

FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA	PROJECT NH0016(79)67	SHEET L1	TOTAL SHEETS L28
PLOTING DATE: 11-12-15			

# SECTION L - SIGNAL & LIGHTING PLANS

**WPE** WEST PLAINS ENGINEERING, INC.  
 1750 RAND ROAD • RAPID CITY, SD 57702  
 PHONE: (605) 348-7455 • FAX: (605) 348-9445  
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 RAPID CITY, SD • SIOUX FALLS, SD • CASPER, WY • CEDAR RAPIDS, IA  
 WPE #BR12026

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END NH 0016(79)67

Mt. Rushmore Rd.  
Station 103+76.67

END GRADING NH 0016(79)67

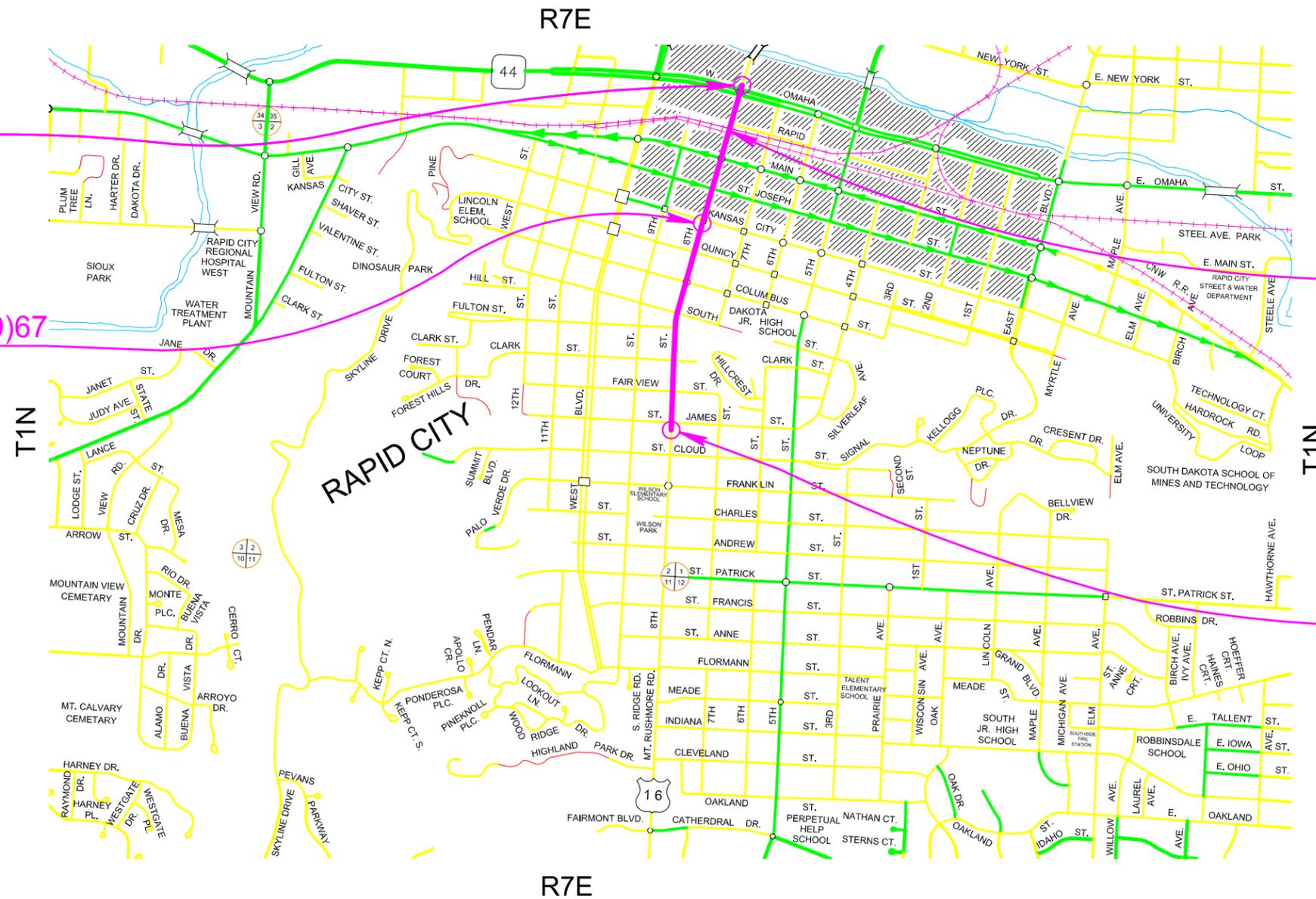
Mt. Rushmore Rd.  
Station 88+01.30

EXCEPTION

Station 99+85.55 to  
Station 101+84.57

BEGIN NH 0016(79)67

Mt. Rushmore Rd.  
Station 62+50.00



**SECTION L ESTIMATE OF QUANTITIES**

**FOR BIDDING PURPOSES ONLY**

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH 0016(79)67	L2	L28

PLOTTING DATE: 11-12-15  
REV: 12-30-15

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
110E1520	Remove Signal Equipment	Lump Sum	LS
110E1530	Remove Signal Pole Footing	9	Each
110E1540	Remove Luminaire Pole Footing	12	Each
110E1570	Remove Pedestrian Push Button Pole	1	Each
110E5100	Salvage Luminaire Pole	12	Each
110E5110	Salvage Signal Equipment	Lump Sum	LS
250E0010	Incidental Work	Lump Sum	LS
635E0900	Decorative Luminaire Pole	12	Each
635E0910	Decorative Luminaire Arm	12	Each
635E2362	Decorative Signal Pole with 20' Mast Arm and Luminaire Arm	2	Each
635E2368	Decorative Signal Pole with 40' Mast Arm and Luminaire Arm	1	Each
635E2372	Decorative Signal Pole with 50' Mast Arm and Luminaire Arm	1	Each
635E3450	Decorative Luminaire, 150 Watt with Photoelectric Cell	12	Each
635E3460	Decorative Luminaire, 400 Watt with Photoelectric Cell	16	Each
635E4030	3 Section Vehicle Signal Head	12	Each
635E4040	4 Section Vehicle Signal Head	4	Each
635E5020	2' Diameter Footing	96.0	Ft
635E5030	3' Diameter Footing	47.0	Ft
635E5301	Type 1 Electrical Junction Box	2	Each
635E5302	Type 2 Electrical Junction Box	23	Each
635E5303	Type 3 Electrical Junction Box	4	Each
635E5304	Type 4 Electrical Junction Box	8	Each
635E5400	Electrical Service Cabinet	2	Each
635E5400	Electrical Service Cabinet	4	Each
635E5430	Traffic Signal Controller	1	Each
635E5500	Meter Socket	2	Each
635E5500	Meter Socket	4	Each
635E5515	Signal Head Battery Backup and Flash System	1	Each
635E5530	Preformed Detector Loop	18	Each
635E5550	Detector Unit	6	Each
635E5562	Siren Emergency Vehicle Preemption System	1	Each
635E5900	Pedestrian Push Button	8	Each
635E5910	Pedestrian Push Button Pole	8	Each
635E5922	Pedestrian Signal Head with Countdown Timer	8	Each
635E5930	Pedestrian Crossing Sign	8	Each
635E6200	Miscellaneous, Electrical	Lump Sum	LS
635E8120	2" Rigid Conduit, Schedule 40	185	Ft
635E8120	2" Rigid Conduit, Schedule 40	6,345	Ft
635E8140	4" Rigid Conduit, Schedule 40	20	Ft
635E8220	2" Rigid Conduit, Schedule 80	105	Ft
635E8220	2" Rigid Conduit, Schedule 80	1,370	Ft
635E8230	3" Rigid Conduit, Schedule 80	260	Ft

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
635E8240	4" Rigid Conduit, Schedule 80	120	Ft
* 635E9012	1/C #2 AWG Copper Wire	30	Ft
635E9012	1/C #2 AWG Copper Wire	60	Ft
635E9014	1/C #4 AWG Copper Wire	1,185	Ft
635E9016	1/C #6 AWG Copper Wire	15,255	Ft
* 635E9018	1/C #8 AWG Copper Wire	14,265	Ft
* 635E9020	1/C #10 AWG Copper Wire	335	Ft
635E9020	1/C #10 AWG Copper Wire	9,130	Ft
635E9504	4/C #14 AWG Copper Tray Cable, K2	1,790	Ft
635E9507	7/C #14 AWG Copper Tray Cable, K2	460	Ft
635E9524	24/C #14 AWG Copper Tray Cable, K2	560	Ft
635E9600	#16 AWG Copper Twisted Shielded Pair	975	Ft
635E9710	2/C #10 AWG Copper Pole and Bracket Cable	920	Ft
635E9948	48 Strand Fiber Optic Cable	3,090	Ft

\* - Denotes Non-Participating

**SHOP DRAWING AND CATALOG CUTS SUBMITTALS**

The Contractor shall submit shop drawings and catalog cuts in accordance with Section 985 of the Standard Specifications or in Adobe PDF format.

Adobe PDF submittals shall be sent to the following email addresses:

[John.Less@state.sd.us](mailto:John.Less@state.sd.us)  
[Pete.Longman@state.sd.us](mailto:Pete.Longman@state.sd.us)

**REMOVE SIGNAL EQUIPMENT**

All existing signal equipment removed and not salvaged by the SDDOT shall become the property of the Contractor.

All costs for work involved in the removal of existing signal equipment shall be incidental to the contract lump sum price for "Remove Signal Equipment".

**SALVAGE SIGNAL EQUIPMENT**

Salvaged equipment shall be delivered to the City. Contact City for desired equipment, equipment not wanted by City shall be disposed of by Contractor

Remaining salvaged signal equipment shall be delivered to the City of Rapid City by the Contractor. The Contractor shall notify the City 5 days before the delivery of the salvaged signal equipment. The City contact is Traffic Operations at (605)394-4118.

All costs for work involved in the salvage and delivery of the existing signal equipment shall be incidental to the contract lump sum price for "Salvage Signal Equipment".

**REMOVE SIGNAL POLE FOOTING**

The footings of existing signal poles EG1-EG4 and ES1-ES5 shall be removed by the Contractor. Restoration of the disturbed area shall be to the satisfaction of the Engineer.

All costs for removing the footings of the existing signal poles shall be incidental to the contract unit price per each for "Remove Signal Pole Footing".

**SALVAGE LUMINAIRE POLE**

Existing luminaire poles EL12-EL23 shall be salvaged and delivered to the City of Rapid City by the Contractor. The Contractor shall notify the City 5 days before the delivery of the salvaged luminaire poles. The City contact is Traffic Operations at (605)394-4118.

All costs for work involved in the salvage and delivery of the existing luminaire poles shall be incidental to the contract unit price per each for "Salvage Luminaire Pole".

**REMOVE LUMINAIRE POLE FOOTING**

The footings of existing luminaire poles EL12-EL23 shall be removed by the Contractor to a minimum of 2' below the ground surface. Restoration of the disturbed area shall be to the satisfaction of the Engineer.

All costs for removing the footings of the existing luminaire poles shall be incidental to the contract unit price per each for "Remove Luminaire Pole Footing."

**TABLE OF FOOTING DATA**

Site Designation	Footing Diameter	* Footing Depth	**Spiral Diameter	**Spiral Length	Vertical Reinforcement
L36-L47	2' - 0"	8' - 0"	1' - 8"	54' - 9"	8-#7 x 7' - 6"
G1	3' - 0"	13' - 0"	2' - 8"	129' - 3"	14-#8 x 12' - 6"
G2, G4	3' - 0"	11' - 0"	2' - 8"	112' - 6"	14-#8 x 10' - 6"
G3	3' - 0"	12' - 0"	2' - 8"	120' - 3"	14-#8 x 11' - 6"

\* Footing depth shall be below ground level.

\*\* The size of all spirals shall be #3.

## FOOTING DATA

The subsurface conditions along US 16/Mt. Rushmore Road through Rapid City consist of a brown silt-clay from 0' – 14.5'. Groundwater was not encountered. Borings remained open to the bottom of the borehole initially with some caving at 13.8' or deeper the following day.

Borings were located in all four corners of the intersection of US 16/Mt. Rushmore Road and Columbus Street and were completed to 17' (1978) below the surface. The subsurface conditions at this intersection on the east corners consist of a brown silt-clay from 0' – 3.5' overlying a brown to red-brown sand silt-clay from 3.5' – 17'. The subsurface conditions at the west corners consist of a brown silt-clay from 0' – 8' overlying a brown to red-brown sand silt-clay from 8' – 17'. Neither groundwater nor the depth to caving was noted at the time of the investigation.

Concrete placement operations should closely follow excavation procedures during construction. The longer the excavations are left open the more likely caving may occur.

Concrete shall not be dropped through standing water. If water is present in the excavation it shall be removed prior to concrete placement or the concrete shall be tremied.

The boring logs and laboratory tests are available for review at the Central Office in Pierre. If questions arise or additional information is needed concerning the cylindrical footings contact the Geotechnical Engineering Activity in Pierre at 605.773.3401.

## POLE LOCATIONS

Signal poles and luminaire poles shall be located as indicated on plan sheets. Pole footings shall have a 5' horizontal clearance from utility lines where possible. A vertical distance of 18' shall be maintained from all overhead utility lines where possible. The Contractor shall contact the Project Engineer before moving specified signal pole and luminaire pole locations.

## BREAKAWAY BASES

A statement is required, signed by a Professional Engineer registered in the State of South Dakota, certifying that the breakaway base devices meet the design requirements, including breakaway and structural adequacy, of the "AASHTO Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals". The physical testing procedures outlined in Section 8 of the Fifth Edition of the Aluminum Association's "Specifications for Aluminum Structures" may be used to establish service limits for structural adequacy certification of aluminum breakaway transformer bases and frangible couplings. If requested, test data of production samples to support the certification shall be provided.

## DECORATIVE LUMINAIRE POLES

Decorative Luminaire Poles L36-L47 shall be 40' fluted tapered steel poles with banner arms, clamshell base, and duplex festoon receptacle (20 amp, 3 wire) suitable for outdoor use with in use cover. The decorative luminaire poles shall have a bronze finish.

The following poles **or equivalent** meets the requirements:

- a.) Holophane: Pole Model Number RFD125859  
Arm Model Number BHC72  
Clamshell Model Number AT22CSBCABZ
- b.) Sternberg: Pole Model Number SRTF9300  
Arm Model Number CAS6  
Clamshell Model Number 9201SS

## DECORATIVE SIGNAL POLES

Decorative Signal Poles G1-G4 shall be 50' fluted tapered steel poles with smooth rotatable mast arms and clamshell base. The decorative signal poles shall have a bronze finish. Luminaire extension(s) shall have a 50 Ft. mounting height with 6 Ft. arm. Poles may require two fluted mounting brackets to properly fit the shaft.

The following poles **or equivalent** meets the requirements:

- a.) Valmont: Pole Model Number CB16  
Clamshell Model Number HNxx-AC

## LUMINAIRES

The accepted design for the roadway luminaires L36-L47 shall provide 1.2 and greater average maintained foot-candles and a uniformity ratio (average maintained to minimum maintained foot-candles) of 3:1 and less using the following parameters:

Setback:	3 Ft.
Lamp Loss Factor (LLF):	0.7
Width of Lighted Area:	65 Ft.
Spacing:	180 Ft.
Configuration:	Staggered
Mounting Height:	40 Ft. & 16 Ft.
Lamp:	400W HPS & 150W HPS

The following luminaires meet the design requirements for the roadway luminaires and the luminaire extensions on the signal poles:

- a.) Holophane: Test No. ESU400HP00X4.IES High Pressure Sodium, Short, Cutoff, Type III
- b.) Holophane: Test No. GV15AHP00XX.IES High Pressure Sodium, Short, Non-cutoff, Type III
- c.) Sternberg: Test No. 1-1914A-CCA6-240V-400HPS-HPS400/MOG/ED18/R1/FHD-BK High Pressure Sodium, Short, Cutoff, Type III
- d.) Sternberg: Test No. 1-A850A-B7-6236PM-240V-150HPS-HPS150/MED-BK High Pressure Sodium, Short, Non-cutoff, Type III

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Three copies of the isofotcandle charts and utilization curves shall be furnished to the Engineer for approval. The Contractor must get approval from the Engineer prior to installation of the luminaires.

The approved isofotcandle data for each case shall be used to determine the correct socket position at each site. Each luminaire shall be installed with its lamp socket in the proper position and in a level attitude.

Luminaire arms for the 150W luminaires shall be incidental to the "Decorative Luminaire, 150 Watt with Photoelectric Cell" bid item.

## CONDUIT INSTALLATION

Each end of each conduit shall be marked with a ½-inch dia. x 12-inch long reinforcing bar driven flush with the finished grade, except when the conduit end terminates inside a junction box. The ends of each conduit run shall be capped to prevent water and soil from entering. This work shall be done by the Lighting Contractor and shall not be disturbed by the Grading Contractor.

The Contractor shall install conduit behind fire hydrants and in front of sanitary cleanouts where possible.

## TRAFFIC SIGNAL METER SOCKETS

The meter sockets provided for traffic signals by the Contractor shall be a 200 amp, positive by-pass.

## SECONDARY SERVICE DISCONNECT

The Contractor shall install an additional Nema 3R rainproof, 60 amp rated, non-fused safety switch (with lock) adjacent to the traffic signal cabinet. The disconnect shall be mounted on a galvanized steel post in accordance with Standard Plate 635.41.

All costs for work involved with furnishing and installing the Secondary Service Disconnect shall be incidental to the contract unit price per each for "Electrical Service Cabinet".

## SIGNAL AIMING

Signals shall be aimed and trees shall be trimmed such that all the signals for each approach shall be continuously visible for the minimum distance listed in the table in Section 4D.12 of the MUTCD.

## **SIGNAL BACKPLATES**

Signal backplates shall extend not less than 5 inches at the top, bottom, and sides. The bottom of the backplate on vehicle signal faces mounted directly above pedestrian signal indications shall be sized to permit the separate adjustment of the vehicle and pedestrian signal indication and may be less than 4 inches. All backplates shall have a dull black finish.

Signal backplates shall be polycarbonate. Signal backplates for 5-section heads shall be louvered.

## **TRAFFIC SIGNAL CONTROLLER**

Vehicle detectors E25-E30, N16-N18, S19-S21 & W25-W30 shall operate in the presence (non-locking) mode and shall have call delay timing capability. The call delay feature shall be inhibited by the controller. Set these detectors to 3 seconds delay.

The Contractor is responsible for programming the controller with the signal timings provided in these plans.

All costs for constructing the concrete pad and footing, materials, labor, and furnishing and installing the controller cabinet shall be incidental to the contract unit price per each for "Traffic Signal Controller".

## **CONTROLLER PROGRAMMING**

The Contractor shall furnish the Road Design Office with a copy of the data programmed into all controllers prior to the full operation of the controller for approval. The address is as follows:

John Less  
Traffic Design Engineer  
Office of Road Design  
700 East Broadway  
Pierre, SD 57501

## **TRAFFIC SIGNAL INTERCONNECTION**

The Contractor shall install managed Gigabit Ethernet communication for the traffic signal controller at the US16/Mount Rushmore Rd & Columbus St intersection. The new controller shall be programmed with coordination plans provided.

All costs for programming and establishing managed Gigabit Ethernet communication for the traffic signal controller shall be incidental to the contract unit price per each for "Traffic Signal Controller".

## **TRAFFIC SIGNAL CONTROL CABLE LABELS**

Traffic signal cable shall be identified in hand holes, junction boxes, pedestal bases, electrical service cabinets, and controller cabinets as indicated on the Wiring Diagram. Labels shall be wrapped around traffic signal cable to indicate the signal pole and signal head that it is connected to. Labels shall be self-adhesive vinyl cloth with a preprinted legend. Traffic signal control cables to the poles shall be marked with a legend and shall be color coded as follows; northwest (blue), northeast (red), southeast (green), and southwest (orange).

## **BATTERY HOUSING AND FLASH SYSTEM**

The Contractor shall supply a cabinet with concrete pad and footing for housing the battery backup at the traffic signal controller. The cabinet shall be aluminum NEMA 3R type. The cabinet shall be securely attached to the footing underneath it and to the side wall of the controller cabinet.

All work involved in supplying and installing the riser units shall be incidental to the contract unit price per each for "Signal Head Battery Backup and Flash System".

## **FIBER OPTIC CABLE**

The fiber optic cable shall be a 48 strand singlemode fiber optic cable with each buffer containing six fibers. The buffer tubes shall be color coded according to EIA/TIA specifications.

Fiber optic cable provided on this project shall meet the latest applicable EIA/TIA Specifications for multimode and REA PE-90 Specifications for single mode. All fiber optic cable shall be rated for outdoor use.

Singlemode optical cable shall have the following optical and physical characteristics:

1. Cladding diameter of 125µm +/- 2µm.
2. Zero dispersion slope shall be 0.092 ps/ (nm<sup>2</sup>•km) or less.
3. Zero dispersion wavelength, 1300 to 1322 nm.
4. Cutoff wavelength, less than 1250 nm.
5. Maximum attenuation at 1310 nm shall be 0.4 dB per Kilometer.
6. The outside diameter shall be less than 22.1 nm.
7. One factory fusion splice per kilometer per fiber shall be allowed.

The fiber optic cable shall have a seven-core configuration, dielectric central strength member, and thermoplastic tubes. The minimum bending radii of the cable shall be 209.5 mm under a static load and 419.1 mm during installation. The installation tensile load rating shall be 2.7 kPa.

The cable core interstices shall be filled with water blocking material. If a gel compound is used, the gel compound shall be readily removable with a nontoxic solvent.

Fiber optic cable shall be terminated in the controller cabinet with a wall mounted distribution enclosure. The distribution enclosure shall be dust and moisture resistant. The size of the distribution enclosure shall be adequate for the number of fibers to be used. The distribution enclosure shall be mounted in the controller cabinet where it does not interfere with normal cabinet maintenance. The fiber optic cable shall be prepared in accordance with the manufacturer's recommendations and have sufficient length to reach the interface panel. Only fibers needed to operate the equipment plus two spare shall be terminated with LC connectors with less than 0.4 dB loss for singlemode. The connector loss after 1000 matings shall be less than 0.2 dB. The connector return loss shall not be greater than 45 dB for singlemode. All other fibers shall be capped and sealed in accordance with the manufacturer's recommendations.

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PLOTTING DATE: 11-12-15

The fiber optic cable shall be installed in accordance with the manufacturer's recommendations and the NEC. Slack cable shall be left in each controller and junction box. All junction boxes except for the junction box at the controller shall have 20' of slack. Controller cabinets shall have 5' of slack. Slack cable shall be coiled and tied in a minimum of three places around the coil. No splices shall be allowed in the fiber optic cable except in the controllers. Splices shall be of the epoxy/polish type.

The contractor shall test the fiber optic cable after the installation to verify the integrity of the fiber.

The supplier of the fiber optic cable shall supervise the installation and testing of the fiber optic cable. The supplier of the fiber optic cable shall provide training to personnel of the City in the installation and maintenance of the fiber optic cable.

## **FIBER OPTIC ETHERNET SWITCH**

The Contractor shall supply a fully managed fiber optic Ethernet switch at the existing Kansas City St. traffic signal controller. The switch shall have a minimum of 9 ports.

All costs for work involved in connecting the new switch shall be incidental to the contract lump sum price for "Miscellaneous, Electrical".

## **DETECTOR LOOP WIRE SPLICING**

Standard Plate 635.77, step 4 indicates methods for environmentally sealing the detector loop wire splice. The sealing connector shall be 3M Scotchcast 3570G or equal.

## **TREE TRIMMING FOR ROADWAY LIGHTING**

Tree trimming may be necessary between station 71+50 and 75+50. Refer to Standard Plate 635.99 for additional information.

## **ON-SITE INSPECTION**

An on-site inspection of the traffic signal shall be conducted before acceptance of the project, once the traffic signal is completed and operational. The on-site inspection shall be conducted by the Contractor, Region Traffic Engineer, City of Rapid City Traffic Engineer, Project Engineer, and the Traffic Design Engineer.

## **SUPPLYING AS BUILT PLANS**

If the traffic signal systems or roadway lighting systems are constructed differently than what is stated in the plans, the Contractor shall supply as built plans to the Engineer and a copy shall be sent to the Traffic Design Engineer and to the City of Rapid City Public Works Department. The as built plans may include conduit layouts, wiring diagrams, or other drawings depicting the changes from the original plans.

# TABLE OF CONDUIT AND CABLE QUANTITIES FOR BIDDING PURPOSES ONLY

Location to Location	Rigid Conduit								Copper Wire								Copper Tray Cable, K2			Twisted Shielded Pair		Pole and Bracket Cable		Preemption Cable (NABI)		Fiber Optic Cable		PLOTING DATE: 11-12-15 REV: 12-30-15	
	Schedule 40				Schedule 80												#14 AWG												
	2"	2"	4"	2"	2"	3"	4"	1/C #2 AWG	1/C #2 AWG	1/C #4 AWG	1/C #6 AWG	1/C #8 AWG	1/C #10 AWG	1/C #10 AWG	4/C	7/C	24/C	#16 AWG			2/C #10 AWG		PC		48 Strand				
	P	NP	P	P	NP	P	P	P	NP	P	NP	P	NP	P	P	P	P	P		P		P		P					
Ft																													
<b>FIBER</b>																													
JF12	JF13	145			60																					230			
JF13	JF14	460			45																					530			
JF14	JF15	455			105																					585			
JF15	JF16	480			50																					555			
JF16	JF17				125																					300			
JF17	CONTROLLER G	5																								50			
JF16	JF18	330			70																					425			
JF18	JF19	315			75																					415			
<b>LIGHTING &amp; RECEPTACLES</b>																													
L37	JL58	5									30	30	10																
JL58	JL59	60			55						375	375	125																
JL59	SERVICE CABINET LF	10									90		15																
JL59	SERVICE CABINET RF		10										15																
JL59	JL62	250									780	780	260																
JL62	L39	5									30	30	10																
JL62	JL64	330			45						1155	1155	385																
JL64	L41	5									30	30	10																
JL59	JL60				100						330	660	110																
JL60	JL57	245			55						930	930	310																
JL57	L36	5									30	30	10																
JL60	JL61	55									180	360	60																
JL61	L38	5									30	30	10																
JL61	JL63	340			35						1155	2310	385																
JL63	L40	5									30	30	10																
JL63	J14				50							180	60																
JL63	J15				55							195	65																
L43	JL66	5									30	30	10																
JL66	JL68	340									1050	1050	350																
JL68	JL69				125						405	405	135																
JL69	SERVICE CABINET LG	25									210		35																
JL69	SERVICE CABINET RG		25										35																
JL69	JL67	160									510	510	170																
JL67	L44	5									30	30	10																
JL67	JL65	305			45						1080	1080	360																
JL65	L42	5									30	30	10																
JL69	JL70				85						285	285	95																
JL70	JL73	320			75						1215	1215	405																
JL70	JL71				105								115																
JL73	L46	5									30	30	10																
JL68	JL71				60						210	210	70																
JL71	JL72	230									720	720	240																
JL72	L45	5									30	30	10																
JL72	JL74	315			55						1140	1140	380																
JL74	L47	5									30	30	10																
JL74	JL75	295									915		300																
JL75	EL24	5									30		10																
BHP TRANSFORMER	METER LG	10											20																
BHP TRANSFORMER	METER SG	10											20																
BHP TRANSFORMER	METER RG		10										20																
METER LG	SERVICE CABINET LG	5									15																		
METER SG	SERVICE CABINET SG	5									15																		
METER RG	SERVICE CABINET RG		5									15																	
<b>Subtotal:</b>		5,565	50	0	1,370	105	0	0			30	15	0	13,125	14,265	7,270	195			0	0	0				0		3,090	





# EXISTING SIGNAL LAYOUT

## MT. RUSHMORE ROAD & COLUMBUS ST.

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STATE OF SOUTH DAKOTA	PROJECT NH0016(79)67	SHEET L8	TOTAL SHEETS L28
PLOTTING DATE: 11-12-15			

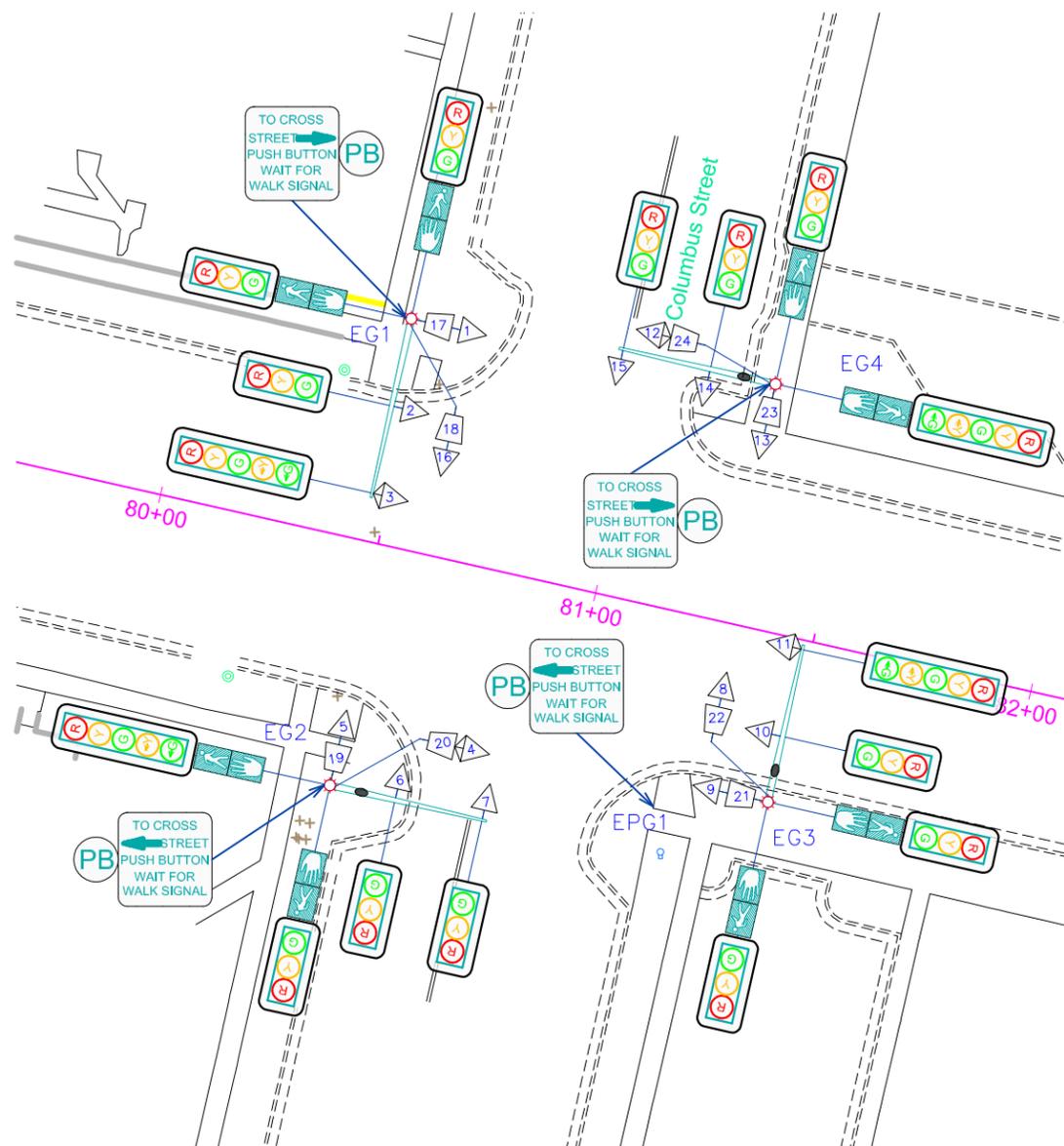
**WPE** WEST PLAINS ENGINEERING, INC.  
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WPE #BR12026

REMOVE SIGNAL EQUIPMENT	
KEY	ITEM
	PEDESTRIAN SIGNAL HEAD (17-24)
	PEDESTRIAN CROSSING SIGN

SALVAGE EQUIPMENT	
KEY	ITEM
	SIGNAL POLE W/ MAST ARM (EG1)
	SIGNAL POLE W/ MAST ARM & LUMINAIRE EXT. (EG2-EG4)
	ROADWAY LUMINAIRE, 400W WITH P.E. (EG2-EG4)
	3 SECTION VEHICLE SIGNAL HEAD (1, 2, 5-10, 13-16)
	5 SECTION VEHICLE SIGNAL HEAD (3, 4, 11, 12)
	PEDESTRIAN PUSH BUTTON
	TRAFFIC SIGNAL CONTROLLER

ESTIMATE OF QUANTITIES			
KEY	ITEM	EST. QUANT.	UNIT
	REMOVE SIGNAL EQUIPMENT	LUMP SUM	LS
	REMOVE SIGNAL POLE FOOTING (EG1-EG4)	4	EACH
	REMOVE PEDESTRIAN PUSH BUTTON POLE (EPG1)	1	EACH
	SALVAGE SIGNAL EQUIPMENT	LUMP SUM	LS



SCALE:  
1" = 40'



11-12-15 k:\2012\BR12026 - Mt. Rushmore Road-Phase III\BR12026E.dwg

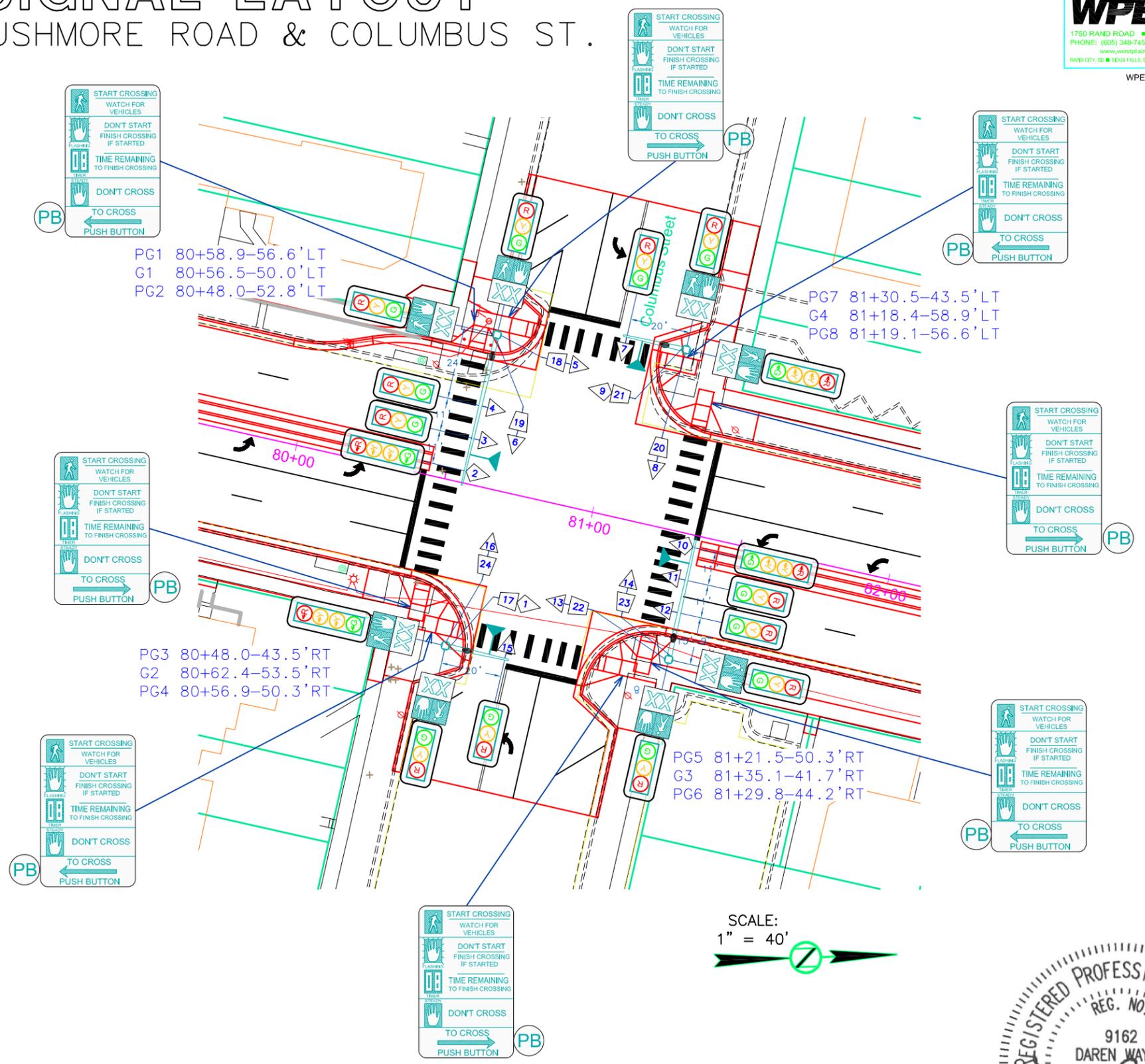
# SIGNAL LAYOUT

## MT. RUSHMORE ROAD & COLUMBUS ST.

FOR BIDDING PURPOSES ONLY

**WPE WEST PLAINS ENGINEERING, INC.**  
 1750 RAND ROAD • RAPID CITY, SD 57702  
 PHONE: (605) 348-7455 • FAX: (605) 348-9445  
 www.westplainsengineering.com  
 RAPID CITY, SD • SIOUX FALLS, SD • CASPER, WY • CEDAR RAPIDS, IA  
 WPE #BR12026

ESTIMATE OF QUANTITIES			
KEY	ITEM	QTY	UNIT
	DECORATIVE SIGNAL POLE W/ 20' MAST ARM & LUMINAIRE ARM (G2, G4)	2	EACH
	DECORATIVE SIGNAL POLE W/ 40' MAST ARM & LUMINAIRE ARM (G3)	1	EACH
	DECORATIVE SIGNAL POLE W/ 50' MAST ARM & LUMINAIRE ARM (G1)	1	EACH
	DECORATIVE LUMINAIRE, 400W WITH P.E. CELL (G1-G4)	4	EACH
	3 SECTION VEHICLE SIGNAL HEAD (3-8, 11-16)	12	EACH
	4 SECTION VEHICLE SIGNAL HEAD (1,2,9,10)	4	EACH
	SIGNAL HEAD BATTERY BACKUP AND FLASH SYSTEM	1	EACH
	SIREN EMERGENCY VEHICLE PREEMPTION SYSTEM (4-CHANNEL)	1	EACH
	SIREN DETECTOR (NOT A BID ITEM)	4	EACH
	PEDESTRIAN PUSH BUTTON	8	EACH
	PEDESTRIAN PUSH BUTTON POLE (PG1-PG8)	8	EACH
	PEDESTRIAN SIGNAL HEAD WITH COUNTDOWN TIMER (17-24)	8	EACH
	PEDESTRIAN CROSSING SIGN (R10-3e) (LEFT-4/RIGHT-4)	8	EACH



SCALE:  
1" = 40'

REGISTERED PROFESSIONAL ENGINEER  
 REG. NO. 9162  
 DAREN WAYNE BECKLOFF  
 SOUTH DAKOTA  
 11/12/15

# CONDUIT LAYOUT

## MT. RUSHMORE ROAD

FOR BIDDING PURPOSES ONLY

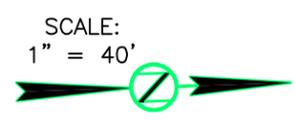
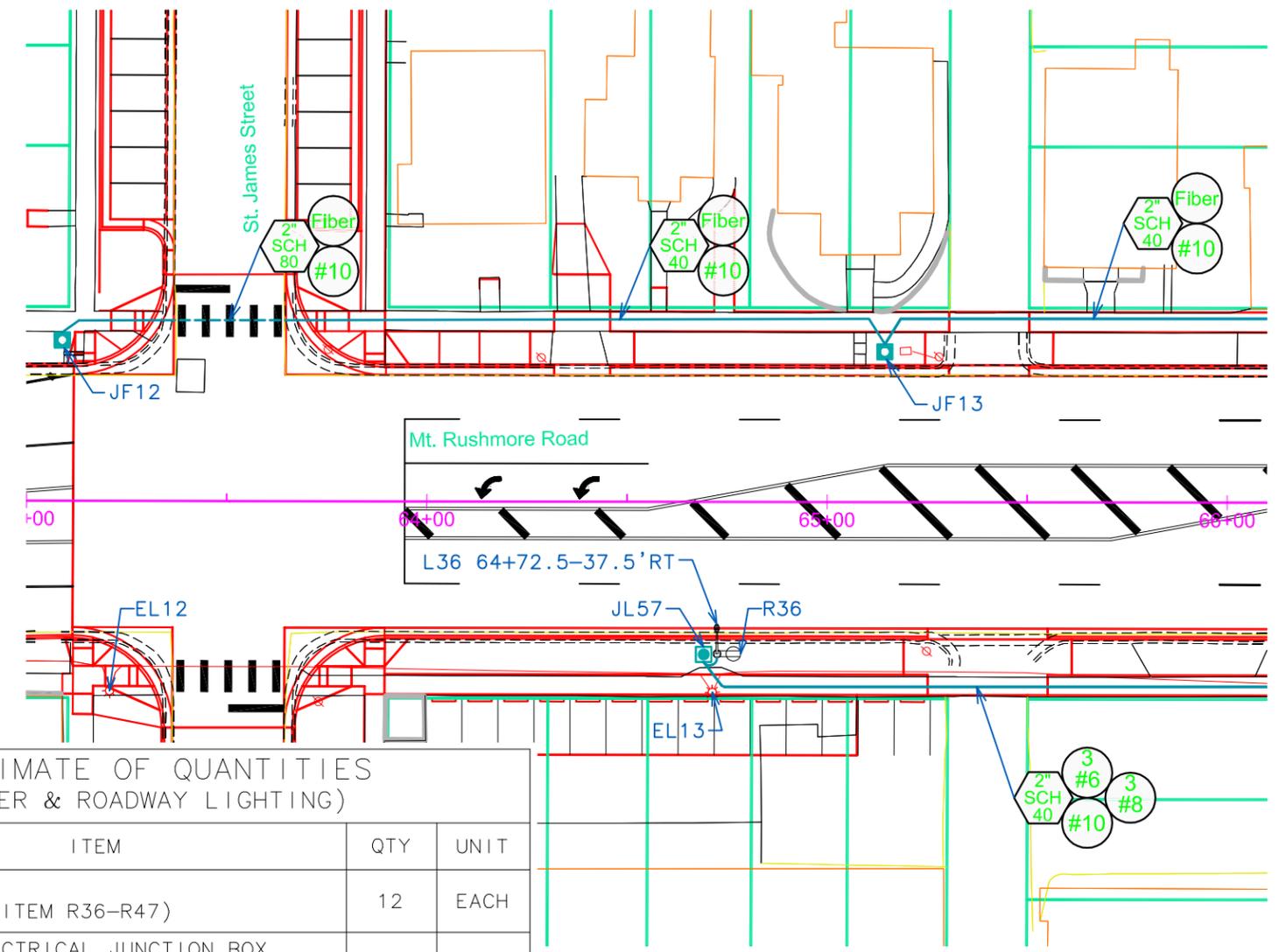
STATE OF SOUTH DAKOTA	PROJECT NH0016(79)67	SHEET L10	TOTAL SHEETS L28
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PLOTTING DATE: 11-12-15  
REV: 12-30-15 DWB

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KEY	ITEM	QTY	UNIT
☀	REMOVE SIGNAL EQUIPMENT (ES1-ES5)	LUMP SUM	LS
☀	SALVAGE SIGNAL EQUIPMENT (ES1-ES5)	LUMP SUM	LS
☀	REMOVE SIGNAL POLE FOOTING (ES1-ES5)	5	EACH
☀	SALVAGE LUMINAIRE POLE (EL12-EL23)	12	EACH
☀	REMOVE LUMINAIRE POLE FOOTING (EL12-EL23)	12	EACH
☛	DECORATIVE LUMINAIRE POLE (L36-L47)	12	EACH
☛	DECORATIVE LUMINAIRE ARM (L36-L47)	12	EACH
●	DECORATIVE LUMINAIRE 400W WITH P.E.-40FT MOUNTING HEIGHT (L36-L47)	12	EACH
●	DECORATIVE LUMINAIRE 150W WITH P.E.-16FT MOUNTING HEIGHT (L36-L47)	12	EACH
○	2' DIAMETER FOOTING (L36-L47)	96	FT
◻	TYPE 2 ELECTRICAL JUNCTION BOX (JL57-JL75)	19	EACH
◻	TYPE 4 ELECTRICAL JUNCTION BOX (JF12-JF19)	8	EACH
▲	ELECTRICAL SERVICE CABINET	3	EACH
2" SCH 40	2" RIGID CONDUIT, SCHEDULE 40	5860	FT
2" SCH 80	2" RIGID CONDUIT, SCHEDULE 80	1370	FT
#2	1/C #2 AWG COPPER WIRE	45	FT
#6	1/C #6 AWG COPPER WIRE	14145	FT
#10	1/C #10 AWG COPPER WIRE	8120	FT
	2/C #10 AWG COPPER POLE & BRACKET CABLE	660	FT
Fiber	48 STRAND FIBER OPTIC CABLE	3090	FT
M	METER SOCKET	3	EACH
#4	1/C #4 AWG COPPER WIRE	1020	FT

KEY	ITEM	QTY	UNIT
⊖	*RECEPTACLE (NOT A BID ITEM R36-R47)	12	EACH
◻	*TYPE 1 ELECTRICAL JUNCTION BOX (J14-J15)	2	EACH
▲	*ELECTRICAL SERVICE CABINET	2	EACH
2" SCH 40	*2" RIGID CONDUIT, SCHEDULE 40	185	FT
2" SCH 80	*2" RIGID CONDUIT, SCHEDULE 80	105	FT
#2	*1/C #2 AWG COPPER WIRE	30	FT
#8	*1/C #8 AWG COPPER WIRE	14265	FT
#10	*1/C #10 AWG COPPER WIRE	335	FT
M	*METER SOCKET	2	EACH



**NOTE:**

CONTRACTOR IS RESPONSIBLE FOR INSTALLING ALL CONDUIT, LIGHTING, AND SIGNAL EQUIPMENT WITHIN THE ROW. SOME CONDUIT MAY BE SHOWN SPACED AND SEPARATED FOR CLARITY PURPOSES.

ALL CONDUITS ARE 2", SCHEDULE 40, UNLESS NOTED OTHERWISE.

CAREFULLY COORDINATE TRENCHING WITH SEWER, WATER AND IRRIGATION LINES. HAND DIG WHERE NECESSARY, ADJUST JUNCTION BOXES AND FOOTING OFFSETS TOWARD CURB IF REQUIRED.

\* - DENOTES NON PARTICIPATING



12-30-15 k:\2012\BRI2026 - Mt. Rushmore Road-Phase III\BRI2026E.dwg

# CONDUIT LAYOUT

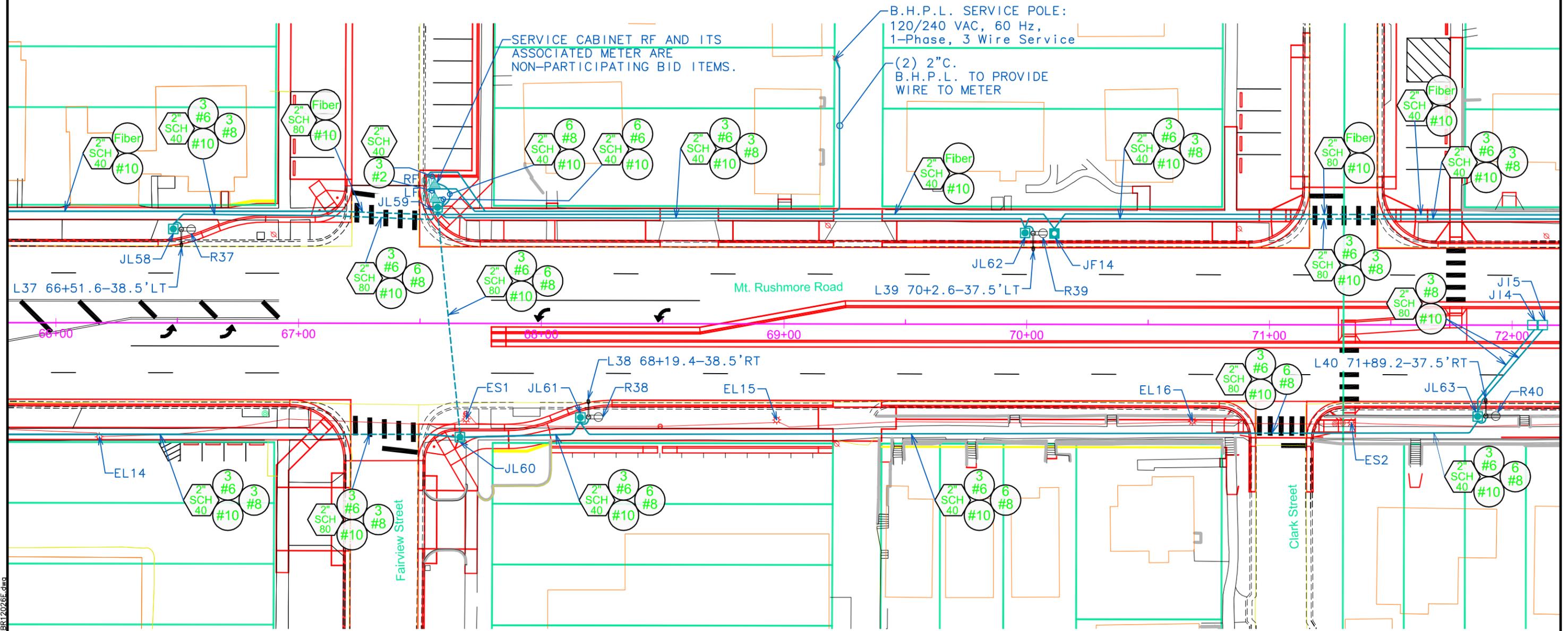
## MT. RUSHMORE ROAD

FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA	PROJECT NH0016(79)67	SHEET L11	TOTAL SHEETS L28
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PLOTTING DATE: 11-12-15

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 WPE #BR12026



SCALE:  
1" = 40'



**NOTE:**

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11-12-15 k:\2012\BR12026 - Mt. Rushmore Road - Phase III\BR12026E.dwg

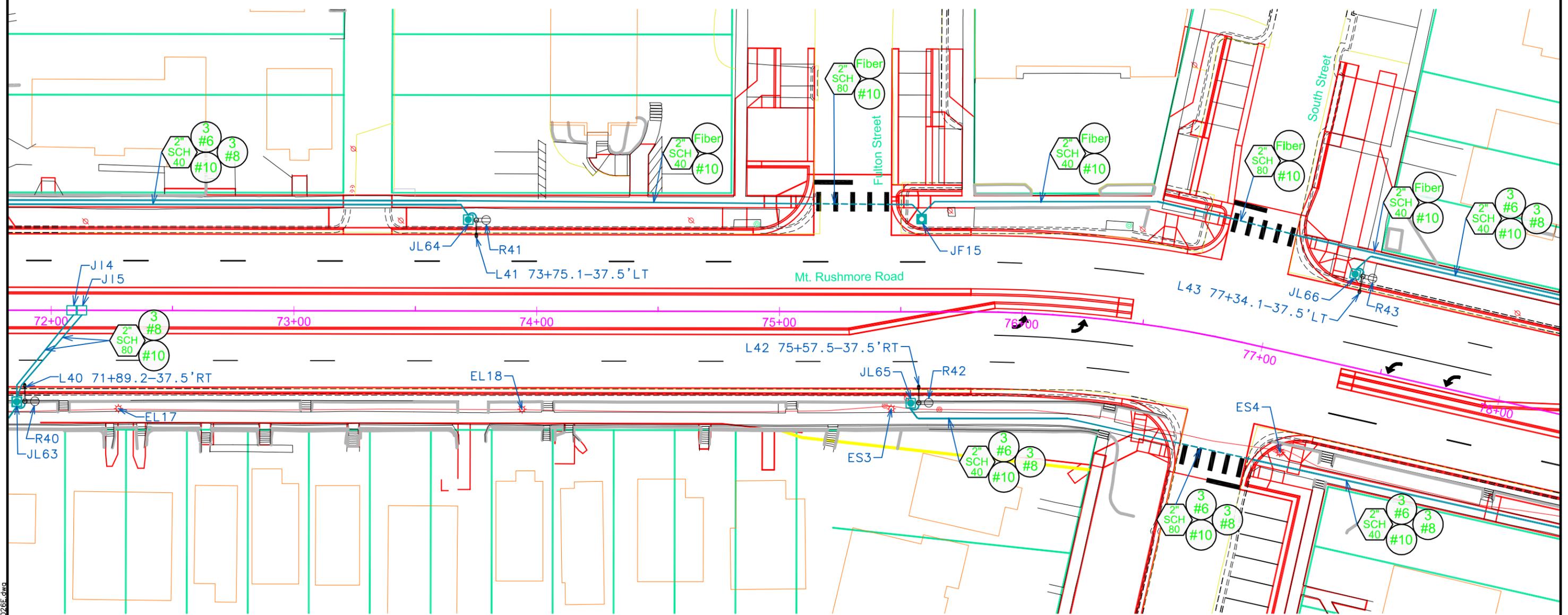
# CONDUIT LAYOUT

## MT. RUSHMORE ROAD

FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA	PROJECT NH0016(79)67	SHEET L12	TOTAL SHEETS L28
PLOTTING DATE: 11-12-15			

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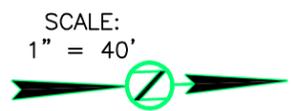


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11-12-15 k:\2012\BR12026 - Mt. Rushmore Road-Phase III\BR12026E.dwg

# CONDUIT LAYOUT

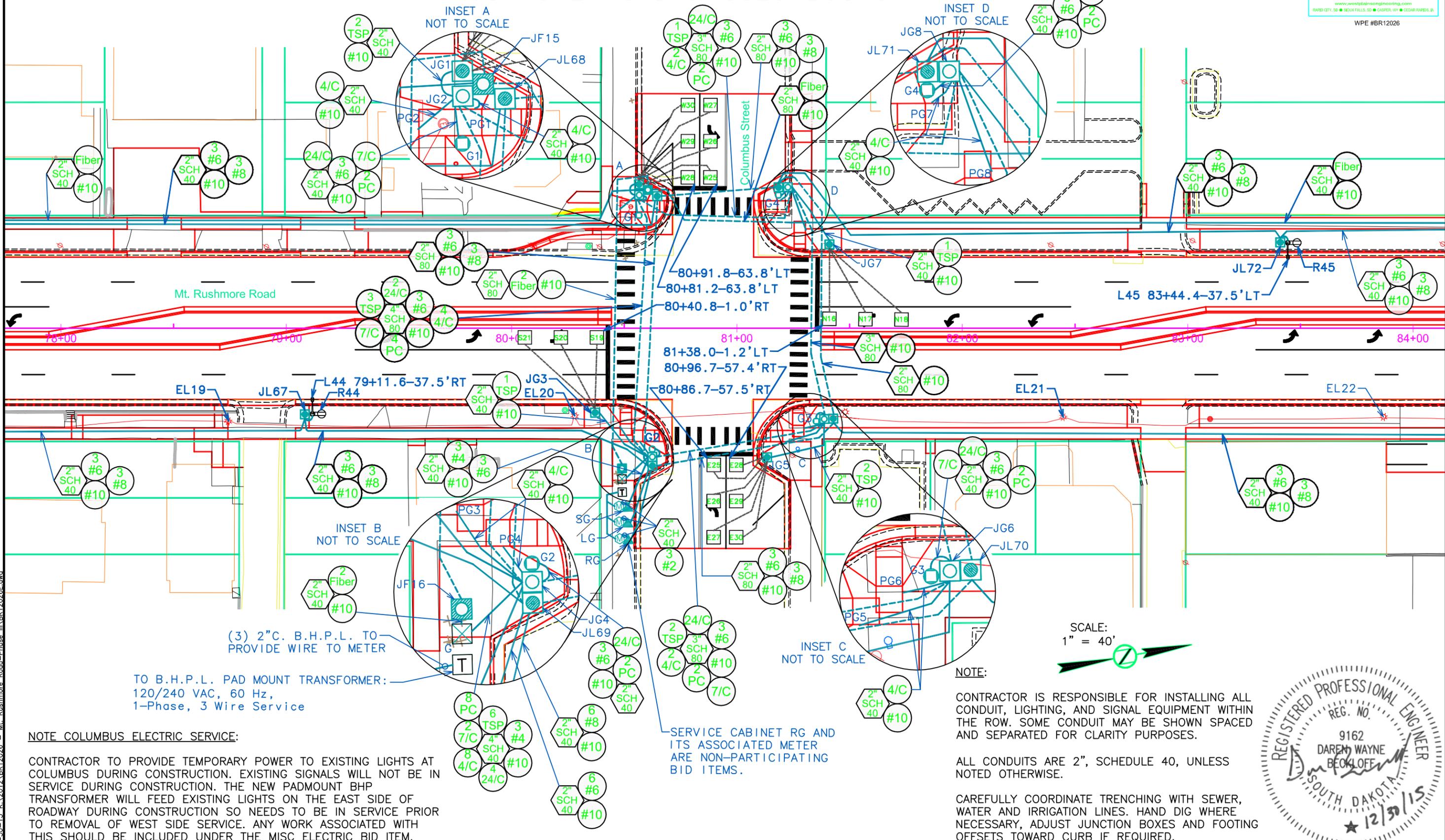
## MT. RUSHMORE ROAD & COLUMBUS ST.

FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA	PROJECT NH0016(79)67	SHEET L13	TOTAL SHEETS L28
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PLOTTING DATE: 11-12-15  
REV: 12-30-15 DWB

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WPE #BR12026



Mt. Rushmore Road

Columbus Street

EL19

JL67

L44 79+11.6-37.5'RT

R44

JG3

EL20

80+86.7-57.5'RT

JG5

EL21

EL22

80+91.8-63.8'LT

80+81.2-63.8'LT

80+40.8-1.0'RT

81+38.0-1.2'LT

80+96.7-57.4'RT

L45 83+44.4-37.5'LT

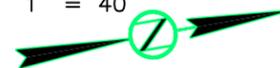
TO B.H.P.L. PAD MOUNT TRANSFORMER:  
120/240 VAC, 60 Hz,  
1-Phase, 3 Wire Service

**NOTE COLUMBUS ELECTRIC SERVICE:**

CONTRACTOR TO PROVIDE TEMPORARY POWER TO EXISTING LIGHTS AT COLUMBUS DURING CONSTRUCTION. EXISTING SIGNALS WILL NOT BE IN SERVICE DURING CONSTRUCTION. THE NEW PADMOUNT BHP TRANSFORMER WILL FEED EXISTING LIGHTS ON THE EAST SIDE OF ROADWAY DURING CONSTRUCTION SO NEEDS TO BE IN SERVICE PRIOR TO REMOVAL OF WEST SIDE SERVICE. ANY WORK ASSOCIATED WITH THIS SHOULD BE INCLUDED UNDER THE MISC ELECTRIC BID ITEM.

SERVICE CABINET RG AND ITS ASSOCIATED METER ARE NON-PARTICIPATING BID ITEMS.

SCALE:  
1" = 40'

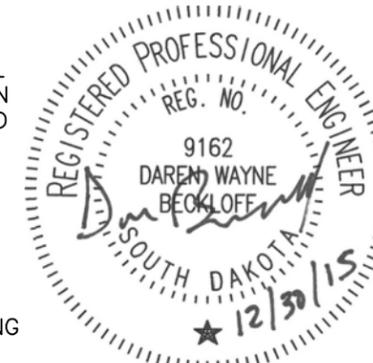


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12-30-15 k:\2012\BR12026 - Mt. Rushmore Road-Phase III\BR12026E.dwg

# CONDUIT LAYOUT

## MT. RUSHMORE ROAD & COLUMBUS ST.

FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA	PROJECT NH0016(79)67	SHEET L14	TOTAL SHEETS L28
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PLOTTING DATE: 11-12-15



WPE #BR12026

### ESTIMATE OF QUANTITIES (TRAFFIC SIGNAL)

KEY	ITEM	QTY	UNIT	KEY	ITEM	QTY	UNIT
○	3' DIAMETER FOOTING (G1-G4)	47	FT	#2	1/C #2 AWG COPPER WIRE	15	FT
■	TYPE 2 ELECTRICAL JUNCTION BOX (JG1, JG3, JG5, JG7)	4	EACH	#4	1/C #4 AWG COPPER WIRE	165	FT
□	TYPE 3 ELECTRICAL JUNCTION BOX (JG2, JG4, JG6, JG8)	4	EACH	#6	1/C #6 AWG COPPER WIRE	1110	FT
▲	ELECTRICAL SERVICE CABINET	1	EACH	#10	1/C #10 AWG COPPER WIRE	1010	FT
☒	TRAFFIC SIGNAL CONTROLLER	1	EACH	4/C	4/C #14 AWG COPPER TRAY CABLE, K2	1790	FT
M	METER SOCKET	1	EACH	7/C	7/C #14 AWG COPPER TRAY CABLE, K2	460	FT
□	PREFORMED DETECTOR LOOP (N16-N18, E25-E30, S19-S21, W25-W30)	18	EACH	24/C	24/C #14 AWG COPPER TRAY CABLE, K2	560	FT
	DETECTOR UNIT	6	EACH	TSP	#16 AWG COPPER TWISTED SHIELDED PAIR	975	FT
2" SCH 40	2" RIGID CONDUIT, SCHEDULE 40	485	FT		2/C #10 AWG COPPER POLE & BRACKET CABLE	260	FT
4" SCH 40	4" RIGID CONDUIT, SCHEDULE 40	20	FT	PC	PREEMPTION CABLE (NOT A BID ITEM)	1540	FT
3" SCH 80	3" RIGID CONDUIT, SCHEDULE 80	260	FT				
4" SCH 80	4" RIGID CONDUIT, SCHEDULE 80	120	FT				



# CONDUIT LAYOUT

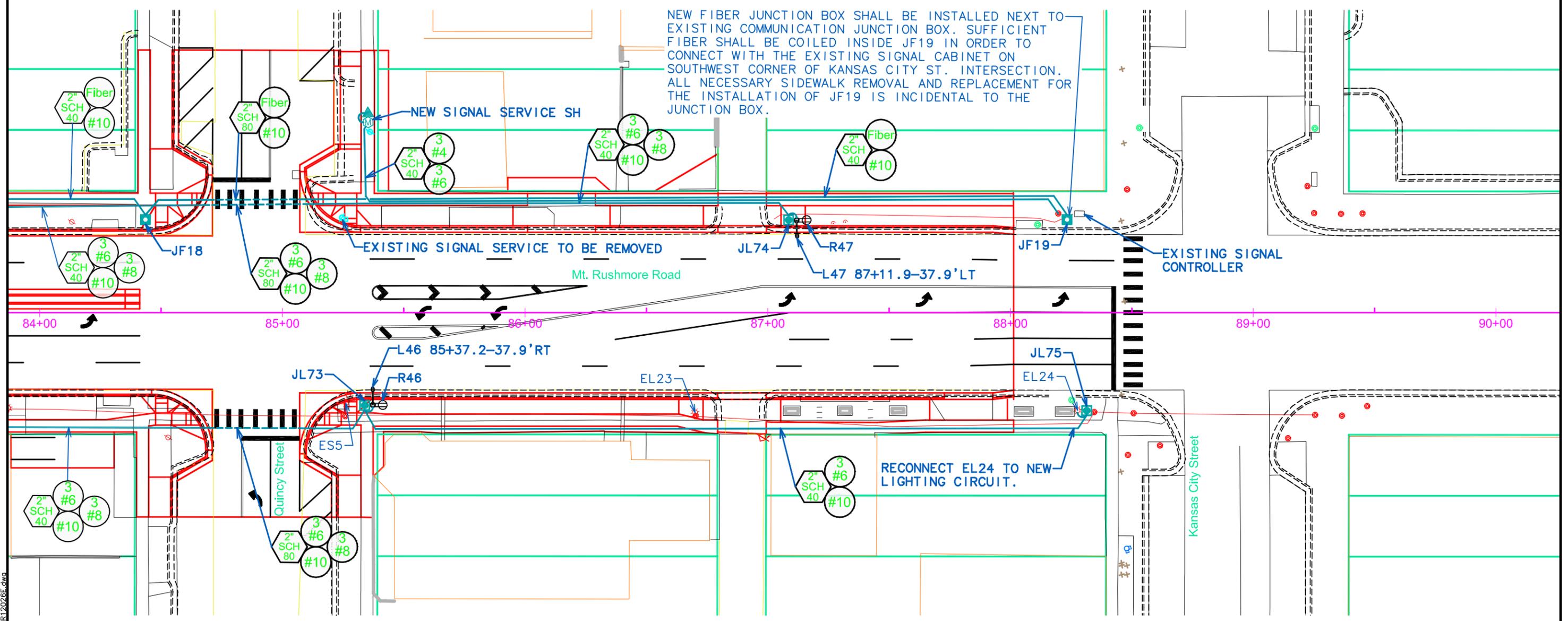
## MT. RUSHMORE ROAD

FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA	PROJECT NH0016(79)67	SHEET L15	TOTAL SHEETS L28
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PLOTTING DATE: 11-12-15  
REV: 12-30-15 DWB

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**NOTE KANSAS CITY SIGNAL SERVICE:**

TEMPORARY SIGNAL SERVICE POWER TO BE MAINTAINED FOR SIGNAL OPERATION & LIGHTING AT INTERSECTION DURING CONSTRUCTION. COORDINATE WITH ROB USERA AT BLACK HILLS POWER. ANY WORK ASSOCIATED WITH THIS SHOULD BE INCLUDED UNDER THE MISC ELECTRICAL BID ITEM.

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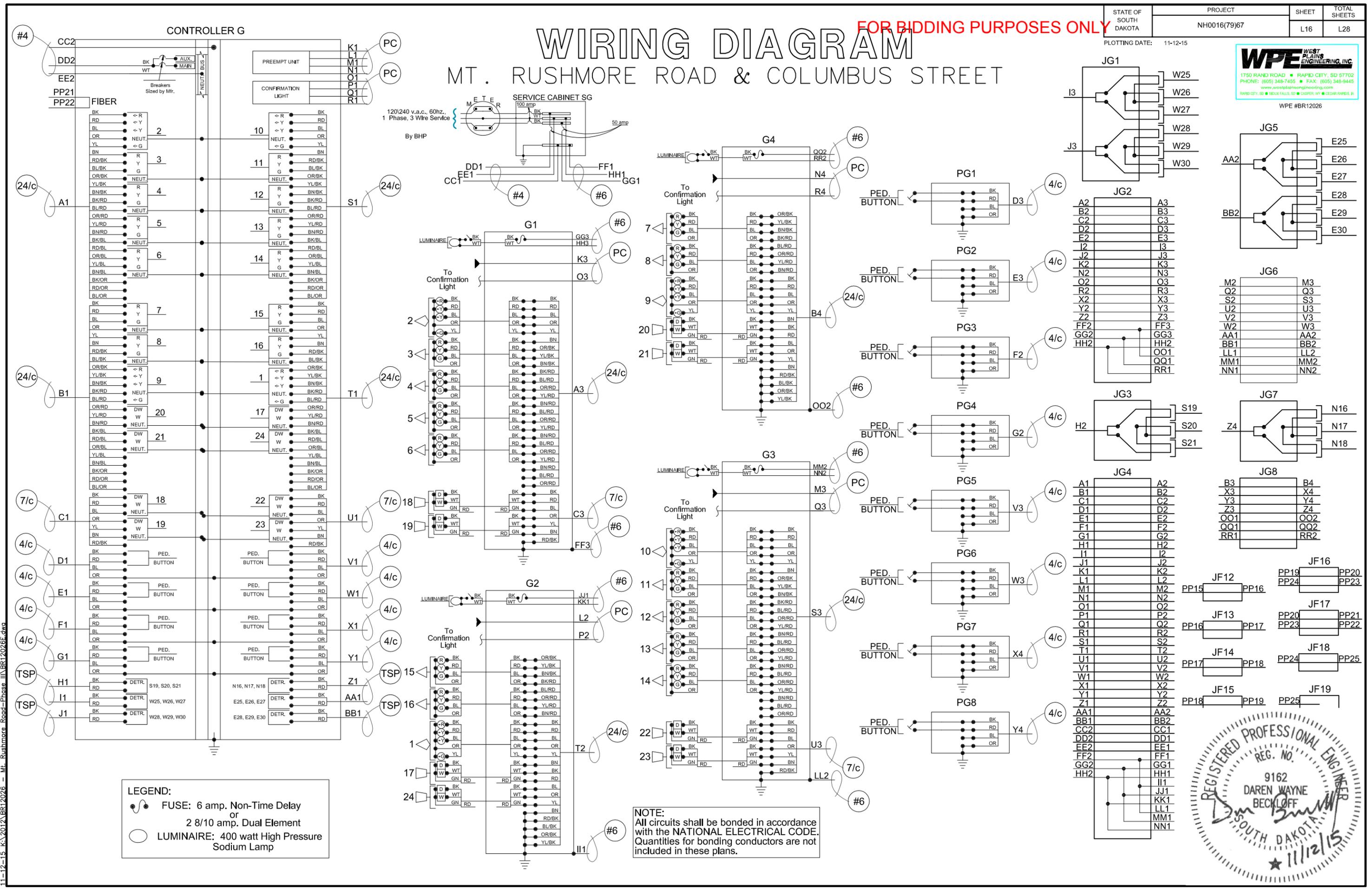
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# WIRING DIAGRAM

## MT. RUSHMORE ROAD & COLUMBUS STREET

FOR BIDDING PURPOSES ONLY



**LEGEND:**

- FUSE: 6 amp. Non-Time Delay or 2 8/10 amp. Dual Element
- LUMINAIRE: 400 watt High Pressure Sodium Lamp

**NOTE:**  
All circuits shall be bonded in accordance with the NATIONAL ELECTRICAL CODE. Quantities for bonding conductors are not included in these plans.



11-12-15 K:\2012\BR12026 - Mt. Rushmore Road-Phase III\BR12026.dwg

# WIRING DIAGRAM

## MT. RUSHMORE ROAD

FOR BIDDING PURPOSES ONLY

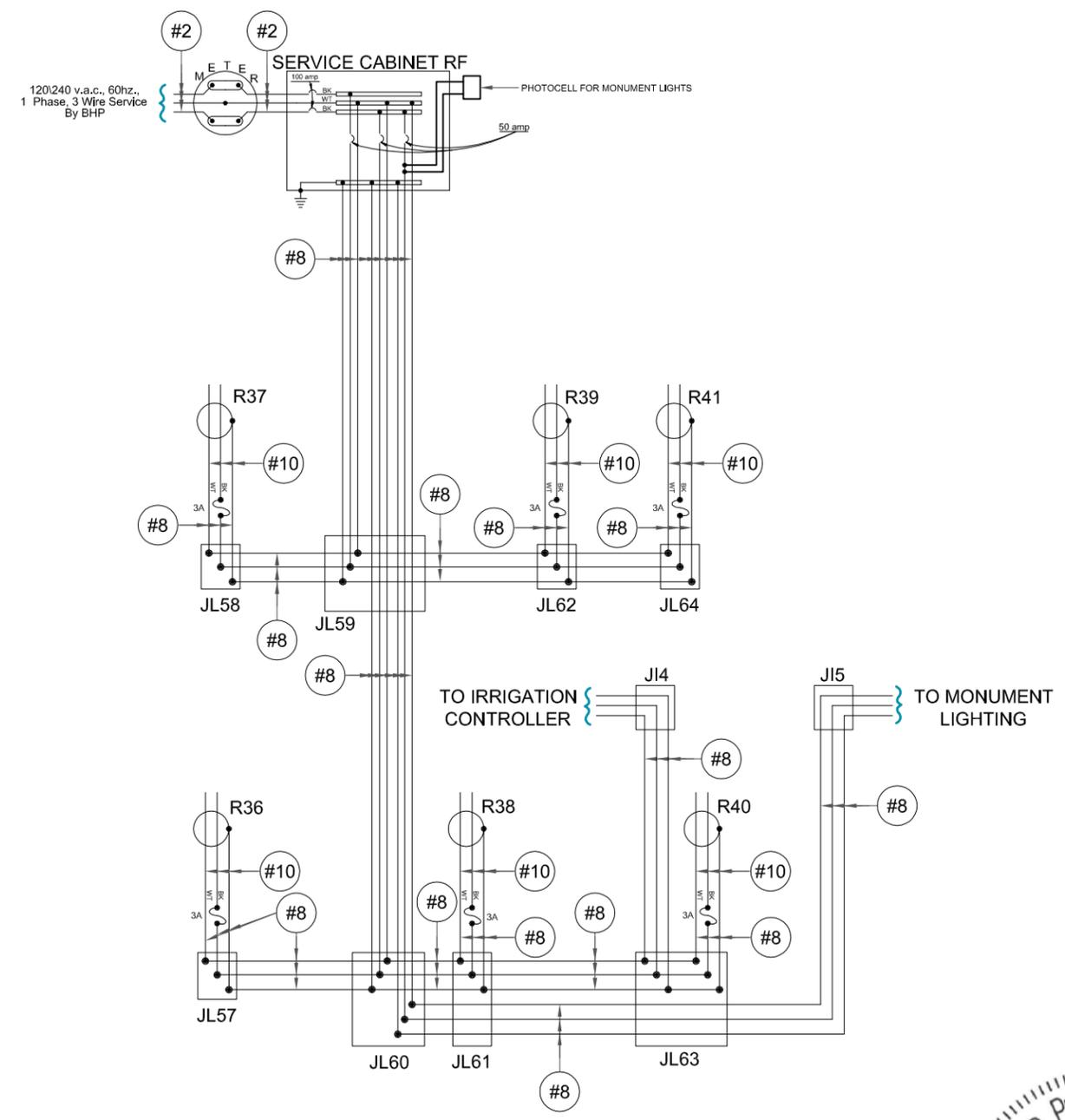
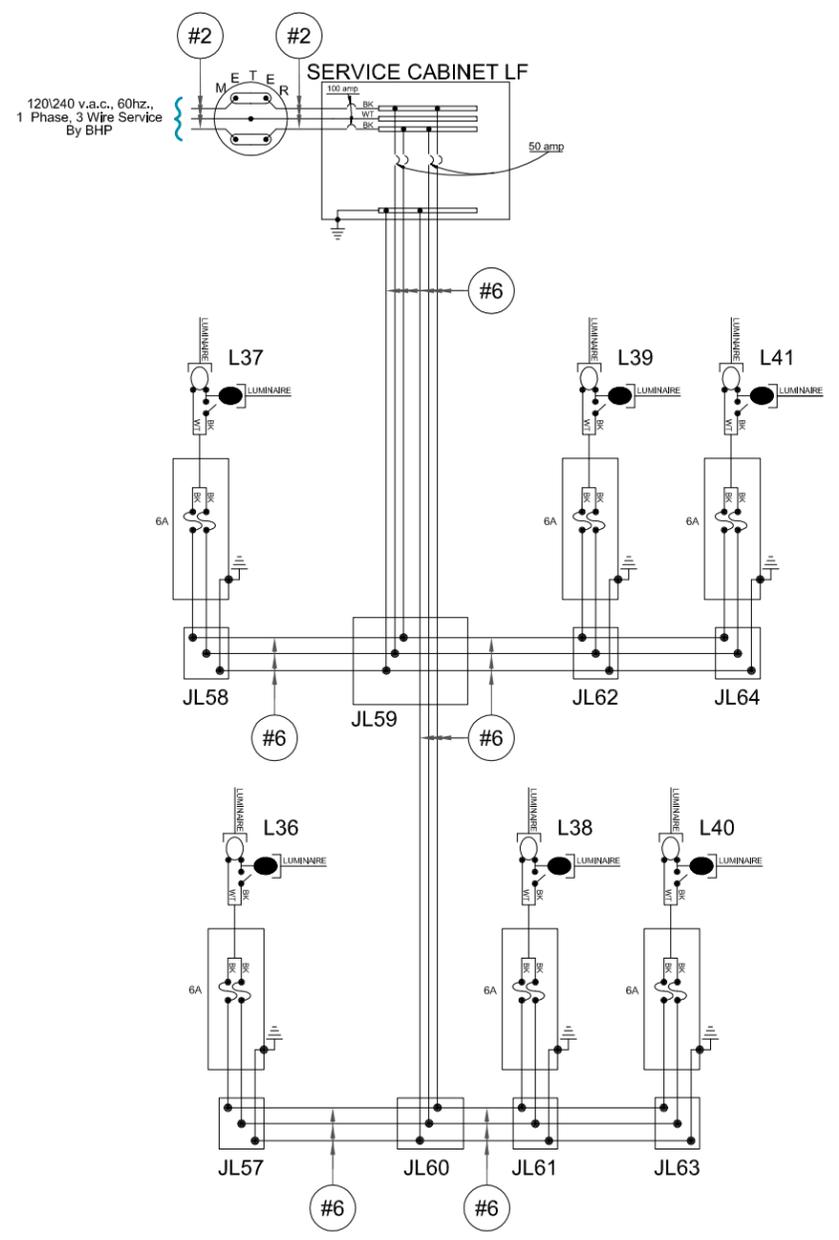
STATE OF SOUTH DAKOTA	PROJECT NH0016(79)67	SHEET L17	TOTAL SHEETS L28
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PLOTTING DATE: 11-12-15

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WPE #BR12026



**LEGEND**

- LUMINAIRE: 400W HPS LAMP
- LUMINAIRE: 150W HPS LAMP
- ⏏ 20A NEMA 5-20R GFI DUPLEX RECEPTACLE



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# WIRING DIAGRAM

## MT. RUSHMORE ROAD

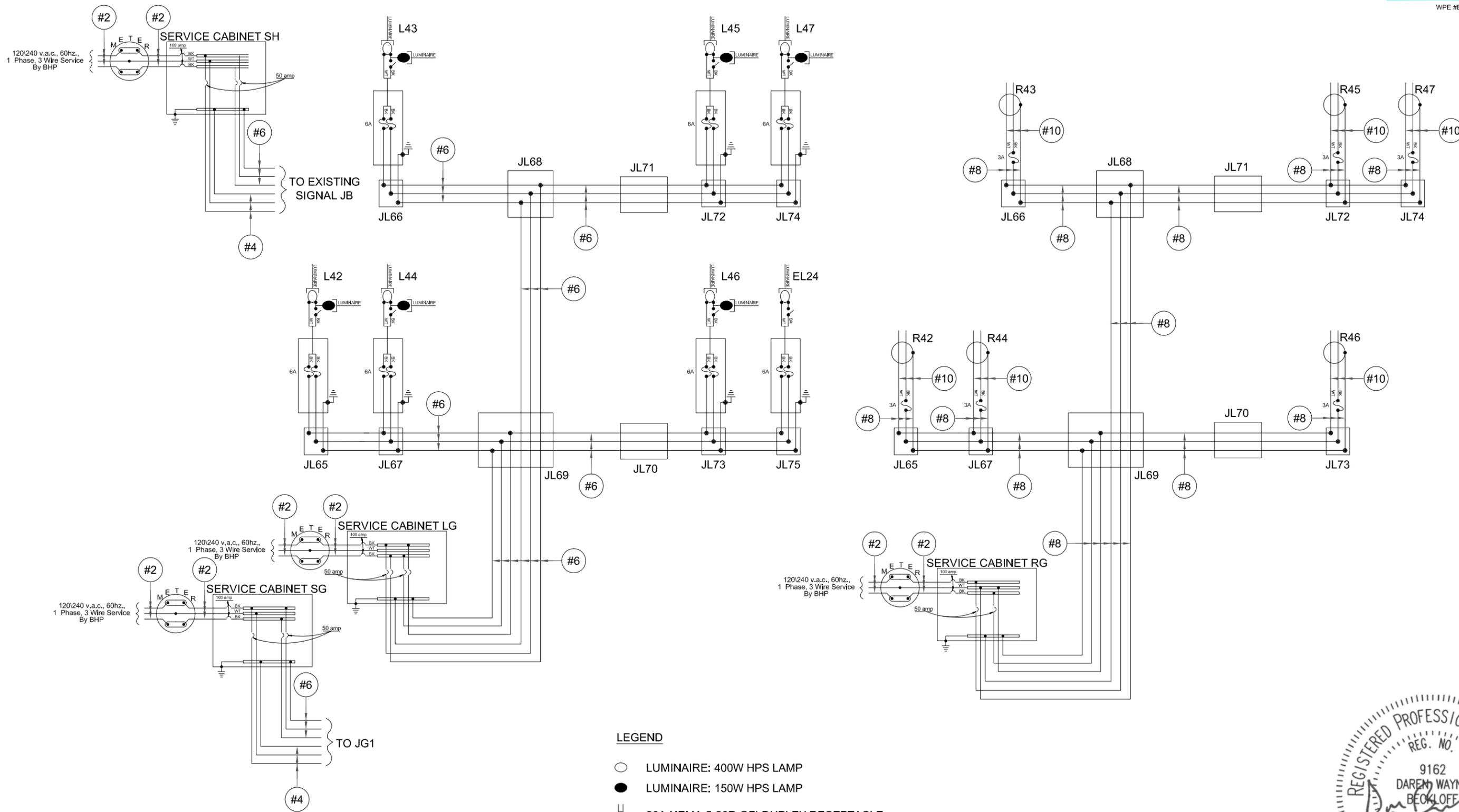
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STATE OF SOUTH DAKOTA	PROJECT NH0016(79)67	SHEET L18	TOTAL SHEETS L28
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PLOTTING DATE: 11-12-15  
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WPE #BR12026



**LEGEND**

- LUMINAIRE: 400W HPS LAMP
- LUMINAIRE: 150W HPS LAMP
- ⌚ 20A NEMA 5-20R GFI DUPLEX RECEPTACLE



12-30-15 k:\2012\BR12026 - Mt. Rushmore Road - Phase III\BR12026.dwg

# SIGNAL TIMING

## MT. RUSHMORE ROAD & COLUMBUS STREET

FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA	PROJECT NH0016(79)67	SHEET L19	TOTAL SHEETS L28
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PLOTTING DATE: 11-12-15

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WPE #BR12026

PHASING AND SEQUENCING																					
INTERVAL	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	FLASH DISPLAY
SIGNAL HEAD																					
NB LEFT: 9,10								<G<Y	<G<Y					F<Y	<Y	F<Y	F<Y	<Y			Y
NB: 11,12,13										G	G			G	Y	G	G	Y			Y
SB LEFT: 1,2								<G<Y				<G<Y		F<Y	<Y	F<Y	F<Y	<Y			Y
SB: 3,4,5												G	G	G	Y	G	G	Y			Y
EB: 14,15,16	G	Y		G	G	Y															R
WB: 6,7,8	G	Y		G	G	Y															R
NB & SB: 17,18,21,22	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	W	F	DW	DW	DW	NO DISPLAY
EB & WB: 19,20,23,24	DW	DW	DW	W	F	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	NO DISPLAY
MOVEMENTS	4&8		4&8 W/PED			1&5		2&5		1&6		2&6		2&6 W/PED							
PHASES																					

CONTROLLER TIMINGS (FREE OPERATION)								
MOVEMENT	1	2	3	4	5	6	7	8
PHASE								
MIN GREEN	7	12		7	7	12		7
ADDED INITIAL								
MAX INITIAL								
PASSAGE TIME	3	3		4	3	3		4
MAXIMUM 1	10	30		20	10	30		20
MAXIMUM 2	15	40		25	15	40		25
TIME BEFORE								
TIME TO REDUCE								
MINIMUM GAP								
YELLOW CHANGE	3.5	4.5		3	3.5	4.5		3
RED CLEARANCE	2	2		2	2	2		2
WALK	7	7		7	7	7		7
PED CLEARANCE	8		19.5		8		19.5	

TIMING PLAN 1	
TIME OF DAY (TOD)	PATTERN (C/S/O)
6:00 - 8:00	1/1/1
8:00 - 14:00	2/1/1
14:00 - 18:00	1/1/1
18:00 - 21:00	3/1/1
21:00 - 6:00	FLASH

TIMING PLAN 2	
TIME OF DAY (TOD)	PATTERN (C/S/O)
6:00 - 21:00	2/1/1
21:00 - 6:00	FLASH

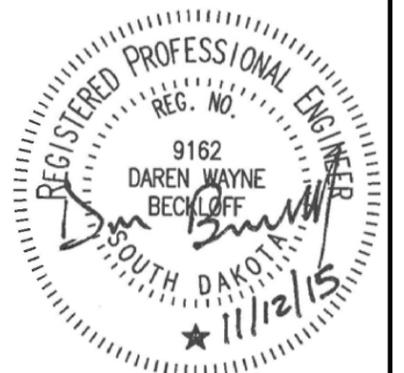
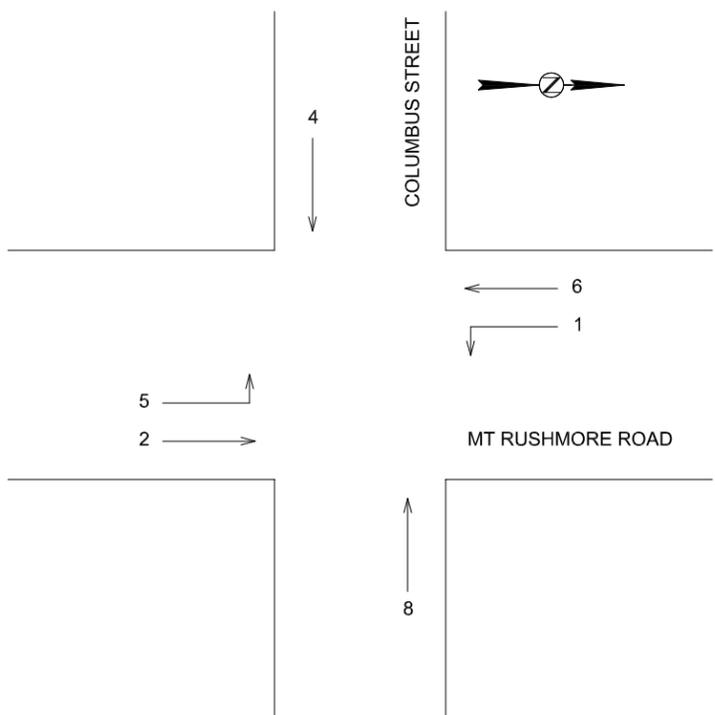
WEEKLY PROGRAM							
	SUN	MON	TUE	WED	THU	FRI	SAT
TIMING PLAN	2	1	1	1	1	1	2

COORDINATION TIMING								
CYCLE 1 = 100 SEC								
MOVEMENT	1	2	3	4	5	6	7	8
PHASE								
TIME - SPLIT 1	12.5	49		38.5	12.5	49		38.5
COORDINATED PHASE		X				X		
OFFSET 1 = 55 SEC								

COORDINATION TIMING								
CYCLE 2 = 100 SEC								
MOVEMENT	1	2	3	4	5	6	7	8
PHASE								
TIME - SPLIT 1	12.5	49		38.5	12.5	49		38.5
COORDINATED PHASE		X				X		
OFFSET 1 = 96 SEC								

COORDINATION TIMING								
CYCLE 3 = 90 SEC								
MOVEMENT	1	2	3	4	5	6	7	8
PHASE								
TIME - SPLIT 1	12.5	38.5		39	12.5	38.5		39
COORDINATED PHASE		X				X		
OFFSET 1 = 66 SEC								

DETECTOR SETTINGS								
DETECTOR LABEL	AMPLIFIED CHANNEL DETECTOR	DETECTOR TYPE	DETECTOR OPERATION			LOCKING CALL	MOVEMENT CALLED	MOVEMENT EXTENDED
			CALLS & EXTENDS	CALLS ONLY	EXTENDS ONLY			
N16,N17,N18	1	PREFORMED	X				1	1&5 OR 1&6
E25,E26,E27	2	PREFORMED	X				8	4&8
E28,E29,E30	3	PREFORMED	X				8	4&8
S19,S20,S21	4	PREFORMED	X				5	1&5 OR 2&5
W25,W26,W27	5	PREFORMED	X				4	4&8
W28,W29,W30	6	PREFORMED	X				4	4&8



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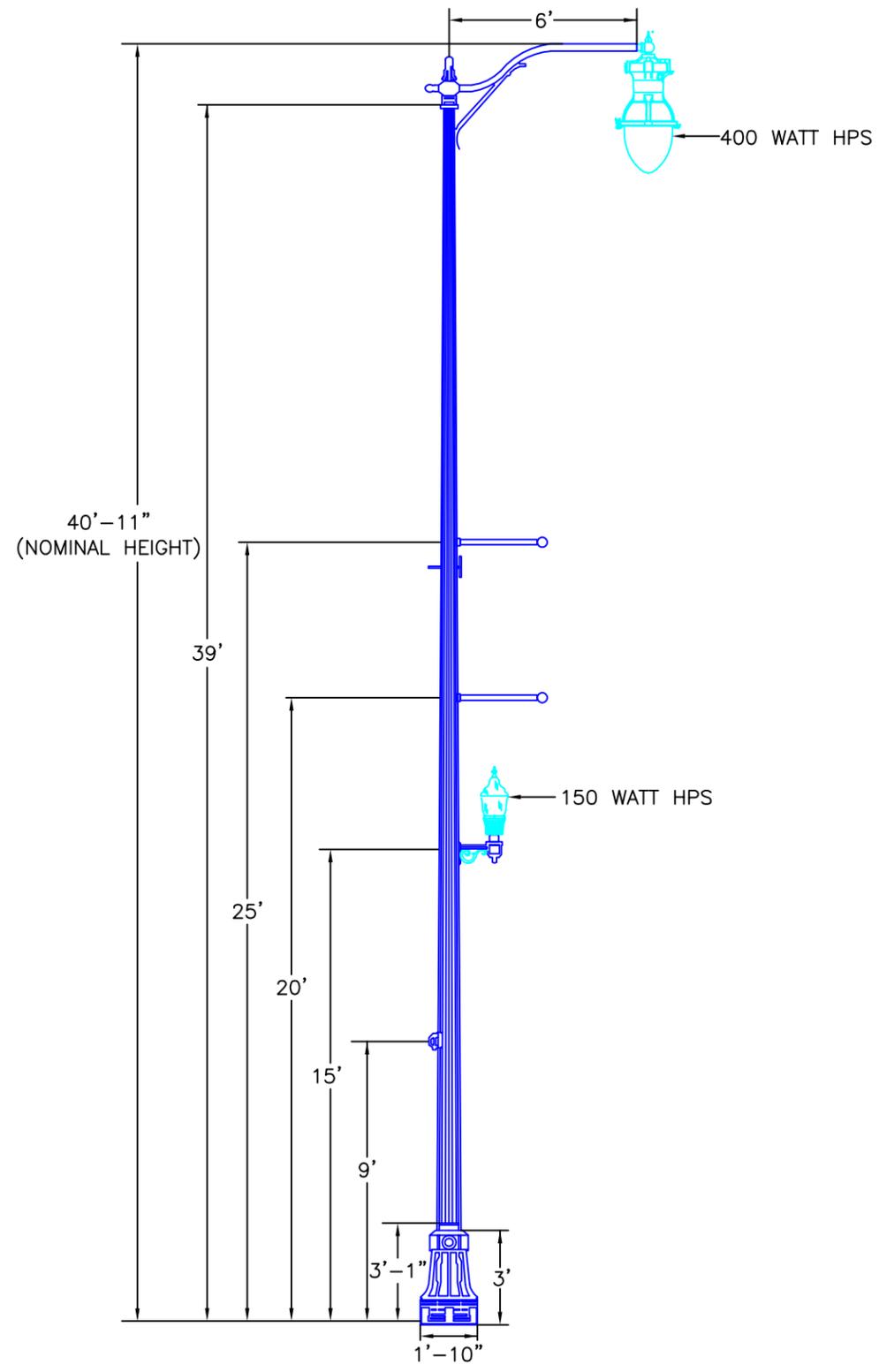
FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA	PROJECT NH0016(79)67	SHEET L20	TOTAL SHEETS L28
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PLOTTING DATE: 11-12-15

**WPE** WEST PLAINS ENGINEERING, INC.  
1750 RAND ROAD • RAPID CITY, SD 57702  
PHONE: (605) 348-7455 • FAX: (605) 348-9445  
www.westplainsengineering.com  
RAPID CITY, SD • SIOUX FALLS, SD • CASPER, WY • CEDAR RAPIDS, IA

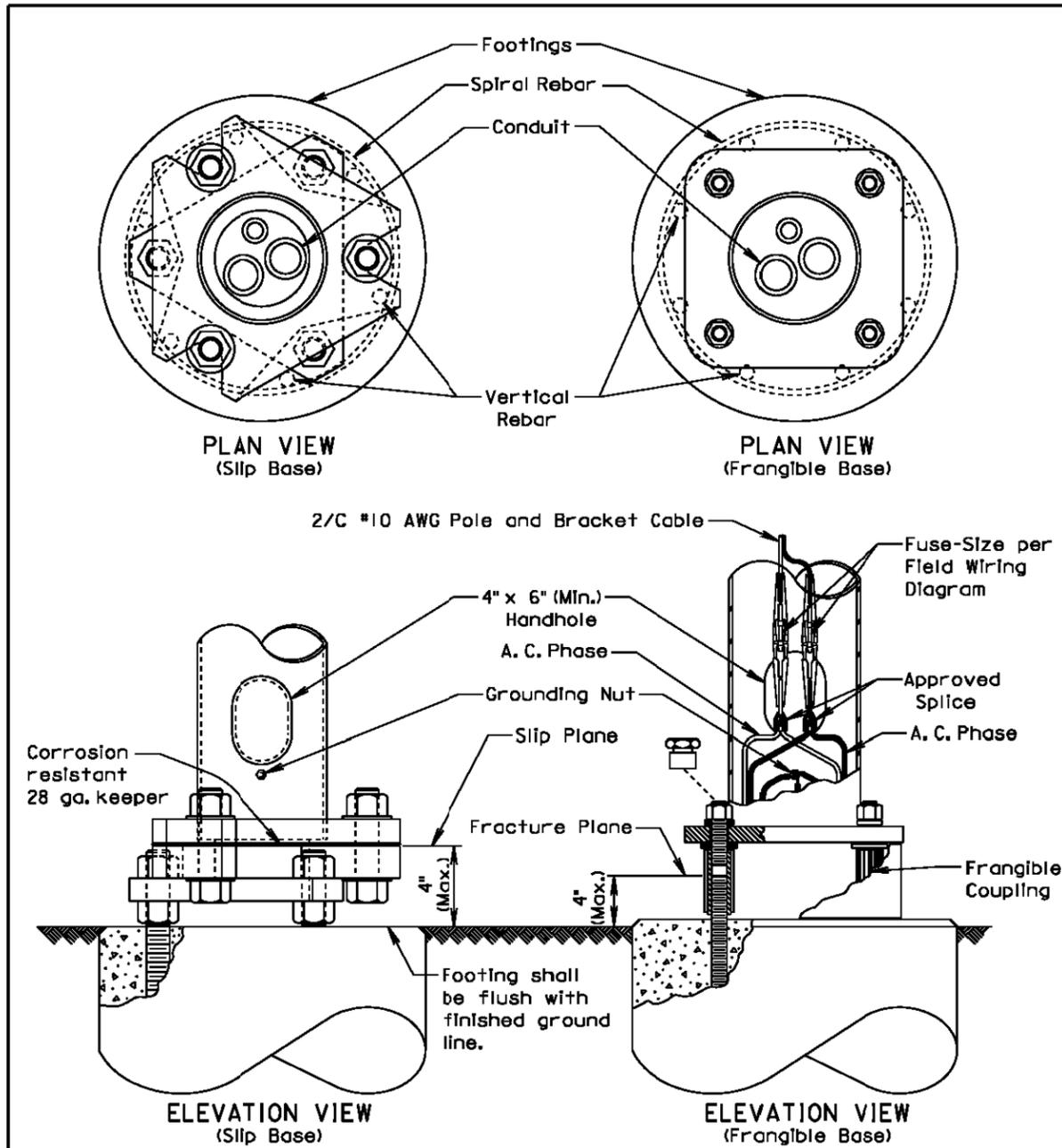
WPE #BR12026



DECORATIVE LIGHT POLE



11-12-15 k:\2012\BR12026 - Mt. Rushmore Road-Phase III\BR12026E.dwg

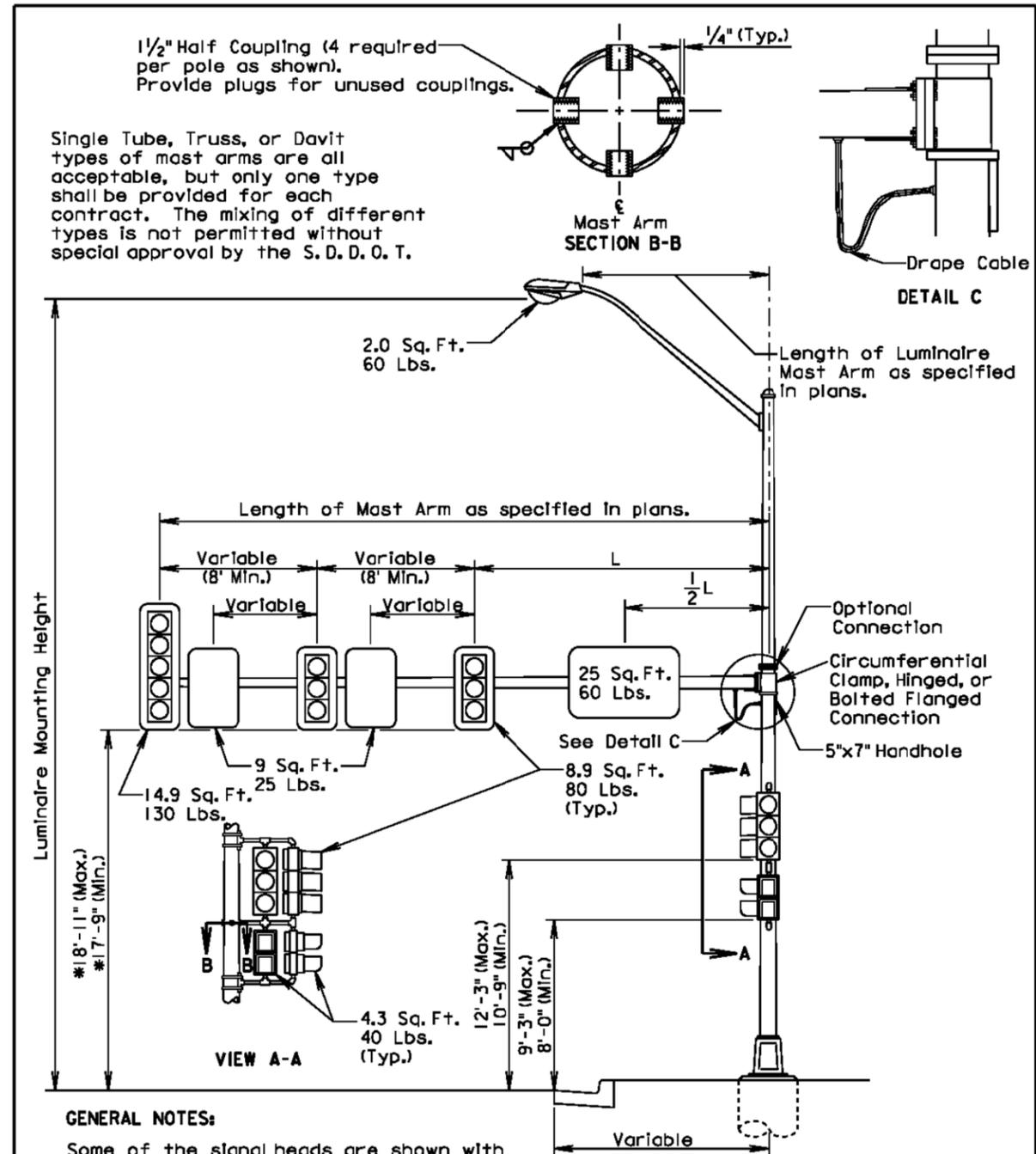


**GENERAL NOTES:**

The Contractor has the option of using either the Slip Base, Transformer Base, or Frangible Base.  
 Base details are provided for example only and are not intended to be a complete design.  
 Connectors shall be breakaway type.

June 26, 2013

Published Date: 4th Qtr. 2015	S D D O T	ROADWAY LUMINAIRE POLE BREAKAWAY BASE	PLATE NUMBER 635.11
			Sheet 1 of 1



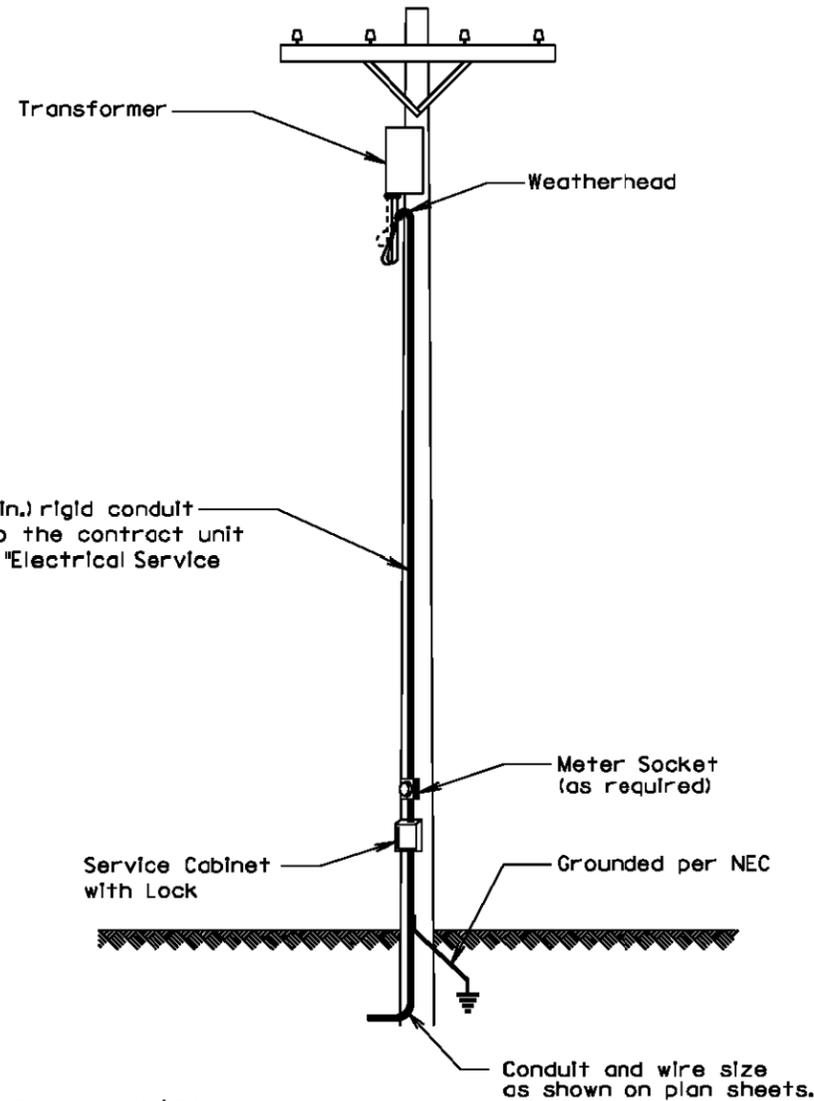
**GENERAL NOTES:**

Some of the signal heads are shown with backplates removed so that the mounting hardware is visible.

\* The signal height allowances shown above are based on a horizontal distance greater than 53' between the signals and stop line. For horizontal distance of 53' and less between the signals and the stop line, the height allowances shall be as specified in Section 4D.15 of the MUTCD.

December 23, 2008

Published Date: 4th Qtr. 2015	S D D O T	SIGNAL POLE (WITH MAST ARM AND LUMINAIRE EXTENSION)	PLATE NUMBER 635.32
			Sheet 1 of 1



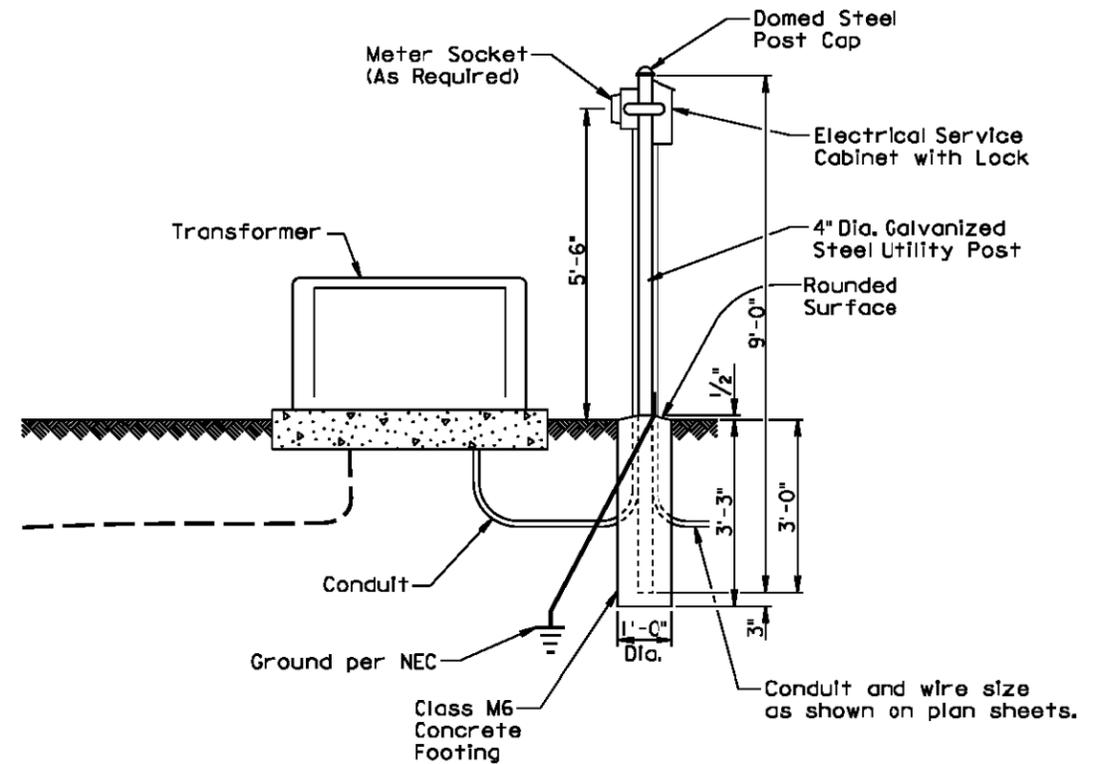
Cost for the 1 1/4" (min.) rigid conduit shall be incidental to the contract unit price per Each for "Electrical Service Cabinet".

**GENERAL NOTE:**  
All materials and labor on secondary side of transformer shall be supplied by the Contractor.

March 31, 2000

<b>S D D O T</b>	<b>SERVICE CABINET ON OVERHEAD UTILITY POLE</b>	PLATE NUMBER <b>635.40</b>
		Sheet 1 of 1

Published Date: 4th Qtr. 2015



ELEVATION

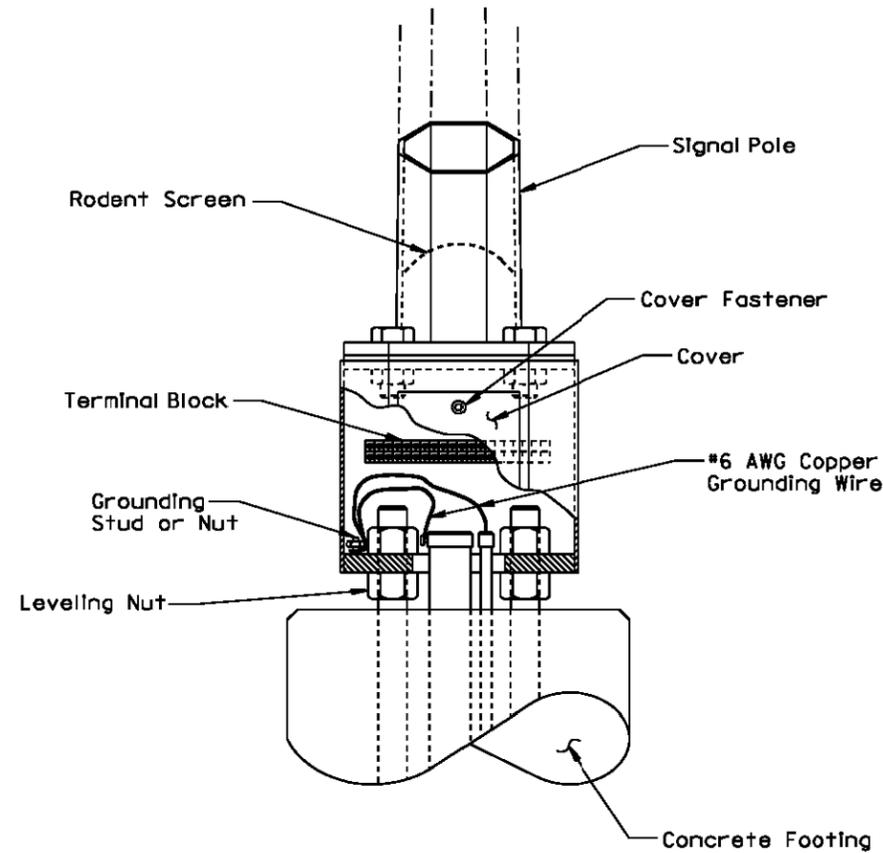
**GENERAL NOTES:**

- The concrete for the post footing shall be class M6 concrete.
- The 4" diameter galvanized steel utility post shall be 9' long and shall be in conformance with AASHTO Standard Specifications M181. The post shall be Type 1 and either Grade 1 or Grade 2. The domed steel post cap shall be in conformance with AASHTO Standard Specifications M181 and shall be Type 1.
- The Contractor shall contact and coordinate his/her work with the Utility Companies regarding hookup requirements, fees, materials, and equipment necessary.
- All costs for furnishing and installing all materials from the electrical service cabinet to the transformer including labor, equipment, hookup fees, all items within the cabinet, post, concrete footing, post cap, meter socket if required, conduit, and incidentals shall be incidental to the contract unit price per each for "Electrical Service Cabinet".

June 26, 2006

<b>S D D O T</b>	<b>SERVICE FROM PAD MOUNTED TRANSFORMER WITH METER ON A GALVANIZED STEEL UTILITY POST</b>	PLATE NUMBER <b>635.41</b>
		Sheet 1 of 1

Published Date: 4th Qtr. 2015



**GENERAL NOTES:**

Base details are provided for example only and are not intended to be a complete design.

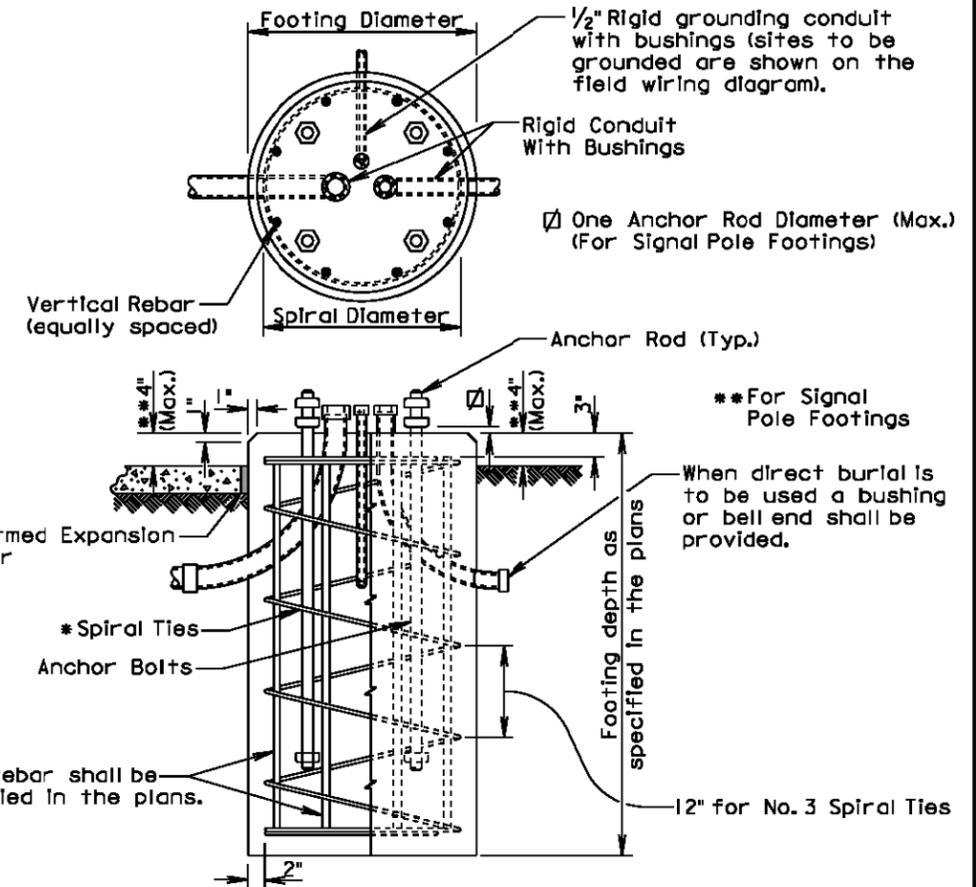
The Contractor shall furnish and install a rodent screen in the signal pole above the transformer base. The rodent screen shall be a galvanized steel mesh with a maximum opening size of 1/4 inch. The rodent screen shall be friction fitted or installed by other methods approved by the Engineer.

All costs for furnishing and installing the rodent screen including labor, equipment, and materials shall be incidental to the contract unit price per each for the corresponding signal pole bid item.

December 23, 2008

<b>S D D O T</b>	<b>TRANSFORMER SIGNAL POLE BASE</b>	PLATE NUMBER <b>635.50</b>
		Sheet 1 of 1

Published Date: 4th Qtr. 2015



**GENERAL NOTES:**

\* Circular ties may be used in lieu of the spiral ties. The No. 3 ties shall be spaced 12 inches apart except for the top two which shall be spaced 6 inches apart. The ties shall be lapped 18 inches and the laps shall be staggered around the cage.

Spiral ties shall have 1-1/2 extra turns at each end.

See Section 985 of the Specifications for footing materials.

Conduits and bushings may project 2 1/2 inches to 6 inches above footing for fixed base poles but shall not project above the slip plane or fracture plane for breakaway poles.

Conduits shall be sealed water-tight during all phases of construction until poles are in place.

The anchor rods shall fit inside the reinforcing steel cage. If the anchor rods designed by the Pole Manufacturer do not fit, contact the Office of Bridge Design for footing redesign. No additional payment will be made for the redesigned footing.

Costs of conduit and conduit bushings shown on footing detail shall be incidental to the footing bid item(s).

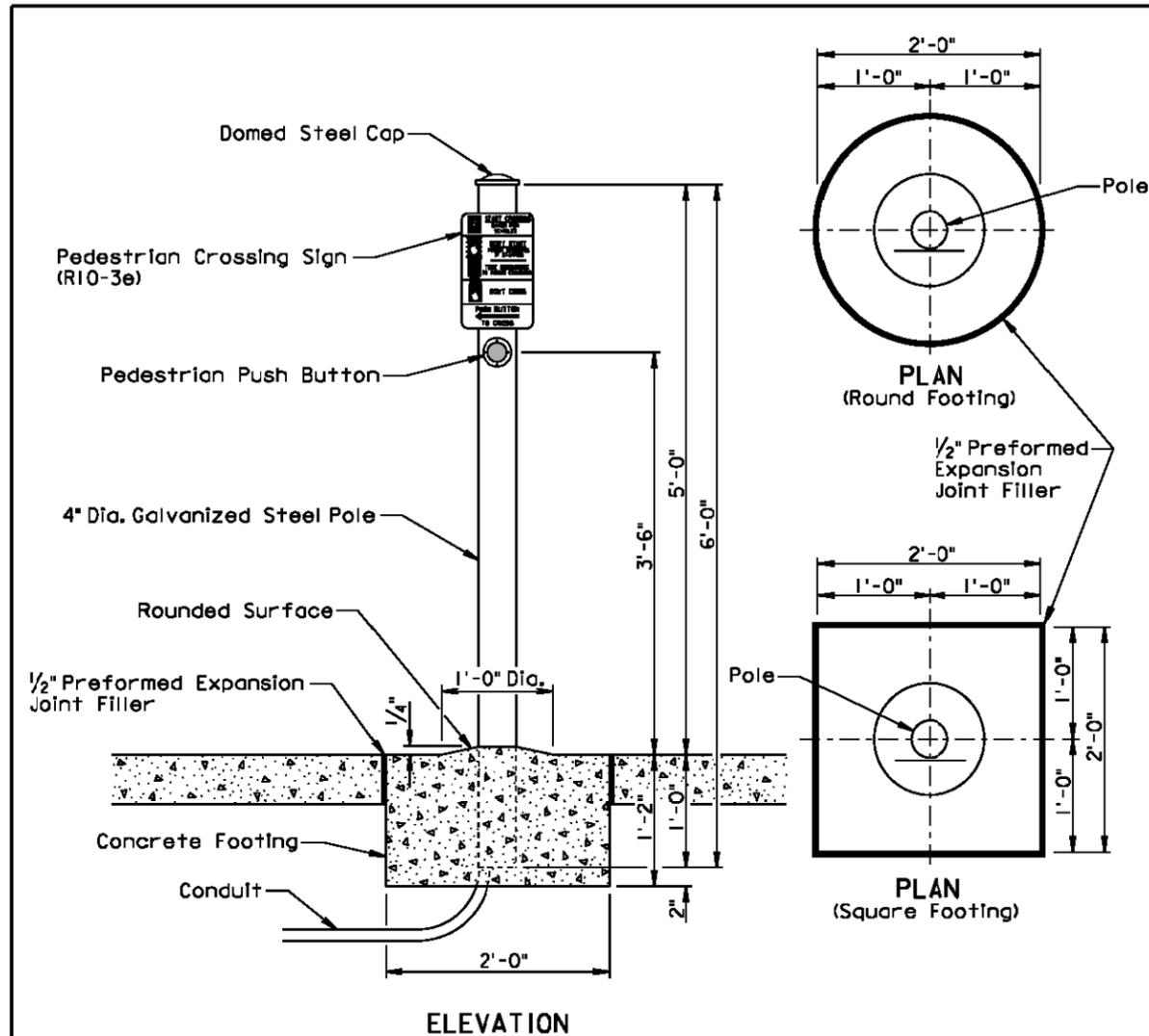
The pole shall not be installed until the concrete has attained design strength (4000 psi).

The contour of the area surrounding the breakaway pole shall be flat, though not necessarily level for a distance of 5 feet in all directions. The Contractor may be required to provide finish grading at some breakaway pole locations.

June 26, 2015

<b>S D D O T</b>	<b>POLE FOOTING</b>	PLATE NUMBER <b>635.55</b>
		Sheet 1 of 1

Published Date: 4th Qtr. 2015



**GENERAL NOTES:**

The Contractor shall install either the round or the square concrete footing. For informational purpose, the quantity of concrete for one footing is 0.14 cubic yards for the round footing and 0.17 cubic yards for the square footing.

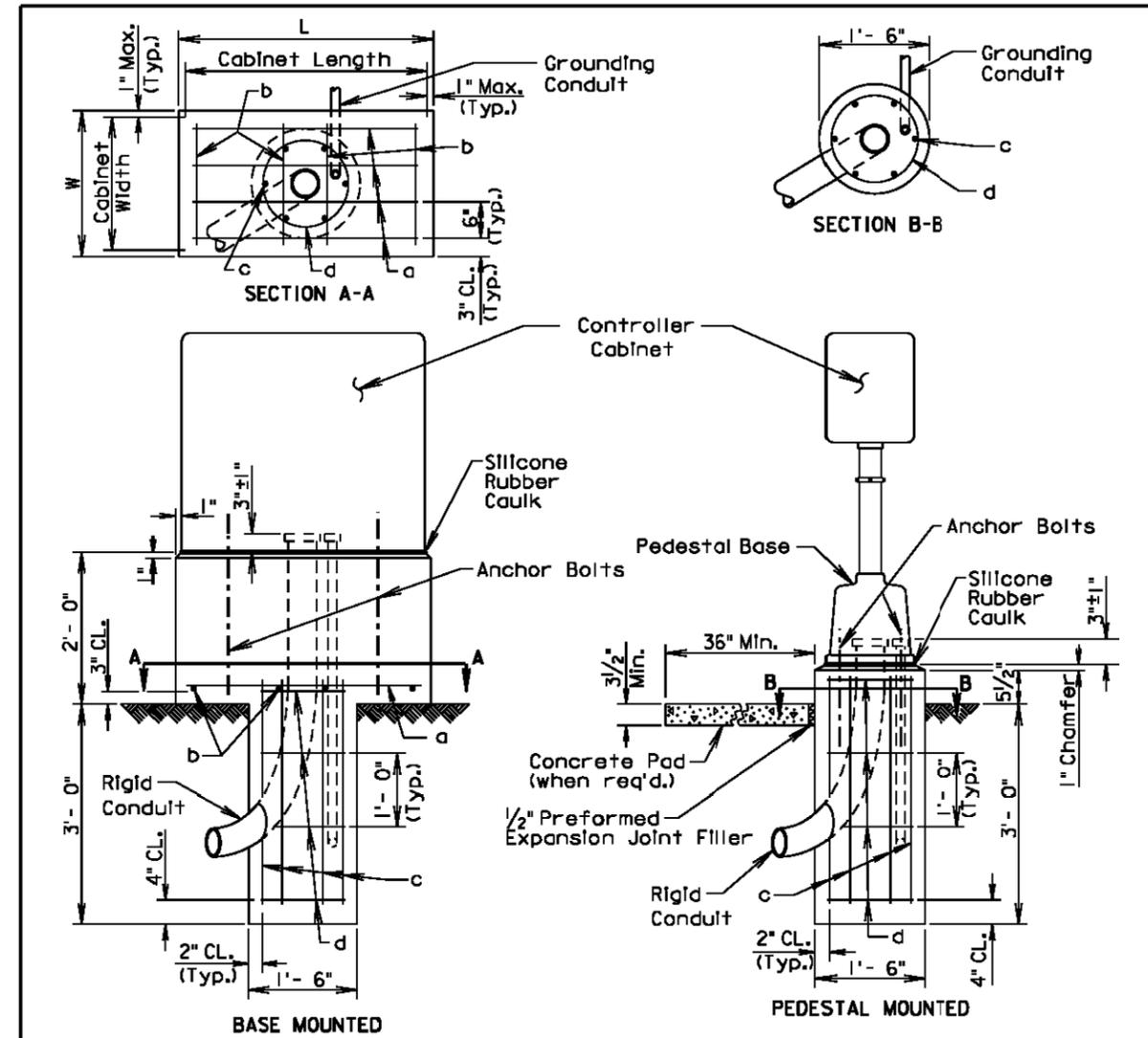
The concrete for the footing shall be class M6 concrete.

The 4" diameter galvanized steel pole shall be 6' long and shall be in conformance with AASHTO Standard Specifications M181. The pole shall be Type 1 and either Grade 1 or Grade 2. The domed steel pole cap shall be in conformance with AASHTO Standard Specifications M181 and shall be Type 1.

All costs for furnishing and installing the pedestrian push button pole including labor, equipment, and materials including the pole, concrete footing, steel cap, and the conduit in the footing shall be incidental to the contract unit price per each for "Pedestrian Push Button Pole".

February 14, 2010

<b>S D D O T</b>	<b>PEDESTRIAN PUSH BUTTON POLE</b>	PLATE NUMBER <b>635.57</b>
	Published Date: 4th Qtr. 2015	Sheet 1 of 1



**GENERAL NOTES:**

The above ground portion of the footing shall conform to the base of the controller to the satisfaction of the Engineer.

Conduits shall be sealed and water-tight until the conductor cables are installed.

If the controller is not located within or adjacent to an existing sidewalk, the Contractor shall provide a concrete pad as directed by the Engineer.

Anchor bolts and related hardware shall conform to the controller manufacturer's requirements and recommendations.

A continuous bead of silicone rubber caulk shall provide a weather-tight seal between the base and the concrete.

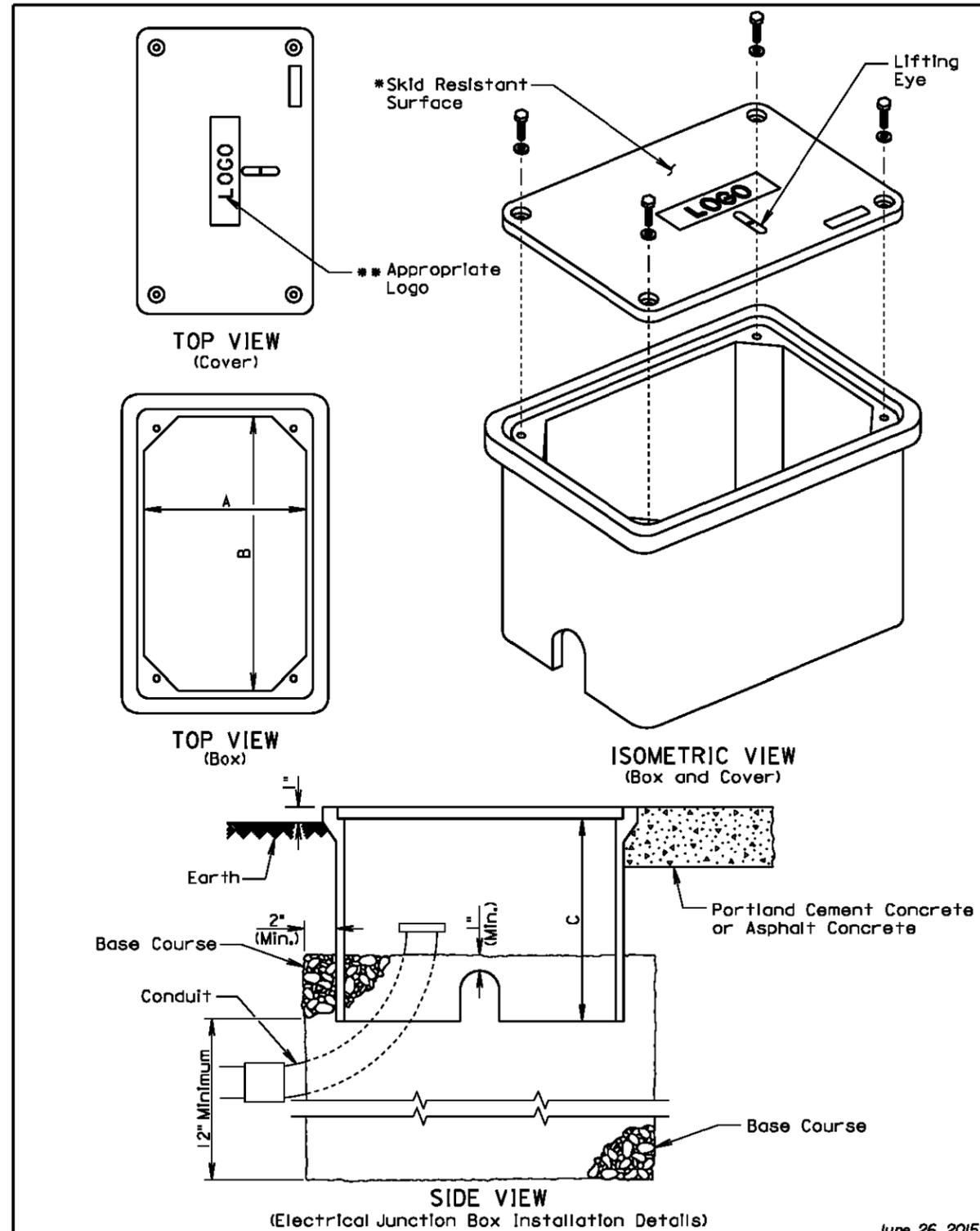
**Reinforcing Schedule  
(for one footing)**

Mk.	No.	Size	Length	Type	Bending Detail
a	*	3	L - 4"	Str.	
b	*	3	W - 4"	Str.	
c	6	6	3' - 0"	Str.	
d	4	3	4' - 0"	T3	

Note: Dimensions are out to out of bar  
\* Vary number of bars as required by footing size.

March 31, 2000

<b>S D D O T</b>	<b>CONTROLLER CABINET AND FOOTING</b>	PLATE NUMBER <b>635.60</b>
	Published Date: 4th Qtr. 2015	Sheet 1 of 1



June 26, 2015

June 26, 2015

Published Date: 4th Qtr. 2015	S D D O T	ELECTRICAL JUNCTION BOXES TYPE 1 THROUGH TYPE 4	PLATE NUMBER 635.65
			Sheet 1 of 2

Published Date: 4th Qtr. 2015	S D D O T	ELECTRICAL JUNCTION BOXES TYPE 1 THROUGH TYPE 4	PLATE NUMBER 635.65
			Sheet 2 of 2

ELECTRICAL JUNCTION BOX

TYPE	DESCRIPTION	DIMENSIONS		
		A	B	C
1	Open Bottom with Gasket	11"-15"	18"-21"	18" (Min.)
2	Open Bottom with Gasket	13"-18"	23"-28"	18" (Min.)
3	Open Bottom with Gasket	17"-22"	24"-30"	18" (Min.)
4	Open Bottom with Gasket	28"-33"	36"-48"	24" (Min.)

GENERAL NOTES:

The cover shall be gasketed with a minimum of two stainless steel bolts and washers.

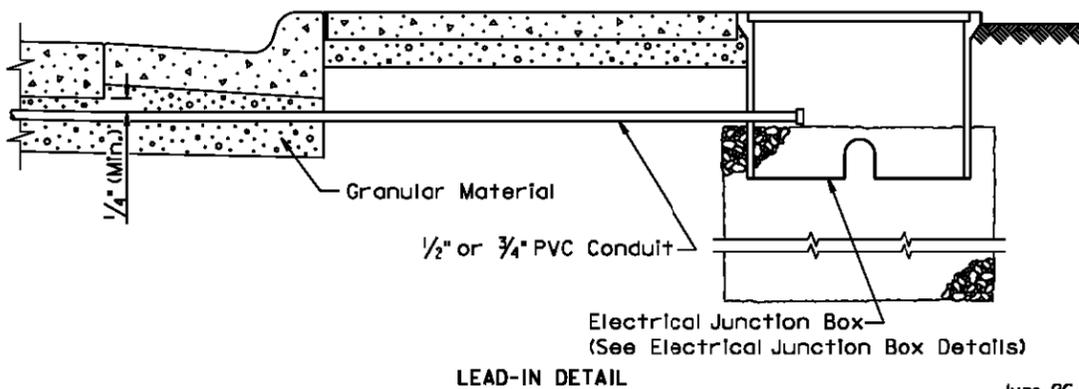
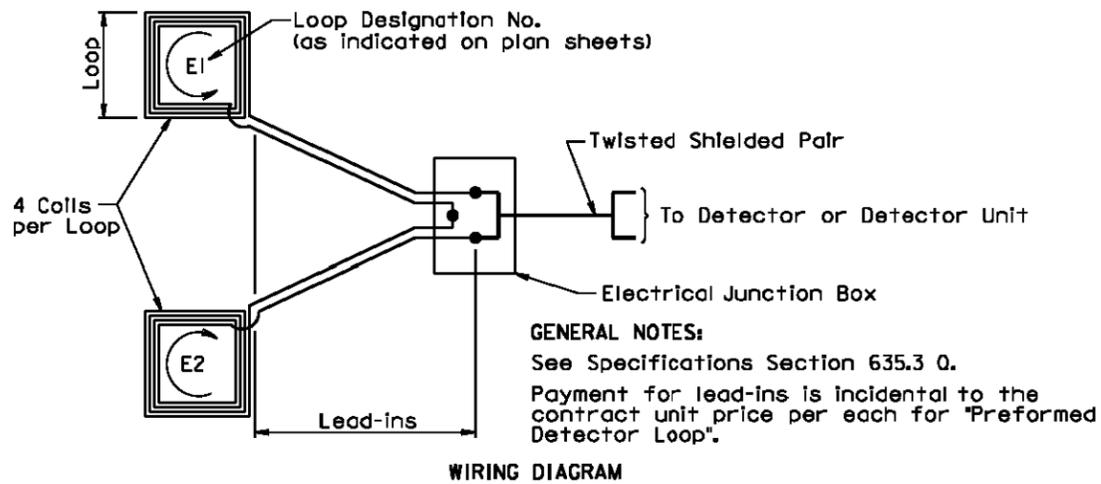
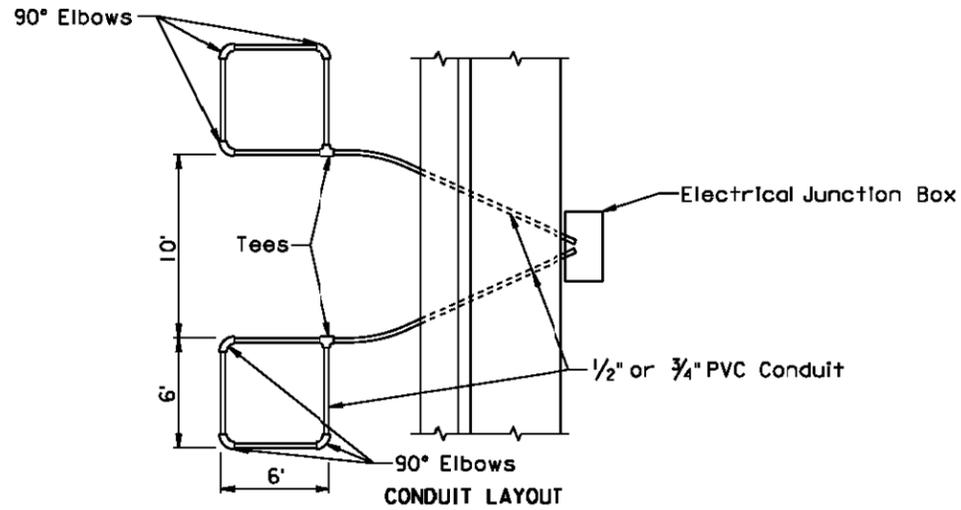
The cover shall have a lifting eye.

\*The surface of the cover shall have a minimum wet and dry coefficient of friction value of 0.5 as determined by ASTM F 609.

\*\*The cover of the junction box shall have the appropriate logo in one inch size letters and shall be recessed. When the junction box contains cables or wires for a traffic signal then the logo shall be "Signal". When the junction box contains lighting conductors then the logo shall be "Lighting".

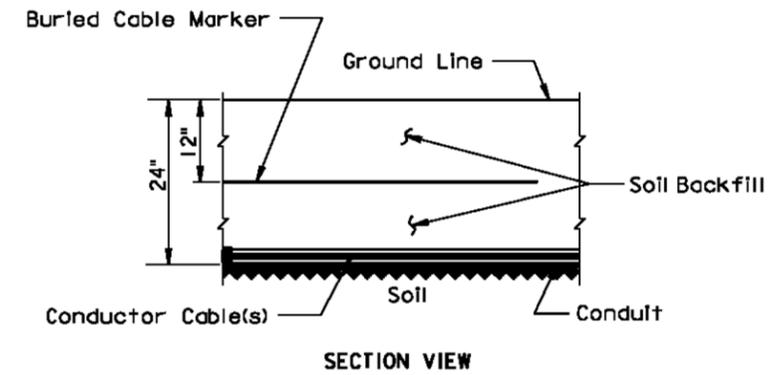
The electrical junction boxes shall comply with the American National Standards Institute (ANSI)/Society of Cable Telecommunications Engineers (SCTE) 77 2007 Specification for Underground Enclosure Integrity. The loading requirement for all the electrical junction boxes shall be Tier 8 of ANSI/SCTE 77 2007.

The electrical junction boxes shall be UL listed.

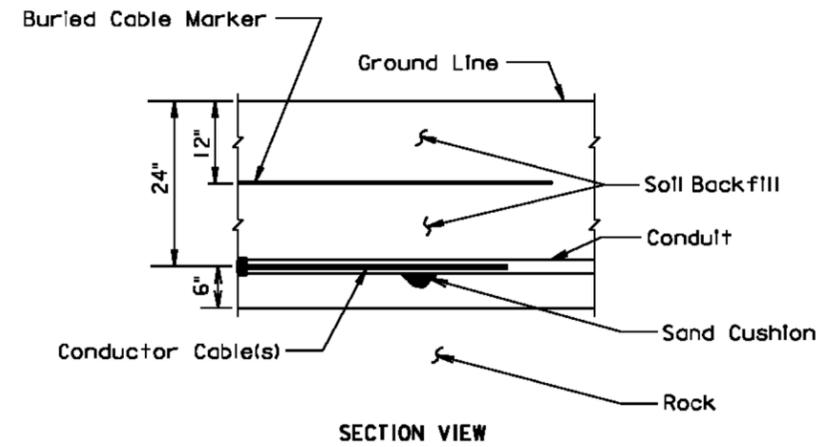


June 26, 2015

Published Date: 4th Qtr. 2015	S D D O T	PREFORMED DETECTOR LOOP	PLATE NUMBER 635.70
			Sheet 1 of 1



SECTION VIEW



SECTION VIEW

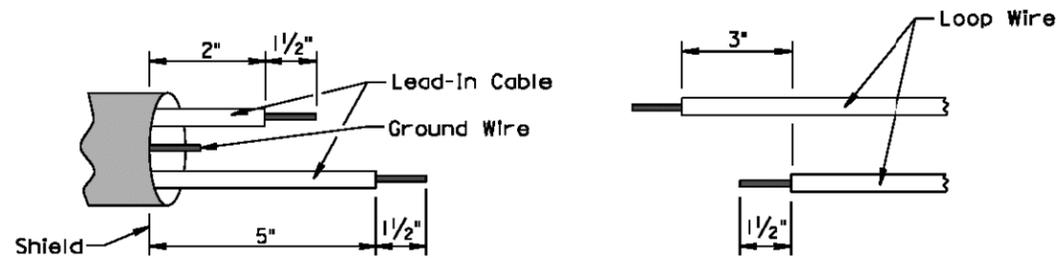
GENERAL NOTE:

The Buried Cable Marker shall be plastic, approximately 6" wide, and shall be capable of sustaining a minimum of a 350% tolerance of elongation without tearing. The Buried Cable Marker shall have a life expectancy approximately equal to that of the conductor(s) beneath it. A phrase indicating the presence of a buried electric circuit below shall be printed in a contrasting color on the cable marker. The Buried Cable Marker shall be subject to approval by the Engineer. All costs associated with furnishing and installing the Buried Cable Marker shall be incidental to the contract unit price per Foot for the bid item used for the electrical conductor.

March 31, 2000

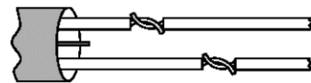
Published Date: 4th Qtr. 2015	S D D O T	CONDUIT INSTALLATION	PLATE NUMBER 635.76
			Sheet 1 of 1

Step 1. Strip loop wires and lead-in cable.



Step 2. Connect and solder.

Twist bare conductors together

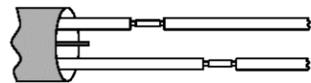


and solder with 60/40 (tin/lead) resin solder

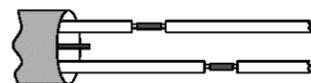


OR

Crimp bare conductors together with an uninsulated butt connector

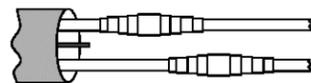


and solder with 60/40 (tin/lead) resin solder



Step 3. Insulate each solder joint separately.

Electrical Tape



OR

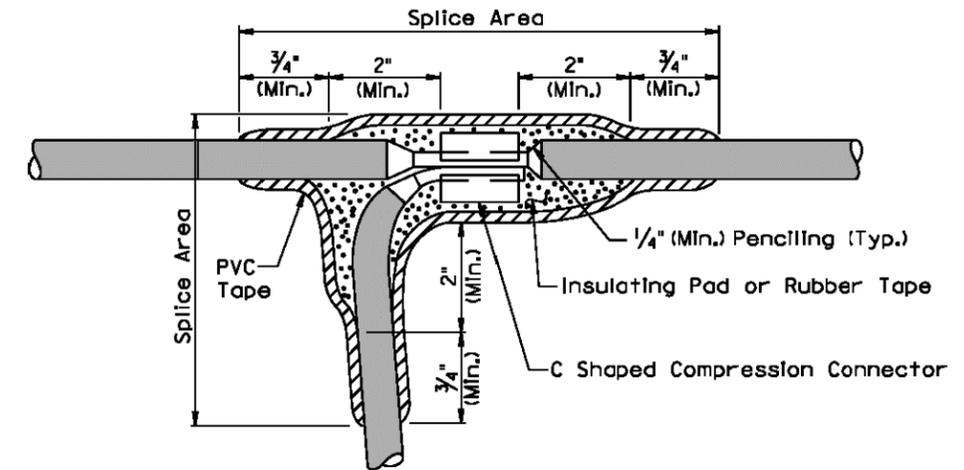
Shrink Tube



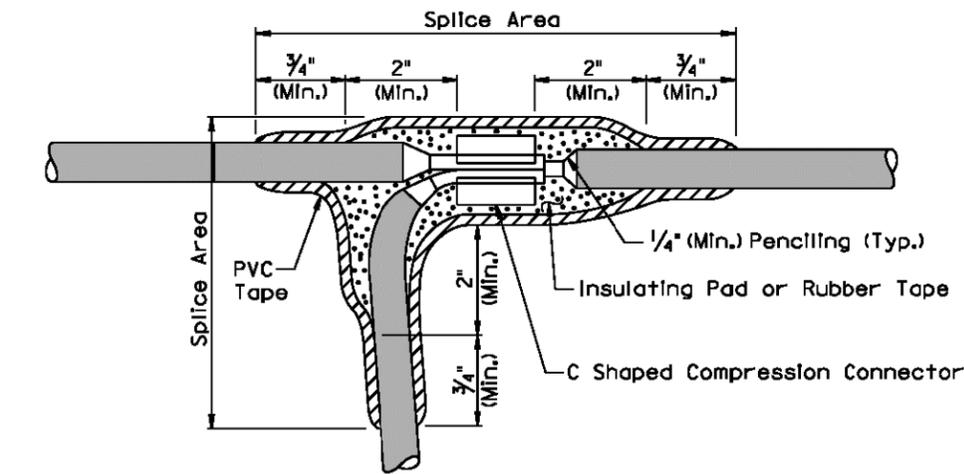
Step 4. Environmentally seal total splice against weather, moisture and abrasion. Methods for environmentally sealing the splice include heat-shrinkable tubing, special sealing kits, special forms to be filled by sealant, and tape and coating.



June 20, 2000



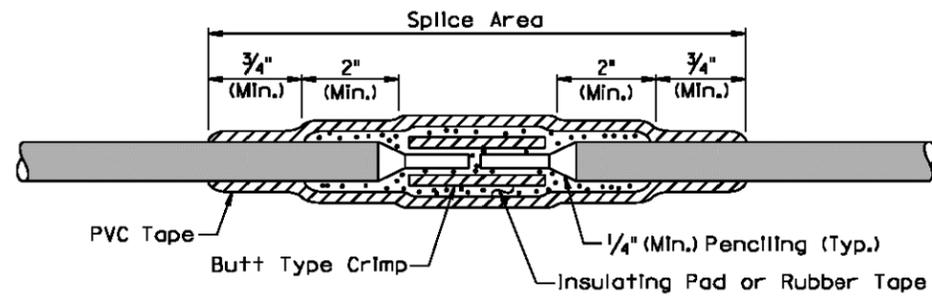
TYPE C SPLICE  
(Between 1 free end and 1 through conductor)



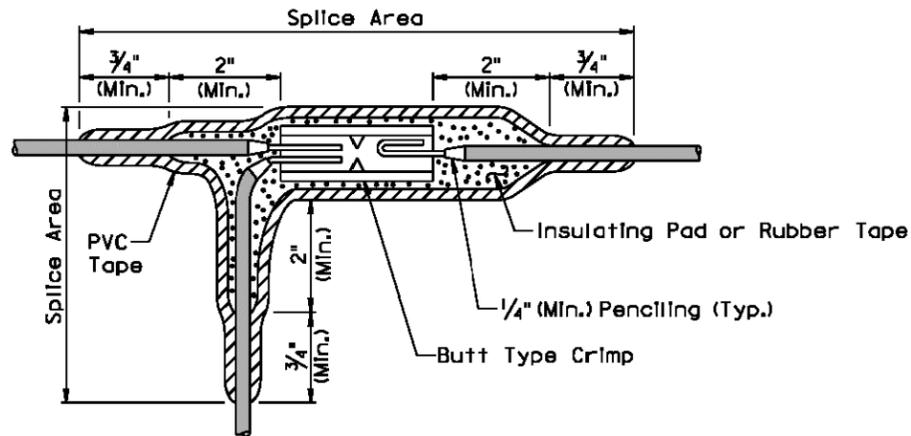
TYPE T SPLICE  
(For 3 free ends)

February 14, 2010

11-12-15 k:\2012\BRI2028 - Mt. Rushmore Road-Phase III\BRI2028E.dwg



**TYPE S SPLICE**  
(Between 2 free ends)



**TYPE ST SPLICE**  
(For 3 free ends)

**GENERAL NOTES:**

The splice shall be environmentally sealed for protection from weather, moisture, and abrasion in accordance with the method stated below.

The rubber tapes shall be rolled after application.

**Method for insulating splice area:**

1. The splice area shall be completely covered with electrical insulating coating and dried.
2. Apply two layers of 1/8" minimum thickness electrical insulating pad or two layers of half lapped synthetic oil resistant self fusing rubber tape.
3. Three layers of half lapped polyvinyl chloride tape shall be applied.
4. The entire splice area shall be covered with electrical insulating coating and dried.

February 14, 2010

Published Date: 4th Qtr. 2015	S D D O T	<b>WIRE SPlicing FOR LIGHTING</b> (LOW VOLTAGE CIRCUITS (0 to 600 V))	PLATE NUMBER 635.80
			Sheet 2 of 2

**GENERAL NOTES:**

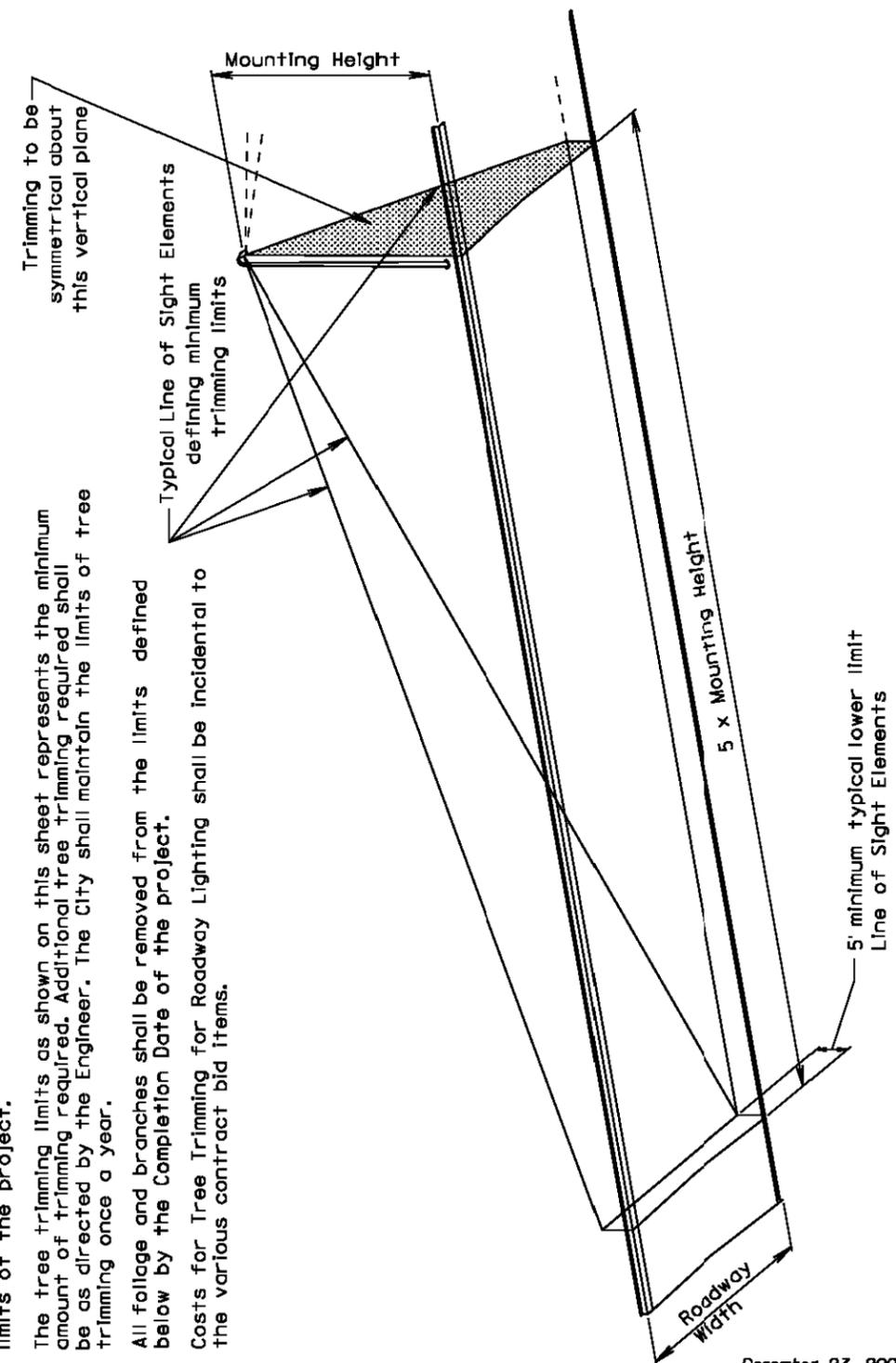
Tree Trimming shall be done in accordance with proper tree trimming practices. The underside of each branch to be removed shall have a groove sawed through the bark (1/2" Min. depth) before any sawing is started on the top side of the branch.

Tree trimming shall be applied around each light source installed within the limits of the project.

The tree trimming limits as shown on this sheet represents the minimum amount of trimming required. Additional tree trimming required shall be as directed by the Engineer. The City shall maintain the limits of tree trimming once a year.

All foliage and branches shall be removed from the limits defined below by the Completion Date of the project.

Costs for Tree Trimming for Roadway Lighting shall be incidental to the various contract bid items.



December 23, 2009

Published Date: 4th Qtr. 2015	S D D O T	<b>TREE TRIMMING FOR ROADWAY LIGHTING</b>	PLATE NUMBER 635.99
			Sheet 1 of 1