

**8-20.3(4) Foundations**

*This section is supplemented with the following:*

All pedestrian pushbutton posts (Type PPB) foundations shall be constructed in accordance with WSDOT Standard Plan J-20.10-05 or J-20.11-03. The anchor bolt template shall match base called for in Section 9-29.6(1). Anchor bolts shall be in accordance with Section 9-29.6(5).

Anchor bolts for streetlight standards and for strain poles shall extend a minimum of two threads and a maximum of six threads above the top heavy-hex-nut. A minimum of three threads shall remain between bottom of the leveling hex-nut and the top of the foundation.

Foundations shall be excavated using an auger and poured against undisturbed material unless otherwise approved by the Engineer. Vacuum excavation should be used where there is a possibility of conflict with utilities or other facilities.

Forming the foundation with galvanized culvert pipe or similar forming methods will only be allowed when soil conditions or other factors make this method of construction necessary and is approved by the Engineer. Biodegradable forming tubes shall be fully removed from the cured concrete prior to backfilling. When using culvert or tubes, the following backfill requirements will apply. The area between the form and undisturbed material shall be filled with CDF. For lightly loaded installations and only with the approval of the Engineer, Crushed Surfacing Top Course meeting the requirements of Section 9-03.9(3) may be used. Placement shall be in accordance with Section 2-09.3(1)E and shall be backfilled and compacted in the presence of the Engineer.

**8-20.3(5) Conduit****8-20.3(5)A General**

*This section is supplemented with the following:*

Unless otherwise specified in the plans and specifications, standard conduit sizes shall be as follows:

- Underground Streetlight Conduit: 2 inch diameter
- Pole Riser Service Installations: 1-1/2 inch diameter
- Traffic Signal Conduit: 3 inch diameter
- Traffic Signal Communication: 3 inch diameter
- All other conduit: 2 inch diameter, unless otherwise specified.

As soon as the mandrel has been pulled through, both ends of the conduit shall be sealed in an approved manner. A minimum size #14 AWG insulated solid copper wire pull line shall be installed in all empty conduits. At least 3 feet of the copper wire pull line shall be neatly coiled and secured to the conduit in the same manner as is shown in Washington State Department of Transportation Standard Plan J-28.70-01, 14 Details A and B.

**8-20.3(5)B Conduit Type**

*This section is supplemented with the following:*

Conduit under driveways and other vehicular access ways shall be Schedule 80 high-density polyethylene (HDPE), Schedule 80 PVC, or rigid metal conduit (RMC).

1  
2 Conduit installed in a joint trench, with power, and that is installed a minimum of  
3 36 inches from finished grade may utilize Schedule 40 PVC in lieu of Schedule 80 PVC.  
4 This allowance shall not be construed to permit the use of dissimilar materials in a single  
5 run.

6  
7 Pole riser conduit material types shall be in accordance with applicable City of Tacoma  
8 standard plans.

9  
10 **8-20.3(5)D Conduit Placement**

11 *This section is supplemented with the following:*

12  
13 Conduit terminating in pole foundations shall extend to 3 inches below the handhole.

14  
15 Conduit terminating in controller foundations shall terminate 1 inch above the foundation.

16  
17 **8-20.3(5)E Method of Conduit Installation**

18  
19 **8-20.3(5)E1 Open Trenching**

20 *Subsection 5 is revised to read:*

- 21  
22 5. Trenches located within the paved roadway shall be backfilled with 3 inches  
23 of sand over the conduit, followed by material meeting the requirements of  
24 Section 9-03.12(3). Compaction shall be in conformance with Section 2-  
25 09.3(1)E. All street cuts shall be repaired in accordance with the standard  
26 plans and City of Tacoma Standard Plan No. SU-15.

27  
28 *This section is supplemented with the following new Subsections:*

- 29  
30 7. Where multiple conduit are installed in the same trench, the trench shall be of  
31 sufficient width to accommodate all conduit with a minimum 3-inch separation  
32 between each conduit, and a minimum clearance of 1 inch on the sides of the  
33 trench. When conduit is laid horizontal to one another, the conduit shall be  
34 laid at the same elevation, parallel with one another. When conduit is laid  
35 vertically in the same trench, conduit spacers shall be used to maintain the 3-  
36 inch separation. Spacers shall be installed in accordance with the  
37 manufacturer's recommendations for conduit of that size and type. Additional  
38 spacers shall be required where the supported conduit is sagging more than  
39 20 percent of the nominal diameter of the conduit.
- 40 8. In all conduit trenches, metallic, detectible, utility warning tape shall be placed  
41 at 12-inches below final grade.

42  
43 **8-20.3(6) Junction Boxes, Cable Vaults, and Pull boxes**

44 *This section is supplemented with the following:*

45  
46 Unless otherwise specified in the Plans, or as otherwise directed by the Engineer, all  
47 junction boxes exposed to vehicular traffic shall be Heavy-Duty. Field adjustments of  
48 junction boxes causing junction boxes to be installed within an intersection radius and  
49 within four feet of the curb may require Heavy-Duty junction boxes. Final placement and  
50 type of all junction boxes within an intersection shall be as directed by the engineer.

51  
52 Adjacent junction boxes shall be separated by a minimum of 3 inches.

53

1 Concrete meeting the requirements of 6-02.3(2)B shall be placed surrounding all  
2 junction boxes, except as otherwise provided for below. Concrete shall be flush with the  
3 top of the junction box and the adjacent improvements. Concrete shall be cast-in-place.  
4 Junction boxes shall be secured with the concrete border as follows:

- 5
- 6 1. When the junction box is located within a concrete or asphalt section and is  
7 located a minimum of 12 inches from the edge of the section, a concrete border  
8 will not be required.
- 9 2. Where junction boxes are located within 12 inches from the edge of the concrete  
10 or asphalt section, the junction box shall be secured on all sides with a minimum  
11 12-inch wide, 6-inch deep concrete section. Concrete shall be finished in the  
12 same manner as the adjacent concrete, where applicable.
- 13 3. Where junction boxes are located within a planter strip, a landscaped area, or  
14 other non-hardened surface, the junction box shall be bordered on all sides with  
15 a minimum 6-inch wide, 12-inch deep concrete section flush with the top of the  
16 junction box.
- 17

18 When setting a new junction box on an existing streetlight circuit where no equipment  
19 ground is present, a non-conductive junction box and lid shall be utilized.

20  
21 All junction box lids for illumination systems shall be welded in place using two, 1-1/2  
22 inch long welds on opposite corners of the junction box lid and frame. Welding shall  
23 occur after inspection and testing of the illumination system and confirmation from the  
24 Engineer. An Illumination System may consist of a separate illumination service or  
25 circuit.

#### 26 27 **8-20.3(7) Messenger Cable, Fittings**

28 *The second paragraph of this section is deleted.*

29  
30 *This section is supplemented with the following:*

31  
32 Cable ties shall be used to neatly secure the signal cable to the span wire at 10-inch  
33 centers and shall be tightened at top. Excess tie material shall be completely cut off. The  
34 signal control cable shall be below the span wire and shall be straight with no twisting or  
35 spiraling.

36  
37 A maximum 5% sag shall be provided in the span wire when fully loaded with all  
38 vehicular signal heads, unless otherwise directed by the Engineer.

#### 39 40 **8-20.3(8) Wiring**

41 *The third paragraph is revised to read:*

42  
43 All splices in underground illumination circuits, induction loop circuits, and magnetometer  
44 circuits shall be installed at junction boxes. The only splice allowed in an induction loop  
45 circuit shall be the shielded cable to loop wire splice. The only splice allowed in a  
46 magnetometer circuit shall be the probe lead-in cable to the magnetometer cable splice.

47  
48 Induction loop splices and magnetometer splices shall be heat-shrink type with moisture  
49 blocking material, sized for the conductors. Magnetometer and induction loop splices  
50 shall be soldered. The end of the sheathing shall be sealed with a heat-shrink insulator.

51

1 *The fourth paragraph is revised to read:*

2  
3 Signal wiring shall be in conformance with the following:

- 4  
5 1. All termination for traffic signal control systems shall be in accordance with City  
6 of Tacoma Standard Plan TS-15.  
7 2. All signal wiring shall be five-conductor or two-conductor 14-gauge stranded  
8 copper wire, unless otherwise shown in the plans.  
9 3. For five-section and bimodal heads, 2-5c-14-gauge conductors shall be utilized.  
10 4. 5c wire shall not be split between high voltage and low voltage. Where a  
11 pedestrian head and a pedestrian push button share a common pole, a separate  
12 2c shall be pulled in for the push button.  
13 5. A single 5c may be split between two pedestrian heads on a common pole with a  
14 jumper across the neutral.  
15 6. Opticom and detection wiring shall be per manufacturer's recommendations.

16  
17 All wiring entering the cabinet shall be gathered across the conduits to the right front of  
18 the cabinet and neatly tied and circle the base of the cabinet counterclockwise as further  
19 described below:

- 20  
21 1. Communication cables shall circle the base of the cabinet, counterclockwise from  
22 front right, one full circle, and around to the back of the right panel. Cables shall  
23 follow up the back of the right panel and terminate on the terminal strip identified  
24 by the Engineer. Unless otherwise directed by the Engineer, cable outer jacket  
25 sheathing shall be removed from a point two (2) inches below the terminal strip.  
26 Cables shall be uniform in length, with sufficient slack to reach any terminal on  
27 the terminal strip. Individual wire slack shall be neatly looped back and tied. A  
28 bolt/flanged nut alligator jaw shield bond connector shall be utilized.  
29 2. Power service conductors shall circle the base of the cabinet, counterclockwise  
30 from front right, one full circle, and back around to the front right of the base.  
31 3. Detection cables shall circle the base of the cabinet, counterclockwise from front  
32 right, to the back of the left panel. Cables shall follow up the back of the left  
33 panel and terminate as directed in the field.  
34 4. Vehicle and pedestrian signal head conductors shall circle the base of the  
35 cabinet, counterclockwise from front right, to back left. Cable outer jacket  
36 sheathing shall be removed from the point that the conductor reaches the back  
37 left of the cabinet to the ends of the conductors. All vehicle and pedestrian signal  
38 head conductors in the cabinets shall be uniform in length, with sufficient slack to  
39 reach any terminal on the load bay. Individual wire slack shall be neatly looped  
40 back and tied.  
41 5. Pushbutton conductors shall circle the base of the cabinet, counterclockwise  
42 from front right, to front left. Cable outer jacket sheathing shall be removed from  
43 the point that the conductor reaches the front left of the cabinet to the ends of the  
44 conductors. All pushbutton conductors in the cabinets shall be uniform in length,  
45 with sufficient slack to reach any terminal on the terminal strip. Individual wire  
46 slack shall be neatly looped back and tied.  
47 6. Interconnect fiber cable shall circle the base of the cabinet with 50 feet of coiled  
48 cable.

49  
50 Field wiring of the cabinet shall be done by City of Tacoma Signal Electricians after all  
51 wiring has been pulled into the cabinet and properly labeled with a temporary label  
52 consisting of white electricians tape with permanent marker. The Contractor shall  
53 provide a detailed description/ key of all temporary labeling. The cabinet and labeling

1 shall be inspected by the Signal/Streetlight inspector prior to cabinet wiring. The  
2 Contractor shall allow five working days for City Electricians to field wire the cabinet after  
3 the inspection is complete. Improper or incorrect labeling requiring additional effort by  
4 the City may result in additional time required by City forces to wire the cabinet.

5  
6 *The fifth paragraph is revised to read:*

7  
8 Splices and taps on underground and overhead circuits shall be made with solderless  
9 crimp connectors, installed with an approved tool designed for the purpose, to securely  
10 join the wires both mechanically and electrically. Splices and taps will be sealed in  
11 accordance with this section.

12  
13 *The seventh paragraph is revised to read:*

14  
15 Aerial illumination splices shall be taped with thermoplastic electrical insulating tape  
16 equivalent to the original wire insulation rating and thickness. It shall be well lapped over  
17 the original insulation.

18  
19 *The eighth paragraph is revised to read:*

20  
21 All splices in junction boxes and handholes shall be taped and sealed with an electrical  
22 coating. Tape splice insulation shall consist of thermoplastic electrical insulating tape  
23 equivalent to the original wire insulation rating and thickness. It shall be well lapped over  
24 the original insulation and moisture resistant electrical coating shall be applied and  
25 allowed to dry. Two layers of thermoplastic tape will then be applied, followed by a  
26 second layer of moisture resistant electrical coating.

27  
28 *The ninth paragraph is revised to read:*

29  
30 Illumination cable in light standards shall be #10 AWG USE or "Pole and Bracket" cable,  
31 as specified in Section 9-29.3(2)D of the Standard Specifications.

32  
33 *The tenth paragraph is revised to read:*

34  
35 Fifteen (15) feet of slack cable shall be provided at the controller end of all cables  
36 terminating in the controller cabinet. A minimum of 3 feet of slack cable shall be left at  
37 all strain poles and junction boxes.

38  
39 **8-20.3(8)A Splices**

40  
41 *The second and third paragraph are deleted.*

42  
43 *The fifth paragraph is revised to read:*

44  
45 Splices and taps on underground and overhead circuits shall be made with solderless  
46 crimp connectors, installed with an approved tool designed for the purpose, to securely  
47 join the wires both mechanically and electrically. Splices and taps will be sealed in  
48 accordance with this section.

49  
50

1 *The seventh paragraph is revised to read:*

2  
3 Aerial illumination splices shall be taped with thermoplastic electrical insulating tape  
4 equivalent to the original wire insulation rating and thickness. It shall be well lapped over  
5 the original insulation.

6  
7 *This section is supplemented with the following:*

8  
9 All splices in junction boxes and handholes shall be taped and sealed with an electrical  
10 coating. Tape splice insulation shall consist of thermoplastic electrical insulating tape  
11 equivalent to the original wire insulation rating and thickness. It shall be well lapped over  
12 the original insulation and moisture resistant electrical coating shall be applied and  
13 allowed to dry. Two layers of thermoplastic tape will then be applied, followed by a  
14 second layer of moisture resistant electrical coating.

15  
16 **8-20.3(9) Bonding, Grounding**

17 *The third paragraph shall be supplemented with the following:*

18  
19 Equipment grounding shall be minimum #8 AWG unless otherwise shown in the plans.  
20 When the ground is pulled through a conduit, the wire shall be insulated. Color tape  
21 marking shall not be acceptable for marking the ground.

22  
23 **8-20.3(10) Service, Transformer, and Intelligent Transportation System (ITS)**  
24 **Cabinets**

25 *The second, third, and fifth paragraphs are deleted.*

26  
27 **8-20.3(11) Testing**

28  
29 **8-20.3(11)B Traffic Signal System Turn-On**

30 *The fourth paragraph is revised to read:*

31  
32 Unless approved by the Engineer no change to signal stop and go operation will be  
33 allowed between 6:00 a.m. to 9:00 a.m. and 2:00 p.m. to 7:00 p.m. on Tuesday through  
34 Thursday, nor will signal operation changes be allowed on Fridays, weekends, holidays,  
35 or the day preceding a holiday. Signal operation changes will be allowed on Monday  
36 with prior coordination with the City of Tacoma Traffic Signal Electricians.

37  
38 **8-20.3(14) Signal Systems**

39 *This section is deleted.*

40  
41 **8-20.3(14)B Signal Heads**

42 *This section is supplemented with the following:*

43  
44 For span wire installation, the red indications shall be leveled to within 1 inch for each  
45 direction as approved by the City. The height to the bottom of the lowest head shall be  
46 17 feet, plus or minus 3 inches. Height to the bottom of the lowest four-section or five-  
47 section head shall be a minimum of 16 feet-3 inches, plus or minus 3 inches.

48  
49 For span wire installation, the signal stem (drop pipe) shall be 1 to 3 feet long unless  
50 otherwise approved by the Engineer.

51  
52 Adjust signal heads to align with revised roadway locations.

53



**8-20.3(17)B “As Built” Plans**

*This section is supplemented with the following:*

These drawings shall show the routing of all underground conduits. The locations of the conduit shall be dimensioned with a precision and accuracy of 1 foot.

**8-20.4 Measurement**

*The section is supplemented with the following:*

When a bid item is shown as “lump sum” in the proposal, no specific unit of measurement will apply, but measurement will be for the sum total of all items for a complete system to be furnished and installed in accordance with approved methods, the Plans, and the Special Provisions, and these Specifications. Removal, relocation and salvage of existing traffic signal and illumination equipment and signs where required shall be incidental to the lump sum items and no separate measurement will be made.

Remove direct bury cable shall be measured per linear foot. This work includes only removal of direct bury cable where there is no signal work being done but where there are existing shallow conduit crossings that could be damaged during the installation of proposed pavement improvements.

Junction Boxes will be measured per each replaced junction box regardless of the type specified use, unless the junction box is intended in an illumination system, traffic signal system, intelligent transportation system, or other type of electrical system lump sum Bid item.

RRFB assembly w/ associated signage, wire, and conduit shall be measured per each. This work shall include all trenching, backfill, pavement restoration, conduit, wiring, and all other work associated with the installation of a complete functioning beacon connected to the adjacent illumination or traffic signal system, included in a separate lump sum bid item. RRFB assemblies shall meet WSDOT requirements as noted on the plans.

PPB assembly w/ associated signage, wire, and conduit shall be measured per each. This work shall include all trenching, backfill, pavement restoration, conduit, wiring, button extensions, anchoring to existing post, and all other work associated with the installation of a complete functioning push button connected to the adjacent illumination or traffic signal system, included in a separate lump sum bid item. Type PPB assemblies shall be either as provided in Special Provision 9-29.6 or mounted to an existing post. Push button extensions may be required to achieve ADA compliance; these shall be provided by the Contractor at no additional cost to the project.

**8-20.5 Payment**

*The section is supplemented with the following:*

“Illumination System Modifications”, lump sum.

The lump sum Contract price for “Illumination System Modifications” shall be full pay for the construction of the complete electrical system, modifying existing systems, or both, as described and as show in the Plans, and herein specified, including excavation, backfilling, concrete foundations, conduit, wiring, restoring facilities destroyed or damaged during construction, salvaging existing materials, and for making all required tests. All additional materials and labor, not shown in the Plans or called for herein and

1 which are required to complete the electrical system, shall be included in the lump sum  
2 Contract price. (The system may include: luminaire poles, luminaire bracket arms, LED  
3 luminaires, electrical service enclosures). All proposed RRFBs and PPBs and  
4 associated wire/conduit/signage shall not be included in this lump sum bid item.

5  
6 “Traffic Signal System Modifications”, lump sum.

7  
8 The lump sum Contract price for “Traffic Signal System Modifications” shall be full pay  
9 for the construction of the complete signal and electrical system, modifying existing  
10 systems, or both, as described and as show in the Plans, and herein specified, including  
11 excavation, backfilling, concrete foundations, conduit, wiring, restoring facilities  
12 destroyed or damaged during construction, salvaging existing materials, and for making  
13 all required tests. All additional materials and labor, not shown in the Plans or called for  
14 herein and which are required to complete the electrical system, shall be included in the  
15 lump sum Contract price.

16 (The system may include: mast arm poles, signal mast arms, terminal cabinets, signal  
17 strain and luminaire poles, luminaire bracket arms, LED luminaires, APS pushbuttons,  
18 pushbutton extension brackets, pushbutton and signal posts, vehicular and pedestrian  
19 signal heads, signage, traffic signal cabinet and controller equipment, vehicular, bicycle,  
20 and emergency pre-emption detection, electrical service enclosures). All proposed  
21 RRFBs and PPBs and associated wire/conduit/signage shall not be included in this lump  
22 sum bid item.

23  
24 “Traffic Signal System Overhead Adjustment,” lump sum.

25  
26 This lump sum bid item shall include all work and coordination required to adjust the  
27 existing overhead traffic signal heads at various signalized intersections as shown on the  
28 plans.

29  
30 “Remove Direct Bury Cable,” per linear foot.

31  
32 This work shall include all coordination required with City of Tacoma Signal Shop crews  
33 to complete this work.

34  
35 “Install Junction Box”, per each.

36  
37 The unit Contract price per each for “Install Junction Box” shall be full pay for all work to  
38 remove the existing junction box, replacing or new placement of the junction box with a  
39 specified type as directed by the Engineer. The costs for this work shall include all  
40 handling, hauling, disposing furnishing, excavation and placing the junction box. Any  
41 work to restore facilities, such as but not limited to: providing conduit, rerouting conduit,  
42 pulling wire, reconnection the system and testing the system as directed by the Engineer  
43 shall be included in this bid time.

44  
45 “RRFB Assembly w/ Associated Signage, Wire, and Conduit,” per each.

46  
47 This work shall include all trenching, backfill, pavement restoration, conduit, wiring, and  
48 all other work associated with the installation of a complete functioning system not  
49 shown on the plans or included under a separate bid item.

50  
51 “PPB Assembly w/ Associated Signage, Wire, and Conduit,” per each.

52  
53 This work shall include all trenching, backfill, pavement restoration, conduit, wiring,  
54 button extensions, anchoring to existing post, and all other work associated with the



1 installation of a complete functioning system not shown on the plans or included under a  
2 separate bid item.

3  
4 The "Conduit Pipe \_\_\_ In. Diam" bid item has been revised to read:

5  
6 "Conduit Pipe 2 In. Diam.", per linear foot. The unit Contract price per linear foot for  
7 "Conduit Pipe 2 In. Diam." shall be full pay for furnishing all pipe, pipe connections,  
8 elbows, bends, caps, reducers, conduits, unions, and fittings; for placing the pipe in  
9 accordance with the above provisions, including all excavation, jacking, or drilling  
10 required, backfilling of any voids around casing, conduits, pits, or trenches; restoration of  
11 native vegetation disturbed by the operation, chipping of pavement, and bedding of the  
12 pipe; and all other Work necessary for the construction of the conduit, except that when  
13 conduit is included on any project as an integral part of an illumination, traffic signal, or  
14 ITS system, and the conduit is not shown as a pay item, it shall be included in the lump  
15 sum price for the system shown.

16  
17 **END OF SECTION**