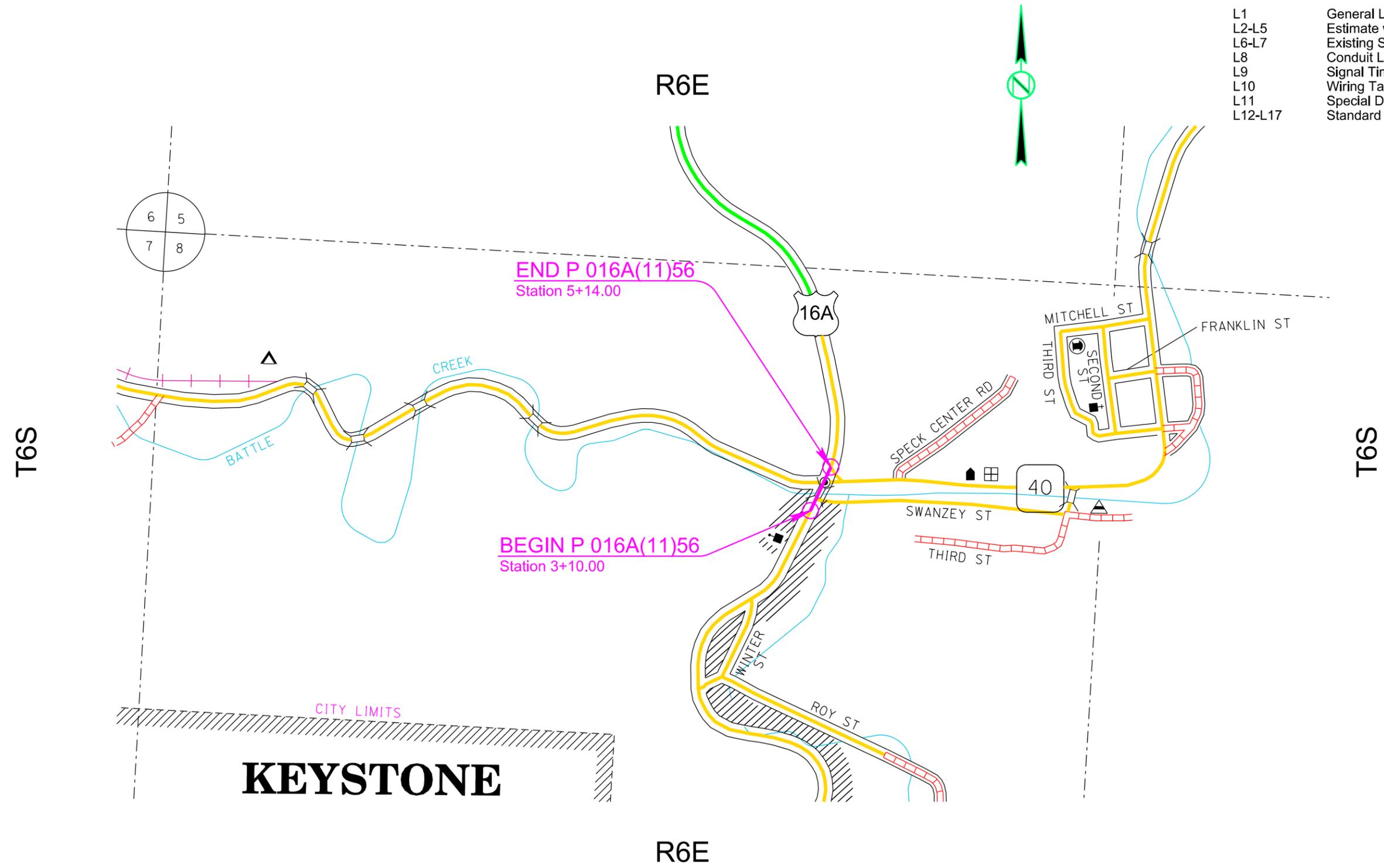


# SECTION L: SIGNAL PLANS

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 016A(11)56	L1	L17
Plotting Date: 02/25/2026			

## INDEX OF SHEETS

- L1 General Layout with Index
- L2-L5 Estimate with General Notes & Tables
- L6-L7 Existing Signal & Signal Layouts
- L8 Conduit Layouts
- L9 Signal Timings
- L10 Wiring Table
- L11 Special Details
- L12-L17 Standard Plates



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**SECTION L ESTIMATE OF QUANTITIES**

STATE OF SOUTH DAKOTA	PROJECT P 016A(11)56	SHEET L2	TOTAL SHEETS L17
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Revised 2/18/2026 - RR

Penn05V8

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
110E1530	Remove Signal Pole Footing	4	Each
110E5110	Salvage Signal Equipment	Lump Sum	LS
420E0400	Structure Excavation, Miscellaneous	28.2	CuYd
460E0382	Install Dowel in Rock	10.0	Ft
462E0100	Class M6 Concrete	8.0	CuYd
480E0200	Epoxy Coated Reinforcing Steel	1,328	Lb
635E2000	Pedestal Signal Pole	1	Each
635E2120	Signal Pole with 20' Mast Arm and Luminaire Arm	1	Each
635E2125	Signal Pole with 25' Mast Arm and Luminaire Arm	1	Each
635E2140	Signal Pole with 40' Mast Arm and Luminaire Arm	2	Each
635E3700	Roadway Luminaire, LED with Photoelectric Cell	4	Each
635E4030	3 Section Vehicle Signal Head	13	Each
635E4050	5 Section Vehicle Signal Head	2	Each
635E5020	2' Diameter Footing	6.0	Ft
635E5030	3' Diameter Footing	37.0	Ft
635E5301	Type 1 Electrical Junction Box	1	Each
635E5302	Type 2 Electrical Junction Box	3	Each
635E5303	Type 3 Electrical Junction Box	1	Each
635E5405	Electrical Service Cabinet with Secondary Disconnect	1	Each
635E5430	Traffic Signal Controller	1	Each
635E5515	Battery Backup System for Traffic Signal	1	Each
635E5520	Video Detection System	1	Each
635E5562	Siren Emergency Vehicle Preemption System	1	Each
635E5880	Accessible Pedestrian Signal	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
635E8110	1" Rigid Conduit, Schedule 40	195	Ft
635E8120	2" Rigid Conduit, Schedule 40	305	Ft
635E8140	4" Rigid Conduit, Schedule 40	30	Ft
635E8230	3" Rigid Conduit, Schedule 80	395	Ft
635E9016	1/C #6 AWG Copper Wire	600	Ft
635E9018	1/C #8 AWG Copper Wire	1,570	Ft
635E9020	1/C #10 AWG Copper Wire	90	Ft
635E9502	2/C #14 AWG Copper Tray Cable, K2	1,395	Ft
635E9503	3/C #14 AWG Copper Tray Cable, K2	140	Ft
635E9504	4/C #14 AWG Copper Tray Cable, K2	370	Ft
635E9505	5/C #14 AWG Copper Tray Cable, K2	355	Ft
635E9506	6/C #14 AWG Copper Tray Cable, K2	90	Ft
635E9525	25/C #14 AWG Copper Tray Cable, K2	650	Ft
635E9710	2/C #10 AWG Copper Pole and Bracket Cable	260	Ft

**SUPPLYING AS BUILT PLANS**

If the traffic signal system or roadway lighting system is constructed differently than what is stated in the plans, the Contractor will supply as built plans to the Engineer and a copy will 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.

**SHOP DRAWING AND CATALOG CUTS SUBMITTALS**

The Contractor will submit shop drawings and catalog cuts in accordance with Section 985 of the Specifications.

PDF submittals will be sent to the following email addresses:

[Stacy.Bartlett@state.sd.us](mailto:Stacy.Bartlett@state.sd.us)  
[Ryley.Rapp@state.sd.us](mailto:Ryley.Rapp@state.sd.us)

**ON-SITE INSPECTION**

An on-site inspection of the traffic signals will be conducted before acceptance of the project once the traffic signals are completed and operational. The on-site inspection will be conducted by the Project Engineer or Region Traffic Engineer with the Contractor, and the Traffic Design Engineer present.

**REMOVE SIGNAL POLE FOOTING**

The footings of existing signal poles EA1-EA4 will be removed by the Contractor to a minimum of 2' below the ground surface. Restoration of the disturbed area will be to the satisfaction of the Engineer.

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

**SALVAGE SIGNAL EQUIPMENT**

The existing signal equipment identified on the plans will be salvaged and delivered to the city of Keystone by the Contractor. The Contractor will notify the city 5 days before the delivery of the salvaged signal equipment to determine time and location for delivery. The Keystone contact is Jerry Prysbyisky at (605) 484-8680.

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

**SIGNAL POLES**

Cantilever traffic signal supports, including anchor bolts, will be designed for fatigue in accordance with Fatigue Importance Category III without galloping and truck induced gusts.

The pole fabricator will be responsible for the determining the diameter, length, and number of anchor bolts.

Signal poles will have rotatable mast arms.

Luminaire extension(s) will have a 50-foot mounting height with 6-foot arm.

**PEDESTAL SIGNAL POLES**

Pedestal signal poles may be aluminum. Aluminum poles will conform to the following requirements:

Aluminum will conform to ASTM B221, Alloy 6061, and Temper T6.

Poles will be round with a minimum outside pole diameter of 4 inches, and the pole assembly will have a square, cast aluminum base with aluminum access door. The base will conform to the breakaway requirements of NCHRP 350 or MASH. A grounding lug will be provided in the base.

The pole to base connection will be a threaded connection; threads will be 8 TPI, NPT. A collar (integral or non-integral) to prevent wind-induced loosening of pole will be provided. All bolt and connection threads will be coated with a commercially available anti-seize compound intended for use in aluminum-to-aluminum and steel-to-aluminum connections.

The pole finish will either be brushed satin or spun. The top of the pole will be sealed by the traffic signal head mounting hardware or by an aluminum cap.

Measurement and payment for aluminum poles will be as specified in Specifications Section 635.

**LUMINAIRES**

The lighting design for the luminaire extensions used the following parameters and provides 2.4 and greater average maintained foot-candles and uniformity ratios of 3:1 (average maintained to minimum maintained foot-candles) and 5:1 (maximum to minimum maintained foot candles):

Pole Setback:	NA
Lamp Loss Factor (LLF):	0.8
Width of Lighted Area:	Varies at Intersection
Luminaire Cycle Length:	NA
Configuration:	Luminaire Extensions
Mounting Height:	50 Ft.
Arm Length	8 Ft.

The following luminaires, or an approved equivalent, meet the requirements for this design:

- a.) AEL Autobahn: ATB0-P305-MVOLT-R2-P7-PCLL
- b.) General Electric Evolve: ERL2-0-23-B5-40-E

**METER SOCKETS FOR TRAFFIC SIGNALS**

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

**MULTICONDUCTOR CONTROL CABLE FOR SIGNAL CIRCUITS**

The Conductor Jackets for the multiconductor control cables will be color coded in accordance with ICEA S-73-532 Table E2.

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**SIGNAL BACKPLATES**

All new vehicle signal heads will have backplates with retroreflective border. The vehicle signal head backplates will have a factory applied 3-inch wide yellow retroreflective border. Sheeting for the border will be Type XI or Type IX in conformance with ASTM D4956. Backplates will be polycarbonate, aluminum, or aluminum-composite. Minimum material thicknesses are:

- Polycarbonate, 0.10-inch
- Aluminum, 0.06-inch
- Aluminum-Composite, 0.08-inch

Signal backplates will extend not less than 5 inches from the edge of the signal head at the top, bottom, and sides. The bottom of the backplate on Vehicle signal faces mounted directly above pedestrian signal indications will be sized to permit the separate adjustment of the vehicle and pedestrian signal indication and may be less than 4 inches.

All costs involved with furnishing and installing backplates with retroreflective border for the new vehicle signal heads will be incidental to the contract unit price per each for "3 Section Vehicle Signal Head".

**ELECTRICAL SERVICE**

The Contractor will be responsible for coordinating the installation of the electrical service and connection to the electrical service. The Contractor will contact the utility company at least 2 weeks prior to needing the electrical service installed.

Contact:

Black Hills Energy  
1-888-890-5554

All cost for contacting the utility company and coordinating the electrical service installations and all hookup fees will be incidental to the contract unit price per each for and "Electrical Service Cabinet with Secondary Disconnect".

**ELECTRICAL SERVICE CABINET WITH SECONDARY DISCONNECT**

The electrical service cabinet will be a standard electrical service cabinet located adjacent to the power source.

The Contractor will install a NEMA 3R rainproof, 60 amp rated, non-fused safety switch (with lock) adjacent to the traffic signal cabinet. The secondary disconnect will be mounted on a galvanized steel post in accordance with standard plate 635.41.

**EXISTING 511 CAMERA**

The existing 511 camera installed on existing signal pole EA4 will be removed and reinstalled on new signal pole A5. Any damage to the camera or hardware during removal and reinstallation will be repaired or replaced by the Contractor at no cost to the State.

The Contractor will notify the DOT ITS office prior to equipment removal and after it has been reinstalled. ITS contact is:

Patrick Brueggeman  
605-773-3852  
Patrick.Brueggeman@state.sd.us

All cost to remove camera and associated hardware, and to reinstall camera and make fully functional will be incidental to the lump sum cost "Miscellaneous, Electrical".

**VIDEO DETECTION SYSTEM**

The video detection system will be one of the following, or an approved equal:

<u>Product</u>	<u>Manufacturer</u>
Autoscope AIS-IV or Vision	Econolite Anaheim, CA 92807 Phone: 1-714-630-3700 <a href="http://www.econolite.com">www.econolite.com</a>
Vantage Next	Iteris, Inc. Santa Ana, CA 92705-5551 Phone: 1-949-270-9400 <a href="http://www.iteris.com">www.iteris.com</a>
TrafficLink Detection	Miovision Technologies, Inc. 137 Glasgow St., Suite 110 Kitchener, Ontario Canada N2G 4X8 Phone: 1-519-513-2407 <a href="http://www.miovision.com">www.miovision.com</a>
NoTraffic Detection System	NoTraffic 720 Main St. Suite 12 Kansas City, MO 64105 <a href="http://www.notraffic.tech">www.notraffic.tech</a>
Currex Vision AI-Vision GPU Server w/Axis M4318 Camera	Currux Vision LLC 520 Post Oak Blvd. Suite 260 Houston TX 77027 <a href="http://www.currux.vision">www.currux.vision</a>

All cabling and hardware necessary to make the detection system operational will be incidental to the contract unit price per each for "Video Detection System".

**ACCESSIBLE PEDESTRIAN SIGNAL**

The work will consist of furnishing and installing accessible pedestrian signals (APS). Each APS will consist of an interactive vibrotactile pedestrian pushbutton with speaker, an informational sign, a latching light emitting diode (LED) indicator light, a solid-state electronic control board, a power supply, wiring, and all necessary mounting hardware. The operation and performance of the APS units will meet the requirements of the current edition of the MUTCD and the applicable sections of NEMA Standards Publication TS-2.

The APS units will be capable of supporting a minimum of 16 push button stations.

The traffic signal cabinet must have four dedicated load switches for the pedestrian phases. If the traffic signal cabinet does not have four dedicated load switches for the pedestrian phases, then the Contractor will furnish and install the necessary number of load switches. All costs associated with furnishing and installing any additional load switches will be incidental to the contract unit price per each for "Accessible Pedestrian Signal".

All mounting fasteners will be stainless steel; all threads will be coated with anti-seize compound meeting the requirements of USA Dept. of Defense specification MIL-PRF-907F.

The push button component of APS will meet the requirements of Section 985.1 S of the Specifications except that all housings and external hardware will be aluminum, powder coated yellow.

The APS control unit will include capability to monitor the push buttons and pedestrian signal head displays. Conflicts will cause the channel to be powered off.

The APS control unit will include capability to monitor communications with the push buttons. Communication faults will automatically reset the control unit.

Two licensed copies of any APS programming software will be furnished. All software programming, firmware updates, and audio message programming of the APS will be through USB port or Ethernet connection.

All costs for furnishing and installing the accessible pedestrian signal including labor, materials, and equipment, will be incidental to the contract unit price per each for "Accessible Pedestrian Signal".

**PEDESTRIAN PUSH BUTTON POLE**

Pedestrian push button poles will be aluminum and will conform to the following requirements:

Aluminum will conform to ASTM B221, Alloy 6061, and Temper T6.

Poles will be round with a minimum outside pole diameter of 4 inches, and the pole assembly will have a square, cast aluminum base with aluminum access door. The base will conform to the breakaway requirements of MASH.

The pole to base connection will be a threaded connection; threads will be 8 TPI, NPT. All bolt and connection threads will be coated with a commercially available anti-seize compound intended for use in aluminum-to-aluminum and steel-to-aluminum connections.

The pole finish will either be brushed satin or spun. The top of the pole will be sealed by an aluminum cap.

Anchor bolts for pedestrian push button poles may have hooked ends.

### TRAFFIC SIGNAL CONTROLLER

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

Controller and flashers are not required to have dimming capability.

Anchor bolts for the traffic signal cabinet may have hooked ends.

All costs for the detector units necessary to operate the signal as shown in these plans, constructing the concrete pad and footing, materials, labor, and furnishing and installing the controller cabinet will be incidental to the contract unit price per each for "Traffic Signal Controller".

### BATTERY BACKUP CABINET

The Contractor will supply cabinets with concrete pad and footing for housing the battery backup system for traffic signal systems at Reed Street/SD40 and US 16-A intersection. The cabinets will be an aluminum NEMA 3R type. The cabinet will have a thermostatically controller exhaust fan. The cabinet will be securely attached to the concrete pad with steel anchors and to the back wall of the controller cabinet using chase nipples as approved by the Engineer. Anchor bolts for battery backup cabinets may have hooked ends.

All costs for constructing the concrete pad and footing, materials, labor, and furnishing and installing the battery backup cabinet will be incidental to the contract unit price per each for "Battery Backup System for Traffic Signal."

### BATTERY BACKUP SYSTEM

The battery backup system will be furnished and installed by the Contractor. The battery backup system will be capable of dual power conversion to take a wide range of power input and output a constant voltage.

The battery backup system will be supplied with an automatic transfer switch to transfer from line power to battery backup and a generator transfer switch to allow switching from line power or battery power to generator power. The transfer switches will be capable of transferring power in under 250 milliseconds permitting the traffic signal to operate normally without interruption to the traffic signal.

A terminal strip for input and output power connections in addition to neutral and ground connections will also be incorporated in the transfer switch design. An interface connector (preferably utilizing a 30-amp, twist lock recessed male plug) allows an external generator or vehicle inverter to be plugged into the system.

Upon loss of utility power, the battery backup system will switch to battery power. In cases of UPS failure, while on utility, the system will auto-bypass and remain in that mode until repaired. Should batteries deplete, while on batteries, the unit will auto-shutdown and return to normal operating mode once the utility power is restored. The By-pass switch will enable removal and replacement of the Traffic UPS without shutting down the traffic control system (i.e., "hot swap" capability). The UPS will support generator input without going to batteries.

The backup battery power system will be sized to accommodate the operation of the signal as shown on the plans for a minimum of 4 hours.

### Standard Features

- On-line double power conversion

- Hot-swappable Input/Output Surge Protection
- Hot-swappable UPS and batteries
- Noise suppression, FCC Class A
- Multiple mounting configurations
- Lockable enclosure

### General Specifications

- Output: Output Voltage Regulation +/-10% over input voltage range
- Low distortion sine wave output
- Typical Efficiency >95%
- Typical Output Voltage THD <3%
- Typical Transfer Time < 5 ms typical

### Environmental:

- Operating Temperature -35°C to +70°C

### Power Modules

- 2000VA Power Module 60Hz
- Input/Output Voltage nominal 120VAC
- Input/Output Frequency nominal 60Hz
- Input Current 20A
- Input Voltage Variation 85-155VAC
- Output Power 2000VA
- Active Output Power 1500W
- Max Charge Current 15 Amps
- Battery Backup Time 4–16 hrs

Product specifications will be submitted for approval prior to ordering. Specifications will be submitted to the following email addresses:

[Stacy.Bartlett@state.sd.us](mailto:Stacy.Bartlett@state.sd.us)  
[Jesse.Nelson@state.sd.us](mailto:Jesse.Nelson@state.sd.us)  
[Ryley.Rapp@state.sd.us](mailto:Ryley.Rapp@state.sd.us)

All costs for furnishing and installing the battery backup system will be included in the contract unit price per each for "Battery Backup System for Traffic Signal".

### TABLE OF FOOTING DATA

Site Designation	Footing Diameter	* Footing Depth	**Spiral Diameter	**Spiral Length	Vertical Reinforcement
A2	2' - 0"	6' - 0"	1' - 8"	44' - 3"	8-#7 x 5' - 6"
A1,A4	3' - 0"	12' - 0"	2' - 8"	120' - 9"	14-#8 x 11' - 6"
A5	3' - 0"	13' - 0"	2' - 8"	129' - 3"	14-#8 x 12' - 6"
A3	Spread footing, see special details.				

\* Footing depth will be below ground level.

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

### SUBSURFACE

1. Subsurface conditions consist of brown silt to sandy gravel overlying schist bedrock. Depth to bedrock and water table information is provided in the below table.

Location	Depth to Intact Schist (ft.)	Ground Water Depth (ft.)
A1	17.2	8.8
A2	6.3	Dry
A3	4.2	Dry
A4	22.0	7.5
A5	21.0	7.5

Groundwater and caving soils are likely to be encountered during the installation of the cylindrical footings. Concrete placement operations should closely follow excavation procedures. The longer the excavations are left open, the more likely caving may occur. Operations should be sequenced so that concrete placement operations closely follow excavation procedures but at a minimum placed the same working day.

If caving soils are encountered, it may be necessary to use casing or drilling fluids to maintain an open excavation. Casing will be of sufficient strength to withstand handling and installation procedures. Casing material may consist of Sonotube, corrugated metal pipe, PVC, smooth metal pipe or any other material as approved by the Engineer. Drilling fluids can be water or other slurries as approved by the Engineer. Concrete placed through drilling fluids will be tremied.

# CONDUIT AND CABLE QUANTITIES

STATE OF SOUTH DAKOTA	PROJECT P 016A(11)56	SHEET L5	TOTAL SHEETS L17
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Plotting Date: 02/25/2026

Location to Location	Rigid Conduit			Copper Wire			Copper Tray Cable, K2						Preemption Cable	Pole and Bracket Cable					
	Schedule 40		Schedule 80	1/C #6 AWG Ft	1/C #8 AWG Ft	1/C #10 AWG Ft	#14 AWG						(not a bid item) Ft	2/C #10 AWG Ft					
	1"	2"	4"				3"	2/C	3/C	4/C	5/C	6/C			25/C				
<b>Penn 05V8</b>																			
<b>SD40 &amp; US16A INTERSECTION</b>																			
A1	JA4	35																	
JA4	JA1				105			325				220		220	40	40			
PA1	JA4	40										45				110			
PA2	JA4	15										20							
ELECT SERVICE	JA5		25				80	80											
JA5	JA1		120				375	375											
A2	JA4		30								70								
A3	JA1		20					75							25	25			
PA3	JA1	20										25							
PA4	JA1	20										25							
Controller	JA1			30								250		65	125	125			
JA1	Secondary Disc.		25				80												
Secondary Disc	Controller		20				65												
JA1	JA2				85			265				350			180	180			
A4	JA2		15												20				
PA5	JA2	25										30							
PA6	JA2	35										40							
JA2	JA3				120			390				260			130				
A5	JA3		15					60							20	20			
PA7	JA3	25										30							
PA8	JA3	15										20							
JA3	JA4				85										90				
<b>Signal Poles</b>																			
A1	Signal Pole											35	65			40	65		
A2	Pedestal Pole												30						
A3	Signal Pole											35	150			60	65		
A4	Signal Pole											35	50			45	65		
A5	Signal Pole											35	75		20	60	65		
PA1	Pushbutton Pole											10							
PA2	Pushbutton Pole											10							
PA3	Pushbutton Pole											10							
PA4	Pushbutton Pole											10							
PA5	Pushbutton Pole											10							
PA6	Pushbutton Pole											10							
PA7	Pushbutton Pole											10							
PA8	Pushbutton Pole											10							
<b>Total:</b>		195	305	30	395		600	1,570	90			1,395	140	370	355	90	650	705	260

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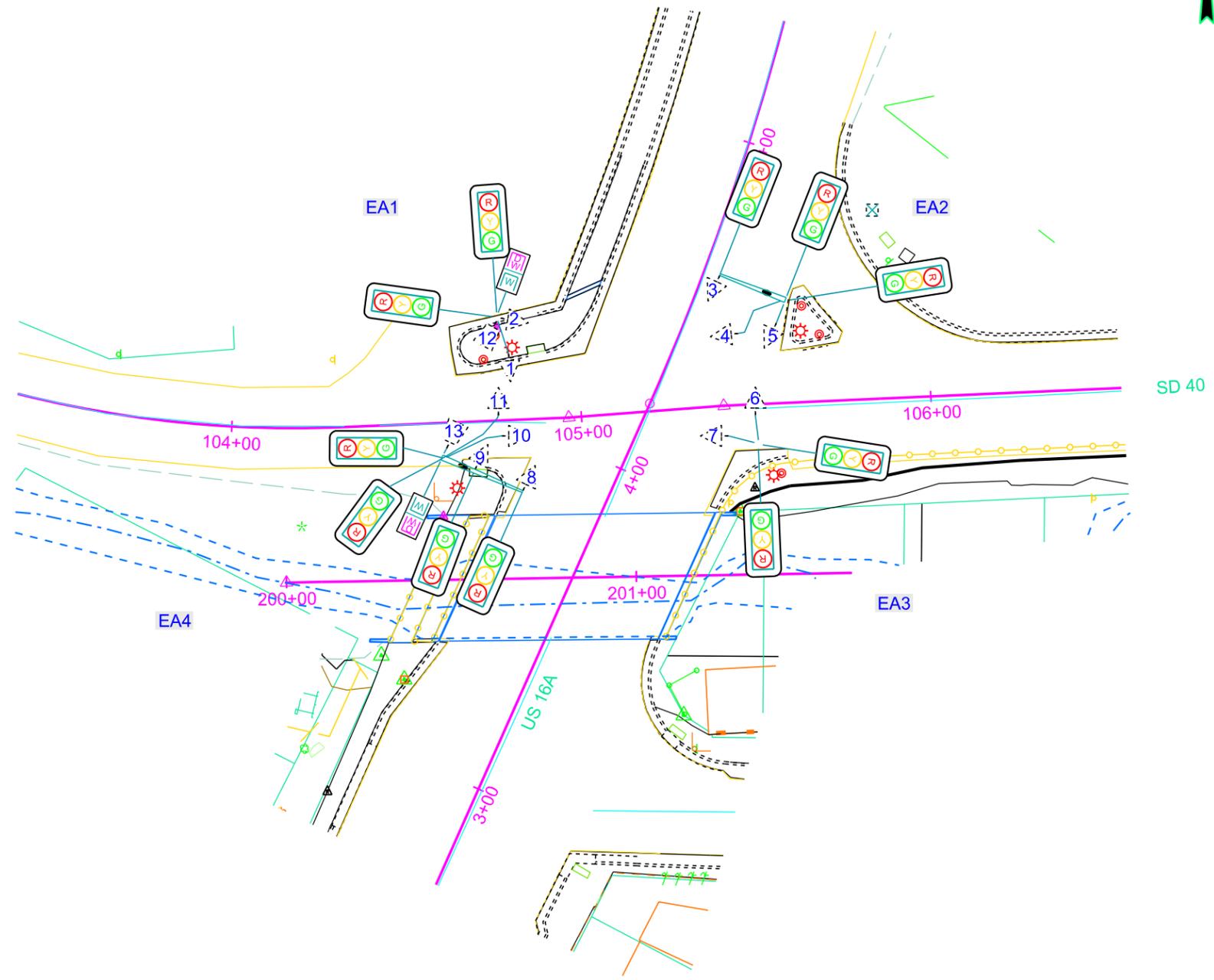
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# EXISTING SIGNAL LAYOUT

## US 16A & SD 40/REED STREET

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 016A(11)56	L6	L17
Plotting Date: 02/25/2026			



### SALVAGE ITEMS

KEY	ITEM	EST QUANT	UNIT
⚙️	Pedestal Signal Pole (EA1,EA3)	2	EACH
⚙️	Signal Pole w/20' Mast Arm & 6' Lumin Arm (EA2)	1	EACH
⚙️	Signal Pole w/25' Mast Arm & 6' Lumin Arm (EA4)	1	EACH
•	Roadway Luminaire, 400w with P.E. (EA2,EA4)	2	EACH
⬆️	3 Section Vehicle Signal Head (1-11)	11	EACH
⬆️	Pedestrian Signal Head w/Countdown Timer (12-13)	2	EACH
⊠	Traffic Signal Controller	1	EACH

### ESTIMATE OF QUANTITIES

KEY	ITEM	EST QUANT	UNIT
⚙️	Remove Signal Pole Footing (EA1-EA4)	4	EACH
	Salvage Signal Equipment	LUMP SUM	LS

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# SIGNAL LAYOUT

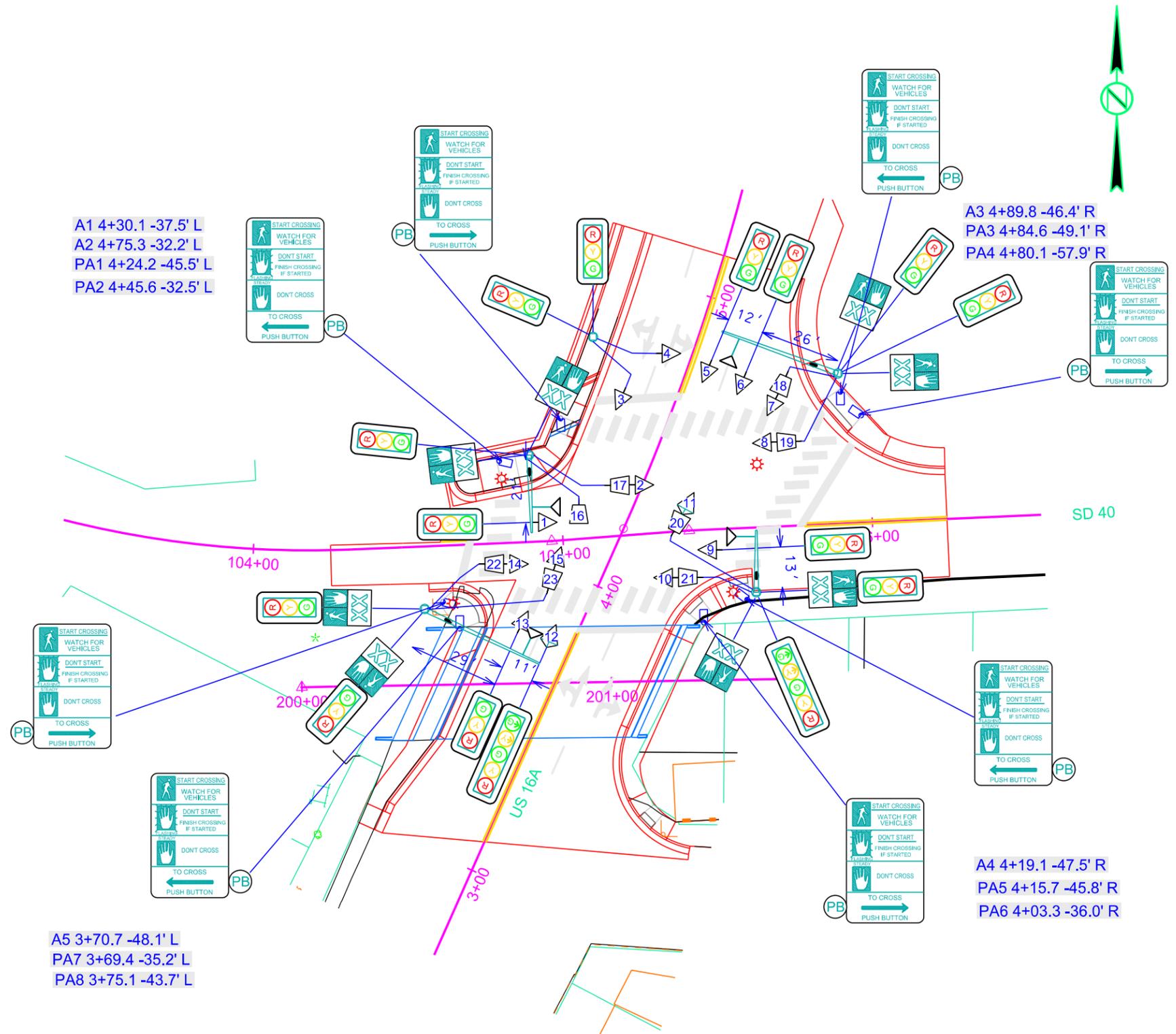
## US 16A & SD 40/REED ST

STATE OF SOUTH DAKOTA	PROJECT P 016A(11)56	SHEET L7	TOTAL SHEETS L17
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Plotting Date: 02/25/2026

### ESTIMATE OF QUANTITIES

KEY	ITEM	EST QUANT	UNIT
○	Pedestal Signal Pole (A2)	1	EACH
⚡	Signal Pole w/20' Mast Arm & 6' Lumin Arm (A4)	1	EACH
⚡	Signal Pole w/25' Mast Arm & 6' Lumin Arm (A1)	1	EACH
⚡	Signal Pole w/40' Mast Arm & 6' Lumin Arm (A3,A5)	2	EACH
•	Roadway Luminaire, LED with P.E. (A1,A3,A4,A5)	4	EACH
▶	3 Section Vehicle Signal Head (1-10,13-15)	13	EACH
▶	3 Section Vehicle Signal Head (11-12)	2	EACH
•	Siren Emergency Vehicle Preemption System (4-Channel)	1	EACH
▶	Siren Detector (Not a Bid Item)	4	EACH
PB	Accessible Pedestrian Signal	8	EACH
○	Pedestrian Push Button Pole (PA1-PA8)	8	EACH
▶	Pedestrian Signal Head w/Countdown Timer (16-23)	8	EACH
▶	Pedestrian Crossing Sign R10-3e (Left-4 / Right-4)	8	EACH



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# CONDUIT LAYOUT

## SD HWY 40 / REED ST. & 16A INTERSECTION

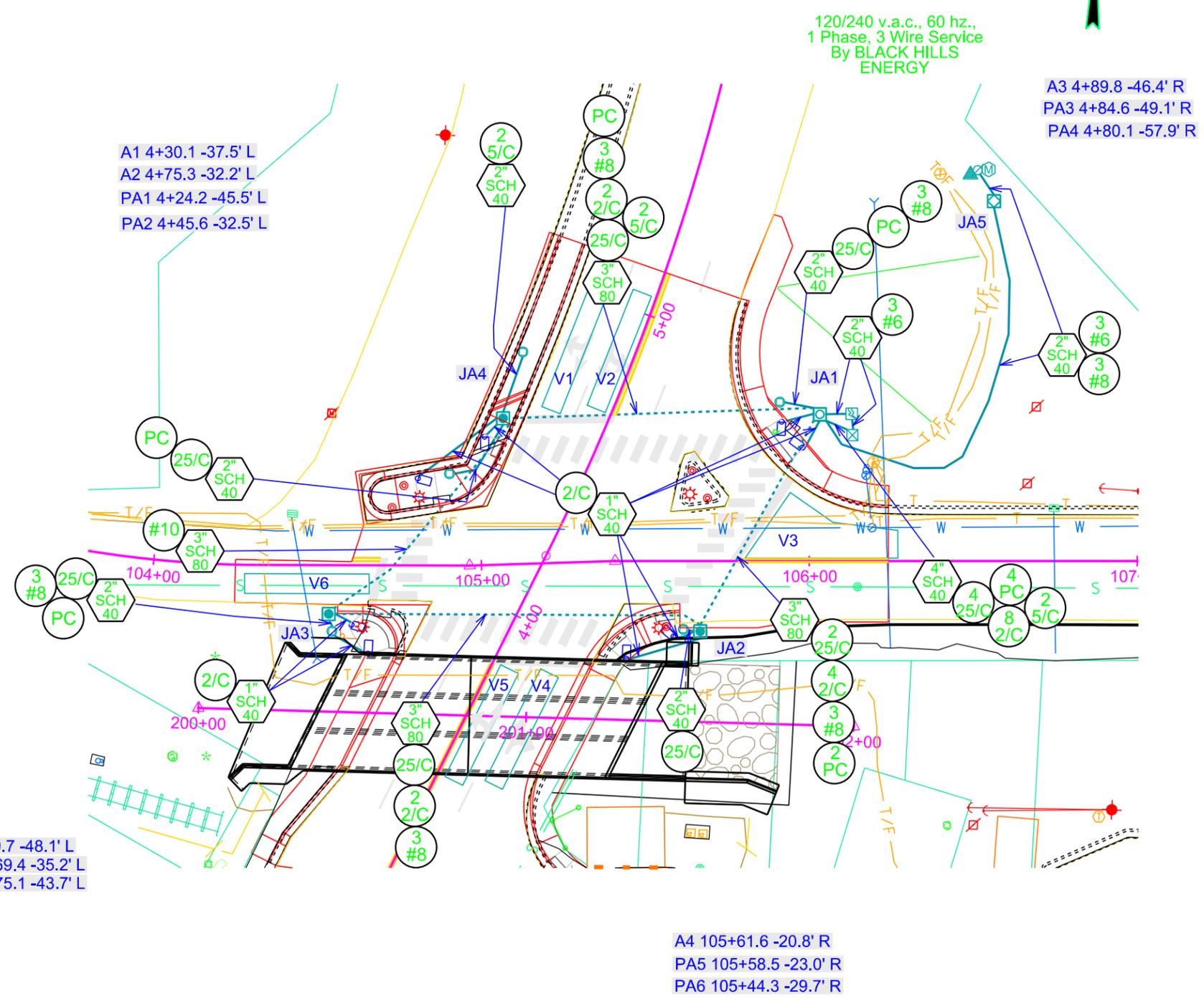
STATE OF SOUTH DAKOTA	PROJECT P 016A(11)56	SHEET L8	TOTAL SHEETS L17
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Plotting Date: 02/25/2026



### ESTIMATE OF QUANTITIES

KEY	ITEM	EST QUANT	UNIT
○	2' Diameter Footing (A2)	6	FT
○	3' Diameter Footing (A1-A4)	37	FT
☑	Type 1 Electrical Junction Box (JA5)	1	EACH
☑	Type 2 Electrical Junction Box (JA2-JA4)	3	EACH
☑	Type 3 Electrical Junction Box (JA1)	1	EACH
▲	Electrical Service Cabinet with Secondary Disconnect	1	EACH
☒	Secondary Disconnect (Not a bid item)	1	EACH
∅	Galvanized Steel Utility Pole Not a Bid Item	1	EACH
Ⓜ	Meter Socket Not a Bid Item	1	EACH
☒	Traffic Signal Controller	1	EACH
	Batter Backup System for Traffic Signal	1	EACH
□	Video Detection Zones (6'x38') (V1-V6) Not a Bid Item	6	EACH
	Video Detection System	1	EACH
1" SCH 40	1" Rigid Conduit, Schedule 40	195	FT
2" SCH 40	2" Rigid Conduit, Schedule 40	305	FT
4" SCH 40	4" Rigid Conduit, Schedule 40	30	FT
3" SCH 80	3" Rigid Conduit, Schedule 80	395	FT
#6	1/C #6 AWG Copper Wire	600	FT
#8	1/C #8 AWG Copper Wire	1570	FT
#10	1/C #10 AWG Copper Wire	90	FT
2/C	2/C #14 AWG Copper Tray Cable, K2	1395	FT
3/C	3/C #14 AWG Copper Tray Cable, K2	140	FT
4/C	4/C #14 AWG Copper Tray Cable, K2	370	FT
5/C	5/C #14 AWG Copper Tray Cable, K2	355	FT
6/C	6/C #14 AWG Copper Tray Cable, K2	90	FT
25/C	25/C #14 AWG Copper Tray Cable, K2	650	FT
	2/C #10 AWG Copper Pole & Bracket Cable	260	FT
PC	Preemption Cable (Not a Bid Item)	705	FT



Plot Scale - 1:40

Plotted From - TRPR37199

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# SIGNAL TIMING

## US 16-A & REED STREET

Plotting Date: 02/25/2026

BASIC INTERVALS								
Phase	1	2	3	4	5	6	7	8
Movement	SBTL	NB		EB		SB		WB
Lag								
Min Green	7	7		7		7		7
Extension	3	3		3		3		3
Max 1	10	20		15		20		15
Max 2	10	27		23		27		23
Time Before								
Time to Reduce								
Minimum Gap								
Yellow	2.5	4		4		4		4
All Red	2.5	2.5		1.5		2.5		1.5
Walk		7		7		7		7.5
Ped Clearance		14.5		20.5		14.5		20.5
Recall		Min				Min		
Prog Flash Display		Y		R		Y		R
Start Up Ø		X				X		

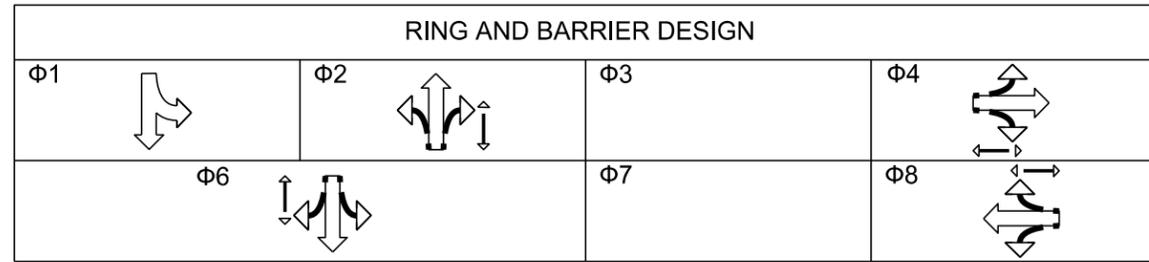
PREEMPTION				
Plan	3	4	5	6
Calls Ø	3	4	2	6
Output	CH13R	CH14R	CH15R	CH16R

WEEKLY PROGRAM (May 1 to October 31)							
	Sun	Mon	Tue	Wed	Thu	Fri	Sat
Timing Plan	1	1	1	1	1	1	1

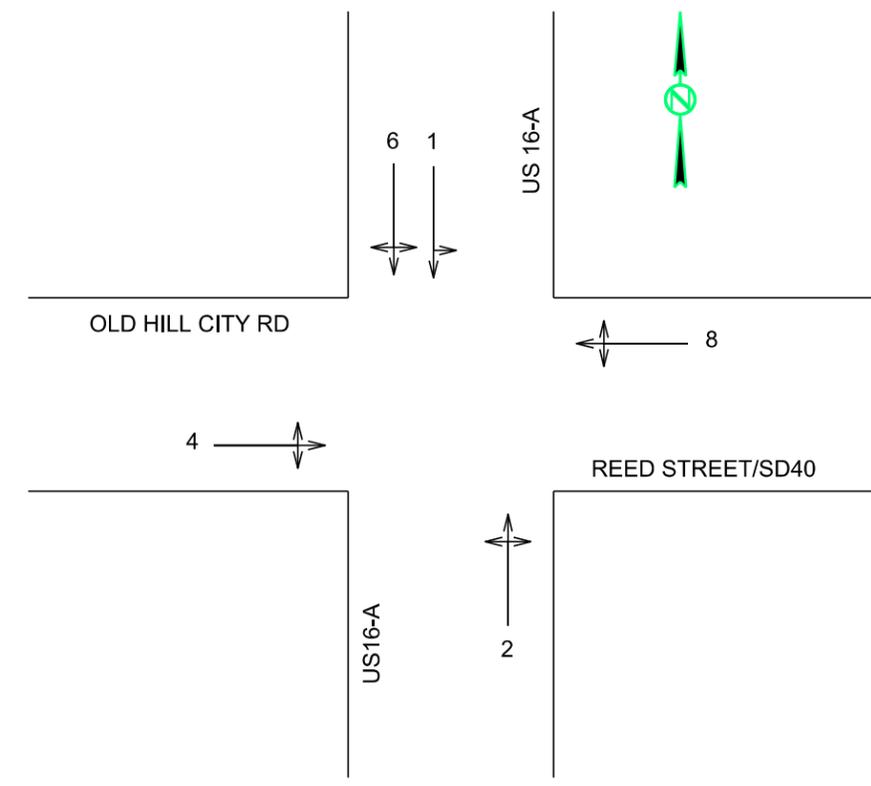
WEEKLY PROGRAM (November 1 to April 30)							
	Sun	Mon	Tue	Wed	Thu	Fri	Sat
Timing Plan	2	2	2	2	2	2	2

TIMING PLAN 1 (TOURIST SEASON)	
Time of Day (TOD)	Pattern (C/S/O)
06:00-23:00	MAX1
23:00-06:00	FLASH

TIMING PLAN 2 (NON-TOURIST SEASON)	
Time of Day (TOD)	Pattern (C/S/O)
07:00-22:00	MAX2
22:00-07:00	FLASH



DETECTOR TABLE															
Local Detector	Controller Detector #	Phase Called (Call/Call Locking/Extend)												Controller Settings	
		1	2	3	4	5	6	7	8	9	10	11	12	Extend	Delay
V1	1						C/E								
V2	2	C/E					C/E								
V3	3								C/E						
V4-V5	4		C/E												
V6	5				C/E										



Plot Scale - 1:40

Plotted From - TRPR17199

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# TRAFFIC SIGNAL WIRING TABLES

## US 16A & REED STREET

Plotting Date: 02/25/2026

POLE: A1 CABLE SIZE: 25/C

CABINET TERM.	CABLE CONDUCTOR COLOR	POLE COND. COLOR	HEAD TERM.	HEAD NO.	Ø
8R	Red	RED	R	1	8
8Y	Orange	ORANGE	Y	1	8
8G	Blue	BLUE	G	1	8
N	Black	BLACK	N	1	8
8R	Red/Black	RED	R	2	8
8Y	Orange/Black	ORANGE	Y	2	8
8G	Blue/Black	BLUE	G	2	8
N	Yellow/Black	BLACK	N	2	8
11R	Black/Red	RED	DW	16	6P
11G	Blue/Red	BLUE	W	16	6P
N	Brown/Black	BLACK	N	16	6P
12R	Red/Orange	RED	DW	17	8P
12G	Blue/Orange	BLUE	W	17	8P
N	Black/Orange	BLACK	N	17	8P
	Yellow				
	Brown				
	Orange/Red				
	Yellow/Red				
	Brown/Red				
	Black/Blue				
	Red/Blue				
	Orange/Blue				
	Yellow/Blue				
	Brown/Blue				
	Yellow/Orange				

POLE: A2 CABLE SIZE: 5/C

CABINET TERM.	CABLE CONDUCTOR COLOR	POLE COND. COLOR	HEAD TERM.	HEAD NO.	Ø
8R	Red	RED	R	4	8
8Y	Orange	ORANGE	Y	4	8
8G	Blue	BLUE	G	4	8
N	Black	BLACK	N	4	8
	Yellow				

POLE: A3 CABLE SIZE: 25/C

CABINET TERM.	CABLE CONDUCTOR COLOR	POLE COND. COLOR	HEAD TERM.	HEAD NO.	Ø
2R	Red	RED	R	5	2
2Y	Orange	ORANGE	Y	5	2
2G	Blue	BLUE	G	5	2
N	Black	BLACK	N	5	2
2R	Red/Black	RED	R	6	2
2Y	Orange/Black	ORANGE	Y	6	2
2G	Blue/Black	BLUE	G	6	2
N	Brown	BLACK	N	6	2
2R	Black/Red	RED	R	7	2
2Y	Orange/Red	ORANGE	Y	7	2
2G	Blue/Red	BLUE	G	7	2
N	Yellow/Black	BLACK	N	7	2
4R	Yellow/Red	RED	R	8	4
4Y	Orange/Blue	ORANGE	Y	8	4
4G	Black/Blue	BLUE	G	8	4
N	Brown/Black	BLACK	N	8	4
9R	Red/Orange	RED	DW	18	2P
9G	Blue/Orange	BLUE	W	18	2P
N	Black/Orange	BLACK	N	18	2P
12R	Red/Blue	RED	DW	19	8P
12G	Yellow/Blue	BLUE	W	19	8P
N	Brown/Red	BLACK	N	19	8P
	Yellow				
	Brown/Blue				
	Yellow/Orange				

POLE: A4 CABLE SIZE: 25/C

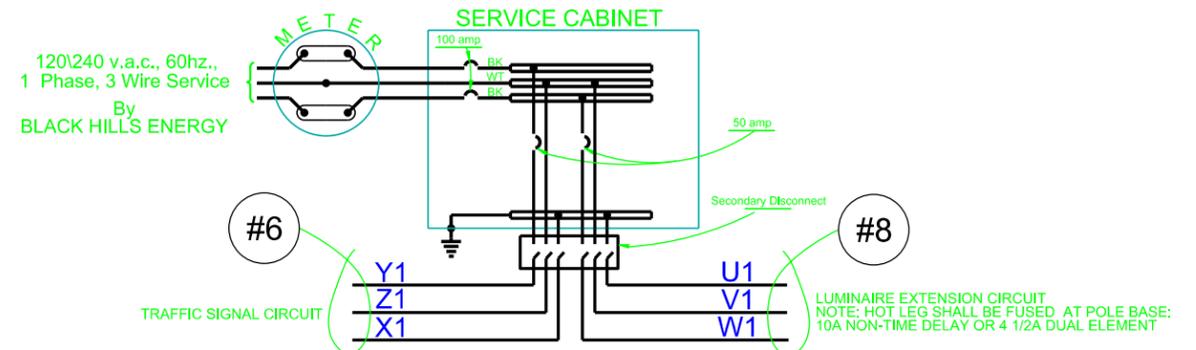
CABINET TERM.	CABLE CONDUCTOR COLOR	POLE COND. COLOR	HEAD TERM.	HEAD NO.	Ø
4R	Red	RED	R	9	4
4Y	Orange	ORANGE	Y	9	4
4G	Blue	BLUE	G	9	4
N	Black	BLACK	N	9	4
4R	Red/Black	RED	R	10	4
4Y	Orange/Black	ORANGE	Y	10	4
4G	Blue/Black	BLUE	G	10	4
N	Yellow/Black	BLACK	N	10	4
6R	Black/Red	RED	R	11	6
6Y	Orange/Red	ORANGE	Y	11	6
6G	Blue/Red	BLUE	G	11	6
N	Brown/Black	BLACK	N	11	6
1Y	Yellow	YELLOW	YA	11	1
1G	Brown	BROWN	GA	11	1
N	Black/Blue	BLACK	N	20	2P
9R	Red/Blue	RED	DW	20	2P
9G	Orange/Blue	BLUE	W	20	2P
N	Black/Orange	BLACK	N	21	4P
10R	Red/Orange	RED	DW	21	4P
10G	Blue/Orange	BLUE	W	21	4P
	Yellow/Red				
	Brown/Red				
	Yellow/Blue				
	Brown/Blue				
	Yellow/Orange				

POLE: A5 CABLE SIZE: 25/C

CABINET TERM.	CABLE CONDUCTOR COLOR	POLE COND. COLOR	HEAD TERM.	HEAD NO.	Ø
6R	Red	RED	R	12	6
6Y	Orange	ORANGE	Y	12	6
6G	Blue	BLUE	G	12	6
N	Black	BLACK	N	12	6
1Y	Yellow	YELLOW	YA	12	1
1G	Red/Blue	BROWN	GA	12	1
6R	Red/Black	RED	R	13	6
6Y	Orange/Black	ORANGE	Y	13	6
6G	Blue/Black	BLUE	G	13	6
N	Yellow/Black	BLACK	N	13	6
8R	Black/Red	RED	R	14	8
8Y	Orange/Red	ORANGE	Y	14	8
8G	Blue/Red	BLUE	G	14	8
N	Brown/Black	BLACK	N	14	8
6R	Red/Orange	RED	R	15	6
6Y	Blue/Orange	ORANGE	Y	15	6
6G	Brown/Blue	BLUE	G	15	6
N	Black/Orange	BLACK	N	15	6
N	Black/Blue	BLACK	N	22	4P
10R	Brown/Red	RED	DW	22	4P
10G	Yellow/Blue	BLUE	W	22	4P
N	Brown	BLACK	N	23	6P
11R	Yellow/Red	RED	DW	23	6P
11G	Orange/Blue	BLUE	W	23	6P
	Yellow/Orange				

POLE: A2 CABLE SIZE: 5/C

CABINET TERM.	CABLE CONDUCTOR COLOR	POLE COND. COLOR	HEAD TERM.	HEAD NO.	Ø
2R	Red	RED	R	3	2
2Y	Orange	ORANGE	Y	3	2
2G	Blue	BLUE	G	3	2
N	Black	BLACK	N	3	2
	Yellow				



Plot Scale - 1:200

Plotted From - TRPR17199

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# SPECIAL DETAILS FOR SPREAD FOOTING

## SPECIFICATIONS

- Design Specifications: AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, Sixth Edition 2013 with 2019 Interims.
- Construction Specifications: South Dakota Standard Specifications for Roads and Bridges, 2025 Edition and required Provisions, Supplemental Specifications, and Special Provisions as included in the Proposal.

## GENERAL NOTES

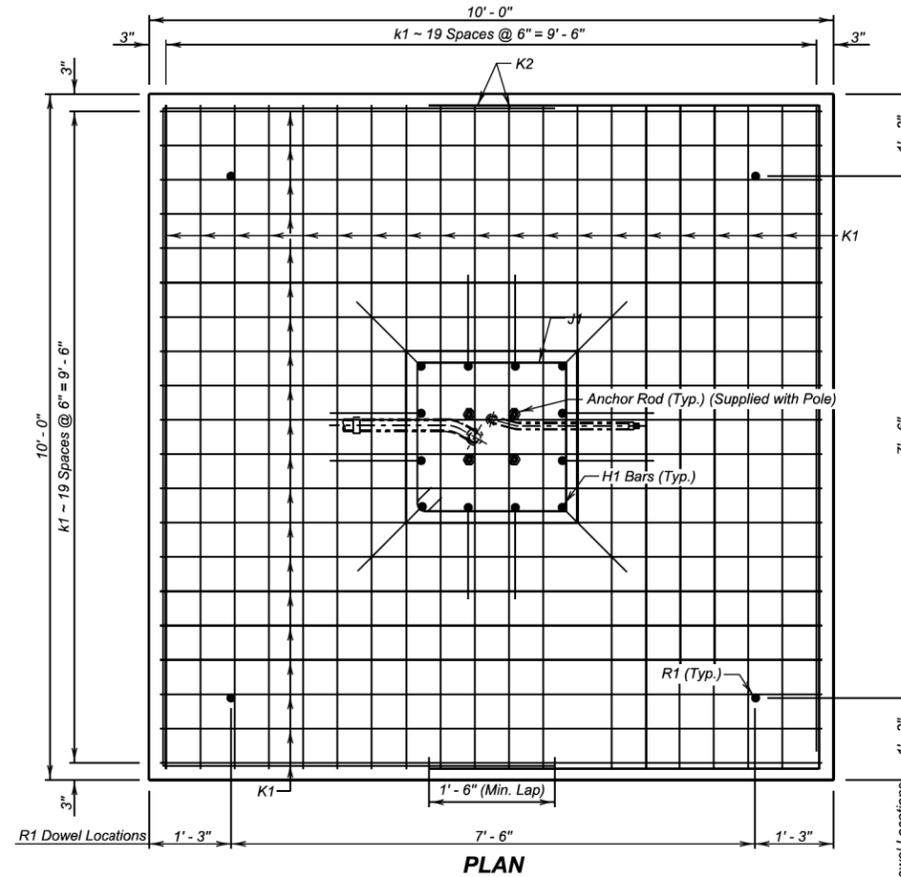
- Unit Stresses: Concrete  $f_c = 1600$  p.s.i.  
Reinforcing Steel  $f_s = 24000$  p.s.i.
- All concrete will be Class M6 conforming to Section 462.
- All reinforcing steel will conform to ASTM A615 Grade 60.
- All exposed edges will be chamfered  $\frac{3}{4}$  inch.
- The subsurface conditions within the limits of the project primarily consist of brown silt overlying schist bedrock at varying depths. Groundwater was encountered during the subsurface investigation between 5.8' to 7.4' below the surface. Caving occurred between 6.6' and 9.1' below the surface.

## SPREAD FOOTING ON ROCK

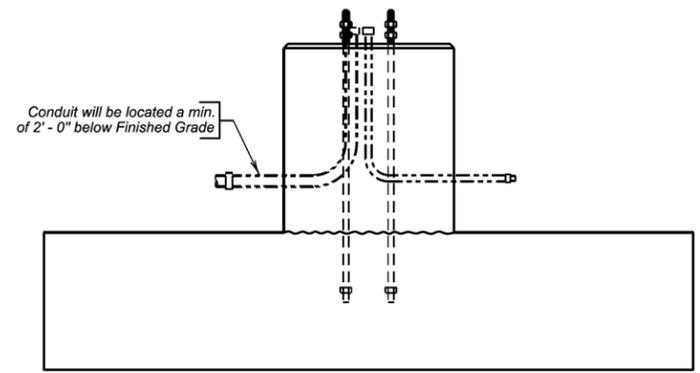
- The rock surface will be cleaned of all soil and debris prior to placing reinforcing steel for the spread footing. Cleaning will be accomplished by water washing and/or air jetting. Material washed from the rock surface will be directed into a sump or low area and physically removed from the exposed rock surface.
- The cost of cleaning the rock will be included in the unit price bid for Structure Excavation, Miscellaneous. Payment will be considered full compensation for all materials, labor, equipment and incidentals necessary to satisfactorily complete the work.
- No blasting of the bedrock will be permitted.

## ROCK DOWELS

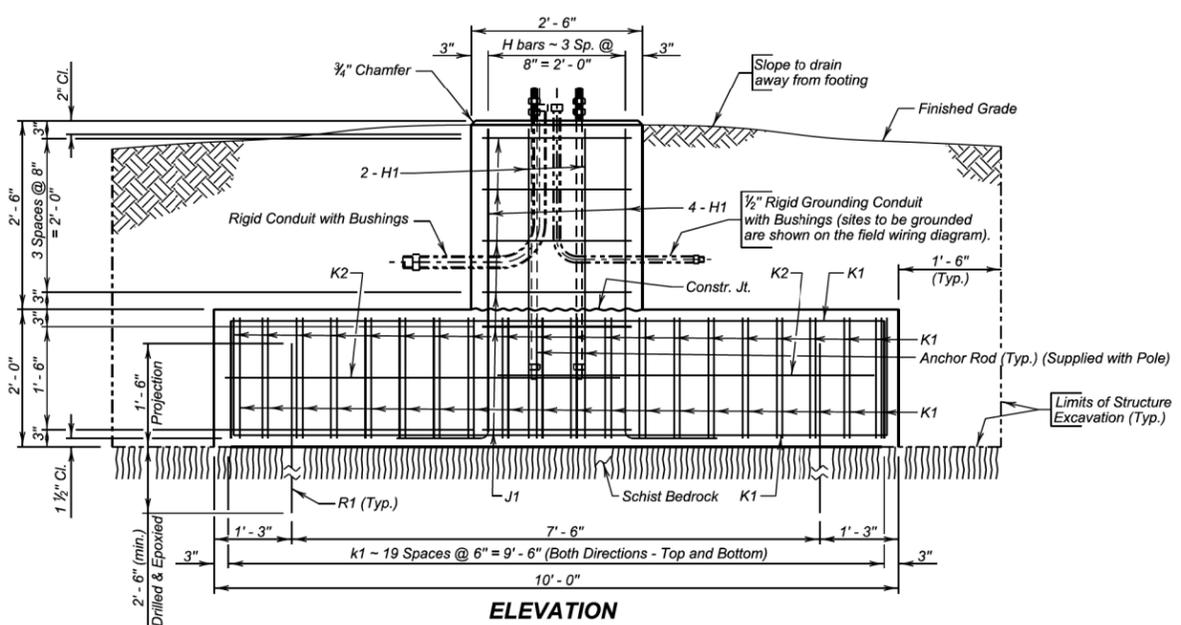
- The steel dowel for use with the item Install Dowel in Rock is included in the Reinforcing Schedule and will be paid for at the unit price bid for Reinforcing Steel. Payment will be for the lineal foot of embedment into the rock, and will be considered full compensation for all materials, labor, equipment and incidentals necessary to satisfactorily complete the work.
- Dowel bond material will be suitable for bonding steel dowel bars to rock in the existing moisture conditions. The Contractor will submit dowel bonding material product data to the Engineer for approval. Site mixed and cartridge resins will be commercially available and manufactured for rock dowel installation in this particular rock type. The diameter of the hole, drilled into the rock, will be a maximum of  $\frac{3}{8}$  inch larger than the diameter of the steel dowel, or as specified by the dowel bond material manufacturer. The drilled holes will be blown out with compressed air using a device that will reach the bottom of the hole to ensure that all debris or loose material has been removed prior to epoxy injection.



PLAN



ELEVATION



ELEVATION

REINFORCING SCHEDULE					Bending Details	
Mk.	No.	Size	Length	Type		
A3						
H1	12	7	5'-6"	17A	9'-6"	
J1	6	4	9'-5"	T1	1'-9"	
K1	80	5	13'-0"	17	5'-9"	
K2	2	4	21'-0"	17		
R1	4	8	4'-0"	Str.		

NOTES:  
All dimensions are out to out of bars.

ESTIMATED QUANTITIES		
ITEM	UNIT	QUANTITY
Epoxy Coated Reinforcing Steel	Lb.	1328
Class M6 Concrete	Cu. Yd.	8.0
Structure Excavation, Miscellaneous	Cu. Yd.	28.2
Install Dowel in Rock	Ft.	10

DETAILS FOR SPREAD FOOTING FOR SIGNAL POLES  
A3 P 016A(11)56

PENNINGTON COUNTY  
S. D. DEPT. OF TRANSPORTATION  
FEBRUARY 2025

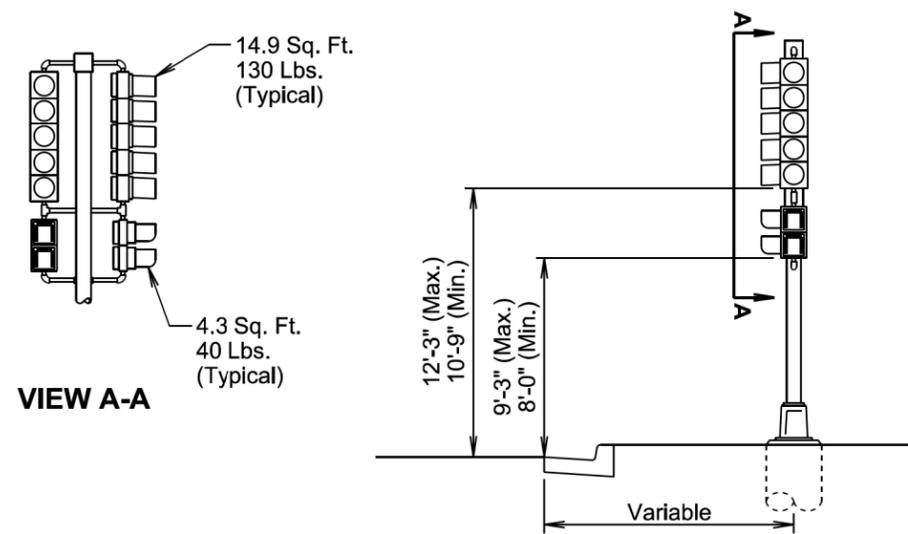
DESIGNED BY SK PENN05V8	CK. DES. BY BR 05V8TA01	DRAFTED BY BT <i>Steve A. Johnson</i> BRIDGE ENGINEER
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PLANS BY:  
OFFICE OF BRIDGE DESIGN, SOUTH DAKOTA DEPARTMENT OF TRANSPORTATION

Plot Scale - 1:200

Plotted From - TRPR17199

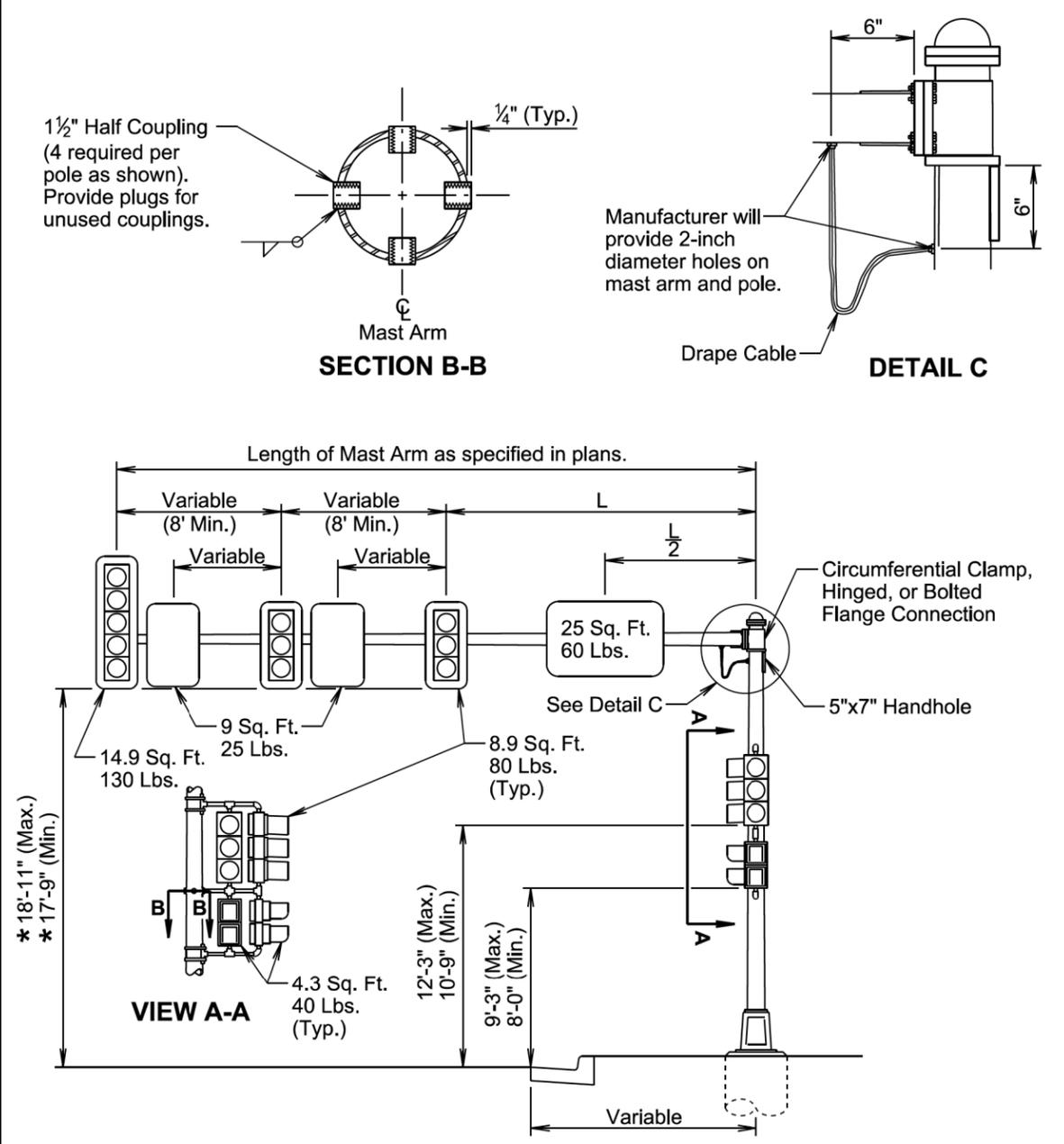
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**GENERAL NOTE:**  
The signal heads are shown with backplates removed so that the mounting hardware is visible.

November 19, 2022

<i>Published Date: 2026</i>	<b>S D D O T</b>	<b>SIGNAL POLE (PEDESTAL)</b>	PLATE NUMBER 635.30
			Sheet 1 of 1



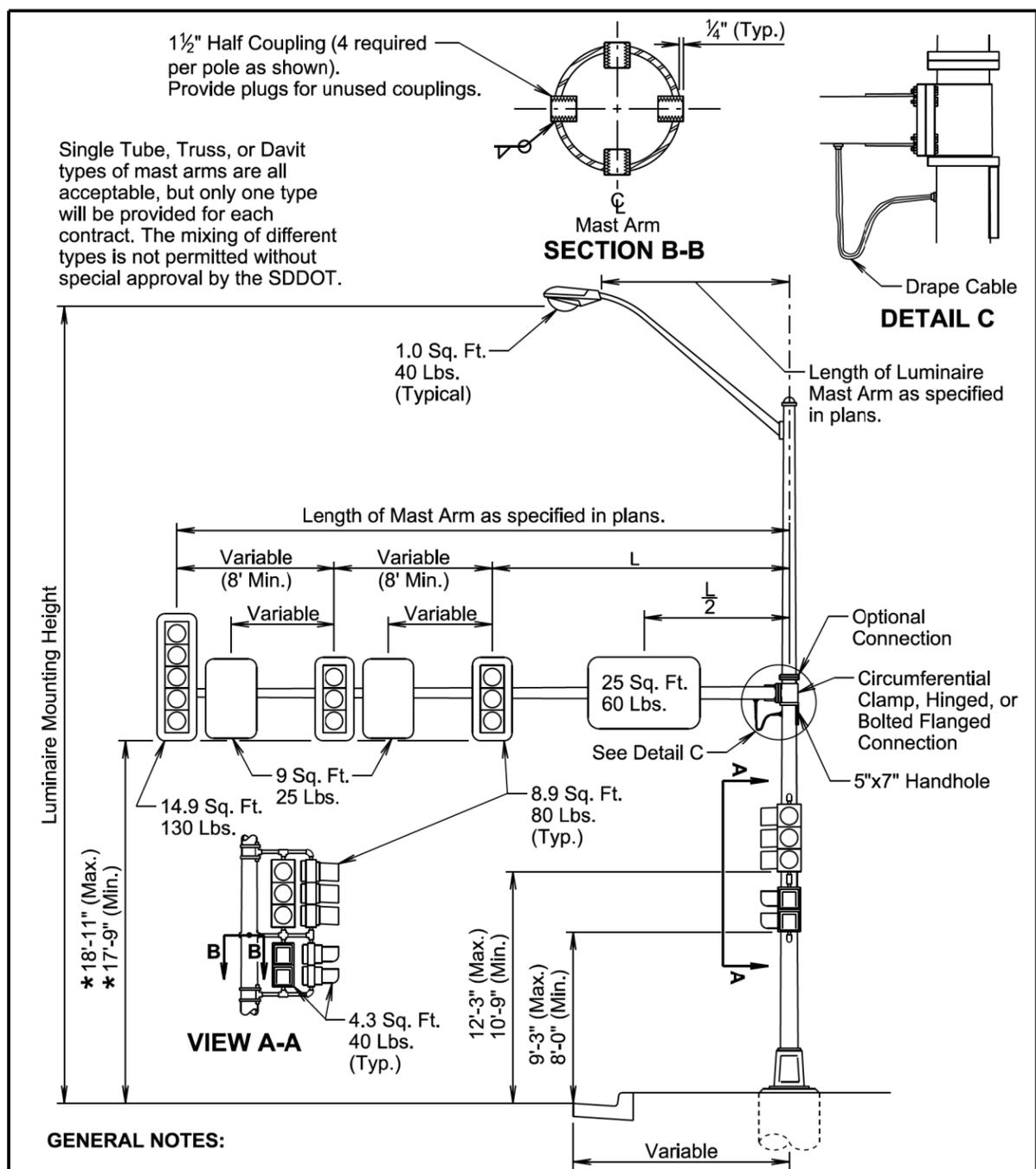
**GENERAL NOTES:**  
Some of the signal heads are shown with backplates removed so that the mounting hardware is visible.

\* 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 will be as specified in Section 4D.15 of the MUTCD.

November 19, 2022

<i>Published Date: 2026</i>	<b>S D D O T</b>	<b>SIGNAL POLE (WITH MAST ARM)</b>	PLATE NUMBER 635.31
			Sheet 1 of 1

Plot Scale - 1:200



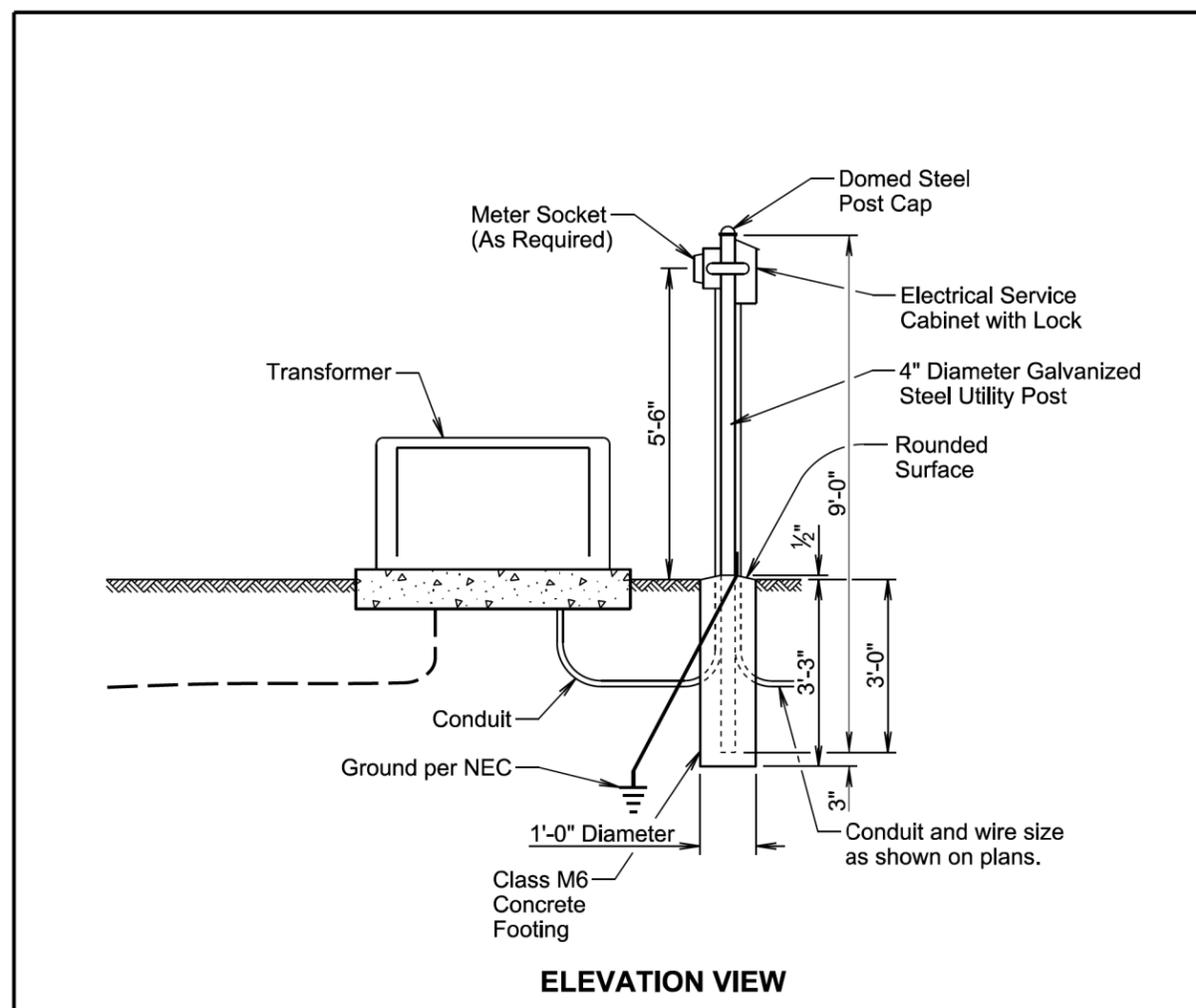
**GENERAL NOTES:**

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 will be as specified in Section 4D.15 of the MUTCD.

November 19, 2022

<b>S D D O T</b>	<b>SIGNAL POLE (WITH MAST ARM AND LUMINAIRE EXTENSION)</b>	PLATE NUMBER <b>635.32</b>
	Published Date: 2026	Sheet 1 of 1



**GENERAL NOTES:**

The concrete for the post footing will be class M6 concrete.

The 4" diameter galvanized steel utility post will be 9' long and will be in conformance with AASHTO Standard Specifications M181. The post will be Type 1 and either Grade 1 or Grade 2. The domed steel post cap will be in conformance with AASHTO Standard Specifications M181 and will be Type 1.

The Contractor will contact and coordinate his/her work with the Utility Companies regarding hookup requirements, fees, materials, and equipment necessary.

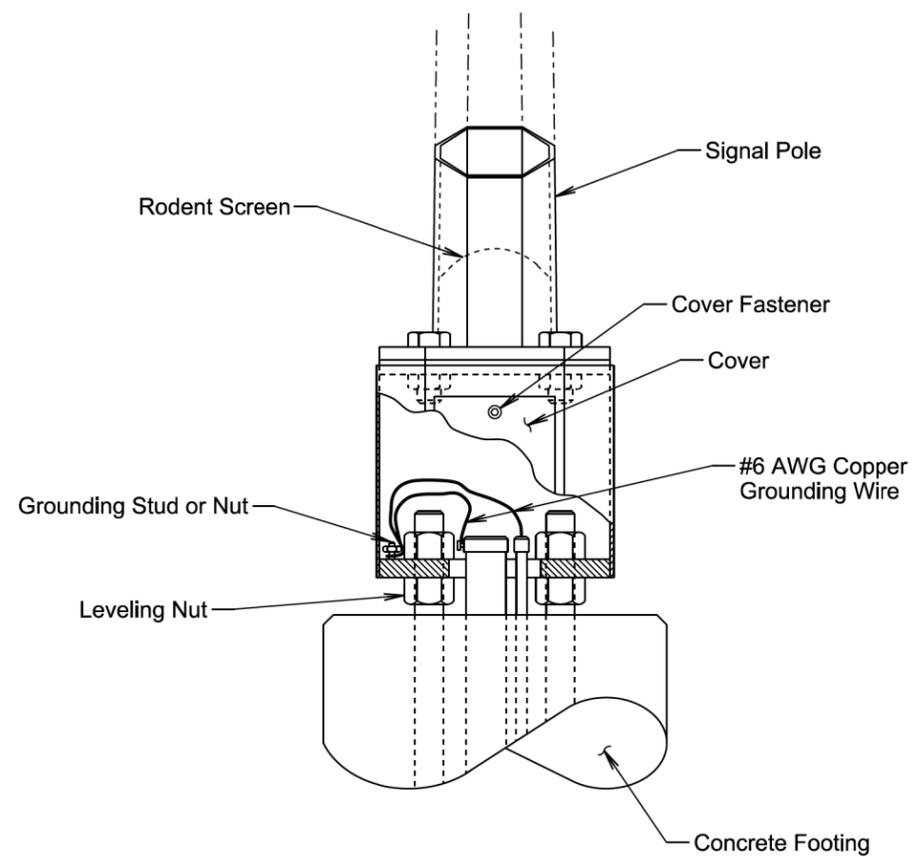
All costs for furnishing and installing all materials from the electrical service cabinet to the transformer including labor, equipment, hookup fees, all items within the cabinet, lockable enclosure with receptacle outlet, lock and keys, post, concrete footing, post cap, meter socket if required, conduit, and incidentals will be incidental to the contract unit price per each for "Electrical Service Cabinet".

March 31, 2024

<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>
	Published Date: 2026	Sheet 1 of 1

Plotted From - TRPR17199

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**GENERAL NOTES:**

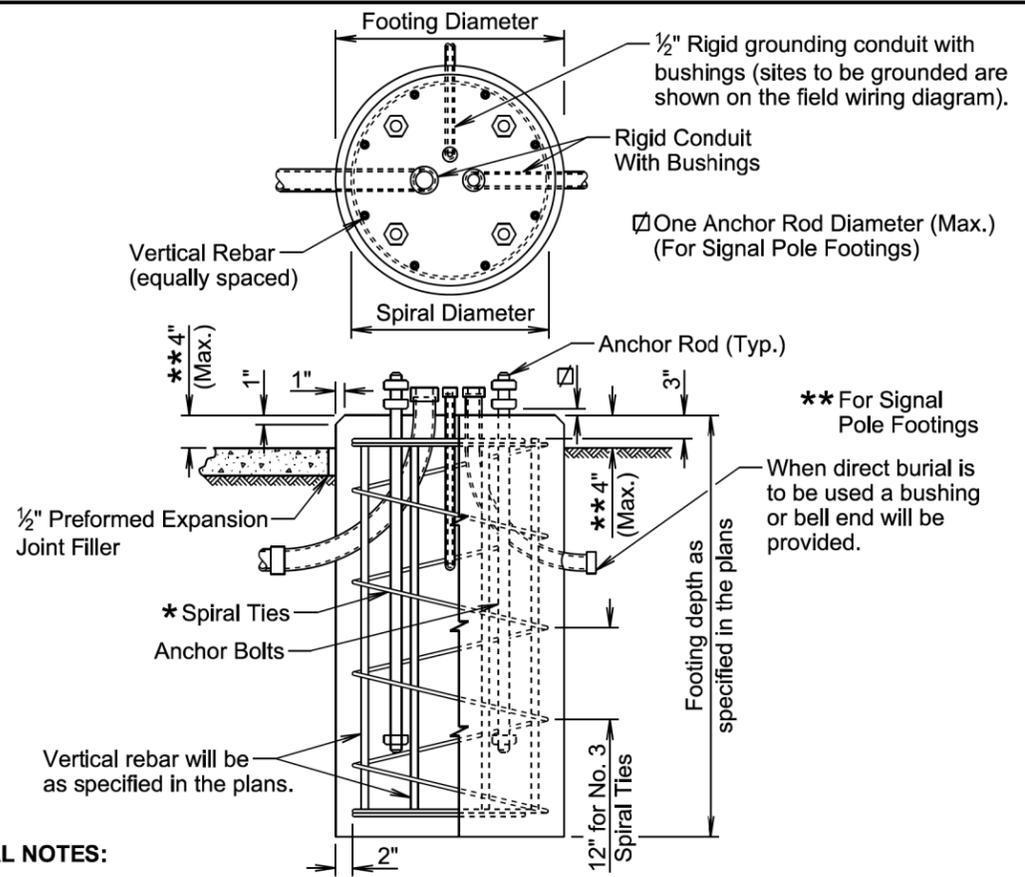
Base details are provided for example only and are not intended to be a complete design.

The Contractor will furnish and install a rodent screen in the signal pole above the transformer base. The rodent screen will be a galvanized steel mesh with a maximum opening size of 1/4 inch. The rodent screen will 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 will be incidental to the contract unit price per each for the corresponding signal pole contract item.

February 14, 2020

<b>Published Date: 2026</b>	<b>S D D O T</b>	<b>TRANSFORMER SIGNAL POLE BASE</b>	PLATE NUMBER <b>635.50</b>
			Sheet 1 of 1



**GENERAL NOTES:**

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

Spiral ties will 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 will not project above the slip plane or fracture plane for breakaway poles.

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

The anchor rods will 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 will be incidental to the footing bid item(s).

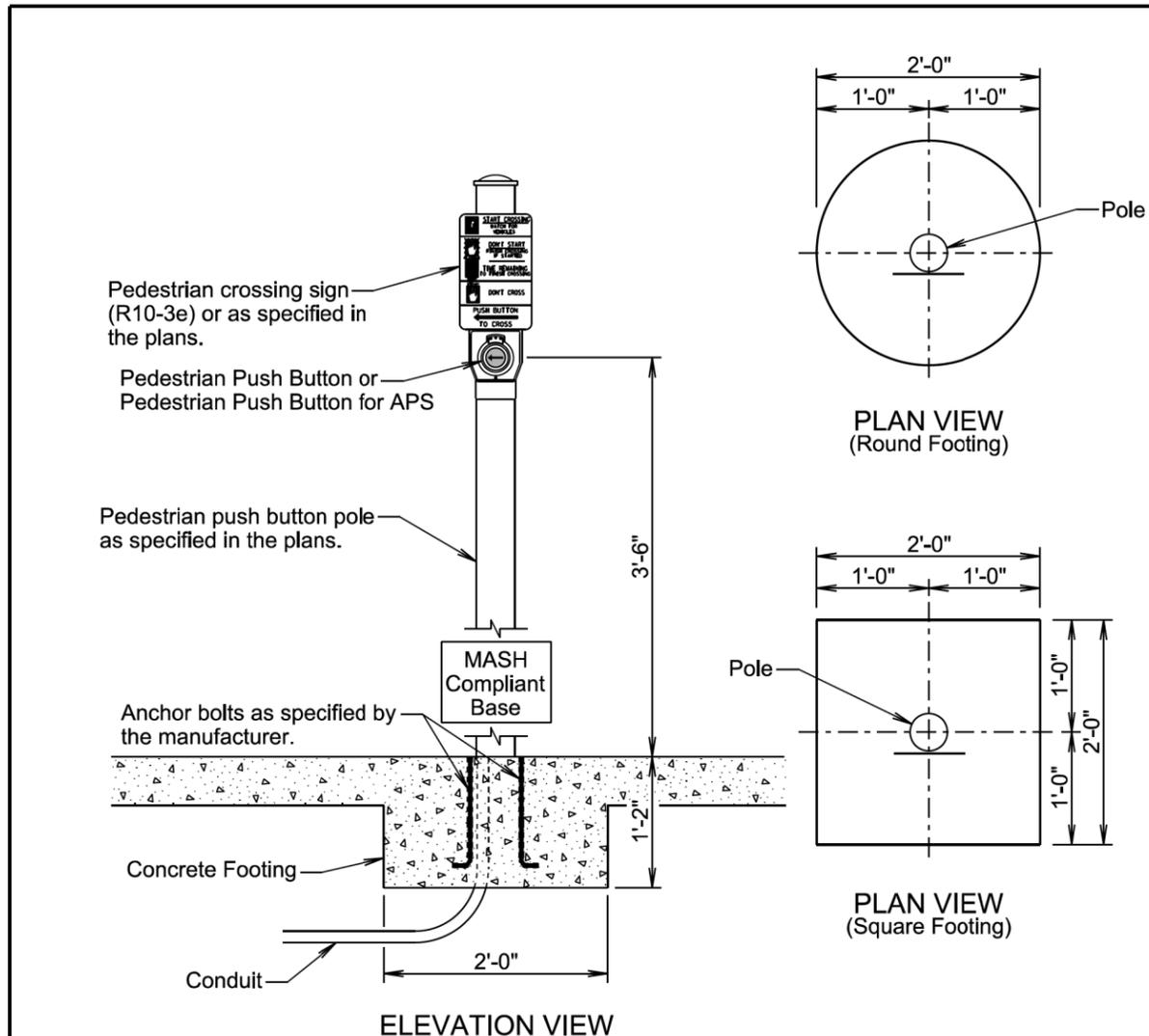
The pole will not be installed until the concrete has attained design strength (4000 psi).

The contour of the area surrounding the breakaway pole will 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.

November 19, 2022

<b>Published Date: 2026</b>	<b>S D D O T</b>	<b>POLE FOOTING</b>	PLATE NUMBER <b>635.55</b>
			Sheet 1 of 1

Plot Scale - 1:200

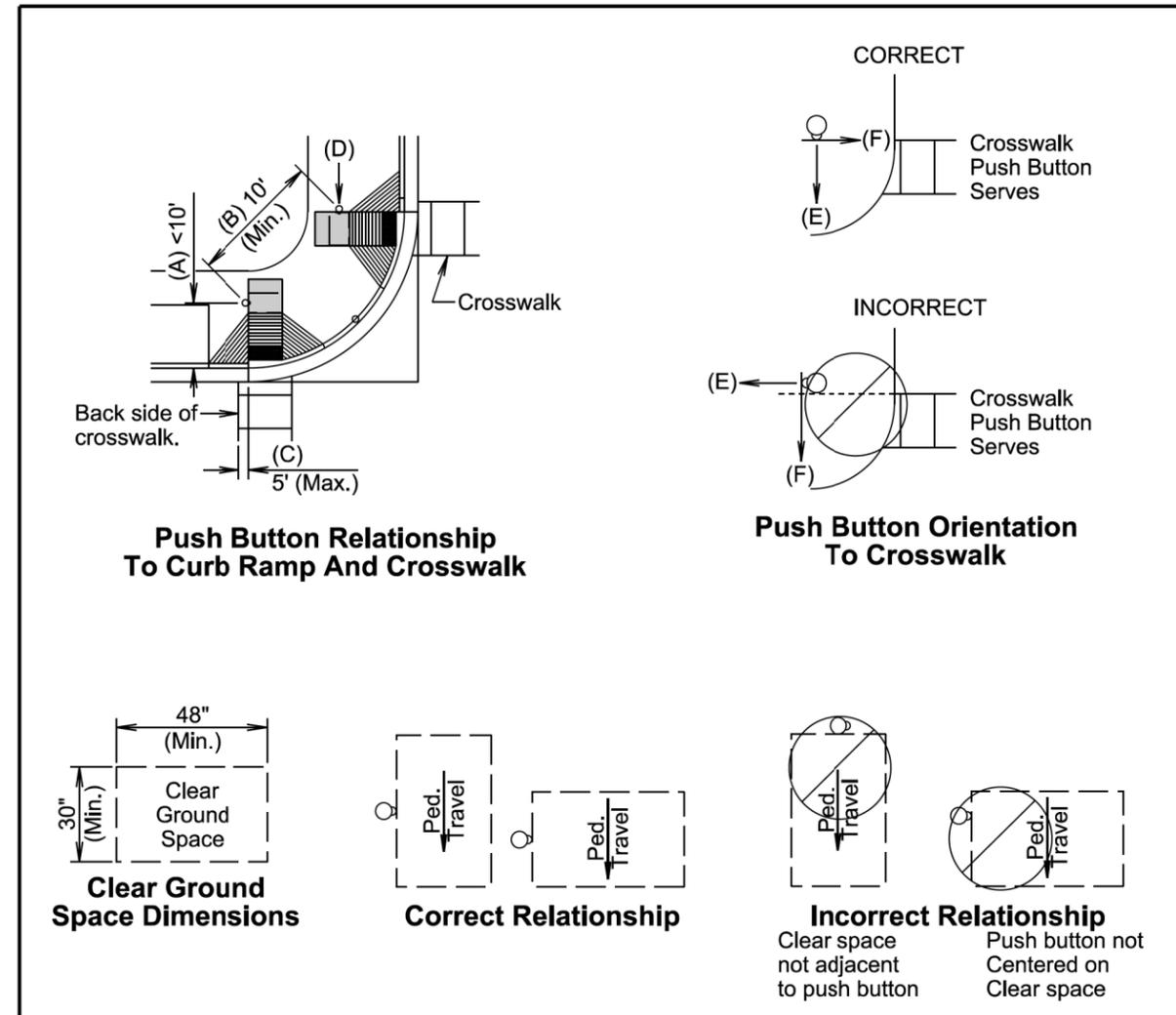


**GENERAL NOTES:**

- The pedestrian push button pole will be as specified in the plans.
- The Contractor will 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 will be class M6 concrete.
- All costs for furnishing and installing the concrete footing will be incidental to the contract unit price per square foot for the corresponding concrete sidewalk bid item.
- All costs for furnishing and installing the pedestrian push button pole including labor, equipment, and materials including the pole, cap, and the conduit in the footing will be incidental to the contract unit price per each for "Pedestrian Push Button Pole".

April 8, 2025

<b>Published Date: 2026</b>	<b>S D D O T</b>	<b>PEDESTRIAN PUSH BUTTON POLE</b>	PLATE NUMBER <b>635.57</b>
			Sheet 1 of 2



**General Notes:**

**Pedestrian Push Buttons Location and Orientation Requirements:**

- (A) Within 10 feet from the front face of curb.
- (B) Where two push buttons are provided, the push buttons should have at least 10 feet of separation from each other.
- (C) If two curb ramps are used, the push button should be within 5 feet of the backside of the crosswalk.
- (D) The push button should be mounted adjacent to a clear ground space (within 10 inches maximum reach). The clear ground space will be a least 30 inches x 48 inches and will slope no more than 2.1% in any direction. The push button will be centered on either side of the clear ground space (either the 30 inch or 48 inch side). The 30 inch x 48 inch clear ground space shouldn't touch the detectable warning panel.
- (E) The push button should face the edge of roadway.
- (F) The push button face should be parallel to the crosswalk being used.

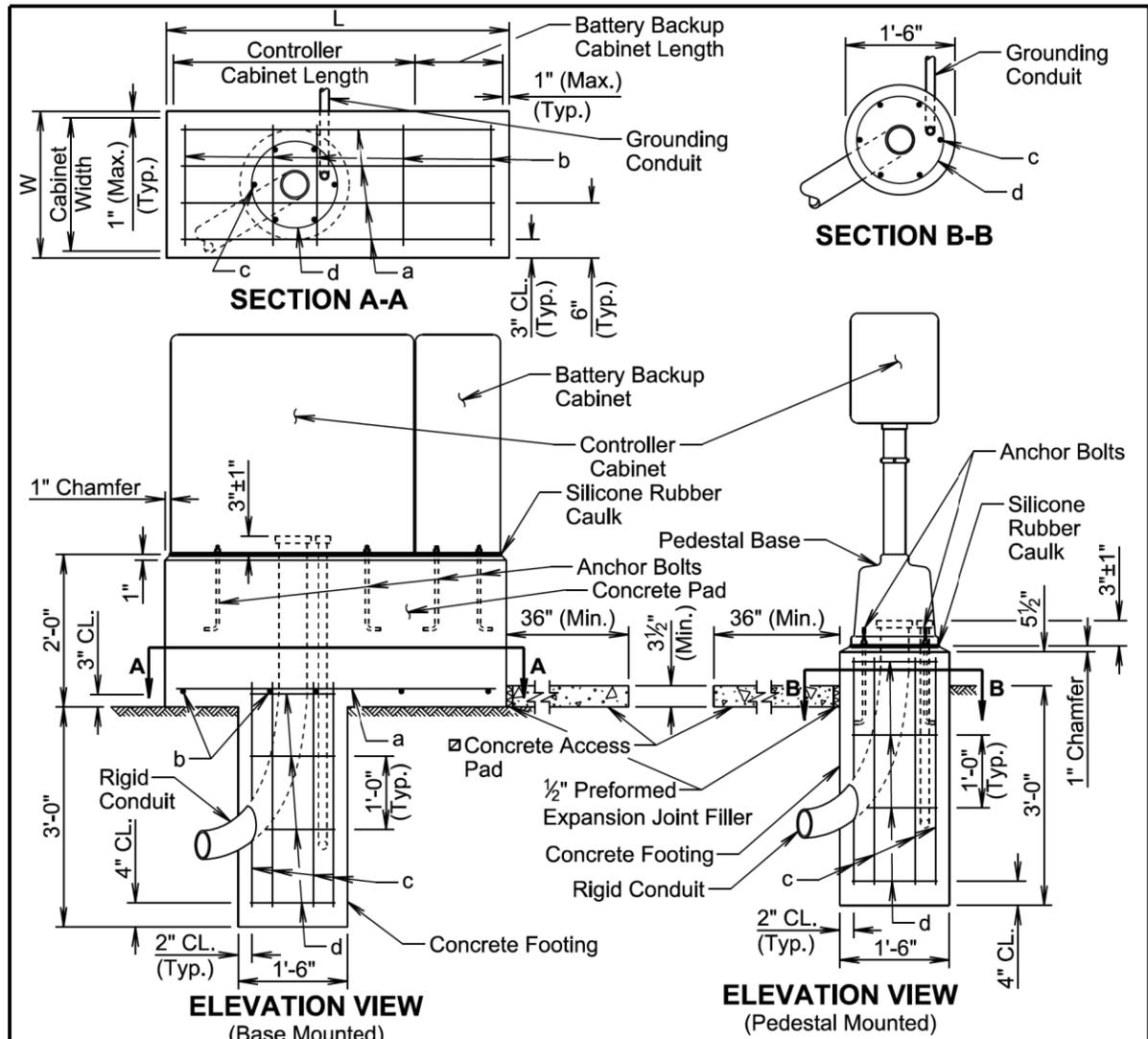
The push button poles will not interfere with the minimum clear width of the Pedestrian Access Route.

April 8, 2025

<b>Published Date: 2026</b>	<b>S D D O T</b>	<b>PEDESTRIAN PUSH BUTTON POLE</b>	PLATE NUMBER <b>635.57</b>
			Sheet 2 of 2

Plotted From - TRPR17199

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**GENERAL NOTES:**

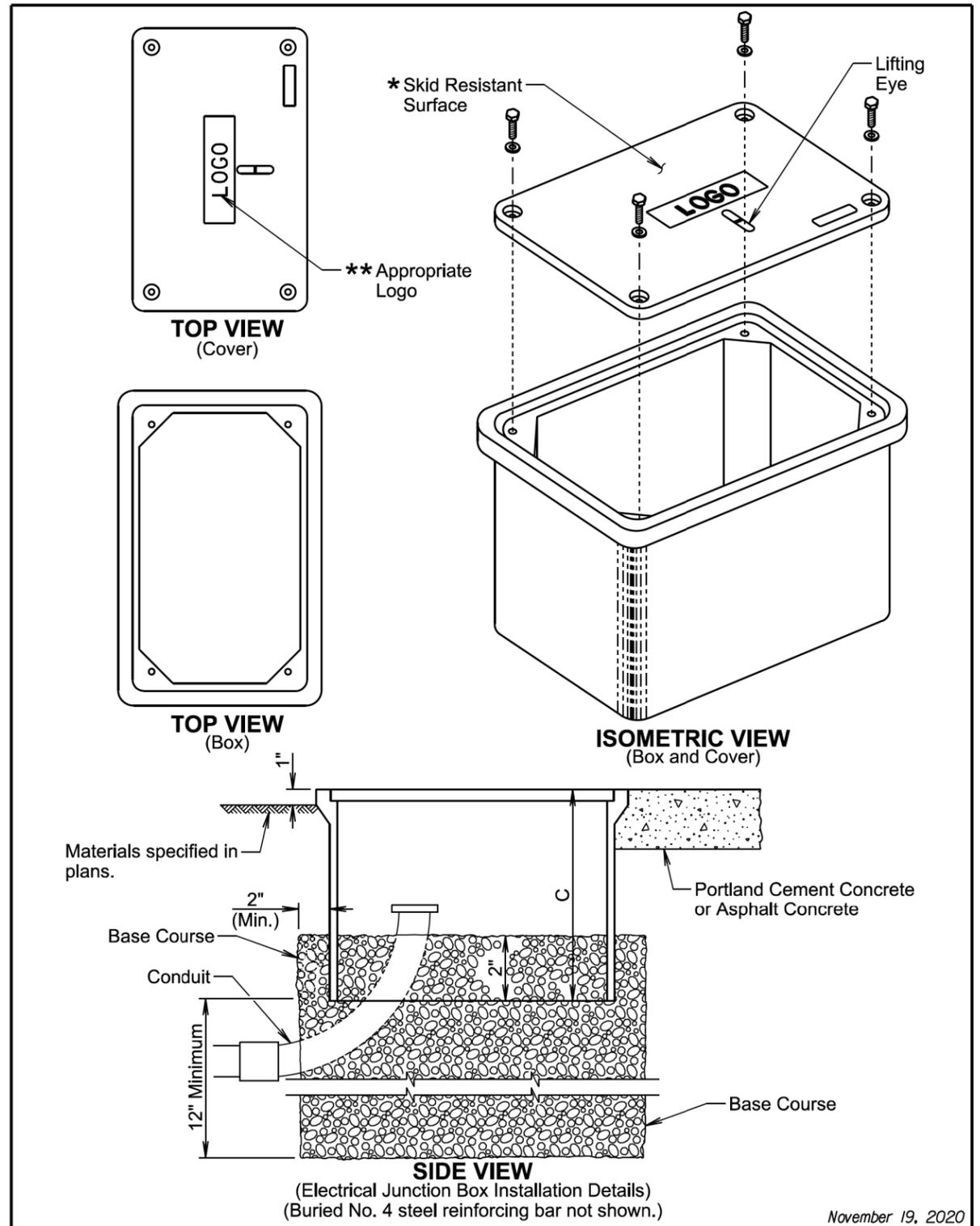
- The concrete pad will conform to the base of the controller and battery backup cabinets to the satisfaction of the Engineer.
- Conduits will be sealed water-tight until the conductor cables are installed.
- ☐ If the controller and battery backup concrete pad and footing is not located within or adjacent to an existing sidewalk, the Contractor will provide a concrete access pad as directed by the Engineer.
- Anchor bolts and related hardware will conform to the controller and battery backup cabinets manufacturer's specifications.
- A continuous bead of silicone rubber caulk will provide a weather-tight seal between the concrete pad or footing, and the cabinet or base.

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.

November 19, 2022

<b>S D D O T</b>	<b>CONTROLLER CABINET AND FOOTING</b>	PLATE NUMBER <b>635.60</b>
	Published Date: 2026	Sheet 1 of 1



November 19, 2020

<b>S D D O T</b>	<b>ELECTRICAL JUNCTION BOXES TYPE 1 THROUGH TYPE 4</b>	PLATE NUMBER <b>635.65</b>
	Published Date: 2026	Sheet 1 of 2

Plot Scale - 1:200

Plotted From - TRPR17199

File - ...apenn05181StdPlateSectionL.dgn

ELECTRICAL JUNCTION BOX			
TYPE	DESCRIPTION	APPROXIMATE COVER SIZE	MINIMUM DEPTH (C)
1	Open Bottom with Gasket	11"x18"	18"
2	Open Bottom with Gasket	13"x24"	18"
3	Open Bottom with Gasket	17"x30"	18"
3A	Open Bottom with Gasket	24"x36"***	24"
4	Open Bottom with Gasket	30"x48"***	24"

**GENERAL NOTES:**

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

The cover will have a lifting eye.

\* The surface of the cover will have a minimum wet and dry coefficient of friction value of 0.5 as determined by ASTM F609.

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

\*\*\* Two piece covers will be used for Type 3A and Type 4 junction boxes.

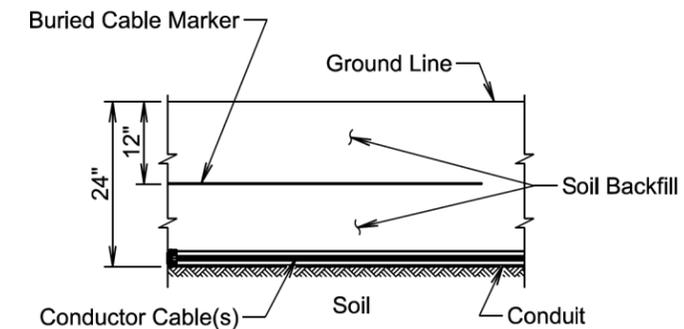
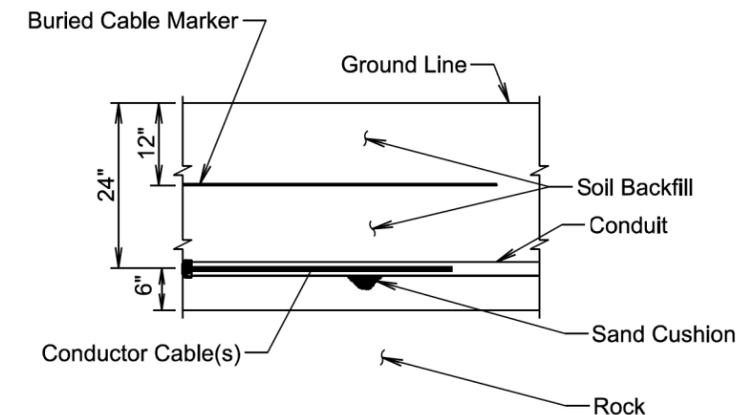
The electrical junction boxes will comply with the American National Standards Institute (ANSI)/Society of Cable Telecommunications Engineers (SCTE) 77 2007 Specification for Underground Enclosure Integrity. The loading requirement for all electrical junction boxes and covers will be Tier 22 of ANSI/SCTE 77 2007.

The electrical junction boxes will be UL listed.

For junction boxes located outside of pavement, a No. 4 steel reinforcing bar with a minimum length of 18" will be buried adjacent to the long side of the junction box. All costs associated with furnishing and placing the steel reinforcing bar will be incidental to the contract unit price per each for "Type \_ Electrical Junction Box".

November 19, 2020

<b>Published Date: 2026</b>	<b>S D D O T</b>	<b>ELECTRICAL JUNCTION BOXES TYPE 1 THROUGH TYPE 4</b>	PLATE NUMBER <b>635.65</b>
			Sheet 2 of 2


**SECTION VIEW**

**SECTION VIEW**
**GENERAL NOTE:**

The Buried Cable Marker will be plastic, approximately 6" wide, and will be capable of sustaining a minimum of a 350% tolerance of elongation without tearing. The Buried Cable Marker will 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 will be printed in a contrasting color on the cable marker. The Buried Cable Marker will be subject to approval by the Engineer. All costs associated with furnishing and installing the Buried Cable Marker will be incidental to the contract unit price per foot for the bid item used for the electrical conductor.

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			Sheet 1 of 1