefficient of friction of no less than 0.6 and have a proven track record of outdoor application which lasts for at least 10 years.

Wiring shall not be pulled into any conduit until all associated junction boxes have been adjusted to, or installed in, their final grade and location, unless installation is necessary to maintain system operation. If wire is installed for this reason, sufficient slack shall be left to allow for future adjustment.

Adjustments involving raising or lowering the junction boxes shall require conduit modification if the resultant clearance between top of conduit and the junction box lid becomes less than 6 inches or more than 10 inches. Wiring shall be replaced for full length if sufficient slack as specified in Section 8-20.3(8) is not maintained. No splicing will be permitted.

Junction boxes Type 1 and 2 shall meet the requirements of WSDOT Standard Plan J-40.10-01. Type 8 junction boxes shall meet the requirements of WSDOT Standard Plan J-40.30-01. Junction boxes shall be inscribed based upon system per WSDOT Standard Plan J-40.30.01. Junction box lids and frames shall be grounded per Section 8-20.3(9).

Junction boxes shall be located at the station and offset indicated in the Plans except that field adjustments may be made at the time of construction by the Engineer to better fit existing field conditions.

Junction boxes for copper and/or fiber signal interconnect shall be placed at a maximum interval of 300 feet and shall be inscribed with "TS" as described on WSDOT Standard Plan J-40.30-01.

Heavy-duty Type 4, 5 and 6 junction boxes, cable vaults and pull boxes shall be installed in accordance with the following:

1. Excavation and backfill shall be in accordance with Section 2-09. Excavation for junction boxes, cable vaults and pull boxes shall be sufficient to leave one foot in the clear between their outer surface and the earth bank.
2. Junction boxes, cable vaults and pull boxes shall be installed on a level 6-inch layer of crushed surfacing top course, in accordance with 9-03.9(3), placed on a compacted or undisturbed foundation. The crushed surfacing shall be compacted in accordance with Section 2-09.3(1)E.
3. After installation, the lid/cover shall be kept bolted down during periods when work is not actively in progress at the junction box, cable vault or pull box.
4. Before closing the lid/cover, the lid/cover and the frame/ring shall be thoroughly brushed and cleaned of all debris. There shall be absolutely no visible dirt, sand or other foreign matter between the bearing surfaces.
5. When the lid/cover is closed for the final time, a liberal coating of anti37 seize compound shall be applied to the bolts and nuts and the lid shall be securely tightened.
6. Hinges on the Type 4, 5, and 6 junction boxes shall be located on the side of the box, which is nearest to adjacent shoulder. Hinges shall allow the lid to open 180 degrees.

### **8-20.3(8) Wiring**

Section 8-20.3(8) is modified as follows:

(March 6, 2012 \*\*\*\*\*)

The following is inserted between the 3<sup>rd</sup> and 4<sup>th</sup> paragraph of this section:

Loop wires will be spliced to lead in wires at the junction box with an approved mastik tape, 3-M 06147 or equal, leaving 3 feet of loose wire.

Connectors will be copper and sized for the wire. Mastik splice material will be centered on the wire and folded up around both sides and joined at the top. Splice will then be worked from the center outward to the ends. The ends will be visible and fully sealed around the wire. The end of the lead-in cables shall have the sheathing removed 8 inches and shall be dressed external to the splice.

(March 6, 2012 \*\*\*\*\*)

The 8th paragraph of this section is deleted and replaced with the following:

Fused quick disconnect kits shall be of the SEC type or equivalent. Underground illumination splices shall be epoxy or underground service buss/lighting connector kits. Installation shall conform to details in the Standard Plans.

Section 8-20.3(8) is supplemented with the following:

(March 6, 2012 \*\*\*\*\*)

Cable entering cabinets shall be neatly bundled and wrapped. Each wire shall bear the circuit number and be thoroughly tested before being connected to the appropriate terminal.

Circuit conductors shall be standard copper wire in all conduit runs with size specified in the Plans. Conductors from luminaire bases to the luminaire fixture shall be minimum No. 14 AWG pole and bracket cable.

Section 8-20.3(8) is supplemented with the following:

(March 13, 1995 WSDOT NWR)

**Wire Splices**

All splices shall be made in the presence of the Engineer.

**8-20.3(9) Bonding and Grounding**

Section 8-20.3(9) is supplemented with the following:

*(March 13, 2012 \*\*\*\*\*)*

At points where shields of shielded conductors are grounded, the shields shall be neatly wired and terminated on suitable grounding lugs.

Junction box lids and frames shall be grounded in accordance with Department of Labor and Industries standards, and shall be grounded so that the ground will not break when the lid is removed and laid on the ground next to the junction box.

All conduits which are not galvanized steel shall have bonding wires between junction boxes.

Ground rods shall be copper clad steel, ¾-inch in diameter by 10-feet long, connections shall be made with termite welds.

At points where wiring shields of shielded conductors are grounded, the shields shall be neatly wired and terminated on suitable grounding lugs.

Section 8-20.3(9) is supplemented with the following:

*(August 21, 2006 WSDOT NWR)*

**Junction Box Grounding**

Where shown in the Plans or where designated by the Engineer, the metal frame and lid of existing junction boxes shall be grounded to the existing equipment grounding system. The existing equipment grounding system shall be derived from the service serving the raceway system of which the existing junction box is a part.

**8-20.3(14)C Induction Loop Vehicle Detectors**

Section 8-20.3(14)C is modified as follows:

(December 18, 2009 \*\*\*\*\*)

Items 2 and the last two sentences of Item 4 are deleted.

(December 18, 2009 \*\*\*\*\*)

Item no. 5 of this section is deleted and replaced with the following:

5. Each loop shall have 3 turns of loop wire.

(December 18, 2009 \*\*\*\*\*)

Item no. 11 of this section is deleted and replaced with the following:

11. The detector loop sealant shall be a flexible traffic loop wire encapsulment. Encapsulment shall be designed to enable vehicular traffic to pass over the properly filled sawcut within five minutes after installation without cracking of material. The encapsulment shall form a surface skin allowing exposure to vehicular traffic within 30 minutes at 75 degrees F. and completely cure to a tough rubber-like consistency within two to seven days after installation. Properly installed and cured encapsulment shall exhibit resistance to defects of weather, vehicle abrasion, motor oil, gasoline, antifreeze solutions, brake fluid, deicing chemicals and salt normally encountered in such a manner that the performance of the vehicle detector loop wire is not adversely affected.

Section 8-20.3(14)C is supplemented with the following:

(January 31, 2012 \*\*\*\*\*)

One-quarter-inch (1/4") saw cuts shall be cleared of debris with compressed air before installing three turns of loop wire. All detector loops shall be 6-foot-diameter circle with diagonal mini-cut corners (no 90 degree corners) of not more than 1-inch on the diagonal. From the loops to the junction box, the loop wires shall be twisted two turns per foot and labeled at the junction box in accordance with the loop schematics included in these Plans. A 3/8-inch saw cut will be required for the twisted pair. No saw cut will be within 3 feet of any manhole or utility risers located in the street. Loops and lead-ins will not be installed in broken or fractured pavement. Where such pavement exists it will be replaced in kind with minimum 12-foot sections. Loops will also not be sawed across transverse joints in the road. Loops to be placed in concrete will be located in full panels, a minimum 18 inches from any expansion joint.

### **Existing Traffic Loops**

The Contractor shall notify the City of Federal Way Traffic Engineer a minimum of five working days in advance of pavement removal in the loop areas.

If the Engineer suspects that damage to any loop, not identified in the Plans as being replaced, may have resulted from Contractor's operations, the Engineer may order the Contractor to perform the field tests specified in Section 8 20.3(14)D. The test results shall be recorded and submitted to the Engineer. Loops that fail any of these tests shall be replaced.

Loops that fail the tests, as described above, and are replaced shall be installed in accordance with current City of Federal Way design standards and Standard Plans, as determined by the Engineer.

If traffic signal loops that fail the tests, as described above, are not replaced and operational within 48 hours, the Contractor shall install and maintain interim video

detection until the replacement loops are operational. The type of interim video detection furnished shall be approved by the Engineer prior to installation.

### **8-20.3(14)D Test for Induction Loops and Lead-in Cable**

Section 8-20.3(14)D is supplemented with the following:

(March 13, 2012 \*\*\*\*\*)

Test A - The resistance shall not exceed values calculated using the given formula.

Resistance per 1000 ft of 14 AWG,  $R = 3.26 \text{ ohms} / 1000 \text{ ft}$

$$R = \frac{3.26 \times \text{distance of lead-in cable (ft)}}{1000 \text{ ft}}$$

Test B and Test C in this section are deleted and replaced with the following:

Megger readings of the detection wire to ground shall read 200 megohms at the amplifier connection. The 200 megohms or more shall be maintained after the splices are tested by submerging them in detergent water for at least 24 hours. The tests will be conducted with County personnel at the request of the Contractor. All costs incurred to meet this minimum standard will be the responsibility of the Contractor.

Section 8-20.3(14)D is supplemented with the following:

(October 5, 2009 WSDOT NWR)

#### **Existing Lead-in Cable Test**

When new Induction loops are scheduled to be installed and spliced to an existing two-conductor shielded detector lead-in cable, the Contractor shall perform the following:

1. Disconnect the existing detector lead-in cable in the controller cabinet and at the loop splice.
2. Megger test both detector lead-in cable conductors. A resistance reading of less than 100-megohms is considered a failure.
3. Detector lead-in cables that fail the test shall be replaced and then retested.
4. After final testing of the detector lead-in cable, the loop installation shall be completed and the loop system tested according to Tests A, C and D.
5. Connect the detector lead-in cables in the controller cabinet.

(October 5, 2009 WSDOT NWR)

#### **Existing Loop Test**

When two-conductor shielded detector lead-in cable is scheduled to be installed and spliced to an existing loop, the Contractor shall perform the following:

1. Disconnect the existing loop from the detector lead-in splice.
2. Megger test the existing loop wire. A resistance reading of less than 100-megohms is considered a failure.
3. Loops that fail the test shall be replaced and then retested.
4. After the final testing of the loops, the detector lead-in cable installation shall be completed and the loop system tested according to Tests A, C and D.



### **8-20.3(18) Construction Requirements**

Section 8-20.3(18) is supplemented with the following:

#### **Pedestrian Push Buttons**

The Pedestrian Push Button (PPB) system shall consist of the following components:

1. Foundation, including excavation, haul, and forms
2. Pole assembly and hardware
3. Push button assembly
4. Wiring and enclosures

The Contractor shall provide and install accessible pedestrian push buttons as shown on the plans. The position of the pedestrian push buttons shall be aligned parallel to the direction of travel for the crosswalk which the push button is intended to serve; however, final positioning for the optimum effectiveness shall be approved by the Engineer.

Push buttons shall be mounted to the poles by means of stainless steel bolts. All mountings shall be securely fastened as approved by the Engineer. Installation shall be per WSDOT Standard Plan J-20.26-01, J-20.15-03, and J-21.10-04.

Any and all other labor, materials, tools, and equipment necessary to satisfactorily complete the work as defined shall be incidental to "Pedestrian Push Button, Complete."

### **8-20.4 Measurement**

Section 8-20.4 is supplemented with the following:

Measurement for "Pedestrian Push Button" shall be per each and as shown on the Plans and Details. "Complete" includes foundation excavation, construction, acquisition and installation of pole, base and hardware, push-button, and wiring such that the installed unit is fully operational per this specification.

Detector loops of the type and size shown in the plans will be measured per each.

### **8-20.5 Payment**

Section 8-20.5 is supplemented with the following:

"Pedestrian Push Button, Complete", per each.  
"Detector Loop", per each.

The unit contract price for "Detector Loop" shall be full compensation for full and complete installation including wire, sealant and all other labor, materials, tools and equipment required to complete the installation in accordance with the Plans, specifications, and Standard Plans. The unit price shall also include providing and installing loop home runs, conduit stub-outs, and soldered splices. Sawcutting shall be considered incidental to the loop installation. Payment shall not be made for this item until the loop is fully functional as determined by the Engineer.

## **8-21 PERMANENT SIGNING**

### **8-21.1 Description**

Section 8-21.1 is deleted and replaced with the following:

*(April 27, 2015 \*\*\*\*\*)*

This work shall consist of furnishing and installing permanent R9-3A "No Crossing" signing in accordance with the Plans, Specifications, MUTCD, and the City of Federal Way Standard Details at the locations shown in the Plans or where designated by the Engineer.

### **8-21.2 Materials**

Section 8-21.2 is revised as follows:

Sentence three is deleted and replaced with the following:

*(April 28, 2015 \*\*\*\*\*)*

Materials for sign mounting shall conform to Section 9-28-11.

### **8-21.3 Construction Requirements**

#### **8-21.3(1) Location of Signs**

Section 8-21.3(1) is replaced with the following:

Signs are located in the plans by reference to a general stationary monument and shown an estimated distance for installation and placement. No survey stations are provided, but dimensions are shown. These are tentative locations, subject to change by the Engineer, and shall be field verified by the inspector prior to installations. Timber posts and break away pole lengths shall be per the plan details. Sign heights shall be per the plan details.

#### **8-21.3(12) Steel Sign Posts**

Section 8-21.3(12) is supplemented with the following:

Poles for "R9-3A Signs, Poles and Bases" shall be per Division 9.

### **8-21.4 Measurement**

Section 8-21.4 is supplemented by the following:

Measurement for R9-3A Sign and Post, Poles and Bases shall be as follows:

All signage to include R9-3A Sign and Post shall be measured per each meeting all the requirements of these special provisions. Measurement will be for the sum total of all items including labor, materials, tools, and equipment necessary to furnish and install the complete assembly per the plans and details.

Sign Removal and or Relocations shall be measured per each. Measurement will be for the sum total of all items including labor, materials, tools and equipment necessary to remove existing signs, posts and any bases and re-use, return to the owner signage, and dispose of posts and any bases as noted in the Plans.

## **8-21.5 Payment**

Section 8-21.5 is supplemented with the following:

Payment will also be made under the following:

"R9-3A Sign and Post", per each.

The bid prices in the Proposal will be full compensation for the costs of all labor, tools, equipment, and materials necessary or incidental to furnishing, installing and/or removing all types of signs as shown in the Plans and returning to the Owner.

## **SECTION 8-22, PAVEMENT MARKING**

### **8-22.1 Description**

Section 8-22.1 is supplemented with the following:

(December 18, 2009 \*\*\*\*\*)

This work shall consist of furnishing and placing pavement markings upon the roadway surface for delineation at the locations shown in the Plans in accordance with WSDOT Standard Plan M-20.20-01, or as directed by the Engineer. All permanent pavement markings must be placed no later than seven (7) calendar days after the final lift of paving is completed, except 90-mil methyl methacrylate materials, which must be placed not later than twenty-one (21) calendar days after the final lift of paving is completed.

### **8-22.2 Materials**

Section 8-22.2 Sentence #3 is deleted and replaced with the following:

(October 23, 2014 \*\*\*\*\*)

Glass beads for Type A plastic shall be as recommended by the manufacturer.

Section 8-22.2 is supplemented with the following:

(October 23, 2014 \*\*\*\*\*)

Glass beads for Type D plastic and Bonded Core Elements shall be as shown in Section 9-34.4.

### **8-22.3 Construction Requirements**

#### **8-22.3(3)E Installation**

Section 8-22.3(3)G is supplemented with the following:

Profiled Methyl Methacrylate lines shall be installed per WSDOT Standard Plans M20.20-01.

#### **8-22.3(3)G Glass Beads**

Section 8-22.3(3)G is supplemented with the following:

(March 13, 2012 \*\*\*\*\*)

#### **Methyl Methacrylate Pavement Markings**

Glass beads shall be applied at a rate of eight (8) to ten (10) pounds per one hundred square feet.

Bonded core elements shall be applied at a rate of ten (10) grams per four (4) inch wide by one (1) linear foot of marking.

### **8-22.3(6) Removal of Pavement Markings**

Section 8-22.3(6) is supplemented with the following:

(\*\*\*\*\*)

All pavement markings, including, but not limited to: paint, lane markers, traffic buttons, plastic markings, and adhesive residue shall be removed prior to overlay. This work shall be incidental to other bid items of the contract, and no separate payment will be made.

### **8-22.5 Payment**

Section 8-22.5 is deleted and replaced with the following:

(December 13, 2012 \*\*\*\*\*)

Payment will be made in accordance with Section 1-04.1 for each of the following Bid Items:

- "Paint Line", per linear foot.
- "Painted Bike Symbol", per each.
- "Profiled Plastic Line", per linear foot.
- "Plastic Edge Line", per linear foot.
- "Profiled Plastic Wide Line", per linear foot.
- "Profiled Plastic Dotted Wide Line", per linear foot.
- "Plastic Crosswalk Line", per linear foot.
- "Plastic Stop Line", per linear foot.
- "Plastic Traffic Arrow", per each.
- "Plastic Letter", per each.
- "Plastic Shared Lane Marking", per each.

The lump sum bid price in the Proposal will be full compensation for the costs of all labor, tools, equipment, and materials necessary or incidental to removing all types of markings and disposing of offsite.

### **8-23 TEMPORARY PAVEMENT MARKINGS**

Section 8-23 is supplemented with the following:

All costs in connection with the use of reflective traffic tape as temporary pavement markings shall be incidental to other bid items. All costs for paint lines and reflective pavement markers used for temporary traffic control shall be paid under other bid items.

#### **Temporary Pavement Markings**

Temporary pavement markings shall be installed and maintained by the Contractor whenever permanent pavement markings are included in the Contract and traffic is released onto public streets or roadways prior to installation of permanent pavement markings. The Contractor shall perform preliminary layout work to the satisfaction of the Engineer prior to installation of the temporary pavement markings. The temporary pavement markings shall be installed and maintained to the satisfaction of the Engineer

until the permanent pavement markings are installed and approved in writing by the Engineer. After approval of permanent lane markings, the Contractor shall remove the temporary lane markings to the satisfaction of the Engineer.

Appropriately colored 4-inch-wide reflective traffic tape shall be installed with a skip pattern based on a 10-foot unit consisting of a 1 foot line of tape and a 9-foot gap, unless otherwise specified in the Plans or in the Special Provisions for this Contract. Reflective traffic tape markings shall generally follow the alignment for the permanent pavement markings and double lines shall be used when specified for the permanent pavement markings. Reflective tape shall not be used when the temporary pavement markings are to be exposed to traffic for more than 2 weeks without the written approval of the Engineer.

The Contractor shall provide paint lines per Sections 8-22 and 9-34, and RPMs per Sections 8-09 and 9-21, at the direction of the Engineer for temporary pavement markings for construction staging. Paint lines shall be provided for temporary pavement markings for any conditions not applicable for reflective tape. Paint lines and RPMs for temporary pavement markings shall be paid under "Paint Line" and "Raised Pavement Marker Type 2".

Temporary pavement marking shall be per Section 5-04.3(17) of these Special Provisions.

## **8-30 CONSTRUCTION IDENTIFICATION SIGNS**

(\*\*\*\*\*)

Two (2) working days prior to the commencement of work, the Contractor shall furnish and erect two (2) Construction Identification Signs. The signs will be portable and placed at locations determined by the Engineer, to correspond to the areas in which the majority of work is being done, at that time. The signs shall be made from 3/4-inch exterior grade plywood and conform to the Standard Plans in Appendix A. The signs shall be erected on suitable wooden posts and be maintained by the Contractor in a neat and presentable condition throughout the progress of the work. At project completion these signs shall be given to the Owner.

### **8-30.2 Payment**

All costs in connection with the furnishing, erection, maintaining, and removal of the signs shall be considered incidental to and included in the cost for the project and no separate payment shall be made for this item.

## **8-31 PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)**

(\*\*\*\*\*)

The PCMS shall meet the requirements of the MUTCD and the following:

1. Back-lighted split-flap
2. Fiber optic/shutter
3. Light emitting diode
4. Light emitting diode/shutter
5. Flip disk

Regardless of the technology, the PCMS shall meet the following general requirements:

1. Be light emitting and must rely solely on reflected light.
2. Be solar powered.
3. Have a display consisting of individually controlled pixels no larger than 2-1/2 inch by 2-1/2 inch. If the display is composed of individual character modules, the space between modules must be minimized so alphanumeric characters of any size specified below can be displayed at any location within the matrix.
4. When activated, the pixels shall display a yellow or orange image. When not activated, the pixels shall display a flat black image that matches the background of the sign face.
5. Be capable of displaying alphanumeric characters that are a minimum of 18-inches in height. The width of alphanumeric characters shall be appropriate for the font. The PCMS shall be capable of displaying three lines of eight characters per line with a minimum of one pixel separation between each line.
6. The PCMS message, using 18-inch characters, shall be legible by a person with 20/20 corrected vision from a distance of not less than 800 feet centered on an axis perpendicular to the sign face.
7. The sign display shall be covered by a stable, impact resistant polycarbonate face. The sign face shall be non-glare from all angles and shall not degrade due to exposure to ultraviolet light.
8. Be capable of simultaneously activating all pixels for the purpose of pixel diagnostics. Any sign that employs flip disk or shutter technology shall be programmable to activate the disk/shutters once a day to clean the electrical components. This feature shall not occur when the sign is displaying an active message.
9. The light source shall be energized only when the sign is displaying an active message.
10. Be equipped with a redundant light source such that the sign will continue to emit light if one of the light sources fails.

The PCMS panels and related equipment shall be permanently mounted on a trailer with all controls and power generating equipment.

The PCMS shall be operated by an easy to use controller that provides the following functions:

1. Select any preprogrammed message by entering a code.
2. Sequence the display of at least five messages.
3. Blank the sign.
4. Program new message, which may include moving arrows and chevrons.
5. Mirror the message currently being displayed or programmed.

Portable changeable message sign(s) shall be available, on site, for the life of the project.

The Contractor shall operate the PCMS in accordance with the approved traffic control plans or as directed by the Engineer. The PCMS shall not be used in lieu of sequential arrow signs.

### **8-31.1 Measurement**

Portable Changeable Message Signs will be measured per day used on the project.

The days of operation will be determined by the Engineer. Any days of operation in excess of those determined by the Engineer will be at the Contractors expense.

### **8-31.2 Payment**

The unit contract price for the portable changeable message signs shall include all costs for furnishing the PCMS, transporting the PCMS to and from each project site, and maintaining the PCMS, and shall be incidental to the following:

“Portable Changeable Message Sign”, per day.

The cost for relocation of the PCMS within each project limit will be paid in accordance with 1-10.3(1).

## **8-32 ASPHALT CONCRETE RAISED CROSSWALK** (\*\*\*\*\*)

## **New Section**

### **8-32.1 Description**

The work shall consist of constructing asphalt concrete raised crosswalk with associated pavement striping per City of Federal Way Detail DWG No. 3-27.

### **8-32.2 Materials**

Asphalt concrete for raised crosswalk shall be HMA Class 1/2" PG 64-22 meeting the requirements of Section 5-04 of the Standard Specifications. Pavement marking materials shall be white plastic meeting the requirements of Section 8-22.2 of the Standard Specifications.

Raised pavement markers should be Type 2 YY and Type 2W meeting the requirements of Section 8-09.2 of the Standard Specifications.

### **8-32.3 Construction Requirements**

The various materials shall be installed as noted on the plan detail.

### **8-33.4 Measurement**

“Removal and Replacement of Raised Crosswalk, Complete”, will be measured per each where a raised crosswalk and associated pavement markings are installed.

### **8-33.5 Payment**

"Removal and Replacement of Raised Crosswalk, Complete", per each.

The unit bid price per each proposal will be full compensation for the cost of all tools, labor, equipment, and materials necessary or incidental to provide and install the asphalt concrete raised crosswalk and pavement markings.

END OF DIVISION 8



## **DIVISION 9 MATERIALS**

### **9-03 AGGREGATES**

#### **9-03.8(3)B Gradation-Recycled Asphalt Pavement and Mineral Aggregate**

Delete the reference to Section 9-03.8(6) in the paragraph of Section 9-03.8(3)B.

#### **9-03.8(6) HMA Proportion of Materials**

Add the following paragraph:

For the determination of a Project Mix Design, the Contractor shall submit to the Engineer's representative samples of the various aggregates to be used along with the gradation data showing stockpile averages and variation of the aggregate produced along with proposed combining ratios and average gradation of the completed mix. The initial asphalt content shall be determined by the Engineer from the aggregates and data provided.

### **SECTION 9-18, PRECAST TRAFFIC CURB AND BLOCK TRAFFIC CURB**

(December 12, 2012 \*\*\*\*\*)

#### **9-18.3 Vacant**

Section 9-18.3 is deleted and replaced with the following:

#### **9-18.3 Block Traffic Curb**

In construction of the block traffic curb, the Contractor shall have the option of using either length block shown in the plans, provided the same length block is used throughout the entire project.

The curb units shall be made from Portland cement and high quality sand and gravel, the proportions of which will be left to the discretion of the producer as long as the unit develops a minimum compressive strength of 1,600 psi at 28 days when tested for end loading. The proportions of sand, gravel, and cement, the type of forms used, and the method of compacting the concrete in the forms shall all be such that as dense, smooth, and uniform a surface as is practicable for a concrete masonry unit is obtained on the finished curb units. The faces that are to be exposed shall be free from chips, cracks, air holes, honeycomb, or other imperfections except that if not more than 5 percent of the curb units contain slight cracks, small chips not larger than 1/2 inch, or air holes not more than 1/2 inch in diameter or depth, this shall not be deemed grounds for rejection. The units used in any contiguous line of curb shall have approximately the same color and surface characteristics.

### **SECTION 9-21, RAISED PAVEMENT MARKERS (RPM)**

#### **9-21.2(1) Physical Properties**

Section 9-21.2(1) is supplemented with the following:

(March 13, 2012 \*\*\*\*\*)

Type 2 raised pavement markers shall NOT be ceramic.

## **SECTION 9-28, SIGNING MATERIALS AND FABRICATION**

### **9-28.1 General**

Paragraph three is deleted and replaced with the following:

All regulatory (R series), school (S series), warning signs (W and X series), except for parking regulation and parking prohibition signing, shall be constructed with Encapsulated Lens Reflective Sheeting in accordance with Section 9-28.8 of the Standard Specifications. This sheeting has a retro reflection rating of 250 candales/foot candle/square foot for white-silver sheeting with a divergence angle of 0.2 degrees and an incidence angle of minus 4 degrees. This high intensity sheeting shall be Type III sheeting or greater. All street name (D-3) sign sheeting shall meet this specification.

All overhead signing shall meet the specifications of Prismatic Lens Reflective Sheeting. This sheeting has a minimum retro reflection rating of 800 candelas/foot candle/square foot for white-silver sheeting with a divergence angle of 0.2 degrees and an incidence angle of minus 4 degrees. This diamond grade sheeting shall be Type IX sheeting or greater. This standard applies to all signs mounted above the roadway, on span wire or signal mast arms.

Motorist information and parking signing shall be constructed with Engineer Grade Sheeting in accordance with Section 9-28.6 of the Standard Specifications. This sheeting has a minimum retro reflection rating of 70 candelas/foot candle/square foot for white-silver sheeting with divergence angle of 0.2 degrees and an incidence of minus 4 degrees. This Engineering Grade sheeting shall be Type I sheeting or greater. These signs include guide signing (D series – except D-3), corporate limit signing (I series), and motorist information signing (K series). The reflectivity standard of supplemental plates shall match that of the primary sign.

### **9-28.8 Sheet Aluminum Signs**

Section 9-28.8 is supplemented with the following:

All permanent signs shall be constructed from aluminum sign blanks unless otherwise approved by the Engineer. Sign-blank minimum thicknesses based on maximum dimensions, shall be as follows:

<u>Maximum Dimension</u>	<u>Blank Thickness</u>
Less than 30 inches	0.080 inches
Greater than 30 inches, less than 48 inches	0.100 inches
Greater than 48 inches	0.125 inches

All D-3 street-name signs shall be constructed with 0.100-inch-thick blanks. The Contractor shall install permanent signs which meet or exceed the minimum reflectivity standards. All sign face sheeting shall be applied to sign blanks with pressure sensitive adhesives.

### **9-28.9 Fiberglass Reinforced Plastic Signs**

Section 9-28.9 is deleted in its entirety.

### **9-28.14 Sign Support Structures**

Section 9-28.14 is supplemented with the following:

Unless otherwise noted in the plans or approved by the engineer, all sign posts shall be timber sign posts.

#### **9-28.14(1) Timber Sign Posts**

Section 9-28.14(1) is supplemented with the following:

All ground-mounted signposts shall use pressure treated hem-fir wood posts unless otherwise approved by the Engineer. All wood posts shall be buried a minimum of 30 inches below the finished ground line. Post backfill shall be compacted at several levels to minimize settling. All posts shall be two-way plumb.

## **SECTION 9-29, ILLUMINATION, SIGNAL, ELECTRICAL**

### **9-29.3(2)F Detector Loop Wire**

Section 9-29.3(2)F is deleted and replaced with the following:

(October 5, 2009 WSDOT NWR)

#### **Detector Loop Wire**

Detector loop wire shall use 14 AWG stranded copper conductors, and shall conform to IMSA Specification 51-7, with cross-linked polyethylene (XLPE) insulation encased in a polyethylene outer jacket (PE tube).

## **SECTION 9-34, PAVEMENT MARKING MATERIAL**

### **9-34.3(4) Type D – Liquid Cold Applied Methyl Methacrylate**

Section 9-34.3(4) is supplemented with the following:

(March 13, 2012 \*\*\*\*\*)

The methyl methacrylate (MMA) material shall be formulated as a long-life durable pavement marking system capable of providing a minimum of two years of continuous performance. The material shall be a catalyzed methyl methacrylate (MMA), wet-continuous reflective product and placed shall have a dry time (cure) to the touch of no more than 30 minutes. The material shall be capable of retaining reflective glass beads and ceramic micro-crystalline elements of the drop-on or spray-on type as specified by the manufacturer. The binder shall be lead free and suitable for bituminous and concrete pavements.

### **9-34.4 Glass Beads for Pavement Marking Materials**

Section 9-34.4 is supplemented with the following:

(March 13, 2012 \*\*\*\*\*)

## Methyl Methacrylate Pavement Markings Optics

### Glass Beads

Surface-drop glass beads shall be the "Utah Blend" with a Methacrylate compatible coupling agent approved by the material manufacturer.

Glass beads shall be applied at a rate of eight (8) to ten (10) pounds per one hundred square feet.

### Bonded Core Elements

Surface-drop ceramic elements shall be the Series 50M or 70M with a Methacrylate compatible coupling agent approved by the material manufacturer. Elements shall meet or exceed a minimum initial value of 150 mcd for white and 125 mcd for yellow per ASTM 2176.

The bonded core reflective elements shall contain either clear or yellow tinted microcrystalline ceramic beads bonded to the pacified core. These elements shall not be manufactured using lead, chromate or arsenic. All "dry-performing" microcrystalline ceramic beads bonded to the core shall have a minimum index of refraction of 1.8 when tested using the liquid oil immersion method. All "wet performing" microcrystalline ceramic beads bonded to the core shall have a minimum index of refraction of 2.30 when tested using the liquid oil immersion method.

There are two gradations for the bonded core elements, standard size and "S" series. "S" series is a slightly finer gradation of elements compared to standard.

Element Gradations			
Mass Percent Passing (ASTM D1214)			
US Mesh	Micron	Standard Elements	"S" Series
12	1700	80-100	85-100
14	1410	45-80	70-96
16	1180	5-40	50-90
18	1000	0-20	5-60
20	850	0-7	0-25
30	600		0-7

A sample of bonded core reflective elements supplied by the manufacturer shall show resistance to corrosion of their surface after exposure to a 1% solution (by weight) of sulfuric acid. The 1% acid solution shall be made by adding 5.7 cc of concentrated acid into 1000cc of distilled water. CAUTION: Always add the concentrated acid into the water, not the reverse.

The bonded core elements are surface treated to optimize embedment and adhesion to the MMA binder. Elements treated for use with MMA shall have identification on packaging or label to indicate use with the MMA binder.

Bonded core elements shall be applied at a rate of ten (10) grams per four (4) inch wide by one (1) linear foot of marking.

**Reflectance**

Typical initial retro reflectance values are shown in the Table below. Typical retro reflectivity is averaged over many readings. Minimum Retro reflectivity results represent average performance for smooth pavement surfaces. Values represent both standard and "S" Series elements. Results may vary due to differences in pavement type and surface roughness. Increased element drop rate may be necessary to compensate for increased surface area characteristic of rough pavement surfaces. The initial retro reflectance of a single installation shall be the average value determined by the measurement procedures outlined in ASTM E 1710, using a 30-meter (98.4 feet) retro-reflectometer. RL shall be expressed in units of millicandelas per square foot per foot-candle [mcd(ft-2)(fc-1)].

The optics incorporated into the pavement marking system shall be tested and certified by an independent laboratory to meet ASTM E2177 for wet-recovery and ASTM E2176 for wet-continuous performance levels.

The pavement marking system installed shall meet a minimum Dry reflectance value of 700 MCD/M2/LX for white pavement markings and 500 MCD/M2/LX for yellow pavement markings and wet-recovery (as described by ASTM 2177) reflectance value of 375 MCD/M2/LX for white pavement markings and 280 MCD/M2/LX for yellow pavement markings, and wet-continuous (as described by ASTM 2176 testing) reflectance values of 150 MCD/M2/LX for white pavement markings and 125 MCD/M2/LX for yellow pavement markings as measured with a 30 meter device approved by the Traffic Engineering Division (TED).

The Contractor will be required to take and record readings every 500 feet utilizing a 30 meter device approved by the Traffic Engineering Division. These readings shall be recorded on the daily report and submitted to the project engineer at the end of each work day or shift.

Minimum Initial Retro Reflectance Values		
	White	Yellow
Dry (ASTM E1710)	700	500
Wet recovery (ASTM E2177)	375	280
Wet continuous (ASTM E2176)	150	125

END OF DIVISION 9