

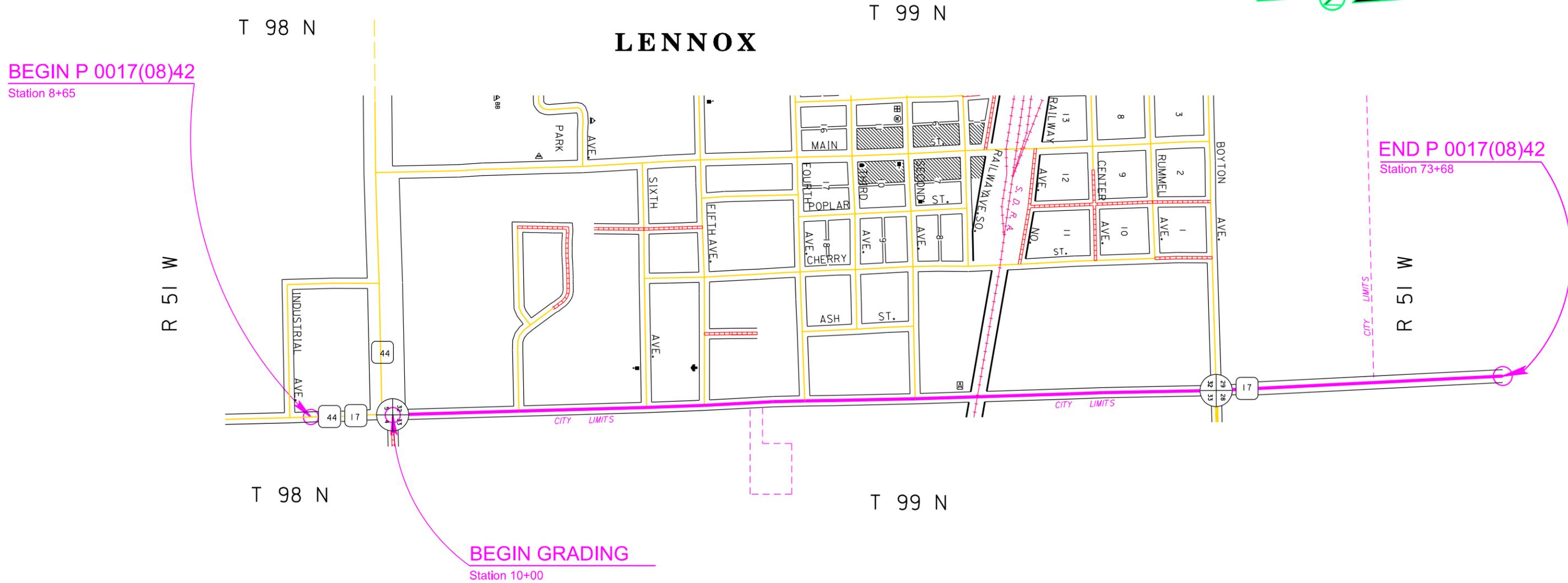
# Section L: Lighting Plans

STATE OF SOUTH DAKOTA	PROJECT P 0017(08)42	SHEET L1	TOTAL SHEETS L23
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Plotting Date: 08/06/2015

## INDEX OF SHEETS

- L1 General Layout With Index
- L2 - L4 Estimate With General Notes & Tables
- L5 - L16 Conduit Layouts
- L17 - L18 Wiring Diagrams
- L19 - L23 Standard Plates



Plot Scale - 1"=40'

Plotted From - trpr14341

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## SECTION L ESTIMATE OF QUANTITIES

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
635E0050	Breakaway Base Luminaire Pole with Arm, 50' Mounting Height	29	Each
635E3340	Roadway Luminaire, 400 Watt with Photoelectric Cell	29	Each
635E5020	2' Diameter Footing	232	Ft
635E5302	Type 2 Electrical Junction Box	17	Each
635E8120	2" Rigid Conduit, Schedule 40	6,680	Ft
635E8130	3" Rigid Conduit, Schedule 40	240	Ft
635E8220	2" Rigid Conduit, Schedule 80	335	Ft
635E8230	3" Rigid Conduit, Schedule 80	850	Ft
635E9011	1/C #1 AWG Copper Wire	7,760	Ft
635E9013	1/C #3 AWG Copper Wire	7,120	Ft
635E9016	1/C #6 AWG Copper Wire	34,620	Ft
635E9710	2/C #10 AWG Copper Pole and Bracket Cable	1,885	Ft
635E5400	Electrical Service Cabinet	2	Each
250E0010	Incidental Work	1	LS

## SUPPLYING AS BUILT PLANS

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

## INCIDENTAL WORK

Incidental work includes, but is not limited to, the restoration of all disturbed areas outside of the grading limits to the satisfaction of the Engineer.

## SHOP DRAWING AND CATALOG CUTS SUBMITTALS

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

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

[Tallon.Cazer@state.sd.us](mailto:Tallon.Cazer@state.sd.us)  
[Pete.Longman@state.sd.us](mailto:Pete.Longman@state.sd.us)

## TABLE OF FOOTING DATA

Site Designation	Footing Diameter	* Footing Depth	**Spiral Diameter	**Spiral Length	Vertical Reinforcement
L1-L29	2' - 0"	8' - 0"	1' - 8"	54' - 9"	8-#7 x 7' - 6"

\* Footing depth shall be below ground level.

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

## FOOTING DATA

The subsurface conditions within the limits of the project consist of olive brown to dark brown silt-clay down to 14.5'. Sandy-clay was located within the middle of the project (Sta. 22+50 to 37+50) at the bottom of the borings (11'-13'). Initial water levels were measured between dry and 13'. Groundwater was measured between 4.9' - 13' below the surface the next day after drilling.

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

Concrete shall not be dropped through standing water. If water is present in the excavation it shall be removed prior to concrete placement or the concrete shall be tremied. If caving occurs during dewatering the concrete shall be placed through a tremie or by means of a casing.

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

## POLES

Luminaires shall have a 50 Ft. mounting height with 8 Ft. arm.

All poles shall have a convenience duplex festoon outlet receptacle (15 amp, 3 wire) suitable for outdoor use.

All poles shall have 2- 2" steel rings located at 6 Ft. and 30 Ft. They will be used as attachment points for Christmas lights that are 30' long with a weight of 10 - 15 pounds each.

## LUMINAIRES

The accepted design for the roadway luminaires L1-L5 shall provide 1.0 and greater average maintained foot-candles and a uniformity ratio (average maintained to minimum maintained foot-candles) of 3:1 and less using the following parameters:

Setback: 5 Ft.  
 Lamp Loss Factor (LLF): 0.7  
 Width of Lighted Area: 30 Ft.  
 Spacing: 580 Ft.(290 Ft)  
 Configuration: Staggered  
 Mounting Height: 50 Ft.  
 Lamp: 400W HPS

The accepted design for the roadway luminaires L6-L-26 shall provide 1.2 and greater average maintained foot-candles and a uniformity ratio (average maintained to minimum maintained foot-candles) of 3:1 and less using the following parameters:

Setback: 5 Ft.  
 Lamp Loss Factor (LLF): 0.7  
 Width of Lighted Area: 40-45 Ft.  
 Spacing: 480 Ft.(240 Ft)  
 Configuration: Staggered  
 Mounting Height: 50 Ft.  
 Lamp: 400W HPS

The accepted design for the roadway luminaires L27-L29 shall provide 1.0 and greater average maintained foot-candles and a uniformity ratio (average maintained to minimum maintained foot-candles) of 3:1 and less using the following parameters:

Setback: 5 Ft.  
 Lamp Loss Factor (LLF): 0.7  
 Width of Lighted Area: 40 Ft.  
 Spacing: 580 Ft. (290 Ft)  
 Configuration: Staggered  
 Mounting Height: 50 Ft.  
 Lamp: 400W HPS

The following luminaires meet the requirements for this design:

- a.) Hubbell: Test No. HP03018.IES High Pressure Sodium, Medium, semi-cutoff, Type II
- b.) Cooper Lighting: Test No. OYV4S2E High Pressure Sodium, Medium, semi-cutoff, Type II

Luminaires shall be High Pressure Sodium, medium, semi-cutoff, type II.

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

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

# TABLE OF CONDUIT AND CABLE QUANTITIES

Location to Location	Rigid Conduit				Copper Wire			Pole and Bracket Cable	
	Schedule 40		Schedule 80		1/C #1 AWG Ft	1/C #3 AWG Ft	1/C #6 AWG Ft	2/C #10 AWG Ft	
	2"	3"	2"	3"					
<b>SD HWY 17</b>									
L1	JL1	315					1,950		
JL1	L2			75			465		
JL1	L3	290					2,095		
L3	JL2			150			1,085		
JL2	L4	75					465		
JL2	JL3			80			580		
JL3	L5	135					975		
L5	JL4	260					1,875		
JL4	L6			70			435		
JL4	L7	250				775	1,030		
L7	JL5	255				790	1,055		
JL5	L8			70			435		
JL5	L9	250				775	1,030		
L9	JL6	200				620	825		
JL6	JL7			70		435	580		
JL7	L10	65				205	205		
JL7	SERVICE CABINET		45			280	375		
JL6	L11	300				930	1,240		
L11	JL8	250				775	1,030		
JL8	L12			70			435		
JL8	L13	255				790	1,055		
L13	JL9	240				745	990		
JL9	L14			65			405		
JL9	L15	250					1,805		
L15	JL10	235					1,695		
JL10	L16			65			405		
JL10	L17	265					1,915		
L17	JL11	250					1,805		
JL11	L18			70			435		
JL11	L19	255					1,580		
L20	JL12		70			220			
JL12	L21	235				730			
L21	JL13	245				1,010			
JL13	L22		65			205			
JL13	L23	250				1,030			
L23	JL14	245				1,010			
JL14	L24		65			205			
JL14	L25	250				1,030			
L25	JL15	275				1,135			
JL15	JL16			65		270	270		
JL16	L26	35				110			
JL16	SERVICE CABINET		195			805	805		
JL15	L27	155	70				930		
L27	JL17	300					1,240		
JL17	L28		65				205		
JL17	L29	295					915		
<b>Subtotal:</b>		6,680	240	335	850	7,760	7,120	34,620	0

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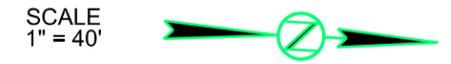
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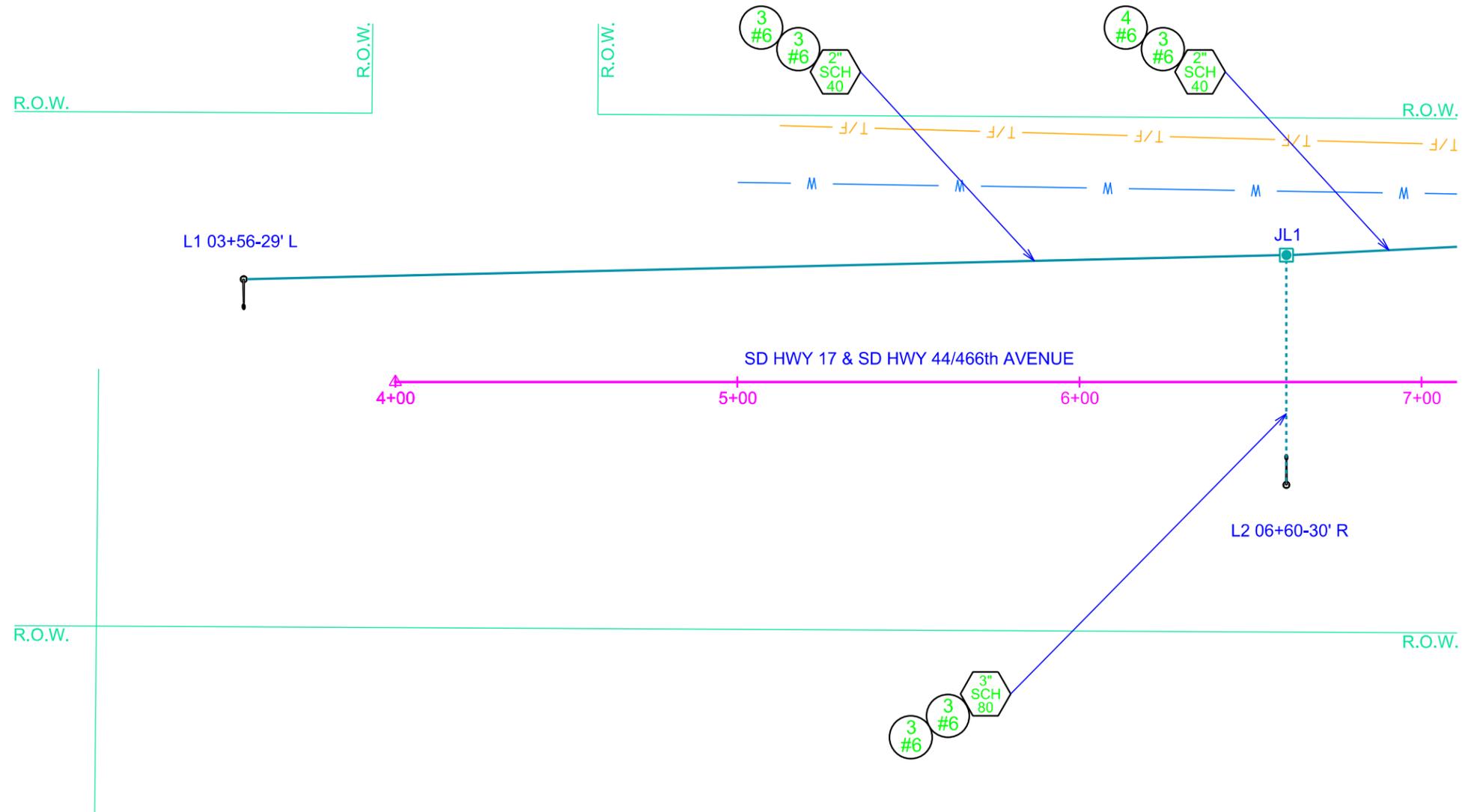
# CONDUIT LAYOUT

## SD HWY 17 AND SD HWY 44/466TH AVENUE

STATE OF SOUTH DAKOTA	PROJECT P 0017(08)42	SHEET L5	TOTAL SHEETS L23
Plotting Date: 10/20/2015		Revised Date: 10/20/2015 TC	



ESTIMATE OF QUANTITIES			
KEY	ITEM	EST QUANT	UNIT
	BREAKAWAY BASE LUMINAIRE POLE W/8' ARM 50' MT HT (L1-L29)	29	EACH
	ROADWAY LUMINAIRE, 400W WITH P.E. (L1-L29)	29	EACH
	2' DIAMETER FOOTING (L1-L29)	232	EACH
	TYPE 2 ELECTRICAL JUNCTION BOX (JL1-JL17)	17	EACH
	ELECTRICAL SERVICE CABINET	2	EACH
	GALVANIZED STEEL UTILITY POLE NOT A BID ITEM	2	EACH
	METER SOCKET NOT A BID ITEM	2	EACH
	2" RIGID CONDUIT, SCHEDULE 40	6,680	FT
	3" RIGID CONDUIT, SCHEDULE 40	240	FT
	2" RIGID CONDUIT, SCHEDULE 80	335	FT
	3" RIGID CONDUIT, SCHEDULE 80	850	FT
	1/C #1 AWG COPPER WIRE	7,760	FT
	1/C #3 AWG COPPER WIRE	7,120	FT
	1/C #6 AWG COPPER WIRE	34,620	FT
	2/C #10 AWG COPPER POLE & BRACKET CABLE	1,885	FT



Plot Scale - 1"=40'

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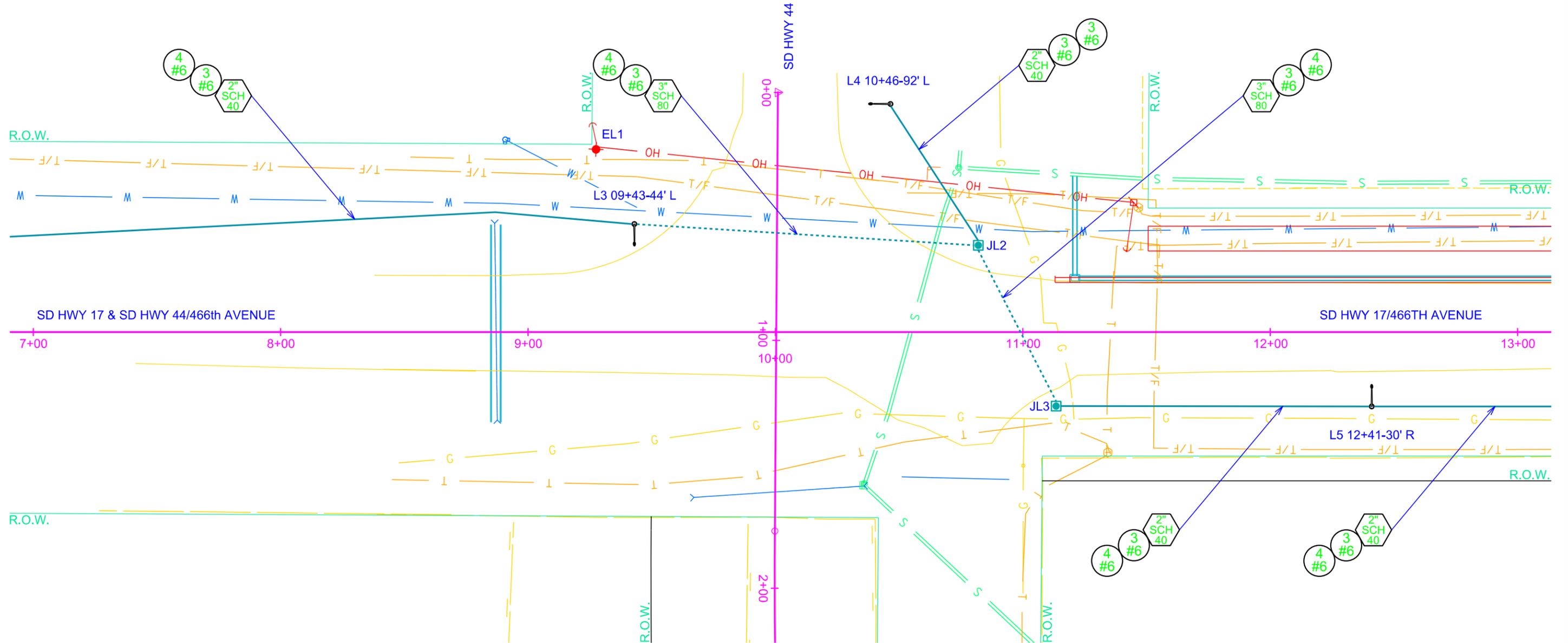
# CONDUIT LAYOUT

## SD HWY 17 AND SD HWY 44/466TH AVENUE

STATE OF SOUTH DAKOTA	PROJECT P 0017(08)42	SHEET L6	TOTAL SHEETS L23
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Plotting Date: 08/12/2015

SCALE  
1" = 40'



Plot Scale - 1"=40'

Plotted From - trp14341

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# CONDUIT LAYOUT

## SD HWY 17/466TH AVENUE

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0017(08)42	L7	L23

Plotting Date: 08/12/2015

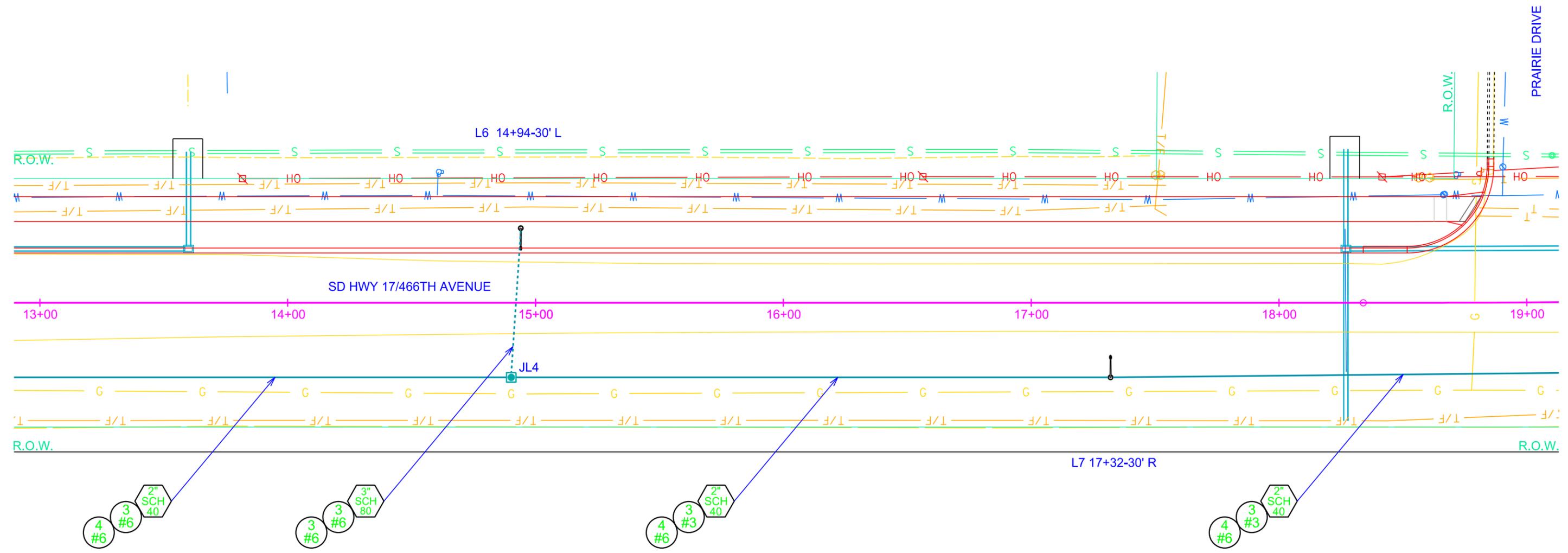
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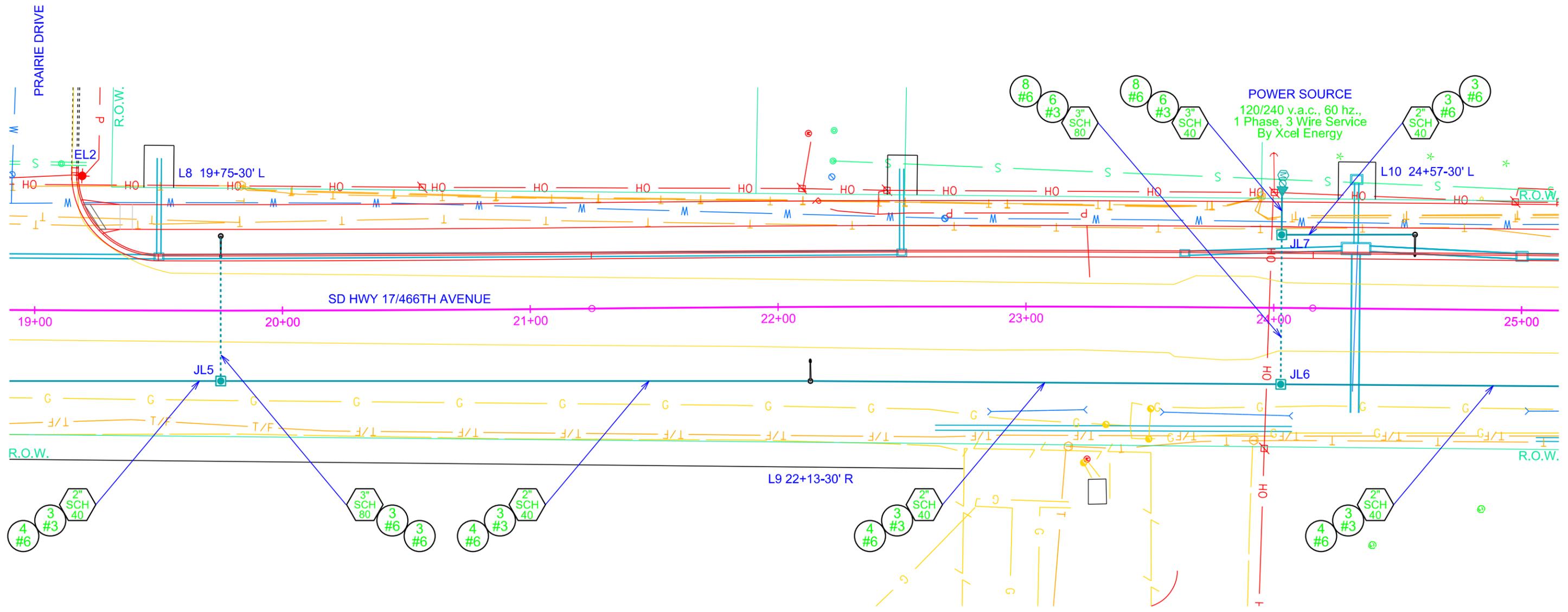


# CONDUIT LAYOUT

## SD HWY 17/466TH AVENUE

STATE OF SOUTH DAKOTA	PROJECT P 0017(08)42	SHEET L8	TOTAL SHEETS L23
Plotting Date: 10/20/2015		Revised Date: 10/20/2015 TC	

SCALE  
1" = 40'



Plot Scale - 1:40

Plotted From - trp14341

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# CONDUIT LAYOUT

## SD HWY 17/466TH AVENUE

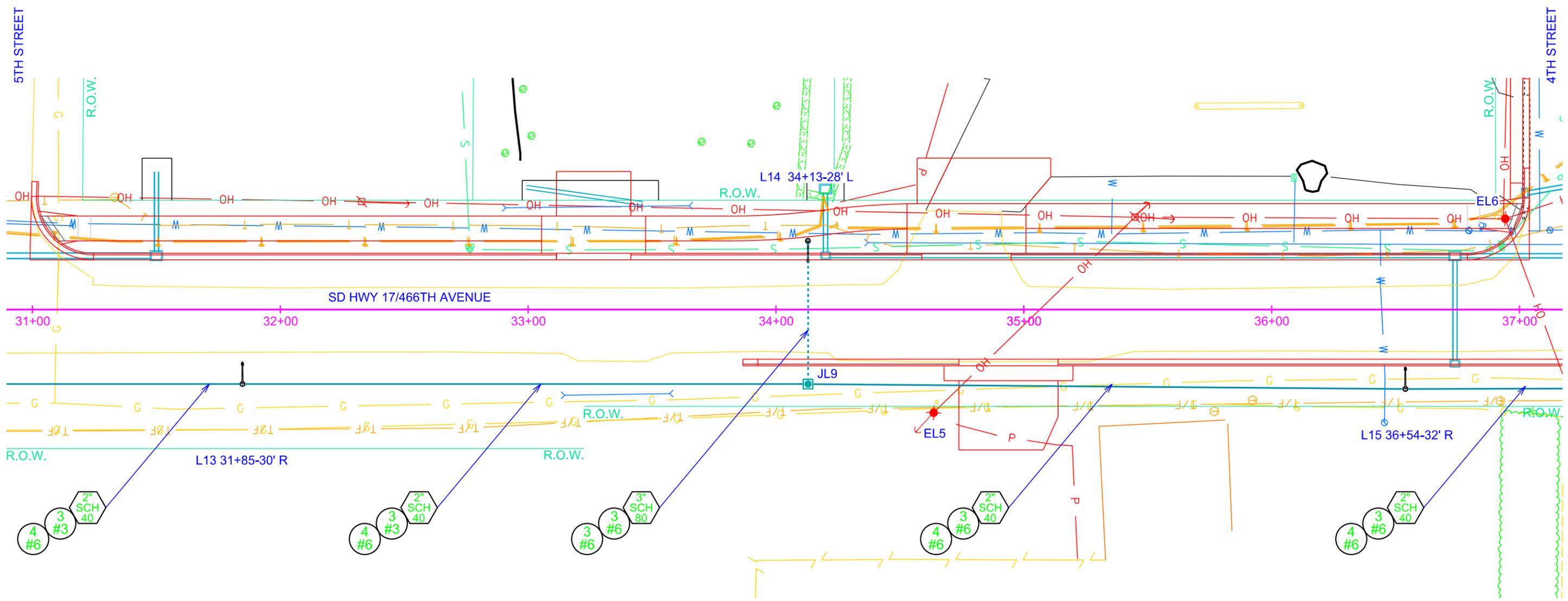
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Plotting Date: 08/12/2015

SCALE  
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Plot Scale - 1:40  
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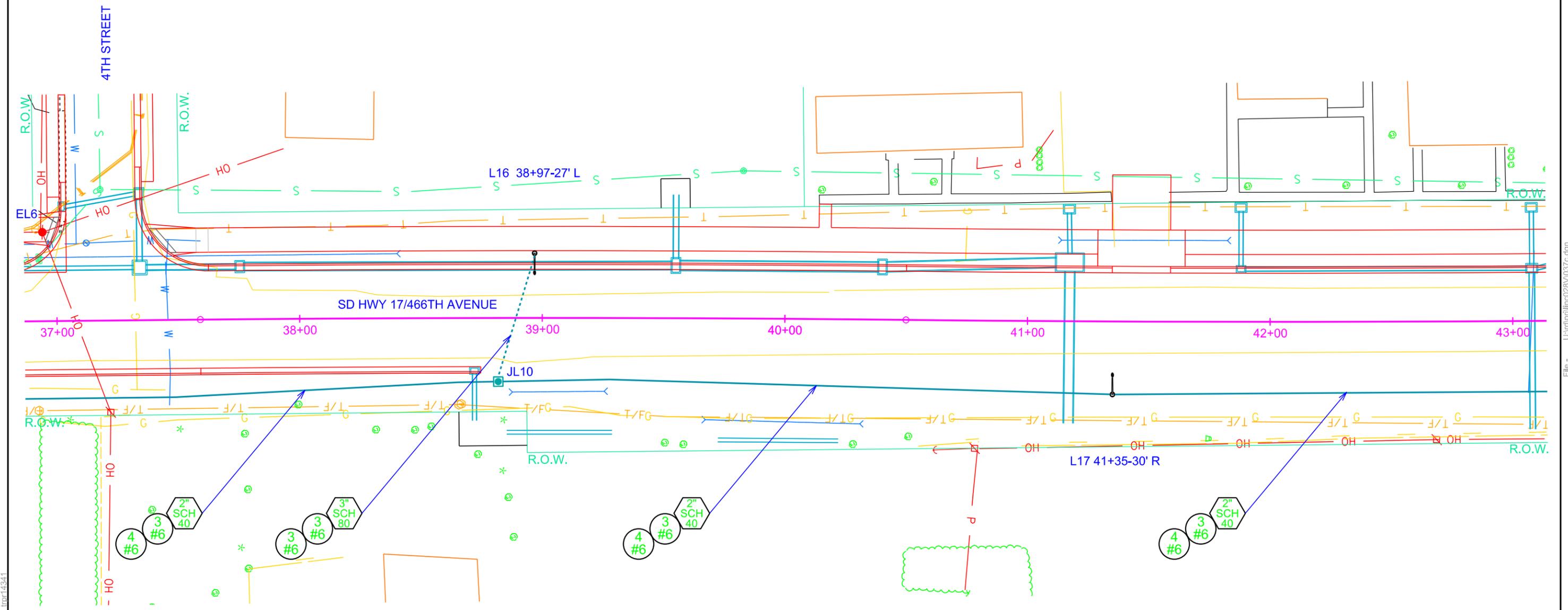
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STATE OF SOUTH DAKOTA	PROJECT P 0017(08)42	SHEET L11	TOTAL SHEETS L23
Plotting Date: 10/19/2015		Revised Date: 10/19/2015 TC	

SCALE  
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Plot Scale - 1"=40'



Plotted From - tpr14341

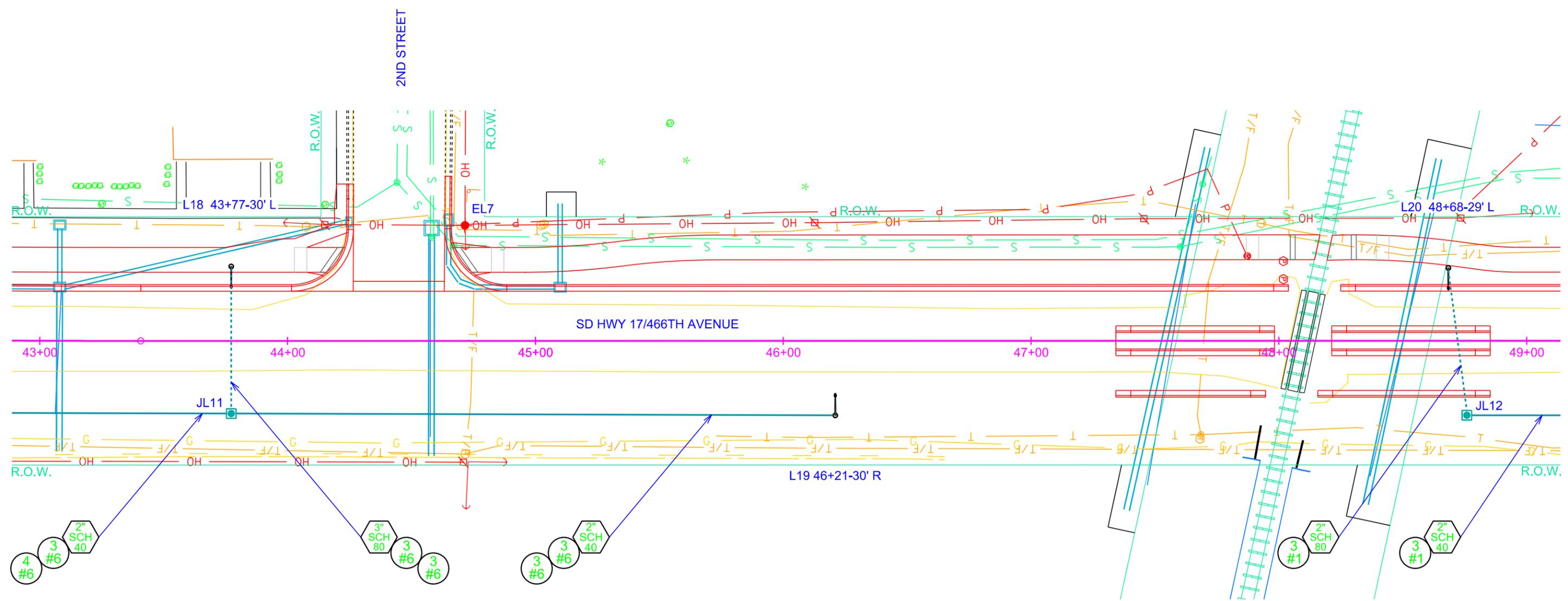
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# CONDUIT LAYOUT

## SD HWY 17/466TH AVENUE

STATE OF SOUTH DAKOTA	PROJECT P 0017(08)42	SHEET L12	TOTAL SHEETS L23
Plotting Date: 10/19/2015		Revised Date: 10/19/2015 TC	

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Plot Scale - 1:40

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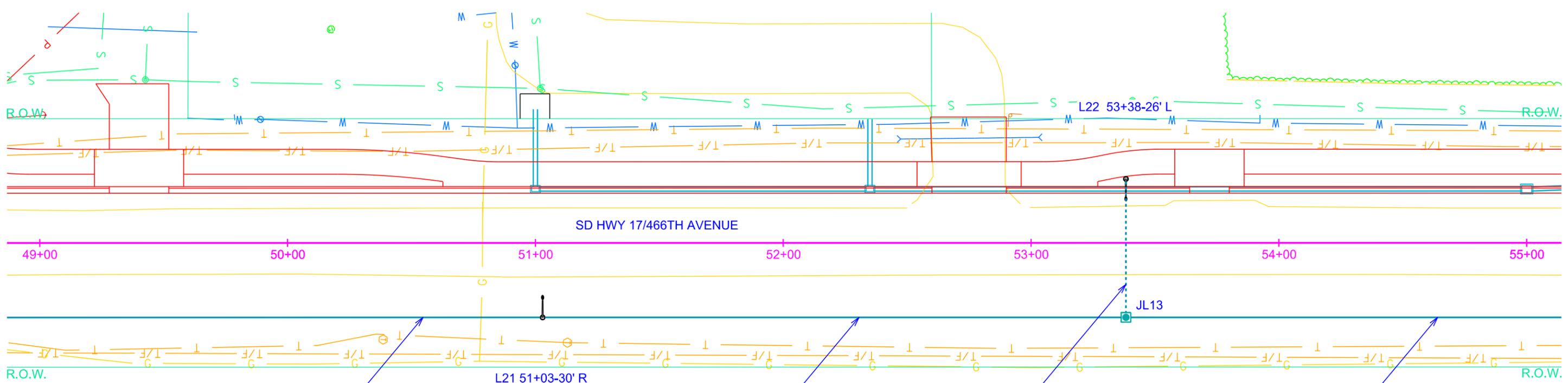
# CONDUIT LAYOUT

## SD HWY 17/466TH AVENUE

STATE OF SOUTH DAKOTA	PROJECT P 0017(08)42	SHEET L13	TOTAL SHEETS L23
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Plotting Date: 10/20/2015

SCALE  
1" = 40'



3 #1  
2" SCH 40

4 #1  
2" SCH 40

3 #1  
2" SCH 80

4 #1  
2" SCH 40

Plot Scale - 1:40

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# CONDUIT LAYOUT

## SD HWY 17/466TH AVENUE

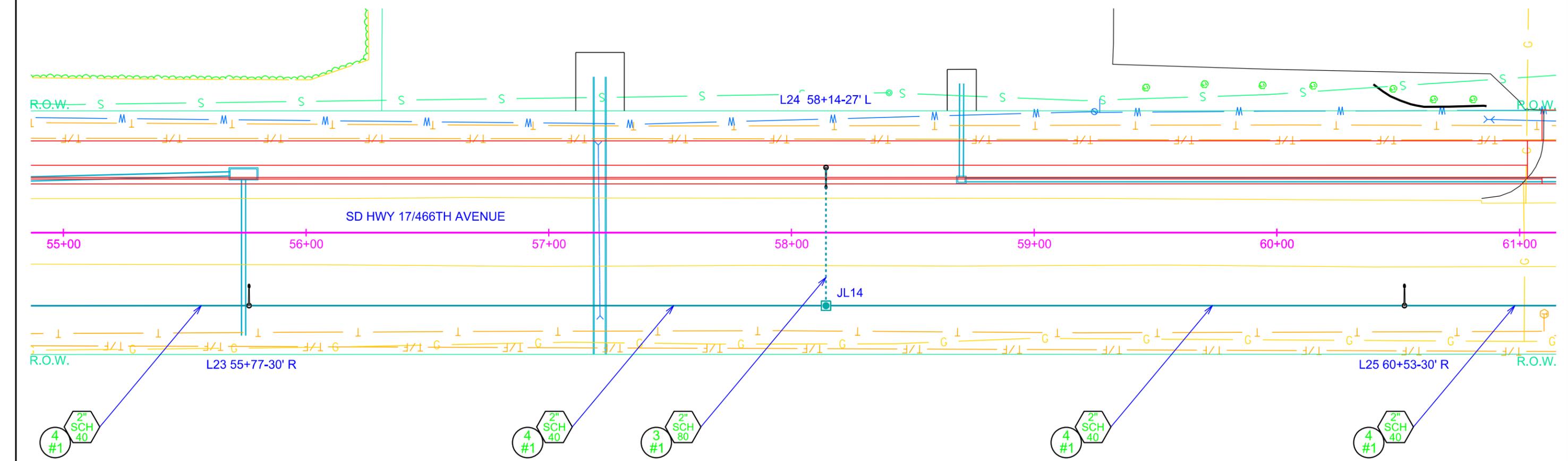
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Plotting Date: 08/12/2015

SCALE  
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Plot Scale - 1:40



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# CONDUIT LAYOUT

## SD HWY 17/466TH AVENUE

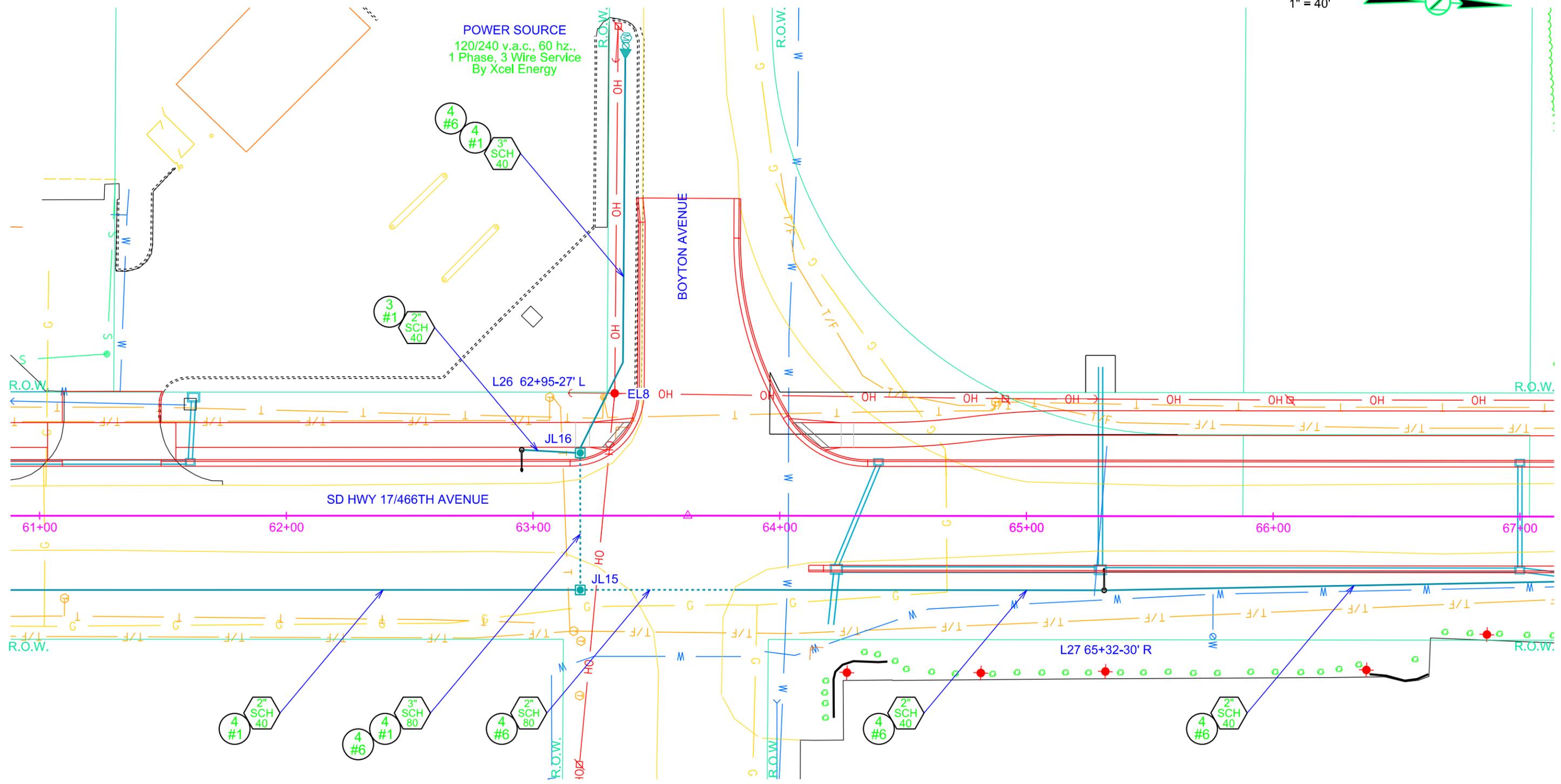
STATE OF SOUTH DAKOTA	PROJECT P 0017(08)42	SHEET L15	TOTAL SHEETS L23
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Plotting Date: 08/12/2015

SCALE  
1" = 40'



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



Plot Scale - 1:40

Plotted From - trp14341

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# CONDUIT LAYOUT

## SD HWY 17/466TH AVENUE

STATE OF SOUTH DAKOTA	PROJECT P 0017(08)42	SHEET L16	TOTAL SHEETS L23
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Plotting Date: 08/12/2015

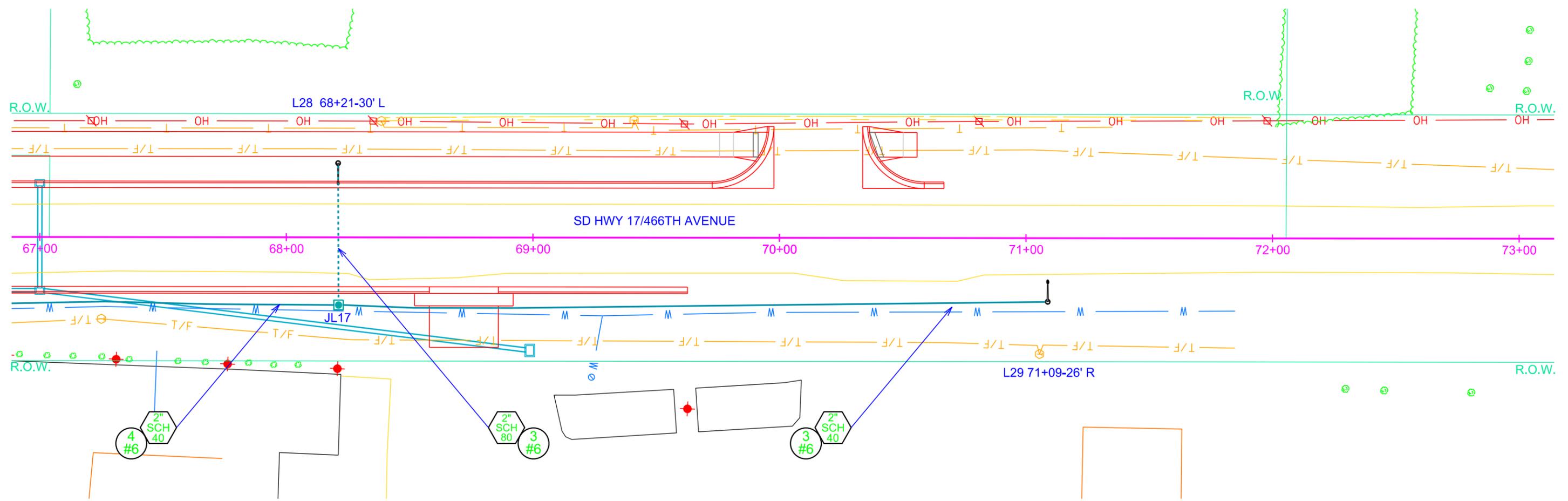
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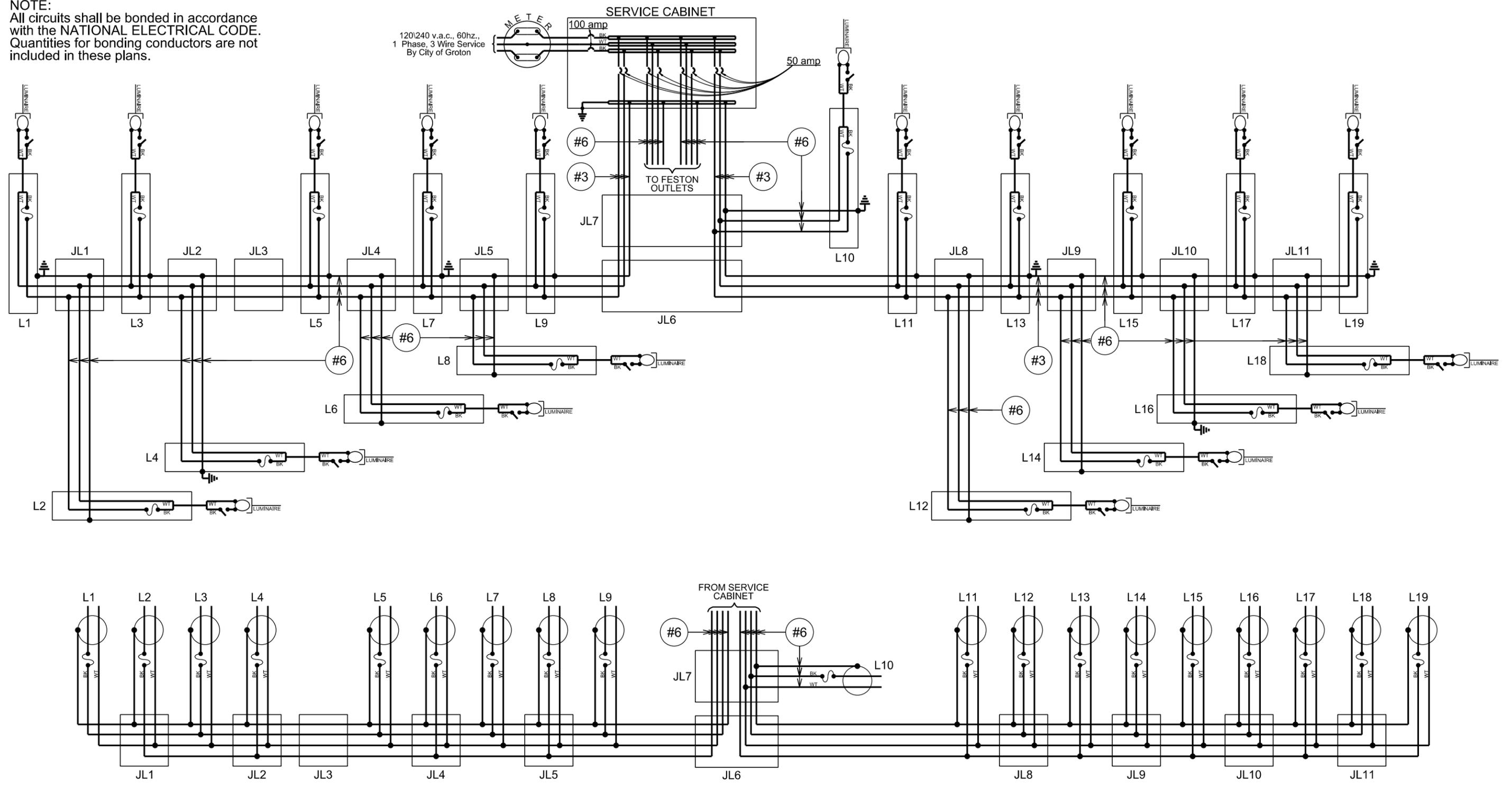


# WIRING DIAGRAM

## SD HWY 17 AND SD HWY 44/466TH AVENUE

- LEGEND:**
-  FUSE: 15 amp. Non-Time Delay or 5 6/10 amp. Dual Element
  -  LUMINAIRE: 400 watt High Pressure Sodium Lamp
  -  FESTON OUTLET

**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

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# WIRING DIAGRAM

## US HWY 212/SEVENTH AVENUE

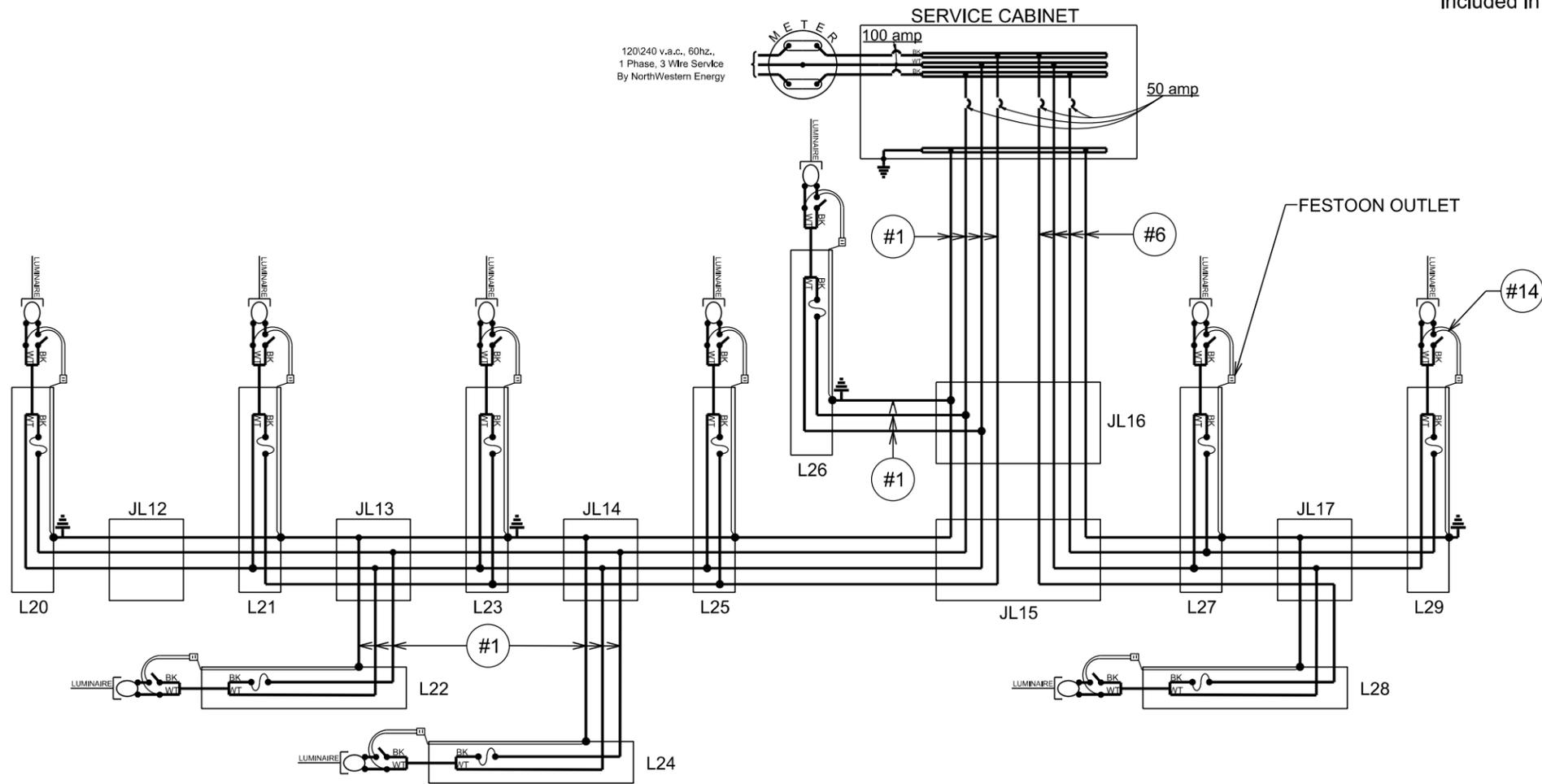
STATE OF SOUTH DAKOTA	PROJECT P 0017(08)42	SHEET L18	TOTAL SHEETS L23
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Plotting Date: 08/06/2015

**LEGEND:**

- FUSE: 15 amp. Non-Time Delay  
or  
5 6/10 amp. Dual Element
- LUMINAIRE: 400 watt High Pressure Sodium Lamp

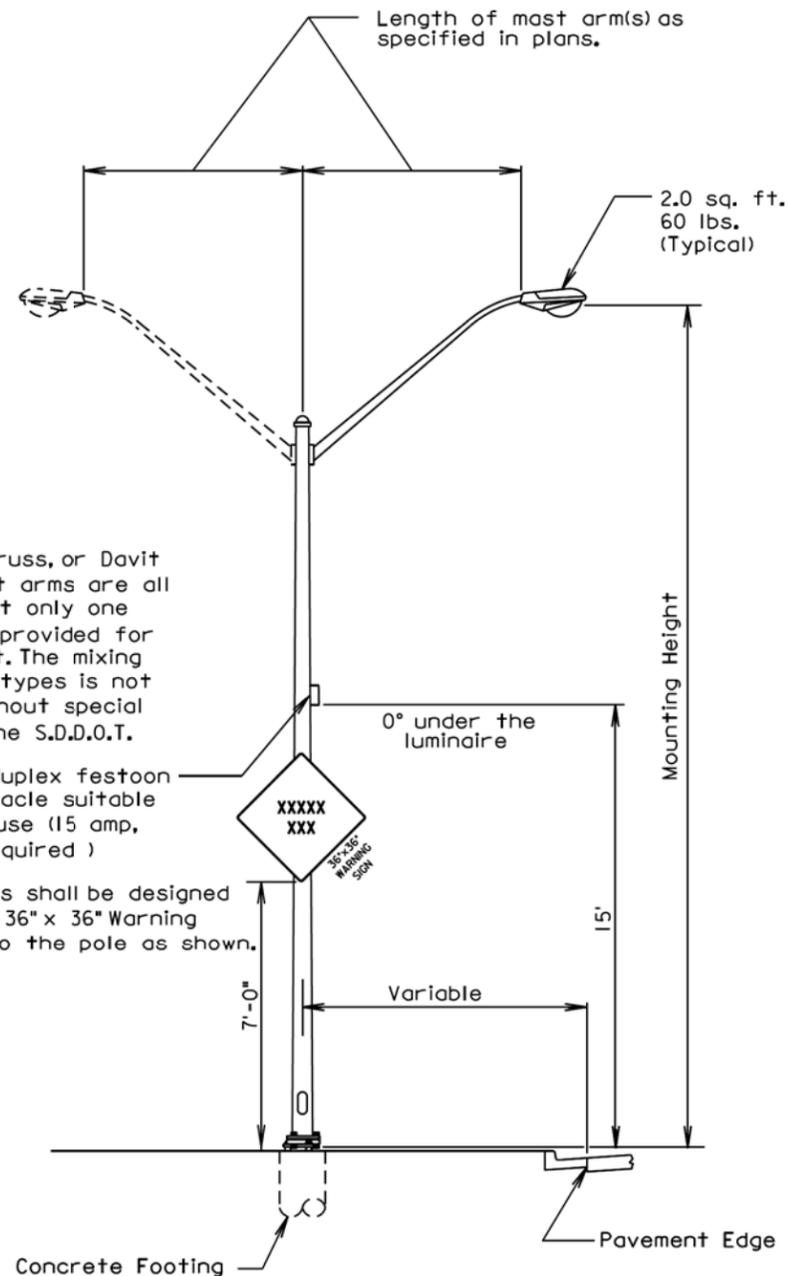
**NOTE:**  
All circuits shall be bonded in accordance with the NATIONAL ELECTRICAL CODE. Quantities for bonding conductors are not included in these plans.



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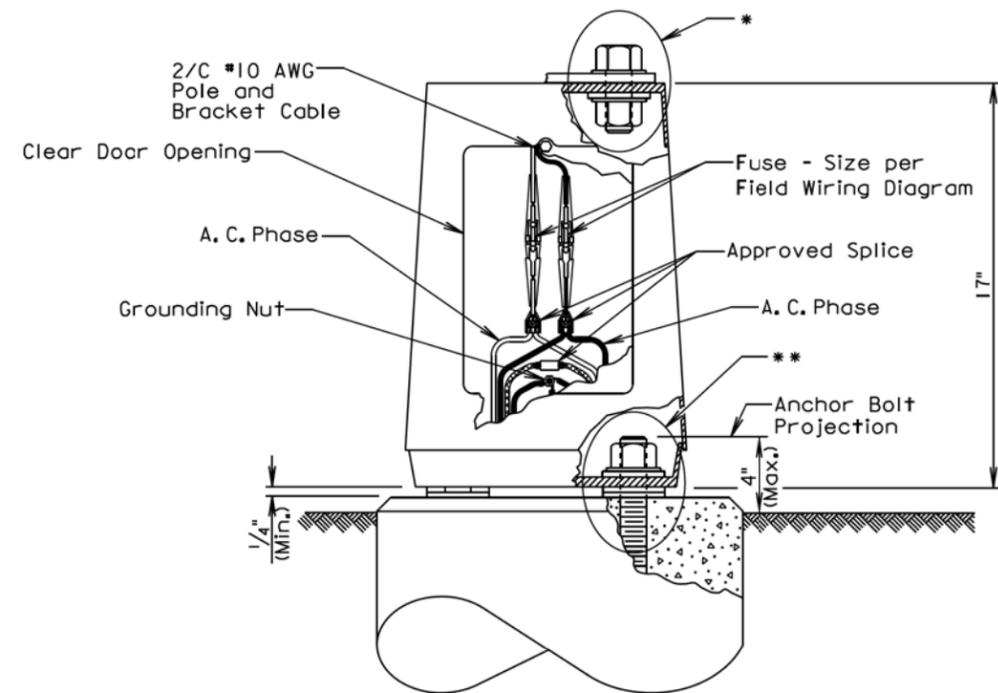
Single Tube, Truss, or Davit types of mast arms are all acceptable, but only one type shall be provided for each contract. The mixing of different types is not permitted without special approval by the S.D.D.O.T.

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

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

March 31, 2000

<b>S D D O T</b>	<b>STEEL ROADWAY LUMINAIRE POLE WITH MAST ARM(S)</b>	PLATE NUMBER 635.01
	Published Date: 4th Qtr. 2015	Sheet 1 of 1



**GENERAL NOTES:**

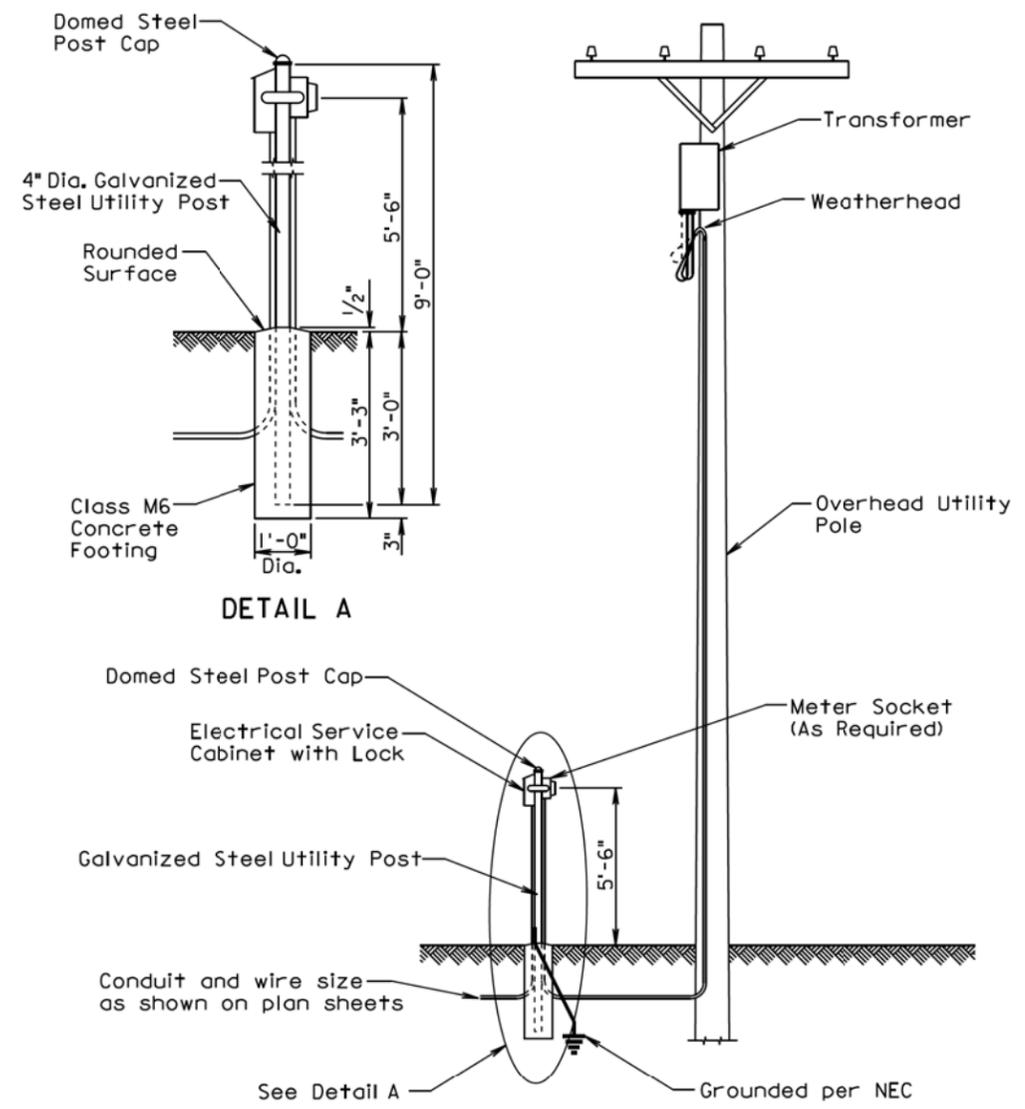
Base details are provided for example only and are not intended to be a complete design. Fused connectors shall be breakaway type.

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

\*\*Hardware connecting the base to the footing shall be installed in accordance with the manufacturer's recommendation. The Contractor shall 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 shall be installed around the anchor bolts.

September 6, 2015

<b>S D D O T</b>	<b>ROADWAY LUMINAIRE POLE BREAKAWAY TRANSFORMER BASE</b>	PLATE NUMBER 635.21
	Published Date: 4th Qtr. 2015	Sheet 1 of 1



**GENERAL NOTES:**

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

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

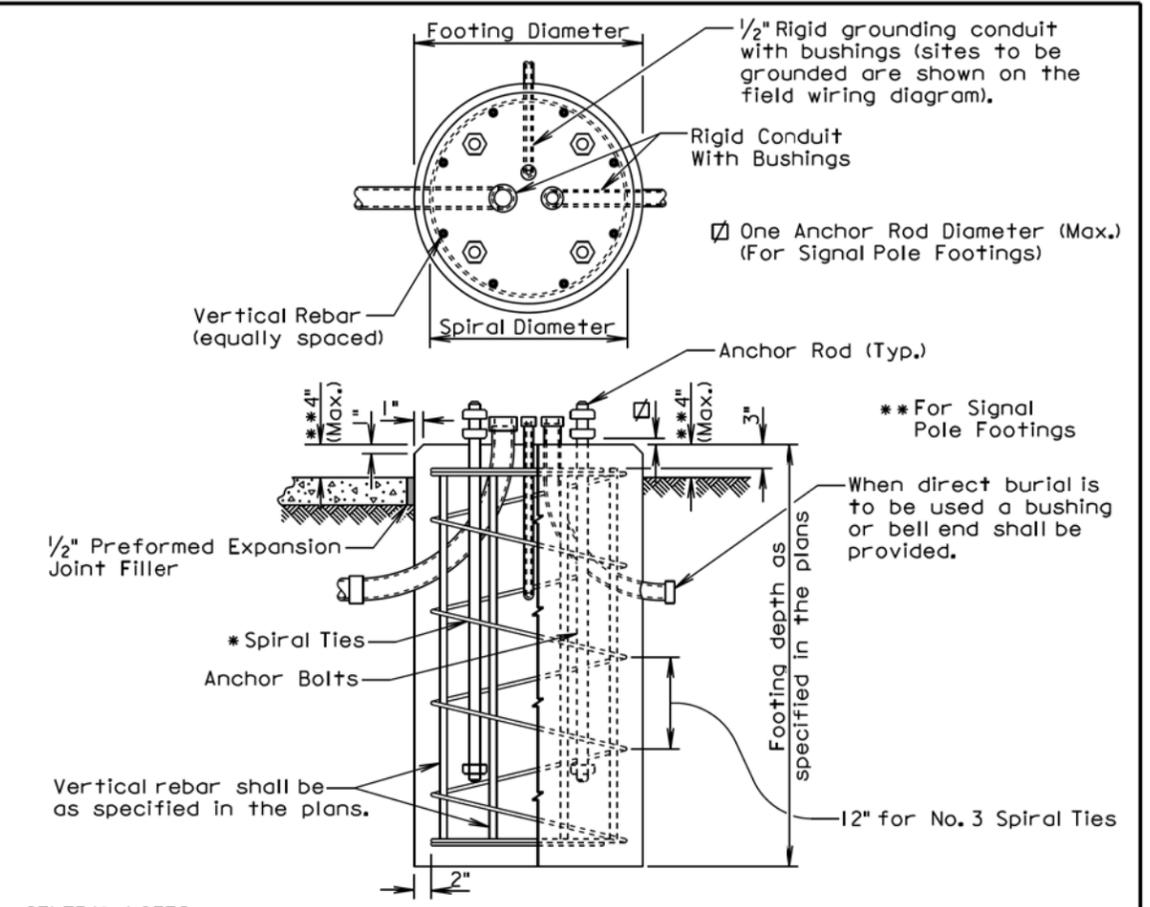
The Contractor shall contact and coordinate his/her work with the Utility Companies regarding hookup requirements, fees, materials, and equipment necessary.

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

June 26, 2006

<b>S D D O T</b>	<b>GALVANIZED STEEL UTILITY POST WITH OVERHEAD UTILITY POLE</b>	PLATE NUMBER <b>635.35</b>
		Sheet 1 of 1

Published Date: 3rd Qtr. 2015



**GENERAL NOTES:**

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

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

See Section 985 of the Specifications for footing materials.

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

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

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

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

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

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

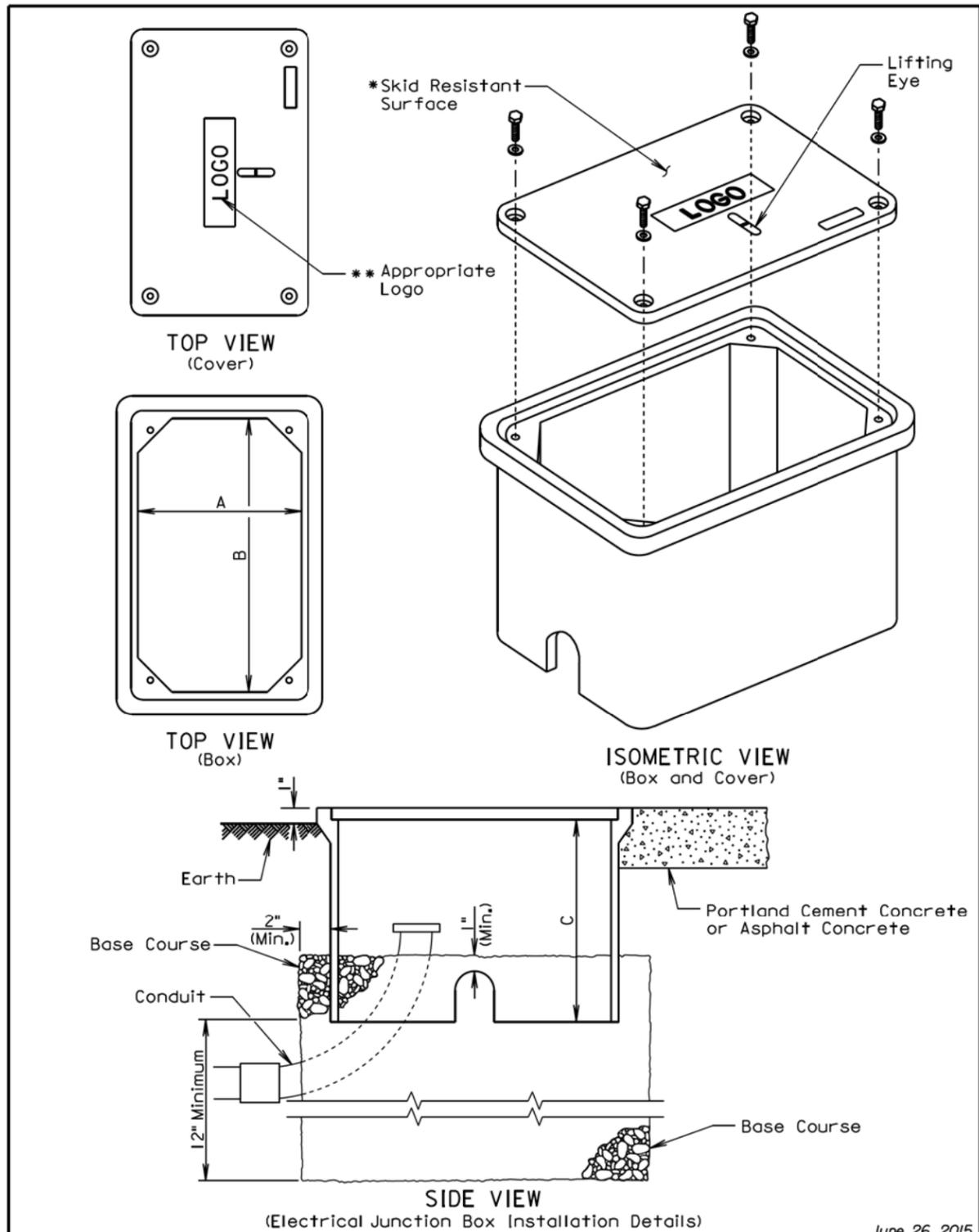
June 26, 2015

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

Published Date: 3rd Qtr. 2015

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June 26, 2015

<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

Published Date: 3rd Qtr. 2015

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

**GENERAL NOTES:**

- The cover shall be gasketed with a minimum of two stainless steel bolts and washers.
  - The cover shall have a lifting eye.
  - \*The surface of the cover shall have a minimum wet and dry coefficient of friction value of 0.5 as determined by ASTM F 609.
  - \*\*The cover of the junction box shall have the appropriate logo in one inch size letters and shall be recessed. When the junction box contains cables or wires for a traffic signal then the logo shall be "Signal". When the junction box contains lighting conductors then the logo shall be "Lighting".
- The electrical junction boxes shall comply with the American National Standards Institute (ANSI)/Society of Cable Telecommunications Engineers (SCTE) 77 2007 Specification for Underground Enclosure Integrity. The loading requirement for all the electrical junction boxes shall be Tier 8 of ANSI/SCTE 77 2007.
- The electrical junction boxes shall be UL listed.

June 26, 2015

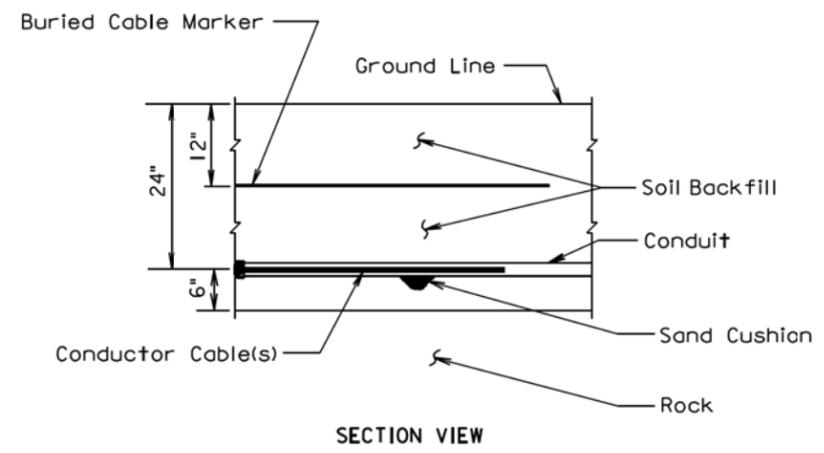
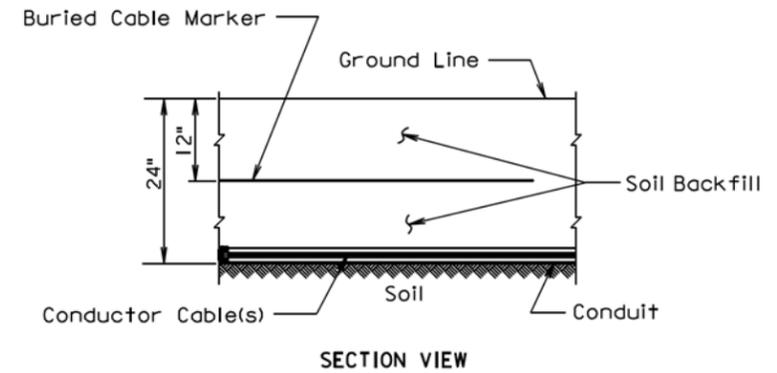
<b>S D D O T</b>	<b>ELECTRICAL JUNCTION BOXES TYPE 1 THROUGH TYPE 4</b>	PLATE NUMBER 635.65
		Sheet 2 of 2

Published Date: 3rd Qtr. 2015

Plot Scale - 1:200

Plotted From - tpr14341

File - ...linc028\vs63565\_1s63565\_2.dgn



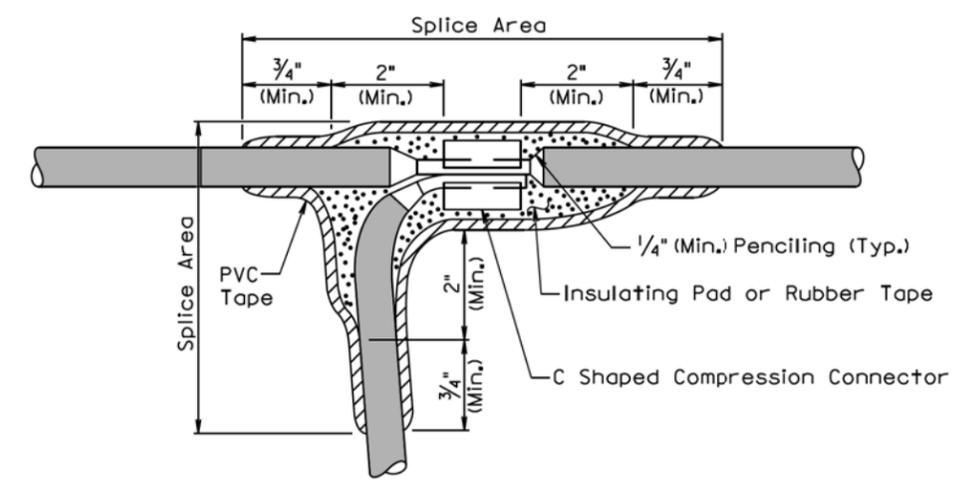
**GENERAL NOTE:**

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

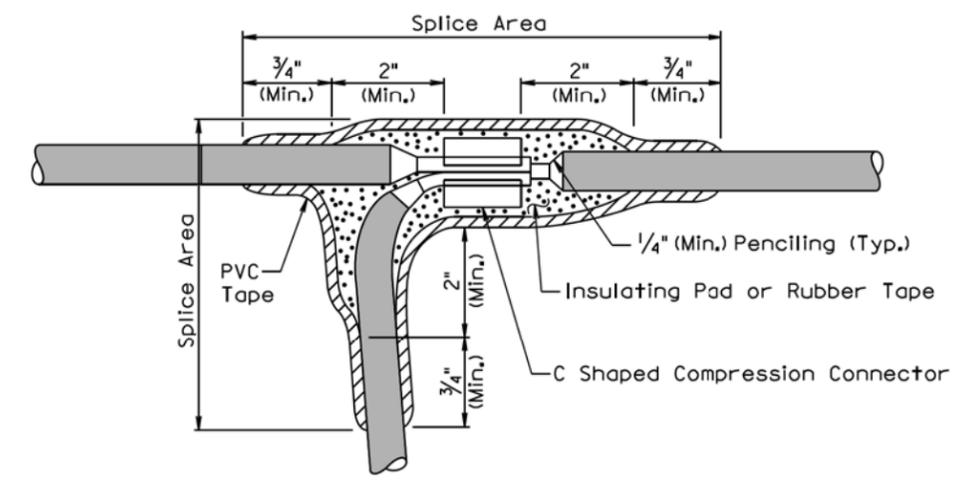
March 31, 2000

<b>S D D O T</b>	<b>CONDUIT INSTALLATION</b>	PLATE NUMBER 635.76
		Sheet 1 of 1

Published Date: 3rd Qtr. 2015



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



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

February 14, 2010

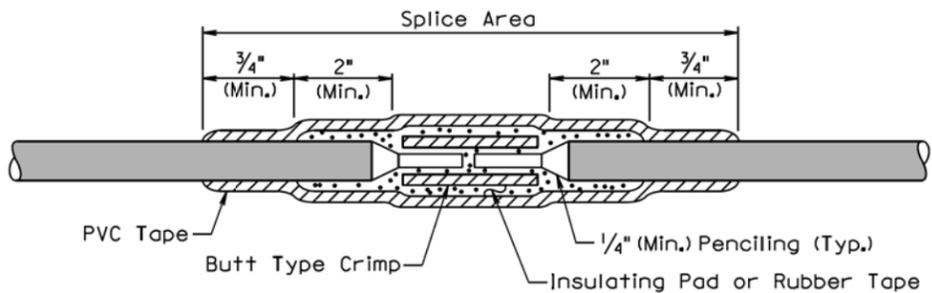
<b>S D D O T</b>	<b>WIRE SPlicing FOR LIGHTING (LOW VOLTAGE CIRCUITS (0 to 600 V))</b>	PLATE NUMBER 635.80
		Sheet 1 of 2

Published Date: 3rd Qtr. 2015

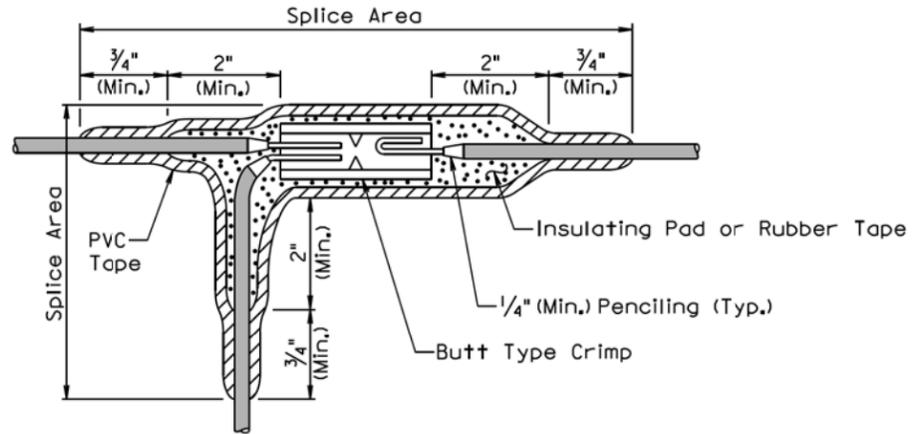
Plot Scale - 1:200

Plotted From - tpr143d1

File - ...linc028\vs63576s63580\_1.dgn



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



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

**GENERAL NOTES:**

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

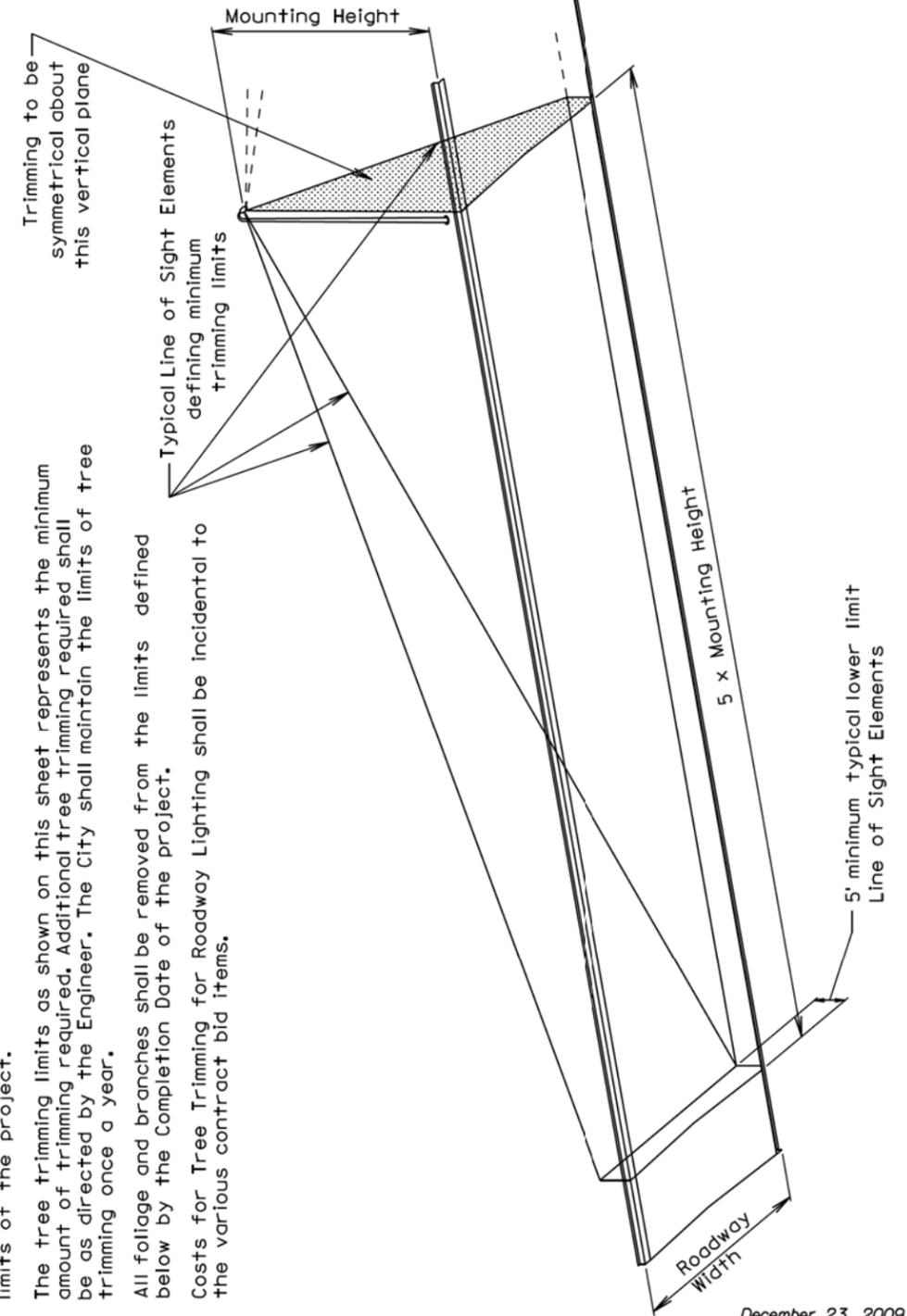
The rubber tapes shall be rolled after application.

Method for insulating splice area:

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

February 14, 2010

<b>S D D O T</b>	<b>WIRE SPlicing FOR LIGHTING</b> (LOW VOLTAGE CIRCUITS (0 to 600 V))	PLATE NUMBER 635.80
	Published Date: 3rd Qtr. 2015	Sheet 2 of 2



**GENERAL NOTES:**

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

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

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

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

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

December 23, 2009

<b>S D D O T</b>	<b>TREE TRIMMING FOR ROADWAY LIGHTING</b>	PLATE NUMBER 635.99
	Published Date: 3rd Qtr. 2015	Sheet 1 of 1