

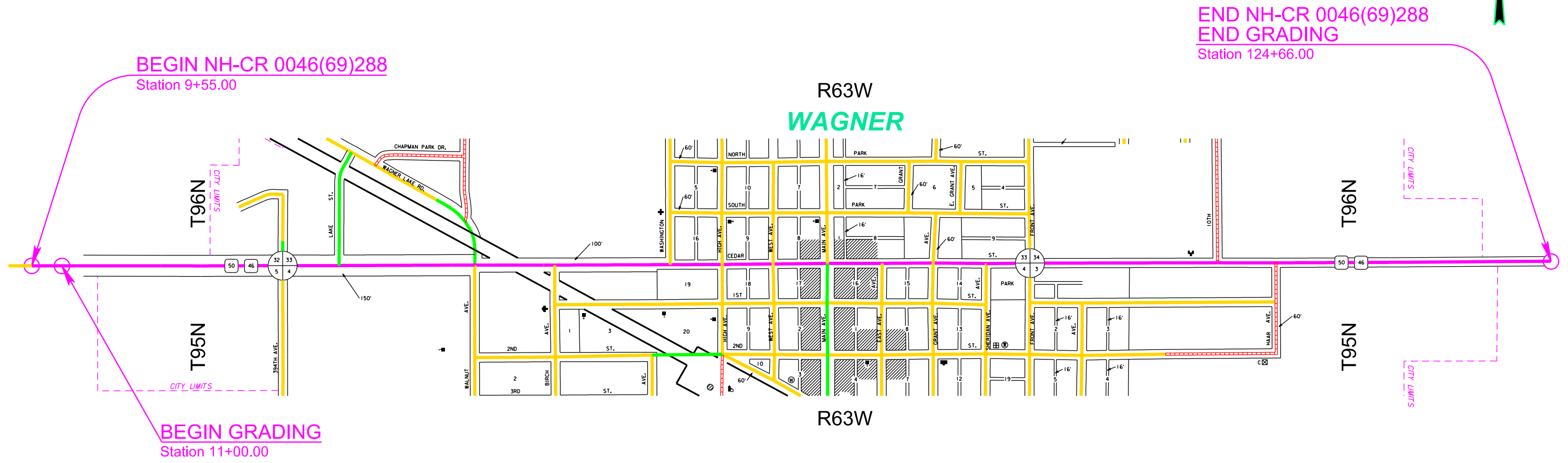
# SECTION L: SIGNAL AND LIGHTING PLANS

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH-CR 0046(69)288	L1	L54

Plotting Date: 10/21/2024

## INDEX OF SHEETS

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**SECTION L ESTIMATE OF QUANTITIES**

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Revised 10/21/2024 - RR

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
110E1510	Remove Luminaire Pole	38	Each
110E1520	Remove Signal Equipment	Lump Sum	LS
110E1530	Remove Signal Pole Footing	4	Each
110E1540	Remove Luminaire Pole Footing	38	Each
110E5110	Salvage Signal Equipment	Lump Sum	LS
635E0040	Breakaway Base Luminaire Pole with Arm, 40' Mounting Height	74	Each
635E2000	Pedestal Signal Pole	4	Each
635E2130	Signal Pole with 30' Mast Arm and Luminaire Arm	1	Each
635E2145	Signal Pole with 45' Mast Arm and Luminaire Arm	3	Each
635E3700	Roadway Luminaire, LED with Photoelectric Cell	78	Each
635E4010	1 Section Vehicle Signal Head	4	Each
635E4030	3 Section Vehicle Signal Head	10	Each
635E4090	4 Section Directional Vehicle Signal Head	4	Each
635E5020	2' Diameter Footing	690.0	Ft
635E5030	3' Diameter Footing	47.0	Ft
635E5301	Type 1 Electrical Junction Box	36	Each
635E5302	Type 2 Electrical Junction Box	3	Each
635E5303	Type 3 Electrical Junction Box	2	Each
635E5400	Electrical Service Cabinet	8	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	12	Each
635E5922	Pedestrian Signal Head with Countdown Timer	8	Each
635E5930	Pedestrian Crossing Sign	8	Each
635E5980	Rectangular Rapid Flashing Beacon System	2	Each
635E8110	1" Rigid Conduit, Schedule 40	100	Ft
635E8120	2" Rigid Conduit, Schedule 40	11,885	Ft
635E8130	3" Rigid Conduit, Schedule 40	20	Ft
635E8140	4" Rigid Conduit, Schedule 40	35	Ft
635E8220	2" Rigid Conduit, Schedule 80	3,295	Ft
635E8230	3" Rigid Conduit, Schedule 80	50	Ft
635E8240	4" Rigid Conduit, Schedule 80	55	Ft
635E9012	1/C #2 AWG Copper Wire	4,675	Ft
635E9013	1/C #3 AWG Copper Wire	2,605	Ft
635E9014	1/C #4 AWG Copper Wire	15,030	Ft
635E9016	1/C #6 AWG Copper Wire	16,945	Ft
635E9018	1/C #8 AWG Copper Wire	13,480	Ft
635E9020	1/C #10 AWG Copper Wire	1,895	Ft
635E9026	3/C #14 AWG Copper Wire	140	Ft
635E9502	2/C #14 AWG Copper Tray Cable, K2	1,680	Ft
635E9504	4/C #14 AWG Copper Tray Cable, K2	380	Ft
635E9505	5/C #14 AWG Copper Tray Cable, K2	700	Ft
635E9506	6/C #14 AWG Copper Tray Cable, K2	340	Ft
635E9525	25/C #14 AWG Copper Tray Cable, K2	750	Ft
635E9710	2/C #10 AWG Copper Pole and Bracket Cable	4,290	Ft

**SUPPLYING AS BUILT PLANS**

If the traffic signal system and roadway lighting systems are 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:

[Joseph.Updike@state.sd.us](mailto:Joseph.Updike@state.sd.us)  
[Stacy.Bartlett@state.sd.us](mailto:Stacy.Bartlett@state.sd.us)

**ON-SITE INSPECTION**

An on-site inspection of the traffic signal will be conducted before acceptance of the project once the traffic signal is 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".

**REMOVE LUMINAIRE POLE FOOTING**

The footings of existing luminaire poles EL1 - EL38 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 luminaire poles will be incidental to the contract unit price per each for "Remove Luminaire Pole Footing".

**REMOVE LUMINAIRE POLE**

The Contractor will contact NorthWestern Energy two weeks prior to removing existing luminaires poles EL1-EL38. Northwestern Energy will remove the LED luminaires from existing luminaire poles EL1-EL38. The contacts for Northwestern Energy are Jareth Watson at (605) 668-4615 and Noah Kimuyukilonzo at (605) 668-4604.

**REMOVE LUMINAIRE POLE (CONTINUED)**

All costs associated with coordinating with NorthWestern Energy for the removal of LED luminaires from existing luminaire poles will be incidental to the contract price per each for "Remove Luminaire Pole".

**SALVAGE SIGNAL EQUIPMENT**

The existing signal equipment identified on the plans will be salvaged and delivered to the City of Wagner by the Contractor. The Contractor will notify the City 5 days before the delivery of the salvaged signal equipment. The City contact is Debbra Houseman at (605) 384-3741. The equipment will be delivered to:

102 5<sup>th</sup> Street SE  
 Wagner, SD 57380

Any equipment damaged during salvaging or delivery will be repaired or replaced by the Contractor at no cost to the State. 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 extensions on B1-B4 will have a 40-foot mounting height with 8-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.

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**PEDESTAL SIGNAL POLES (CONTINUED)**

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.

**LUMINAIRE POLES**

Luminaire poles L1 to L74 will have a mounting height of 40-foot with an 8-foot arm.

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

Luminaire poles will be designed to include loadings created by banners that are 2.5 feet wide by 5 feet long, mounted 15 feet from the top of footing to the bottom of the banner and holiday decorations that are 6 feet wide by 6 feet tall and weigh 45 pounds, mounted 15' from the top of footing to the bottoms of the holiday decoration.

Luminaire poles L1 to L74 will have a convenience duplex festoon outlet receptacle (15-amp, 3 wire) suitable for outdoor use. Festoon will be placed 90° counterclockwise to the pole arm. All cost associated with making the festoon receptacles operational including but not limited to, the necessary hardware and #14 AWG wiring, will be incidental to the contract unit price per each "Breakaway Base Luminaire Pole with Arm, 40' Mounting Height".

**LUMINAIRES**

The lighting design for L1-L6 used the following parameters and provides 1.1 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: 13 Ft.
- Lamp Loss Factor (LLF): 0.8
- Width of Lighted Area: 55 ft.
- Luminaire Cycle Length: 165 Ft.
- Configuration: Staggered
- Mounting Height: 40 Ft.
- Arm Length: 8 Ft.
- Light Source: LED

The lighting design for L7-L30 used the following parameters and provides 1.1 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: 9.5 Ft.
- Lamp Loss Factor (LLF): 0.8
- Width of Lighted Area: 55 Ft.
- Luminaire Cycle Length: 165 Ft.
- Configuration: Staggered
- Mounting Height: 40 Ft.
- Arm Length: 8 Ft.
- Light Source: LED

**LUMINAIRES (CONTINUED)**

The lighting design for L31-L68 used the following parameters and provides 1.1 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: 15.5 Ft.
- Lamp Loss Factor (LLF): 0.8
- Width of Lighted Area: 38 Ft.
- Luminaire Cycle Length: 190 Ft.
- Configuration: Staggered
- Mounting Height: 40 Ft.
- Arm Length: 8 Ft.
- Light Source: LED

The lighting design for L69-L72 used the following parameters and provides 1.1 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: 13 Ft.
- Lamp Loss Factor (LLF): 0.8
- Width of Lighted Area: 38 Ft.
- Luminaire Cycle Length: 190 Ft.
- Configuration: Staggered
- Mounting Height: 40 Ft.
- Arm Length: 8 Ft.
- Light Source: LED

The lighting design for L73-L74 used the following parameters and provides 1.1 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: 5 Ft.
- Lamp Loss Factor (LLF): 0.8
- Width of Lighted Area: 40 Ft.
- Luminaire Cycle Length: 165 Ft.
- Configuration: One Sided
- Mounting Height: 40 Ft.
- Arm Length: 8 Ft.
- Light Source: LED

The following LED luminaires meet the requirements for this design:

- a.) Cooper - Streetworks: VERD-M-CA3-170-740-U-T3-AP-PR7-0A/RA1016
- b.) American Electric Lighting: ATB0-P453-MVOLT-R3-4K-P7-PCLL

**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

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**SIGNAL BACKPLATES (CONTINUED)**

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", and "4 Section Directional Vehicle Signal Head".

**TABLE OF FOOTING DATA**

Site Designation	Footing Diameter	* Footing Depth	**Spiral Diameter	**Spiral Length	Vertical Reinforcement
A1-A2, C1-C2	2' - 0"	6' - 0"	1' - 8"	44' - 3"	8-#7 x 5' - 6"
L1-L74	2' - 0"	9' - 0"	1' - 8"	60' - 0"	8-#7 x 8' - 6"
B4	3' - 0"	11' - 0"	2' - 8"	112' - 6"	14-#8 x 10' - 6"
B1-B3	3' - 0"	12' - 0"	2' - 8"	120' - 9"	14-#8 x 11' - 6"

- \* Footing depth will be below ground level.
- \*\* The size of all spirals will be #3.

**SUBSURFACE**

Subsurface conditions along the length of the corridor consist of brown to gray silt clay. Borings drilled in September 2019 indicate that the typical groundwater level is 14.5' below ground level or deeper; however, shallower water tables were encountered at the following locations: 29+50 (6.5 ft); 38+60 (7.4 ft); and 54+00 (8.0 ft).

Concrete placement operations should closely follow excavation procedures. The longer the excavations are left open, the more likely that caving will occur.

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. If caving is not an issue but water is present, it will be removed prior to concrete placement, or the concrete will be tremied.

**ELECTRICAL SERVICE CABINET WITH SECONDARY DISCONNECT**

The electrical service cabinet for the SD-46 / Main St traffic signal, Meter B, 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.

### METER SOCKETS FOR TRAFFIC SIGNAL

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

### TRAFFIC SIGNAL CONTROLLER

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

Controllers and flashers are not required to have dimming capability.

Anchor bolts for the traffic signal cabinets 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 a cabinet with concrete pad and footing for housing the battery backup system for the SD-46 / Main St traffic signal. The cabinet will be an aluminum NEMA 3R type. The cabinet will have a thermostatically controlled 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."

### 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>

### VIDEO DETECTION SYSTEM (CONTINUED)

#### NoTraffic Detection System

Currex Vision AI-Vision GPU Server  
(must use cameras from one of the above listed systems or approved equal)

NoTraffic  
720 Main St.  
Suite 12  
Kansas City, MO 64105  
[www.notraffic.tech](http://www.notraffic.tech)

Currux Vision LLC  
520 Post Oak Blvd.  
Suite 260  
Houston TX 77027  
[www.currux.vision](http://www.currux.vision)

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 MUTCD Sections 4E.08 to 4E.13. 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.

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.

### PEDESTRIAN PUSH BUTTON POLE (CONTINUED)

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.

### RECTANGULAR RAPID FLASHING BEACON SYSTEM

A Rectangular Rapid Flashing Beacon (RRFB) system will be in conformance with the current MUTCD and will consist of the following components:

- Individual RRFB displays as shown in the plans.
- Accessible Pedestrian Signal push buttons as shown in the plans.
- W11-2 (pedestrian crossing) signs as shown in the plans.
- W16-7P (diagonal arrow) plaques as shown in the plans.
- R10-25 (push button) signs as shown in the plans.
- All necessary electronic programming and flash units, hardware, and wiring to make the system operational.

One RRFB system is necessary for each pedestrian crossing location shown in the plans.

The programmed flash time will be 38 seconds.

A small light directed at and visible to pedestrians in the crosswalk will be installed integral to the RRFB or push button, to give confirmation that each beacon is in operation.

All enclosures will be aluminum and comply with the requirements for NEMA 3R type.

All materials and installation costs necessary for the operation of each system will be incidental to the contract unit price per each for "Rectangular Rapid Flashing Beacon System".

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### **ELECTRICAL SERVICE**

The Contractor will coordinate with NorthWestern Energy to have the existing lighting and signal system de-energized prior to removal.

The Contractor will coordinate with NorthWestern Energy to activate the new electric services two weeks prior to needing the power.

The contacts for Northwestern Energy are Jareth Watson at (605) 668-4615 and Noah Kimuyukilonzo at (605) 668-4604. All costs associated with coordinating with NorthWestern Energy, removing and disposing of the existing electric services, and activating the new electric services, will be incidental to the contract lump sum price for "Electrical Service Cabinet".

### **WIRE SPLICING FOR LIGHTING**

All wire splices for lighting will be made using TE Connectivity GTAP connectors, NSI Industries Polaris Blue connectors, or an approved equal.

### **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.

### **EVP CONFIRMATION LIGHT**

The EVP confirmation light will be installed facing the intersection associated with the corresponding microphone. The confirmation light will be mounted as close to the last head on the mast arm as possible.

Electrical cable from the confirmation light to the controller cabinet will be a 16AWG (minimum) 2-conductor cable that meets the Specifications.

### **YELLOW BEACONS**

Yellow beacons will be installed above and below the proposed "SCHOOL SPEED LIMIT 15 WHEN FLASHING" signs. See Section S for the School Speed Limit Reduction Installation drawing. The Contractor will make all necessary connections to make the flashing beacon system operational.

# CONDUIT AND CABLE QUANTITIES

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Location to Location	Rigid Conduit							Copper Wire						Copper Tray Cable, K2 #14 AWG						Preemption Cable		Pole and Bracket Cable	
	Schedule 40				Schedule 80			1/C #8 AWG	1/C #6 AWG	1/C #4 AWG	1/C #3 AWG	1/C #2 AWG	1/C #10 AWG	25/C #14 AWG	3/C #14 AWG	5/C #14 AWG	2/C #14 AWG	6/C #14 AWG	4/C #14 AWG	Not A Bid Item	2/C #10 AWG		
	1"	2"	3"	4"	2"	3"	4"	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft			
<b>Lighting</b>																							
L1	JL1	165'																					
JL1	L3	165'																					
L3	JL2	165'																					
JL2	L5	170'																					
L5	JL3	155'																					
L6	JL3				80'																		
Meter	JL3	45'																					
JL3	L7	165'																					
L7	JL4	170'																					
JL4	L9	150'																					
L9	JL5	165'																					
JL5	L11	165'																					
L11	L12	170'			70'																		
L13	JL7				75'																		
JL7	L14	170'																					
L14	JL8	105'																					
JL8	L16	165'																					
L16	JL9	155'																					
JL9	JL17 - YF1 & YF2	60'			125'																		
JL9	METER 2	40'																					
METER 2	JL9	40'																					
JL9	L18	175'																					
L18	JL10	205'																					
JL10	L20	125'																					
L20	JL11	175'																					
JL11	L21																						
L21	L73	165'																					
L73	L74	165'																					
L26	YF3 & YF4																						
L23	L24	175'																					
L24	L25	165'																					
L25	L26	170'																					
L26	L27	165'																					
L27	L28	165'																					
L28	L29	85'																					
L29	L30	165'																					
L30	JL13	125'																					
JL13	METER 3	15'																					
METER 3	JL13	15'																					
JL13	L32	110'			60'																		
L32	L33	135'																					
L33	L34	105'			40'																		
L34	L35	175'																					
L36	L37	65'			95'																		
L37	JL16	115'																					
JL16	JL17	35'																					
JL17	METER 4	35'																					
JL17	JL18	395'			55'																		
JL18	L40	130'			60'																		
L40	JL19	135'			40'																		
<b>Subtotal:</b>		6,275'			700'																		

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# CONDUIT AND CABLE QUANTITIES

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Location to Location	Rigid Conduit							Copper Wire						Copper Tray Cable, K2						Preemption Cable		Pole and Bracket Cable	
	Schedule 40				Schedule 80			1/C	1/C	1/C	1/C	1/C	1/C	25/C	3/C	5/C	2/C	6/C	4/C	Not		2/C	
	1"	2"	3"	4"	2"	3"	4"	#8	#6	#4	#3	#2	#10	#14	#14	#14	#14	#14	#14	A Bid		#10	
Ft	Ft	Ft	Ft	Ft	Ft	Ft	AWG	AWG	AWG	AWG	AWG	AWG	AWG	AWG	AWG	AWG	AWG	AWG	Item		AWG		
L35																						55'	
L36																						55'	
L37																						55'	
L38																						55'	
L39																						55'	
L40																						55'	
L41																						55'	
L42																						55'	
L43																						55'	
L44																						55'	
L45																						55'	
L46																						55'	
L47																						55'	
L48																						55'	
L49																						55'	
L50																						55'	
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L65																						55'	
L66																						55'	
L67																						55'	
L68																						55'	
L69																						55'	
L70																						55'	
L71																						55'	
L72																						55'	
L73																						55'	
L74																						55'	
Subtotal:																						2,200'	

Plotted From - TRPR17199

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# CONDUIT AND CABLE QUANTITIES

STATE OF SOUTH DAKOTA	PROJECT NH-CR 0046(69)288	SHEET L10	TOTAL SHEETS L54
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Plotting Date: 10/21/2024

Plot Scale - 1:200

Location to Location	Rigid Conduit							Copper Wire						Copper Tray Cable, K2 #14 AWG						Preemption Cable		Pole and Bracket Cable													
	Schedule 40				Schedule 80			1/C #8	1/C #6	1/C #4	1/C #3	1/C #2	1/C #10	25/C #14	3/C #14	5/C #14	2/C #14	6/C #14	4/C #14	Not A Bid Item	2/C #10														
	1"	2"	3"	4"	2"	3"	4"	AWG	AWG	AWG	AWG	AWG	AWG	AWG	AWG	AWG	AWG	AWG	AWG	AWG	AWG														
SIGNAL AT SD46 AND MAIN ST																																			
METER B	JB5							155'																											
JB5	JB4							1,085'	960'																										
JB4	PB8							10'						25'																					
JB4	PB7							10'						25'																					
JB4	B4							15'						65'						20'		75'													
JB4	CONTROL							10'						80'	35'	85'						45'		165'		125'									
JB4	JB3							25'						55'						280'						190'		495'		250'					
JB3	PB6							10'						20'																					
JB3	PB5							15'						20'																					
JB3	B3							10'						35'						15'						15'		80'							
JB3	JB2							20'						50'						250'						165'		290'		165'					
JB2	B2							20'						65'						25'						25'		85'							
JB2	PB4							10'						35'																					
JB2	PB3							15'						20'																					
JB2	JB1							60'						50'						375'						125'						125'		125'	
JB1	PB1							10'						35'																					
PB1	PB2							10'						15'																					
JB1	B1							20'						95'						35'						35'		35'		95'					
Signal Poles																																			
Signal Pole	B1													35'						70'		90'		65'		55'									
Signal Pole	B2													35'						20'		80'		40'		55'									
Signal Pole	B3													35'						70'		85'		65'		55'									
Signal Pole	B4													35'						20'		65'		45'		55'									
Ped Pushbutton	PB1																			5'															
Ped Push Button	PB2																			5'															
Ped Pushbutton	PB3																			5'															
Ped Push Button	PB4																			5'															
Ped Pushbutton	PB5																			5'															
Ped Push Button	PB6																			5'															
Ped Pushbutton	PB7																			5'															
Ped Push Button	PB8																			5'															
<b>Subtotal:</b>																																			
65'	295'	20'	35'	65'	50'	55'	2,330'	1,150'				750'	140'	700'	1,325'	380'	1,215'	220'																	

Plotted From - TRPR17199

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# EXISTING SIGNAL LAYOUT

## SD HWY 46 & MAIN ST

STATE OF SOUTH DAKOTA	PROJECT NH-CR 0046(69)288	SHEET L12	TOTAL SHEETS L54
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Plotting Date: 10/21/2024

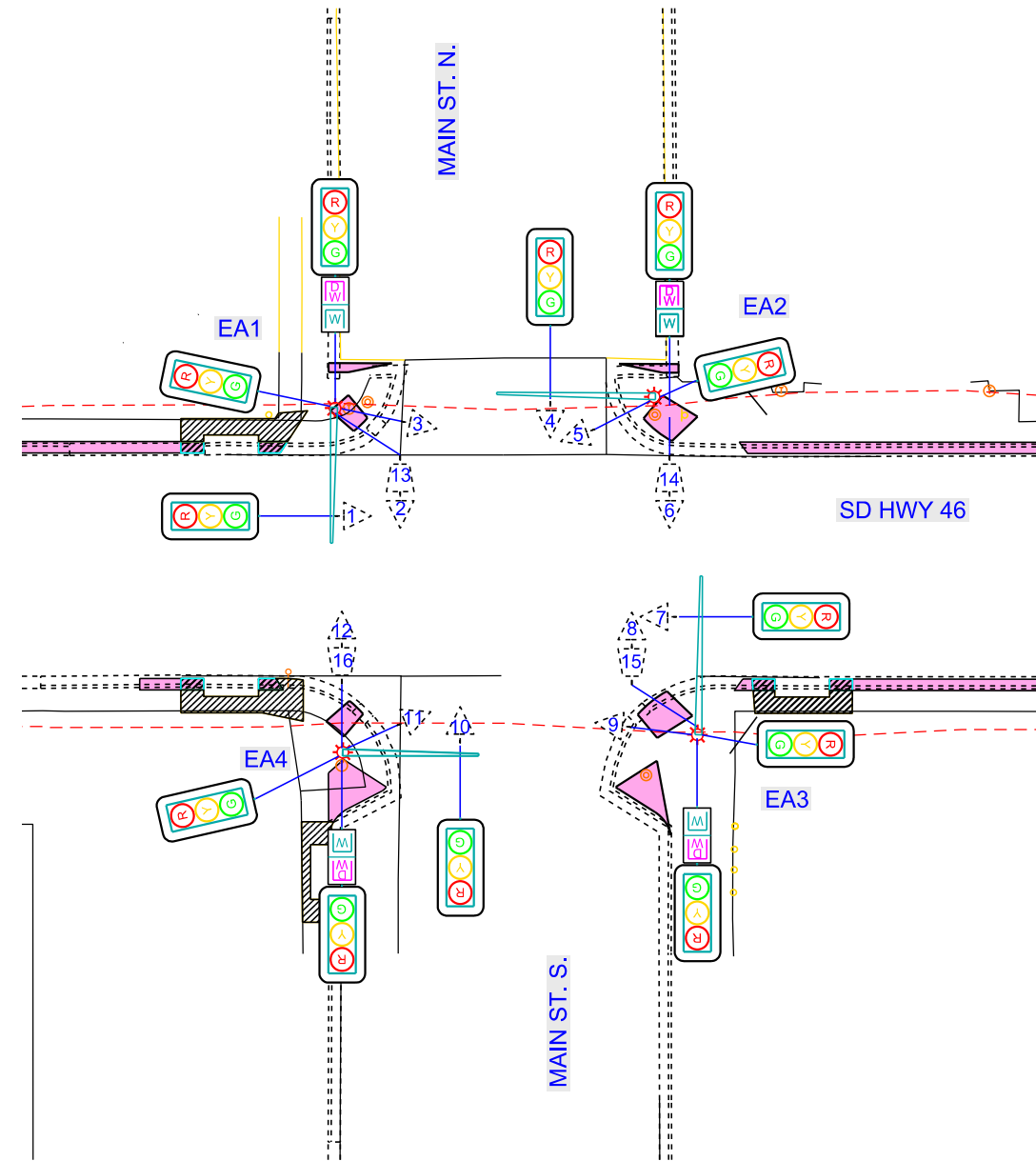


ESTIMATE OF QUANTITIES			
KEY	ITEM	EST QUANT	UNIT
	Remove Signal Pole Footing (EA1-EA4)	4	EACH
	Remove Signal Equipment	LUMP SUM	LS
	Salvage Signal Equipment	LUMP SUM	LS

EXISTING SIGNAL EQUIPMENT	
KEY	ITEM
	Signal Pole Footing (EA1-EA4)
	Signal Pole w/ Mast Arm (EA1-EA4)
	3 Section Signal Pole Heads (1-12)
	Pedestrian Signal Head (13-16)
	Pedestrian Push Button
	Pedestrian Crossing Sign R10-4a (Left 2 / Right - 2)

SALVAGE SIGNAL EQUIPMENT	
KEY	ITEM
	Signal Pole w/ Mast Arm (EA1-EA4)
	3 Section Signal Pole Heads (1-12)
	Pedestrian Signal Head (13-16)

REMOVE SIGNAL EQUIPMENT	
KEY	ITEM
	Pedestrian Push Button
	Pedestrian Crossing Sign R10-4a (Left 2 / Right 2)



Plot Scale - 1:40

Plotted From - TRPR17199

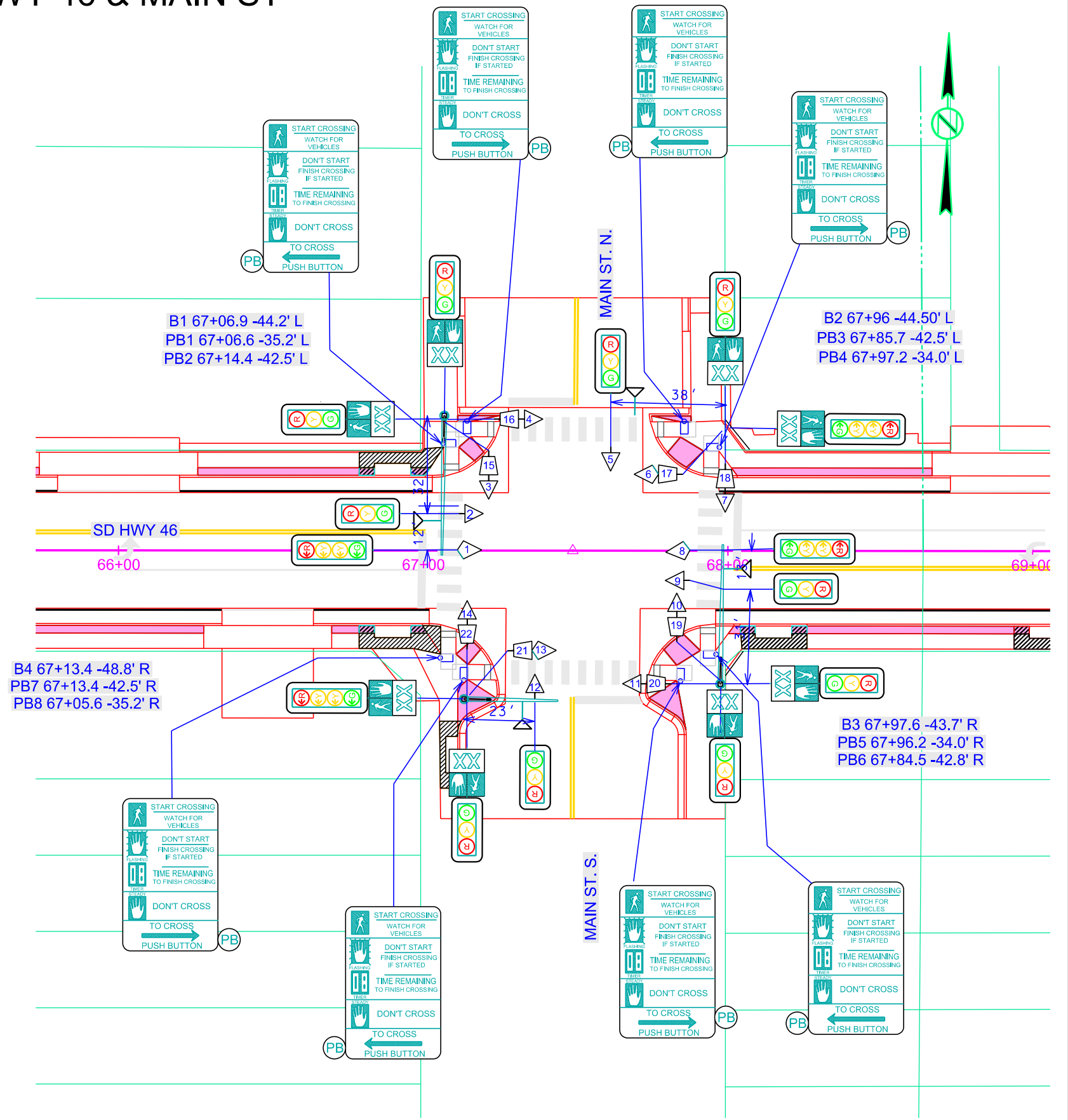
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# SIGNAL LAYOUT SD HWY 46 & MAIN ST

STATE OF SOUTH DAKOTA	PROJECT NH-CR 0046(69)288	SHEET L13	TOTAL SHEETS L54
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Plotting Date: 10/21/2024

ESTIMATE OF QUANTITIES			
KEY	ITEM	EST QUANT	UNIT
	Signal Pole w/45' Mast Arm & 8' Lumin Arm (B1, B2, B3)	3	EACH
	Signal Pole w/30' Mast Arm & 8' Lumin Arm (B4)	1	EACH
	Roadway Luminaire, LED with P.E. (B1-B4)	4	EACH
	4 Section Directional Vehicle Signal Head (1, 6, 8, 13)	4	EACH
	3 Section Vehicle Signal Head (2-5, 7, 9-12, 14)	10	EACH
	Accessible Pedestrian Signal	8	EACH
	Pedestrian Push Button Pole (PB1-PB8)	8	EACH
	Pedestrian Signal Head w/Countdown Timer (15-22)	8	EACH
	Siren Emergency Vehicle Preemption System	1	EACH
	Pedestrian Crossing Sign R10-3e (Left - 4 /Right - 4)	8	EACH



Plot Scale - 1:40










Plotted From - TRPR17199

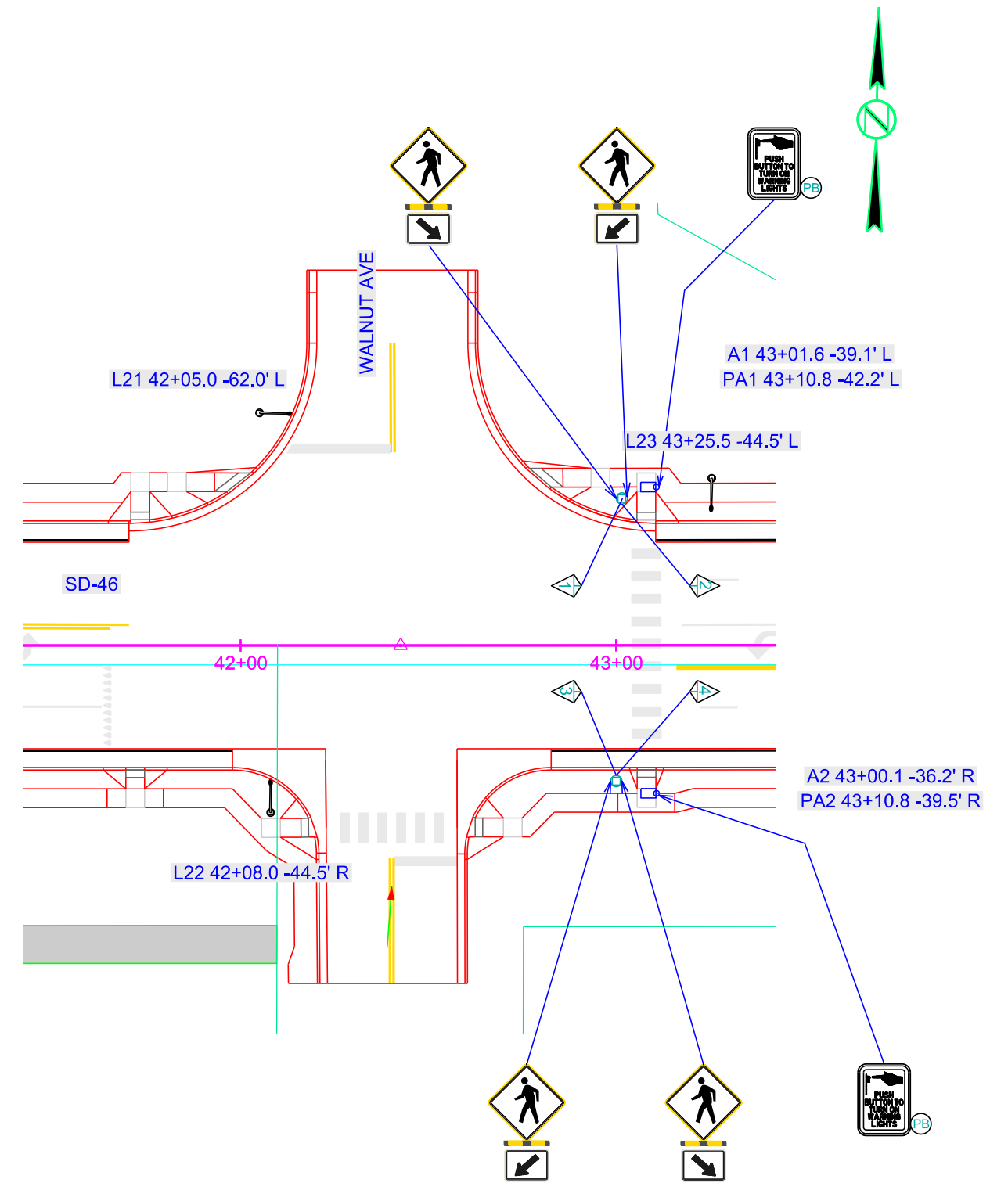
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# SIGNAL LAYOUT SD HWY 46 & WALNUT AVE

STATE OF SOUTH DAKOTA	PROJECT NH-CR 0046(69)288	SHEET L14	TOTAL SHEETS L54
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Plotting Date: 10/21/2024

ESTIMATE OF QUANTITIES			
KEY	ITEM	EST QUANT	UNIT
	Rectangular Rapid Flashing Beacon (RRFB) System	1	EACH
	Pedestal Signal Pole (A1, A2)	2	EACH
	2' Diameter Footing (A1, A2)	12	FT
	Pedestrian Crossing Sign for RRFB (Left - 2 / Right - 2) W11-2 (Incidental to RRFB System)	4	EACH
	Pedestrian Directional Signal Sign (Left - 2 / Right - 2) W16-7pL (Incidental to RRFB System)	4	EACH
	Flashing Beacon (Incidental to RRFB System) (1-4)	4	EACH
	Accessible Pedestrian Signal (Incidental to RRFB System)	2	EACH
	Pedestrian Push Button Pole (PA1-PA2)	2	EACH
	Pedestrian Crossing Sign R10-25 (Left - 1 / Right - 1 ) (Incidental to RRFB System)	2	EACH



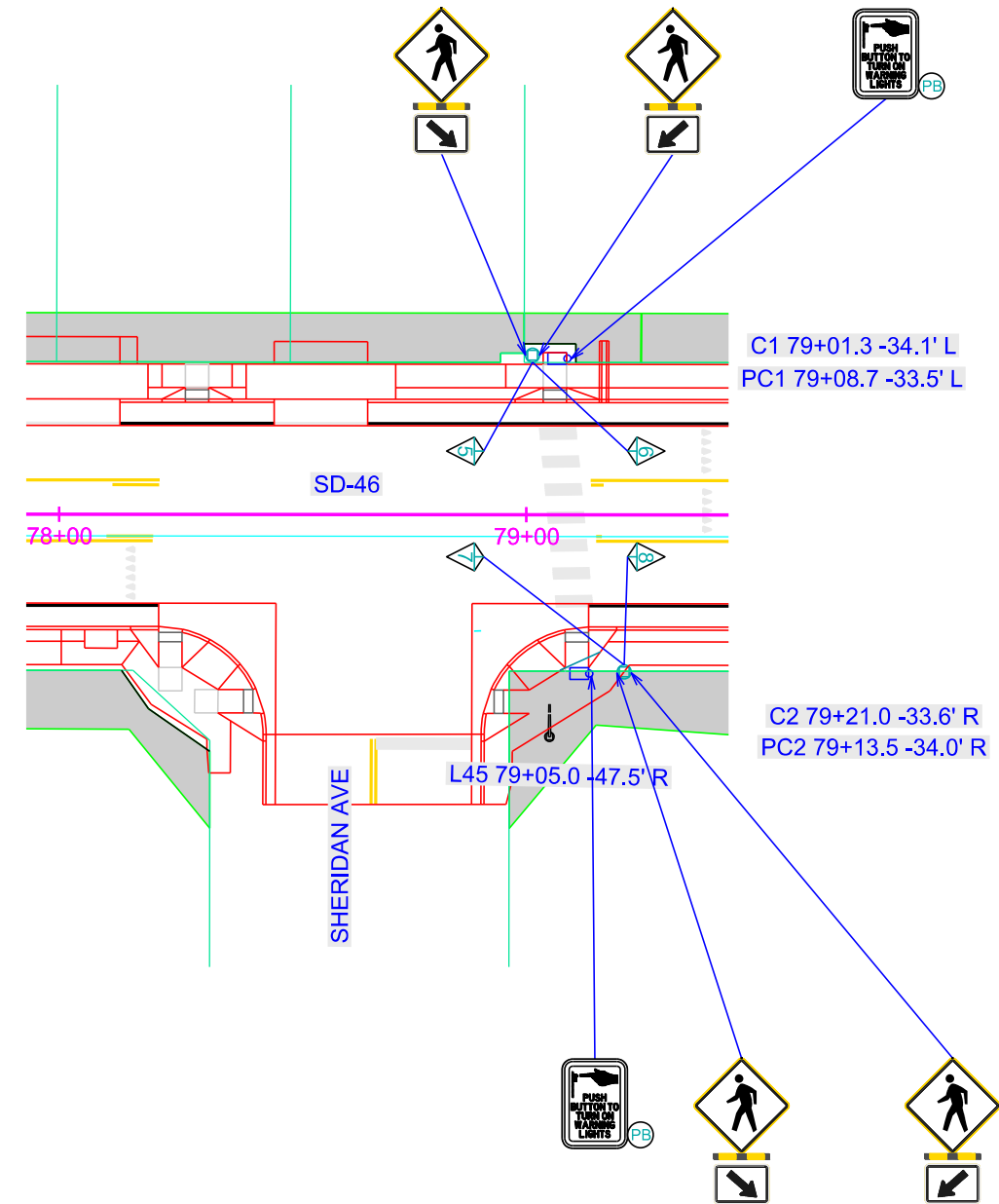
# SIGNAL LAYOUT SD HWY 46 & SHERIDAN AVE

STATE OF SOUTH DAKOTA	PROJECT NH-CR 0046(69)288	SHEET L15	TOTAL SHEETS L54
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Plotting Date: 10/21/2024



ESTIMATE OF QUANTITIES			
KEY	ITEM	EST QUANT	UNIT
	Rectangular Rapid Flashing Beacon (RRFB) System	1	EACH
	Pedestal Signal Pole (C1, C2)	2	EACH
	2' Diameter Footing (C1, C2)	12	FT
	Pedestrian Crossing Sign for RRFB (Left - 2 / Right - 2) W11-2 (Incidental to RRFB System)	4	EACH
	Pedestrian Directional Signal Sign (Left - 2 / Right - 2) W16-7pL (Incidental to RRFB System)	4	EACH
	Flashing Beacon (Incidental to RRFB System) (5-8)	4	EACH
	Accessible Pedestrian Signal (Incidental to RRFB System)	2	EACH
	Pedestrian Push Button Pole (PC1-PC2)	2	EACH
	Pedestrian Crossing Sign R10-25 (Left - 1 / Right - 1 ) (Incidental to RRFB System)	2	EACH



Plot Scale - 1:40

Plotted From - TRPR17199

Plotted From -

File - Untitled1.dwg

# CONDUIT LAYOUT SD HWY 46

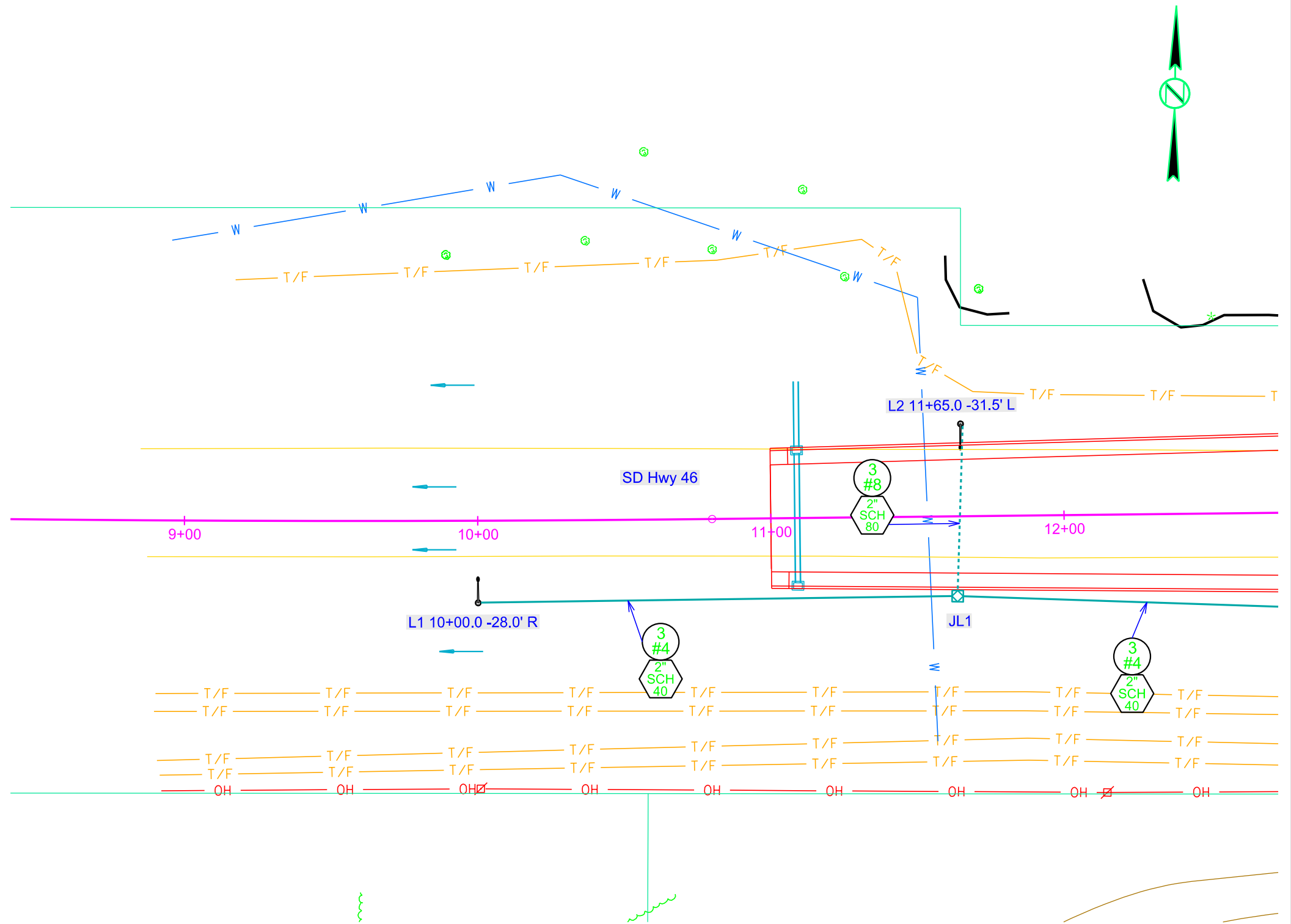
STATE OF SOUTH DAKOTA	PROJECT NH-CR 0046(69)288	SHEET L16	TOTAL SHEETS L54
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Revised 10/21/2024 - RR



## ESTIMATE OF QUANTITIES

KEY	ITEM	EST QUANT	UNIT
	Remove Luminaire Pole (EL1-EL38)	38	EACH
	Remove Luminaire Pole Footing (EL1-EL38)	38	EACH
	Breakaway Base Luminaire Pole w/8' Arm 40' Mounting Height (L1-L74)	74	EACH
	Roadway Luminaire, LED with P.E. (L1-L74)	74	EACH
	2' Diameter Luminaire Pole Footing (L1-L74)	666	FT
	Type 1 Electrical Junction Box (JL1-JL16, JL18-JL32)	31	EACH
	Type 3 Electrical Junction Box (JL17)	1	EACH
	Electrical Service Cabinet	6	EACH
	Galvanized Steel Utility Pole (Not a Bid Item)	6	EACH
	Meter Socket (Not a Bid Item)	6	EACH
	2" Rigid Conduit, Schedule 40	11,130	FT
	2" Rigid Conduit, Schedule 80	3,100	FT
	1/C #2 AWG Copper Wire	4,675	FT
	1/C #3 AWG Copper Wire	2,605	FT
	1/C #4 AWG Copper Wire	15,030	FT
	1/C #6 AWG Copper Wire	15,795	FT
	1/C #8 AWG Copper Wire	11,150	FT
	1/C #10 AWG Copper Wire	1,895	FT
	2/C #10 AWG Copper Pole & Bracket Cable	4,290	FT
	1 Section Vehicle Signal Head (YF1-YF4)	4	EACH



Plot Scale - 1"=40'

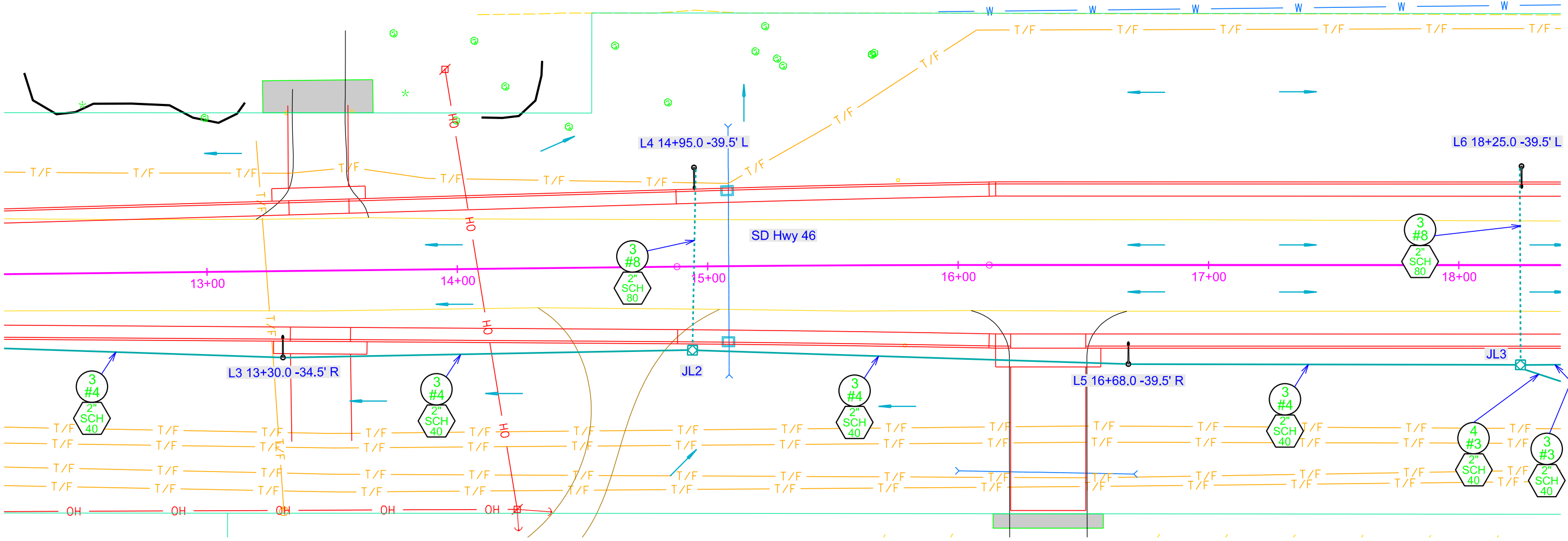
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# CONDUIT LAYOUT SD HWY 46

STATE OF SOUTH DAKOTA	PROJECT NH-CR 0046(69)288	SHEET L17	TOTAL SHEETS L54
Plotting Date: 10/21/2024			



Plot Scale - 1"=40'

Plotted From - TRPR17199

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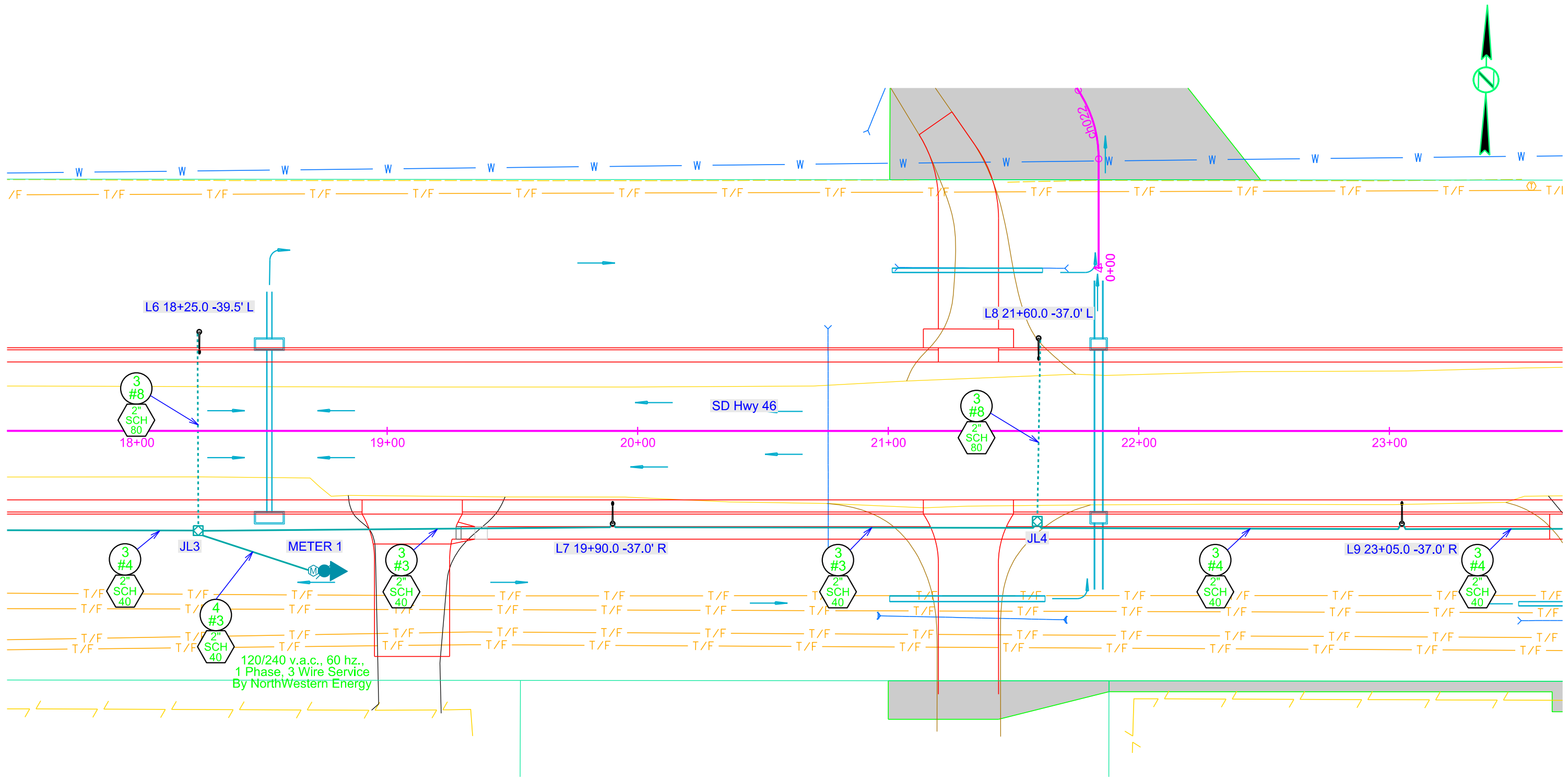
# CONDUIT LAYOUT SD HWY 46

STATE OF SOUTH DAKOTA	PROJECT NH-CR 0046(69)288	SHEET L18	TOTAL SHEETS L54
Plotting Date: 10/21/2024			

Plot Scale - 1"=40'

Plotted From - TRPR17199

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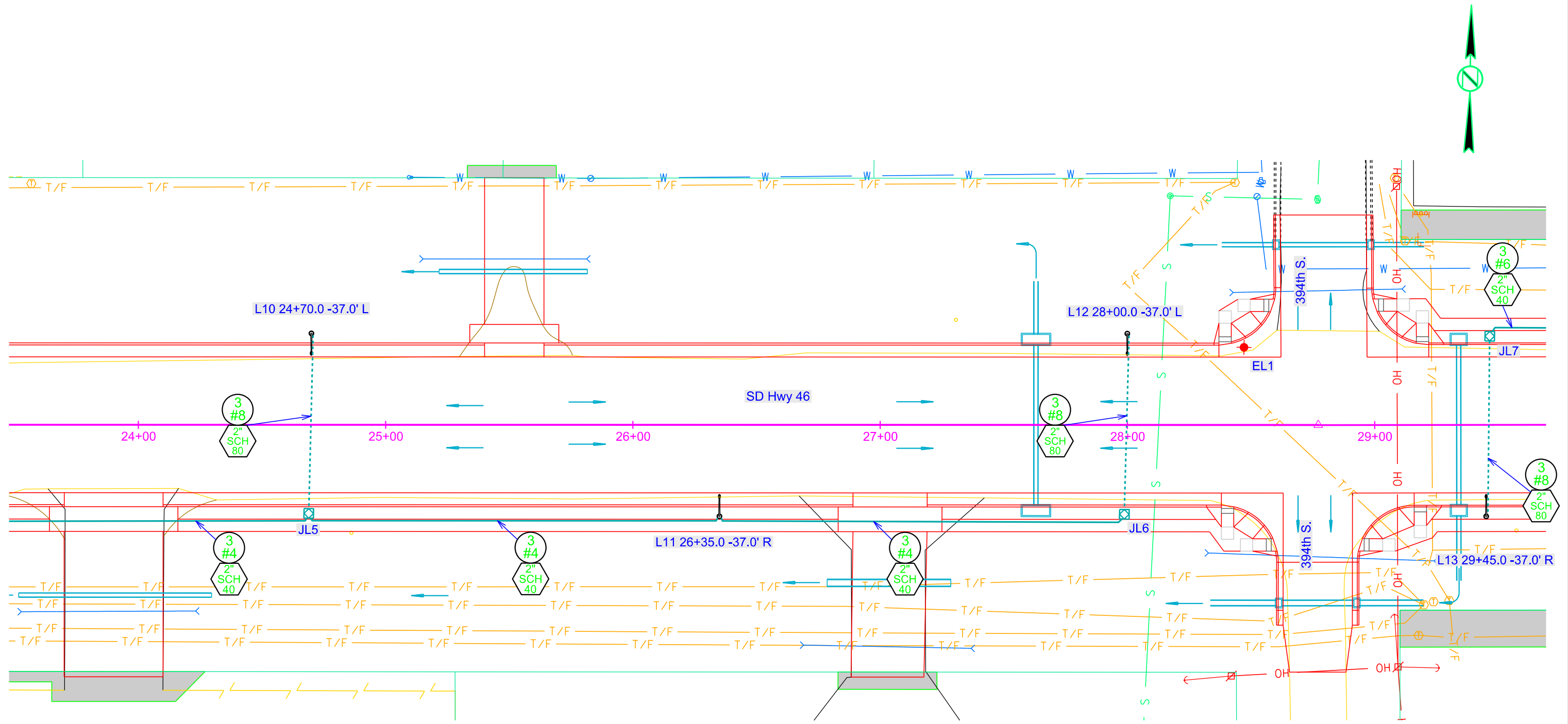
# CONDUIT LAYOUT SD HWY 46

STATE OF SOUTH DAKOTA	PROJECT NH-CR 0046(69)288	SHEET L19	TOTAL SHEETS L54
Plotting Date: 10/21/2024			

Plot Scale - 1"=40'

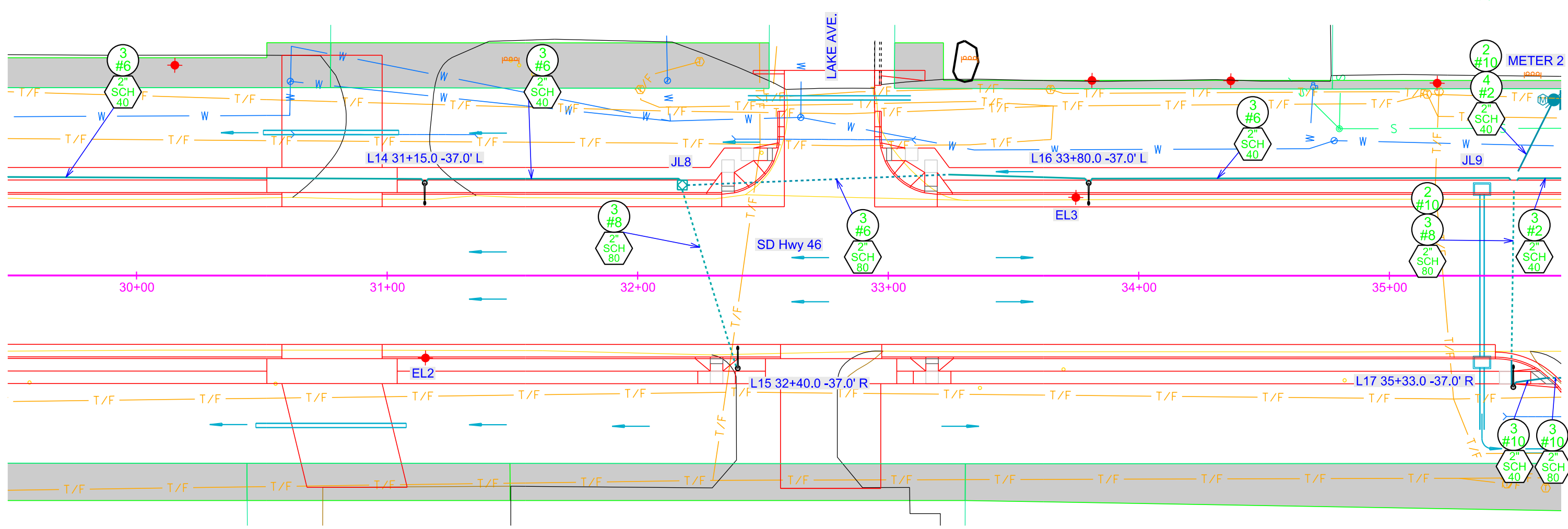
Plotted From - TRPR17199

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# CONDUIT LAYOUT SD HWY 46

STATE OF SOUTH DAKOTA	PROJECT NH-CR 0046(69)288	SHEET L20	TOTAL SHEETS L54
Plotting Date: 10/21/2024			



Plot Scale - 1"=40'

Plotted From - TRPR17199

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# CONDUIT LAYOUT SD HWY 46

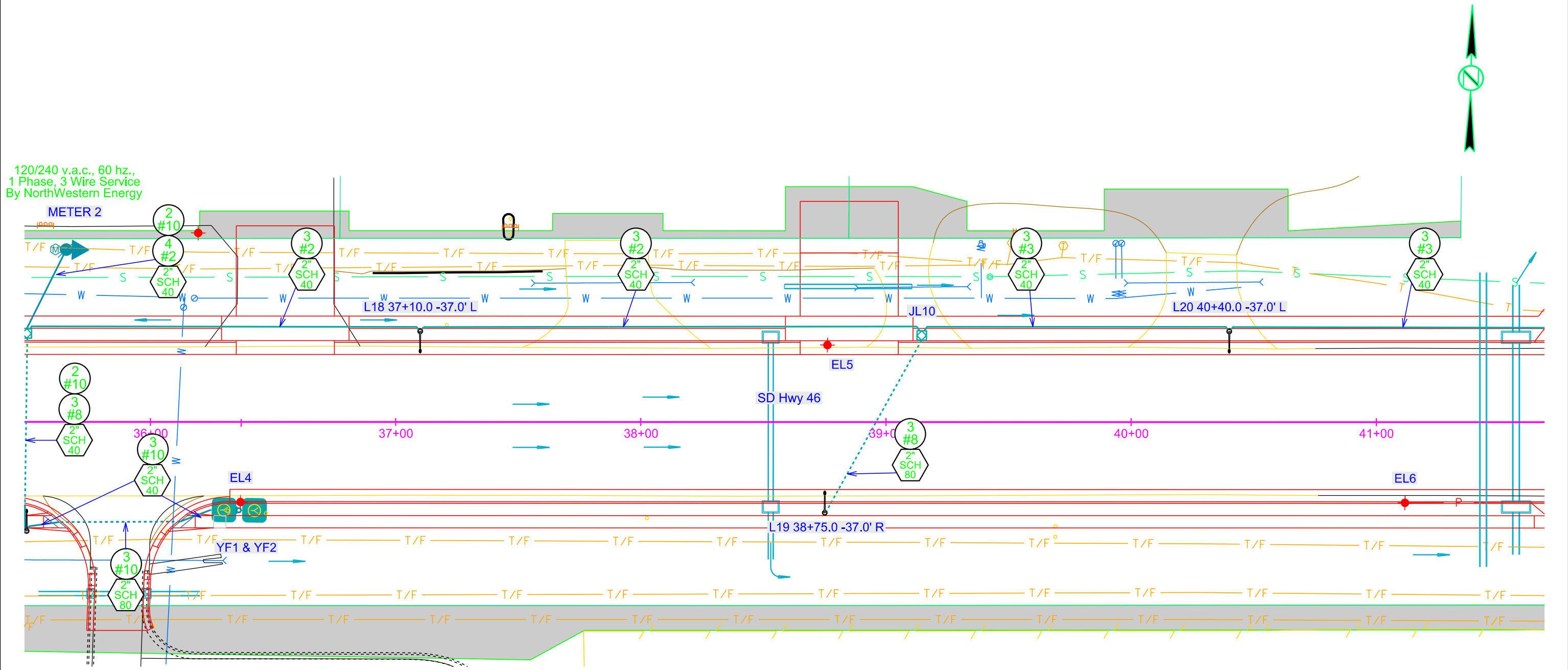
STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH-CR 0046(69)288	L21	L54

Plotting Date: 10/21/2024

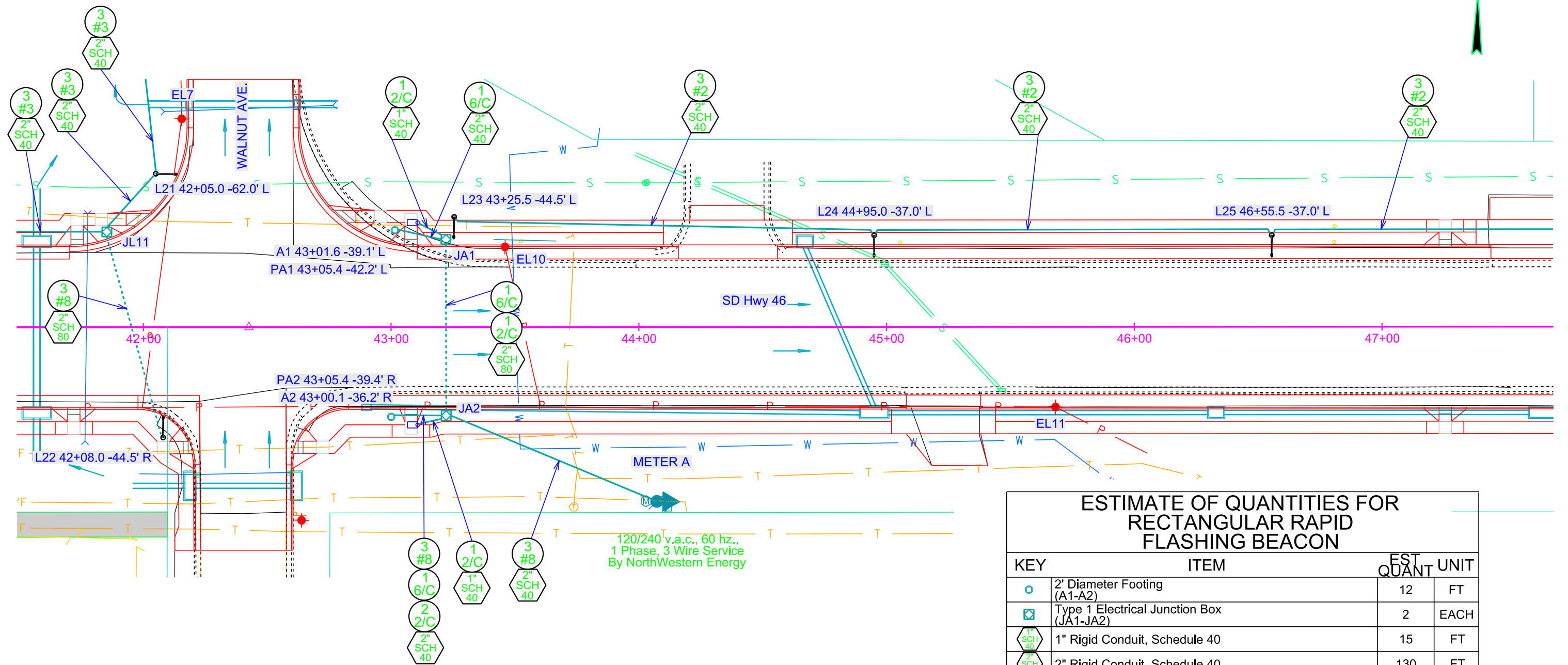
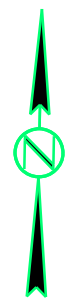
Plot Scale - 1"=40'

Plotted From - TRPR17199

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# CONDUIT LAYOUT SD HWY 46



Note: RRFB Controller to be mounted on sign pole A2.

ESTIMATE OF QUANTITIES FOR RECTANGULAR RAPID FLASHING BEACON			
KEY	ITEM	EST QUANT	UNIT
○	2' Diameter Footing (A1-A2)	12	FT
☒	Type 1 Electrical Junction Box (JA1-JA2)	2	EACH
⬡ 1" SCH 40	1" Rigid Conduit, Schedule 40	15	FT
⬡ 2" SCH 40	2" Rigid Conduit, Schedule 40	130	FT
⬡ 2" SCH 80	2" Rigid Conduit, Schedule 80	70	FT
○ 2/C	2/C #14 AWG Copper Tray Cable, K2	200	FT
○ 6/C	6/C #14 AWG Copper Tray Cable, K2	150	FT
▲	Electrical Service Cabinet	1	EACH
⊗	Galvanized Steel Utility Pole (Not a Bid Item)	1	EACH
Ⓜ	Meter Socket (Not a Bid Item)	1	EACH

Plot Scale - 1"=40'

Plotted From - TRPR17199

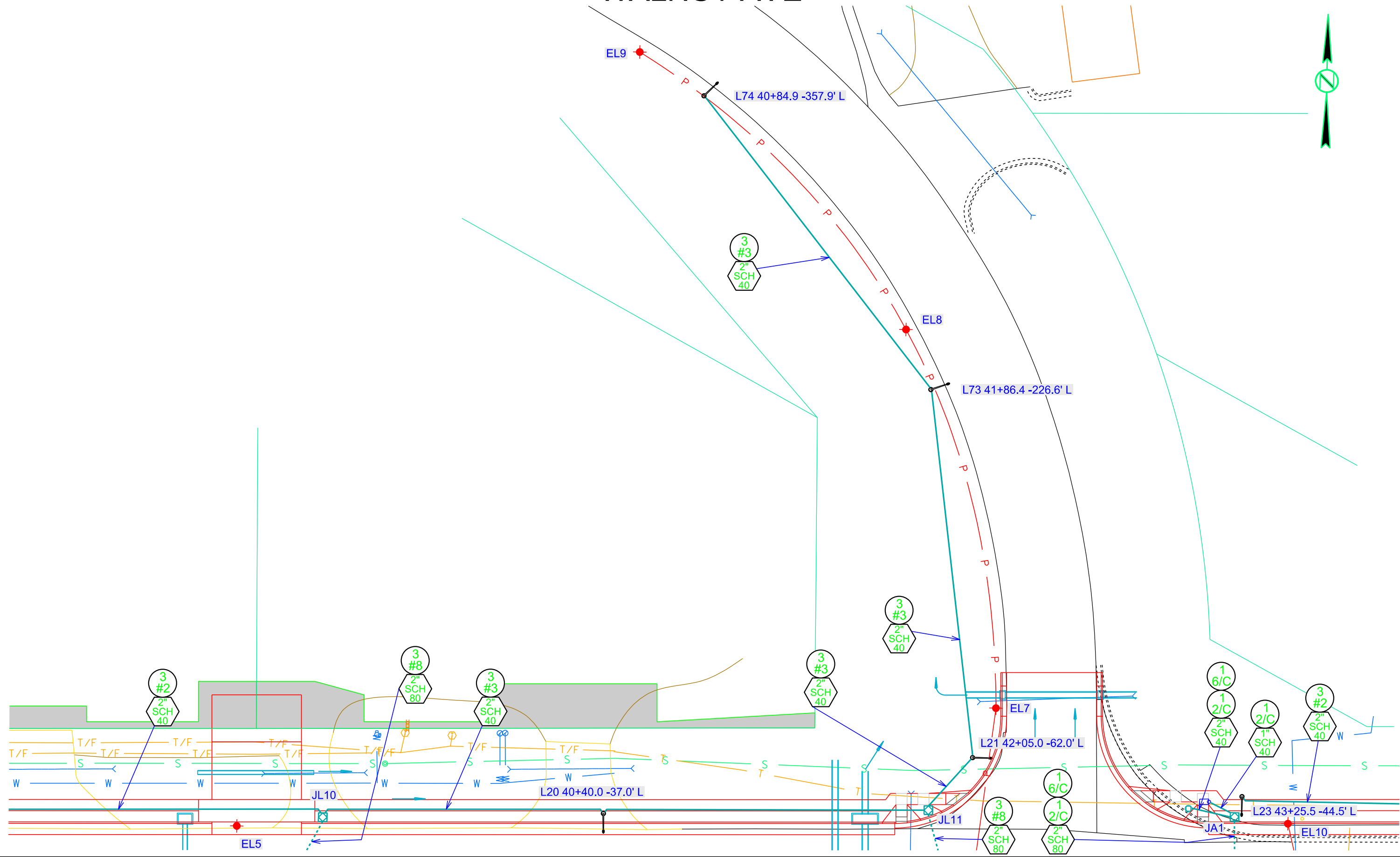
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# CONDUIT LAYOUT WALNUT AVE

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH-CR 0046(69)288	L23	L54
Plotting Date: 10/21/2024			



Plotted From: TRPR317199 Plot Scale: 1"=40'



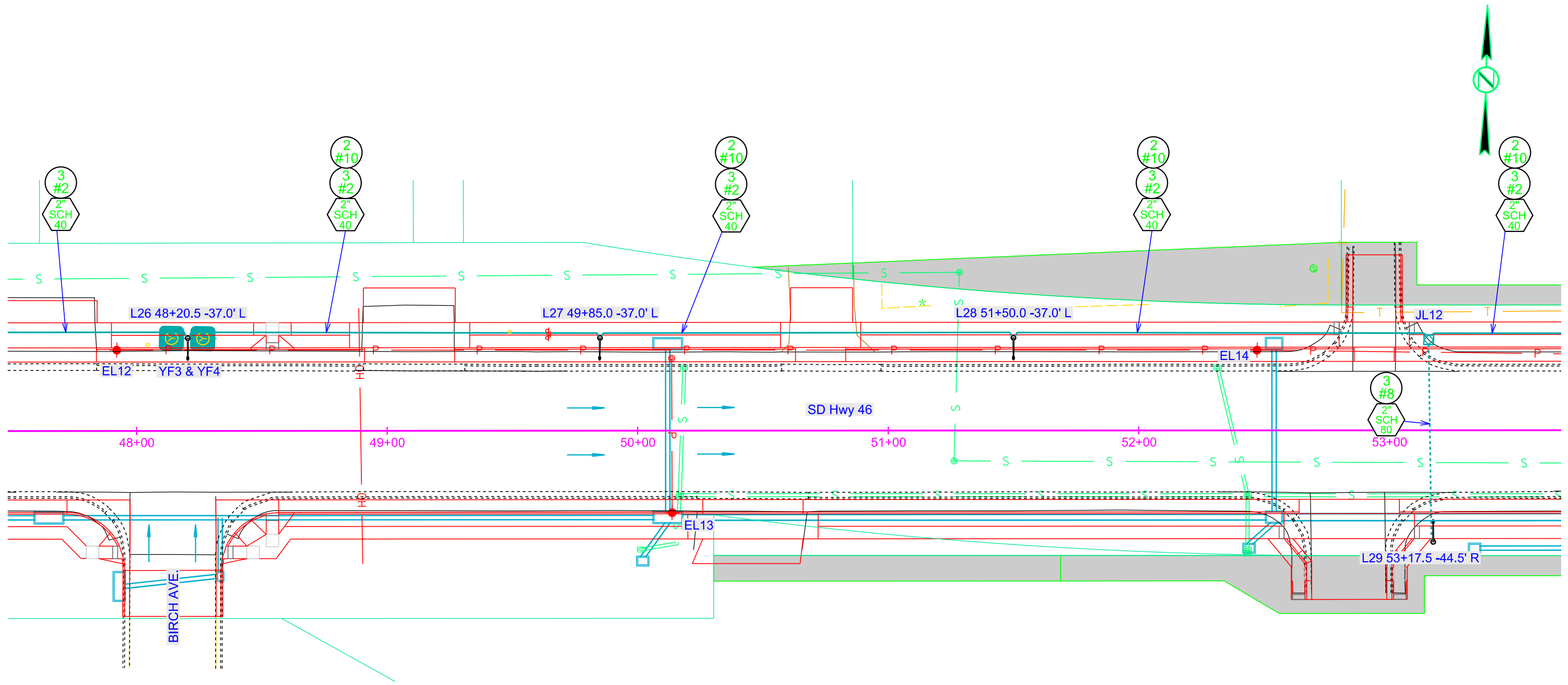
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# CONDUIT LAYOUT SD HWY 46

STATE OF SOUTH DAKOTA	PROJECT NH-CR 0046(69)288	SHEET L24	TOTAL SHEETS L54
Plotting Date: 10/21/2024			

Plot Scale - 1"=40'

Plotted From - TRPR17199



File - U:\trp\jtemix05\10\48c.dgn



# CONDUIT LAYOUT SD HWY 46

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH-CR 0046(69)288	L25	L54
Plotting Date: 10/21/2024			



120/240 v.a.c., 60 hz.,  
1 Phase, 3 Wire Service  
By NorthWestern Energy

WASHINGTON AVE.

METER 3

2 #10  
4 #2  
2" SCH 40

3 #6  
2" SCH 40

3 #6  
2" SCH 40

3 #6  
2" SCH 40

3 #8  
2" SCH 80

L30 54+80.0 -37.0' L

L32 57+70.0 -33.5' L

L33 59+00.0 -33.5' L

L31 56+15.5 -44.5' R

SD Hwy 46, 2' L

54+00

55+00

56+00

57+00

58+00

59+00

EL15

EL16

JL13

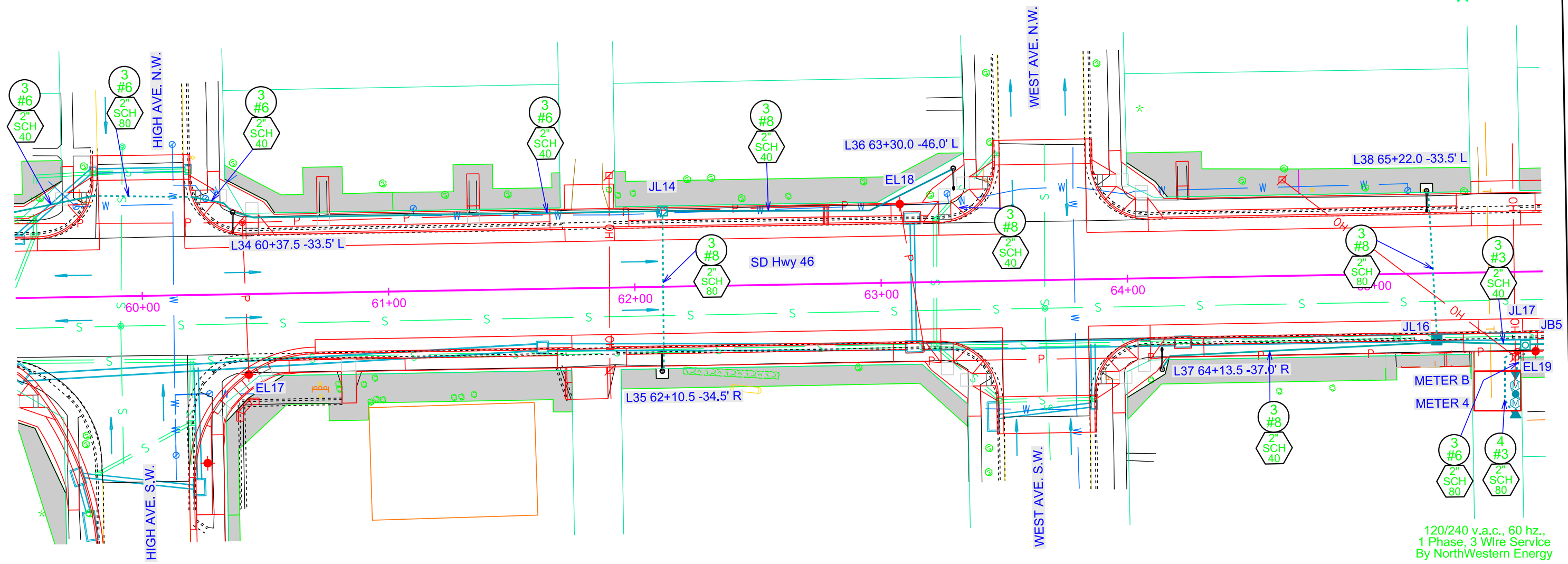
Plot Scale - 1"=40'

Plotted From - TRPR17199

File - U:\trp\jcmix\05\10646.dgn

# CONDUIT LAYOUT SD HWY 46

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH-CR 0046(69)288	L26	L54
Plotting Date:		10/21/2024	



120/240 v.a.c., 60 hz.,  
1 Phase, 3 Wire Service  
By NorthWestern Energy

Plot Scale - 1:41,121

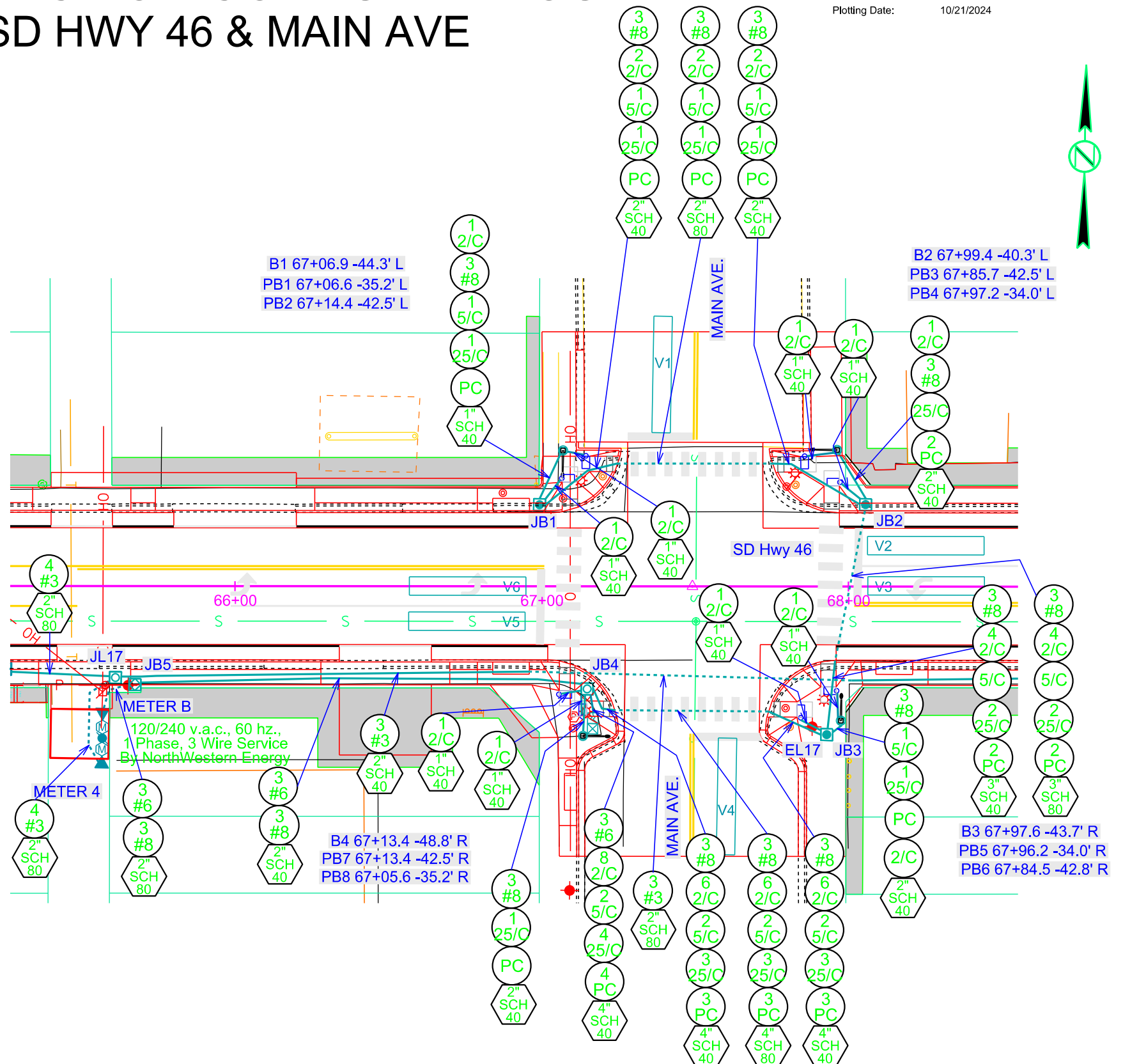
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# INTERSECTION CONDUIT LAYOUT SD HWY 46 & MAIN AVE

Plotting Date: 10/21/2024

ESTIMATE OF QUANTITIES			
KEY	ITEM	EST QUANT	UNIT
<span style="border: 1px solid black; display: inline-block; width: 20px; height: 10px;"></span>	Video Detection Zone (6' x 42') (V1-V6) (Not a bid item)	6	EACH
<span style="display: inline-block; width: 10px; height: 10px; border: 1px solid black; border-radius: 50%;"></span>	3" Diameter Footing (B1-B4)	47	FT
<span style="border: 1px solid black; padding: 2px;"> </span>	Type 1 Electrical Junction Box (JB5)	1	EACH
<span style="border: 1px solid black; padding: 2px;"> </span>	Type 2 Electrical Junction Box (JB1-JB3)	3	EACH
<span style="border: 1px solid black; padding: 2px;"> </span>	Type 3 Electrical Junction Box (JB4)	1	EACH
<span style="border: 1px solid black; padding: 2px;"> </span>	Electrical Service Cabinet with Secondary Disconnect	1	EACH
<span style="display: inline-block; width: 10px; height: 10px; border: 1px solid black; border-radius: 50%;"></span>	Galvanized Steel Utility Pole Not a Bid Item	1	EACH
<span style="border: 1px solid black; border-radius: 50%; padding: 2px;">M</span>	Meter Socket Not a Bid Item	1	EACH
<span style="border: 1px solid black; padding: 2px;"> </span>	Traffic Signal Controller	1	EACH
<span style="border: 1px solid black; padding: 2px;">1" SCH 40</span>	1" Rigid Conduit, Schedule 40	65	EACH
<span style="border: 1px solid black; padding: 2px;">2" SCH 40</span>	2" Rigid Conduit, Schedule 40	295	FT
<span style="border: 1px solid black; padding: 2px;">3" SCH 40</span>	3" Rigid Conduit, Schedule 40	20	FT
<span style="border: 1px solid black; padding: 2px;">4" SCH 40</span>	4" Rigid Conduit, Schedule 40	35	FT
<span style="border: 1px solid black; padding: 2px;">2" SCH 80</span>	2" Rigid Conduit, Schedule 80	65	FT
<span style="border: 1px solid black; padding: 2px;">3" SCH 80</span>	3" Rigid Conduit, Schedule 80	50	FT
<span style="border: 1px solid black; padding: 2px;">4" SCH 80</span>	4" Rigid Conduit, Schedule 80	55	FT
<span style="border: 1px solid black; border-radius: 50%; padding: 2px;">#6</span>	1/C #6 AWG Copper Wire	1,150	FT
<span style="border: 1px solid black; border-radius: 50%; padding: 2px;">#8</span>	1/C #8 AWG Copper Wire	2,330	FT
<span style="border: 1px solid black; border-radius: 50%; padding: 2px;">2/C</span>	2/C #14 AWG Copper Tray Cable, K2	1,325	FT
<span style="border: 1px solid black; border-radius: 50%; padding: 2px;">3/C</span>	3/C #14 AWG Copper Tray Cable, K2	140	FT
<span style="border: 1px solid black; border-radius: 50%; padding: 2px;">4/C</span>	4/C #14 AWG Copper Tray Cable, K2	380	FT
<span style="border: 1px solid black; border-radius: 50%; padding: 2px;">5/C</span>	5/C #14 AWG Copper Tray Cable, K2	700	FT
<span style="border: 1px solid black; border-radius: 50%; padding: 2px;">25/C</span>	25/C #14 AWG Copper Tray Cable, K2	750	FT
<span style="border: 1px solid black; border-radius: 50%; padding: 2px;">2/C</span>	2/C #10 AWG Copper Pole & Bracket Cable	220	FT
<span style="border: 1px solid black; border-radius: 50%; padding: 2px;">PC</span>	Preemption Cable	1,215	FT



Plot Scale - 1"=40'

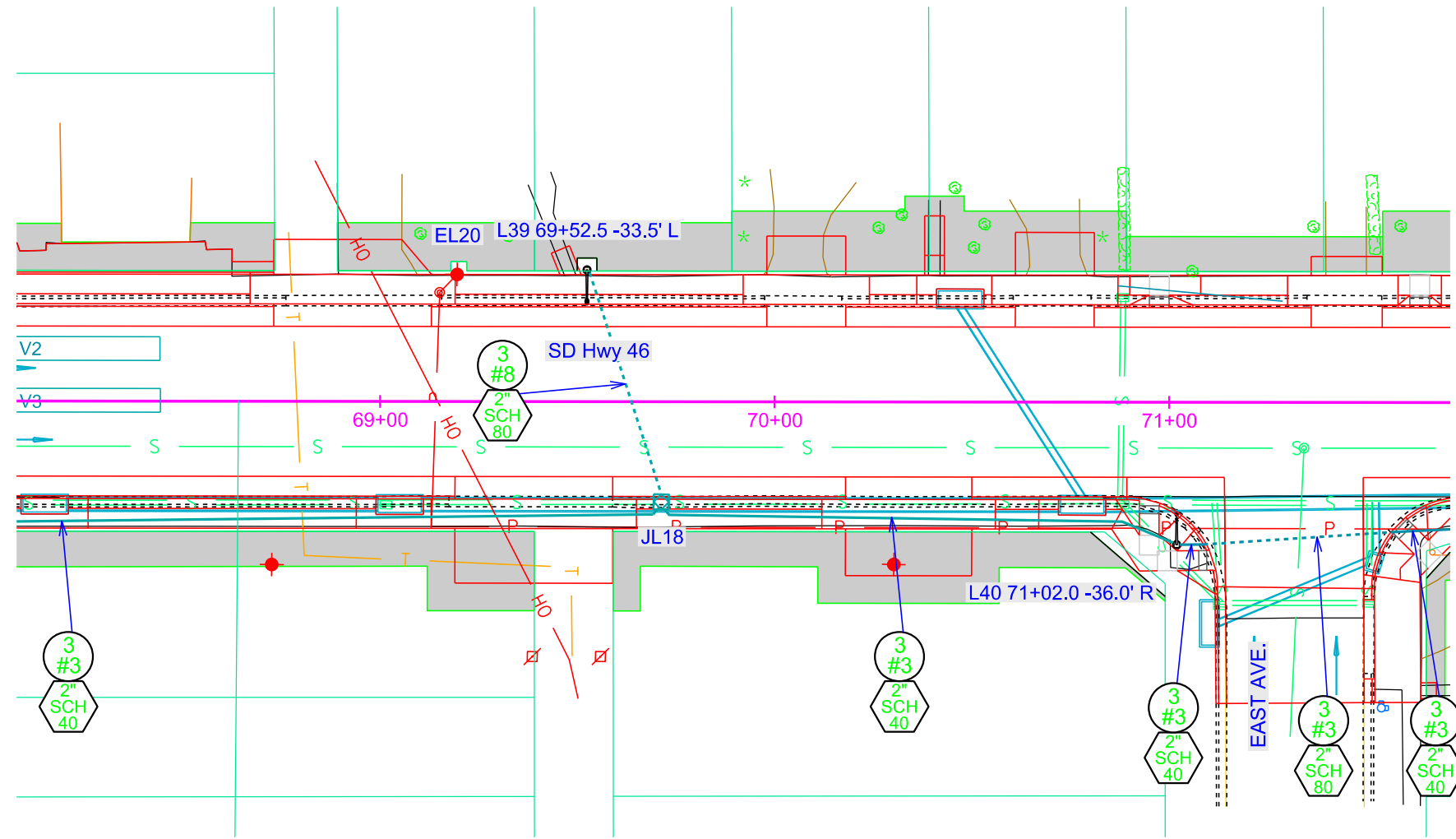
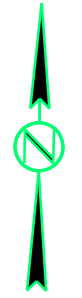
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# CONDUIT LAYOUT SD HWY 46

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH-CR 0046(69)288	L28	L54

Plotting Date: 10/21/2024



Plot Scale - 1:40

Plotted From - TRPR17199

File - U:\trp\jcmix05\JN1066c.dgn

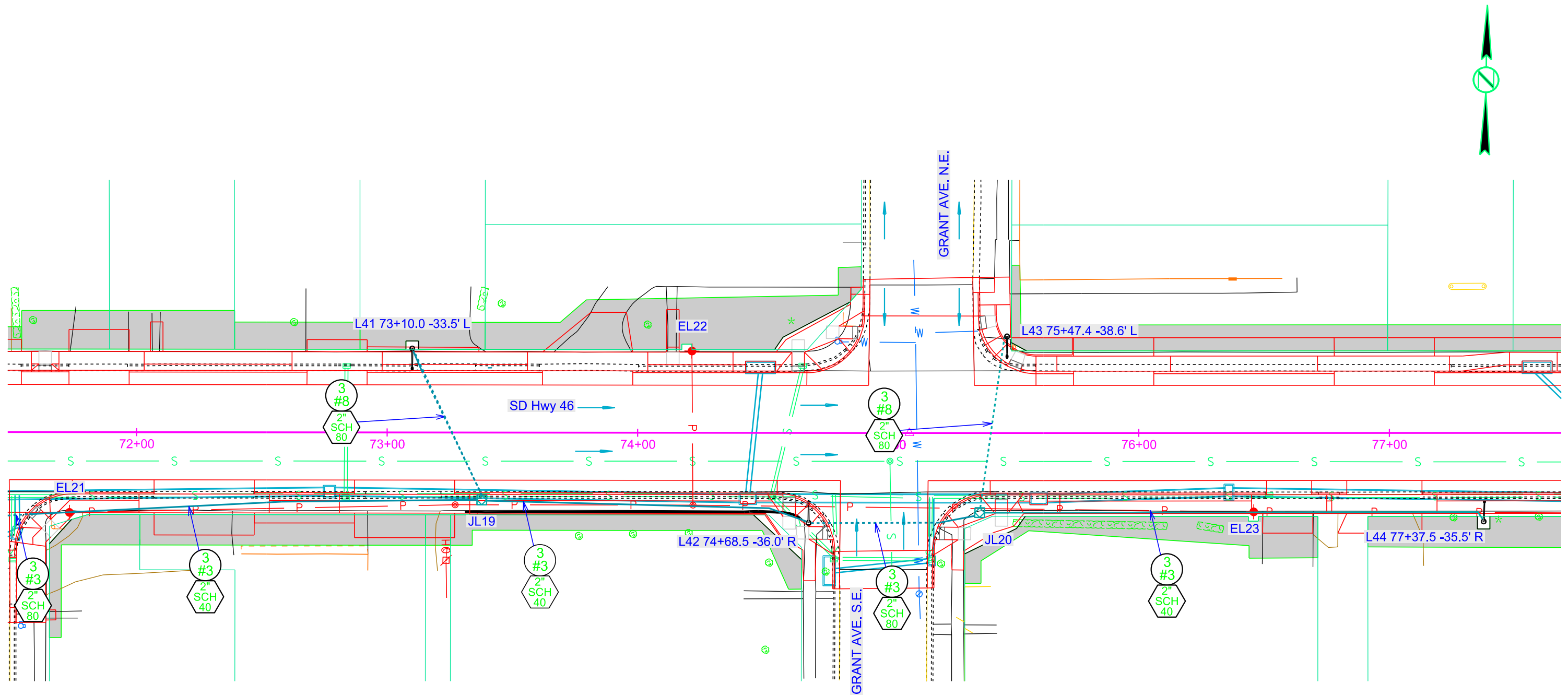
# CONDUIT LAYOUT SD HWY 46

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH-CR 0046(69)288	L29	L54
Plotting Date:		10/21/2024	

Plot Scale - 1"=40'

Plotted From - TRPR17199

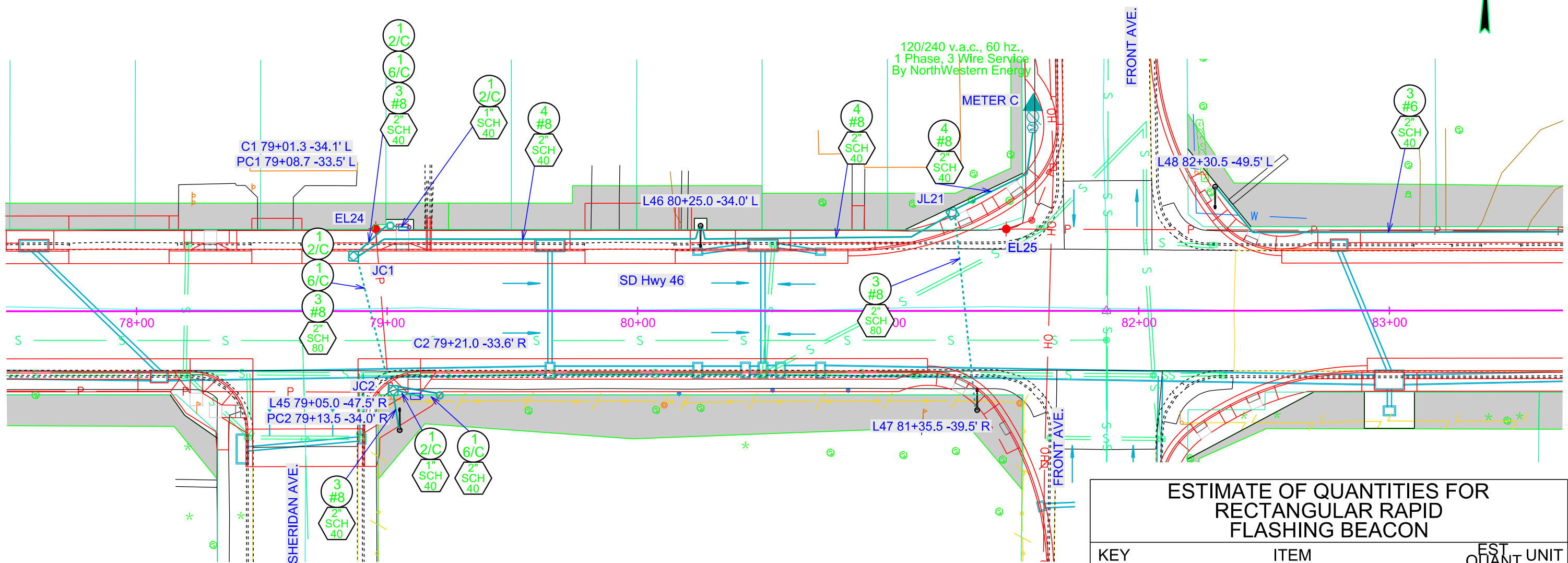
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# CONDUIT LAYOUT SD HWY 46

STATE OF SOUTH DAKOTA	PROJECT NH-CR 0046(69)288	SHEET L30	TOTAL SHEETS L54
Plotting Date: 10/21/2024			

Note: RRFB Controller will be mounted to sign pole C1.



ESTIMATE OF QUANTITIES FOR RECTANGULAR RAPID FLASHING BEACON			
KEY	ITEM	EST QUANT	UNIT
	2' Diameter Footing (C1-C2)	12	FT
	Type 1 Electrical Junction Box (JC1-JC2)	2	EACH
	2/C #14 AWG Copper Tray Cable, K2	145	FT
	6/C #14 AWG Copper Tray Cable, K2	130	FT
	1" Rigid Conduit, Schedule 40	20	FT
	2" Rigid Conduit, Schedule 40	330	FT
	2" Rigid Conduit, Schedule 80	60	FT
	Electrical Service Cabinet	1	EACH
	Galvanized Steel Utility Pole (Not a Bid Item)	1	EACH
	Meter Socket (Not a Bid Item)	1	EACH

Plot Scale - 1"=40'

Plotted From - TRPR17199

File - U:\trp\jemix05\JN1078c.dgn

# CONDUIT LAYOUT SD HWY 46

STATE OF SOUTH DAKOTA	PROJECT NH-CR 0046(69)288	SHEET L31	TOTAL SHEETS L54
-----------------------	------------------------------	--------------	---------------------

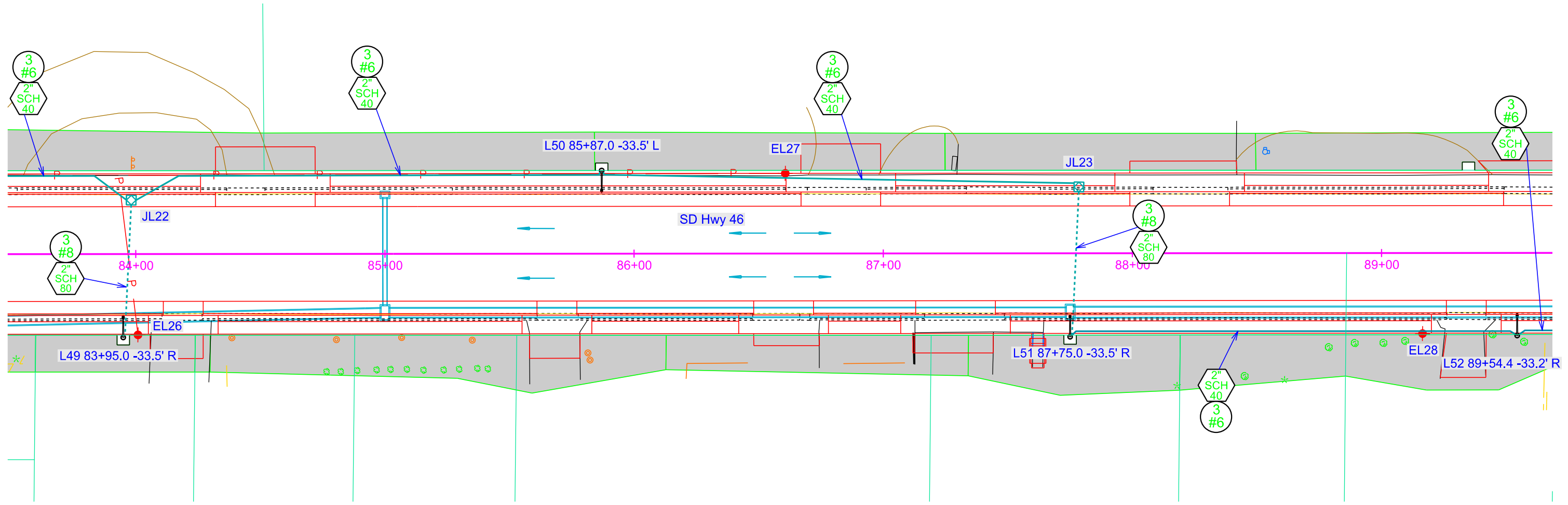
Revised 10/21/2024 - RR



Plot Scale - 1:40

Plotted From - TRPR17199

File - U:\trp\jcmix\05\10084.dgn



# CONDUIT LAYOUT SD HWY 46

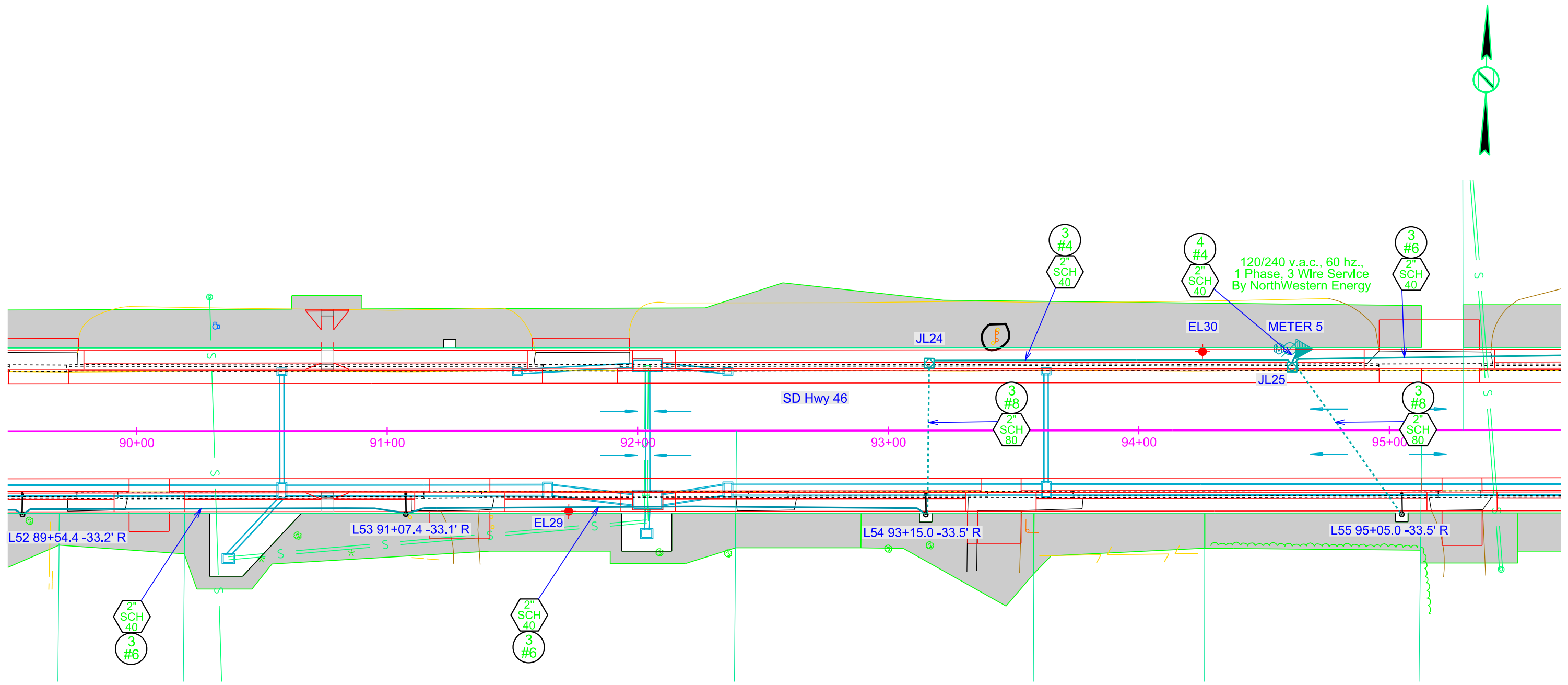
STATE OF SOUTH DAKOTA	PROJECT NH-CR 0046(69)288	SHEET L32	TOTAL SHEETS L54
-----------------------	------------------------------	--------------	---------------------

Revised 10/21/2024 - RR

Plot Scale - 1"=40'

Plotted From - TRPR17199

File - U:\trp\jcmix\05\10\090.cad





# CONDUIT LAYOUT SD HWY 46

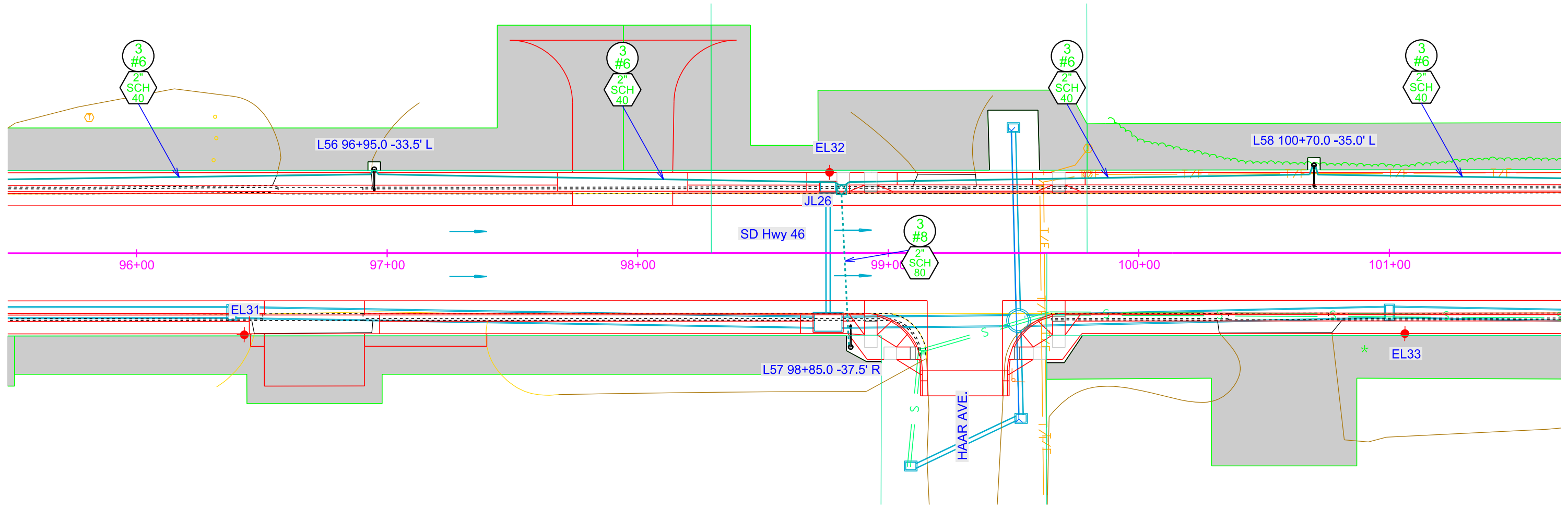
STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH-CR 0046(69)288	L33	L54
Plotting Date: 10/21/2024			



Plot Scale - 1"=40'

Plotted From - TRPR17199

File - U:\trp\jcmix\05\10\096.dgn



# CONDUIT LAYOUT SD HWY 46

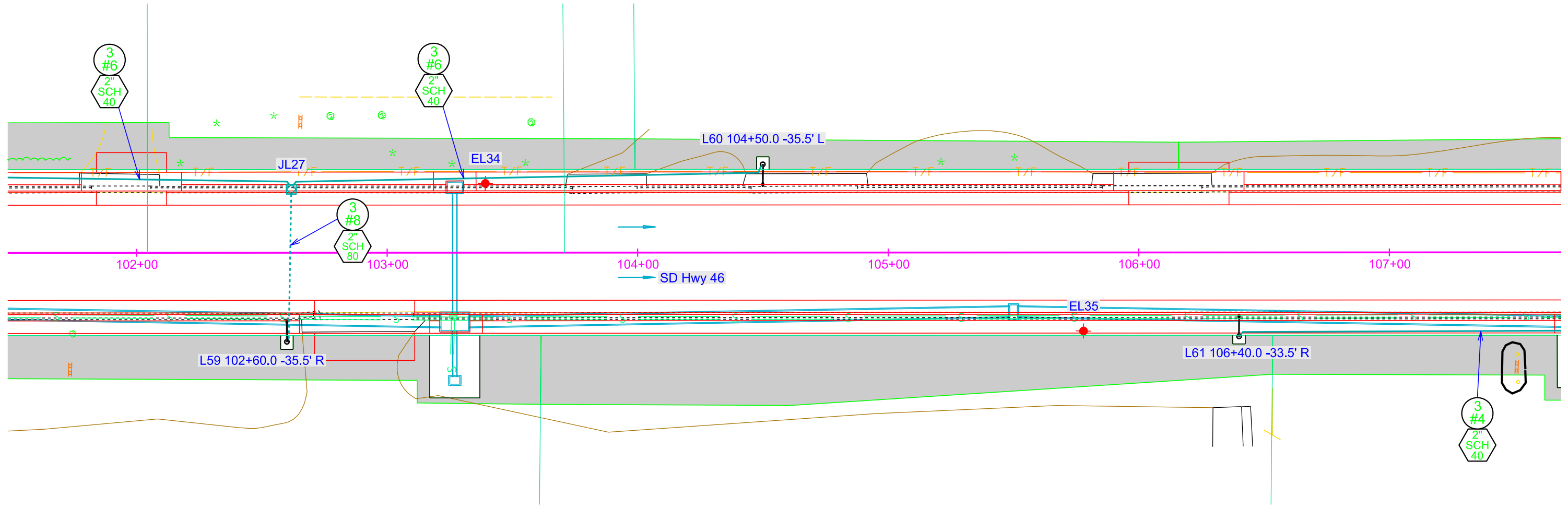
STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH-CR 0046(69)288	L34	L54
Plotting Date: 10/21/2024			



Plot Scale - 1"=40'

Plotted From - TRPR17199

File - U:\trp\jcmix\05\N1102.cad



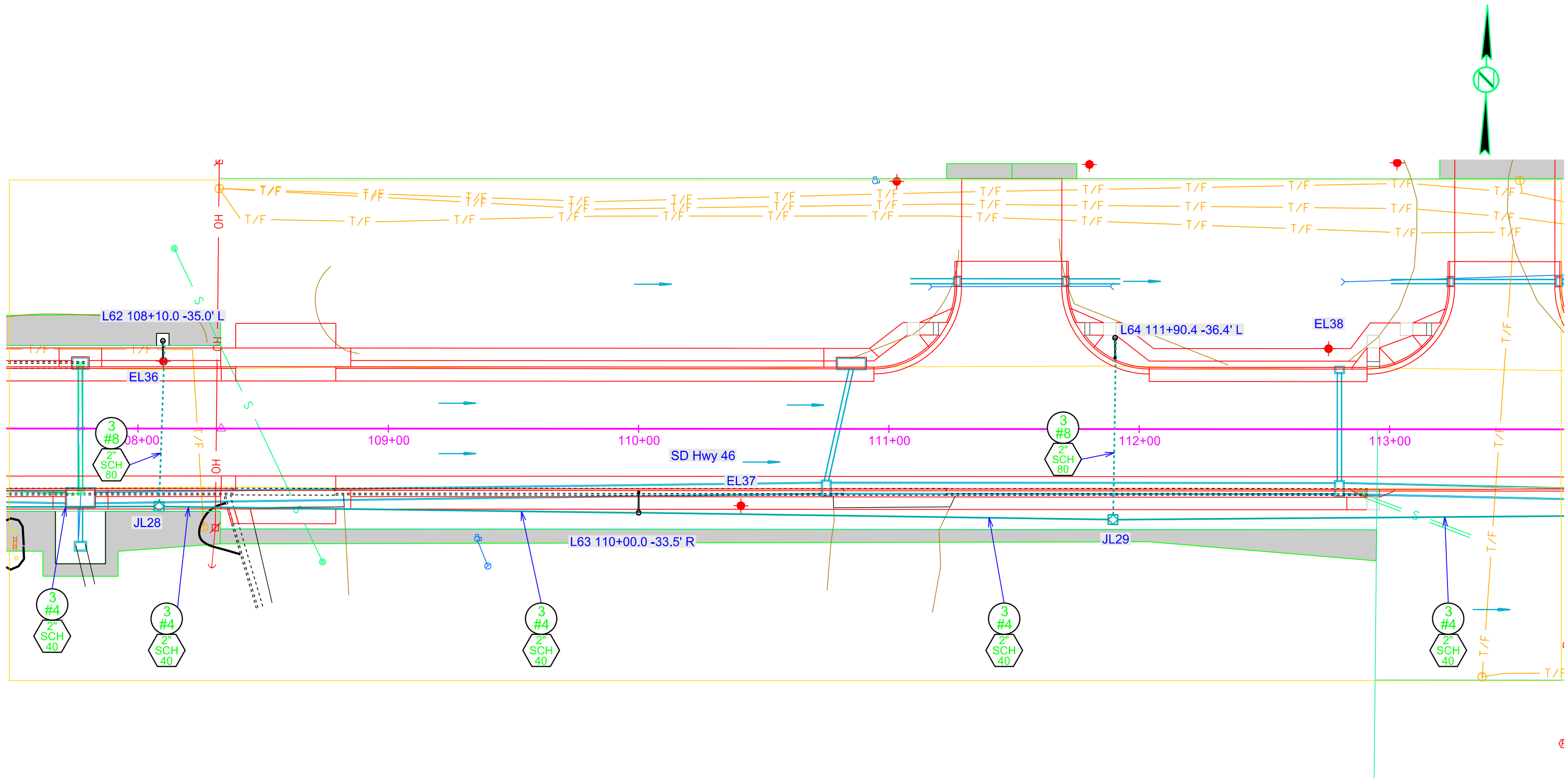
# CONDUIT LAYOUT SD HWY 46

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH-CR 0046(69)288	L35	L54
Plotting Date: 10/21/2024			

Plot Scale - 1"=40'

Plotted From - TRPR17199

File - U:\trp\jcmix\5\JN1108.dgn



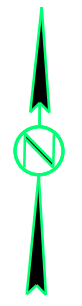
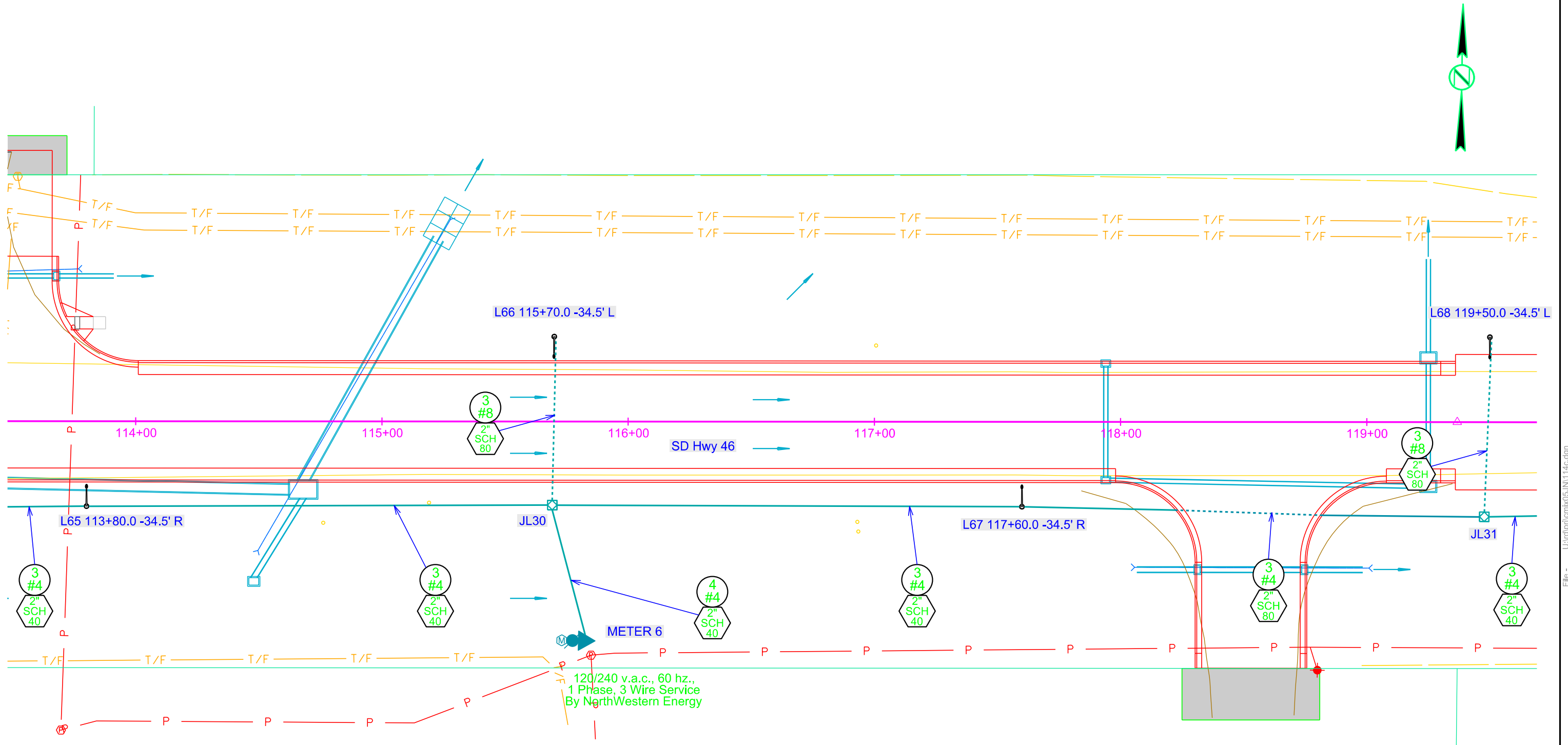
# CONDUIT LAYOUT SD HWY 46

STATE OF SOUTH DAKOTA	PROJECT NH-CR 0046(69)288	SHEET L36	TOTAL SHEETS L54
Plotting Date: 10/21/2024			

Plot Scale - 1"=40'

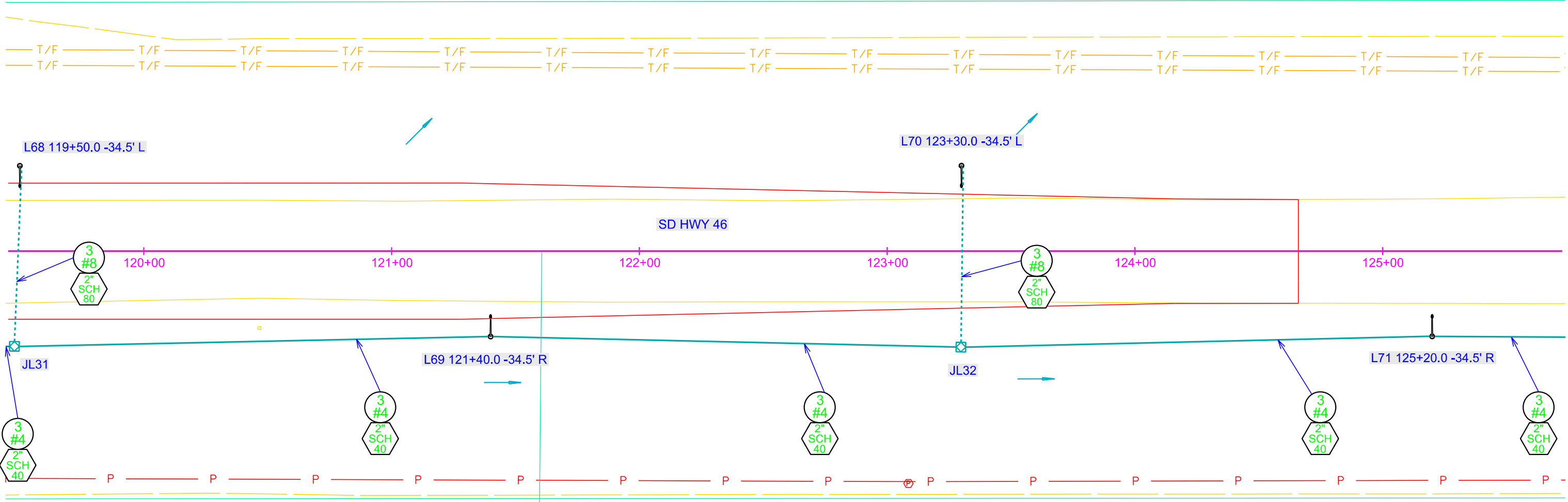
Plotted From - TRPR17199

File - U:\trproj\emix05\JN114.c.dgn



# CONDUIT LAYOUT SD HWY 46

STATE OF SOUTH DAKOTA	PROJECT NH-CR 0046(69)288	SHEET L37	TOTAL SHEETS L54
Plotting Date: 10/21/2024			



Plot Scale - 1"=40'

Plotted From - TRPR17199

File - U:\trproj\mix05\JN120.cad

# CONDUIT LAYOUT SD HWY 46

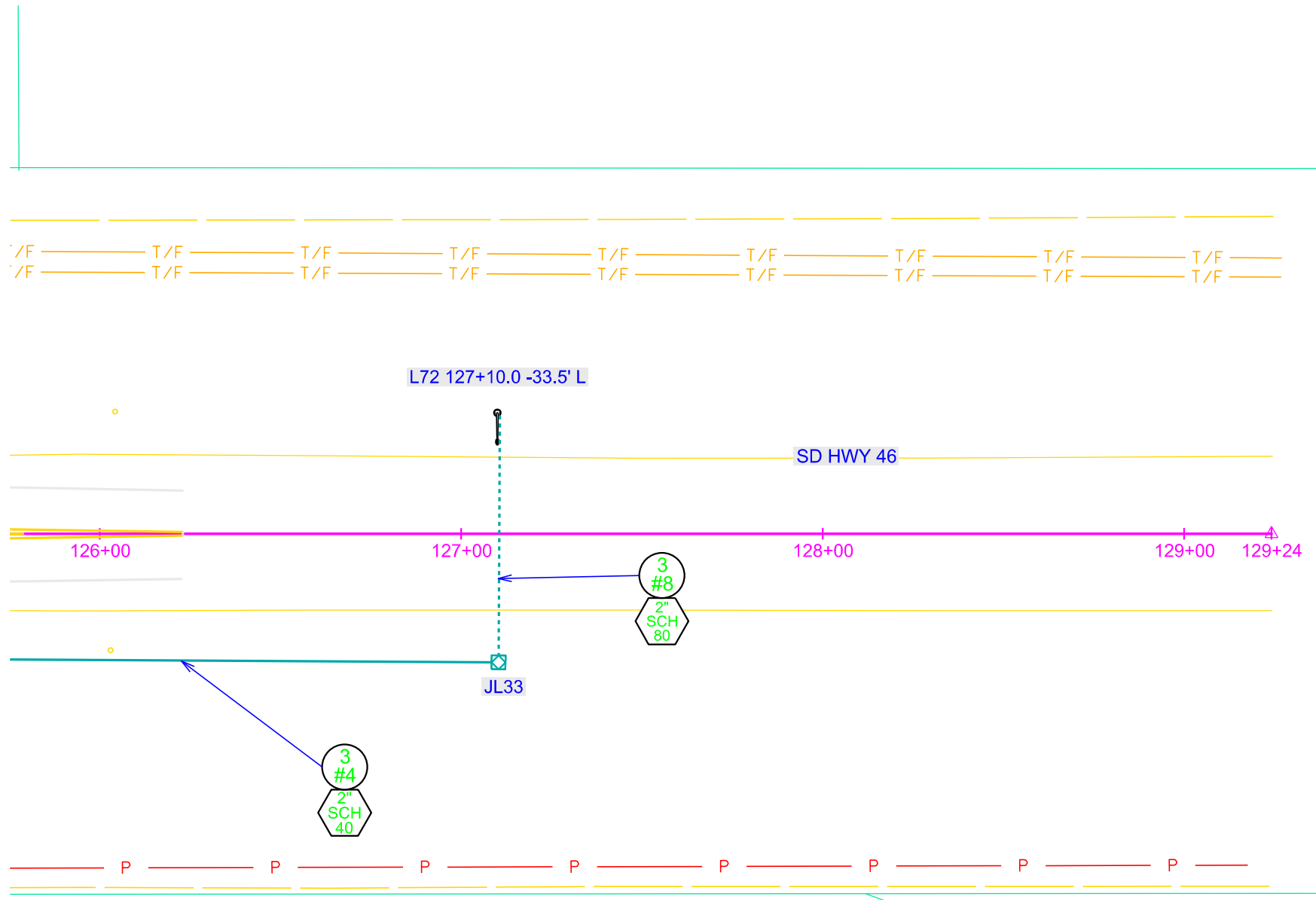
STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH-CR 0046(69)288	L38	L54

Plotting Date: 10/21/2024



Plot Scale - 1:40

Plotted From - TRPR17199



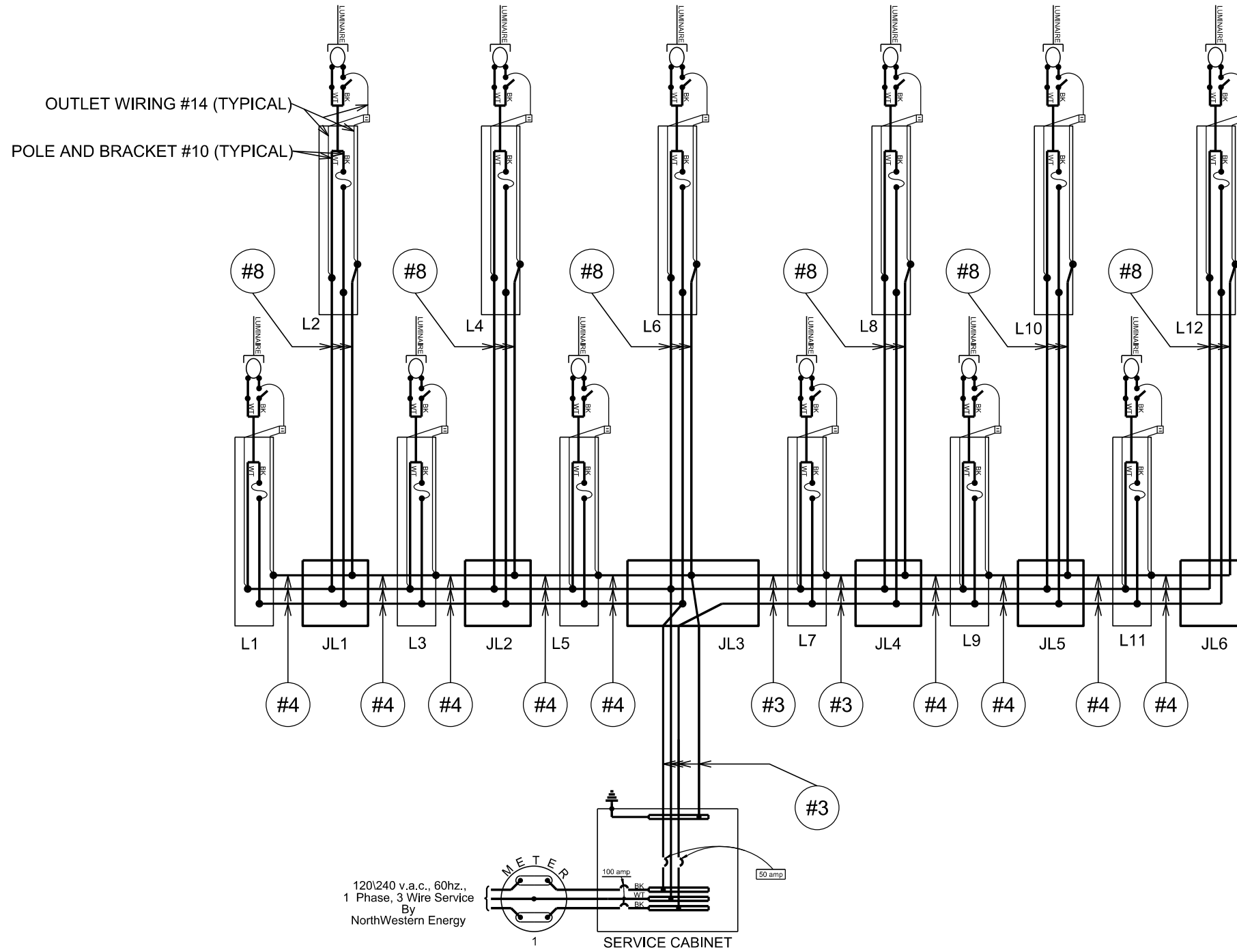
File - U:\proj\emix\05\N126c.dgn

# WIRING DIAGRAM

STATE OF SOUTH DAKOTA	PROJECT NH-CR 0046(69)288	SHEET L39	TOTAL SHEETS L54
-----------------------	------------------------------	--------------	---------------------

Plotting Date: 10/21/2024

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



- LEGEND:**
- FUSE: 10 amp.
  - LUMINAIRE: LED
  - PHOTOCELL (TYPICAL OF ALL)

Plot Scale - 1:40

Plotted From - TRPR17199

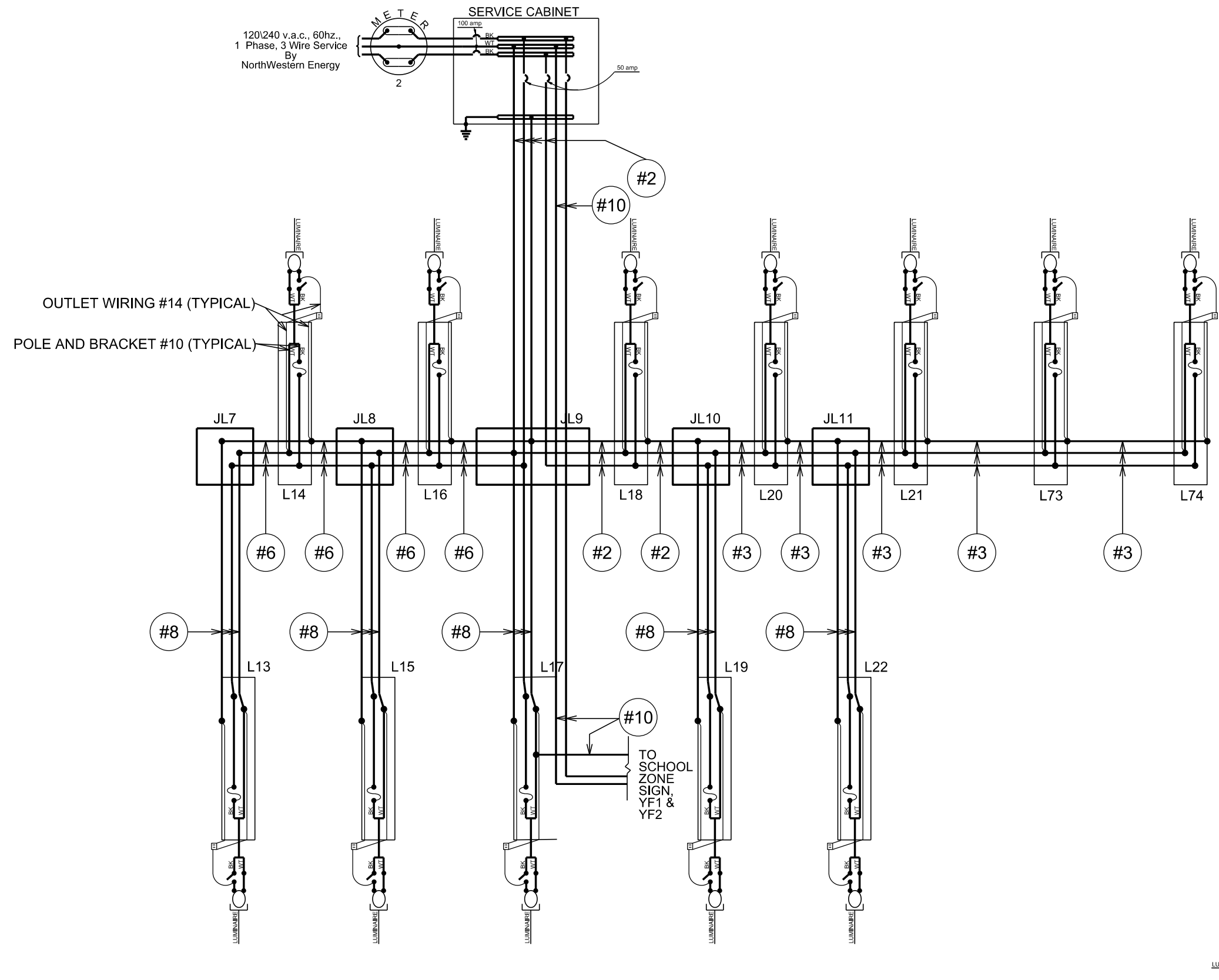
File - ...lcmix05JNWiring\_Diagrams.dgn

# WIRING DIAGRAM

STATE OF SOUTH DAKOTA	PROJECT NH-CR 0046(69)288	SHEET L40	TOTAL SHEETS L54
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Plotting Date: 10/21/2024

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



**LEGEND:**

	FUSE: 10 amp.
	LUMINAIRE: LED
	PHOTOCELL (TYPICAL OF ALL)

Plot Scale - 1:40

Plotted From - TRPR17199

File - ...acmix05\NWiring\_Diagrams.dgn

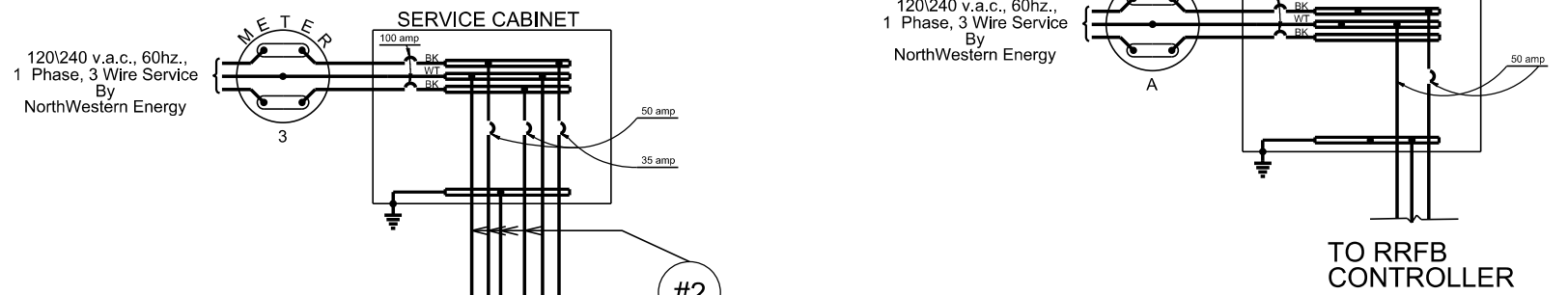


# WIRING DIAGRAM

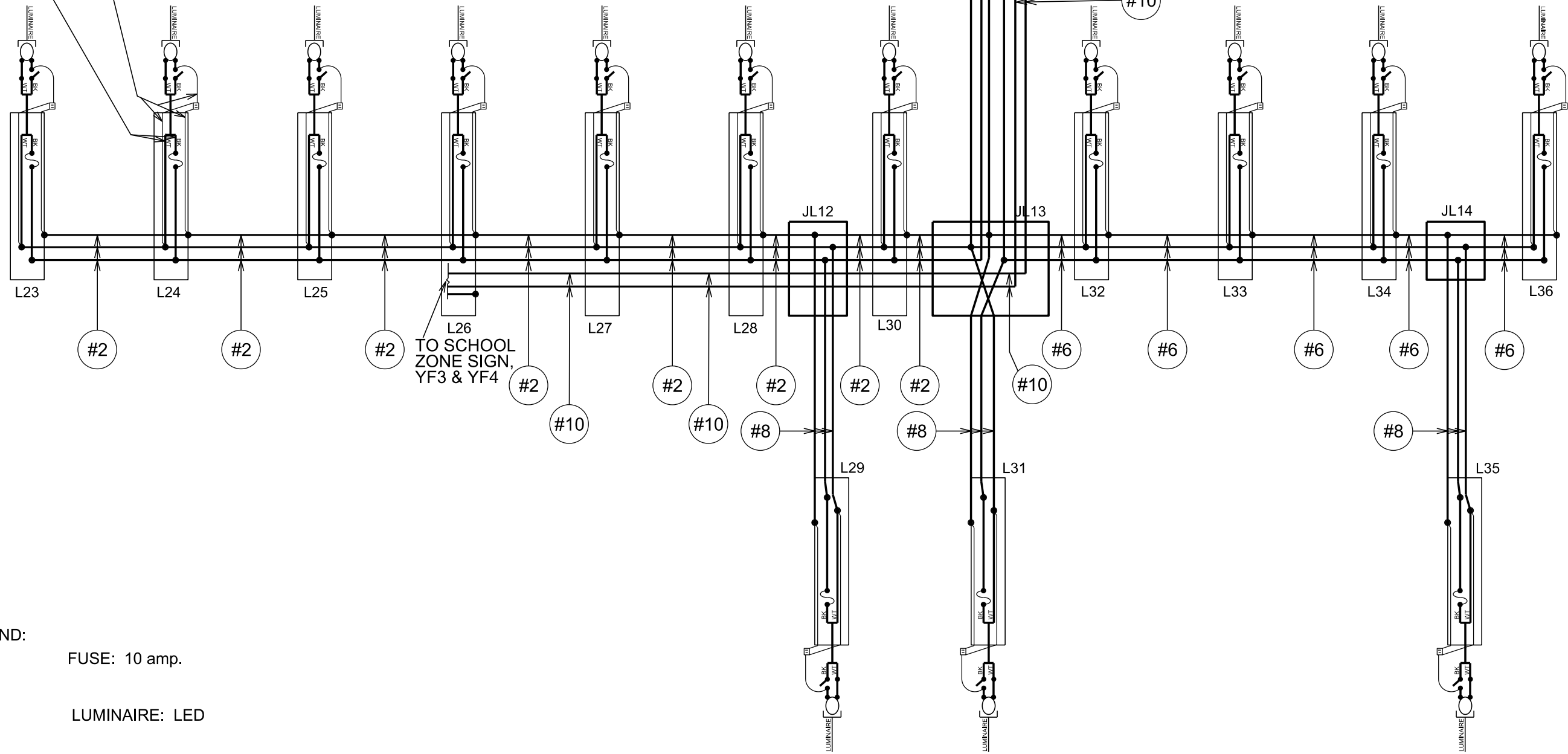
STATE OF SOUTH DAKOTA	PROJECT NH-CR 0046(69)288	SHEET L41	TOTAL SHEETS L54
-----------------------	------------------------------	--------------	---------------------

Plotting Date: 10/21/2024



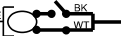
**NOTE:**  
All circuits shall be bonded in accordance with the NATIONAL ELECTRICAL CODE. Quantities for bonding conductors are not included in these plans.



POLE AND BRACKET #10 (TYPICAL)  
OUTLET WIRING #14 (TYPICAL)



**LEGEND:**

-  FUSE: 10 amp.
-  LUMINAIRE: LED
-  PHOTOCELL (TYPICAL OF ALL)

Plot Scale - 1:40

Plotted From - TRPR17199

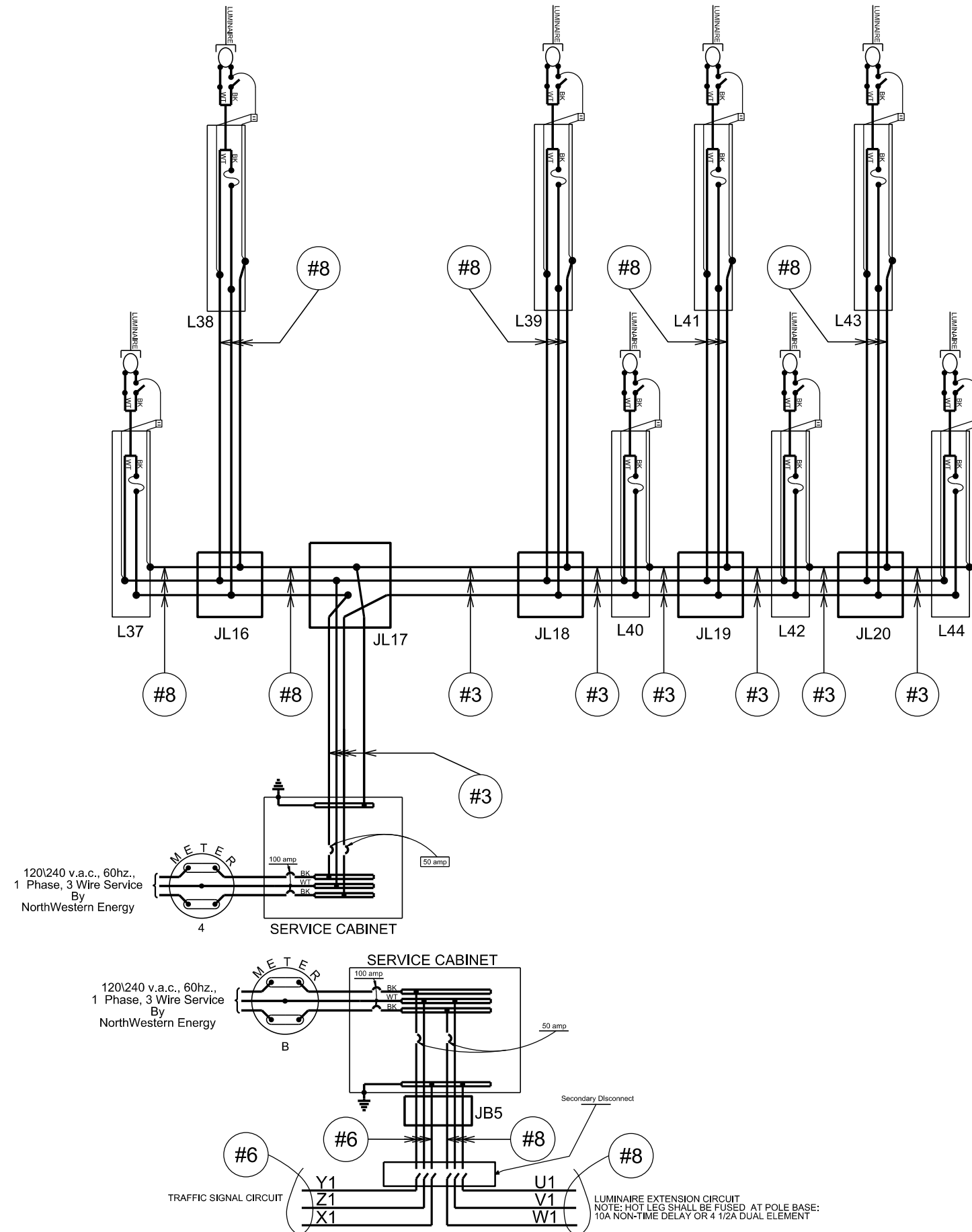
File - ...Acmix05JNWiring\_Diagrams.dgn

# WIRING DIAGRAM

STATE OF SOUTH DAKOTA	PROJECT NH-CR 0046(69)288	SHEET L42	TOTAL SHEETS L54
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Plotting Date: 10/21/2024

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



- LEGEND:**
- ⋈
FUSE: 10 amp.
  - LUMINAIRE: LED
  - ⎓
PHOTOCELL (TYPICAL OF ALL)

Plot Scale - 1:40

TRPR17199

Plotted From -

File - ...Acmix05\NWiring\_Diagrams.dgn

# WIRING DIAGRAM

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH-CR 0046(69)288	L43	L54

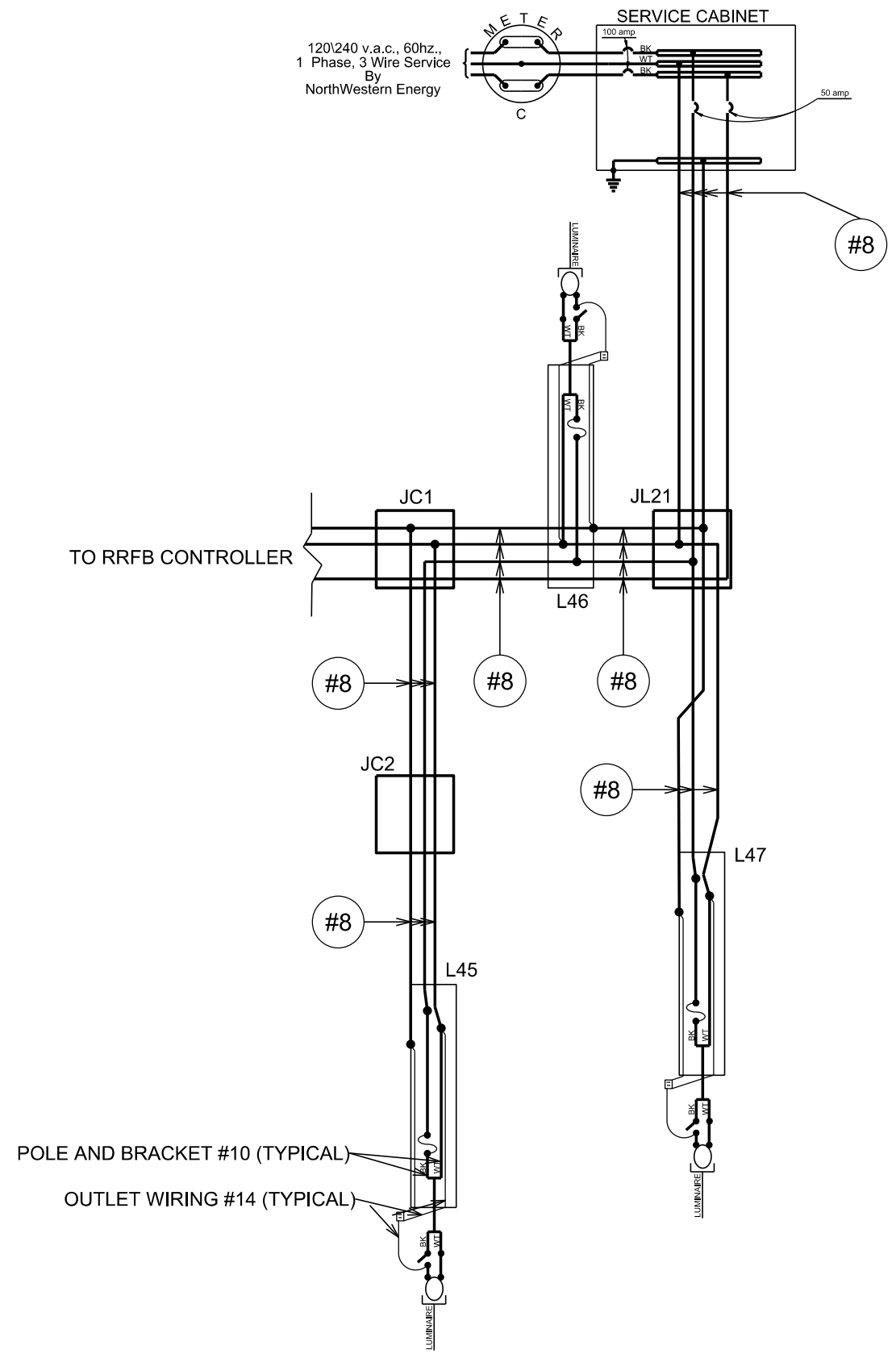
Plotting Date: 10/21/2024

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

Plot Scale - 1:40

Plotted From - TRPR17199

Plotted From -



LEGEND:

	FUSE: 10 amp.
	LUMINAIRE: LED
	PHOTOCELL (TYPICAL OF ALL)

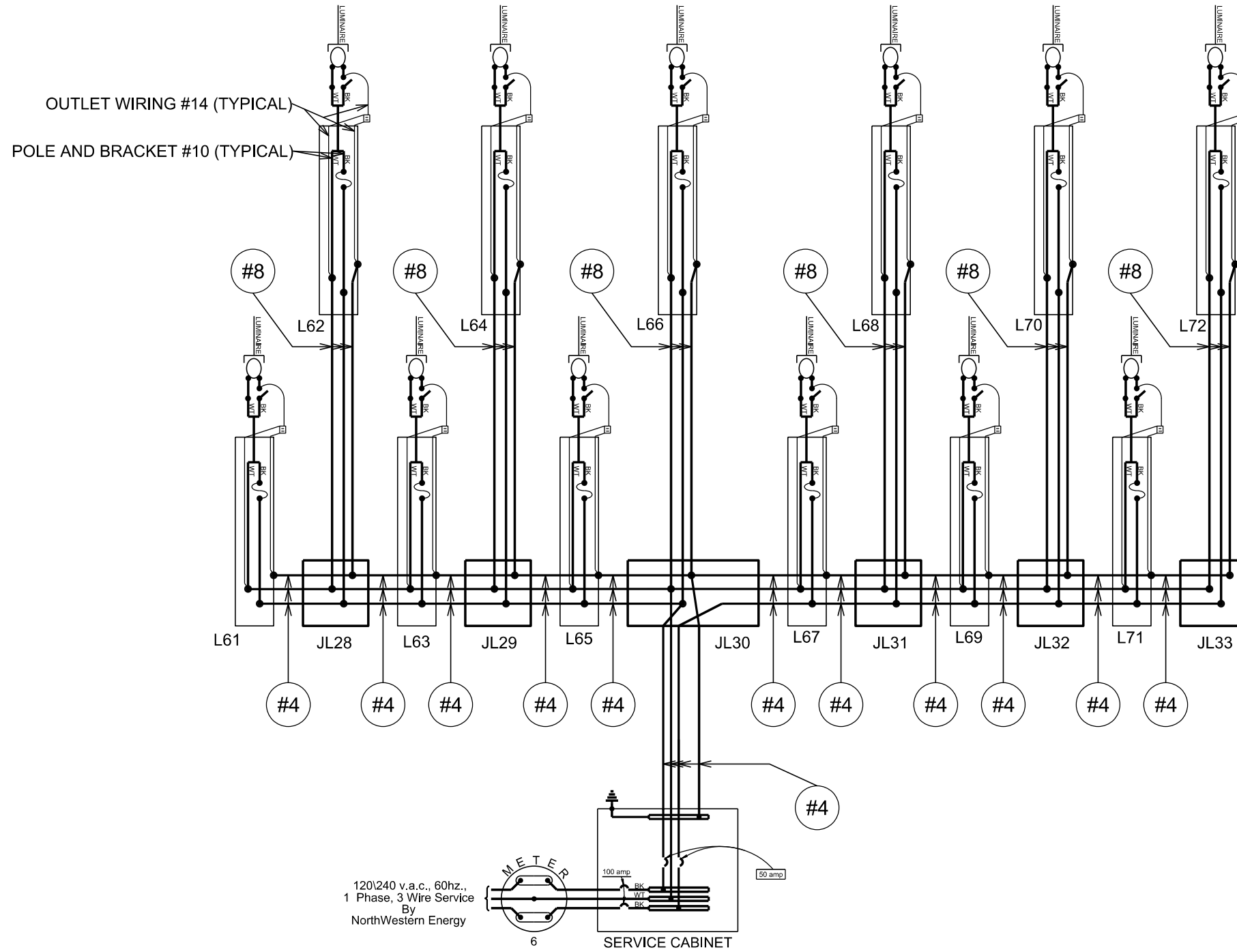


# WIRING DIAGRAM

STATE OF SOUTH DAKOTA	PROJECT NH-CR 0046(69)288	SHEET L45	TOTAL SHEETS L54
-----------------------	------------------------------	--------------	---------------------

Plotting Date: 10/21/2024

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



- LEGEND:**
- FUSE: 10 amp.
  - LUMINAIRE: LED
  - PHOTOCELL (TYPICAL OF ALL)

Plotted From: - TRPR17199 Plot Scale: - 1:40

File - ...cmix05\NWiring\_Diagrams.dgn

# TRAFFIC SIGNAL WIRING TABLES

## SD HWY 46 & MAIN AVE

Plotting Date: 10/21/2024

POLE: B1 CABLE SIZE: 25/C

POLE: B2 CABLE SIZE: 25/C

POLE: B3 CABLE SIZE: 25/C

POLE: B4 CABLE SIZE: 25/C

Plot Scale - 1:200

CABINET TERM.	CABLE CONDUCTOR COLOR	POLE COND. COLOR	HEAD TERM.	HEAD NO.	Ø
6R	Red	R	R	2	6
6Y	Orange	O	Y	2	6
6G	Blue	BL	G	2	6
N	Black	BK	N	2	6
8R	Red/Black	R	R	3	8
8Y	Orange/Black	O	Y	3	8
8G	Blue/Black	BL	G	3	8
N	Brown/Black	BK	N	3	8
6R	Yellow/Red	R	R	4	6
6Y	Brown/Red	O	Y	4	6
6G	Black/Blue	BL	G	4	6
N	Black/Red	BK	N	4	6
10R	Orange/Red	R	DW	15	4P
10G	Orange/Blue	BL	W	15	4P
N	Brown	BK	N	15	4P
11R	Red/Orange	R	DW	16	6P
11G	Yellow/Blue	BL	W	16	6P
N	Black/Orange	BK	N	16	6P
	Yellow				
	Yellow/Black				
	Blue/Red				
	Red/Blue				
	Brown/Blue				
	Blue/Orange				
	Yellow/Orange				

CABINET TERM.	CABLE CONDUCTOR COLOR	POLE COND. COLOR	HEAD TERM.	HEAD NO.	Ø
8R	Red	RD	R	5	8
8Y	Orange	O	Y	5	8
8G	Blue	BL	G	5	8
N	Black	BK	N	5	8
5R	Red/Black	R	RA	6	5
5Y	Orange/Black	O	YA	6	5
11Y	Yellow	Y	FYA	6	5
5G	Blue/Black	BL	GA	6	5
N	Brown/Black	BK	N	6	5
8R	Orange/Red	R	R	7	8
8G	Black/Blue	BL	G	7	8
N	Black/Orange	BK	N	7	8
8Y	Yellow/Orange	O	O	7	8
11R	Red/Orange	R	DW	17	6P
11G	Blue/Orange	BL	W	17	6P
N	Brown	BK	N	17	6P
12R	Black/Red	R	DW	18	8P
12G	Orange/Blue	BL	W	18	8P
N	Yellow/Black	BK	N	18	8P
	Blue/Red				
	Yellow/Red				
	Brown/Red				
	Red/Blue				
	Yellow/Blue				
	Brown/Blue				

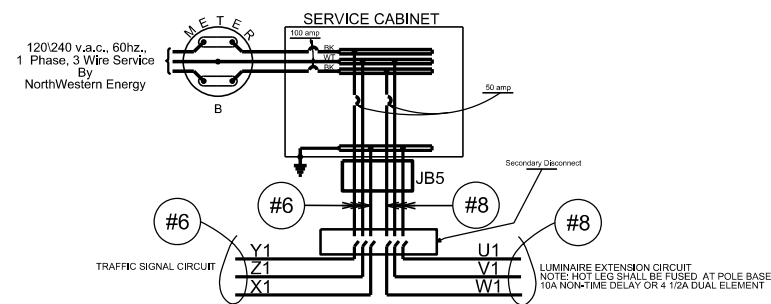
CABINET TERM.	CABLE CONDUCTOR COLOR	POLE COND. COLOR	HEAD TERM.	HEAD NO.	Ø
2R	Red	R	R	9	2
2Y	Orange	O	Y	9	2
2G	Blue	BL	G	9	2
N	Black	BK	N	9	2
4R	Red/Black	R	R	10	4
4Y	Orange/Black	O	Y	10	4
4G	Blue/Black	BL	G	10	4
N	Brown/Black	BK	N	10	4
2R	Black/Red	R	R	11	2
2G	Yellow/Blue	BL	G	11	2
N	Yellow/Black	BK	N	11	2
12R	Brown/Red	R	DW	19	8P
12G	Black/Blue	BL	W	19	8P
N	Brown	BK	N	19	8P
2Y	Yellow/Orange	O	Y	20	2
9R	Yellow/Red	R	DW	20	2P
9G	Brown/Blue	BL	W	20	2P
N	Black/Orange	BK	N	20	2P
	Yellow				
	Blue/Red				
	Orange/Red				
	Red/Blue				
	Orange/Blue				
	Red/Orange				
	Blue/Orange				

CABINET TERM.	CABLE CONDUCTOR COLOR	POLE COND. COLOR	HEAD TERM.	HEAD NO.	Ø
4R	Red	R	R	12	4
4Y	Orange	O	Y	12	4
4G	Blue	BL	GA	12	4
N	Black	BK	N	12	4
1R	Red/Black	R	RA	13	1
1Y	Orange/Black	O	YA	13	1
1G	Blue/Black	BL	GA	13	1
N	Brown/Black	BK	N	14	4
4R	Black/Red	R	R	14	4
	Yellow/Blue				
N	Yellow/Black	BK	N	21	2P
	Brown/Red				
9G	Black/Blue	BL	W	21	2P
N	Brown	BK	N	13	1
4Y	Yellow/Orange	O	Y	14	4
10R	Yellow/Red	R	DW	22	4P
4G	Brown/Blue	BL	GA	14	4
N	Black/Orange	BK	N	22	4P
9Y	Yellow	Y	FYA	13	1
10G	Blue/Red	BL	W	22	4P
9R	Orange/Red	R	DW	21	2P
	Red/Blue				
	Orange/Blue				
	Red/Orange				
	Blue/Orange				

POLE: B1 CABLE SIZE: 5/C

POLE: B3 CABLE SIZE: 5/C

CABINET TERM.	CABLE CONDUCTOR COLOR	POLE COND. COLOR	HEAD TERM.	HEAD NO.	Ø
1R	Red	R	RA	1	1
1Y	Orange	O	YA	1	1
9Y	Yellow	Y	FYA	1	1
1G	Blue	BL	GA	1	1
N	Black	BK	N	1	1



CABINET TERM.	CABLE CONDUCTOR COLOR	POLE COND. COLOR	HEAD TERM.	HEAD NO.	Ø
5R	Red	R	RA	8	5
5Y	Orange	O	YA	8	5
11Y	Yellow	Y	FYA	8	5
5G	Blue	BL	GA	8	5
N	Black	BK	N	8	5

Plotted From - TRPR17199

File - ...apj\cmx05\NWiringTables.dgn

# SIGNAL TIMING

## HIGHWAY 46 & MAIN ST

STATE OF SOUTH DAKOTA	PROJECT NH-CR 0046(69)288	SHEET L47	TOTAL SHEETS L54
-----------------------	------------------------------	--------------	---------------------

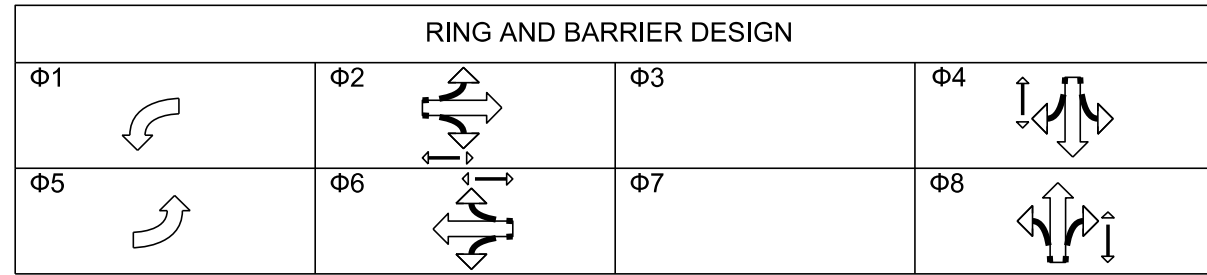
Plotting Date: 10/21/2024

BASIC INTERVALS								
Phase	1	2	3	4	5	6	7	8
Movement	WBL	EB		SB	EBL	WB		NB
Lag								
Min Green	5	10		10	5	10		10
Extension	3	3		3	3	3		3
Max 1	5	20		19.5	5	20		19.5
Max 2								
Time Before								
Time to Reduce								
Minimum Gap								
Yellow	3.5	4		3.5	3.5	4		3.5
All Red	2.5	1		1	2.5	1		1
Walk		10		9.5		10		9.5
Ped Clearance		12		12.5		12.5		12.5
Recall								
Prog Flash Display	R	Y		R	R	Y		R
Start Up Ø		X				X		

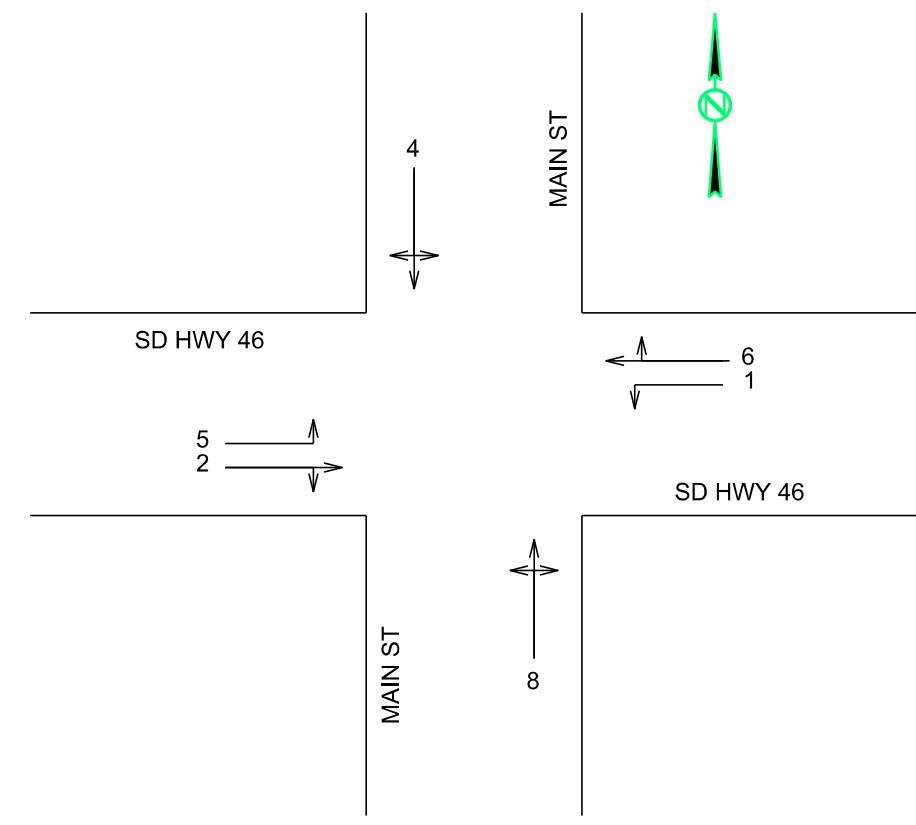
PREEMPTION				
Plan	3	4	5	6
Calls Ø	8	4	5 & 2	1 & 6
Output	CH13R	CH14R	CH15R	CH16R

TIMING PLAN 1	
Time of Day (TOD)	Pattern (C/S/O)
06:00	Free
23:00	Flash

WEEKLY PROGRAM							
	Sun	Mon	Tue	Wed	Thu	Fri	Sat
Timing Plan	1	1	1	1	1	1	1



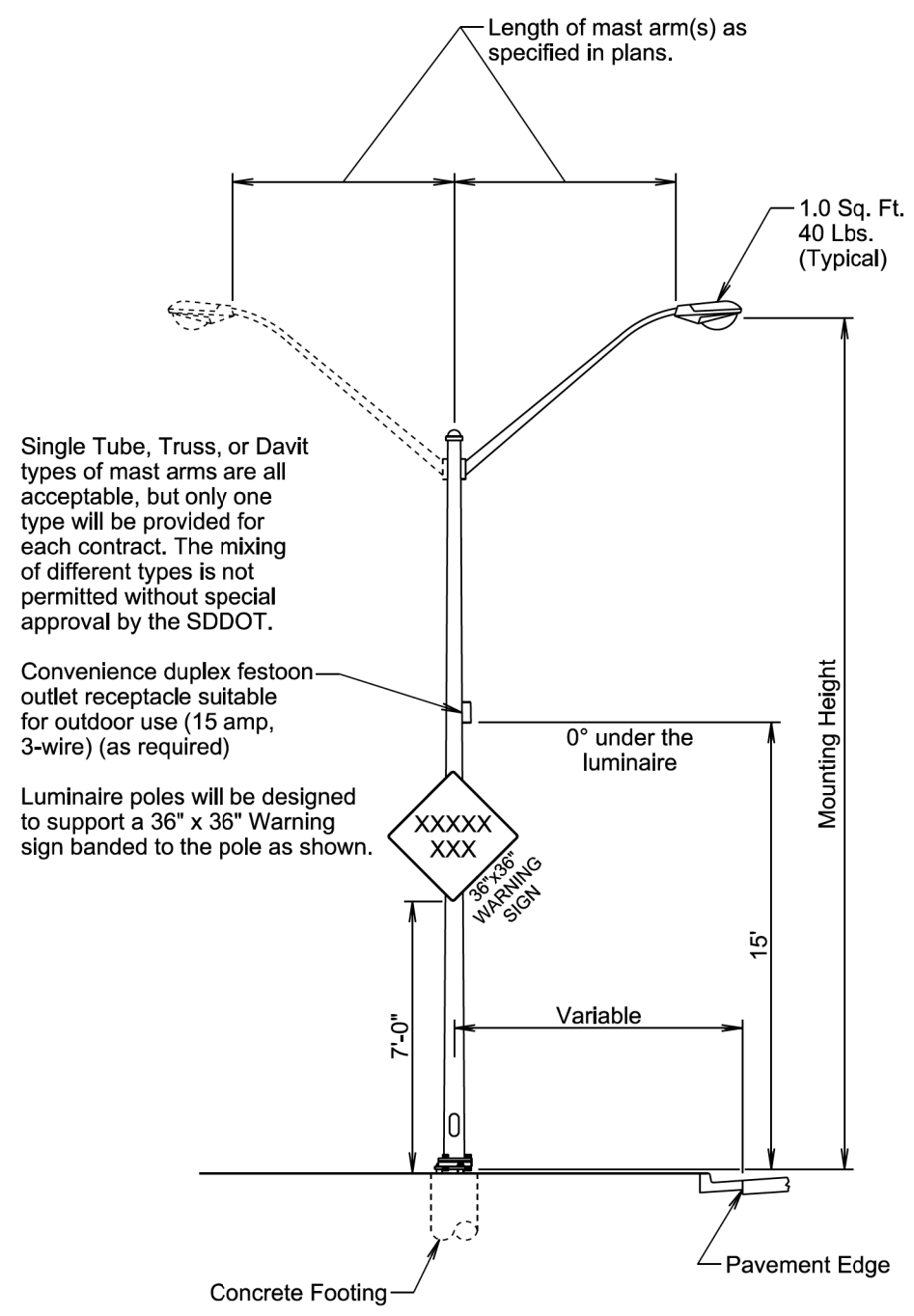
DETECTOR TABLE															
Local Detector	Controller Detector #	Phase Called (Call/Call Locking/Extend)												Controller Settings	
		1	2	3	4	5	6	7	8	9	10	11	12	Extend	Delay
V1	1				C/E										
V2	2					C/E									
V3	3	C/E													
V4	4							C/E							
V5	5		C/E												
V6	6				C/E										



Plot Scale - 1"=40'

Plotted From - TRPR17199

File - U:\trproj\cmix05\1007\time.dgn



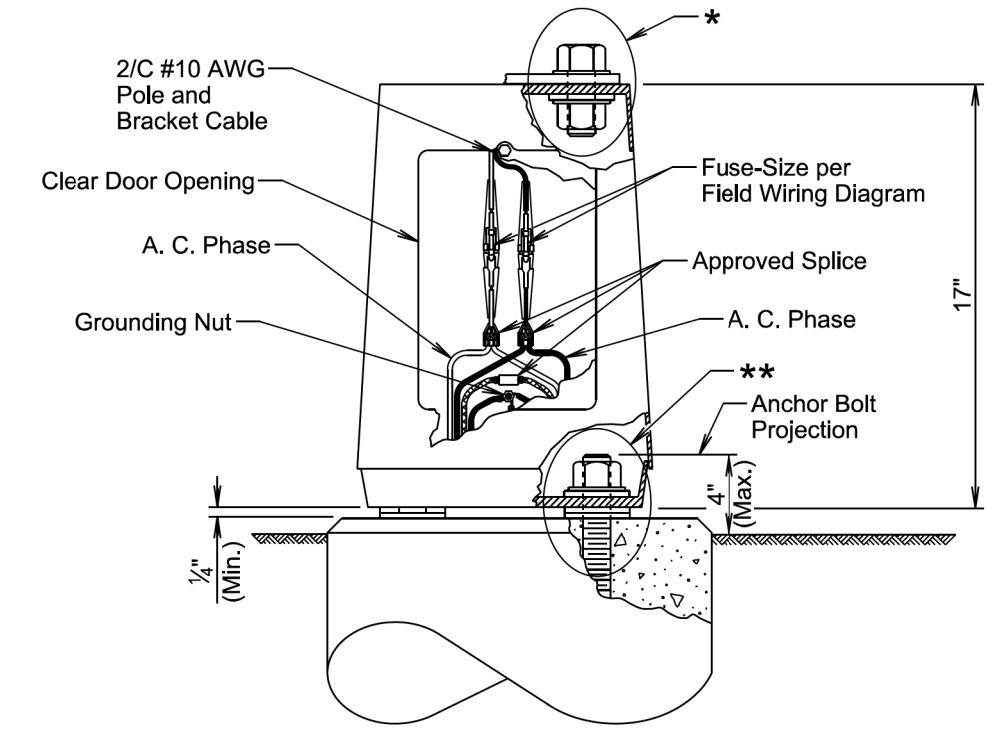
Single Tube, Truss, or Davit types of mast arms are all acceptable, but only one type will be provided for each contract. The mixing of different types is not permitted without special approval by the SDDOT.

Convenience duplex festoon outlet receptacle suitable for outdoor use (15 amp, 3-wire) (as required)

Luminaire poles will be designed to support a 36" x 36" Warning sign banded to the pole as shown.

November 19, 2022

<i>Published Date: 2025</i>	<b>S D D O T</b>	<b>STEEL ROADWAY LUMINAIRE POLE WITH MAST ARM(S)</b>	PLATE NUMBER <b>635.01</b>
			Sheet 1 of 1



**GENERAL NOTES:**

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

Fused connectors will be breakaway type.

\* Hardware connecting the pole to the base will be installed in accordance with the manufacturer's recommendation.

\*\* Hardware connecting the base to the footing will be installed in accordance with the manufacturer's recommendation. The Contractor will install leveling devices in accordance with the manufacturer's recommendation if shimming is necessary to install the light poles plumb and level. The washers and shims will be installed around the anchor bolts.

November 19, 2022

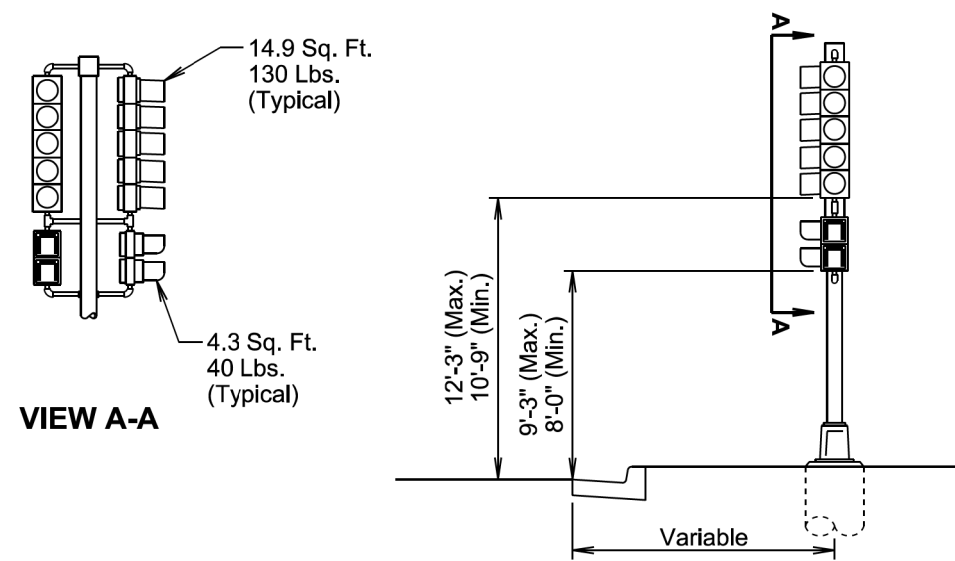
<i>Published Date: 2025</i>	<b>S D D O T</b>	<b>ROADWAY LUMINAIRE POLE BREAKAWAY TRANSFORMER BASE</b>	PLATE NUMBER <b>635.21</b>
			Sheet 1 of 1

Plot Scale - 1:200

Plotted From - TRPR17199

File - ...acmix05\N\Std\Plates\SectionL.dgn

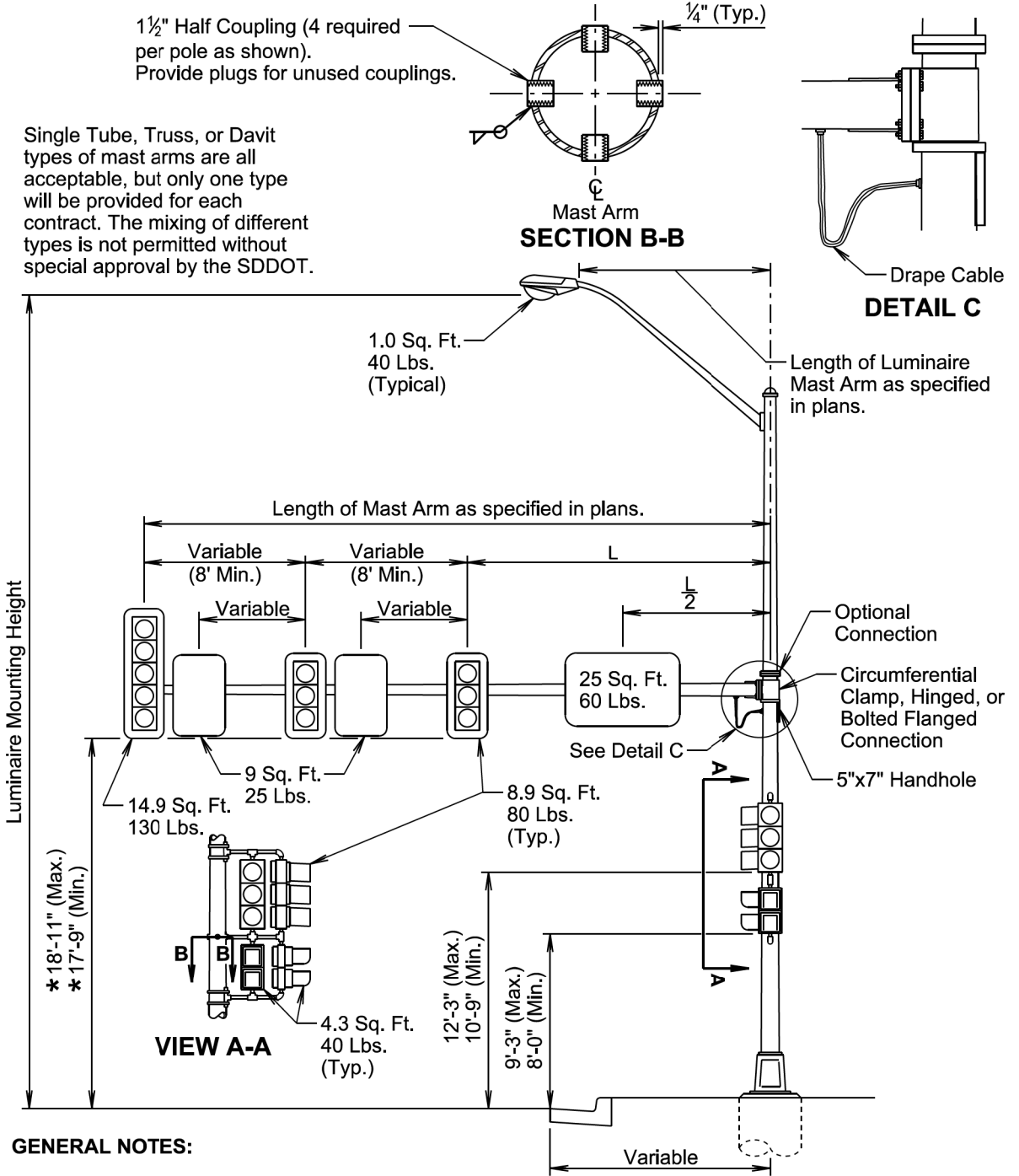




**GENERAL NOTE:**  
The signal heads are shown with backplates removed so that the mounting hardware is visible.

November 19, 2022

<i>Published Date: 2025</i>	<b>S D D O T</b>	<b>SIGNAL POLE (PEDESTAL)</b>	PLATE NUMBER <b>635.30</b>
			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.

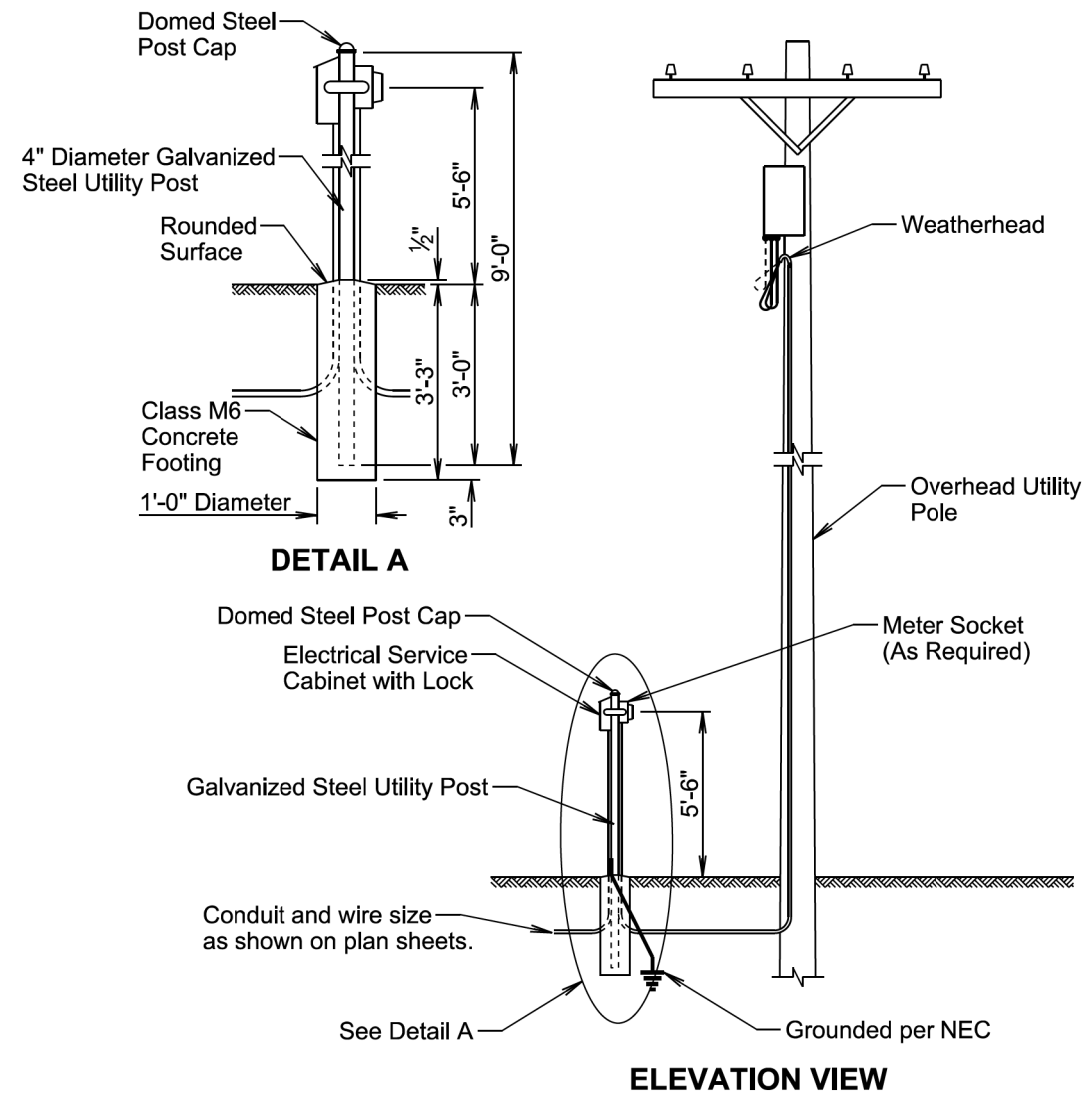
November 19, 2022

<i>Published Date: 2025</i>	<b>S D D O T</b>	<b>SIGNAL POLE (WITH MAST ARM AND LUMINAIRE EXTENSION)</b>	PLATE NUMBER <b>635.32</b>
			Sheet 1 of 1

Plot Scale - 1:200

Plotted From - TRPR17199

File - ...Acmix05\N\Std\Plates\SectionL.dgn



**GENERAL NOTES:**

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

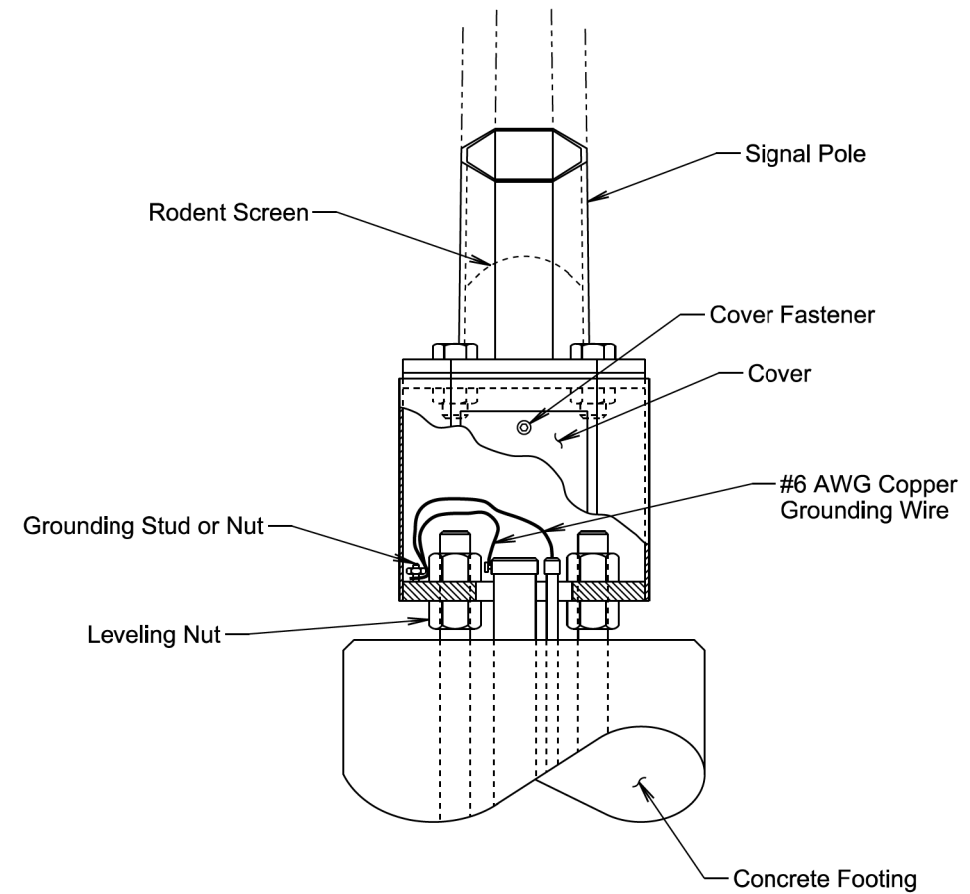
The 4" diameter galvanized steel utility post will be 9' long and will be in conformance with AASHTO Standard Specifications M181. The post will be Type 1 and either Grade 1 or Grade 2. The domed steel post cap will be in conformance with AASHTO Standard Specifications M181 and will be Type 1.

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

<i>Published Date: 2025</i>	S D D O T	GALVANIZED STEEL UTILITY POST WITH OVERHEAD UTILITY POLE	PLATE NUMBER 635.35
			Sheet 1 of 1



**GENERAL NOTES:**

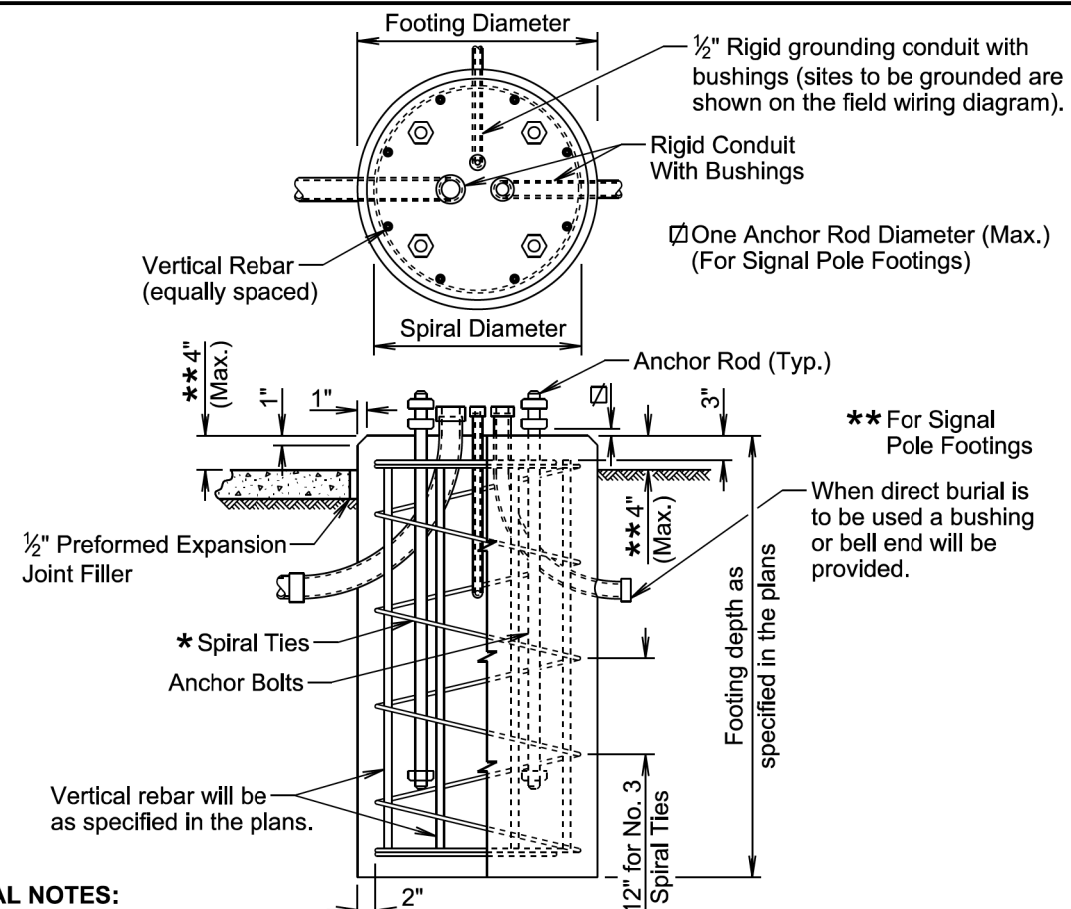
Base details are provided for example only and are not intended to be a complete design.

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

<i>Published Date: 2025</i>	S D D O T	TRANSFORMER SIGNAL POLE BASE	PLATE NUMBER 635.50
			Sheet 1 of 1

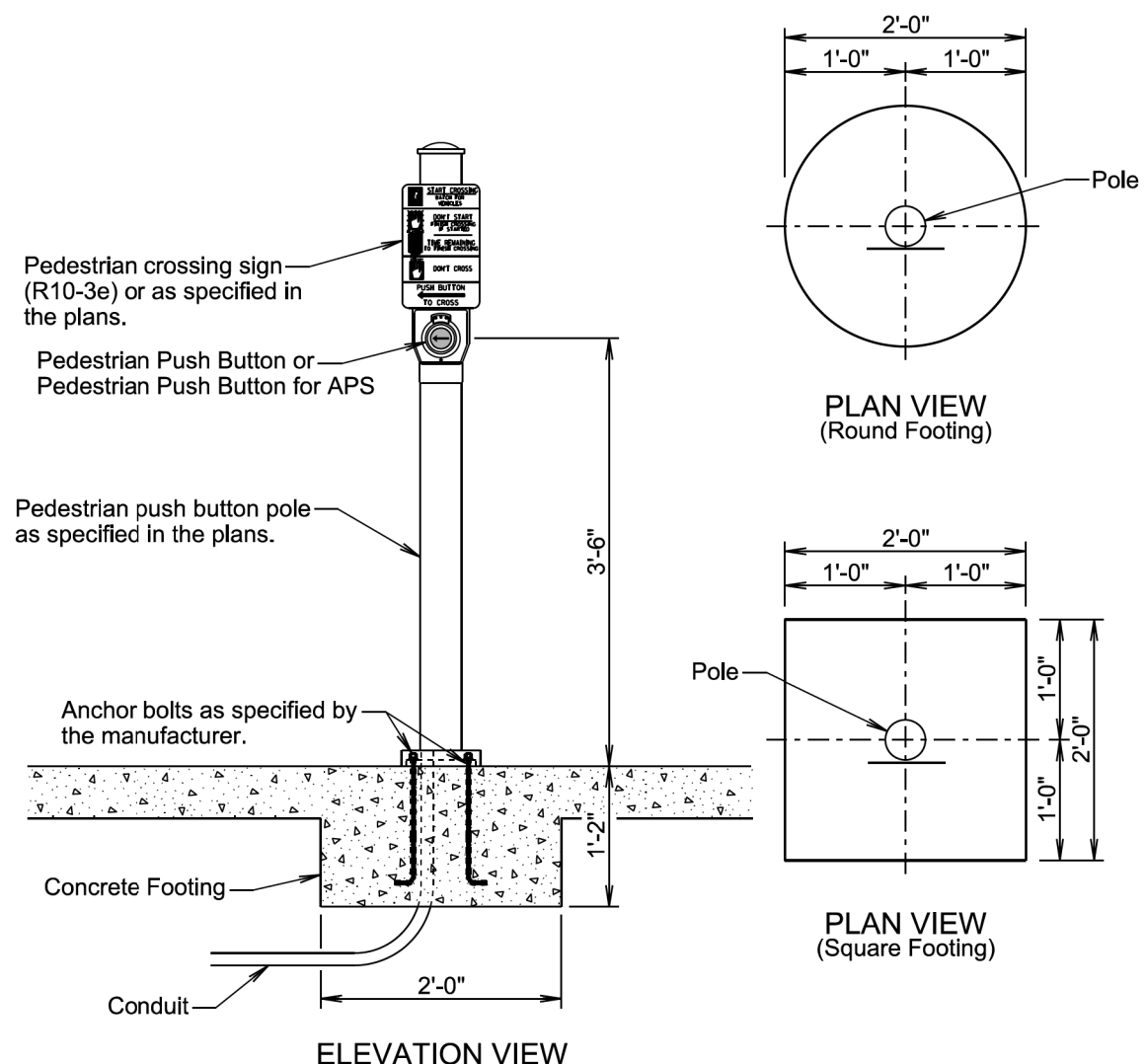


**GENERAL NOTES:**

- \* 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: 2025</b>	<b>S D D O T</b>	<b>POLE FOOTING</b>	PLATE NUMBER <b>635.55</b>
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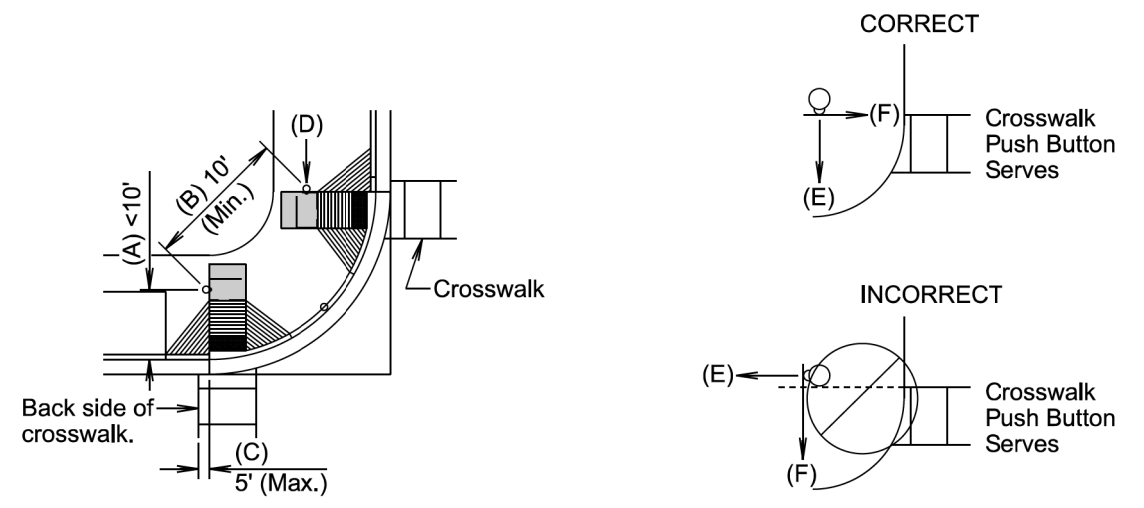


**GENERAL NOTES:**

- 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".

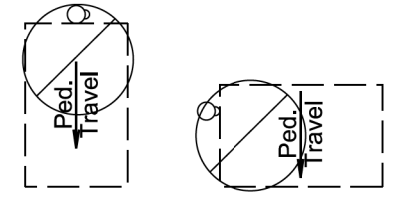
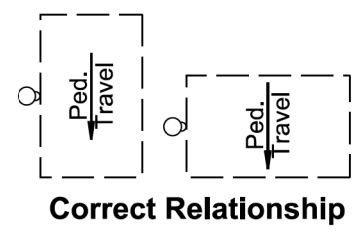
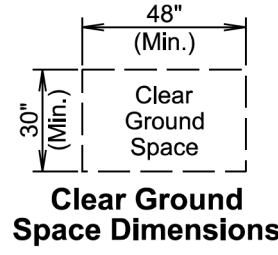
May 9, 2020

<b>Published Date: 2025</b>	<b>S D D O T</b>	<b>PEDESTRIAN PUSH BUTTON POLE</b>	PLATE NUMBER <b>635.57</b>
			Sheet 1 of 2



**Push Button Relationship To Curb Ramp And Crosswalk**

**Push Button Orientation To Crosswalk**



**Incorrect Relationship**  
Clear space not adjacent to push button  
Push button not centered on clear space

**General Notes:**

Pedestrian Push Buttons Location and Orientation Requirements:

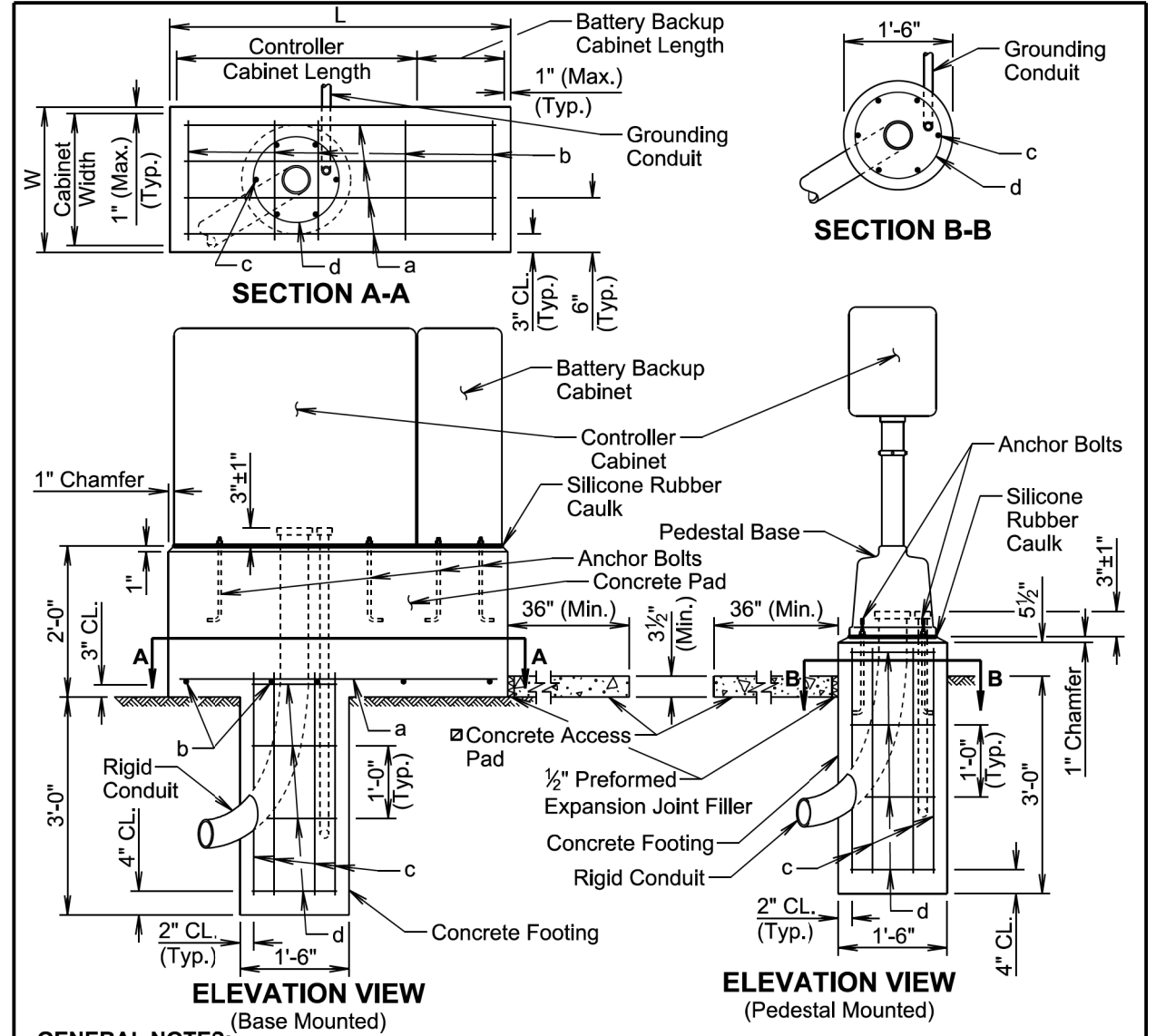
- (A) Within 10 feet from the front face of curb.
- (B) Where two push buttons are provided, the push buttons should have at least 10 feet of separation from each other.
- (C) If two curb ramps are used, the push button should be within 5 feet of the backside of the crosswalk.
- (D) The push button should 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 50:1 (2%) 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.

May 9, 2020

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

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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.	<p>Type T3</p>
b	*	3	W-4"	Str.	
c	6	6	3'-0"	Str.	
d	4	3	4'-0"	T3	

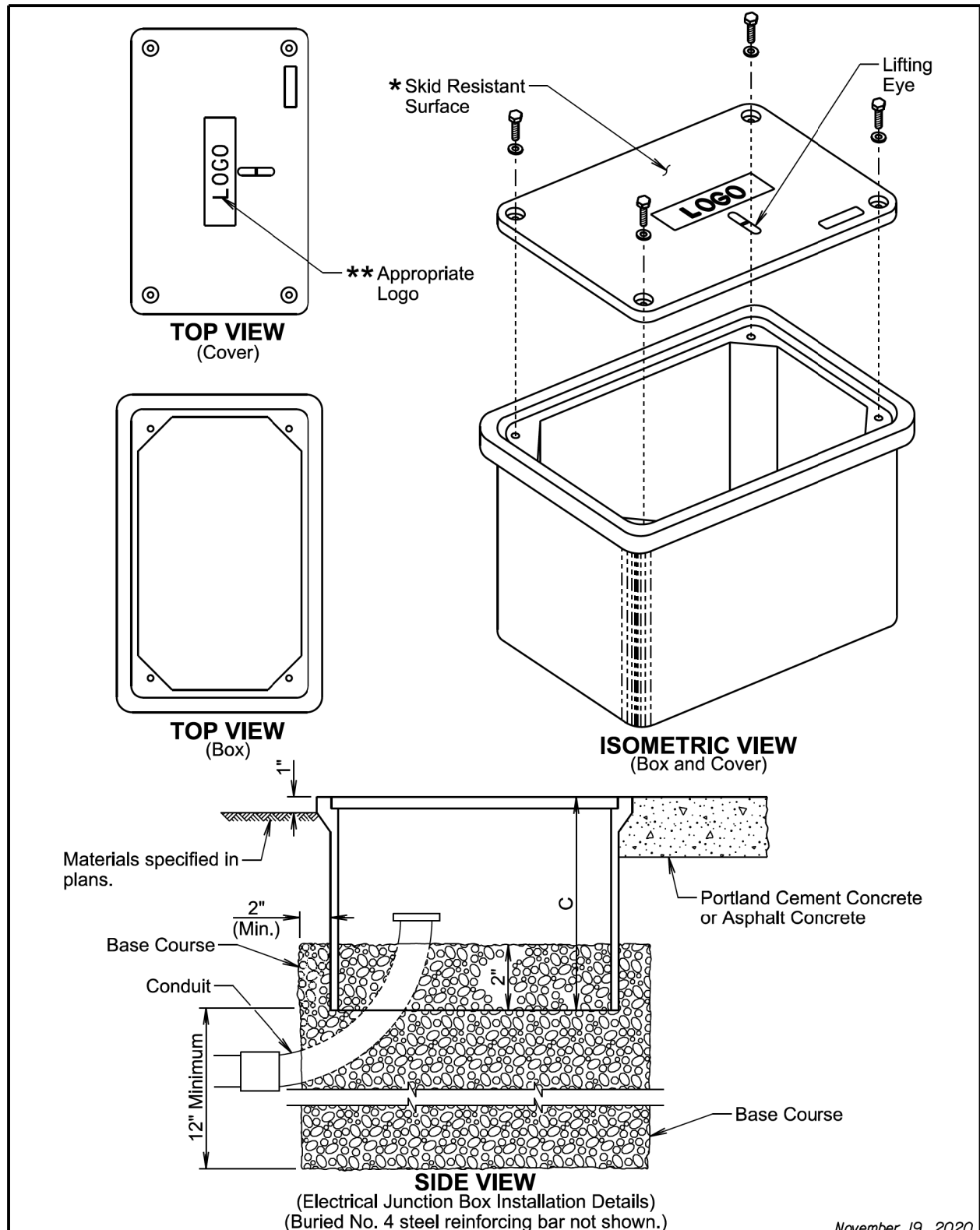
Note: Dimensions are out to out of bar  
\* Vary number of bars as required by footing size.

November 19, 2022

<b>S D D O T</b>	<b>CONTROLLER CABINET AND FOOTING</b>	PLATE NUMBER <b>635.60</b>
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Published Date: 2025

Plot Scale - 1:200



November 19, 2020

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

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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".

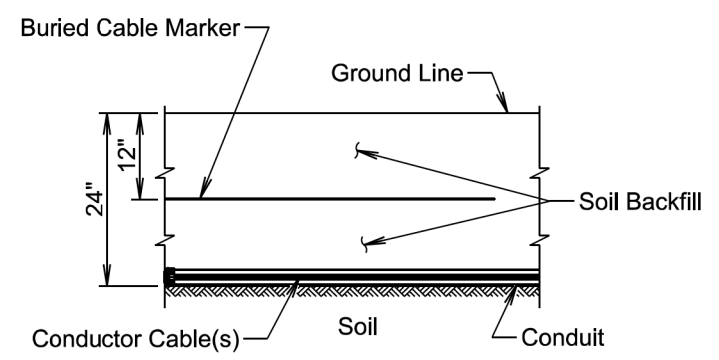
November 19, 2020

<b>S D D O T</b>	<b>ELECTRICAL JUNCTION BOXES TYPE 1 THROUGH TYPE 4</b>	PLATE NUMBER 635.65
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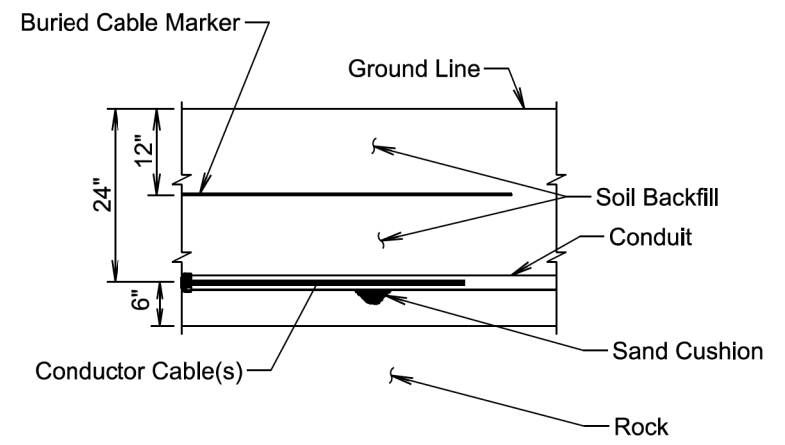
Published Date: 2025

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**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.

November 19, 2022

<i>Published Date: 2025</i>	<b>S D D O T</b>	<b>CONDUIT INSTALLATION</b>	PLATE NUMBER <b>635.76</b>
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