FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH0016(78)67	L1	L38

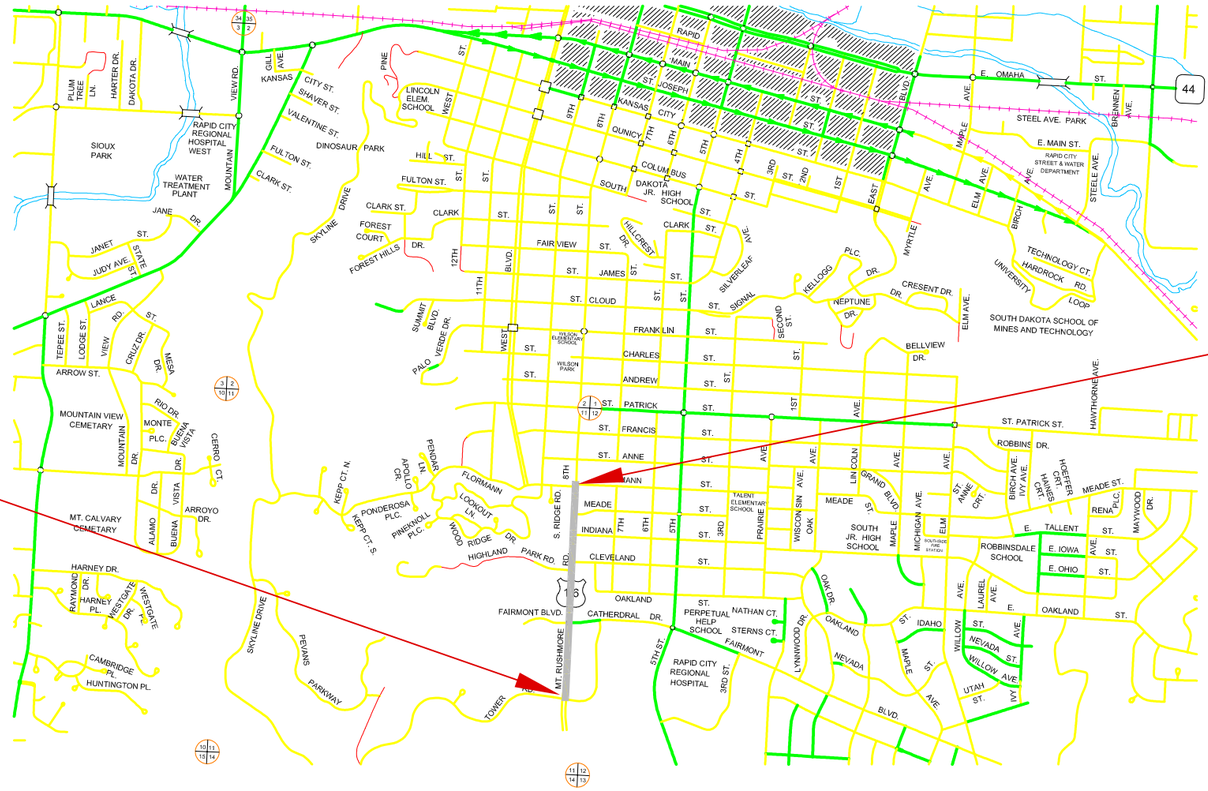
PLOTTING DATE: 6-13-14

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 #BR12025

SECTION L: SIGNAL & LIGHTING PLANS

INDEX OF SHEETS



BEGIN P NH0016(78)67
MT. RUSHMORE ROAD
Station 0+00
Rapid City, SD

END P NH0016(78)67
MT. RUSHMORE ROAD
Station 34+25
Rapid City, SD

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 9162
DAREN WAYNE BECKLOFF
SOUTH DAKOTA
6/13/14

06-20-14 K:\2012\BR12025 - Mt. Rushmore Road-Phase I\BR12025E 6-13-14.dwg

FOR BIDDING PURPOSES ONLY

SECTION L ESTIMATE OF QUANTITIES

	Bid Item Number	Item	Quantity	Unit
	110E1520	Remove Signal Equipment	Lump Sum	LS
	110E1530	Remove Signal Pole Footing	4	Each
	110E5110	Salvage Signal Equipment	Lump Sum	LS
	250E0010	Incidental Work	Lump Sum	LS
	635E0900	Decorative Luminaire Pole	21	Each
	635E0910	Decorative Luminaire Arm	21	Each
	635E2364	Decorative Signal Pole with 25' Mast Arm and Luminaire Arm	2	Each
	635E2366	Decorative Signal Pole with 35' Mast Arm and Luminaire Arm	1	Each
	635E2368	Decorative Signal Pole with 40' Mast Arm and Luminaire Arm	2	Each
	635E2370	Decorative Signal Pole with 45' Mast Arm and Luminaire Arm	1	Each
	635E2376	Decorative Signal Pole with 60' Mast Arm and Luminaire Arm	2	Each
	635E3450	Decorative Luminaire, 150 Watt with Photoelectric Cell	11	Each
	635E3460	Decorative Luminaire, 400 Watt with Photoelectric Cell	29	Each
	635E4030	3 Section Vehicle Signal Head	30	Each
	635E4040	4 Section Vehicle Signal Head	6	Each
	635E4050	5 Section Vehicle Signal Head	1	Each
	635E5020	2' Diameter Footing	168.0	Ft
	635E5030	3' Diameter Footing	96.0	Ft
*	635E5301	Type 1 Electrical Junction Box	3	Each
*	635E5302	Type 2 Electrical Junction Box	3	Each
	635E5302	Type 2 Electrical Junction Box	43	Each
	635E5303	Type 3 Electrical Junction Box	12	Each
	635E5304	Type 4 Electrical Junction Box	5	Each
	635E5400	Electrical Service Cabinet	5	Each
*	635E5400	Electrical Service Cabinet	2	Each
	635E5430	Traffic Signal Controller	2	Each
*	635E5500	Meter Socket	2	Each
	635E5500	Meter Socket	5	Each
	635E5515	Signal Head Battery Backup and Flash System	2	Each
	635E5530	Preformed Detector Loop	51	Each
	635E5550	Detector Unit	21	Each
	635E5562	Siren Emergency Vehicle Preemption System	1	Each
	635E5900	Pedestrian Push Button	16	Each
	635E5910	Pedestrian Push Button Pole	16	Each
	635E5922	Pedestrian Signal Head with Countdown Timer	16	Each
	635E5930	Pedestrian Crossing Sign	16	Each
	635E7530	Relocate Signal Equipment	Lump Sum	LS
*	635E8120	2" Rigid Conduit, Schedule 40	330	Ft
	635E8120	2" Rigid Conduit, Schedule 40	9,540	Ft
	635E8130	3" Rigid Conduit, Schedule 40	180	Ft
	635E8140	4" Rigid Conduit, Schedule 40	20	Ft
	635E8220	2" Rigid Conduit, Schedule 80	1,780	Ft
*	635E8220	2" Rigid Conduit, Schedule 80	40	Ft
	635E8230	3" Rigid Conduit, Schedule 80	1,045	Ft
*	635E9012	1/C #2 AWG Copper Wire	335	Ft
	635E9012	1/C #2 AWG Copper Wire	505	Ft
*	635E9013	1/C #3 AWG Copper Wire	3,180	Ft
	635E9014	1/C #4 AWG Copper Wire	4,415	Ft
*	635E9014	1/C #4 AWG Copper Wire	2,710	Ft
	635E9016	1/C #6 AWG Copper Wire	18,235	Ft
*	635E9016	1/C #6 AWG Copper Wire	9,320	Ft
*	635E9018	1/C #8 AWG Copper Wire	4,260	Ft
*	635E9020	1/C #10 AWG Copper Wire	1,045	Ft
	635E9020	1/C #10 AWG Copper Wire	17,835	Ft
	635E9502	2/C #14 AWG Copper Tray Cable, K2	160	Ft
	635E9504	4/C #14 AWG Copper Tray Cable, K2	3,595	Ft
	635E9507	7/C #14 AWG Copper Tray Cable, K2	915	Ft
	635E9512	12/C #14 AWG Copper Tray Cable, K2	30	Ft
	635E9524	24/C #14 AWG Copper Tray Cable, K2	585	Ft
	635E9530	30/C #14 AWG Copper Tray Cable, K2	470	Ft
	635E9600	#16 AWG Copper Twisted Shielded Pair	5,050	Ft
	635E9710	2/C #10 AWG Copper Pole and Bracket Cable	1,675	Ft
	635E9948	48 Strand Fiber Optic Cable	2,160	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:

Stacy.Bartlett@state.sd.us
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 The Contractor shall notify the Rapid City Region Traffic Engineer 5 days before the delivery of the salvaged signal poles with mast arms and traffic signal controllers. The Rapid City Region Traffic Engineer contact number is (605)394-1633.

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 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”.

Coordinate removal of Black Hills Power owned power/light poles with BHP. Lights to remain in operation as long as possible until new lights and poles are installed.

TABLE OF FOOTING DATA

PLOTTING DATE: 6-13-14
REV 7-3-14

Site Designation	Footing Diameter	* Footing Depth	**Spiral Diameter	**Spiral Length	Vertical Reinforcement
L1-L21	2’ - 0”	8’ - 0”	1’ - 8”	54’ - 9”	8-#7 x 7’ - 6”
A2, A4	3’ - 0”	11’ - 0”	2’ - 8”	112’ - 6”	14-#8 x 10’ - 6”
C1-C4	3’ - 0”	12’ - 0”	2’ - 8”	120’ - 9”	14-#8 x 11’ - 6”
A1, A3	3’ - 0”	13’ - 0”	2’ - 8”	129’ - 3”	14-#8 x 12’ - 6”

* Footing depth shall be below ground level.
** The size of all spirals shall be #3.

FOOTING DATA

The boring logs and laboratory tests are available for review from the Geotechnical Engineering Activity 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.

From station 0+00 to station 23+00+/- the subsurface soils consist of 2’ to 9’ of clay-silt to sand-clay overlying weathered sandstone to 15’ below the surface. Groundwater was measured to be between 8’ and 13.1’ and the borings caved between 12.8’ and 13.5’ below the surface.

From station 23+00+/- to 34+25 the subsurface soils consist of 1’ to 10.3’ of sand-clay over silt-clay (shale). Groundwater was measured to be between 7’ and 14’ below the surface and the borings remained open in this section.

Concrete placement operations should closely follow excavation procedures. The longer the excavations are left open the more likely caving may occur. If caving soils are encountered during excavation, casing may be required to construct the cylindrical footings.

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. If caving occurs during dewatering the concrete shall be placed through a tremie or by means of a casing.

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 L1-L21 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 A1-A4 & C1-C4 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.

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

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

ANCHOR RODS

Anchor rods for all poles shall be furnished and installed by the Contractor. Costs for furnishing and installing the anchor rods shall be incidental to the contract lump sum price for "Incidental Work."

LUMINAIRES

The accepted design for the roadway luminaires L1-L10 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:	100 Ft.
Spacing:	125 Ft.
Configuration:	Staggered
Mounting Height:	40 Ft.
Lamp:	400W HPS

The accepted design for the roadway luminaires L11-L12 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:	100 Ft.
Spacing:	115 Ft.
Configuration:	Staggered
Mounting Height:	40 Ft. & 16 Ft.
Lamp:	400W HPS & 150W HPS

LUMINAIRES (continued)

The accepted design for the roadway luminaires L13-L14 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 accepted design for the roadway luminaires L15-L21 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:	60 Ft.
Spacing:	170 Ft.
Configuration:	Staggered
Mounting Height:	40 Ft. & 16 Ft.
Lamp:	400W HPS & 150W HPS

The following luminaires meet the requirements for the designs:

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

Three copies of the isofootcandle 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 isofootcandle 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

PLOTTING DATE: 6-13-14
REV 7-3-14

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.

TRAFFIC SIGNAL ELECTRICAL SERVICE CABINETS

The Contractor shall provide a non-fuse disconnect panel at all electrical service cabinets for traffic signals.

All costs for work involved with furnishing and installing the non-fuse disconnect panels 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.

PLOTTING DATE: 6-13-14

TRAFFIC SIGNAL CONTROLLER

The controllers shall be a solid state, digital, NEMA TS2 Type 1 compatible with existing signal control equipment and software in the City of Rapid City.

The controllers shall be two through twelve phase controllers.

Vehicle detectors E1-E12, N1-N9, S7-S12 & W1-W12 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.

Vehicle detectors S1-S6 shall operate in the passage (locking) mode.

The controller cabinet doors shall be hinged on the right side.

Digital timing shall be provided with a battery backup.

The controllers shall alternate the red and yellow indication when flashing.

The interface panels shall be capable of inserting up to sixteen load switches.

The controller cabinets shall be pad mounted.

The controllers shall be capable of programming by manual entry via the front panel keyboard, data downloading from a portable PC computer via null-modem cable, and data downloading from one controller to another using a serial port on each controller.

The controllers shall be capable of operating coordinated by time-based, hardwire, and telemetry.

The controller cabinets shall be capable of placing vehicle and pedestrian calls into the controller. Placed calls shall provide for eight vehicle phases and four pedestrian phases. The placed calls for vehicle phases shall be capable of extending the associated vehicle phase by continuous or intermittent contact.

The controllers shall have a copy function to copy all timing data from one phase to another. The controllers shall also permit copying all coordination pattern data from one pattern to another.

A Malfunction Management Unit shall be installed in each cabinet and shall conform to the requirements of NEMA Standard TS-2 Section 4.

A sufficient quantity of BUS Interface Units shall be installed in the cabinet to provide communication between detectors, load switches, controller unit, etc. Each BUS Interface Unit shall conform to NEMA Standard TS-2, Section 8.

The controllers shall have internal signal dimming.

The controllers Solid State Flasher shall have dimming capability.

The Contractor is responsible for programming controllers 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:

Stacy Bartlett
Traffic Design Engineer
Office of Road Design
700 East Broadway
Pierre, SD 57501

TRAFFIC SIGNAL INTERCONNECTION

The Contractor shall install managed Gigabit Ethernet communication between traffic signal controllers at US16/Mount Rushmore Rd & Cathedral Dr and US16/Mount Rushmore Rd & Flormann St intersections. Communication between the traffic signal controllers shall be compatible with the existing traffic control communication software on SD44/Omaha St.

The controllers at US16/Mount Rushmore Rd & Cathedral Dr and US16/Mount Rushmore & Flormann St shall be time-base coordinated until a master controller is installed at the intersection of US16/Mount Rushmore Rd & St Patrick St. The master controller will be installed at the intersection of US16/Mount Rushmore Rd & St Patrick St on a future project.

All costs for establishing managed Gigabit Ethernet communication between the traffic signal controllers and time base coordination operation along US16/Mount Rushmore Rd 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

The Contractor shall supply a cabinet for housing the battery backup at the traffic signal controller.

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

FIBER OPTIC CABLE MODEM

New controllers shall be equipped with a fiber optic modem.

All costs for furnishing and installing fiber optic modems in new controllers shall be incidental to the contract unit price per each for “Traffic Signal Controller”.

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^2●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.

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 CABLE (continued)

The payment for supplying, installing, testing, and training of city personnel shall be incidental to the contract unit price per foot for “48 Strand Fiber Optic Cable”.

FIBER OPTIC CABLE CONNECTION TO EXISTING FIBER OPTIC CABLE

All work involved in the connection of new fiber optic cable to existing fiber optic cable shall be incidental to the contract unit price per foot for “48 Strand Fiber Optic Cable”.

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.

PEDESTRIAN PUSH BUTTON

The pedestrian push button shall meet the following requirements:

General Requirements:

1. Shall be pressure activated with essentially no moving parts.
2. Shall be vandal resistant.
3. Shall activate with 3 lbs. force or less.
4. Shall have an LED that illuminates when the button is being pushed.
5. Shall give a toned beep verification of button being pushed.
6. Shall have an operating life of 1 million actuations.
7. Shall be compatible with NEMA TS1 and TS2 controllers.

Housing:

1. Button housing shall be high impact cast or machined aluminum.
2. All switch electronics shall be sealed within the high impact cast or machined aluminum housing.
3. Shall have a gasket between the button housing and the mounting cup.
4. Shall be natural aluminum material.

Electrical:

1. Operating Voltage: 15 to 24V DC or 12 to 24V AC.
2. On Resistance 10 Ohms (When the button is activated and placing a call).
3. Standby Current 10 micro amps typical.
4. Shall have built in surge protection.
5. Shall have a solid state electronic piezo switch rated for 1 million cycles with no moving plunger or moving electrical contacts.
6. Shall hold the call for a minimum of 5 seconds.
7. Requires only two conductors be run from the traffic signal cabinet to the push button to operate.
8. Six units wired in parallel on a single pedestrian isolator input shall not pull the input voltage of the pedestrian isolator down such that a false pedestrian call is placed in the controller.

ON-SITE INSPECTION

An on-site inspection of the traffic signals shall be conducted before acceptance of the project, once the traffic signals are completed and operational. The on-site inspection shall be conducted by the Contractor, Region Traffic Engineer, 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. 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

STATE OF SOUTH DAKOTA | PROJECT: NH0016(78)67 | SHEET: L6 | TOTAL SHEETS: L38

PLOTTING DATE: 6-13-14
REV 7-3-14

Location to Location		Rigid Conduit Schedule 40 2" Ft	Rigid Conduit Schedule 40 3" Ft	Rigid Conduit Schedule 40 4" Ft	Rigid Conduit Schedule 80 2" Ft	Rigid Conduit Schedule 80 3" Ft	Copper Wire 1/C #2 AWG Ft	Copper Wire 1/C #3 AWG Ft	Copper Wire 1/C #4 AWG Ft	Copper Wire 1/C #6 AWG Ft	Copper Wire 1/C #8 AWG Ft	Copper Wire 1/C #10 AWG Ft	Copper Tray Cable, K2 #14 AWG 2/C Ft	4/C Ft	7/C Ft	12/C Ft	24/C Ft	30/C Ft	Twisted Shielded Pair #16 AWG Ft	Pole and Bracket Cable 2/C #10 AWG Ft	Preemption Cable PC Ft	Fiber Optic Cable Ft
FIBER																						
CONTROLLER A	JF1	5										10										10
JF1	JF2	405			90							500										500
JF2	JF3	305			65							370										370
JF3	JF4	710										715										715
JF4	JF5	480			75							555										555
JF5	CONTROLLER C	5										10										10
LIGHTING & RECEPTACLES																						
L1	JL1	5								30	30	30										
JL1	JL3	265						540	540	540		270										
JL3	L3	5								30	30	30										
JL3	JL5	260						530	530	530		265										
JL5	L5	5								30	30	30										
JL5	JL7	100						210	210	210		105										
JL7	JI2	45						100		50		50										
JL7	JL9	165						340	340	370		170										
JL9	L7	5									30	30										
JL9	JL11	260						530	530	530		265										
JL11	L9	5								30	30	30										
JL11	JL13	260						530	530	530		265										
JL13	SIGNAL POLE A1	5								30		10										
JL13	JL16				120					315		105										
JL16	SIGNAL POLE A4	5								30		10										
JL13	JL14				125			260	260	260		130										
JL14	SIGNAL POLE A2	5								30		10										
JL14	SERVICE CABINET LA	65							280	140		70										
JL14	SERVICE CABINET RA	65						140	140	140		70										
JL14	JL15				100					315		105										
JL15	SIGNAL POLE A3	5								30		10										
JL14	JL12	165							680	340		170										
JL12	L10	5							30		30	30										
JL12	JL10	255							520	1040		260										
JL10	L8	5								30	30	30										
JL10	JL8	195			100				540	1080		270										
JL8	L6	5								30	30	30										
JL8	JL6	80							170	340		85										
JL6	JI1	40							90	45		45										
JL6	JL4	185							380	760		190										
JL4	L4	5								30	30	30										
JL4	JL2	260							530	1060		265										
JL2	L2	5								30	30	30										
BHP TRANSFORMER	METER LA	30					100															
BHP TRANSFORMER	METER SA	30					100															
BHP TRANSFORMER	METER RA	30					100															
METER LA	SERVICE CABINET LA	5					20															
METER SA	SERVICE CABINET SA	5					20															
METER RA	SERVICE CABINET RA	5					20															
Subtotal:		4,750	0	0	675	0	360	3,180	6,300	8,955	300	5,655	0	0	0	0	0	0	0	0	0	2,160

TABLE OF CONDUIT AND CABLE QUANTITIES

FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA | PROJECT: NH0016(78)67 | SHEET: L7 | TOTAL SHEETS: L38

PLOTTING DATE: 6-13-14

Location to Location		Rigid Conduit Schedule 40 2" Ft	Rigid Conduit Schedule 40 3" Ft	Rigid Conduit Schedule 40 4" Ft	Rigid Conduit Schedule 80 2" Ft	Rigid Conduit Schedule 80 3" Ft	Copper Wire 1/C #2 AWG Ft	Copper Wire 1/C #3 AWG Ft	Copper Wire 1/C #4 AWG Ft	Copper Wire 1/C #6 AWG Ft	Copper Wire 1/C #8 AWG Ft	Copper Wire 1/C #10 AWG Ft	Copper Tray Cable, K2 #14 AWG 2/C Ft	4/C Ft	7/C Ft	12/C Ft	24/C Ft	30/C Ft	Twisted Shielded Pair #16 AWG Ft	Pole and Bracket Cable 2/C #10 AWG Ft	Preemption Cable PC Ft	Fiber Optic Cable Ft
LIGHTING & RECEPTACLES CONTINUED																						
JL17	L11	5								30	30	30										
JL17	JL20	275								840	840	280										
JL20	L13	5								30	30	30										
JL20	JL22	300			75					1125	1125	375										
JL22	L15	5								30	30	30										
JL22	SERVICE CABINET LB	20								90		20										
JL22	SERVICE CABINET RB	20								90		20										
JL22	JL23				80					765		90										
JL23	JL21	190								1170	585	195										
JL21	L14	5								30	30	30										
JL21	JL19	240								1470	735	245										
JL19	JI3				45					150		50										
JL19	JL18	110								345	345	115										
JL18	L12	5								30	30	30										
JL22	JL25	125								780		130										
JL25	JL26	195								1200		200										
JL26	L17	5								30	30	30										
JL26	JL28	385								2340		390										
JL28	L19	5								30	30	30										
JL28	JL30	300								1830		305										
JL30	L21	5								30	30	30										
JL23	JL24	55			70					750		125										
JL24	JL25				95							100										
JL24	L16	5								30	30	30										
JL24	JL27	355			65					2520		420										
JL27	L18	5								30	30	30										
JL27	JL29	255			65					1920		320										
JL29	L20	5								30	30	30										
BHP TRANSFORMER	METER LB				65		200															
BHP TRANSFORMER	METER RB				65		200															
BHP TRANSFORMER	FUTURE METER SB				65							70										
METER LB	SERVICE CABINET LB	5					20															
METER RB	SERVICE CABINET RB	5					20															
SERVICE CABINET LC	JL34	10							45			15										
JL34	SIGNAL POLE C4	5								30		10										
JL34	JL31				75					240		80										
JL31	SIGNAL POLE C1	5								30		10										
JL31	JL32				100							105										
JL32	SIGNAL POLE C2	5								30		10										
JL32	JL33				70					225		75										
JL33	SIGNAL POLE C3	5								30		10										
JL33	JL34				95					300		100										
METER LC	SERVICE CABINET LC	5					20															
METER SC	SERVICE CABINET SC	5					20															
BHP TRANSFORMER	METER LC	200										205										
BHP TRANSFORMER	METER SC	200										205										
BHP TRANSFORMER	FUTURE METER RC	200										205										
Subtotal:		3,530	0	0	1,030	0	480	0	45	18,600	3,960	4,810	0	0	0	0	0	0	0	0	0	0

TABLE OF CONDUIT AND CABLE QUANTITIES

FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH0016(78)67	L8	L38

PLOTTING DATE: 6-13-14

Location to Location		Rigid Conduit						Copper Wire							Copper Tray Cable, K2							Twisted Shielded Pair			Pole and Bracket Cable			Preemption Cable			Fiber Optic Cable					
		Schedule 40			Schedule 80										#14 AWG																					
		2" Ft	3" Ft	4" Ft	2" Ft	3" Ft		1/C #2 AWG Ft	1/C #3 AWG Ft	1/C #4 AWG Ft	1/C #6 AWG Ft	1/C #8 AWG Ft	1/C #10 AWG Ft		2/C Ft	4/C Ft	7/C Ft	12/C Ft	24/C Ft	30/C Ft		#16 AWG Ft			2/C #10 AWG Ft			PC Ft			Ft					
LUMINAIRE POLES																																				
LUMINAIRE	L1																								55											
LUMINAIRE	L2																								55											
LUMINAIRE	L3																								55											
LUMINAIRE	L4																								55											
LUMINAIRE	L5																								55											
LUMINAIRE	L6																								55											
LUMINAIRE	L7																								55											
LUMINAIRE	L8																								55											
LUMINAIRE	L9																								55											
LUMINAIRE	L10																								55											
LUMINAIRE	L11																								55											
LUMINAIRE	L12																								55											
LUMINAIRE	L13																								55											
LUMINAIRE	L14																								55											
LUMINAIRE	L15																								55											
LUMINAIRE	L16																								55											
LUMINAIRE	L17																								55											
LUMINAIRE	L18																								55											
LUMINAIRE	L19																								55											
LUMINAIRE	L20																								55											
LUMINAIRE	L21																								55											
RECEPTACLE	L1												45																							
RECEPTACLE	L2												45																							
RECEPTACLE	L3												45																							
RECEPTACLE	L4												45																							
RECEPTACLE	L5												45																							
RECEPTACLE	L6												45																							
RECEPTACLE	L7												45																							
RECEPTACLE	L8												45																							
RECEPTACLE	L9												45																							
RECEPTACLE	L10												45																							
RECEPTACLE	L11												45																							
RECEPTACLE	L12												45																							
RECEPTACLE	L13												45																							
RECEPTACLE	L14												45																							
RECEPTACLE	L15												45																							
RECEPTACLE	L16												45																							
RECEPTACLE	L17												45																							
RECEPTACLE	L18												45																							
RECEPTACLE	L19												45																							
RECEPTACLE	L20												45																							
RECEPTACLE	L21												45																							
Subtotal:		0	0	0	0	0		0	0	0	0	0	945		0	0	0	0	0	0		0			1,155			0			0					

TABLE OF CONDUIT AND CABLE QUANTITIES

FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA | PROJECT NH0016(78)67 | SHEET L9 | TOTAL SHEETS L38

PLOTTING DATE: 6-13-14
REV 7-3-14

Location to Location		Rigid Conduit Schedule 40 2" Ft	Rigid Conduit Schedule 40 3" Ft	Rigid Conduit Schedule 40 4" Ft	Rigid Conduit Schedule 80 2" Ft	Rigid Conduit Schedule 80 3" Ft	Copper Wire 1/C #2 AWG Ft	Copper Wire 1/C #3 AWG Ft	Copper Wire 1/C #4 AWG Ft	Copper Wire 1/C #6 AWG Ft	Copper Wire 1/C #8 AWG Ft	Copper Wire 1/C #10 AWG Ft	Copper Tray Cable, K2 #14 AWG 2/C Ft	4/C Ft	7/C Ft	12/C Ft	24/C Ft	30/C Ft	Twisted Shielded Pair #16 AWG Ft	Pole and Bracket Cable 2/C #10 AWG Ft	Preemption Cable PC Ft	Fiber Optic Cable Ft
MT. RUSHMORE RD & CATHEDRAL DR																						
CONTROLLER A	JA2			15					60			70		160	40	20	20	60	300		160	
JA2	JA1	30										35							105			
JA2	PED PBP PA1	25										30		30								
JA2	PED PBP PA2	15										20		20								
JA2	SIGNAL POLE A1	5										10				10		10			20	
JA2	JA7					105						110		220	110		110		220		220	
JA2	JA4					130			405			540		540	135			270	1350		540	
JA4	SERVICE CABINET SA	60							240			65										
JA4	JA3	35										160							280			
JA3	JA9	165										680							1020			
JA9	JA10	95										400							400			
JA10	JA11	105										440							220			
JA11	JA12	700			75							3120										
JA12	E FLASHING SIGN	10										60										
JA12	W FLASHING SIGN				40							200										
JA4	PED PBP PA3	25										30		30								
JA4	PED PBP PA4	15										20		20								
JA4	SIGNAL POLE A2	5										10						10			20	
JA4	JA6					105						110		220	110			110	330		220	
JA6	JA5	25										30							90			
JA6	PED PBP PA5	20										25		25								
JA6	PED PBP PA6	10										15		15								
JA6	SIGNAL POLE A3	5										10			10			10			20	
JA6	JA7					125						130										
JA7	JA8	25										30							60			
JA7	PED PBP PA7	15										20		20								
JA7	PED PBP PA8	5										10		10								
JA7	SIGNAL POLE A4	5										10			10		10				20	
PED PB	PA1												10									
PED PB	PA2												10									
PED PB	PA3												10									
PED PB	PA4												10									
PED PB	PA5												10									
PED PB	PA6												10									
PED PB	PA7												10									
PED PB	PA8												10									
SIGNAL POLE	A1													360						65	130	
SIGNAL POLE	A2													175						65	120	
SIGNAL POLE	A3													215	80					65	130	
SIGNAL POLE	A4													130	30					65	100	
MT. RUSHMORE RD & CLEVELAND ST																						
JB1	JB4		125									130										
JB1	JB2					80						85										
JB2	JB3		55			70						125										
JB3	JB4					85						90										
Subtotal:		1,400	180	15	115	700	0	0	705	0	0	6,820	80	2,190	525	30	140	470	4,375	260	1,700	0

TABLE OF CONDUIT AND CABLE QUANTITIES

FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA | PROJECT: NH0016(78)67 | SHEET: L10 | TOTAL SHEETS: L38

PLOTTING DATE: 6-13-14
REV 7-3-14

Location to Location		Rigid Conduit: Schedule 40 2" Ft	Schedule 40 3" Ft	Schedule 40 4" Ft	Schedule 80 2" Ft	Schedule 80 3" Ft	Copper Wire: 1/C #2 AWG Ft	1/C #3 AWG Ft	1/C #4 AWG Ft	1/C #6 AWG Ft	1/C #8 AWG Ft	1/C #10 AWG Ft	Copper Tray Cable, K2 #14 AWG: 2/C Ft	4/C Ft	7/C Ft	12/C Ft	24/C Ft	30/C Ft	Twisted Shielded Pair #16 AWG Ft	Pole and Bracket Cable 2/C #10 AWG Ft	Preemption Cable PC Ft	Fiber Optic Cable Ft
MT. RUSHMORE RD & FLORMANN ST																						
SERVICE CABINET SC	JC8	10							45			15										
JC8	CONTROLLER C			5					30			10		80	20		40		60		80	
JC8	JC7	5										10							10			
JC8	PED PBP PC7	10										15		15								
JC8	PED PBP PC8	5										10		10								
JC8	SIGNAL POLE C4	10										15					15				30	
JC8	JC2					75						80		160	80		80		160		160	
JC2	JC1	10										15							30			
JC2	PED PBP PC1	25										30		30								
JC2	PED PBP PC2	15										20		20								
JC2	SIGNAL POLE C1	5										10			10		10				20	
JC2	JC4					110						115										
JC4	JC3	20										25							25			
JC4	PED PBP PC3	20										25		25								
JC4	PED PBP PC4	15										20		20								
JC4	SIGNAL POLE C2	5										10					10				20	
JC4	JC6					65						70		140			70		70		140	
JC6	JC5	5										10							20			
JC6	PED PBP PC5	5										10		10								
JC6	PED PBP PC6	10										15		15								
JC6	SIGNAL POLE C3	15										20			20		20				40	
JC6	JC8					95						100		400	100		200		300		400	
PED PB	PC1												10									
PED PB	PC2												10									
PED PB	PC3												10									
PED PB	PC4												10									
PED PB	PC5												10									
PED PB	PC6												10									
PED PB	PC7												10									
PED PB	PC8												10									
SIGNAL POLE	C1													150	65					65	120	
SIGNAL POLE	C2													90	15					65	80	
SIGNAL POLE	C3													150	65					65	120	
SIGNAL POLE	C4													90	15					65	80	
Subtotal:		190	0	5	0	345	0	0	75	0	0	650	80	1,405	390	0	445	0	675	260	1,290	0
Total:		9,870	180	20	1,820	1,045	840	3,180	7,125	27,555	4,260	18,880	160	3,595	915	30	585	470	5,050	1,675	2,990	2,160

EXISTING SIGNAL LAYOUT

MT. RUSHMORE ROAD & CATHEDRAL DRIVE

FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH0016(78)67	L11	L38

PLOTTING DATE: 6-13-14

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 #BR12025

REMOVE SIGNAL EQUIPMENT

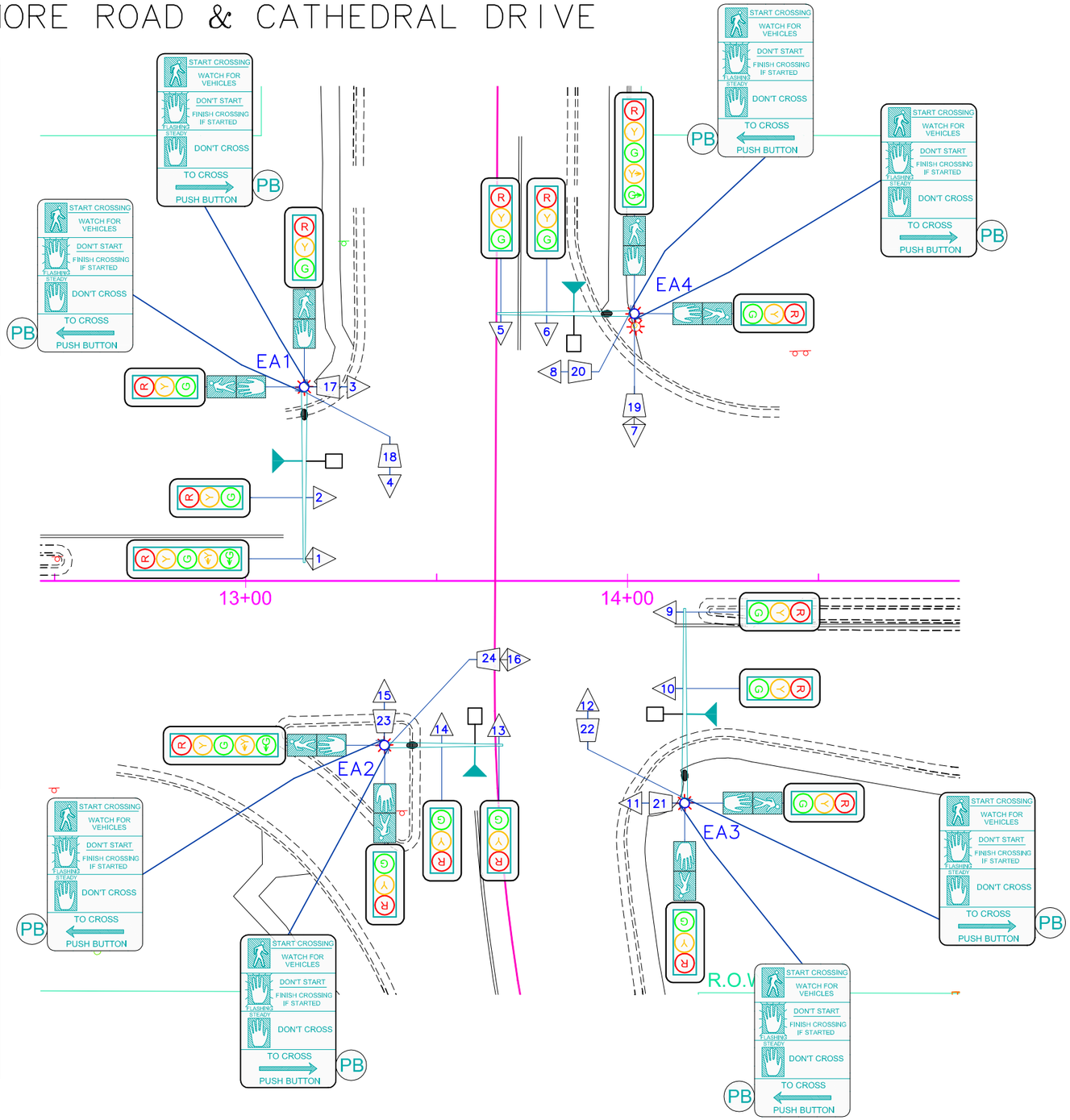
KEY	ITEM
	PEDESTRIAN SIGNAL HEAD (17–24)
PB	PEDESTRIAN PUSH BUTTON
START CROSSING / WATCH FOR VEHICLES / DON'T START / FINISH CROSSING IF STARTED / FLASHING STEADY / DON'T CROSS / TO CROSS / PUSH BUTTON	PEDESTRIAN CROSSING SIGN

SALVAGE EQUIPMENT

KEY	ITEM
	SIGNAL POLE W/ MAST ARM & LUMINAIRE ARM (EA1–EA4)
	ROADWAY LUMINAIRE, 400W WITH P.E. CELL (EA1–EA4)
	3 SECTION VEHICLE SIGNAL HEAD (2–6, 8–15)
	5 SECTION VEHICLE SIGNAL HEAD (1,7,16)
	4 SIREN DETECTORS
	CONFIRMATION LIGHT

ESTIMATE OF QUANTITIES

KEY	ITEM	EST. QUANT	UNIT
	REMOVE SIGNAL EQUIPMENT	LUMP SUM	LS
☼	REMOVE SIGNAL POLE FOOTING (EA1–EA4)	4	EACH
	SALVAGE SIGNAL EQUIPMENT	LUMP SUM	LS



SCALE:
1" = 40'

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 9162
DAREN WAYNE BECKLOFF
SOUTH DAKOTA
6/13/14

06-20-14

SIGNAL LAYOUT

MT. RUSHMORE ROAD & CATHEDRAL DRIVE

FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH0016(78)67	L12	L38

PLOTTING DATE: 6-13-14

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

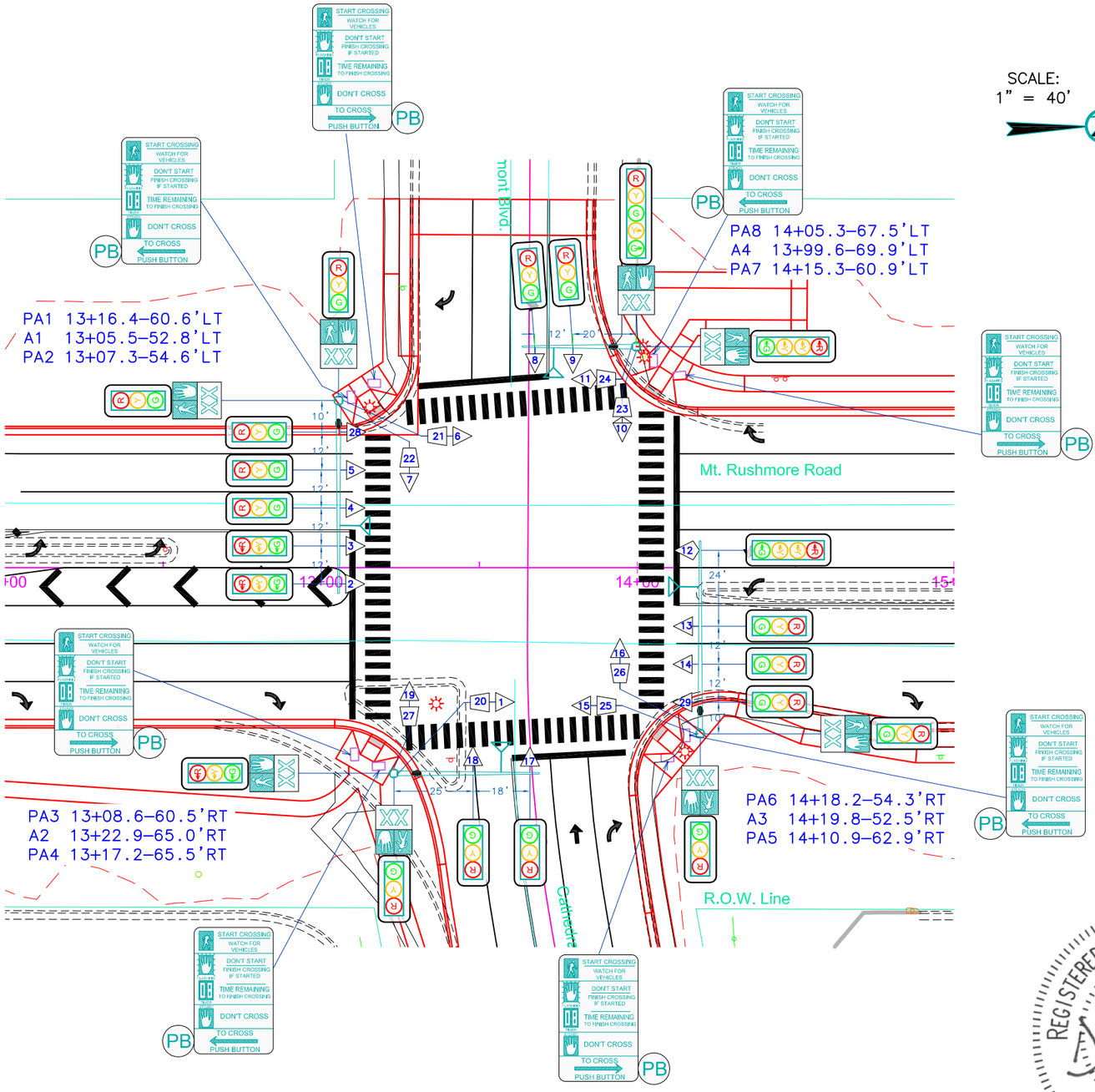
WPE #BR12025

ESTIMATE OF QUANTITIES

KEY	ITEM	QTY	UNIT
	DECORATIVE SIGNAL POLE W/ 35' MAST ARM & LUMINAIRE ARM (A4)	1	EACH
	DECORATIVE SIGNAL POLE W/ 45' MAST ARM & LUMINAIRE ARM (A2)	1	EACH
	DECORATIVE SIGNAL POLE W/ 60' MAST ARM & LUMINAIRE ARM (A1,A3)	2	EACH
	DECORATIVE LUMINAIRE, 400W WITH P.E. CELL (A1–A4)	4	EACH
	3 SECTION VEHICLE SIGNAL HEAD (1–9, 13–19) (28,29)	18	EACH
	4 SECTION VEHICLE SIGNAL HEAD (11,12)	2	EACH
	5 SECTION VEHICLE SIGNAL HEAD (10)	1	EACH
	SIGNAL HEAD BATTERY BACKUP AND FLASH SYSTEM	1	EACH
PB	PEDESTRIAN PUSH BUTTON	8	EACH
	PEDESTRIAN PUSH BUTTON POLE (PA1–PA8)	8	EACH
	PEDESTRIAN SIGNAL HEAD WITH COUNTDOWN TIMER (20–27)	8	EACH
	PEDESTRIAN CROSSING SIGN (R10–3e) (LEFT–4/RIGHT–4)	8	EACH

RELOCATE SIGNAL EQUIPMENT

KEY	ITEM
	SIREN EMERGENCY VEHICLE PREEMPTION SYSTEM (4 CHANNEL)
	SIREN DETECTOR



REGISTERED PROFESSIONAL ENGINEER
REG. NO. 9162
DAREN WAYNE BECKLOFF
SOUTH DAKOTA
6/13/14

SIGNAL LAYOUT

MT. RUSHMORE ROAD & FLORMANN STREET

FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH0016(78)67	L13	L38

PLOTTING DATE: 6-13-14

WEST PLAINS ENGINEERING, INC.
1750 RAND ROAD ■ RAPID CITY, SD 57702
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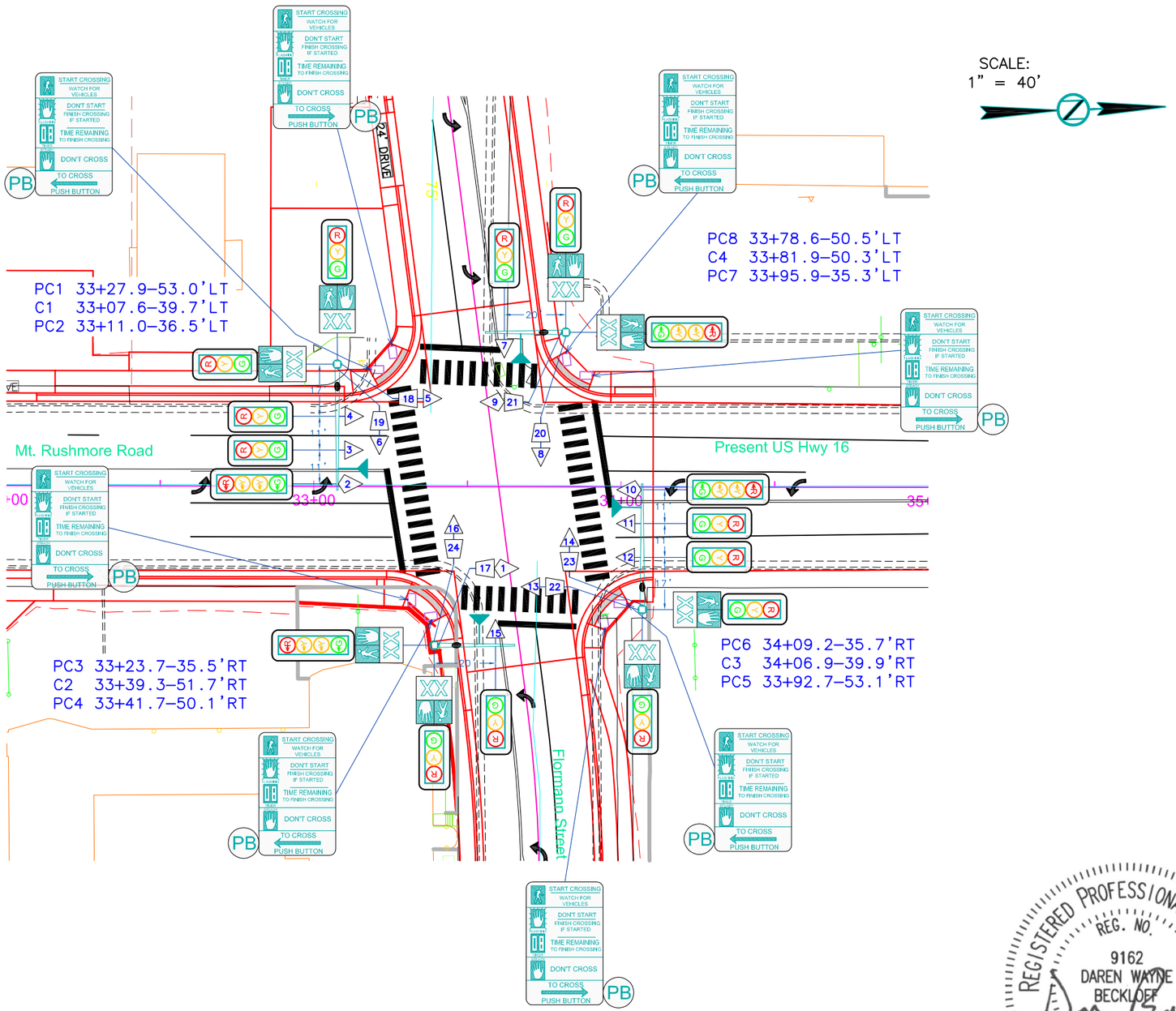
RAPID CITY, SD ■ SIOUX FALLS, SD ■ CASPER, WY ■ CEDAR RAPIDS, IA

WPE #BR12025

ESTIMATE OF QUANTITIES

KEY	ITEM	QTY	UNIT
	DECORATIVE SIGNAL POLE W/ 25' MAST ARM & LUMINAIRE ARM (C2,C4)	2	EACH
	DECORATIVE SIGNAL POLE W/ 40' MAST ARM & LUMINAIRE ARM (C1,C3)	2	EACH
	DECORATIVE LUMINAIRE, 400W WITH P.E. CELL (C1–C4)	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
PB	PEDESTRIAN PUSH BUTTON	8	EACH
°	PEDESTRIAN PUSH BUTTON POLE (PC1–PC8)	8	EACH
	PEDESTRIAN SIGNAL HEAD WITH COUNTDOWN TIMER (17–24)	8	EACH
	PEDESTRIAN CROSSING SIGN (R10–3e) (LEFT–4/RIGHT–4)	8	EACH



REGISTERED PROFESSIONAL ENGINEER
REG. NO. 9162
DAREN WAYNE BECKLOFF
SOUTH DAKOTA
6/13/14

CONDUIT LAYOUT
MT. RUSHMORE ROAD

FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH0016(78)67	L14	L38

PLOTTING DATE: 6-13-14

WPE WEST PLAINS ENGINEERING, INC.
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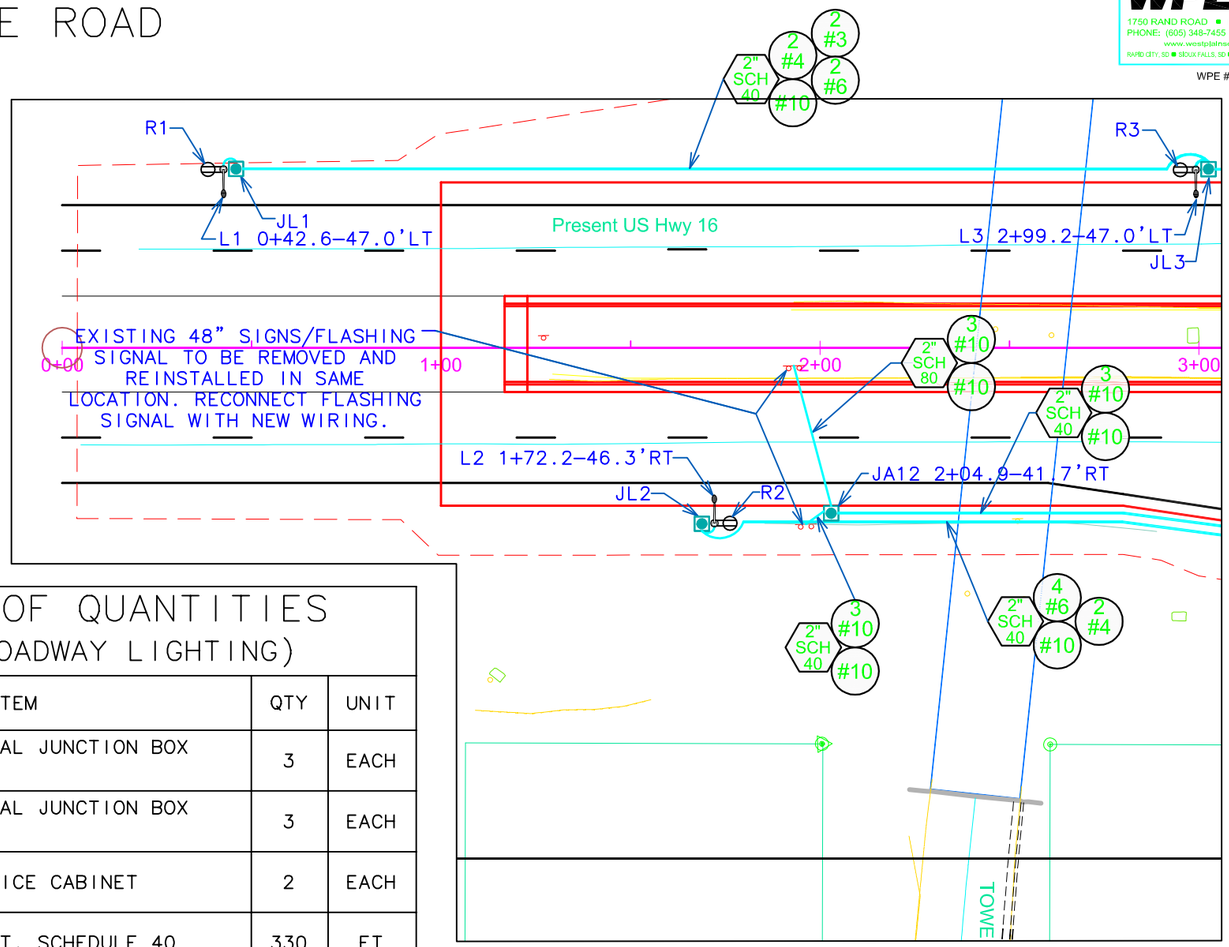
RAPID CITY, SD ■ SIOUX FALLS, SD ■ CASPER, WY ■ CEDAR RAPIDS, IA

WPE #BR12025



SCALE:
1" = 40'

NOTE:

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

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 9162
DAREN WAYNE BECKLOFF
SOUTH DAKOTA
6/13/14

ESTIMATE OF QUANTITIES
(FIBER & ROADWAY LIGHTING)

KEY	ITEM	QTY	UNIT
	DECORATIVE LUMINAIRE POLE (L1–L21)	21	EACH
	DECORATIVE LUMINAIRE ARM (L1–L21)	21	EACH
	DECORATIVE LUMINAIRE 400W WITH P.E.–40FT MOUNTING HEIGHT (L1–L21)	21	EACH
	DECORATIVE LUMINAIRE 150W WITH P.E.–16FT MOUNTING HEIGHT (L11–L21)	11	EACH
	RECEPTACLE (R1–R21)	21	EACH
	2' DIAMETER FOOTING (L1–L21)	168	FT
	TYPE 2 ELECTRICAL JUNCTION BOX (JL1–JL5, JL8–JL18, JL20–JL34)	31	EACH
	TYPE 4 ELECTRICAL JUNCTION BOX (JF1–JF5)	5	EACH
	ELECTRICAL SERVICE CABINET	3	EACH
2" SCH 40	2" RIGID CONDUIT, SCHEDULE 40	7750	FT
2" SCH 80	2" RIGID CONDUIT, SCHEDULE 80	1660	FT
#2	1/C #2 AWG COPPER WIRE	370	FT
#4	1/C #4 AWG COPPER WIRE	3635	FT
#6	1/C #6 AWG COPPER WIRE	18235	FT
#10	1/C #10 AWG COPPER WIRE	10195	FT
	2/C #10 AWG COPPER POLE & BRACKET CABLE	1155	FT
Fiber	48 STRAND FIBER OPTIC CABLE	2160	FT
M	METER SOCKET	3	EACH

ESTIMATE OF QUANTITIES
(FIBER & ROADWAY LIGHTING)

KEY	ITEM	QTY	UNIT
	* TYPE 1 ELECTRICAL JUNCTION BOX (JI1–J13)	3	EACH
	* TYPE 2 ELECTRICAL JUNCTION BOX (JL6, JL7, JL19)	3	EACH
	* ELECTRICAL SERVICE CABINET	2	EACH
2" SCH 40	* 2" RIGID CONDUIT, SCHEDULE 40	330	FT
2" SCH 80	* 2" RIGID CONDUIT, SCHEDULE 80	40	FT
#2	* 1/C #2 AWG COPPER WIRE	335	FT
#3	* 1/C #3 AWG COPPER WIRE	3180	FT
#4	* 1/C #4 AWG COPPER WIRE	2710	FT
#6	* 1/C #6 AWG COPPER WIRE	9320	FT
#8	* 1/C #8 AWG COPPER WIRE	4260	FT
#10	* 1/C #10 AWG COPPER WIRE	1045	FT
M	* METER SOCKET	2	EACH

CONDUIT LAYOUT
MT. RUSHMORE ROAD

FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH0016(78)67	L15	L38

PLOTTING DATE: 6-13-14
REV 7-7-14 DWB

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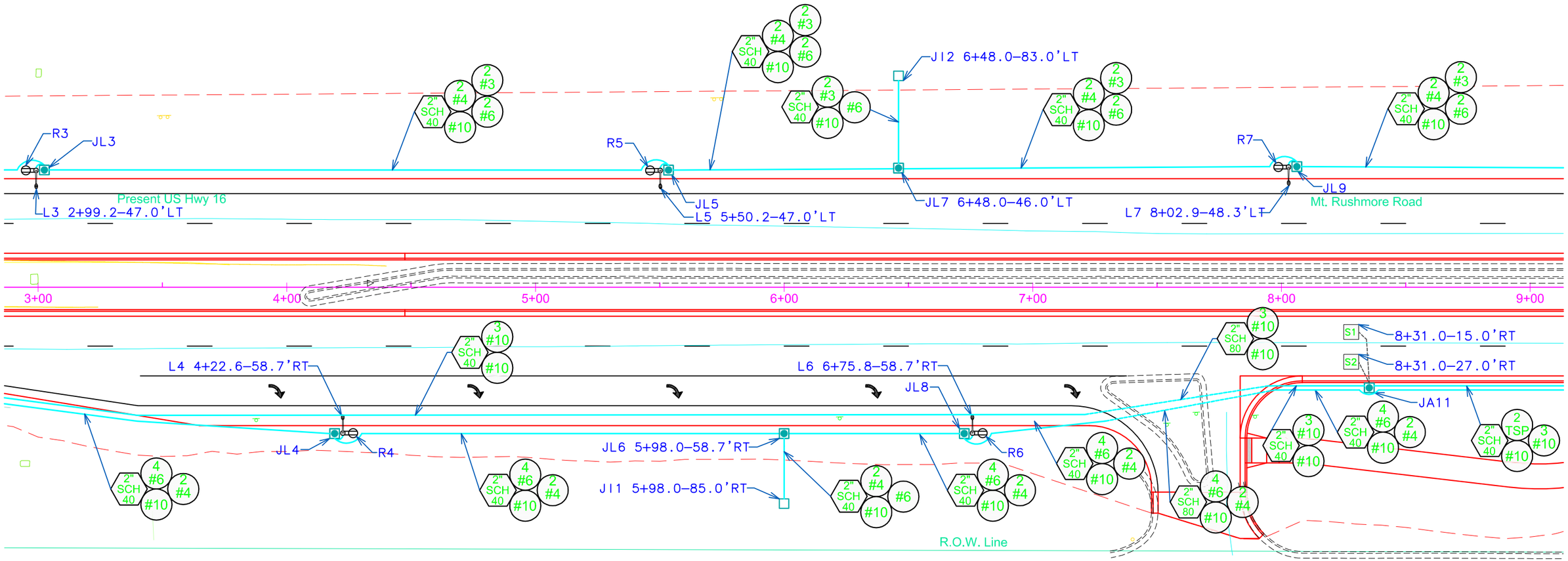
WPE #BR12025



SCALE:
1" = 40'

NOTE:

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.

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 9162
DAREN WAYNE BECKLOFF
SOUTH DAKOTA
6/13/14

07-7-14

CONDUIT LAYOUT

CATHEDRAL DR. &
MT. RUSHMORE ROAD

FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH0016(78)67	L16	L38

PLOTTING DATE: 6-13-14
REV 7-7-14 DWB

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WPE #BR12025

SIGNAL CONTROLLER

INSET A
NOT TO SCALE

R.O.W. Line

Present US Hwy 16

Mt. Rushmore Road

Junction Blvd.

Junction Blvd.

R8 R9 R10

JL10 JL11 JL12 JL13 JL14 JL15 JL16

JA1 JA2 JA3 JA4 JA5 JA6 JA8 JA9 JA10

A1 A2 A3 A4 A

L8 9+29.0–41.1'RT

L9 54.8–47.3'LT

L10 11+73.0–53.3'RT

10+08.0–15.0'RT

10+08.0–27.0'RT

11+85.0–15.0'RT

11+85.0–27.0'RT

13+67.7–59.6'LT

13+57.5–60.6'LT

13+42.1–61.3'LT

14+12.9–2.0'LT

14+12.9–2.0'RT

13+09.2–2.1'LT

13+87.2–60.1'RT

13+75.1–60.8'RT

13+64.3–61.3'RT

9+00 10+00 11+00 12+00 13+00 14+00 15+00

S3 S4 S5 S6 S7 S8 S9

N1 N2 N3 N4 N5 N6

W1 W2 W3 W4 W5 W6 W7 W8 W9

E1 E2 E3 E4 E5 E6 E7 E8 E9

EXISTING PADMOUNT TRANSFORMER
120/240 VAC, 60Hz,
1 Phase, 3 Wire
Service By B.H.P.L.

EXISTING METER TO BE REUSED

SCALE:
1" = 40'

INSET B
NOT TO SCALE

NOTE:

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

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 9162
DAREN WAYNE BECKLOFF
SOUTH DAKOTA
6/13/14

07-7-14

CONDUIT LAYOUT

CATHEDRAL DR. & MT. RUSHMORE ROAD

FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH0016(78)67	L17	L38

PLOTTING DATE: 6-13-14

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WPE #BR12025

ESTIMATE OF QUANTITIES (TRAFFIC SIGNAL)

KEY	ITEM	QTY	UNIT	KEY	ITEM	QTY	UNIT
	3' DIAMETER FOOTING (A1–A4)	48	FT	#2	1/C #2 AWG COPPER WIRE	100	FT
	TYPE 2 ELECTRICAL JUNCTION BOX (JA1,JA3,JA5,JA8–JA12)	8	EACH	#4	1/C #4 AWG COPPER WIRE	705	FT
	TYPE 3 ELECTRICAL JUNCTION BOX (JA2,JA4,JA6,JA7)	4	EACH	#10	1/C #10 AWG COPPER WIRE	6355	FT
	ELECTRICAL SERVICE CABINET	1	EACH		2/C #14 AWG COPPER TRAY CABLE, K2	80	FT
	TRAFFIC SIGNAL CONTROLLER	1	EACH	4/C	4/C #14 AWG COPPER TRAY CABLE, K2	2190	FT
M	METER SOCKET	1	EACH	7/C	7/C #14 AWG COPPER TRAY CABLE, K2	525	FT
	PREFORMED DETECTOR LOOP (S1–S9,E1–E9,N1–N6,W1–W9)	33	EACH	12/C	12/C #14 AWG COPPER TRAY CABLE, K2	30	FT
	DETECTOR UNIT	15	EACH	24/C	24/C #14 AWG COPPER TRAY CABLE, K2	140	FT
2" SCH 40	2" RIGID CONDUIT, SCHEDULE 40	1400	FT	30/C	30/C #14 AWG COPPER TRAY CABLE, K2	470	FT
4" SCH 40	4" RIGID CONDUIT, SCHEDULE 40	15	FT	TSP	#16 AWG COPPER TWISTED SHIELDED PAIR	4375	FT
2" SCH 80	2" RIGID CONDUIT, SCHEDULE 80	120	FT		2/C #10 AWG COPPER POLE & BRACKET CABLE	260	FT
3" SCH 80	3" RIGID CONDUIT, SCHEDULE 80	465	FT	PC	PREEMPTION CABLE (NOT A BID ITEM)	1700	FT

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 9162
DAREN WAYNE BECKLOFF
SOUTH DAKOTA
6/13/14

06-20-14

CONDUIT LAYOUT

MT. RUSHMORE ROAD

FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH0016(78)67	L18	L38

PLOTTING DATE: 6-13-14

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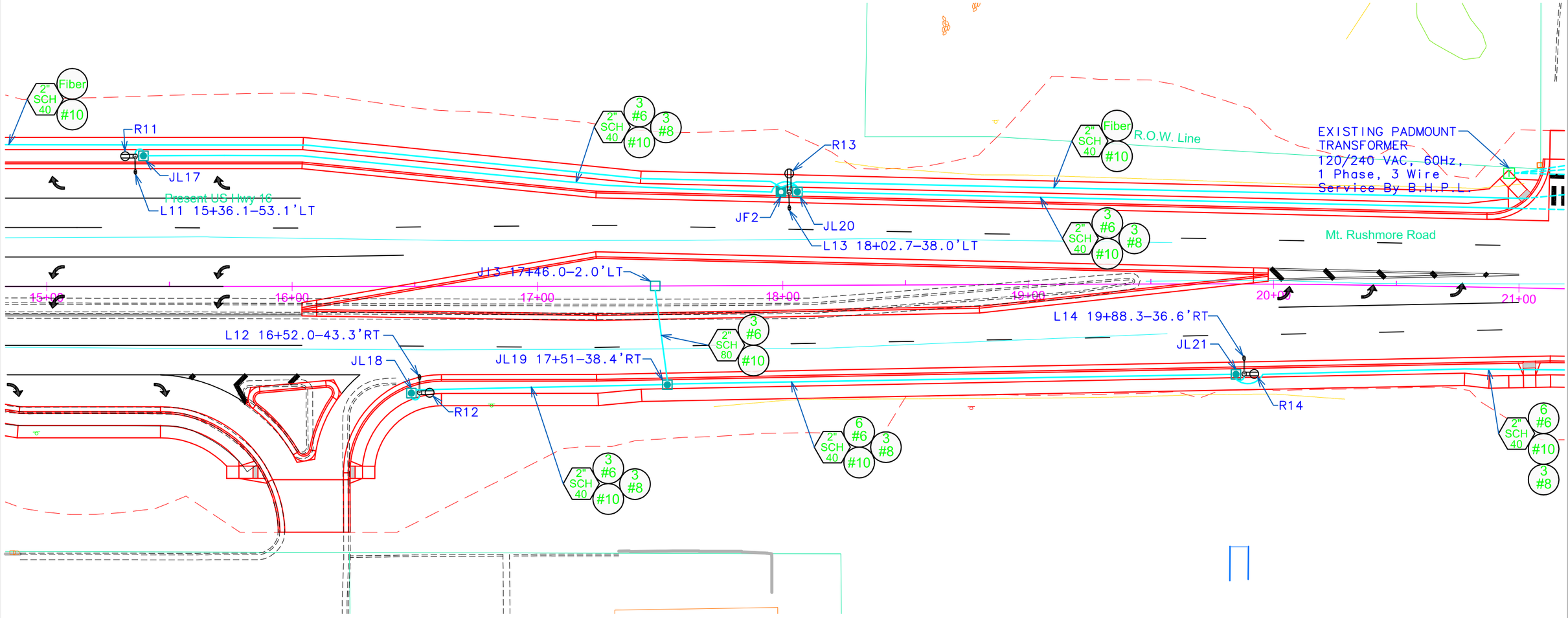
WPE #BR12025



SCALE:
1" = 40'

NOTE:

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.

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 9162
DAREN WAYNE BECKLOFF
SOUTH DAKOTA
6/13/14

06-20-14

CONDUIT LAYOUT

MT. RUSHMORE ROAD

FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH0016(78)67	L19	L38

PLOTTING DATE: 6-13-14

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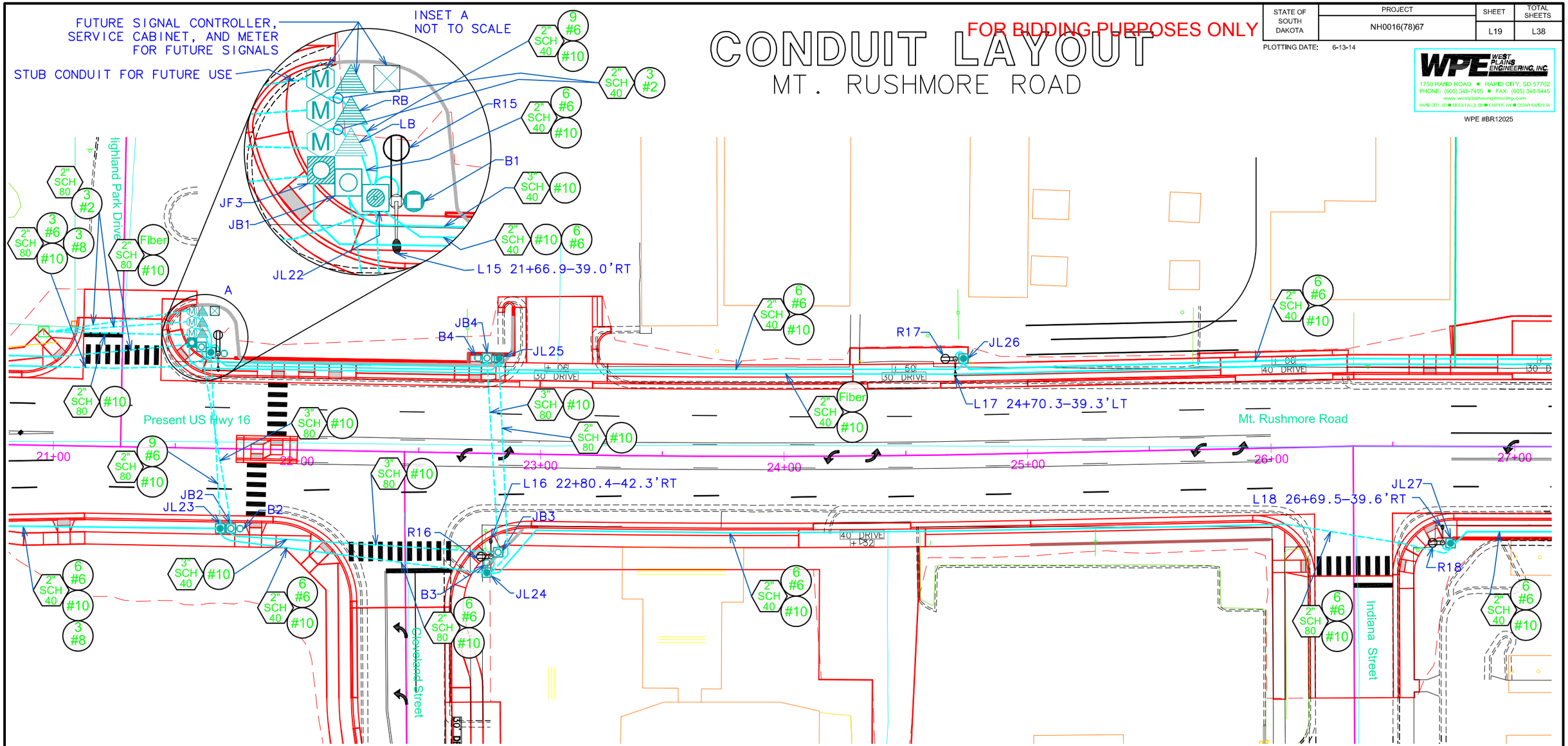

ESTIMATE OF QUANTITIES
(FUTURE TRAFFIC SIGNAL)

KEY	ITEM	QTY	UNIT	KEY	ITEM	QTY	UNIT
○	FUTURE 3' DIAMETER FOOTING (B1–B4)	–	FT	3" SCH 40	3" RIGID CONDUIT, SCHEDULE 40	180	EACH
▣	TYPE 3 ELECTRICAL JUNCTION BOX (JB1–JB4)	4	EACH	3" SCH 80	3" RIGID CONDUIT, SCHEDULE 80	235	EACH
				#10	1/C #10 AWG COPPER WIRE	430	EACH

SCALE:
1" = 40'

NOTE:

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

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 9162
DAREN WAYNE BECKLER
SOUTH DAKOTA
6/13/14

CONDUIT LAYOUT
MT. RUSHMORE ROAD

FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH0016(78)67	L20	L38

PLOTTING DATE: 6-13-14

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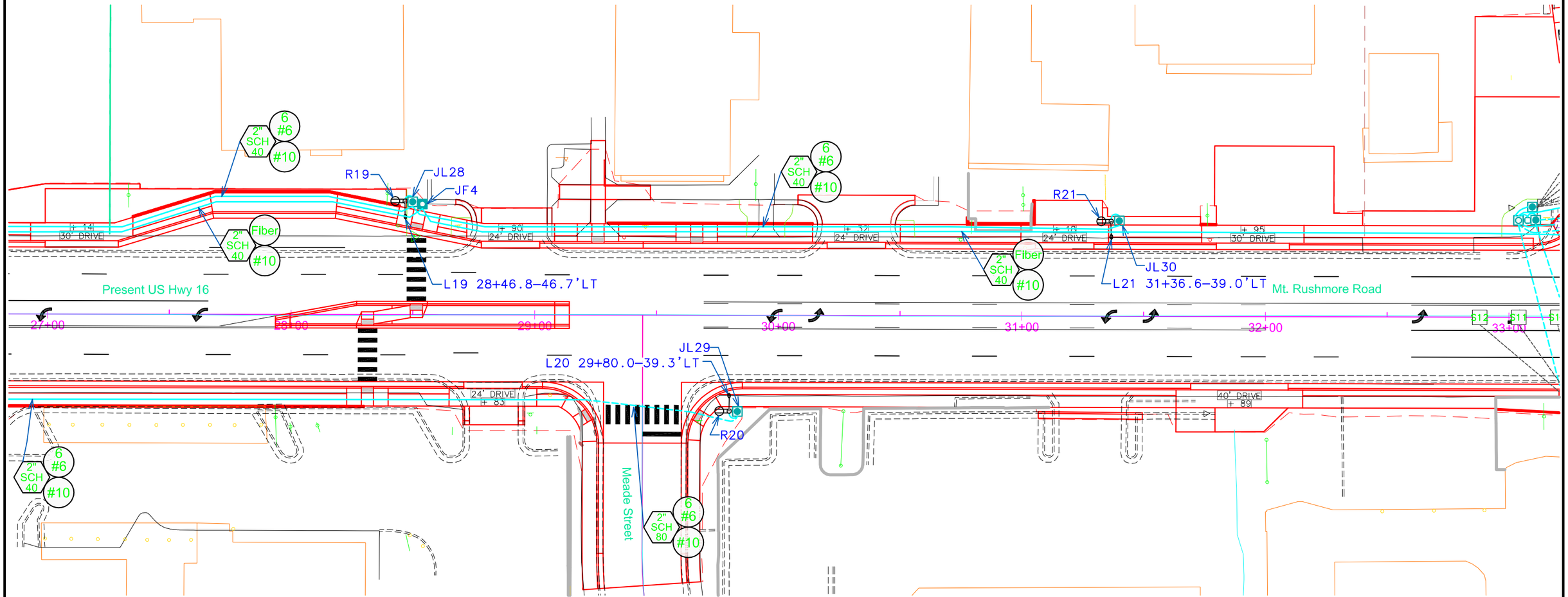
WPE #BR12025



SCALE:
1" = 40'

NOTE:

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.

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 9162
DAREN WAYNE BECKLOFF
SOUTH DAKOTA
6/13/14

06-20-14

CONDUIT LAYOUT

FOR BIDDING PURPOSES ONLY

FLORMANN ST. & MT. RUSHMORE ROAD

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH0016(78)67	L21	L38

PLOTTING DATE: 6-13-14

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WPE #BR12025

INSET A
NOT TO SCALE

INSET B
NOT TO SCALE

INSET C
NOT TO SCALE

INSET D
NOT TO SCALE

120/240 VAC, 60 Hz, 1-Phase, 3 Wire Service By B.H.P.L.

(3) 2"C. SCH 40 B.H.P.L. TO PROVIDE WIRE TO METERS

33+46.2-47.3'LT

33+56.6-46.8'LT

33+23.0-3.0'LT

33+74.7-47.0'RT

33+64.4-46.7.0'RT

33+97.0-3.0'RT

Present US Hwy 16

Flormann Street

JC1 JC2 JC3 JC4 JC5 JC6 JC7 JC8

JL31 JL32 JL33 JL34

C1 C2 C3 C4

JF5

FUTURE METER
FUTURE PC
LC
SC
SIGNAL CONTROLLER

SCALE:
1" = 40'

NOTE:

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.

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 9162
DAREN WAYNE BECKLOFF
SOUTH DAKOTA
6/13/14

06-20-14

CONDUIT LAYOUT

FLORMANN ST. & MT. RUSHMORE ROAD

FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH0016(78)67	L22	L38

PLOTTING DATE: 6-13-14

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WPE #BR12025

ESTIMATE OF QUANTITIES (TRAFFIC SIGNAL)

KEY	ITEM	QTY	UNIT	KEY	ITEM	QTY	UNIT
	3' DIAMETER FOOTING (C1–C4)	48	FT	#2	1/C #2 AWG COPPER WIRE	35	FT
	TYPE 2 ELECTRICAL JUNCTION BOX (JC1,JC3,JC5,JC7)	4	EACH	#4	1/C #4 AWG COPPER WIRE	75	FT
	TYPE 3 ELECTRICAL JUNCTION BOX (JC2,JC4,JC6,JC8)	4	EACH	#10	1/C #10 AWG COPPER WIRE	855	FT
	ELECTRICAL SERVICE CABINET	1	EACH		2/C #14 AWG COPPER TRAY CABLE, K2	80	FT
	TRAFFIC SIGNAL CONTROLLER	1	EACH	4/C	4/C #14 AWG COPPER TRAY CABLE, K2	1405	FT
M	METER SOCKET	1	EACH	7/C	7/C #14 AWG COPPER TRAY CABLE, K2	390	FT
	PREFORMED DETECTOR LOOP (S10–S12,E10–E12,N7–N9,W7–W12)	18	EACH	24/C	24/C #14 AWG COPPER TRAY CABLE, K2	445	FT
	DETECTOR UNIT	6	EACH	TSP	#16 AWG COPPER TWISTED SHIELDED PAIR	675	FT
2" SCH 40	2" RIGID CONDUIT, SCHEDULE 40	390	FT		2/C #10 AWG COPPER POLE & BRACKET CABLE	260	FT
4" SCH 40	4" RIGID CONDUIT, SCHEDULE 40	5	FT	PC	PREEMPTION CABLE (NOT A BID ITEM)	1290	FT
3" SCH 80	3" RIGID CONDUIT, SCHEDULE 80	345	FT				

REGISTERED PROFESSIONAL ENGINEER
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DAREN WAYNE BECKLOFF
SOUTH DAKOTA
6/13/14

06-20-14

WIRING DIAGRAM

MT. RUSHMORE ROAD & CATHEDRAL DRIVE

FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH0016(78)67	L23	L38

PLOTTING DATE: 6-13-14

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WPE #BR12025

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

120\240 v.a.c., 60hz., 1 Phase, 3 Wire Service By BHP

SERVICE CABINET SA — 100 amp — 50 amp

CONTROLLER A

#4 X3 Y3 Z3 — 3 #10 PP1 — FIBER — QQ1 FLASHER UNIT

BK AUX. WT MAIN — NEUT. BUS — Breakers Sized by Mfr.

PREEMPT UNIT: P1 Q1 R1 S1 T1 U1 V1 W1 — PC PC

CONFIRMATION LIGHT

30/c A1 — AA1 — BB1 — 12/c B1 — 24/c C1 — 4/c D1 — 4/c E1 — 4/c F1 — 4/c G1 — TSP H1 — TSP I1 — TSP J1 — TSP K1 — TSP L1 — TSP M1 — TSP N1 — O1

2 3 4 5 6 28 7 21 9 10 11 8 1 22 19 20 27 23 24 25 26 12 13 14 15 16 29 17 18

PED. BUTTON

DETR. S1 S2 S3 S4 S5 S6 S7, S8, S9 W1, W2, W3

W4, W5, W6 — W7, W8, W9 — N1, N2, N3 — N4, N5, N6 — E1, E2, E3 — E4, E5, E6 — E7, E8, E9

A1

LUMINAIRE — To Confirmation Light — P2 T2 — #6 PC — 30/c A2

A2

LUMINAIRE — To Confirmation Light — Q3 U3 — #6 PC — 30/c BB3

A4

LUMINAIRE — To Confirmation Light — S3 W3 — #6 PC — 24/c C3

A3

LUMINAIRE — To Confirmation Light — R4 V4 — #6 PC — 30/c AA4

B2 — 12/c — CC1 — 7/c — DD1 — 7/c — EE1 — 4/c — FF1 — 4/c — GG1 — 4/c — HH1 — 4/c — II1 — TSP — JJ1 — TSP — KK1 — TSP — LL1 — TSP — MM1 — TSP — NN1 — TSP — OO1

C3 — 24/c — CC3 — 7/c — DD4 — 7/c

JF1 PP1 PP2 — JF2 PP2 PP3 — JF3 PP3 PP4 — JF4 PP4 PP5 — JF5 PP5 PP6

PA1 PED. BUTTON — D2 — 4/c

PA2 PED. BUTTON — E2 — 4/c

PA3 PED. BUTTON — F3 — 4/c

PA4 PED. BUTTON — G3 — 4/c

PA5 PED. BUTTON — EE4 — 4/c

PA6 PED. BUTTON — FF4 — 4/c

PA7 PED. BUTTON — GG3 — 4/c

PA8 PED. BUTTON — HH3 — 4/c

JA10: I4 I5 QQ5 J5 K5 — I6 QQ6 — S3 S4

JA6: R3 V3 AA3 DD3 EE3 FF3 MM3 NN3 QQ3 — R4 V4 AA4 DD4 EE4 FF4 MM4 NN4 QQ4 — S5 S6

JA3: H3 I3 J3 K3 L3 M3 QQ3 N3 — H4 I4 J4 K4 L4 M4 QQ4 — S7 S8 S9

JA9: H4 I4 J4 K4 QQ4 L4 M4 — H5 I5 J5 K5 QQ5 — S5 S6

JA1: O2 II2 JJ2 — W1 W2 W3 W4 W5 W6 W7 W8 W9

JA4: F2 G2 H2 I2 J2 K2 L2 M2 N2 Q2 R2 U2 V2 X1 Y1 Z1 AA2 BB2 DD2 EE2 FF2 MM2 NN2 OO2 QQ2 — F3 G3 H3 I3 J3 K3 L3 M3 N3 Q3 R3 U3 V3 X2 Y2 Z2 AA3 BB3 DD3 EE3 FF3 MM3 NN3 OO3 QQ3

JA2: A1 B2 C1 D1 E1 F1 G1 H1 I1 J1 K1 L1 M1 N1 O1 P1 Q1 R1 S1 T1 U1 V1 W1 X2 Y2 Z2 AA1 BB1 CC1 DD1 EE1 FF1 GG1 HH1 II1 JJ1 KK1 LL1 MM1 NN1 OO1 QQ1 — A2 B2 C2 D2 E2 F2 G2 H2 I2 J2 K2 L2 M2 N2 O2 P2 Q2 R2 S2 T2 U2 V2 W2 X3 Y3 Z3 AA2 BB2 CC2 DD2 EE2 FF2 MM2 NN2 OO2 QQ2

JA5: MM3 NN3 OO3 — E1 E2 E3 E4 E5 E6 E7 E8 E9

JA8: KK3 LL3 — N1 N2 N3 N4 N5 N6

JA12: QQ7 QQ8 FLASHER BEACON

JA7: C2 S2 W2 CC2 GG2 HH2 KK2 LL2 — C3 S3 W3 CC3 GG3 HH3 KK3 LL3

JA11: QQ6 H6 I6 — QQ7 S1 S2

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

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 9162
DAREN WAYNE BECKLOFF
SOUTH DAKOTA
6/13/14

06-20-14 K:\2012\BR12025 - Mt. Rushmore Road-Phase 1\BR12025E 6-13-14.dwg

FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH0016(78)67	L24	L38

PLOTTING DATE: 6-13-14

WIRING DIAGRAM

MT. RUSHMORE ROAD & FLORMANN STREET

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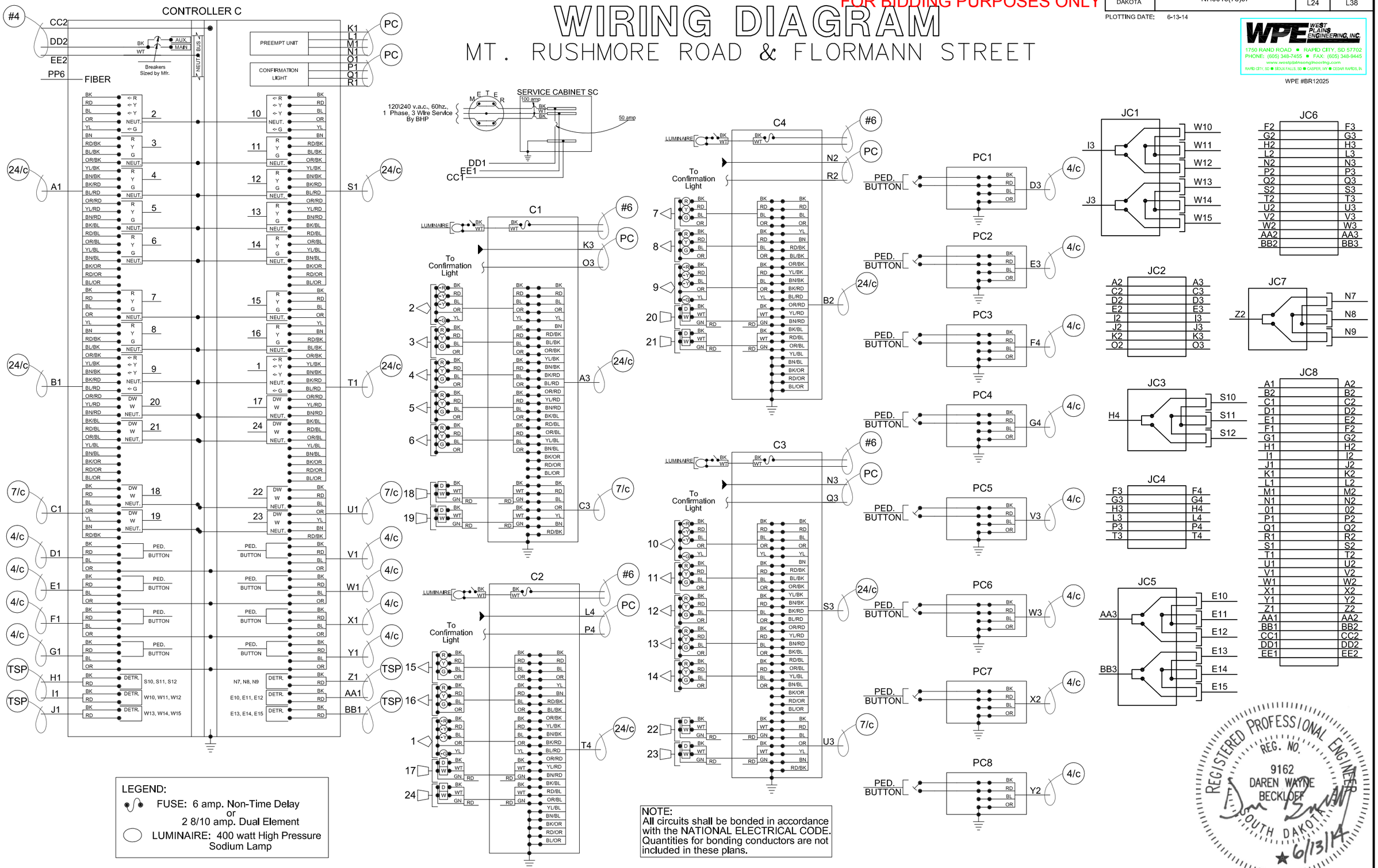
WPE #BR12025



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.

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 9162
DAREN WAYNE BECKLOFF
SOUTH DAKOTA
6/13/14

06-20-14 K:\2012\BR12025 - Mt. Rushmore Road-Phase 1\BR12025E 6-13-14.dwg

WIRING DIAGRAM
MT. RUSHMORE ROAD

FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH0016(78)67	L25	L38

PLOTTING DATE: 6-13-14

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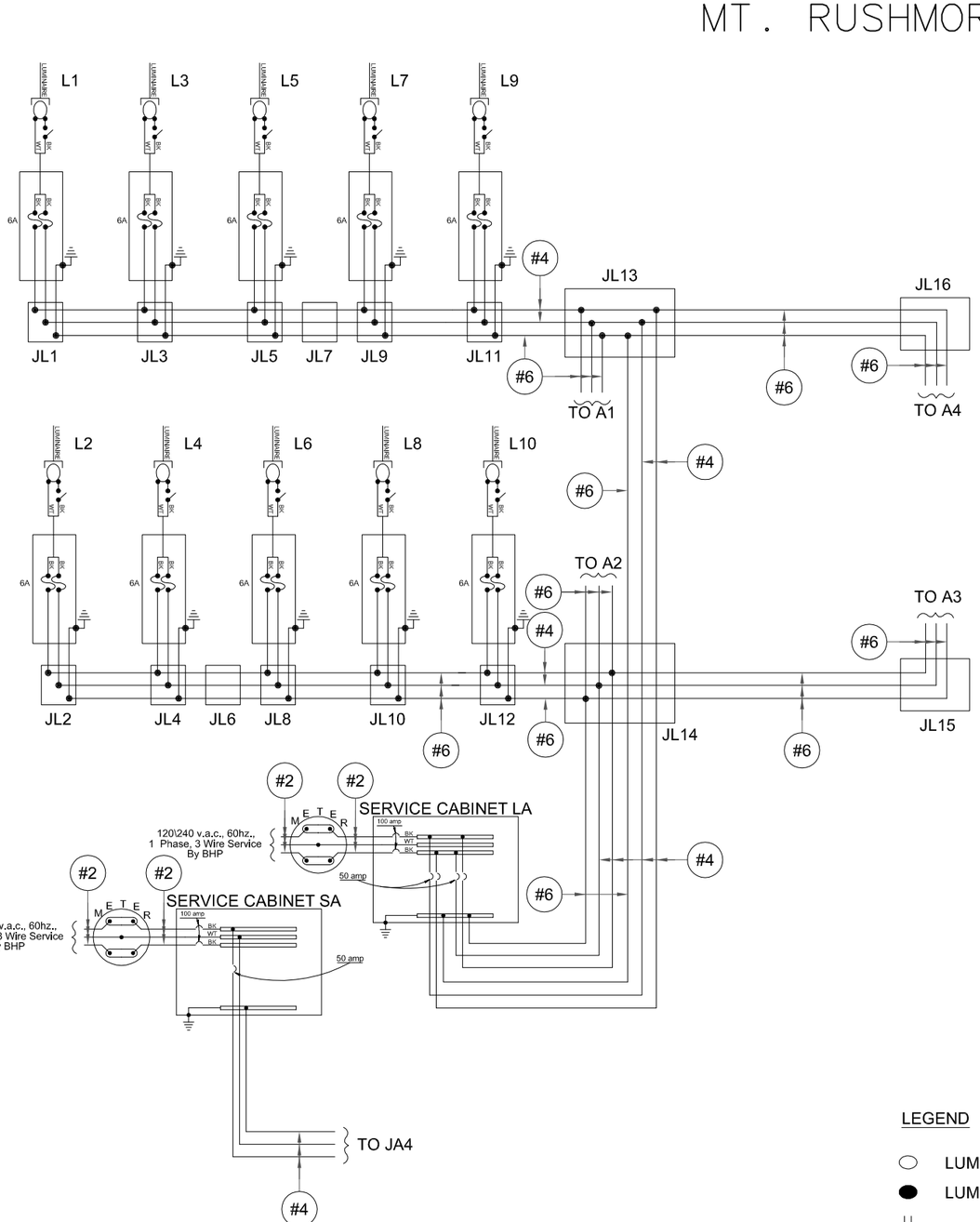

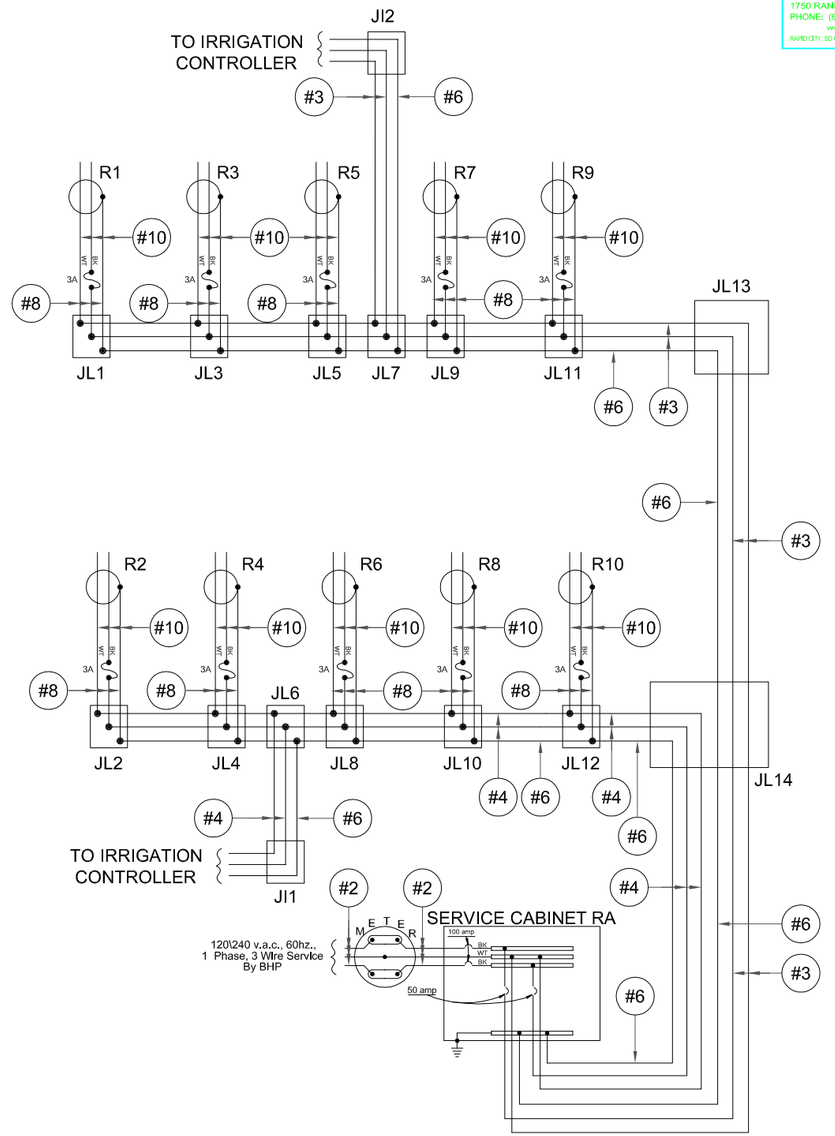

LEGEND

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

REGISTERED PROFESSIONAL ENGINEER
REG. NO.
9162
DAREN WAYNE
BECKLOFF
SOUTH DAKOTA
6/13/14

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WIRING DIAGRAM

MT. RUSHMORE ROAD

FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH0016(78)67	L26	L38

PLOTTING DATE: 6-13-14

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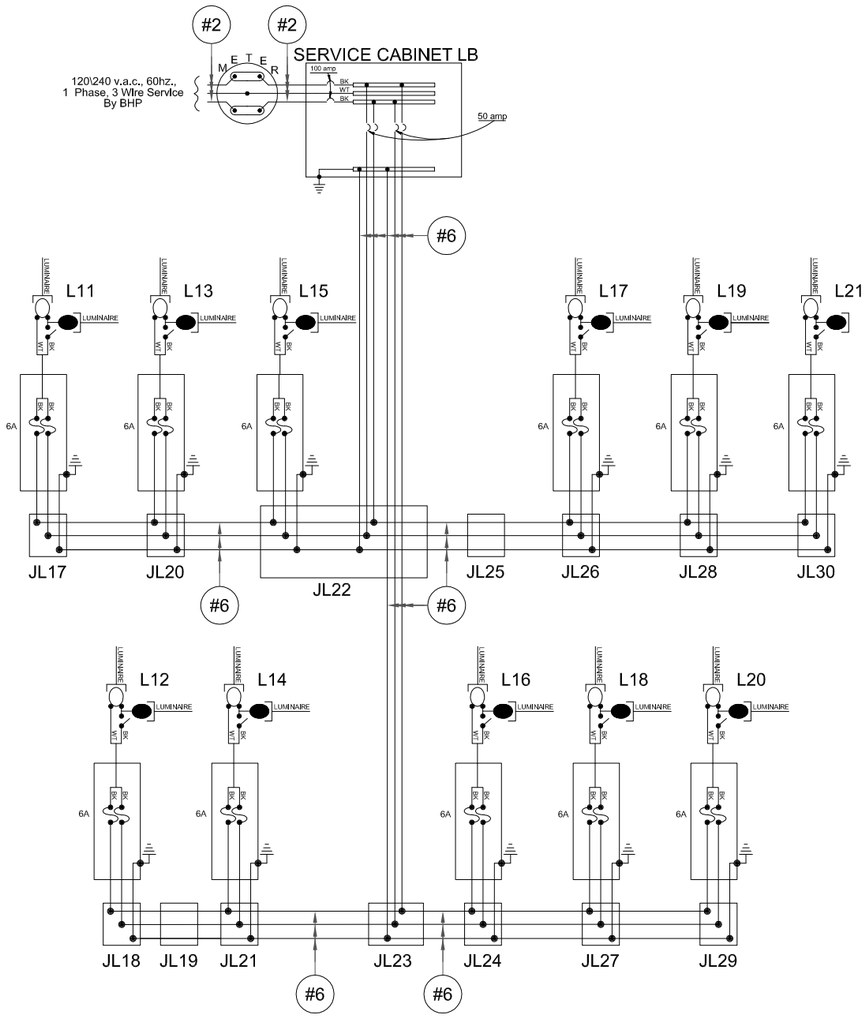

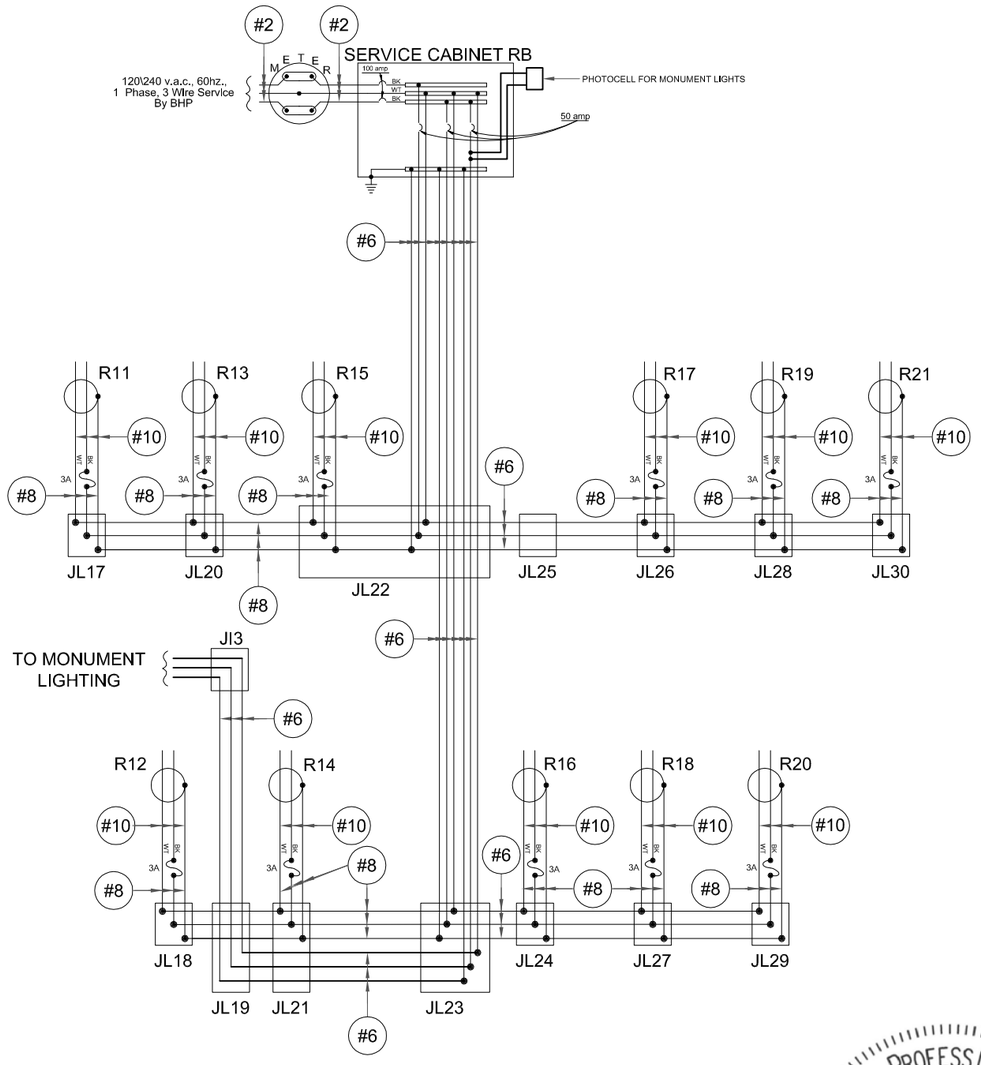

LEGEND

- 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	SHEET	TOTAL SHEETS
	NH0016(78)67	L27	L38

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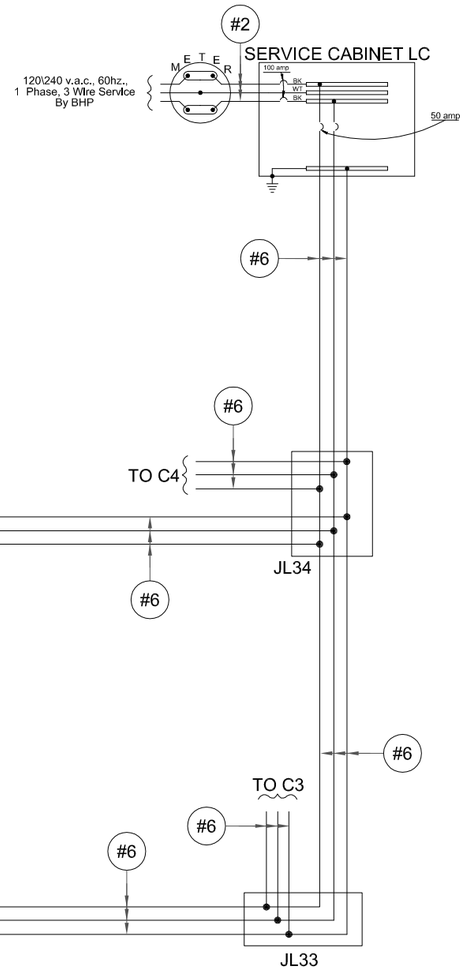

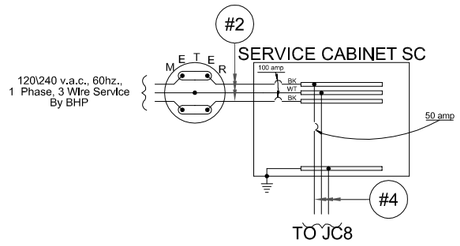

REGISTERED PROFESSIONAL ENGINEER
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DAREN WAYNE
BECKLOFF
SOUTH DAKOTA
6/13/14

SIGNAL TIMING

CATHEDRAL DR. & MT. RUSHMORE ROAD

FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH0016(78)67	L28	L38

PLOTTING DATE: 6-13-14
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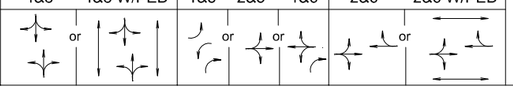
PHASING AND SEQUENCING

INTERVAL / SIGNAL HEAD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	FLASH DISPLAY
NBL:11,12								<G	<Y	<G	<Y			F <Y	<Y		F <Y	F <Y	<Y		Y
NB:13,14,15,29										G	Y			G	Y		G	G	Y		Y
SBL:1,2,3								<G	<Y			<G	<Y								Y
SB:4,5,6,28												G	Y	G	Y		G	G	Y		Y
EB:16,17,18,19	G	Y		G	G	Y													Y		R
WB:7,8,9	G	Y		G	G	Y															R
WBR:10	G	Y		G	G	Y		R G>	R Y>			G G>	G Y>								R
NB & SB:20,21,24,25	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	W	F DW	DW	DW	NO DISPLAY
EB & WB:22,23,26,27	DW	DW	DW	W	F DW	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	7	8	5	6	3	4
PHASE								
MIN GREEN	7	12		7	7	12		7
ADDED INITIAL								
MAX INITIAL								
PASSAGE TIME	3	3		3	3	3		3
MAXIMUM 1	21	5		43	20	36		31
MAXIMUM 2								
TIME BEFORE								
TIME TO REDUCE								
MINIMUM GAP								
YELLOW CHANGE	3	4		4	3	4		4
RED CLEARANCE	1	2		2		2		2
WALK		7		8		7		8
PED CLEARANCE		19		25		19		25

TIMING PLAN 1

TIME OF DAY (TOD)	PATTERN (C/S/O)
6:00 - 7:00	1/1/1
7:00 - 9:00	2/1/1
9:00 - 16:00	1/1/1
16:00 - 18:30	3/1/1
18:30 - 23:00	1/1/1
23:00 - 6:00	FLASH

TIMING PLAN 2

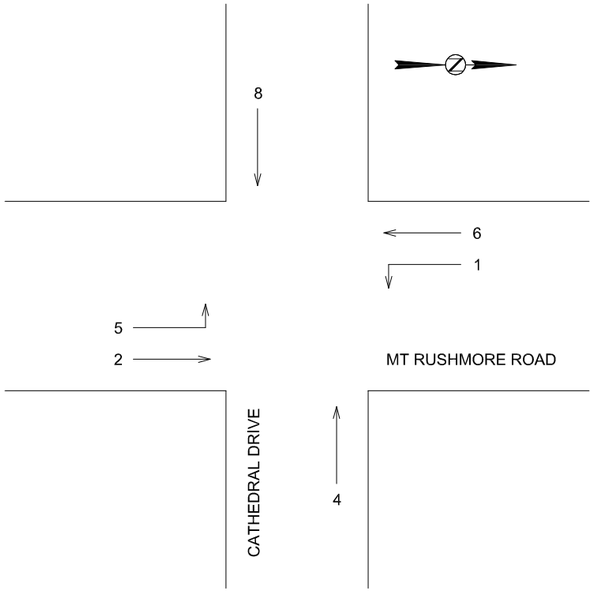
TIME OF DAY (TOD)	PATTERN (C/S/O)
6:00 - 23:00	FREE
23:00 - 6:00	FLASH

COORDINATION TIMING

CYCLE 1 = 70 SEC

MOVEMENT	1	2	7	8	5	6	3	4
PHASE								
TIME - SPLIT 1	16	34		20	16	34		20
COORDINATED PHASE		X				X		

OFFSET 1 = 30 SEC



WEEKLY PROGRAM

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

DETECTOR SETTINGS

DETECTOR LABEL	AMPLIFIED CHANNEL DETECTOR	DETECTOR TYPE	DETECTOR OPERATION: CALLS & EXTENDS	DETECTOR OPERATION: CALLS ONLY	DETECTOR OPERATION: EXTENDS ONLY	LOCKING CALL	MOVEMENT CALLED	MOVEMENT EXTENDED
N1,N2,N3	1	PREFORMED	X				1	1&5 OR 1&6
N4,N5,N6	2	PREFORMED	X				1	1&5 OR 1&6
E1,E2,E3	3	PREFORMED	X				4	4&8
E4,E5,E6	4	PREFORMED	X				4	4&8
E7,E8,E9	5	PREFORMED	X				4	4&8
S7,S8,S9	6	PREFORMED	X				5	1&5 OR 2&5
S5,S6	7	PREFORMED			X	X	2	2&6
S3,S4	8	PREFORMED			X	X	2	2&6
S1,S2	9	PREFORMED			X	X	2	2&6
W1,W2,W3	10	PREFORMED	X				8	4&8
W4,W5,W6	11	PREFORMED	X				8	4&8
W7,W8,W9	12	PREFORMED	X				8	4&8

COORDINATION TIMING

CYCLE 2 = 70 SEC

MOVEMENT	1	2	7	8	5	6	3	4
PHASE								
TIME - SPLIT 1	21	29		20	21	29		20
COORDINATED PHASE		X				X		

OFFSET 1 = 30 SEC

COORDINATION TIMING

CYCLE 3 = 70 SEC

MOVEMENT	1	2	7	8	5	6	3	4
PHASE								
TIME - SPLIT 1	24	22		24	11	35		24
COORDINATED PHASE		X				X		

OFFSET 1 = 15 SEC

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SIGNAL TIMING
FLORMANN ST. & MT. RUSHMORE ROAD

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STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH0016(78)67	L29	L38

PLOTTING DATE: 6-13-14
REV 7-3-14 DWB

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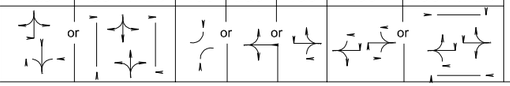
WPE #BR12025

PHASING AND SEQUENCING																				
INTERVAL / SIGNAL HEAD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	FLASH DISPLAY
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	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	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		3	3	3		3
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	3		4	3	3		4
RED CLEARANCE		2		2		2		2
WALK		6		7		6		7
PED CLEARANCE		11		16		11		16

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

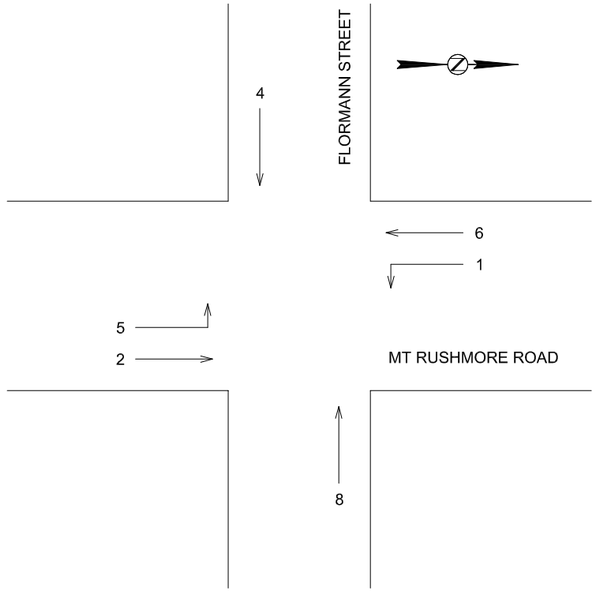
TIMING PLAN 1	
TIME OF DAY (TOD)	PATTERN (C/S/O)
6:00 - 7:00	1/1/1
7:00 - 9:00	2/1/1
9:00 - 16:00	1/1/1
16:00 - 18:30	3/1/1
18:30 - 23:00	1/1/1
23:00 - 6:00	FLASH

TIMING PLAN 2	
TIME OF DAY (TOD)	PATTERN (C/S/O)
6:00 - 23:00	FREE
23:00 - 6:00	FLASH

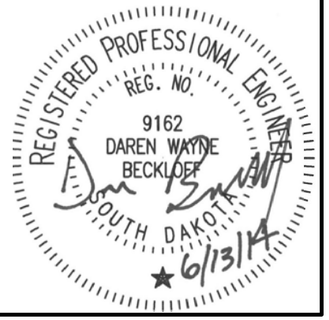
COORDINATION TIMING								
CYCLE 1 = 70 SEC								
MOVEMENT	1	2	3	4	5	6	7	8
PHASE								
TIME - SPLIT 1	10	42		18	10	42		18
COORDINATED PHASE		X				X		
OFFSET 1 = 8 SEC								

COORDINATION TIMING								
CYCLE 2 = 70 SEC								
MOVEMENT	1	2	3	4	5	6	7	8
PHASE								
TIME - SPLIT 1	10	39		21	10	39		21
COORDINATED PHASE		X				X		
OFFSET 1 = 8 SEC								

COORDINATION TIMING								
CYCLE 3 = 70 SEC								
MOVEMENT	1	2	3	4	5	6	7	8
PHASE								
TIME - SPLIT 1	10	38		22	10	38		22
COORDINATED PHASE		X				X		
OFFSET 1 = 59 SEC								



DETECTOR SETTINGS								
DETECTOR LABEL	AMPLIFIED CHANNEL DETECTOR	DETECTOR TYPE	DETECTOR OPERATION			LOCKING CALL	MOVEMENT CALLED	MOVEMENT EXTENDED
			CALLS & EXTENDS	CALLS ONLY	EXTENDS ONLY			
N9,N10,N11	1	PREFORMED	X				1	1&5 OR 1&6
E7,E8,E9	2	PREFORMED	X				8	4&8
E10,E11,E12	3	PREFORMED	X				8	4&8
S6,S7,S8	4	PREFORMED	X				5	1&5 OR 2&5
W7,W8,W9	5	PREFORMED	X				4	4&8
W10,W11,W12	6	PREFORMED	X				4	4&8



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STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH0016(78)67	L30	L38

PLOTTING DATE: 6-13-14
REV 1-31-14 DWB

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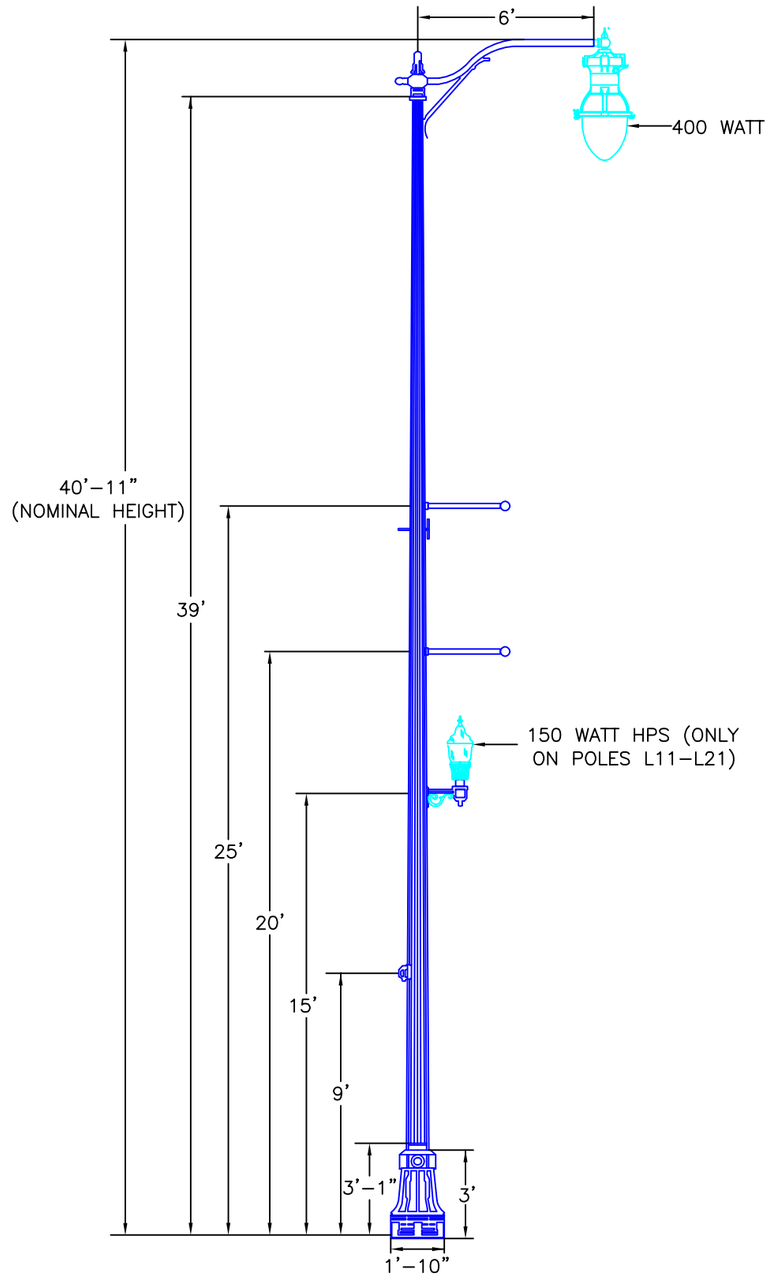

DECORATIVE LIGHT POLE

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 9162
DAREN WAYNE BECKLOFF
SOUTH DAKOTA
6/13/14

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STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH0016(78)67	L31	L38

PLOTTING DATE: 6-13-14
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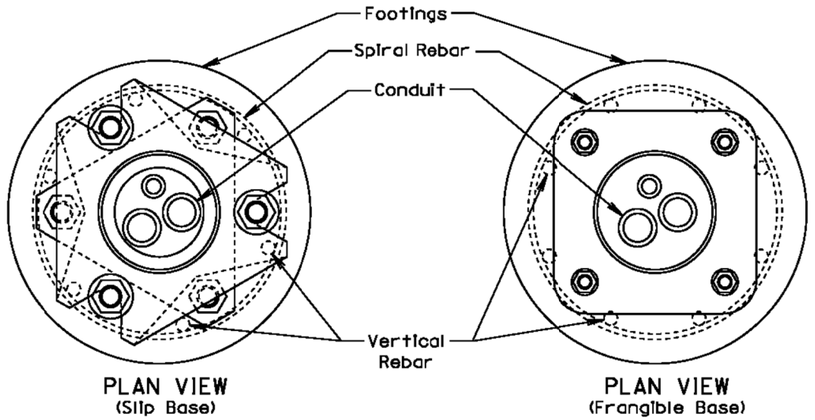
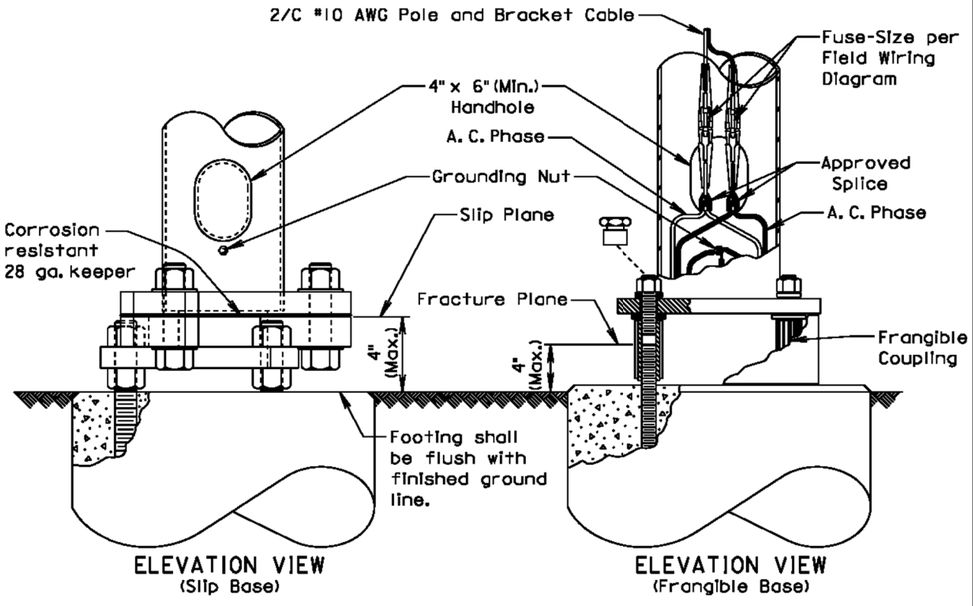




GENERAL NOTES:

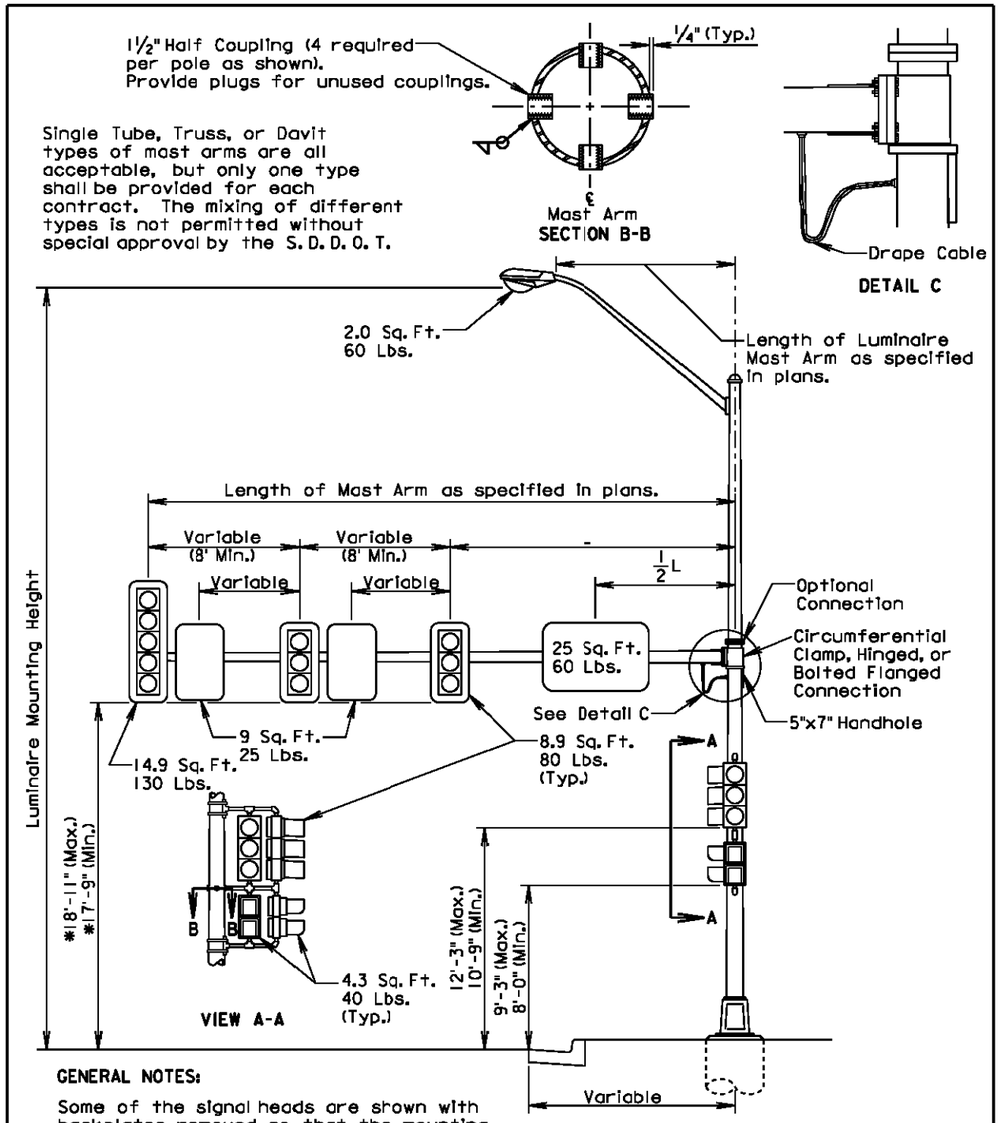
The Contractor has the option of using either the Slip Base, Transformer Base, or Frangible Base.

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. 2013	**SDDOT**	***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. 2013	**SDDOT**	***SIGNAL POLE (WITH MAST ARM AND LUMINAIRE EXTENSION)***	***PLATE NUMBER 635.32*** *Sheet 1 of 1*

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STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH0016(78)67	L32	L38

PLOTTING DATE: 6-13-14
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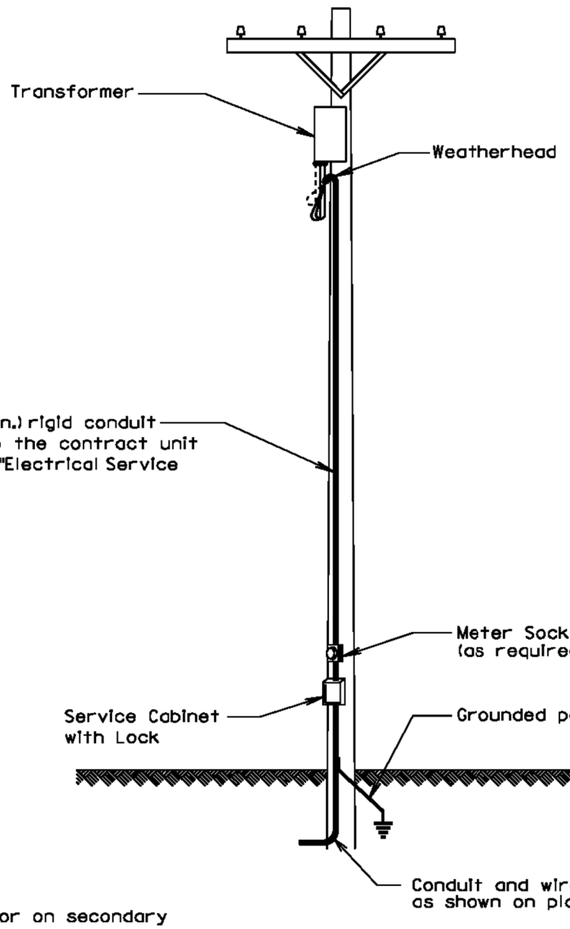
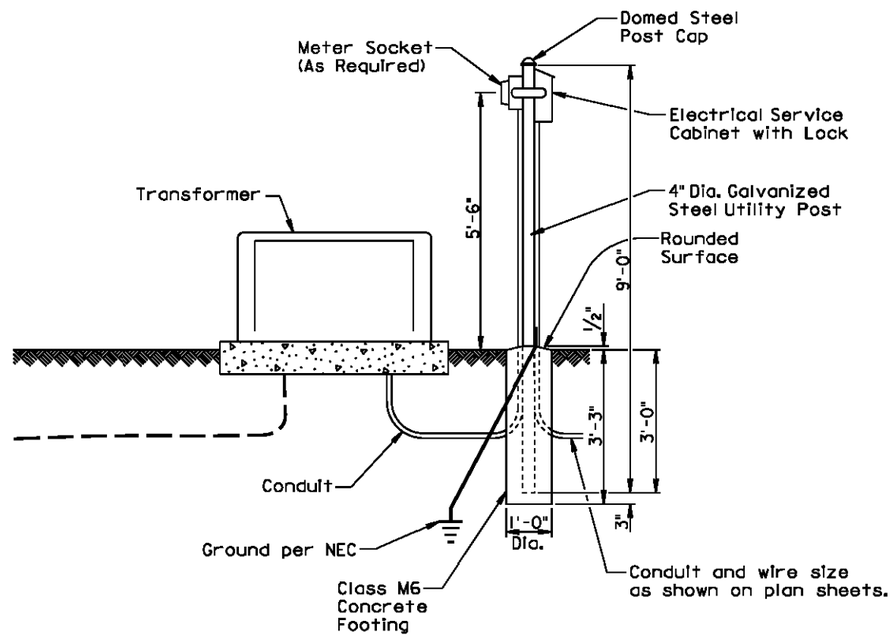


GENERAL NOTE:

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

March 31, 2000

Published Date: 4th Qtr. 2013	SDDOT	SERVICE CABINET ON OVERHEAD UTILITY POLE	PLATE NUMBER 635.40
			Sheet 1 of 1



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

Published Date: 4th Qtr. 2013	SDDOT	SERVICE FROM PAD MOUNTED TRANSFORMER WITH METER ON A GALVANIZED STEEL UTILITY POST	PLATE NUMBER 635.41
			Sheet 1 of 1

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STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH0016(78)67	L33	L38

PLOTTING DATE: 6-13-14
REV 1-31-14 DWB

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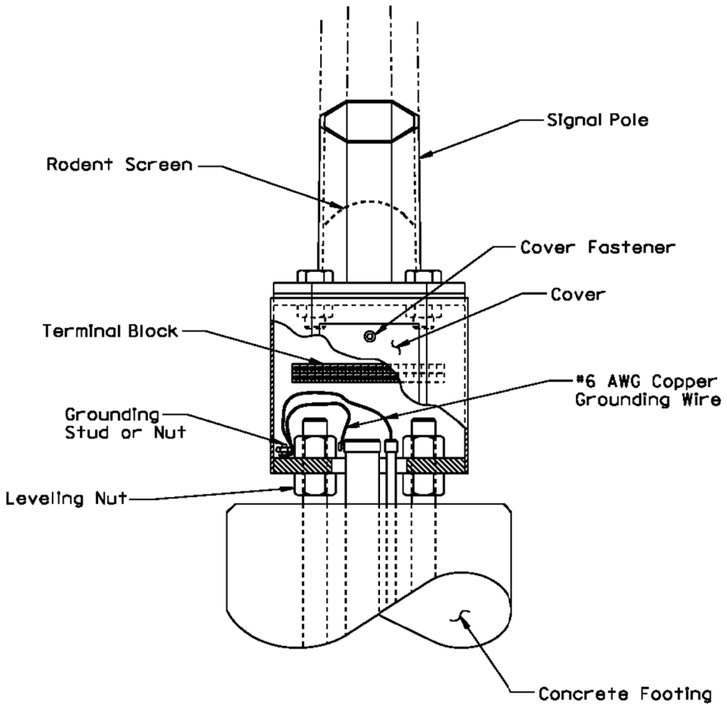


GENERAL NOTES:

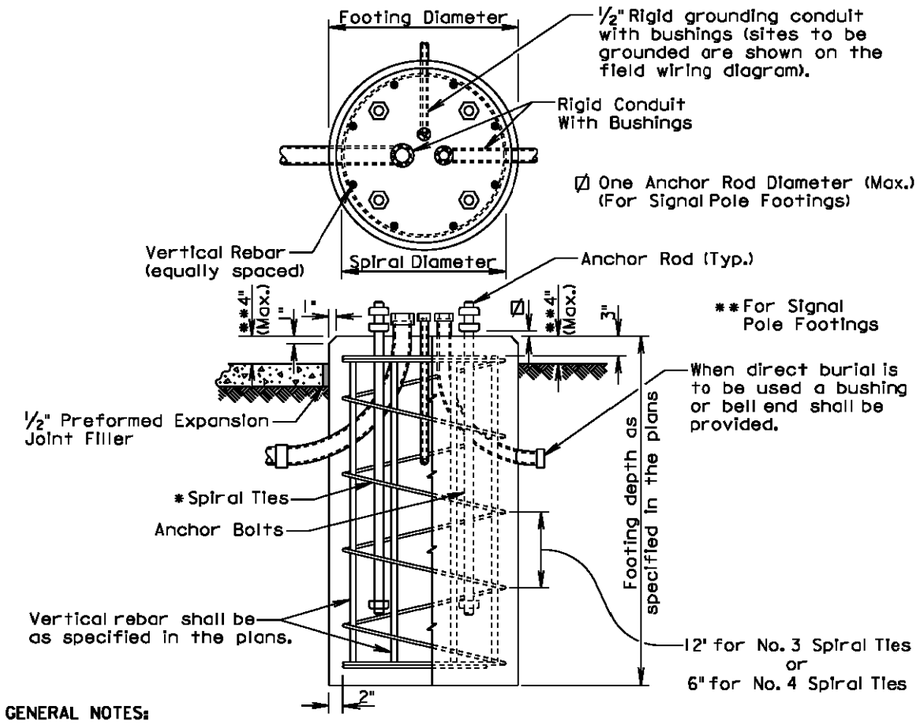
Base details are provided for example only and are not intended to be a complete design.

The Contractor shall furnish and install a rodent screen in the signal pole above the tranformer base. The rodent screen shall be a galvanized steel mesh with a maximum opening size of ¼ 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

Published Date: 4th Qtr. 2013	SDDOT	TRANSFORMER SIGNAL POLE BASE	PLATE NUMBER 635.50
			Sheet 1 of 1



GENERAL NOTES:

* The tie sizes are specified in the plans. 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 No. 4 ties shall be spaced 6 inches apart except for the top two which shall be spaced 3 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 Standard Specifications for footing materials.

Conduits and bushings may project 2½ 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.

September 6, 2013

Published Date: 4th Qtr. 2013	SDDOT	POLE FOOTING	PLATE NUMBER 635.55
			Sheet 1 of 1

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 9162
DAREN WAYNE BECKLOFF
SOUTH DAKOTA
6/13/14

06-20-14 K:\2012\BR12025 - Mt. Rushmore Road-Phase I\BR12025E 6-13-14.dwg

FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH0016(78)67	L34	L38

PLOTTING DATE: 6-13-14

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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

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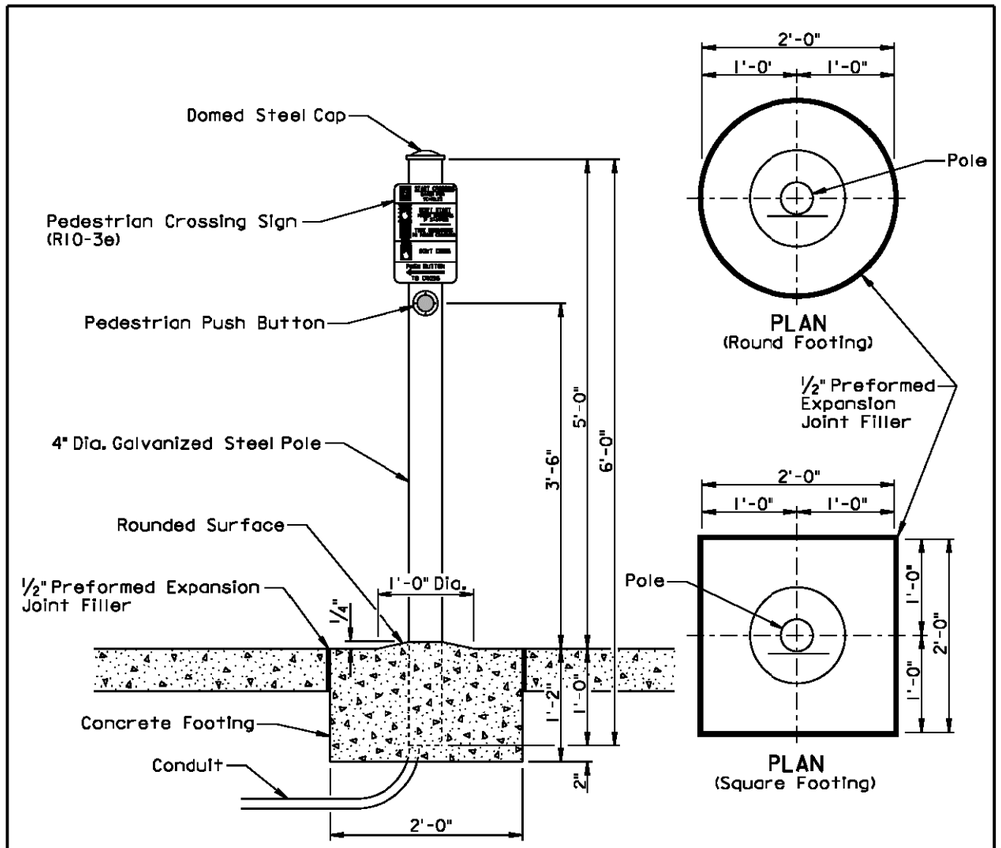


GENERAL NOTES:

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.

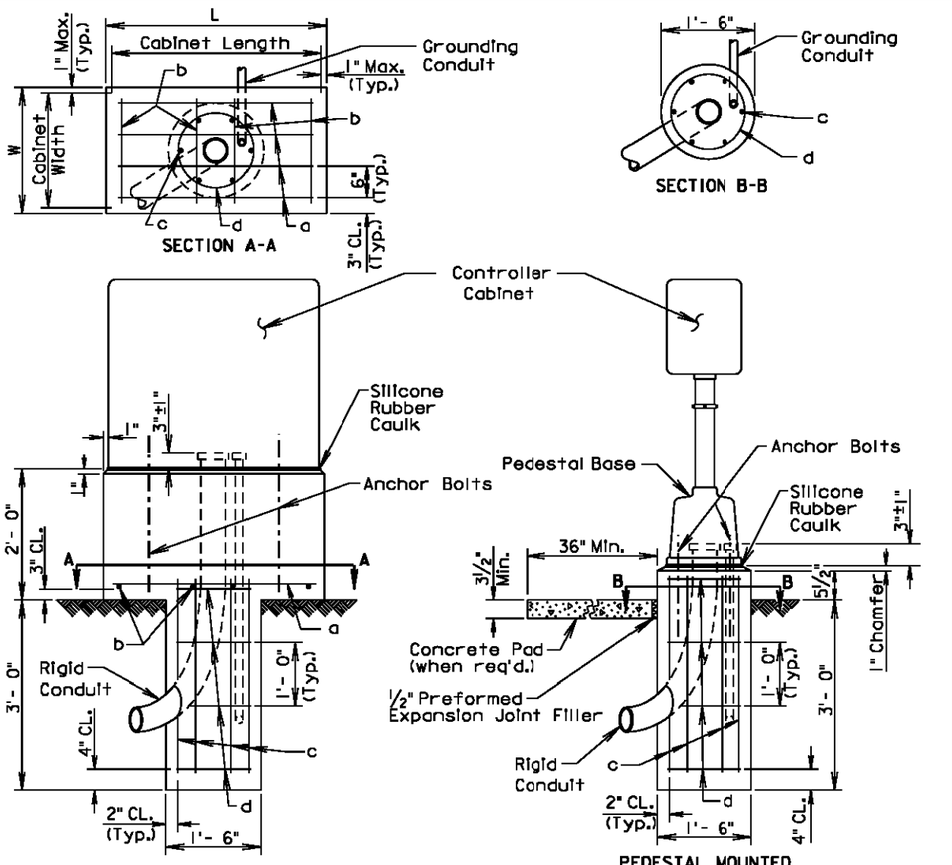
The concrete for the footing shall be class M6 concrete.

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

Published Date: 4th Qtr. 2013	SDDOT	PEDESTRIAN PUSH BUTTON POLE	PLATE NUMBER 635.57
			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	6" Min. Lap, 1'- 2", Type T3

Note: Dimensions are out to out of bar

* Vary number of bars as required by footing size.

March 31, 2000

Published Date: 4th Qtr. 2013	SDDOT	CONTROLLER CABINET AND FOOTING	PLATE NUMBER 635.60
			Sheet 1 of 1

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REG. NO. 9162
DAREN WAYNE BECKLOFF
SOUTH DAKOTA
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STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH0016(78)67	L35	L38

PLOTTING DATE: 6-13-14

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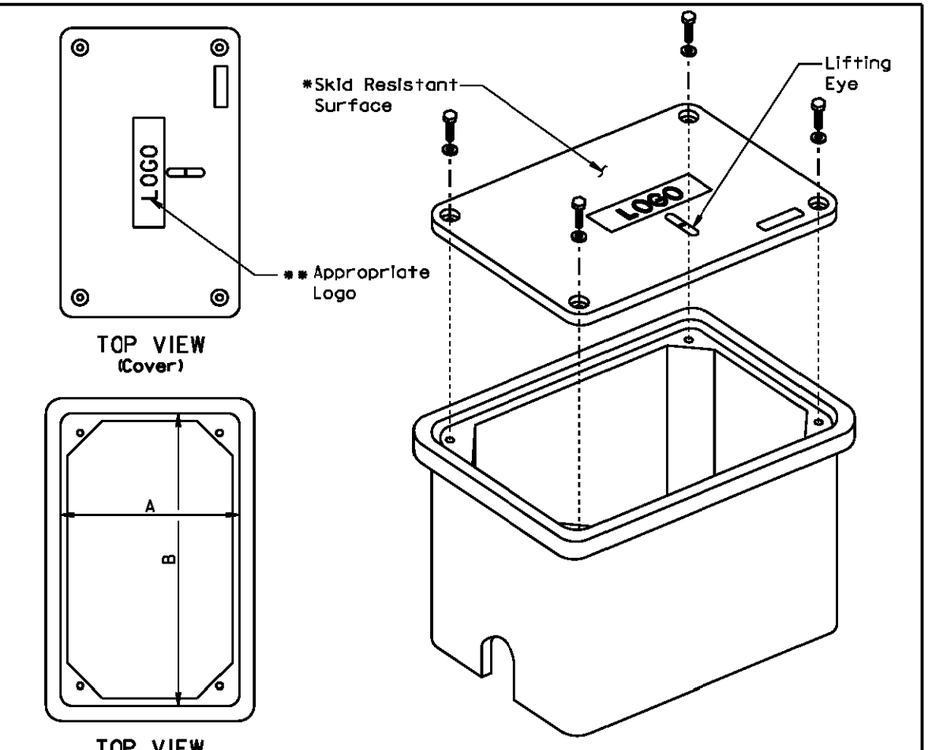

June 26, 2012

Published Date: 4th Qtr. 2013	SDDOT	ELECTRICAL JUNCTION BOXES TYPE 1 THROUGH TYPE 4	PLATE NUMBER 635.65
			Sheet 1 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, 2012

Published Date: 4th Qtr. 2013	SDDOT	ELECTRICAL JUNCTION BOXES TYPE 1 THROUGH TYPE 4	PLATE NUMBER 635.65
			Sheet 2 of 2

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 9162
DAREN WAYNE BECKLOFF
SOUTH DAKOTA
6/13/14

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STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH0016(78)67	L36	L38

PLOTTING DATE: 6-13-14

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1750 RAND ROAD ■ RAPID CITY, SD 57702
PHONE: (605) 348-7455 ■ FAX: (605) 348-9445
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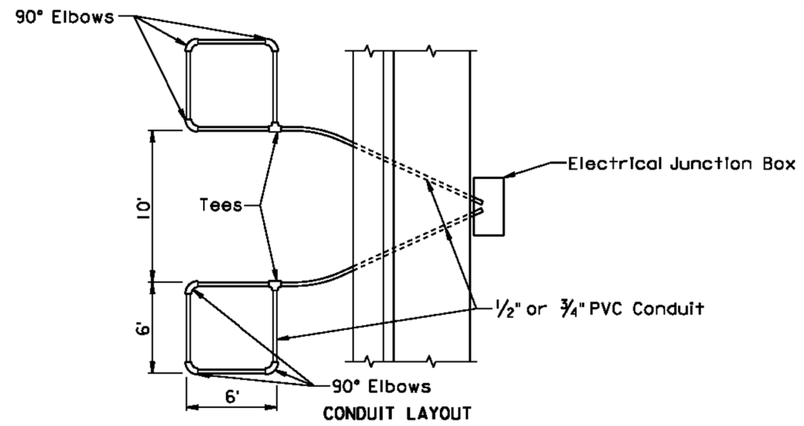
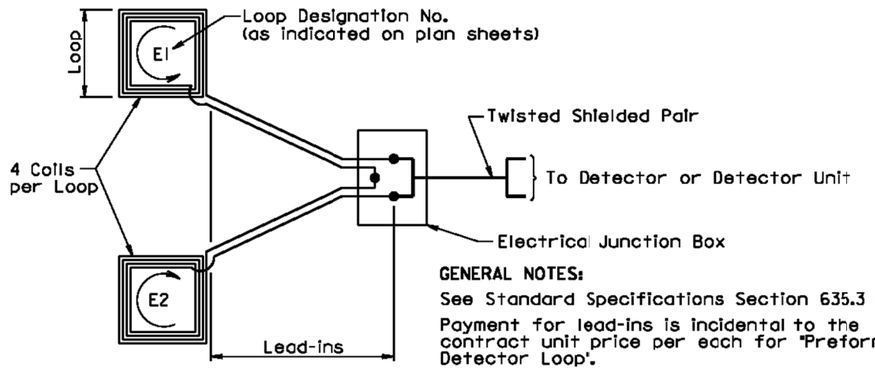


CONDUIT LAYOUT

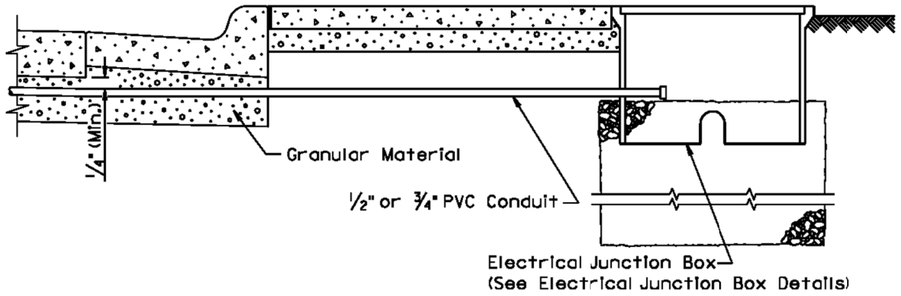


GENERAL NOTES:

See Standard Specifications Section 635.3 Q.

Payment for lead-ins is incidental to the contract unit price per each for "Preformed Detector Loop".

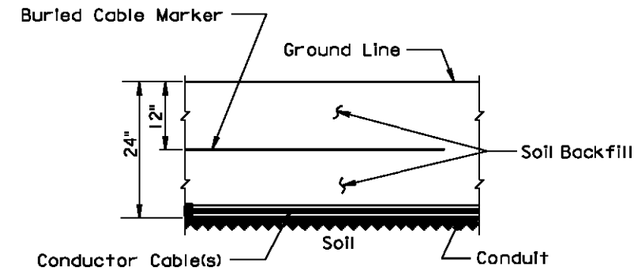
WIRING DIAGRAM



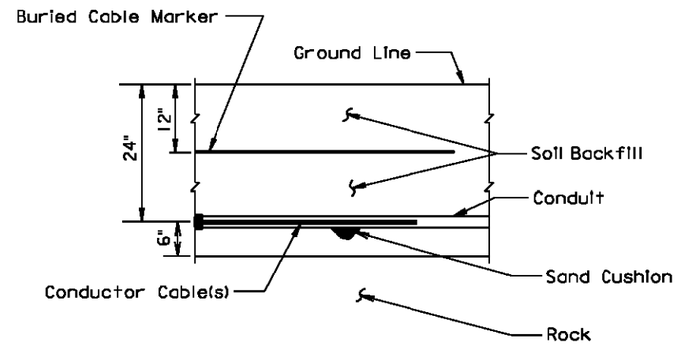
LEAD-IN DETAIL

February 14, 2011

Published Date: 4th Qtr. 2013	SDDOT	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. 2013	SDDOT	CONDUIT INSTALLATION	PLATE NUMBER 635.76
			Sheet 1 of 1

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STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH0016(78)67	L37	L38

PLOTTING DATE: 6-13-14

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1750 RAND ROAD ■ RAPID CITY, SD 57702
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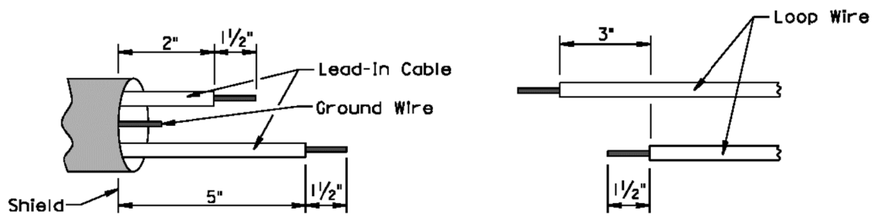
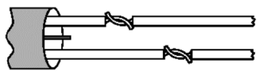
WPE #BR12025

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

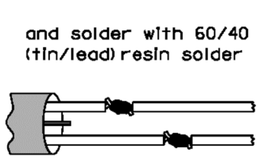


Step 2. Connect and solder.

Twist bare conductors together

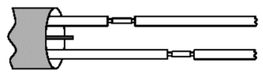


and solder with 60/40 (tin/lead) resin solder

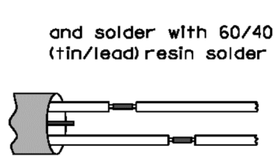


OR

Crimp bare conductors together with an uninsulated butt connector

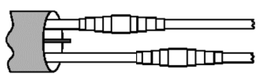


and solder with 60/40 (tin/lead) resin solder



Step 3. Insulate each solder joint seperately.

Electrical Tape



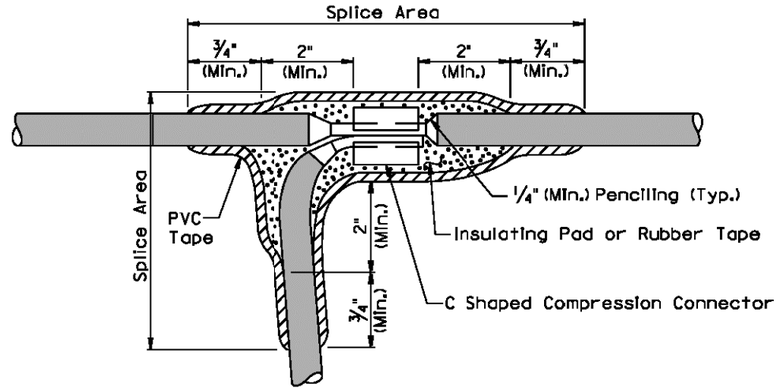
OR

Shrink Tube

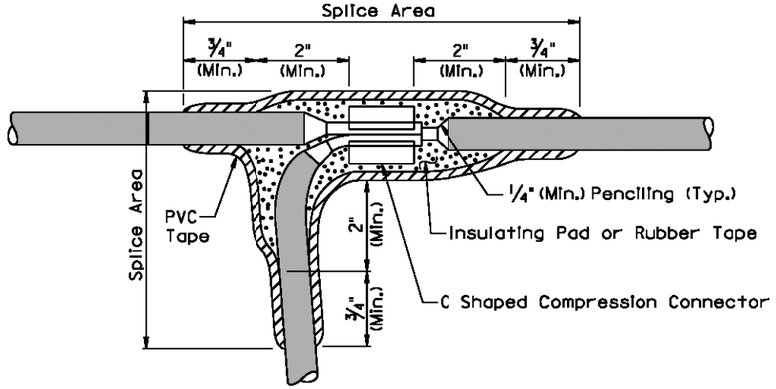
Step 4. Environmentally seal total splice against weather, moisture and abrasion. Methods for environmentally sealing the splice include heat-shrinkable tubing, special sealing kits, special forms to be filled by sealant, and tape and coating.

June 20, 2000

Published Date: 4th Qtr. 2013	SDDOT	DETECTOR LOOP WIRE SPLICING	PLATE NUMBER 635.77
			Sheet 1 of 1



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



TYPE T SPLICE
(For 3 free ends)

February 14, 2010

Published Date: 4th Qtr. 2013	SDDOT	WIRE SPLICING FOR LIGHTING (LOW VOLTAGE CIRCUITS (0 to 600 V))	PLATE NUMBER 635.80
			Sheet 1 of 2

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SOUTH DAKOTA
6/13/14

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STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH0016(78)67	L38	L38

PLOTTING DATE: 6-13-14

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www.westplainsengineering.com
RAPID CITY, SD ■ SIOUX FALLS, SD ■ CASPER, WY ■ CEDAR RAPIDS, IA

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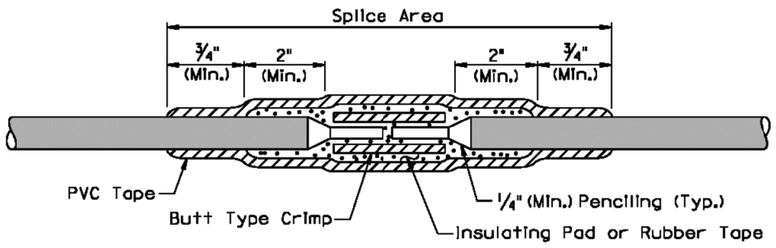
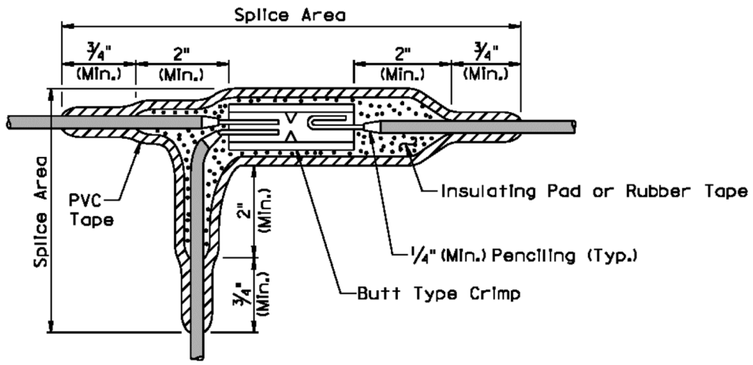


TYPE S SPLICE
(Between 2 free ends)



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.

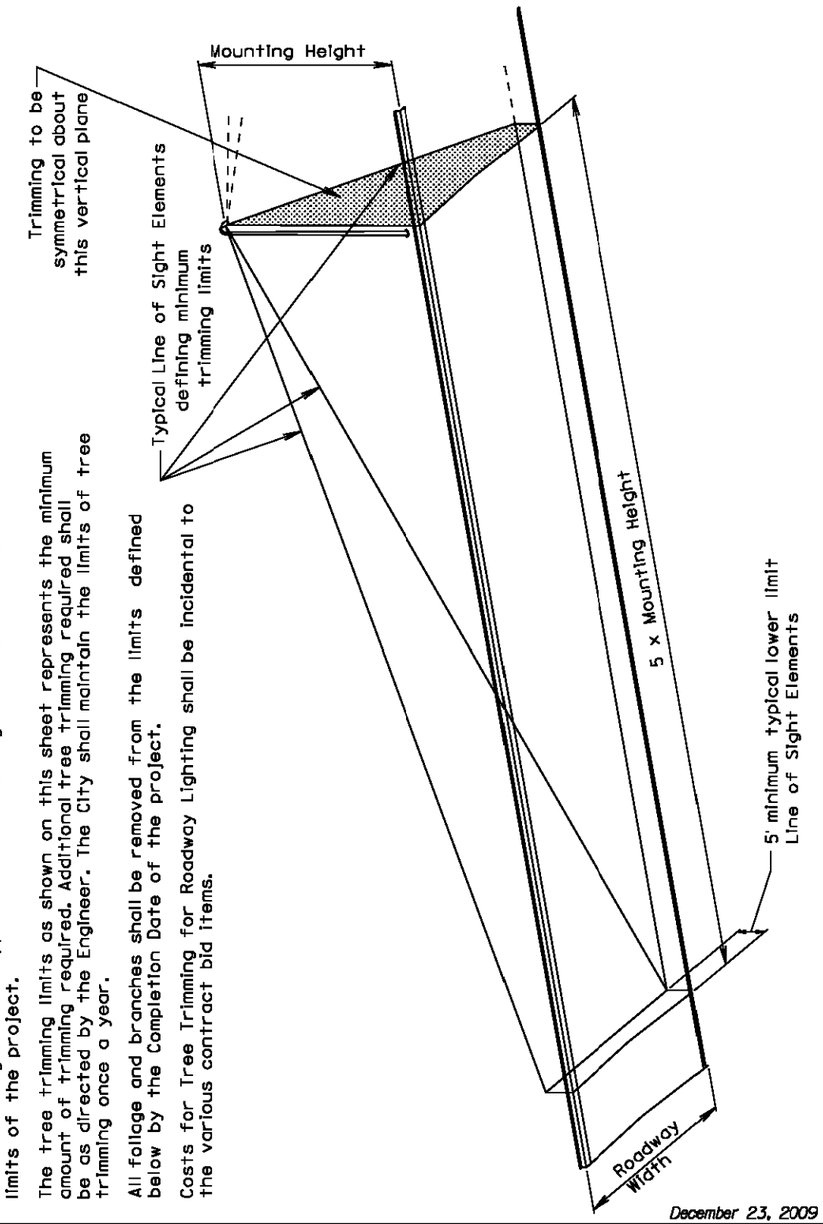
The rubber tapes shall be rolled after application.

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. 2013	SDDOT	WIRE SPLICING FOR LIGHTING (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. 2013	SDDOT	TREE TRIMMING FOR ROADWAY LIGHTING	PLATE NUMBER 635.99
			Sheet 1 of 1

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