

FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA	PROJECT NH 0100(105)419	SHEET L1	TOTAL SHEETS L46
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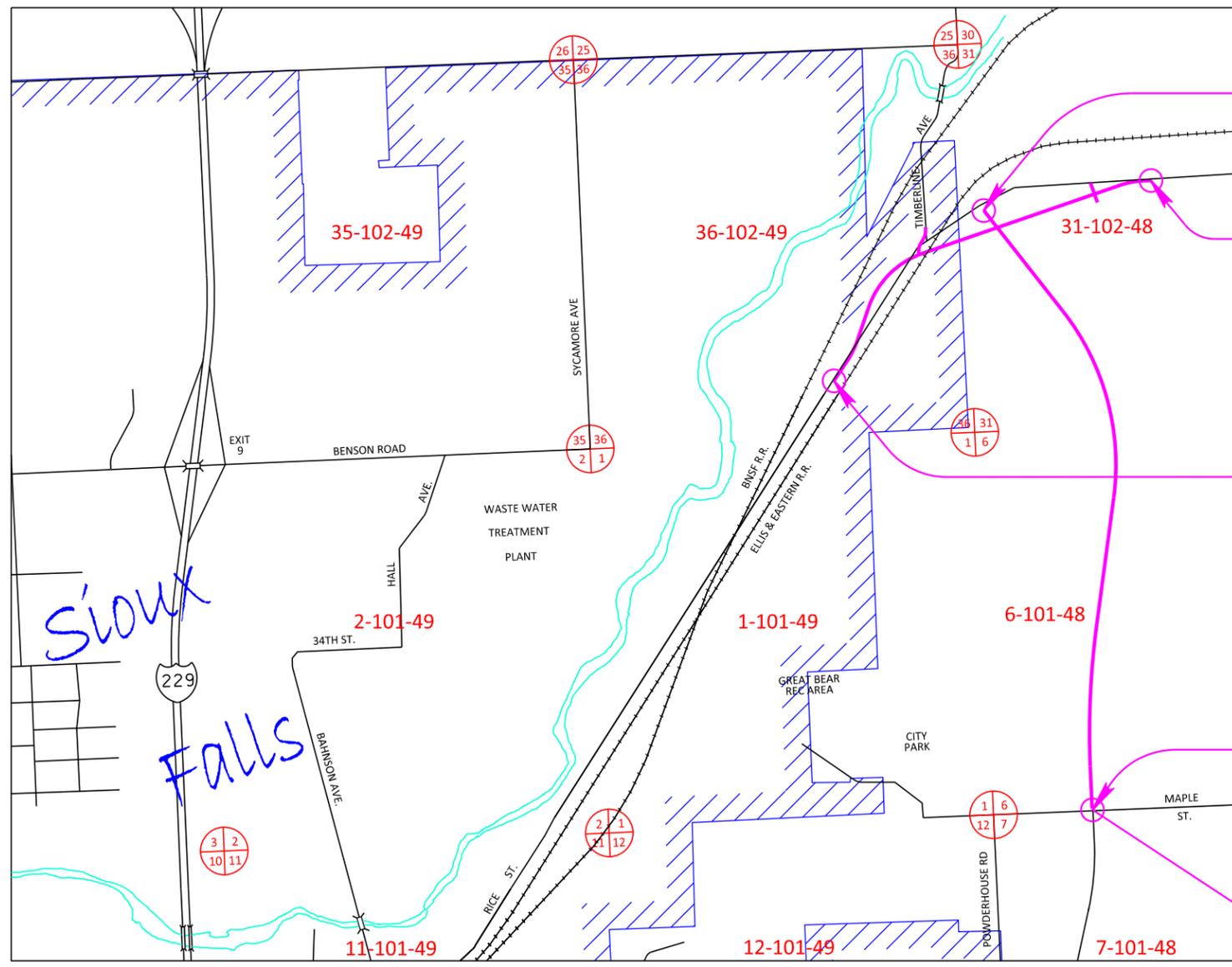
FILE: ...Section L Title Sheet  
PLOTTING DATE: 06-09-2016

REV DATE:  
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# Section L: Lighting and Signal Plans

### INDEX OF SHEETS

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- L11 Signal Layouts
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- L29 Wireless Sensor Layouts
- L30 TO L34 Wiring Diagrams
- L35 TO L46 Standard Plates



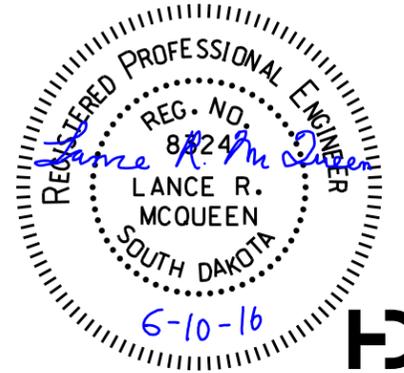
END NH 0100(105)419  
HWY 100  
Station 872+50.00

END NH 0100(105)419  
Rice Street  
Station 56+50.00

BEGIN NH 0100(105)419  
Rice Street  
Station 0+00.00

BEGIN NH 0100(105)419  
HWY 100  
Station 787+09.87

EQUATION  
786+00.00 PCN 00KB  
= 787+09.87 PCN 01V5



**SECTION L ESTIMATE OF QUANTITIES**

Bid Item Number	Item	Quantity	Unit
110E1530	Remove Signal Pole Footing	1	Each
110E1540	Remove Luminaire Pole Footing	3	Each
635E0050	Breakaway Base Luminaire Pole with Arm, 50' Mounting Height	56	Each
635E2065	Signal Pole with 65' Mast Arm	2	Each
635E2165	Signal Pole with 65' Mast Arm and Luminaire Arm	2	Each
635E3700	Roadway Luminaire, LED with Photoelectric Cell	58	Each
635E4030	3 Section Vehicle Signal Head	11	Each
635E4050	5 Section Vehicle Signal Head	2	Each
635E4080	3 Section Directional Vehicle Signal Head	12	Each
635E5020	2' Diameter Footing	478.0	Ft
635E5030	3' Diameter Footing	60.0	Ft
635E5310	Special Electrical Junction Box	40	Each
635E5400	Electrical Service Cabinet	4	Each
635E5430	Traffic Signal Controller	1	Each
635E5450	Side Mounted Cabinet	1	Each
635E5515	Signal Head Battery Backup and Flash System	1	Each
635E5545	Wireless In Pavement Traffic Sensor	44	Each
635E5555	Wireless Access Point	4	Each
635E5558	Wireless Repeater	3	Each
635E5560	Emergency Vehicle Preemption Unit	1	Each
635E5570	Optical Detector	4	Each
635E5900	Pedestrian Push Button	2	Each
635E5910	Pedestrian Push Button Pole	2	Each
635E5922	Pedestrian Signal Head with Countdown Timer	2	Each
635E5930	Pedestrian Crossing Sign	2	Each
635E6200	Miscellaneous, Electrical	Lump Sum	LS
635E7500	Remove and Reset Luminaire Pole	3	Each
635E7510	Remove and Reset Signal Pole	1	Each
635E7530	Relocate Signal Equipment	Lump Sum	LS
635E8025	2.5" Rigid Galvanized Steel Conduit	985	Ft
635E8030	3" Rigid Galvanized Steel Conduit	740	Ft
635E8040	4" Rigid Galvanized Steel Conduit	400	Ft
635E8050	5" Rigid Galvanized Steel Conduit	10	Ft
635E8108	0.75" Rigid Conduit, Schedule 40	80	Ft
635E8115	1.5" Rigid Conduit, Schedule 40	270	Ft
635E8120	2" Rigid Conduit, Schedule 40	11,520	Ft
635E8130	3" Rigid Conduit, Schedule 40	5,850	Ft
635E8140	4" Rigid Conduit, Schedule 40	80	Ft
635E8215	1.5" Rigid Conduit, Schedule 80	45	Ft
635E8220	2" Rigid Conduit, Schedule 80	305	Ft
635E8230	3" Rigid Conduit, Schedule 80	1,305	Ft
635E8410	1/2" Innerduct, SDR 13.5	26,565	Ft
635E8420	1.5" Innerduct, SDR 13.5	75	Ft
635E8830	2/2/2/4 Aluminum Wire	25,985	Ft
635E9011	1/C #1 AWG Copper Wire	1,680	Ft
635E9014	1/C #4 AWG Copper Wire	165	Ft
635E9020	1/C #10 AWG Copper Wire	10,175	Ft
635E9023	3/C #12 AWG Copper Wire	270	Ft
635E9302	2/C #14 AWG IMSA Copper Cable, K1	110	Ft
635E9304	4/C #14 AWG IMSA Copper Cable, K1	1,370	Ft
635E9307	7/C #14 AWG IMSA Copper Cable, K1	30	Ft
635E9325	25/C #14 AWG IMSA Copper Cable, K1	1,325	Ft
635E9710	2/C #10 AWG Copper Pole and Bracket Cable	3,770	Ft
635E9800	Preemption Cable	3,230	Ft

**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.

**SHOP DRAWING AND CATALOG CUTS SUBMITTAL**

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

PDF submittals shall be sent to the following email address:

[Lance.McQueen@hdrinc.com](mailto:Lance.McQueen@hdrinc.com)

Upon review of the submittals, they will be sent by the Engineer to the following email addresses for concurrence of approvals or remarks:

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

**ON-SITE INSPECTION**

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

**MISCELLANEOUS, ELECTRICAL**

- "Miscellaneous, Electrical" work includes, but is not limited to:
- PVC junction boxes installed within the pedestrian underpass (15 Each)
  - Connecting / tying to existing conduits and junction boxes
  - Removal of existing traffic and lighting junction boxes
  - Removal/abandonment of existing lighting and traffic conduits and cables

**LIGHTNING PROTECTION**

All luminaire poles and service cabinets shall be equipped with industrial lightning arrestors compliant with current NEMA and UL Standards for lightning arrestors. Cost for ground rods and lightning arrestors shall be incidental to the contract unit price for the corresponding luminaire pole and service cabinet bid item.

**CONDUIT INSTALLATION**

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

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**REMOVE AND RESET LUMINAIRE POLE**

Existing luminaire poles and luminaires along Timberline Avenue and Rice Street shall be removed, salvaged and reset at the locations shown on the plans.

It shall be the Contractor's responsibility to obtain the bolt circle pattern and anchor bolts for the salvaged poles from the original pole manufacturer. The Contractor shall determine the original pole manufacturer.

Luminaire poles and luminaires damaged during relocation shall be repaired or replaced by the Contractor at no cost to the State.

All costs involved with removing and resetting the existing luminaire poles and luminaires, including new anchor bolts with associated hardware, shall be incidental to the contract unit price per each for "Remove and Reset Luminaire Pole".

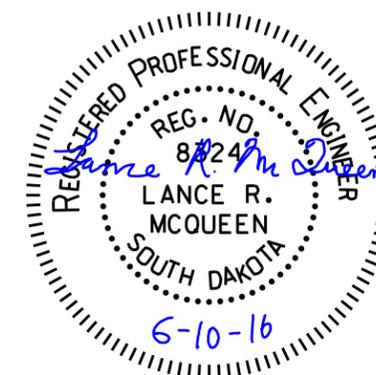
**REMOVE AND RESET SIGNAL POLE**

The existing signal pedestal pole at the northwest corner of Timberline Avenue and Rice Street shall be removed, salvaged and reset at the location shown on the plans.

It shall be the Contractor's responsibility to obtain the bolt circle pattern and anchor bolts for the salvaged poles from the original pole manufacturer. The Contractor shall determine the original pole manufacturer.

Signal poles damaged during relocation shall be repaired or replaced by the Contractor at no cost to the State.

All costs involved with removing and resetting the existing pedestal signal pole, including new anchor bolts with associated hardware, shall be incidental to the contract unit price per each for "Remove and Reset Signal Pole".



**RELOCATE SIGNAL EQUIPMENT**

The existing flashing red beacon signal head located on the existing pedestal signal pole at the northwest corner of Timberline Avenue and Rice Street shall be removed, salvaged and reset on the reinstalled pedestal signal pole.

The existing flashing red beacon signal head shall be banded to pedestal signal pole. The Contractor shall make all necessary connections to make the flasher system operational.

All costs to relocate the flashing red beacon signal head shall be incidental to the contract lump sum price for "Relocate Signal Equipment".

**REMOVE LUMINAIRE POLE FOOTING**

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

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

**REMOVE SIGNAL POLE FOOTING**

The footings of salvaged signal poles shall be removed by the Contractor to a minimum of 2' below the ground surface. Restoration of the disturbed area shall be to the satisfaction of the Engineer.

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

**TABLE OF FOOTING DATA**

Site Designation	Footing Diameter	*Footing Depth	**Spiral Diameter	**Spiral Length	Vertical Reinforcement
L1-L56	2' - 0"	8' - 0"	1' - 8"	54' - 9"	8-#7 x 7' - 6"
S1, S3, S3, S4	3' - 0"	15' - 0"	2' - 8"	145' - 9"	14-#8 x 14' - 6"
REL3, REL4, REL5	2' - 0"	8' - 0"	1' - 8"	54' - 9"	8-#7 x 7' - 6"
RES1	2' - 0"	6' - 0"	1' - 8"	44' - 3"	8-#7 x 5' - 6"

\*Footing depth shall be below ground level.

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

**SOILS INFORMATION**

The subsurface conditions within the limits of the project consist of brown silt-clay to clay-silt with occasional gravel layers throughout. Groundwater may be encountered at cylindrical footing locations within the deep cut sections of the project.

During construction of the cylindrical footings, concrete placement operations should closely follow excavation procedures. The longer the excavations are left open the more likely caving may occur. If caving soils are encountered during excavation, casing may be required to construct the cylindrical footings. All costs for the casings shall be incidental to the footing costs.

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.

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**SPECIAL ELECTRICAL JUNCTION BOX**

The proposed electrical junction boxes for traffic, innerduct and lighting shall be the 12", 24", or 30" diameter junction boxes as shown on City of Sioux Falls standard plates #635.31, 635.33 and 635.70.

All costs for the electrical junction boxes, regardless of the type or size, shall be included in the contract unit price per each for "Special Electrical Junction Box".

**POLES**

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

Signal poles shall have rotatable mast arms.

**LUMINAIRES**

The accepted design for the roadway luminaires shall provide 1.1 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:

<u>L1-L56, S3, S4</u>	
Setback:	6 Ft.
Lamp Loss Factor (LLF):	0.8
Width of Lighted Area:	104 Ft.
Spacing:	302 Ft.
Configuration:	Opposite
Mounting Height:	50 Ft.
Arm Extension Length:	8 Ft.
Luminaire:	315W LED

The following luminaires meet the requirements for this design:

- o Cooper Navion NAV-AE-06-E-UNV-SL2-10K-AP-PER or approved equal
- o voltage shall be universal 120-277V
- o Distribution shall be Type 2 with spill control
- o Absolute Lumens shall be 30,444
- o CCT shall be 4000K
- o Driver shall be Non-Dimming
- o Color shall be grey
- o Surge Protection shall be provided
- o A photocontrol receptacle shall be provided

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.



**ELECTRICAL SERVICE CABINET**

All costs to furnish and install the Electrical Service Cabinets as shown on the plans and as discussed below shall be incidental to the contract unit price per each for "Electrical Service Cabinet".

The Contractor shall follow the City of Sioux Falls standard plates #635.41 and 635.42 as provided in the plans. Single meter pedestals shall be installed for each service cabinet shown on the plans.

Contact Jerry Jongeling (#605-373-6979) at the City Lighting Shop to verify the field location of the service cabinets.

**MULTICONDUCTOR CONTROL CABLE FOR SIGNAL CIRCUITS**

The cable furnished for signal circuits shall be furnished with the number and size of the conductors shown in the plans and shall meet the specifications for either of the two types specified below.

1. General Purpose Control Cable with stranded copper conductors, ICEA S-61-402, PE-PV Insulated (20-10), 600 volts.
2. General Purpose Control Cable, with standard copper conductors, Aerial and Duct., IMSA 20-1, 600 volts.

The Conductor Jackets for the above cables shall be color coded in accordance with IMSA 19-1 Table 5.1.

**TRAFFIC SIGNAL WIRING**

The Contractor shall use Buchanan crimp connectors and insulating caps, or approved equal, on all wire terminations in the signal bases.

All costs for this work shall be incidental to the signal bid items.

**TRAFFIC SIGNAL HEADS**

Traffic signal heads for vehicle and pedestrian traffic signal heads shall be furnished and installed by the Contractor, as specified in the special provisions. See the special provisions for measurement and payment.

**CONTROLLER CABINET**

Controller cabinets shall be furnished and installed by the Contractor to meet the specifications discussed below and in the special provisions. See the special provisions for measurement and payment.

Controller cabinets shall be Size P Cabinet, Catalog No. EL712, Base Mount as manufactured by Siemens or approved equal. The cabinet dimensions shall be 56"H, 44"W, 25.5"D. The cabinet shall have four anchor points, one per corner at a 40 3/4" Width and 18 1/2" Depth. Anchor points shall be internal to the cabinet housing.

The controller cabinets shall be mounted on a concrete footing. The proposed footing is shown in the standard details. A 100% silicone caulk shall be used to seal the cabinet flange to the concrete footing to prevent the incursion of water and shall be placed around the total distance of the flange.

The Contractor shall provide a 3'x4'x 4" thick concrete pad in front of the controller cabinet door, against the footing base.

All costs to furnish and install the controller cabinet footing and concrete pad shall be incidental to the contract unit price per each for "Traffic Signal Controller".

**SIDE MOUNTED CABINET FOR FIBER OPTIC CABLE**

The side mounted cabinet for the fiber optic cable shall be mounted on the side of the proposed controller cabinet at the locations shown on the plans.

The side mounted cabinet for the fiber optic cable:

- shall meet standards for a NEMA Traffic Enclosure for fiber optic cable
- shall have dimensions of 32"H, 20"W, 14"D or 34"H, 20"W, 14"D
- shall be furnished with a plain door
- shall not have ventilation louvers
- shall be DT-34 Enclosure Type 2 as manufactured by Brown Traffic Products Inc.; 32H20W14D cabinet as manufactured by Southern Manufacturing; or approved equal

The side mounted cabinet shall be plumb and level in reference to the back side of the controller cabinet. The Contractor must take precautions when positioning the side mounted cabinet to avoid damaging wire or equipment within the controller cabinet while drilling the mounting holes and the access hole. The access hole shall be two inch diameter and shall be drilled through the side mounted cabinet into the controller cabinet. A grommet or bushing shall be installed in the two inch diameter hole to prevent damage during pull through of the fiber optic cable.

The side mounted cabinet shall be mounted and tightened securely to the controller cabinet using a minimum of four bolts. A bead of clear silicon caulking shall be placed in all gaps between the side mounted cabinet and controller cabinet to prevent water intrusion into either cabinet.

All costs to furnish and install the side mounted cabinet as discussed above shall be incidental to the contract unit price per each for "Side Mounted Cabinet".

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**TRAFFIC SIGNAL CONTROLLER**

The traffic signal controller shall be furnished and installed by the Contractor to meet the specifications discussed below and in the special provisions. See the special provisions for measurement and payment.

Two sets of wiring diagrams and one maintenance and operation manual shall be supplied for the controller. The Contractor shall place all diagrams and manuals in the controller cabinet.

The traffic signal controller shall be compatible with existing controllers installed along SD 11 / Veterans Pkwy, Madison Street to 57<sup>th</sup> Street.

The Contractor shall deliver the traffic signal controller to the City of Sioux Falls for programming. The City will program the controller and contact the Contractor for controller pick-up. The Contractor shall install the programmed controller in the controller cabinet. Contact Gary Styke (#605-367-6133) of the City of Sioux Falls for drop-off information.

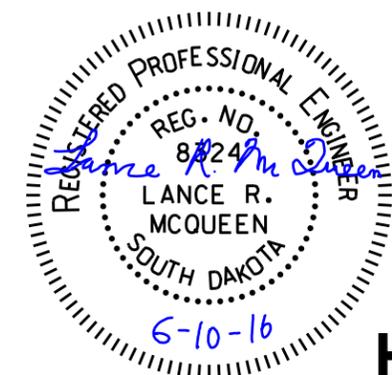
**PVC JUNCTION BOX FOR FUTURE PEDESTRIAN UNDERPASS LIGHTS**

At the proposed future light locations within the pedestrian underpass, PVC junction boxes shall be installed at the locations of the future light locations. See Section E for further details and locations of the boxes / future lights.

The PVC junction boxes shall be:

- 6" tall x 6" wide x 4" deep PVC junction boxes with a removable cover
- Carlon PVC Junction Box # E987R or approved equal
- The junction boxes shall be installed with the 4" depth into the wall/fillet of the pedestrian underpass.
- The front of the junction box shall be mounted flush with the face of the wall/fillet of the pedestrian underpass.

All costs for the PVC junction boxes shall be included in the contract lump sum price for "Miscellaneous, Electrical".



**OPTICAL ACTIVATED EMERGENCY VEHICLE PRE-EMPTION SYSTEM**

Optical Activated Emergency Vehicle Preemption (EVP) Systems shall be furnished and installed by the Contractor to meet the specifications discussed below and in the special provisions. See the special provisions for measurement and payment.

The Contractor shall furnish and install the EVP Systems on the mast arms at the intersections as shown on the plans.

The EVP detector heads and confirmation lights shall be mounted to the signal mast arm using 3/4-inch NPT electrical pipe materials including a malleable Iron "T" approved for rain-tight locations, threaded nipples, and single lamp holder approved for outdoor use. The use of a PELCO AB-0155-42 Band Mount Mini-Brac, or approved, equal shall be used where no integrated threaded outlet exists on the mast arm. All equipment shall be securely mounted to be level/plumb and retain its alignment.

The interface card and card cage for the EVP system shall be installed within the controller cabinet's rack mount. One 4-channel card shall be installed in the controller cabinet.

The preemption and conductor cables for the detector heads shall be installed without splices from the heads to the controller cabinets.

**WIRELESS TRAFFIC SENSORS AND DETECTION SYSTEM**

The Wireless In Pavement Traffic Sensors, Wireless Access Points and Wireless Repeaters shall be furnished and installed by the Contractor to meet the specifications discussed below and in the special provisions.

- Wireless sensors to be installed within the proposed bike lanes shall be designed for bicycle traffic and shall be installed per the manufacturer's recommendations.
- Wireless sensors to be installed within the proposed bike lanes shall have micro-radar technology.

All costs to furnish and install the wireless sensors shall be included in the contract unit price per each for "Wireless In-Pavement Traffic Sensor".

- This shall include the bike lane sensors (2 each)

All costs to furnish and install the wireless access points and repeaters shall be included in the contract unit price per each for "Wireless Access Point" or "Wireless Repeater". These bid items shall include, but not be limited to:

- mounting brackets and hardware
- Contact Closure Interface (CCI) cards required in the controller cabinet
- all equipment required in the controller cabinet to provide a fully functioning wireless vehicle detection system

The CAT-5 cable for the Wireless Access Point shall be installed from the controller cabinet to the Wireless Access Point without splices. The cable shall be rated for outdoor use and installed according to the manufacturer's recommendations. All costs for the CAT-5 cable shall be incidental to the contract unit price per each "Wireless Access Point".

**INNERDUCT**

The innerduct conduit shall be orange in color and longitudinally ribbed on the inside wall.

The innerduct bid items shall include furnishing and installing the innerduct, as well as all work to seal the traffic interconnect conduit within the junction boxes. Innerduct ends shall be sealed using a mastic style tape wrapped around the end of the innerduct and fiber optic cable. If innerduct is empty, a heat shrinkable cap shall be installed over the end of the innerduct.

Innerduct conduit shall be sleeved in a rigid steel conduit (RGSC) under all roadways (from back of curb to back of curb) or as shown in the plans. The RGSC conduit shall be paid under its respective bid item.

When installing the innerduct into the side mounted cabinets, the Contractor shall install the innerduct within RGSC. The RGSC shall extend from the 90 degree bend in the ground to the side mounted cabinet. Quantity has been included in the plans for this RGSC. The RGSC shall be fully sealed at the side mounted cabinet. RGSC shall be 5" diameter for the three 1.5" diameter innerducts being installed into the proposed side mounted cabinet.

All costs for the innerduct shall be included in the contract unit price per foot for "1/2" Innerduct, SDR 13.5" or "1.5" Innerduct, SDR 13.5".

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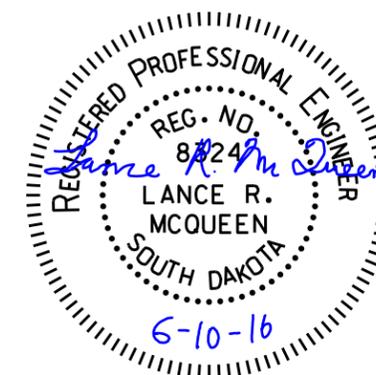
**PEDESTRIAN PUSH BUTTON POLE**

Pedestrian push button poles shall be one of the following types, or an approved equal:

Product	Manufacturer
Crosswalk Pedestal CP6ACT4840TCSS	Frey Manufacturing Corp. Norwood, MN 55368-9675 Phone: 1-952-467-4402 <a href="http://www.freymfgcorp.com">www.freymfgcorp.com</a>
Ped Poles SP-3022-NY-SP0001	Pelco Products, Inc Edmond, OK 73013 Phone: 1-405-340-3434 <a href="http://www.pelcoinc.com">www.pelcoinc.com</a>

For installation of the pedestrian push button posts in the concrete surfacing:

- An 8" diameter Schedule 40 PVC pipe shall be used to create a hole in the concrete where the post will be installed.
- The posts shall be centered in the PVC pipe opening.
- The PVC pipe length shall be adequate according to proposed concrete depth.
- The PVC pipe shall permanently remain in the concrete.
- The top of the PVC pipe shall be recessed 1/4" into the concrete.
- Upon installing the post, the hole within the PVC pipe shall be filled with grout and shall be blended into the surrounding concrete surface to be flush with the surface.
- All costs for this work shall be included in the contract unit price per each for "Pedestrian Push Button Pole".



**SIGNAL HEAD BATTERY BACKUP AND FLASH SYSTEM**

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The signal head battery backup and flash system shall be furnished and installed by the Contractor.

The signal head battery backup and flash system shall be Alpha Backup Power System—2000 VA Power Module as manufactured by Alpha Technologies or approved equal.

- All costs the signal head battery backup and flash system shall be included in the contract unit price per each for "Signal Head Battery Backup and Flash System".

The Contractor shall furnish and install a cabinet that shall be installed on the side of the traffic signal controller cabinet to house the battery backup and flash system.

- The size of the side mounted cabinet shall be determined by the supplier of the traffic signal controller cabinet. The side mounted cabinet shall be of sufficient size to accommodate the battery backup and flash system, batteries and any associated components.
- All costs for the side mounted cabinet shall be included in the contract unit price per each for "Signal Head Battery Backup and Flash System".

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

The signal head battery backup and flash system shall meet the following specifications:

**Standard Features**

- Hot-swappable Input/Output Surge Protection
- Intelligent boost operation for brownout protection
- Hot-swappable UPS and batteries
- Noise suppression, FCC Class A
- Multiple mounting configurations
- Rugged, outdoor weather resistant construction
- Lockable enclosure
- NRTL/CSA approved

**General Specifications**

**Output:**

Output Voltage Regulation	+/-5%
Waveform	sine
Typical Efficiency	>95%
Typical Output Voltage THD	<5%
Typical Transfer Time	2 ms typical
Audible Noise at 1m	<55 dbA

**Environment:**

Operating Temperature	-35°C to +50°C
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**Agency Compliance:**

Lightning/Surge Protection:	Passes ANSI/IEEE C.62.41/C.62.45 Cat A&B
Safety:	EN50091-1
Low Voltage:	EN50091-2

**Power Modules**

2000VA Power Module	60Hz
Input/Output Voltage nominal	208/240VAC
Input/Output Frequency nominal	60Hz
Input Current	15A
Input Voltage Variation	150-300VAC
Output Power	2000VA
Active Output Power	1500W
Typical Efficiency	>95%
Max Charge Current	10 Amps
Battery Backup Time*	2-16 hrs

**Communications and Alarms**

DB-9 compatible connector/RS-232 interface capable of monitoring, controlling, and calibrating the UPS, using ASCII commands with terminal emulation software. External Alarm Signal with relay contacts for a) line fail, b) low battery warning, c) UPS needs service.

**Brownout Protection**

Boost mode increases voltage by 12% of nominal line voltage if input voltage falls below 12% of nominal.



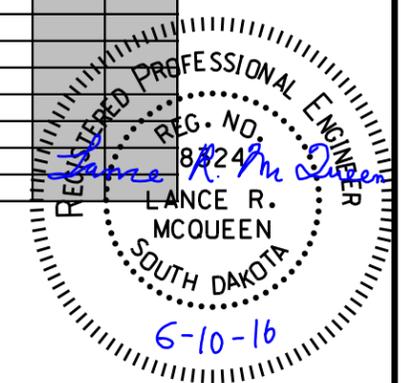
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TABLE FOR CONDUIT & CABLE QUANTITIES

Location to Location	Steel Conduit				PVC Conduit						Innerduct		Cable*														
	RGSC				Sch 40				Sch 80		SDR 13.5																
	2.5" (Ft)	3" (Ft)	4" (Ft)	5" (Ft)	.75" (Ft)	1.5" (Ft)	2" (Ft)	3" (Ft)	4" (Ft)	1.5" (Ft)	2" (Ft)	3" (Ft)	0.5" (Ft)	1.5" (Ft)	2/2/2/4 (Ft)	1C #1 (Ft)	1C #4 (Ft)	1C #10 (Ft)	3C #12 (Ft)	2/C #14 (Ft)	4/C #14 (Ft)	7/C #14 (Ft)	25/C #14 (Ft)	Pole & Bracket (Ft)	PC (Ft)	CAT5** (Ft)	
<b>Lighting</b>																											
Sta. 800+50, Lt-Rt																			270	270							
EJL2 JL2																											
JL2 JL1																											
JL2 L2																											
JL2 L4																											
L4 L6																											
L6 L8																											
L8 L10																											
L10 L12																											
L12 L14																											
L14 L16																											
L16 L18																											
L18 JL3																											
EJL1 JL1																											
JL1 L1																											
JL1 L3																											
L3 L5																											
L5 L7																											
L7 L9																											
L9 L11																											
L11 L13																											
L13 L15																											
L15 L17																											
L17 JL4																											
Transformer LC1																											
LC1 JL3																											
JL3 JL4																											
JL3 L20																											
L20 L22																											
L22 L24																											
L24 L26																											
L26 L28																											
L28 L30																											
L30 L32																											
L32 L34																											
L34 L36																											
JL4 L19																											
L19 L21																											
L21 L23																											
L23 L25																											
L25 L27																											
L27 L29																											
L29 L31																											
L31 L33																											
L33 L35																											



FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH 0100(105)419	L8	L46

Plotting Date: 6/9/2016

TABLE FOR CONDUIT & CABLE QUANTITIES																											
Location to Location		Steel Conduit				PVC Conduit							Innerduct		Cable*												
		RGSC				Sch 40				Sch 80			SDR 13.5														
		2.5"	3"	4"	5"	.75"	1.5"	2"	3"	4"	1.5"	2"	3"	0.5"	1.5"	2/2/2/4	1C #1	1C #4	1C #10	3C #12	2/C #14	4/C #14	7/C #14	25/C #14	Pole & Bracket	PC	CAT5**
(Ft)	(Ft)	(Ft)	(Ft)	(Ft)	(Ft)	(Ft)	(Ft)	(Ft)	(Ft)	(Ft)	(Ft)	(Ft)	(Ft)	(Ft)	(Ft)	(Ft)	(Ft)	(Ft)	(Ft)	(Ft)	(Ft)	(Ft)	(Ft)	(Ft)	(Ft)	(Ft)	
L36	L38						310								325											65	
L38	L40							310							650											65	
L40	L42							310							650											65	
L42	L44							310							650											65	
L44	L46							310							650											65	
L46	L48							310							650											65	
L48	JL5							110							230												
JL5	JL6									45								50									
JL6	T1					40												40									
T1	T15					230												210									
JL5	L50							205							430										65		
L50	L52							305							640										65		
L52	L54							305							640										65		
L54	L56							260							540										65		
L56	JL9							90							200												
JL9	JL10												120		125												
JL10	S3						20								45										65		
JL10	JL11												175					180									
L35	L37						240				60				315										65		
L37	L39							305							630										65		
L39	L41							300							620										65		
L41	L43							300							630										65		
L43	L45							300							620										65		
L45	L47							300							630										65		
L47	L49							305							640										65		
L49	L51							305							640										65		
L51	L53							305							640										65		
L53	L55							260							540										65		
L55	JL12							90							190												
JL12	JL9												140		290												
JL12	S4						110								120										65		
JL12	JL13												300				305										
Transformer	JL7												80					285									
JL7	JL8							180										555									
JL8	LC2							20										75									
JL8	LC3							20										75									
LC2	JL9								25						180												
RES1	REL3												75		95												
REL3	REL4							195							410												
REL4	REL5							155							330												
REL5	LC4							35							120												
LC4	Transformer												170				525										



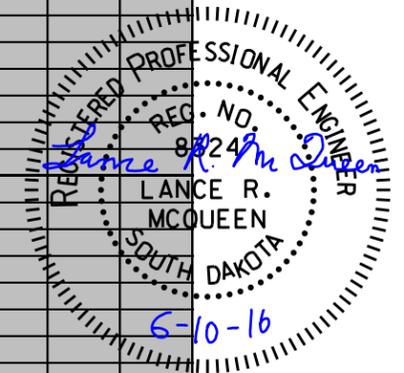
FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH 0100(105)419	L9	L46

Plotting Date: 6/9/2016

TABLE FOR CONDUIT & CABLE QUANTITIES

Location to Location	Steel Conduit				PVC Conduit						Innerduct		Cable*															
	RGSC				Sch 40				Sch 80		SDR 13.5																	
	2.5" (Ft)	3" (Ft)	4" (Ft)	5" (Ft)	.75" (Ft)	1.5" (Ft)	2" (Ft)	3" (Ft)	4" (Ft)	1.5" (Ft)	2" (Ft)	3" (Ft)	0.5" (Ft)	1.5" (Ft)	2/2/2/4 (Ft)	1C #1 (Ft)	1C #4 (Ft)	1C #10 (Ft)	3C #12 (Ft)	2/C #14 (Ft)	4/C #14 (Ft)	7/C #14 (Ft)	25/C #14 (Ft)	Pole & Bracket (Ft)	PC (Ft)	CAT5** (Ft)		
<b>Fiber</b>																												
EJF2	JF2	115											930															
JF1	JF2	145											435															
JF2	JF3												1635															
JF3	JF4												1635															
JF4	JF5												1635															
JF5	JF6												1740															
JF6	JF7												1635															
JF7	JF8												1605															
JF8	JF9												1755															
JF9	JF10												1635															
JF10	JF11												1635															
JF11	JF12												1635															
JF12	JF13												1635															
JF13	JF14												1635															
JF14	JF15												1635															
JF15	JF16												1635															
JF16	JF17												1680															
JF17	CC1				10									75														
JF17	JF18	285																										
JF17	JF19	145											435															
JF19	JF20	295																										
<b>Signals</b>																												
EJS2	JS2			110																								
JS2	JS1		140																									
LC3	CC1							35								165												
CC1	JS3			40																								
JS3	JS6			135																								
JS6	S4		105																									
JS6	JS7		270																									
JS7	S1		20																									
JS3	JS4			115																								
JS4	S3		20																									
S3	PB2				20																							
JS4	JS5		175																									
JS5	S2		10																									
S2	PB1				60																							
CC1	S1																						480		1110	520		
CC1	S2																						360		850	400		
CC1	S3																						190		530	230		
CC1	S4																						295		740	335		
S3	PB2																											
S1	PB1																											
	S1																											
	S2																											
	S3																											
	S4																											
<b>Total:</b>		985	740	400	10	80	270	11520	5850	80	45	305	1305	26565	75	25985	1680	165	10175	270	110	1370	30	1325	3770	3230	1485	



\*All cable quantities shown include 6' of slack/coil installed in each junction box, unless shown otherwise.  
 \*\*Incidental to Wireless Access Point bid items.



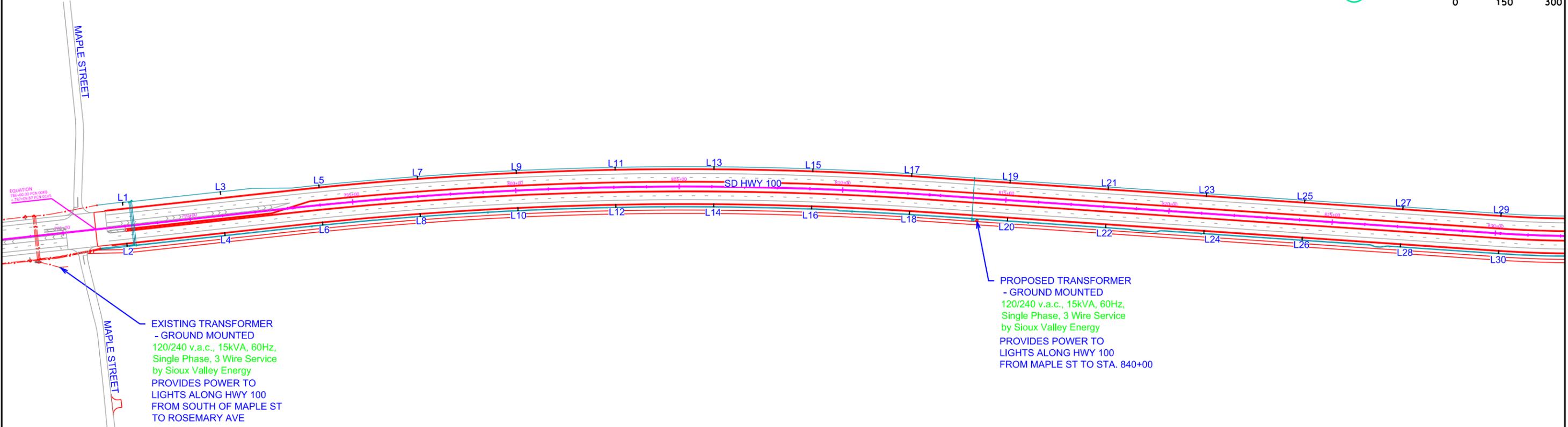
# OVERALL LAYOUT FOR BIDDING PURPOSES ONLY

## Hwy 100

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH 0100(105)419	L10	L46

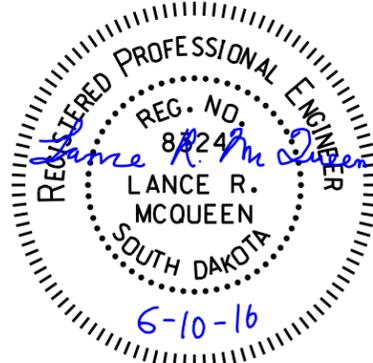
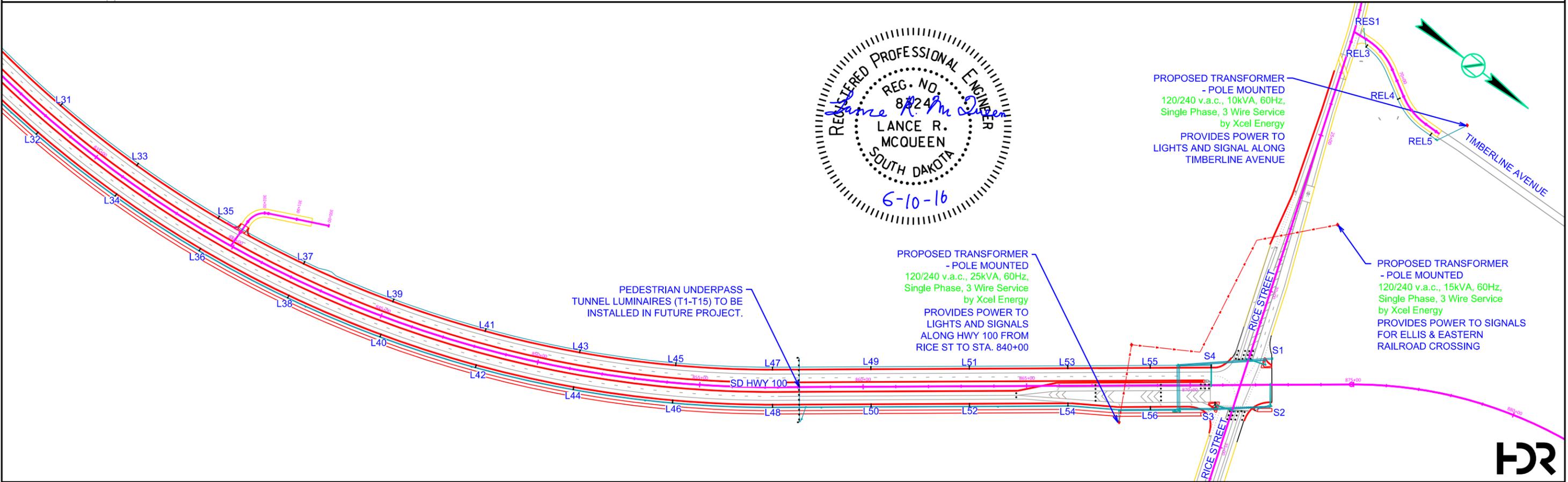
FILE: ...Overall Layout  
PLOTTING DATE: 06-09-2016

REV DATE:  
INITIAL:



EXISTING TRANSFORMER  
- GROUND MOUNTED  
120/240 v.a.c., 15kVA, 60Hz,  
Single Phase, 3 Wire Service  
by Sioux Valley Energy  
PROVIDES POWER TO  
LIGHTS ALONG HWY 100  
FROM SOUTH OF MAPLE ST  
TO ROSEMARY AVE

PROPOSED TRANSFORMER  
- GROUND MOUNTED  
120/240 v.a.c., 15kVA, 60Hz,  
Single Phase, 3 Wire Service  
by Sioux Valley Energy  
PROVIDES POWER TO  
LIGHTS ALONG HWY 100  
FROM MAPLE ST TO STA. 840+00



PROPOSED TRANSFORMER  
- POLE MOUNTED  
120/240 v.a.c., 10kVA, 60Hz,  
Single Phase, 3 Wire Service  
by Xcel Energy  
PROVIDES POWER TO  
LIGHTS AND SIGNAL ALONG  
TIMBERLINE AVENUE

PROPOSED TRANSFORMER  
- POLE MOUNTED  
120/240 v.a.c., 25kVA, 60Hz,  
Single Phase, 3 Wire Service  
by Xcel Energy  
PROVIDES POWER TO  
LIGHTS AND SIGNALS  
ALONG HWY 100 FROM  
RICE ST TO STA. 840+00

PROPOSED TRANSFORMER  
- POLE MOUNTED  
120/240 v.a.c., 15kVA, 60Hz,  
Single Phase, 3 Wire Service  
by Xcel Energy  
PROVIDES POWER TO SIGNALS  
FOR ELLIS & EASTERN  
RAILROAD CROSSING

PEDESTRIAN UNDERPASS  
TUNNEL LUMINAIRES (T1-T15) TO BE  
INSTALLED IN FUTURE PROJECT.



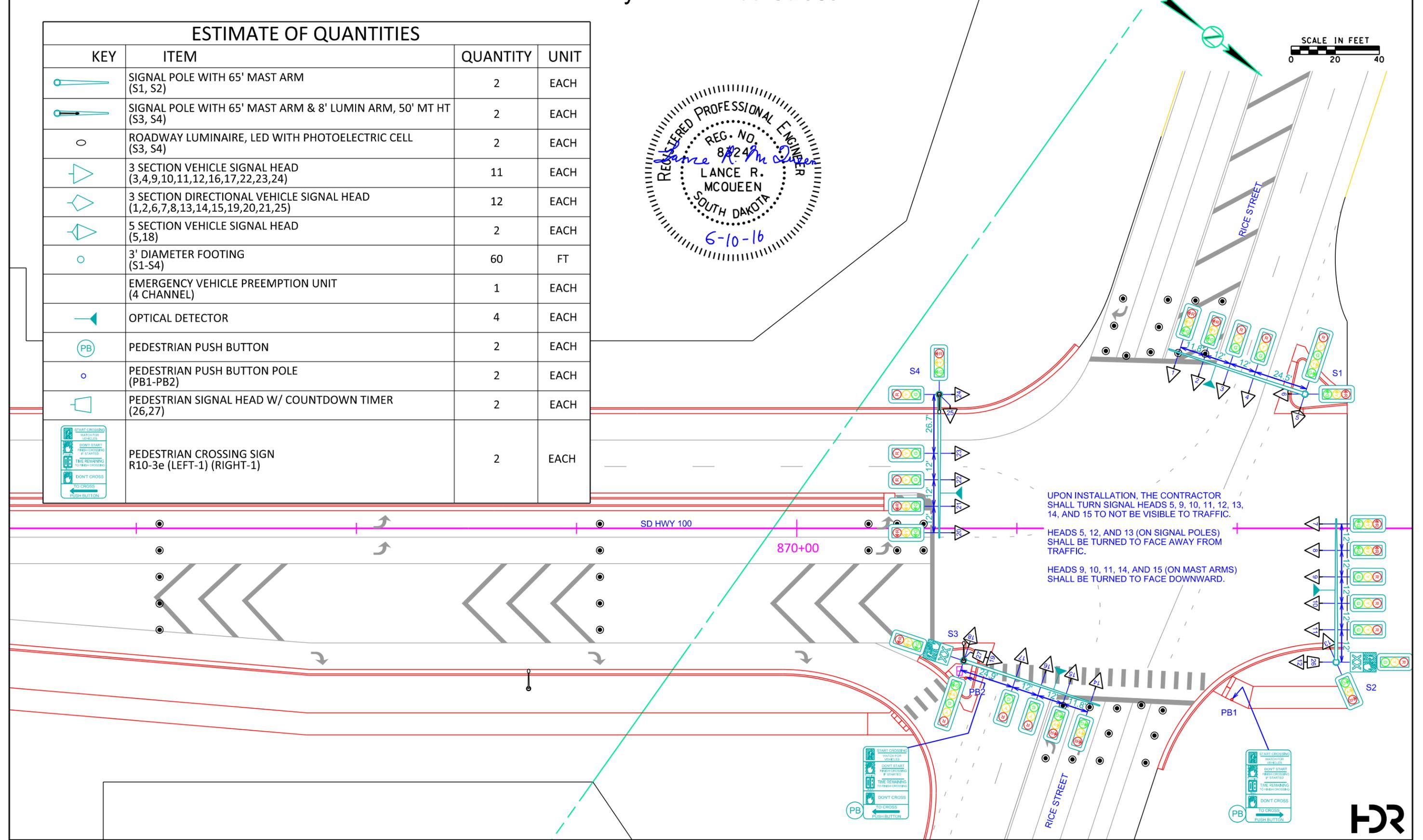
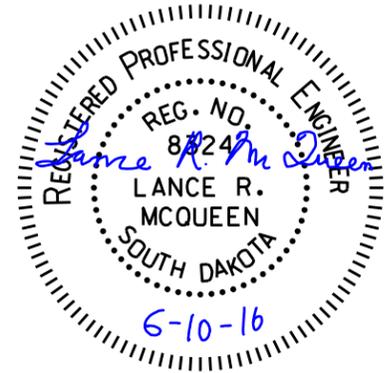
# SIGNAL LAYOUT FOR BIDDING PURPOSES ONLY

## Hwy 100 & Rice Street

STATE OF SOUTH DAKOTA	PROJECT NH 0100(105)419	SHEET L11	TOTAL SHEETS L46
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FILE: ...Signal Layout - Rice St  
PLOTTING DATE: 06-09-2016  
REV DATE:  
INITIAL:

ESTIMATE OF QUANTITIES			
KEY	ITEM	QUANTITY	UNIT
	SIGNAL POLE WITH 65' MAST ARM (S1, S2)	2	EACH
	SIGNAL POLE WITH 65' MAST ARM & 8' LUMIN ARM, 50' MT HT (S3, S4)	2	EACH
	ROADWAY LUMINAIRE, LED WITH PHOTOELECTRIC CELL (S3, S4)	2	EACH
	3 SECTION VEHICLE SIGNAL HEAD (3,4,9,10,11,12,16,17,22,23,24)	11	EACH
	3 SECTION DIRECTIONAL VEHICLE SIGNAL HEAD (1,2,6,7,8,13,14,15,19,20,21,25)	12	EACH
	5 SECTION VEHICLE SIGNAL HEAD (5,18)	2	EACH
	3' DIAMETER FOOTING (S1-S4)	60	FT
	EMERGENCY VEHICLE PREEMPTION UNIT (4 CHANNEL)	1	EACH
	OPTICAL DETECTOR	4	EACH
	PEDESTRIAN PUSH BUTTON	2	EACH
	PEDESTRIAN PUSH BUTTON POLE (PB1-PB2)	2	EACH
	PEDESTRIAN SIGNAL HEAD W/ COUNTDOWN TIMER (26,27)	2	EACH
	PEDESTRIAN CROSSING SIGN R10-3e (LEFT-1) (RIGHT-1)	2	EACH



UPON INSTALLATION, THE CONTRACTOR SHALL TURN SIGNAL HEADS 5, 9, 10, 11, 12, 13, 14, AND 15 TO NOT BE VISIBLE TO TRAFFIC.

HEADS 5, 12, AND 13 (ON SIGNAL POLES) SHALL BE TURNED TO FACE AWAY FROM TRAFFIC.

HEADS 9, 10, 11, 14, AND 15 (ON MAST ARMS) SHALL BE TURNED TO FACE DOWNWARD.



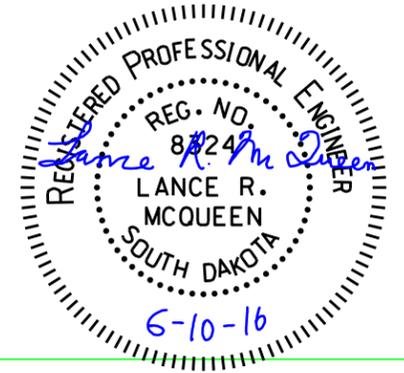
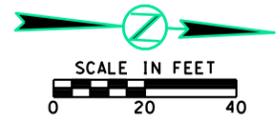
# CONDUIT LAYOUT FOR BIDDING PURPOSES ONLY

## Hwy 100

STATE OF SOUTH DAKOTA	PROJECT NH 0100(105)419	SHEET L12	TOTAL SHEETS L46
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FILE: ...Conduit Layout Sta. 784+00  
PLOTTING DATE: 06-09-2016

REV DATE:  
INITIAL:



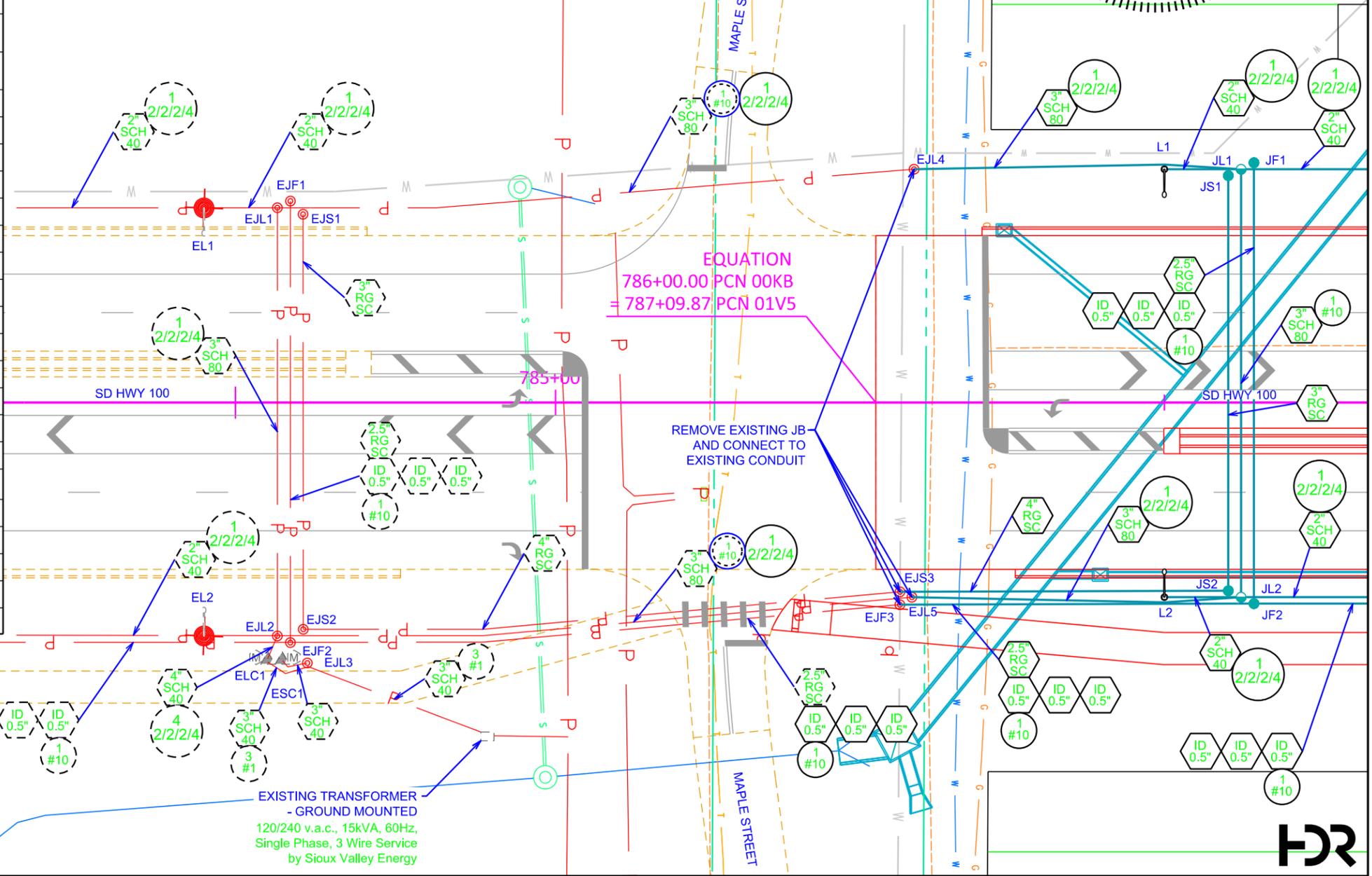
ESTIMATE OF QUANTITIES			
KEY	ITEM	QUANTITY	UNIT
	RELOCATE SIGNAL EQUIPMENT (ES1 / RES1)	LUMP SUM	LS
⚡	BREAKAWAY BASE LUMINAIRE POLE, 50' MOUNTING HEIGHT W/ 8' ARM (L1-L56)	56	EACH
○	ROADWAY LUMINAIRE, LED WITH PHOTOELECTRIC CELL (L1-L56)	56	EACH
○	2' DIAMETER FOOTING (L1-L56, REL3, REL4, REL5, RES1)	478	FT
○	12" DIAMETER ELECTRICAL JUNCTION BOX (JL11,JL13,JF18,JF20)	4	EACH
○	24" DIAMETER ELECTRICAL JUNCTION BOX (JL1-JL10,JL12,JS5,JS7)	13	EACH
○	30" DIAMETER ELECTRICAL JUNCTION BOX (JS1-JS4,JS6,JF1-JF19)	23	EACH
▲	ELECTRICAL SERVICE CABINET (LC1-LC4)	4	EACH
M	METER SOCKET (NOT A BID ITEM)	4	EACH
RG SC	2.5" RIGID GALVANIZED STEEL CONDUIT	985	FT
RG SC	3" RIGID GALVANIZED STEEL CONDUIT	740	FT
RG SC	4" RIGID GALVANIZED STEEL CONDUIT	400	FT
RG SC	5" RIGID GALVANIZED STEEL CONDUIT	10	FT
SCH 40	0.75" RIGID CONDUIT, SCHEDULE 40	80	FT
SCH 40	1.5" RIGID CONDUIT, SCHEDULE 40	270	FT
SCH 40	2" RIGID CONDUIT, SCHEDULE 40	11520	FT
SCH 40	3" RIGID CONDUIT, SCHEDULE 40	5850	FT
SCH 40	4" RIGID CONDUIT, SCHEDULE 40	80	FT
SCH 80	1.5" RIGID CONDUIT, SCHEDULE 80	45	FT
SCH 80	2" RIGID CONDUIT, SCHEDULE 80	305	FT
SCH 80	3" RIGID CONDUIT, SCHEDULE 80	1305	FT
ID 0.5"	0.5" INNERDUCT, SDR 13.5	26565	FT
ID 1.5"	1.5" INNERDUCT, SDR 13.5	75	FT
2/2/2/4	2/2/2/4 ALUMINUM WIRE	25985	FT
#1	1/C #1 AWG COPPER WIRE	1680	FT
#4	1/C #4 AWG COPPER WIRE	165	FT
#10	1/C #10 AWG COPPER WIRE	10175	FT
#12	3/C #12 AWG COPPER WIRE	270	FT
#10	2/C #10 AWG COPPER POLE AND BRACKET CABLE	3770	FT

REMOVAL ITEMS			
KEY	ITEM	QUANTITY	UNIT
⚡	REMOVE AND RESET EXISTING LUMINAIRE POLE (40' MOUNTING HEIGHT W/ 8' ARM AND 400W LUMINAIRE) (EL3 / REL3, EL4 / REL4, EL5 / REL5)	3	EACH
⚡	REMOVE EXISTING LUMINAIRE POLE FOOTING (EL3,EL4,EL5)	3	EACH
⚡	REMOVE AND RESET EXISTING SIGNAL POLE (ES1 / RES1)	1	EACH
⚡	REMOVE EXISTING SIGNAL POLE FOOTING (ES1)	1	EACH
○	REMOVE EXISTING ELECTRICAL JUNCTION BOX (EJS3,EJF3,EJL4,EJL5)	LUMP SUM*	LS
#10	REMOVE EXISTING 1/C #10 AWG COPPER WIRE	LUMP SUM*	LS

\*INCLUDED IN THE BID ITEM "MISCELLANEOUS, ELECTRICAL"

PROPOSED ITEM LOCATIONS	
ITEM	STATION-OFFSET
L1	788+00.02 - 72.67' LT
L2	788+00.02 - 60.67' RT
JL1	788+24.00 - 72.67' LT
JL2	788+24.00 - 60.67' RT
JS1	788+20.00 - 70.67' LT
JS2	788+20.00 - 58.67' RT
JF1	788+28.00 - 74.67' LT
JF2	788+28.00 - 62.67' RT

REMOVAL ITEMS	
EJL4	
EJL5	
EJS3	
EJF3	

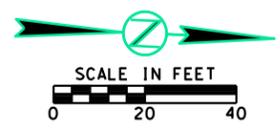


# CONDUIT LAYOUT FOR BIDDING PURPOSES ONLY

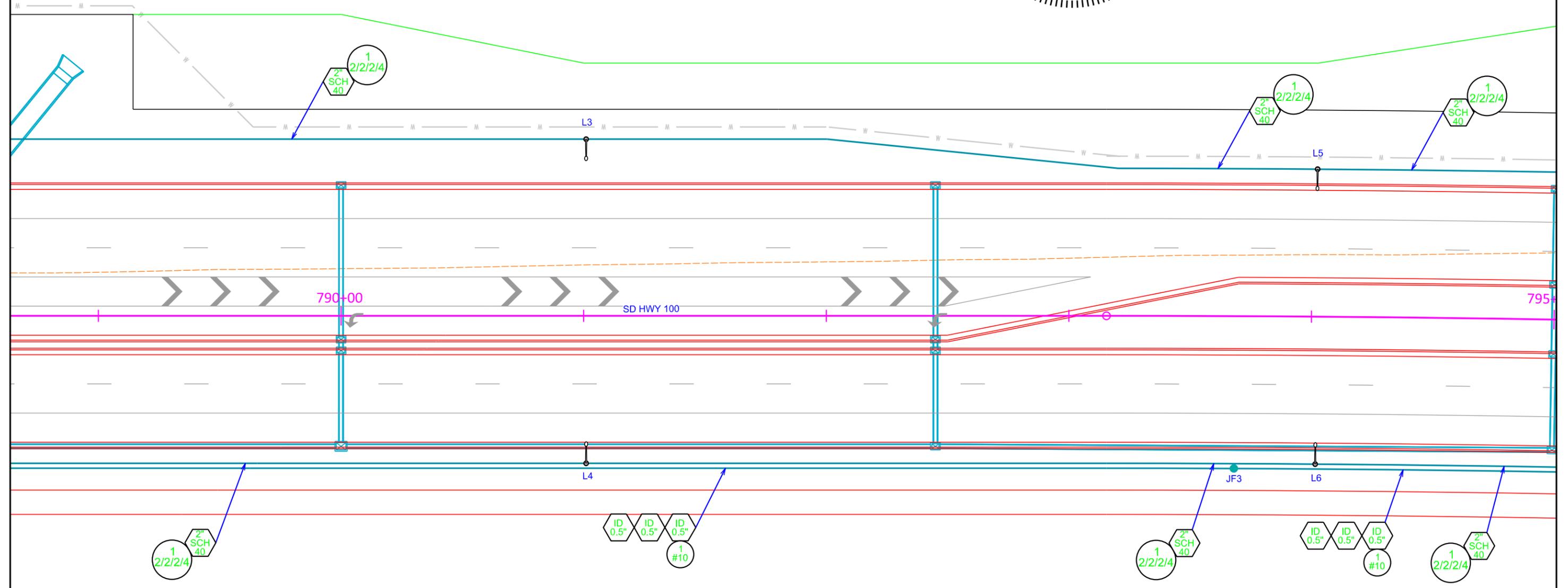
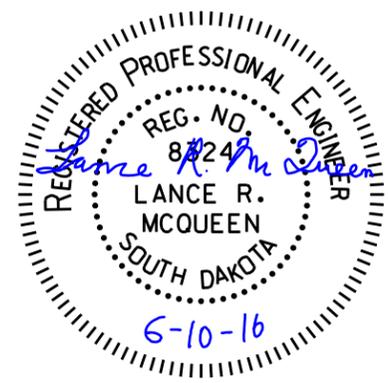
## Hwy 100

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH 0100(105)419	L13	L46

FILE: ...Conduit Layout Sta. 789+00  
 PLOTTING DATE: 06-09-2016  
 REV DATE:  
 INITIAL:



PROPOSED ITEM LOCATIONS	
ITEM	STATION-OFFSET
L3	791+01.02 - 72.67' LT
L4	791+01.02 - 60.67' RT
L5	794+02.05 - 60.67' LT
L6	794+01.98 - 60.67' RT
JF3	793+68.30 - 62.67' RT



# CONDUIT LAYOUT FOR BIDDING PURPOSES ONLY

## Hwy 100

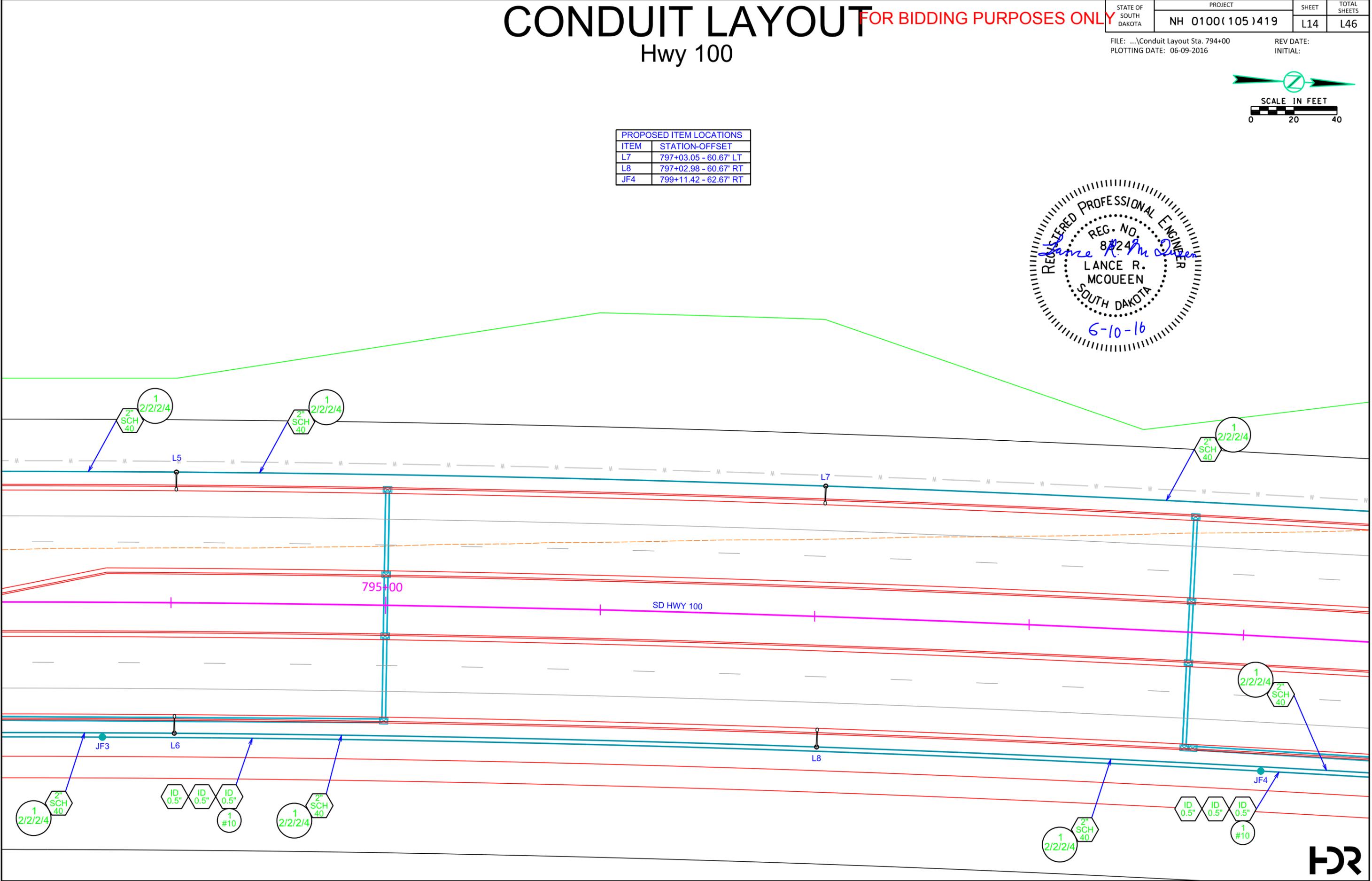
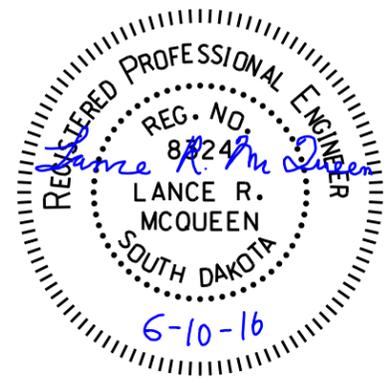
STATE OF SOUTH DAKOTA	PROJECT NH 0100(105)419	SHEET L14	TOTAL SHEETS L46
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FILE: ...Conduit Layout Sta. 794+00  
PLOTTING DATE: 06-09-2016

REV DATE: INITIAL:



PROPOSED ITEM LOCATIONS	
ITEM	STATION-OFFSET
L7	797+03.05 - 60.67' LT
L8	797+02.98 - 60.67' RT
JF4	799+11.42 - 62.67' RT

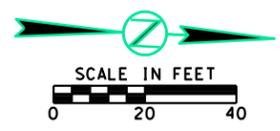


# CONDUIT LAYOUT FOR BIDDING PURPOSES ONLY

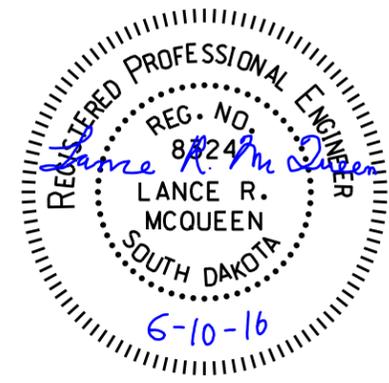
## Hwy 100

STATE OF SOUTH DAKOTA	PROJECT NH 0100(105)419	SHEET L15	TOTAL SHEETS L46
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FILE: ...Conduit Layout Sta. 799+00  
 PLOTTING DATE: 06-09-2016  
 REV DATE:  
 INITIAL:



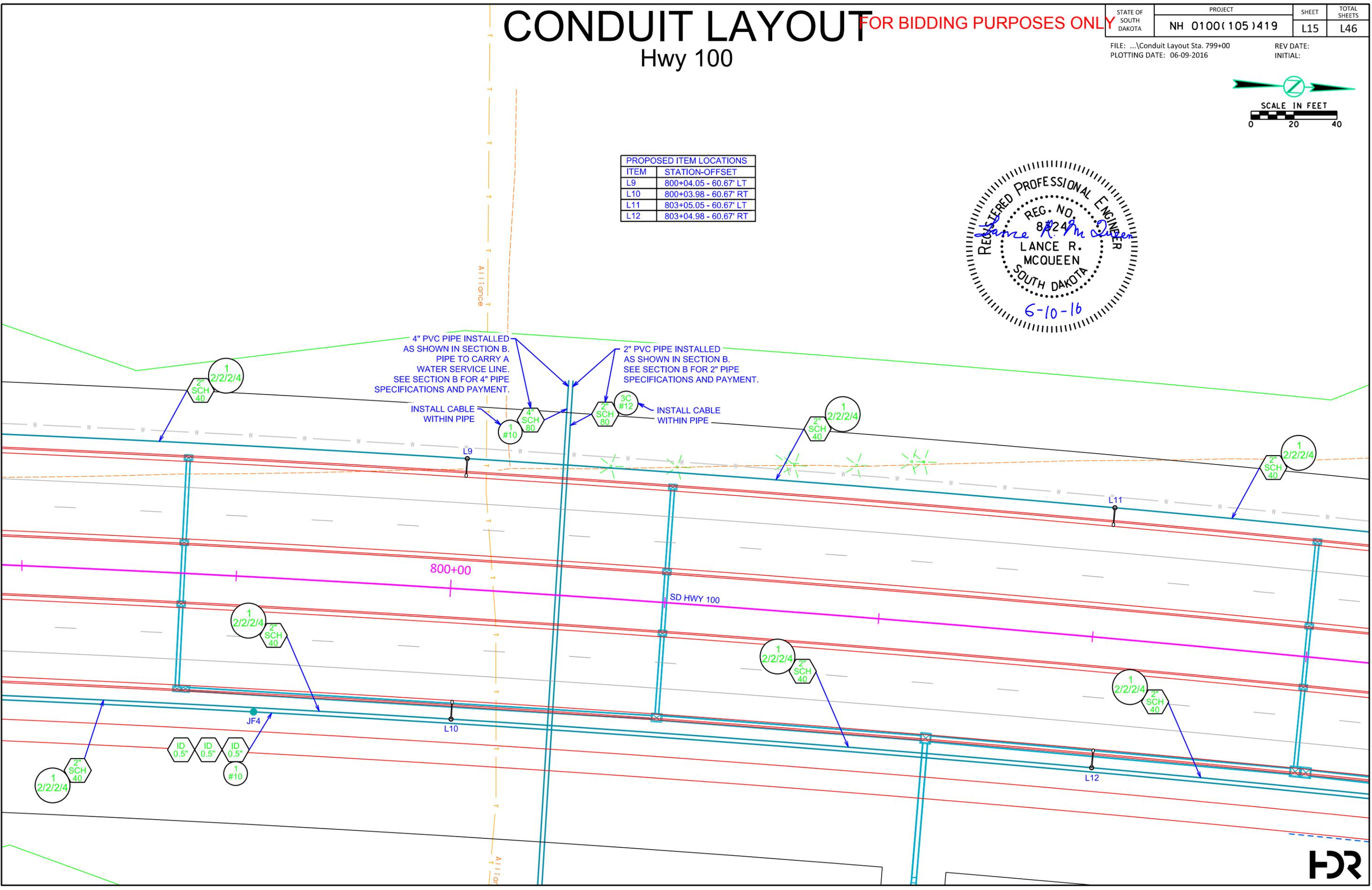
PROPOSED ITEM LOCATIONS	
ITEM	STATION-OFFSET
L9	800+04.05 - 60.67' LT
L10	800+03.98 - 60.67' RT
L11	803+05.05 - 60.67' LT
L12	803+04.98 - 60.67' RT



4" PVC PIPE INSTALLED AS SHOWN IN SECTION B. PIPE TO CARRY A WATER SERVICE LINE. SEE SECTION B FOR 4" PIPE SPECIFICATIONS AND PAYMENT.

2" PVC PIPE INSTALLED AS SHOWN IN SECTION B. SEE SECTION B FOR 2" PIPE SPECIFICATIONS AND PAYMENT.

INSTALL CABLE WITHIN PIPE



# CONDUIT LAYOUT FOR BIDDING PURPOSES ONLY

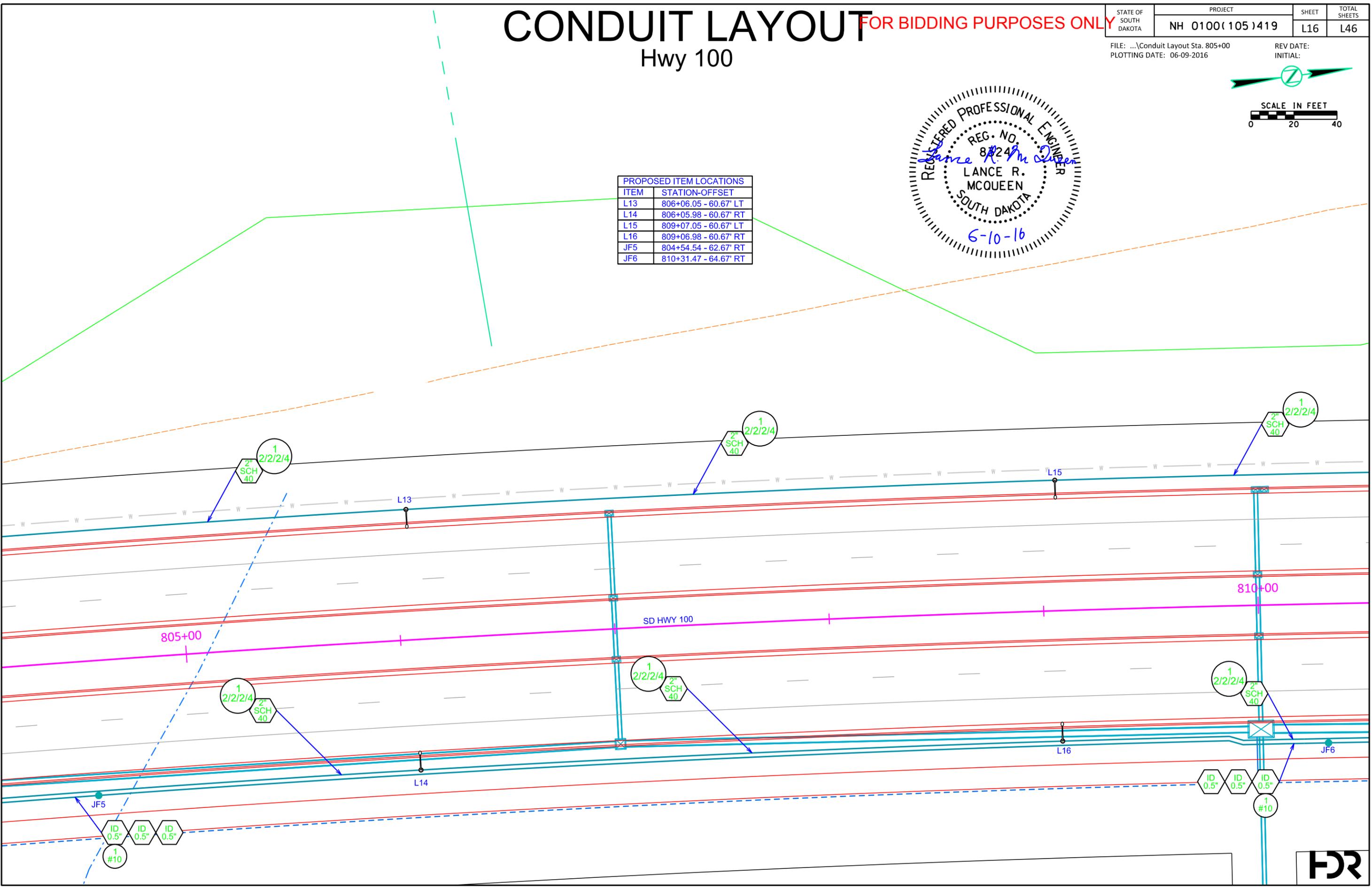
## Hwy 100

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH 0100(105)419	L16	L46

FILE: ...Conduit Layout Sta. 805+00  
 PLOTTING DATE: 06-09-2016  
 REV DATE: INITIAL:



PROPOSED ITEM LOCATIONS	
ITEM	STATION-OFFSET
L13	806+06.05 - 60.67' LT
L14	806+05.98 - 60.67' RT
L15	809+07.05 - 60.67' LT
L16	809+06.98 - 60.67' RT
JF5	804+54.54 - 62.67' RT
JF6	810+31.47 - 64.67' RT



# CONDUIT LAYOUT FOR BIDDING PURPOSES ONLY

## Hwy 100

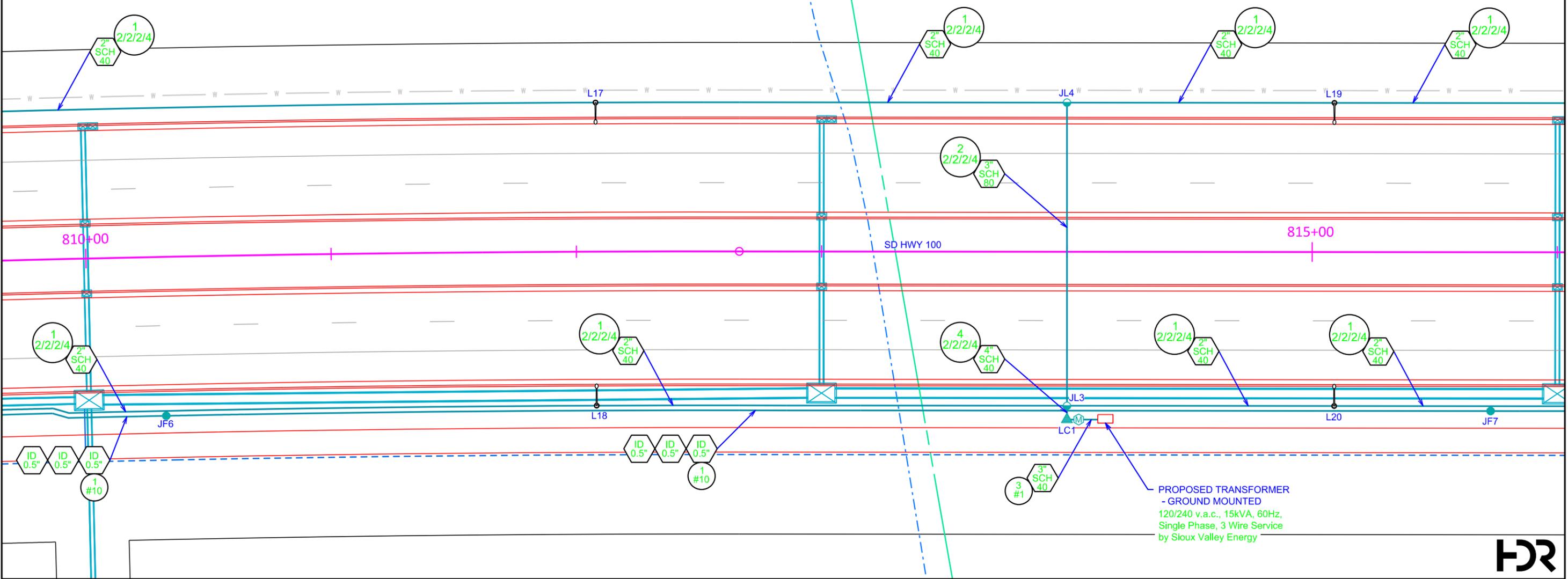
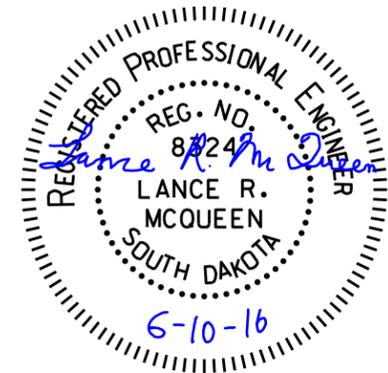
STATE OF SOUTH DAKOTA	PROJECT NH 0100(105)419	SHEET L17	TOTAL SHEETS L46
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FILE: ...Conduit Layout Sta. 810+00  
PLOTTING DATE: 06-09-2016

REV DATE:  
INITIAL:



ITEM	STATION-OFFSET
L17	812+08.05 - 60.67' LT
L18	812+08.01 - 62.67' RT
L19	815+09.02 - 60.67' LT
L20	815+09.02 - 62.67' RT
JF7	815+72.81 - 64.67' RT
JL3	814+00.06 - 62.67' RT
JL4	813+99.94 - 60.67' LT
LC1	814+00.07 - 68.29' RT



# CONDUIT LAYOUT FOR BIDDING PURPOSES ONLY

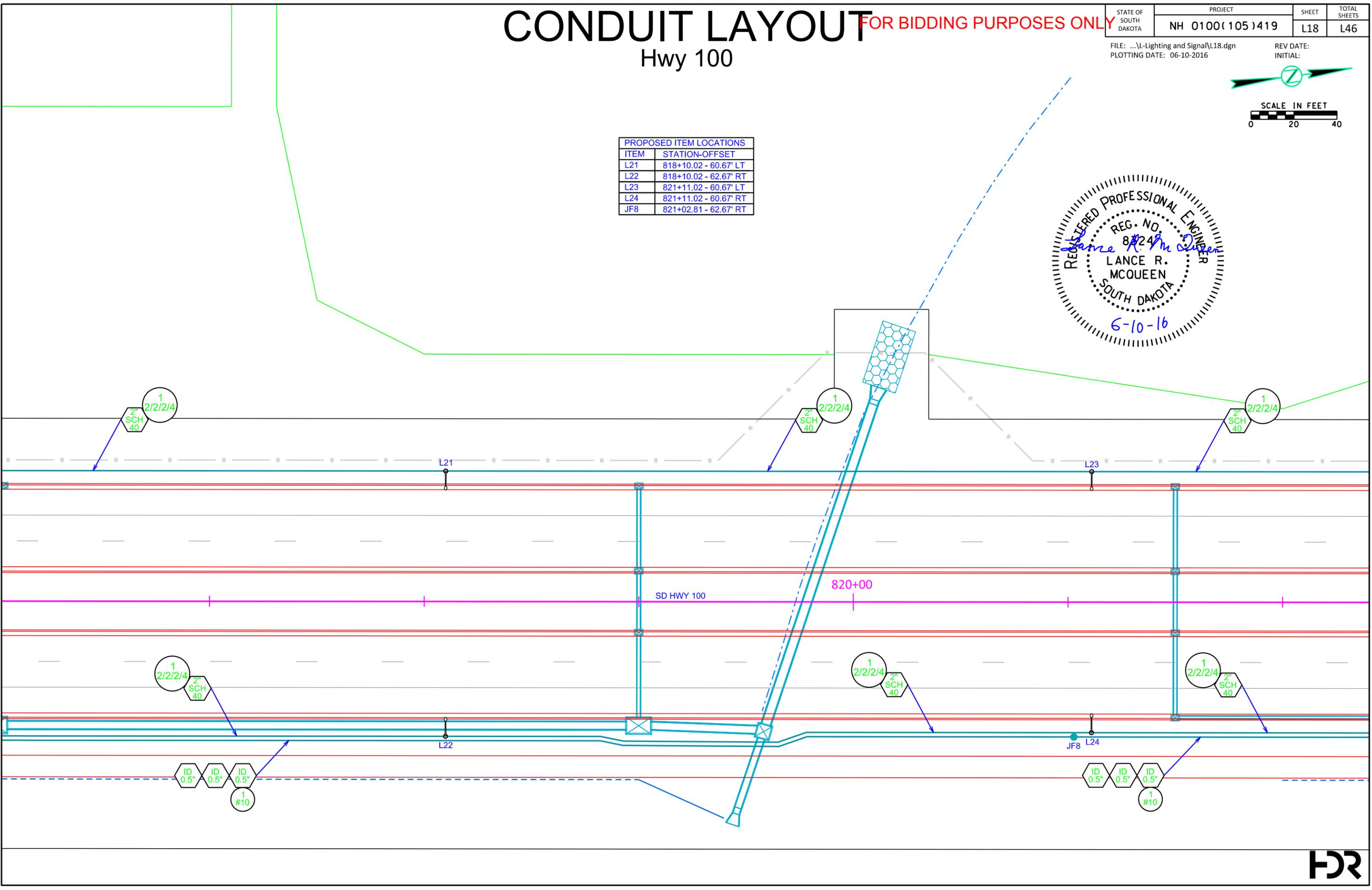
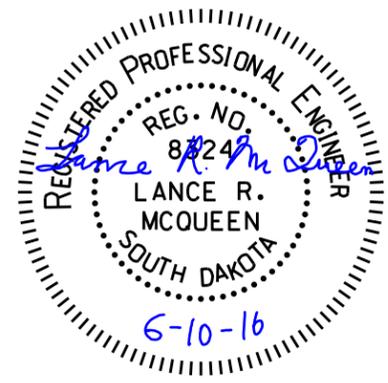
## Hwy 100

STATE OF SOUTH DAKOTA	PROJECT NH 0100(105)419	SHEET L18	TOTAL SHEETS L46
-----------------------	----------------------------	--------------	---------------------

FILE: ...L-Lighting and Signal\L18.dgn  
 PLOTTING DATE: 06-10-2016  
 REV DATE:  
 INITIAL:



PROPOSED ITEM LOCATIONS	
ITEM	STATION-OFFSET
L21	818+10.02 - 60.67' LT
L22	818+10.02 - 62.67' RT
L23	821+11.02 - 60.67' LT
L24	821+11.02 - 60.67' RT
JF8	821+02.81 - 62.67' RT



# CONDUIT LAYOUT FOR BIDDING PURPOSES ONLY

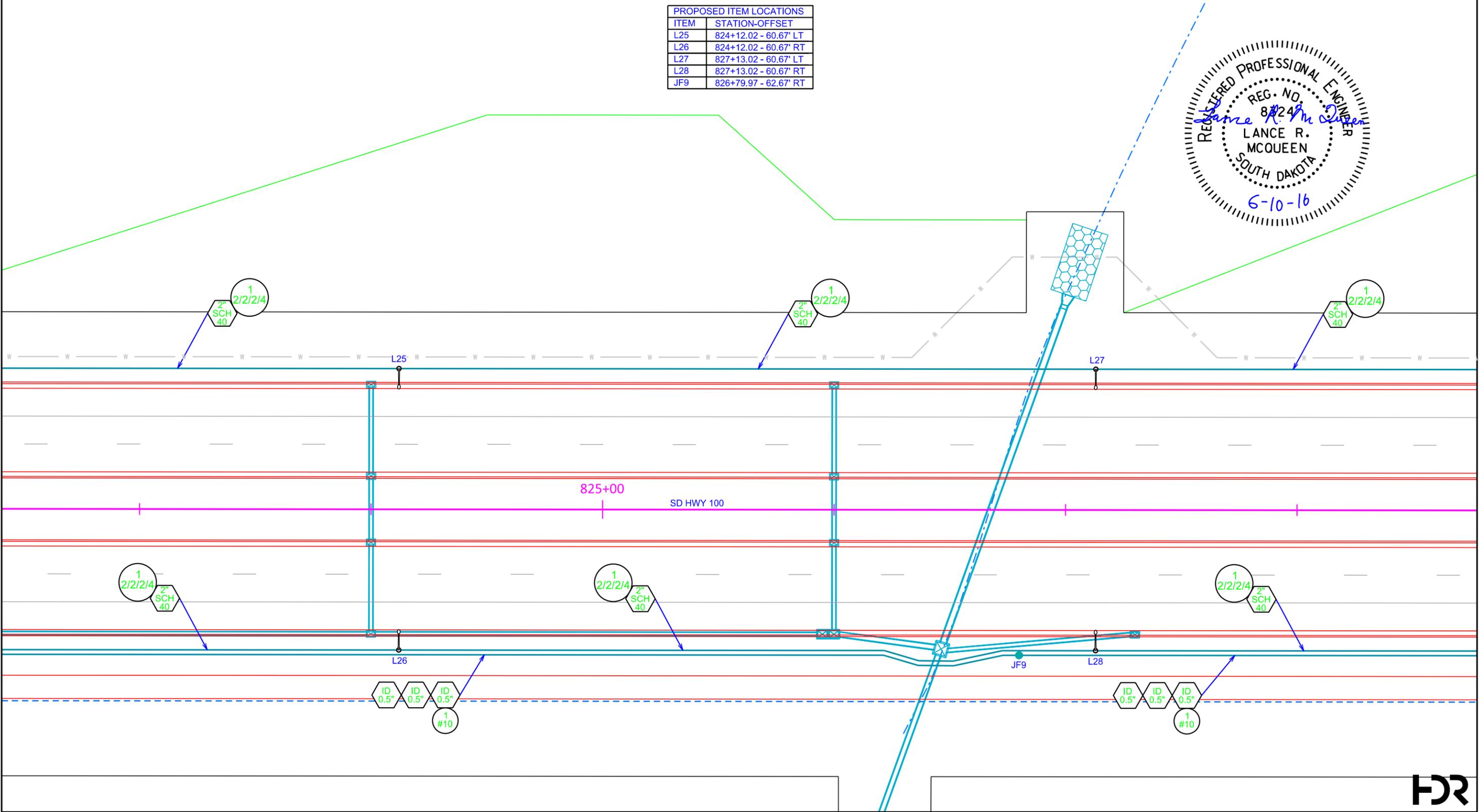
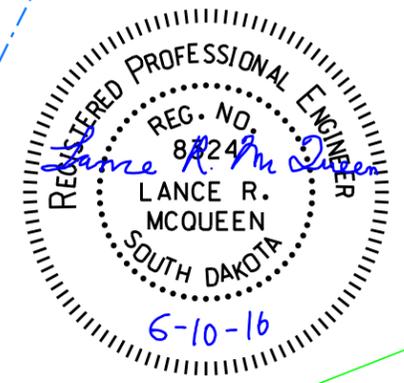
## Hwy 100

STATE OF SOUTH DAKOTA	PROJECT NH 0100(105)419	SHEET L19	TOTAL SHEETS L46
-----------------------	----------------------------	--------------	---------------------

FILE: ...L-Lighting and Signal\L19.dgn  
 PLOTTING DATE: 06-10-2016  
 REV DATE:  
 INITIAL:



PROPOSED ITEM LOCATIONS	
ITEM	STATION-OFFSET
L25	824+12.02 - 60.67' LT
L26	824+12.02 - 60.67' RT
L27	827+13.02 - 60.67' LT
L28	827+13.02 - 60.67' RT
JF9	826+79.97 - 62.67' RT



# CONDUIT LAYOUT FOR BIDDING PURPOSES ONLY

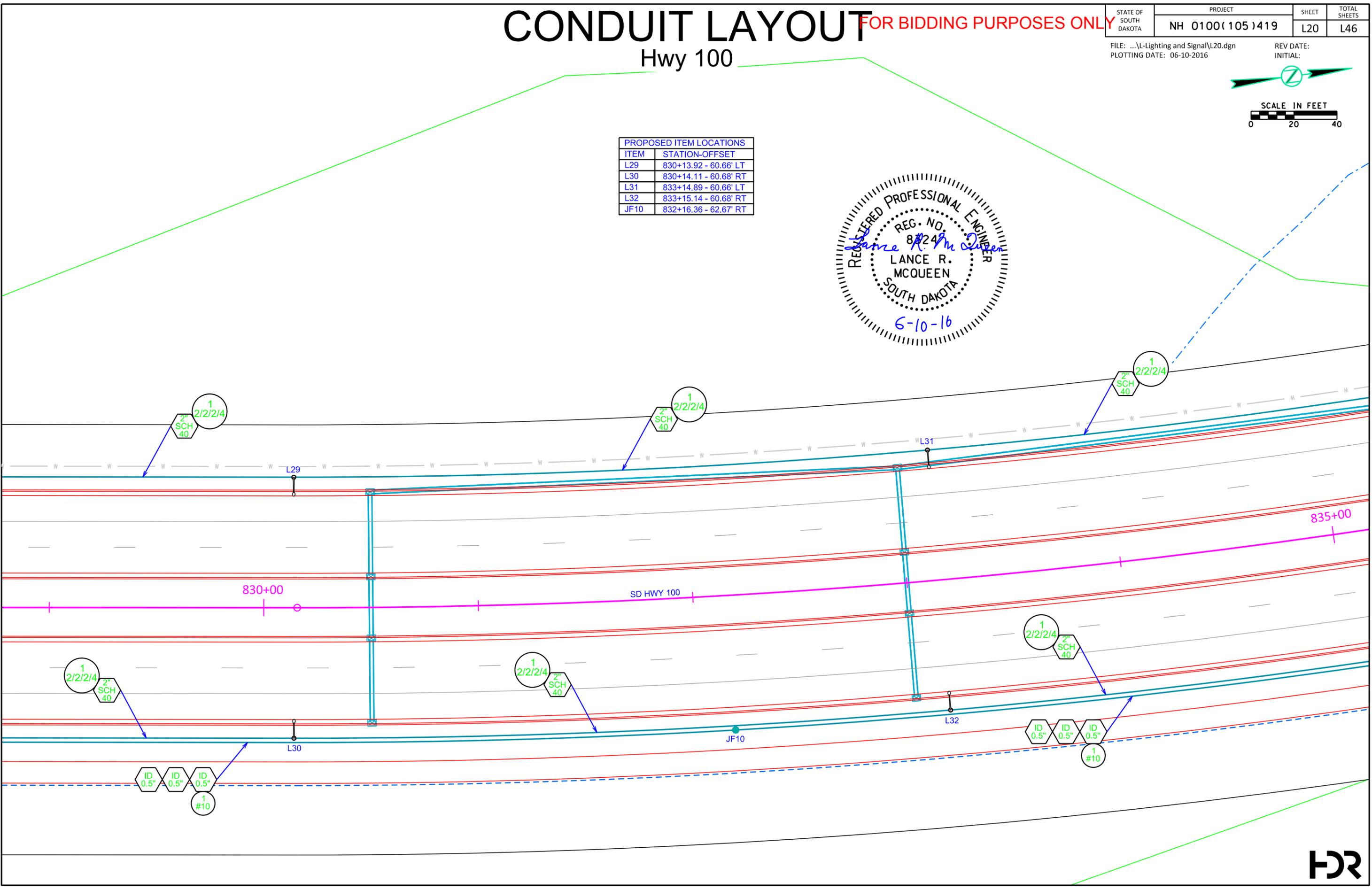
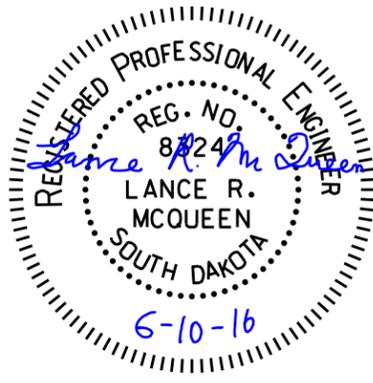
Hwy 100

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH 0100(105)419	L20	L46

FILE: ...L-Lighting and Signal\L20.dgn  
 PLOTTING DATE: 06-10-2016  
 REV DATE: INITIAL:



PROPOSED ITEM LOCATIONS	
ITEM	STATION-OFFSET
L29	830+13.92 - 60.66' LT
L30	830+14.11 - 60.68' RT
L31	833+14.89 - 60.66' LT
L32	833+15.14 - 60.68' RT
JF10	832+16.36 - 62.67' RT



# CONDUIT LAYOUT FOR BIDDING PURPOSES ONLY

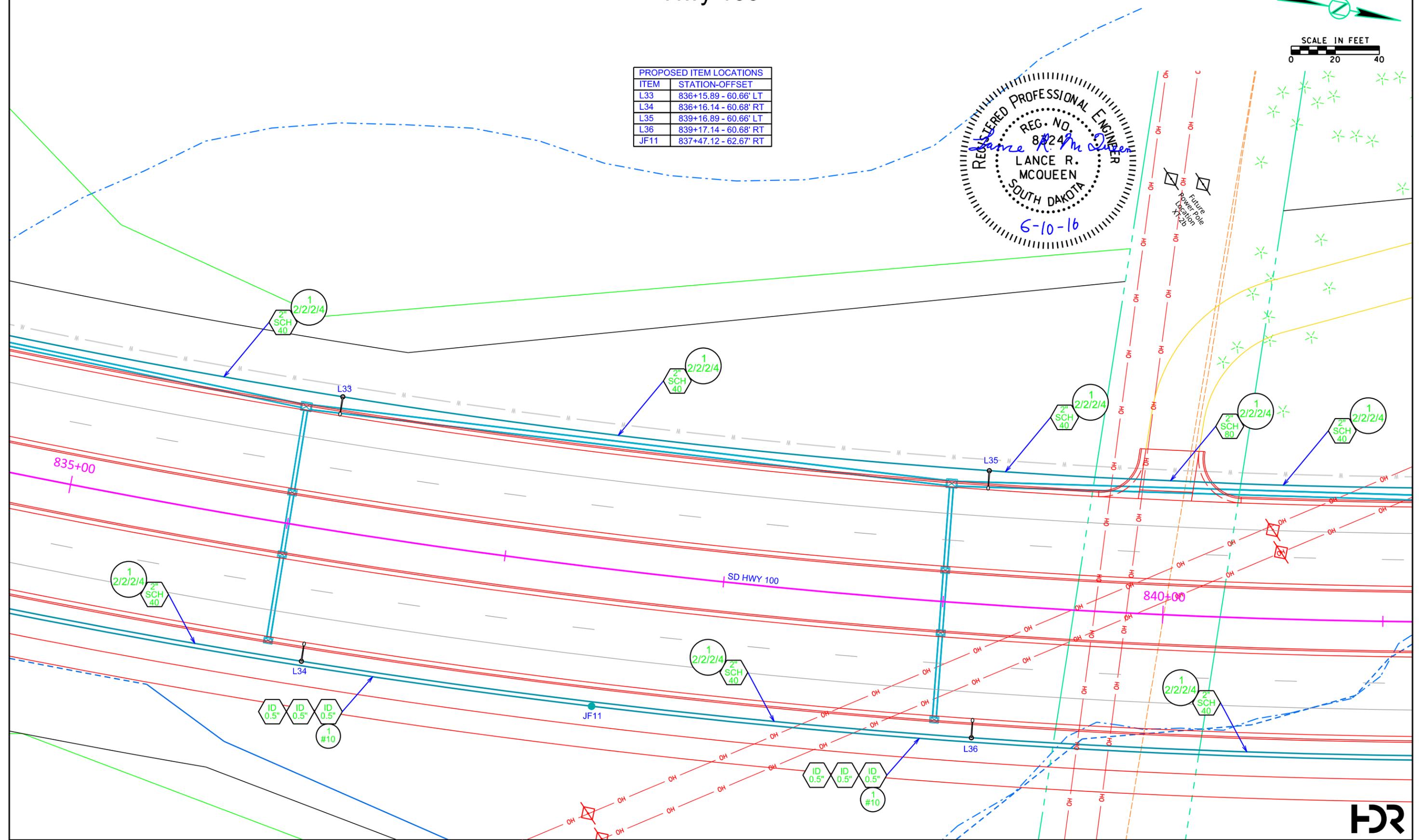
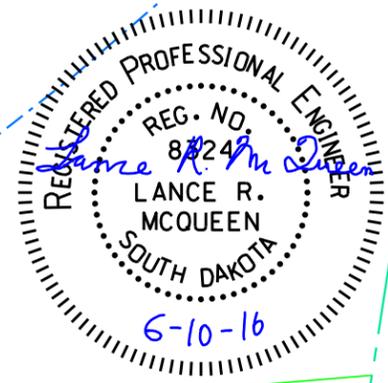
## Hwy 100

STATE OF SOUTH DAKOTA	PROJECT NH 0100(105)419	SHEET L21	TOTAL SHEETS L46
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FILE: ...L-Lighting and Signal\L21.dgn  
 PLOTTING DATE: 06-10-2016  
 REV DATE:  
 INITIAL:



PROPOSED ITEM LOCATIONS	
ITEM	STATION-OFFSET
L33	836+15.89 - 60.66' LT
L34	836+16.14 - 60.68' RT
L35	839+16.89 - 60.66' LT
L36	839+17.14 - 60.68' RT
JF11	837+47.12 - 62.67' RT



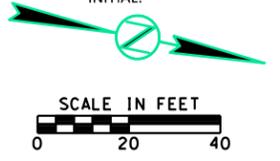
# CONDUIT LAYOUT FOR BIDDING PURPOSES ONLY

## Hwy 100

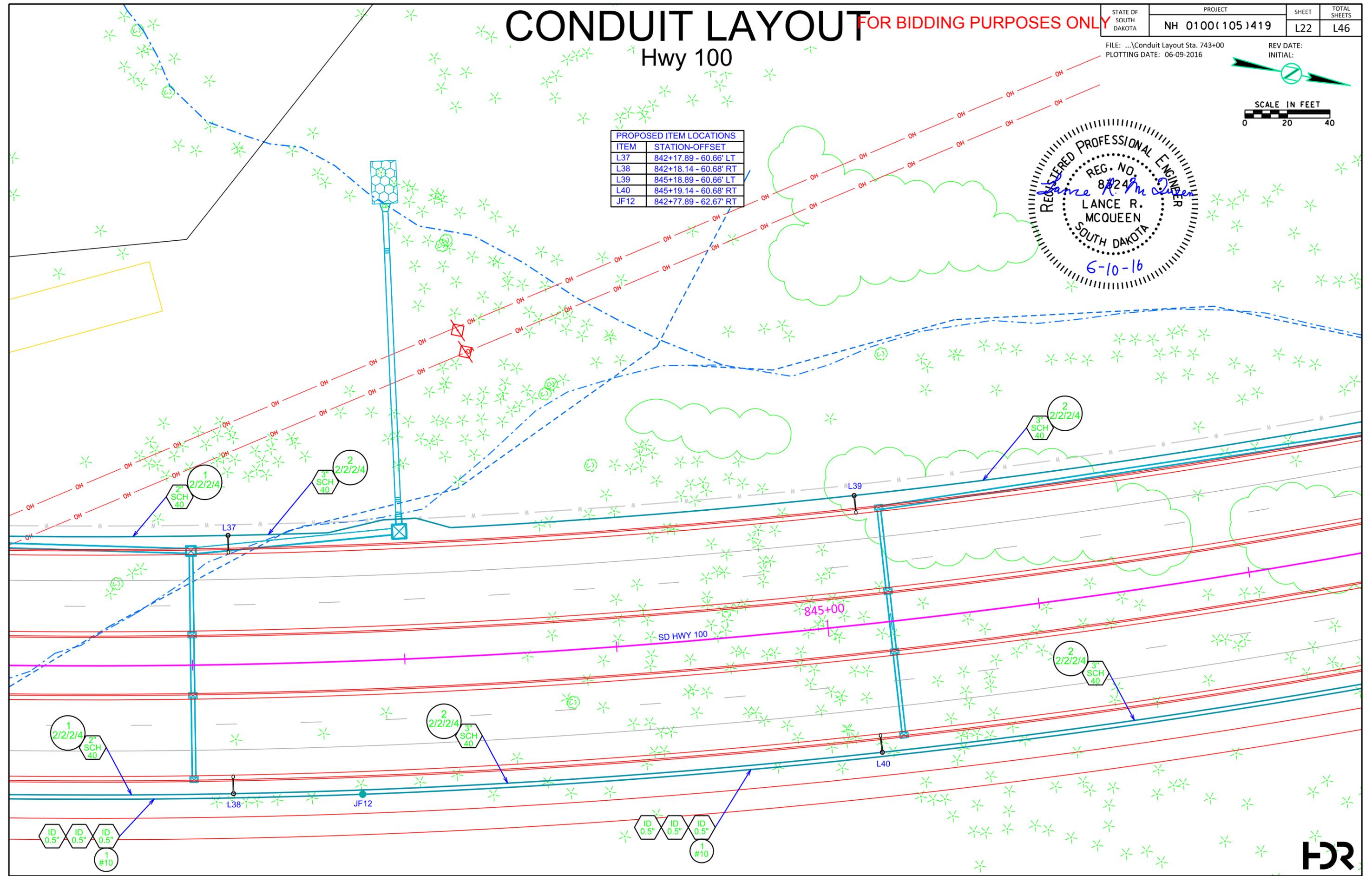
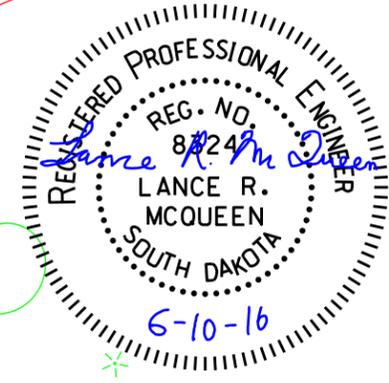
STATE OF SOUTH DAKOTA	PROJECT NH 0100(105)419	SHEET L22	TOTAL SHEETS L46
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FILE: ...Conduit Layout Sta. 743+00  
PLOTTING DATE: 06-09-2016

REV DATE:  
INITIAL:



PROPOSED ITEM LOCATIONS	
ITEM	STATION-OFFSET
L37	842+17.89 - 60.66' LT
L38	842+18.14 - 60.68' RT
L39	845+18.89 - 60.66' LT
L40	845+19.14 - 60.68' RT
JF12	842+77.89 - 62.67' RT



# CONDUIT LAYOUT FOR BIDDING PURPOSES ONLY

## Hwy 100

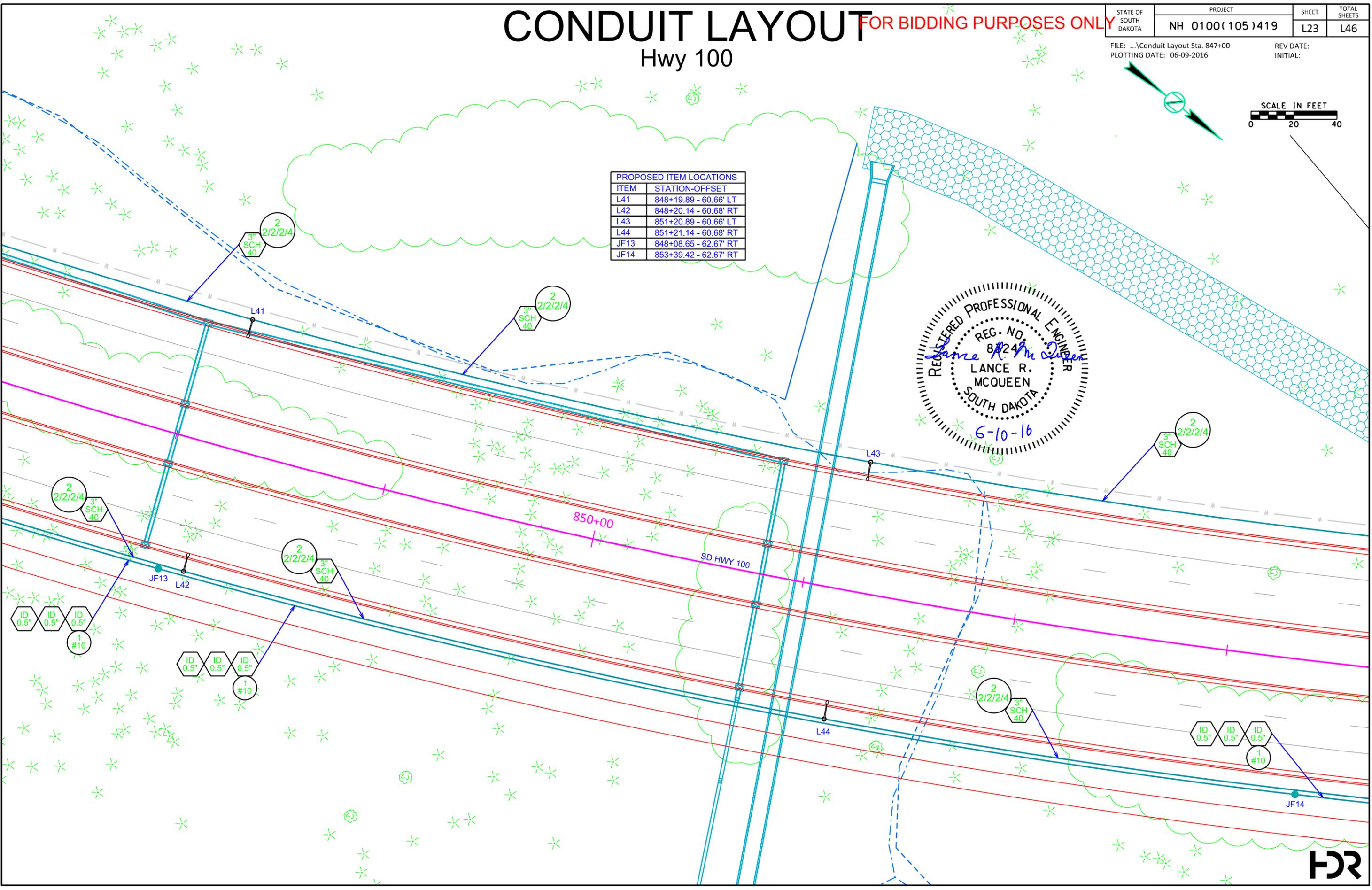
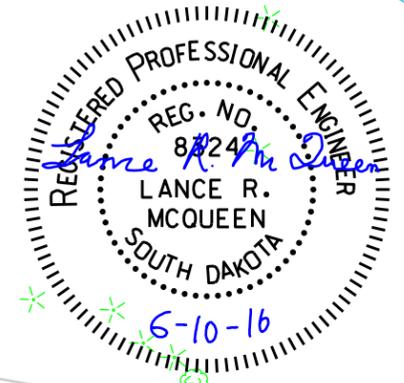
STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH 0100(105)419	L23	L46

FILE: ...Conduit Layout Sta. 847+00  
PLOTTING DATE: 06-09-2016

REV DATE:  
INITIAL:



ITEM	STATION-OFFSET
L41	848+19.89 - 60.66' LT
L42	848+20.14 - 60.68' RT
L43	851+20.89 - 60.66' LT
L44	851+21.14 - 60.68' RT
JF13	848+08.65 - 62.67' RT
JF14	853+39.42 - 62.67' RT



# CONDUIT LAYOUT

Hwy 100

FOR BIDDING PURPOSES ONLY

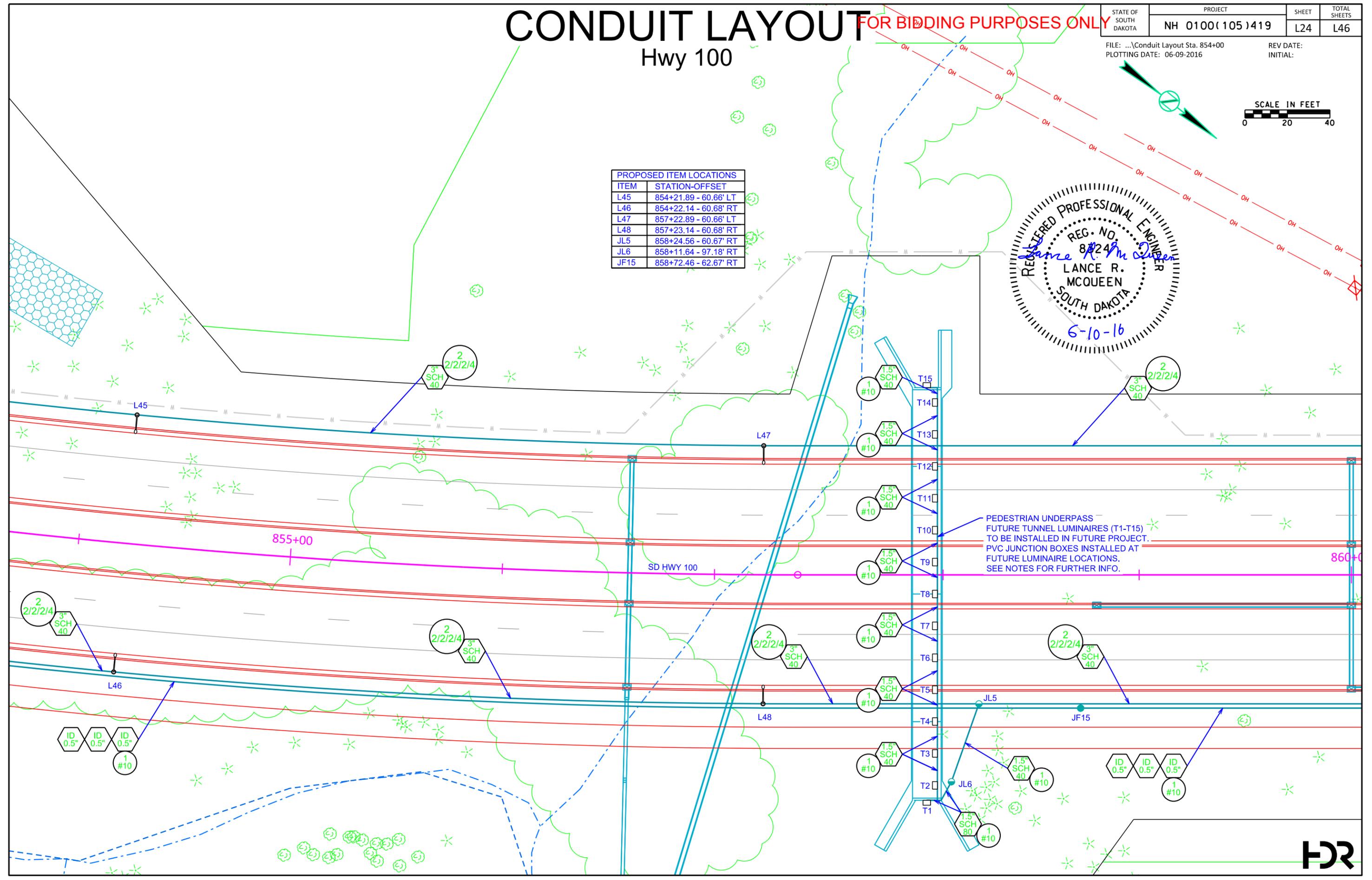
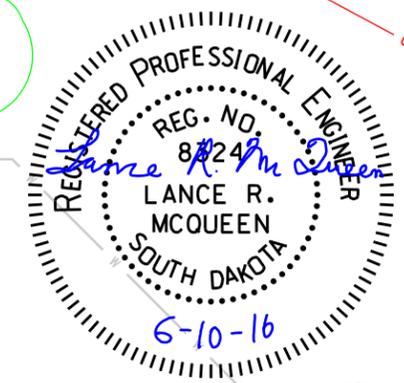
STATE OF SOUTH DAKOTA	PROJECT NH 0100(105)419	SHEET L24	TOTAL SHEETS L46
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FILE: ...Conduit Layout Sta. 854+00  
PLOTTING DATE: 06-09-2016

REV DATE:  
INITIAL:



ITEM	STATION-OFFSET
L45	854+21.89 - 60.66' LT
L46	854+22.14 - 60.68' RT
L47	857+22.89 - 60.66' LT
L48	857+23.14 - 60.68' RT
JL5	858+24.56 - 60.67' RT
JL6	858+11.64 - 97.18' RT
JF15	858+72.46 - 62.67' RT



# CONDUIT LAYOUT FOR BIDDING PURPOSES ONLY

## Hwy 100

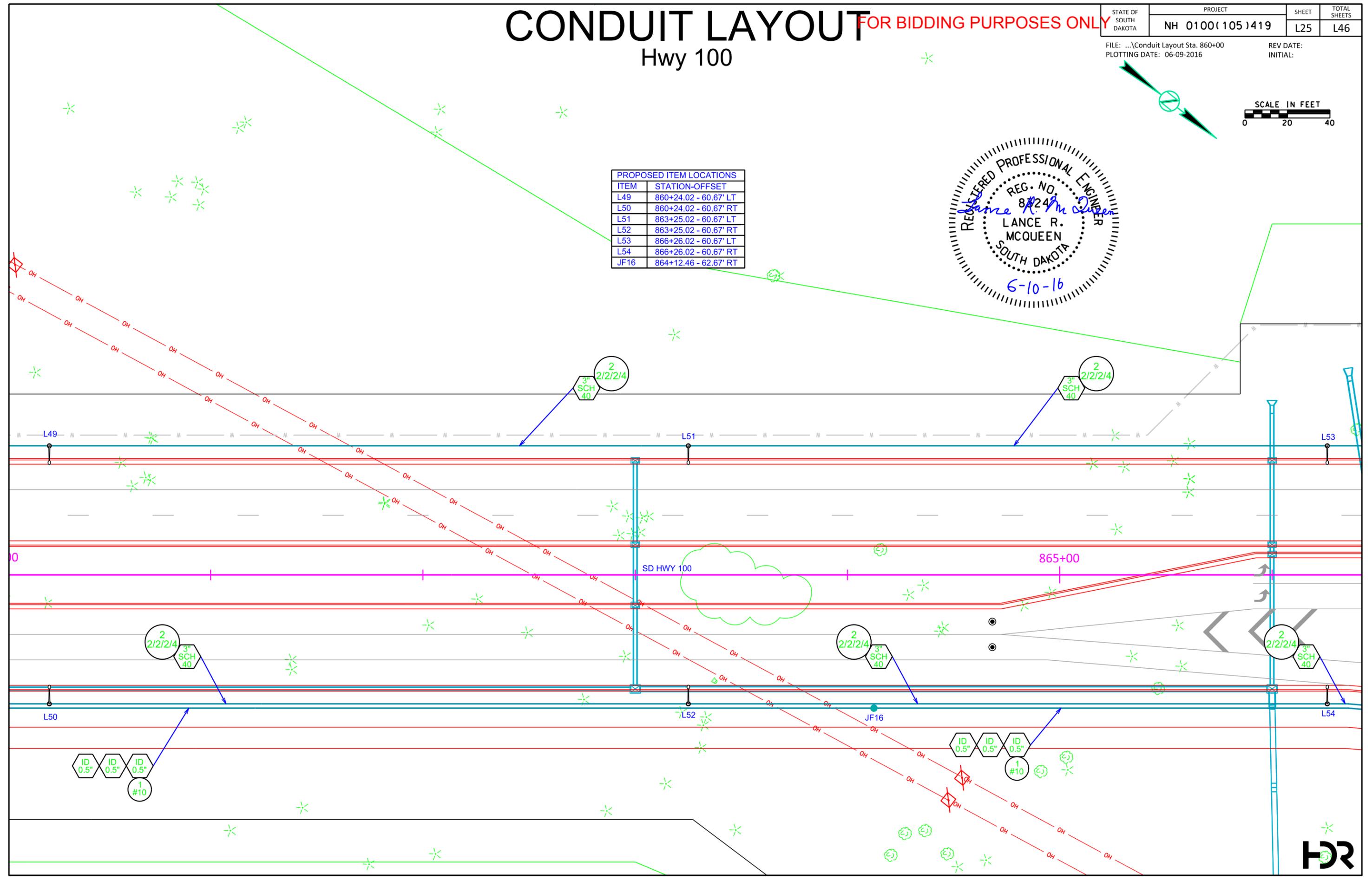
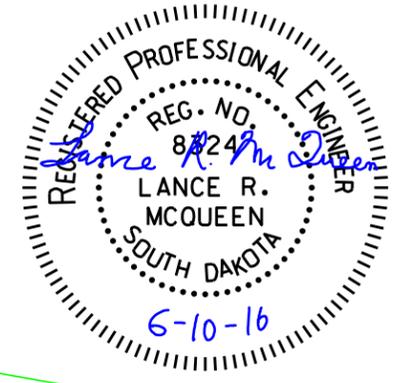
STATE OF SOUTH DAKOTA	PROJECT NH 0100(105)419	SHEET L25	TOTAL SHEETS L46
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FILE: ...Conduit Layout Sta. 860+00  
PLOTTING DATE: 06-09-2016

REV DATE:  
INITIAL:



PROPOSED ITEM LOCATIONS	
ITEM	STATION-OFFSET
L49	860+24.02 - 60.67' LT
L50	860+24.02 - 60.67' RT
L51	863+25.02 - 60.67' LT
L52	863+25.02 - 60.67' RT
L53	866+26.02 - 60.67' LT
L54	866+26.02 - 60.67' RT
JF16	864+12.46 - 62.67' RT

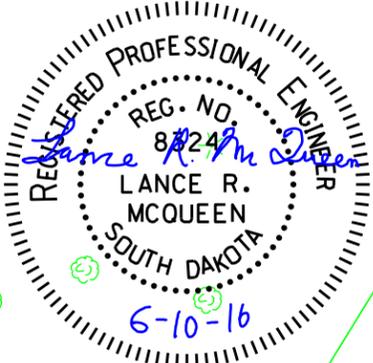


# CONDUIT LAYOUT

## Hwy 100

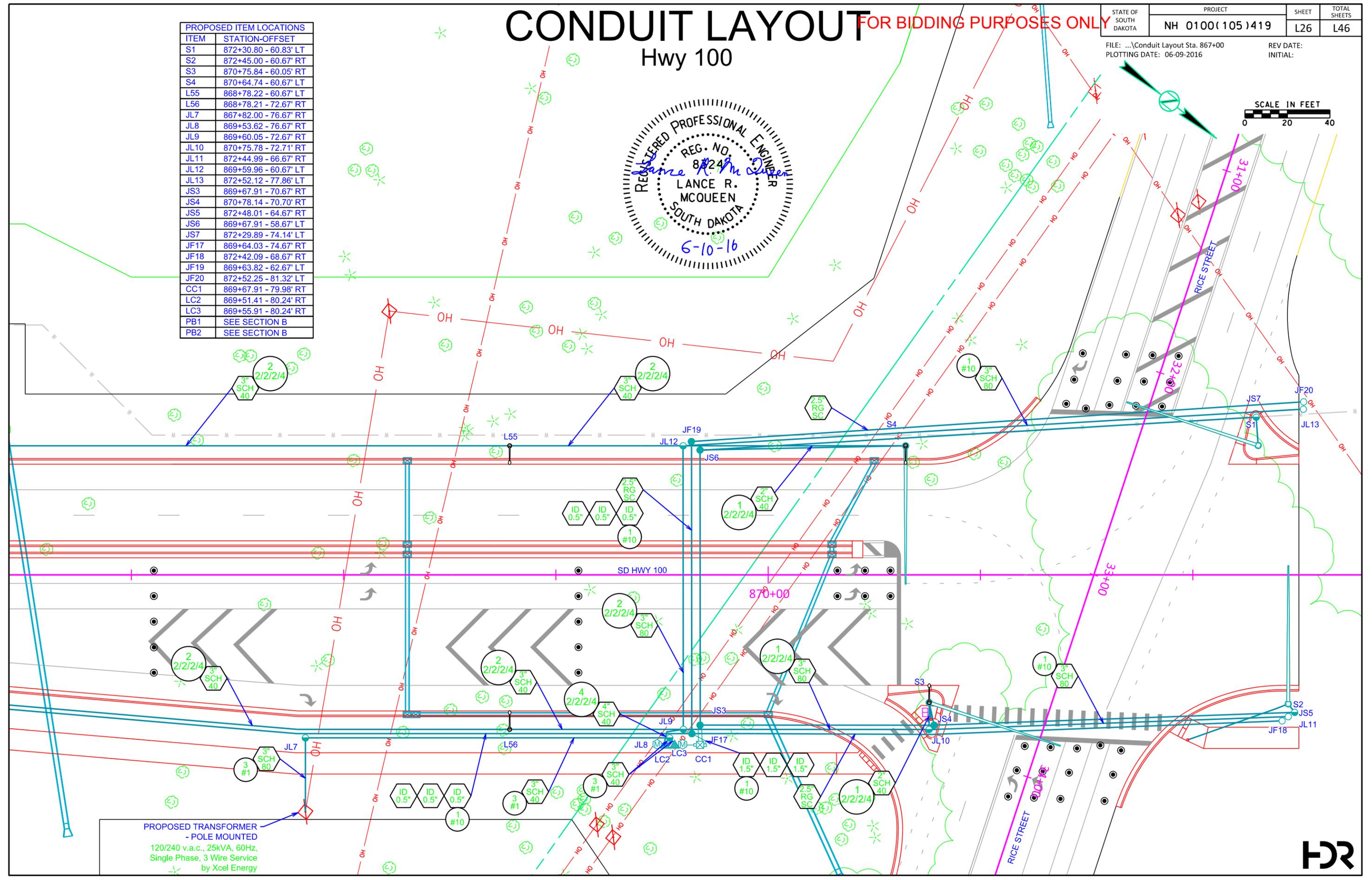
FOR BIDDING PURPOSES ONLY

PROPOSED ITEM LOCATIONS	
ITEM	STATION-OFFSET
S1	872+30.80 - 60.83' LT
S2	872+45.00 - 60.67' RT
S3	870+75.84 - 60.05' RT
S4	870+64.74 - 60.67' LT
L55	868+78.22 - 60.67' LT
L56	868+78.21 - 72.67' RT
JL7	867+82.00 - 76.67' RT
JL8	869+53.62 - 76.67' RT
JL9	869+60.05 - 72.67' RT
JL10	870+75.78 - 72.71' RT
JL11	872+44.99 - 66.67' RT
JL12	869+59.96 - 60.67' LT
JL13	872+52.12 - 77.86' LT
JS3	869+67.91 - 70.67' RT
JS4	870+78.14 - 70.70' RT
JS5	872+48.01 - 64.67' RT
JS6	869+67.91 - 58.67' LT
JS7	872+29.89 - 74.14' LT
JF17	869+64.03 - 74.67' RT
JF18	872+42.09 - 68.67' RT
JF19	869+63.82 - 62.67' LT
JF20	872+52.25 - 81.32' LT
CC1	869+67.91 - 79.98' RT
LC2	869+51.41 - 80.24' RT
LC3	869+55.91 - 80.24' RT
PB1	SEE SECTION B
PB2	SEE SECTION B



STATE OF SOUTH DAKOTA	PROJECT NH 0100(105)419	SHEET L26	TOTAL SHEETS L46
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FILE: ...Conduit Layout Sta. 867+00  
PLOTTING DATE: 06-09-2016  
REV DATE:  
INITIAL:



PROPOSED TRANSFORMER  
- POLE MOUNTED  
120/240 v.a.c., 25kVA, 60Hz,  
Single Phase, 3 Wire Service  
by Xcel Energy



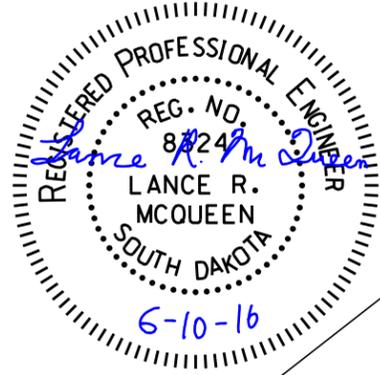
# SIGNAL CONDUIT LAYOUT

FOR BIDDING PURPOSES ONLY

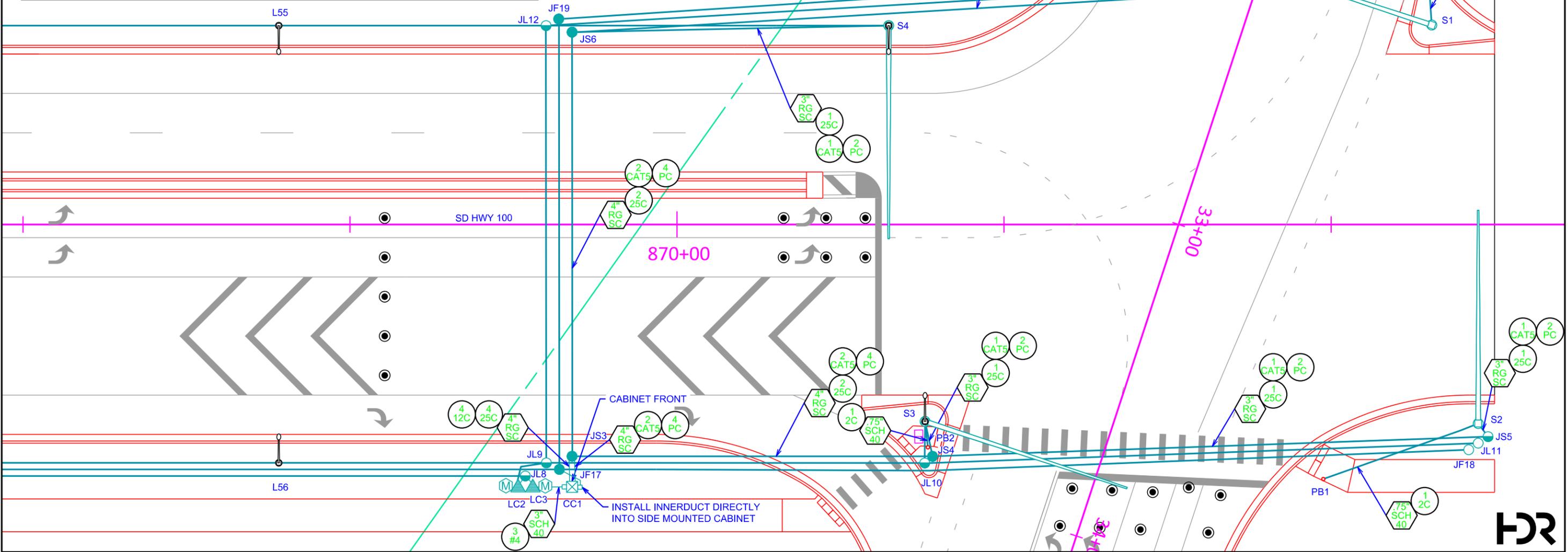
## Hwy 100 & Rice Street

STATE OF SOUTH DAKOTA	PROJECT NH 0100(105)419	SHEET L27	TOTAL SHEETS L46
-----------------------	----------------------------	--------------	---------------------

FILE: ...Conduit Signal Layout-Rice St  
PLOTTING DATE: 06-09-2016  
REV DATE: INITIAL:



ESTIMATE OF QUANTITIES			
KEY	ITEM	QUANTITY	UNIT
☒	TRAFFIC SIGNAL CONTROLLER	1	EACH
☐	SIGNAL HEAD BATTERY BACKUP AND FLASH SYSTEM (INSTALLED WITHIN SIDE MOUNTED CABINET) (INSTALLED ON RIGHT SIDE OF CABINET FRONT)	1	EACH
☐	SIDE MOUNTED CABINET (FOR FIBER OPTIC CABLE) (INSTALLED ON LEFT SIDE OF CABINET FRONT)	1	EACH
2C	2/C #14 AWG IMSA COPPER CABLE, K1 (TO PED. PUSH BUTTONS)	110	FT
4C	4/C #14 AWG IMSA COPPER CABLE, K1 (TO 3 SECTION AND PED SIGNAL HEADS)	1370	FT
7C	7/C #14 AWG IMSA COPPER CABLE, K1 (TO 5 SECTION SIGNAL HEADS)	30	FT
25C	25/C #14 AWG IMSA COPPER CABLE, K1 (TO SIGNAL BASES)	1325	FT
PC	PREEMPTION CABLE (TO OPTICAL DETECTORS) (1 PC FOR THE PREEMPTION UNIT) (1 PC FOR THE CONFIRMATION LIGHT)	3230	FT
CAT5	OUTDOOR RATED CAT5 CABLE (TO WIRELESS ACCESS POINTS)	1485	FT



# CONDUIT LAYOUT

## Rice Street & Timberline Avenue

FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA	PROJECT NH 0100(105)419	SHEET L28	TOTAL SHEETS L46
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FILE: ...Conduit Layout Timberline  
PLOTING DATE: 06-09-2016

REV DATE:  
INITIAL:



PROPOSED ITEM LOCATIONS	
ITEM	STATION-OFFSET
RES1	68+16.43 - 23.63' LT
REL3	68+52.58 - 20.00' RT
REL4	70+52.75 - 20.00' RT
REL5	71+92.55 - 20.00' RT
LC4	72+13.71 - 20.00' RT

REMOVAL ITEMS	
EL3	
EL4	
EL5	
ES1	



INSTALL SALVAGED PEDESTAL SIGNAL POLE, FLASHING RED BEACON AND STOP SIGN FROM ES1 LOCATION. THE CONTRACTOR SHALL WIRE THE FLASHING RED BEACON TO OPERATE AS IT CURRENTLY OPERATES. THE EXISTING BEACON CURRENTLY FLASHES ON AND OFF RED TO WARN SB TIMBERLINE AVENUE TRAFFIC TO STOP AT STOP SIGN.

STOP SIGN TO BE MOUNTED ON PEDESTAL SIGNAL POLE. SEE SECTION S FOR STOP SIGN DETAILS.

INSTALL SALVAGED LUMINAIRE EL3

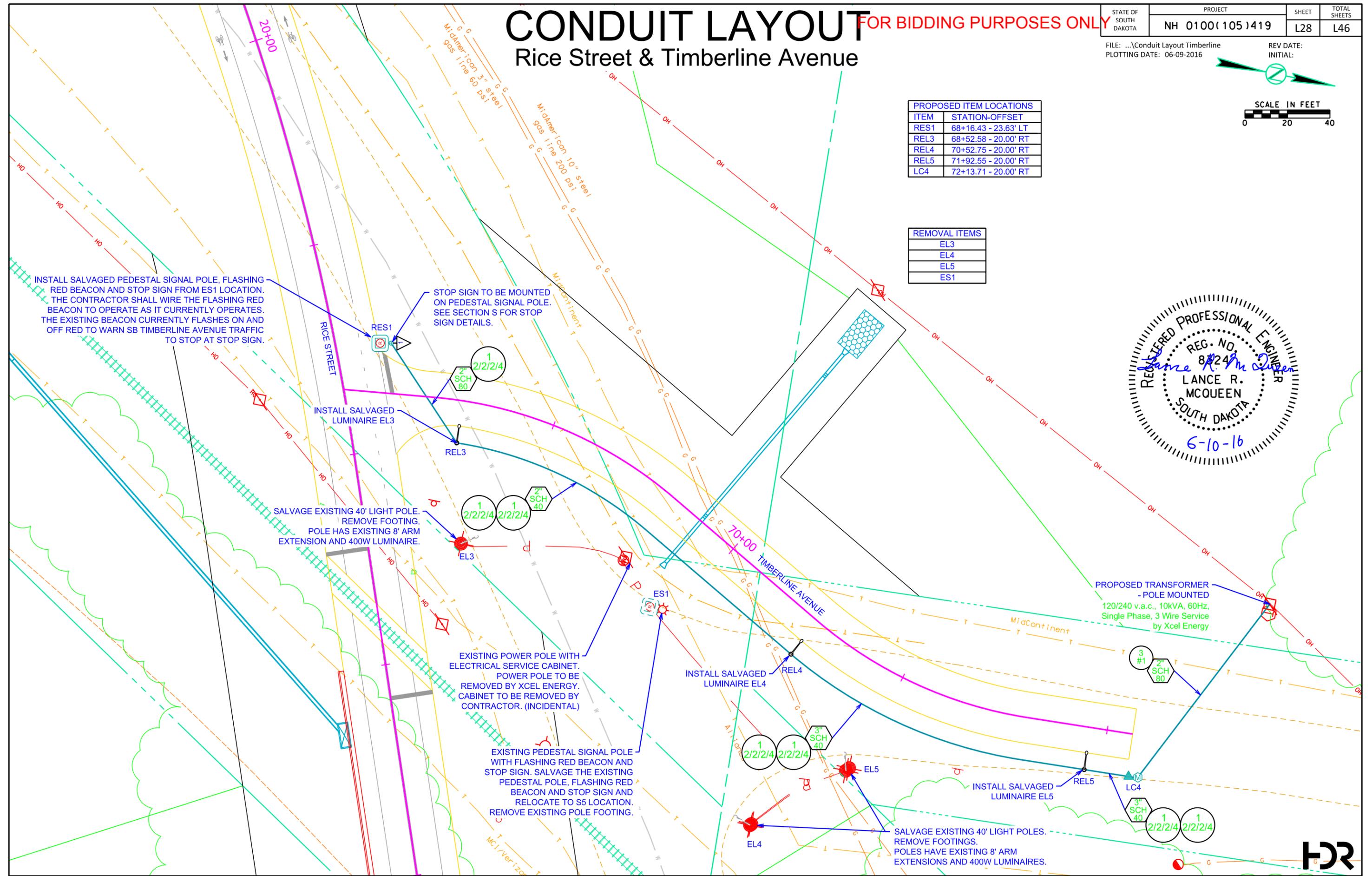
SALVAGE EXISTING 40' LIGHT POLE. REMOVE FOOTING. POLE HAS EXISTING 8' ARM EXTENSION AND 400W LUMINAIRE.

EXISTING POWER POLE WITH ELECTRICAL SERVICE CABINET. POWER POLE TO BE REMOVED BY XCEL ENERGY. CABINET TO BE REMOVED BY CONTRACTOR. (INCIDENTAL)

EXISTING PEDESTAL SIGNAL POLE WITH FLASHING RED BEACON AND STOP SIGN. SALVAGE THE EXISTING PEDESTAL POLE, FLASHING RED BEACON AND STOP SIGN AND RELOCATE TO S5 LOCATION. REMOVE EXISTING POLE FOOTING.

SALVAGE EXISTING 40' LIGHT POLES. REMOVE FOOTINGS. POLES HAVE EXISTING 8' ARM EXTENSIONS AND 400W LUMINAIRES.

PROPOSED TRANSFORMER - POLE MOUNTED  
120/240 v.a.c., 10kVA, 60Hz,  
Single Phase, 3 Wire Service  
by Xcel Energy



# WIRELESS SENSOR LAYOUT

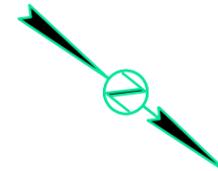
Hwy 100 & Rice Street

FOR BIDDING PURPOSES ONLY

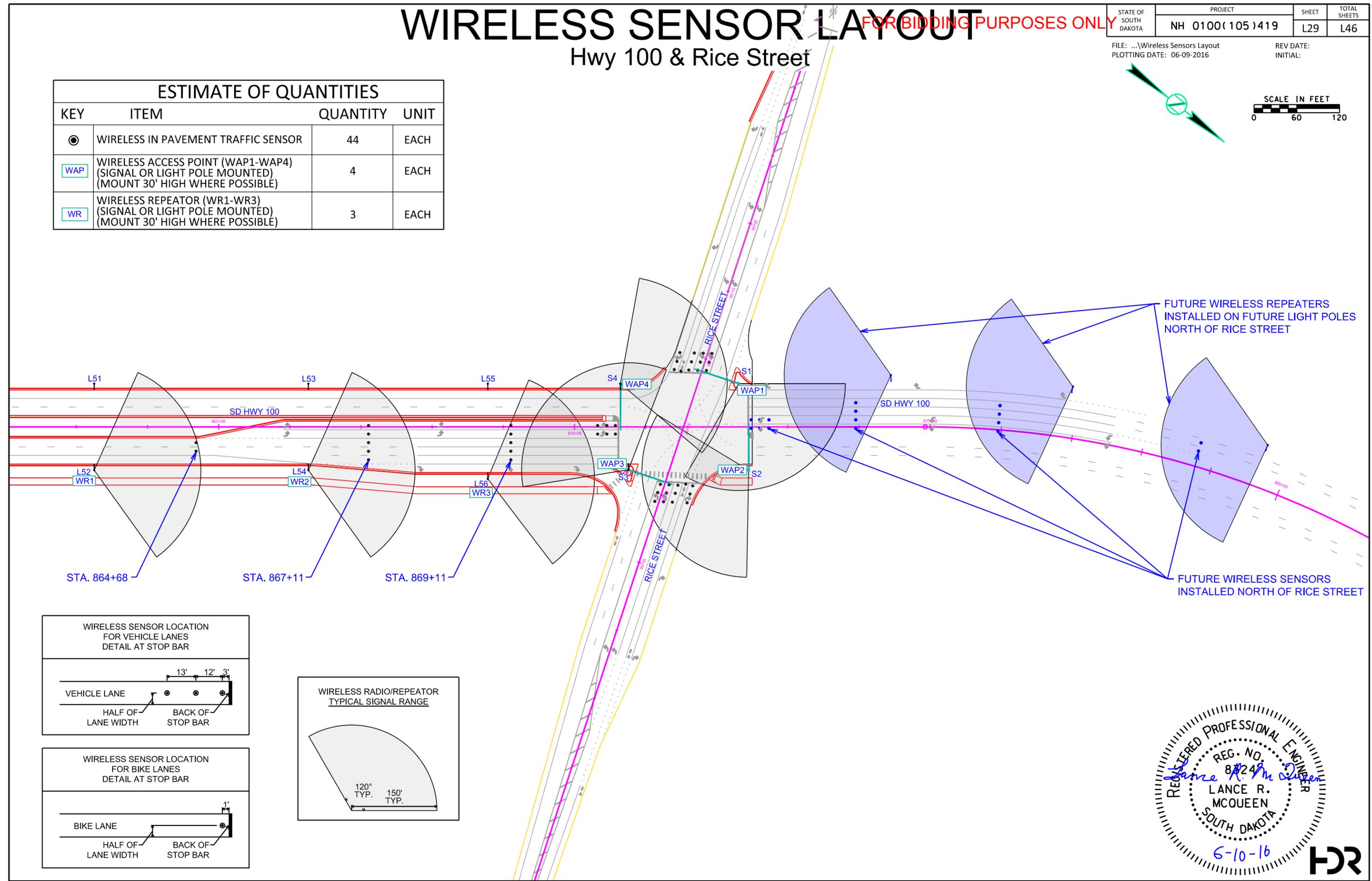
STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH 0100(105)419	L29	L46

FILE: ...Wireless Sensors Layout  
PLOTTING DATE: 06-09-2016

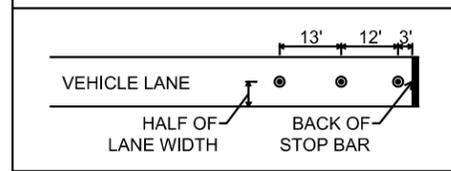
REV DATE:  
INITIAL:



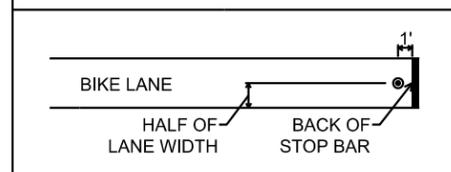
ESTIMATE OF QUANTITIES			
KEY	ITEM	QUANTITY	UNIT
●	WIRELESS IN PAVEMENT TRAFFIC SENSOR	44	EACH
WAP	WIRELESS ACCESS POINT (WAP1-WAP4) (SIGNAL OR LIGHT POLE MOUNTED) (MOUNT 30' HIGH WHERE POSSIBLE)	4	EACH
WR	WIRELESS REPEATER (WR1-WR3) (SIGNAL OR LIGHT POLE MOUNTED) (MOUNT 30' HIGH WHERE POSSIBLE)	3	EACH



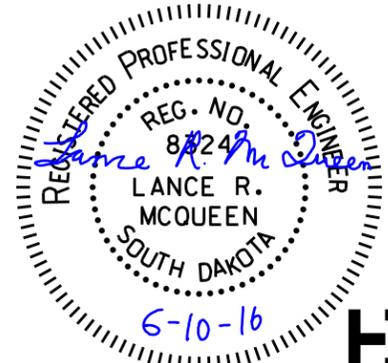
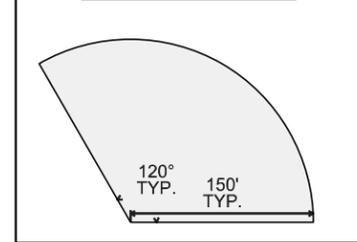
WIRELESS SENSOR LOCATION FOR VEHICLE LANES  
DETAIL AT STOP BAR



WIRELESS SENSOR LOCATION FOR BIKE LANES  
DETAIL AT STOP BAR



WIRELESS RADIO/REPEATER  
TYPICAL SIGNAL RANGE



# SIGNAL WIRING DIAGRAM

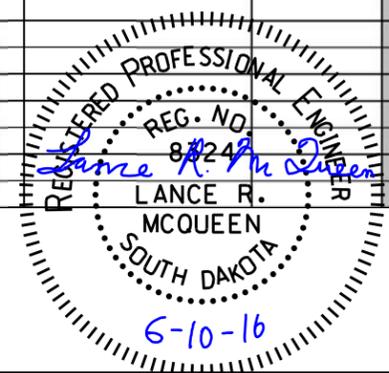
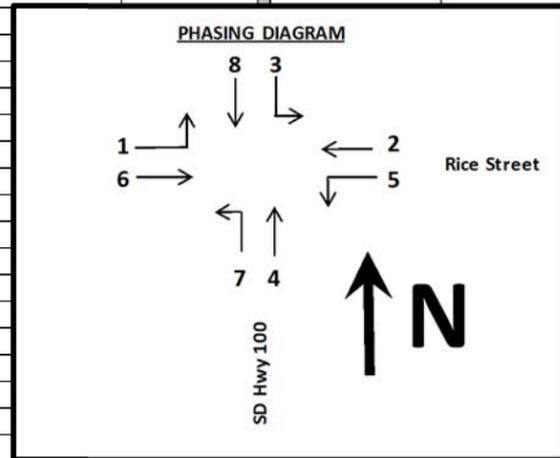
Hwy 100 & Rice Street

FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH 0100(105)419	L30	L46

FILE: ...Signal Wiring Diagram  
PLOTTING DATE: 06-09-2016  
REV DATE:  
INITIAL:

CORNER	S3 - Southeast			CORNER	S4-Southwest			CORNER	S1-Northwest			CORNER	S2-Northeast		
	Phase # 6	Cable # or color	Controller		Phase # 4	Cable # or color	Controller		Phase # 2	Cable # or color	Controller		Phase # 8	Cable # or color	Controller
Phase #6 Head No.	Wire Color	Head Color	Terminal Designation	Phase # 8 Head No.	Wire Color	Head Color	Terminal Designation	Phase # 2 Head No.	Wire Color	Head Color	Terminal Designation	Phase # 4 Head No.	Wire Color	Head Color	Terminal Designation
16,17,18	Red Orange Green White	Red Amber Green Ground/neutral	6 R 6 Y 6 G CB	22,23,24	Red Orange Green White	Red Amber Green Ground/neutral	8 R 8 Y 8 G CB	3,4,5	Red Orange Green White	Red Amber Green Ground/neutral	2 R 2 Y 2 G CB	9,10,11,12	Red Orange Green White	Red Amber Green Ground/neutral	4 R 4 Y 4 G CB
Phase # 4 Ped Head No.				Phase # 3 Head No.				Phase # 5 Head No.				Phase # 4 Ped Head No.			
27	Black/White Blue/Black White/Black	Don't Walk Walk Ground/neutral	10 R 10 G CB	20,21	Red/Black Orange/Black Green/Black White	<< Red << << Amber << << Green << Ground/neutral	3 R 3 Y 3 G CB	1,2	Red/Black Orange/Black Green/Black White	<< Red << << Amber << << Green << Ground/neutral	5 R 5 Y 5 G CB	26	Black Blue White/Black	Don't Walk Walk Ground/neutral	10 R 10 G CB
Phase # 1 Head No.				Phase # 5 Head No.				Phase # 7 Head No.				Phase # 7 Head No.			
14,15	Red/Black Orange/Black Green/Black White	<< Red << << Amber << << Green << Ground/neutral	1 R 1 Y 1G CB	25	Red/Black Orange/Black Green/Black White	<< Red << << Amber << << Green << Ground/neutral	5 R 5 Y 5 G CB	6	Red/Black Orange/Black Green/Black White	<< Red << << Amber << << Green << Ground/neutral	7 R 7 Y 7 G CB	7,8	Red/Black Orange/Black Green/Black White	<< Red << << Amber << << Green << Ground/neutral	7 R 7 Y 7 G CB
Phase # 3 Head No.								Phase # 7 Head No.				Phase # 1 Head No.			
19	Red/Black Orange/Black Green/Black White	<< Red << << Amber << << Green << Ground/neutral	3 R 3 Y 3 G CB					5	Red Orange Green Black/Red Blue/White White	See Phase #2, Head No. 5 above <<Amber>> <<Green<< Ground/neutral	3 Y 3 G CB	13	Red/Black Orange/Black Green/Black White	<< Red << << Amber << << Green << Ground/neutral	1 R 1 Y 1G CB
Phase # 3 Head No.															
18	Red Orange Green Black/Red Blue/White White	See Phase #6, Head No. 18 above <<Amber>> <<Green<< Ground/neutral	7 Y 7 G CB												
PED. P.B.'s	Blue/Red Red/white Blue/Red Red/white White/Red	Phase 2 Phase 4 Phase 6 Phase 8 P.B. common	L 11 L 9 Q 11 Q 9 R 9 ~12									PED. P.B.'s	Blue/Red Red/white Blue/Red Red/white White/Red	Phase 2 Phase 4 Phase 6 Phase 8 P.B. common	L 11 L 9 Q 11 Q 9 R 9 ~12



# LIGHTING WIRING DIAGRAM

FOR BIDDING PURPOSES ONLY

Hwy 100 - Maple St to Sta. 840+00

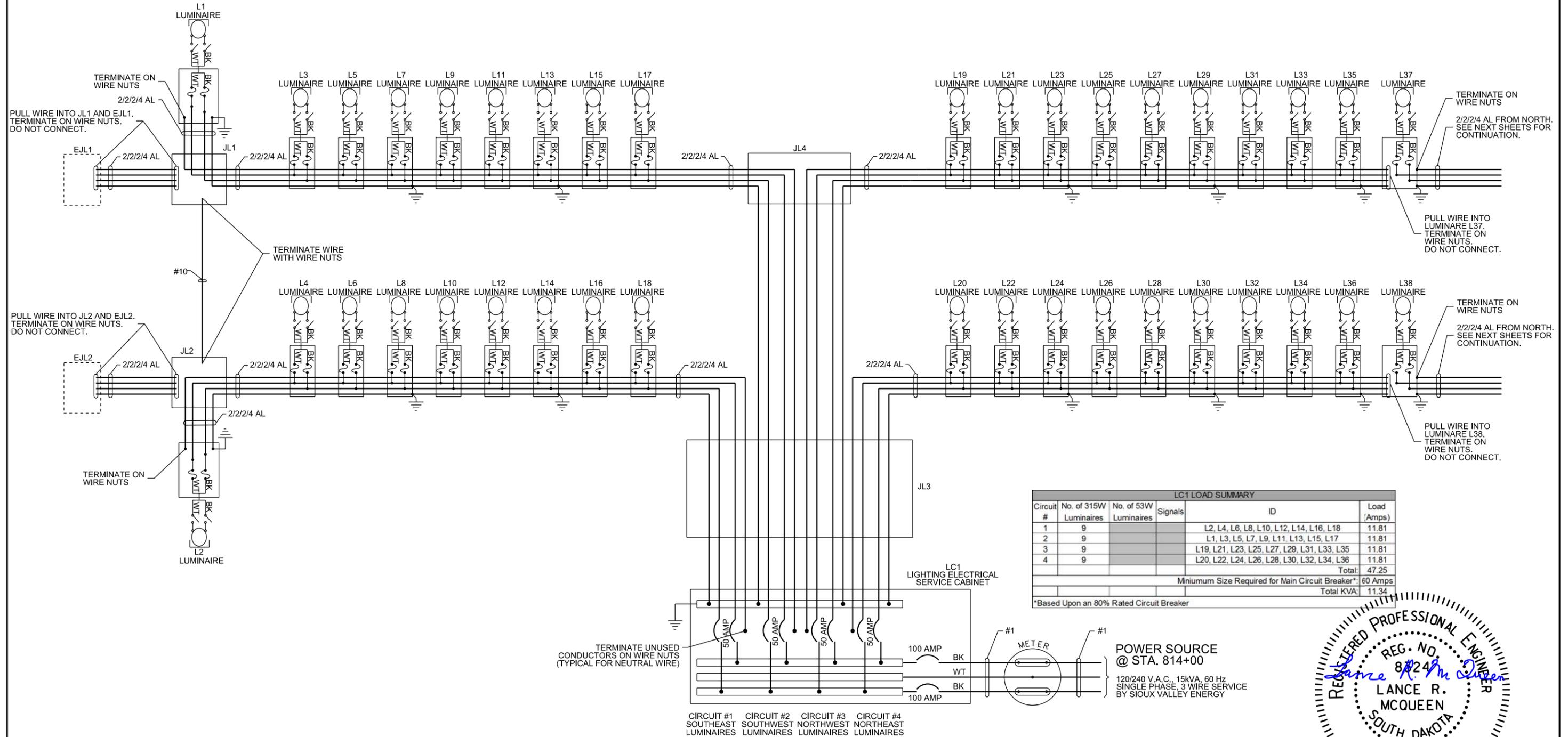
STATE OF SOUTH DAKOTA	PROJECT NH 0100(105)419	SHEET L31	TOTAL SHEETS L46
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FILE: ...Lighting Wiring - Maple  
PLOTTING DATE: 06-09-2016

REV DATE:  
INITIAL:

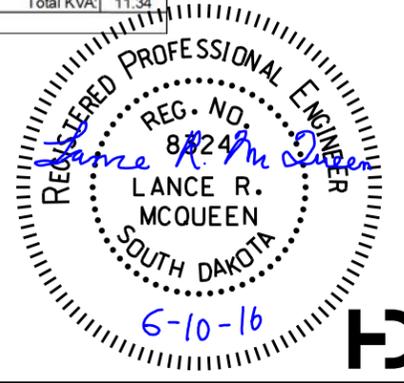
- LEGEND:
- LUMINAIRE: 315 WATT LED LAMP
  - FUSE: 4 AMP. NON-TIME DELAY OR 1 8/10 AMP. DUAL ELEMENT

NOTE:  
ALL CIRCUITS SHALL BE BONDED IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE. QUANTITIES FOR BONDING CONDUCTORS ARE NOT INCLUDED IN THESE PLANS.



Circuit #	No. of 315W Luminaires	No. of 53W Luminaires	Signals	ID	Load (Amps)
1	9			L2, L4, L6, L8, L10, L12, L14, L16, L18	11.81
2	9			L1, L3, L5, L7, L9, L11, L13, L15, L17	11.81
3	9			L19, L21, L23, L25, L27, L29, L31, L33, L35	11.81
4	9			L20, L22, L24, L26, L28, L30, L32, L34, L36	11.81
Total:					47.25
Minimum Size Required for Main Circuit Breaker*:					60 Amps
Total KVA:					11.34

\*Based Upon an 80% Rated Circuit Breaker



# LIGHTING WIRING DIAGRAM

FOR BIDDING PURPOSES ONLY

Hwy 100 - Sta. 840+00 to Rice St

STATE OF SOUTH DAKOTA	PROJECT NH 0100(105)419	SHEET L32	TOTAL SHEETS L46
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FILE: ...Lighting Wiring - Rice St  
PLOTING DATE: 06-09-2016

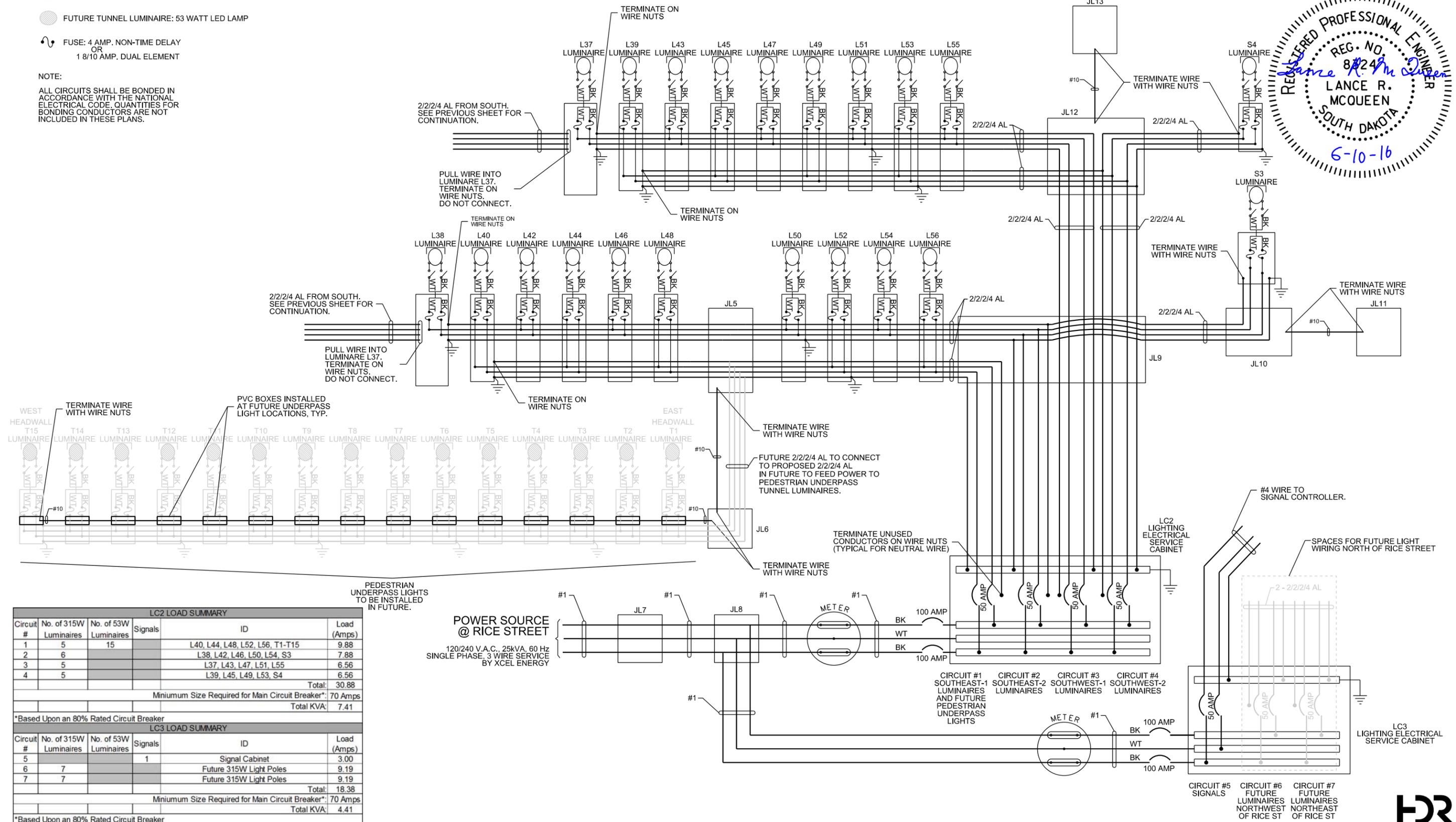
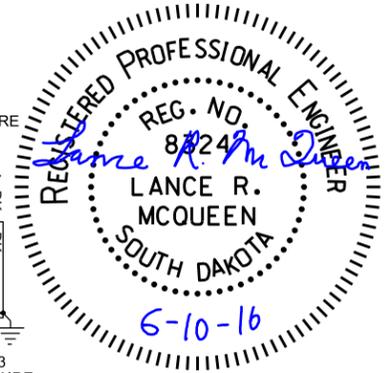
REV DATE:  
INITIAL:

LEGEND:

- LUMINAIRE: 315 WATT LED LAMP
- FUTURE TUNNEL LUMINAIRE: 53 WATT LED LAMP
- FUSE: 4 AMP. NON-TIME DELAY OR 1 8/10 AMP. DUAL ELEMENT

NOTE:

ALL CIRCUITS SHALL BE BONDED IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE. QUANTITIES FOR BONDING CONDUCTORS ARE NOT INCLUDED IN THESE PLANS.



Circuit #	No. of 315W Luminaires	No. of 53W Luminaires	Signals	ID	Load (Amps)
1	5	15		L40, L44, L48, L52, L56, T1-T15	9.88
2	6			L38, L42, L46, L50, L54, S3	7.88
3	5			L37, L43, L47, L51, L55	6.56
4	5			L39, L45, L49, L53, S4	6.56
Total:					30.88
Minimum Size Required for Main Circuit Breaker*:					70 Amps
Total KVA:					7.41

Circuit #	No. of 315W Luminaires	No. of 53W Luminaires	Signals	ID	Load (Amps)
5			1	Signal Cabinet	3.00
6	7			Future 315W Light Poles	9.19
7	7			Future 315W Light Poles	9.19
Total:					18.38
Minimum Size Required for Main Circuit Breaker*:					70 Amps
Total KVA:					4.41

POWER SOURCE @ RICE STREET  
120/240 V.A.C., 25kVA, 60 Hz  
SINGLE PHASE, 3 WIRE SERVICE  
BY XCEL ENERGY

PEDESTRIAN UNDERPASS LIGHTS TO BE INSTALLED IN FUTURE.



# LIGHTING WIRING DIAGRAM

## Timberline Ave

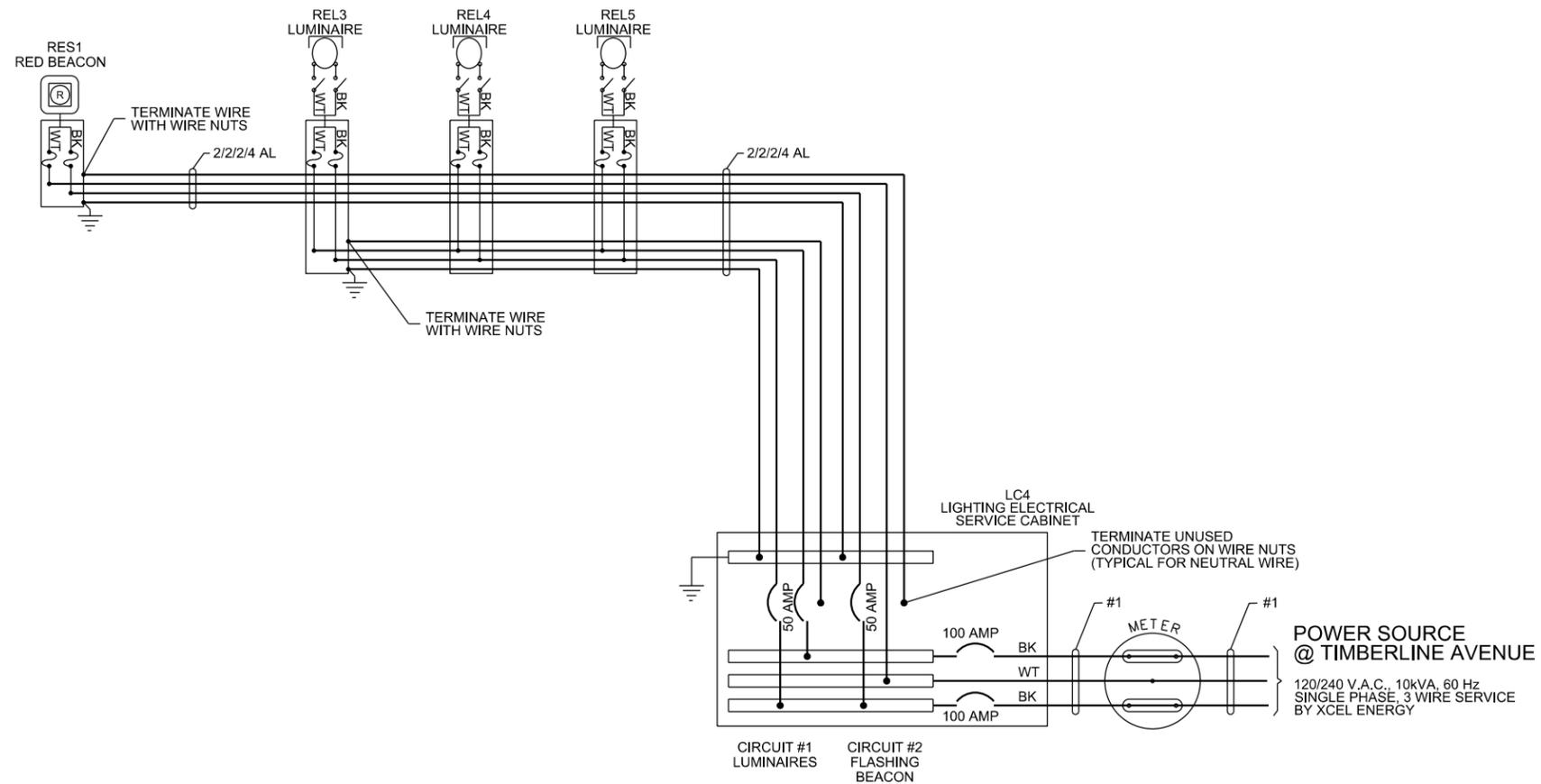
FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA	PROJECT NH 0100(105)419	SHEET L33	TOTAL SHEETS L46
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FILE: ...Lighting Wiring - Timberline Ave  
 PLOTTING DATE: 06-09-2016  
 REV DATE:  
 INITIAL:

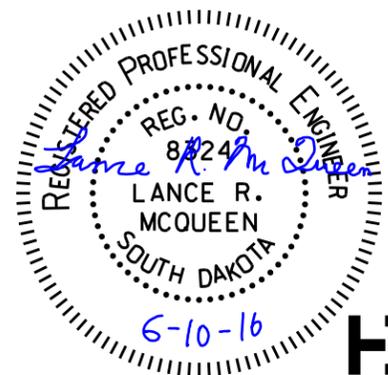
- LEGEND:**
- LUMINAIRE: 400 WATT HPS LAMP
  - ⚡ FUSE: 6 AMP. NON-TIME DELAY  
OR  
2 8/10 AMP. DUAL ELEMENT

**NOTE:**  
 ALL CIRCUITS SHALL BE BONDED IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE. QUANTITIES FOR BONDING CONDUCTORS ARE NOT INCLUDED IN THESE PLANS.



LC4 LOAD SUMMARY				
Circuit #	No. of 400W Luminaires	Signal Beacon	ID	Load (Amps)
1	3		REL3, REL4, REL5	5.55
2		1	RES1	0.83
			Total:	6.38
Minimum Size Required for Main Circuit Breaker*:				50 Amps
			Total KVA:	1.73

\*Based Upon an 80% Rated Circuit Breaker



# FIBER OPTIC CABLE WIRING DIAGRAM

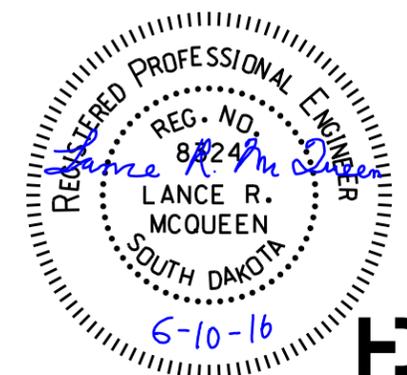
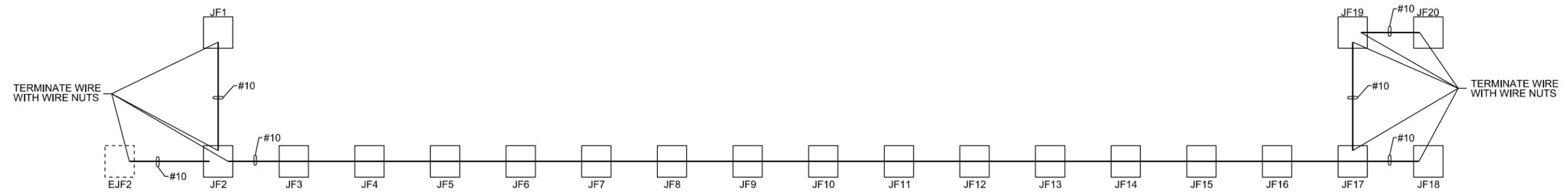
Hwy 100 - Maple St to Rice St

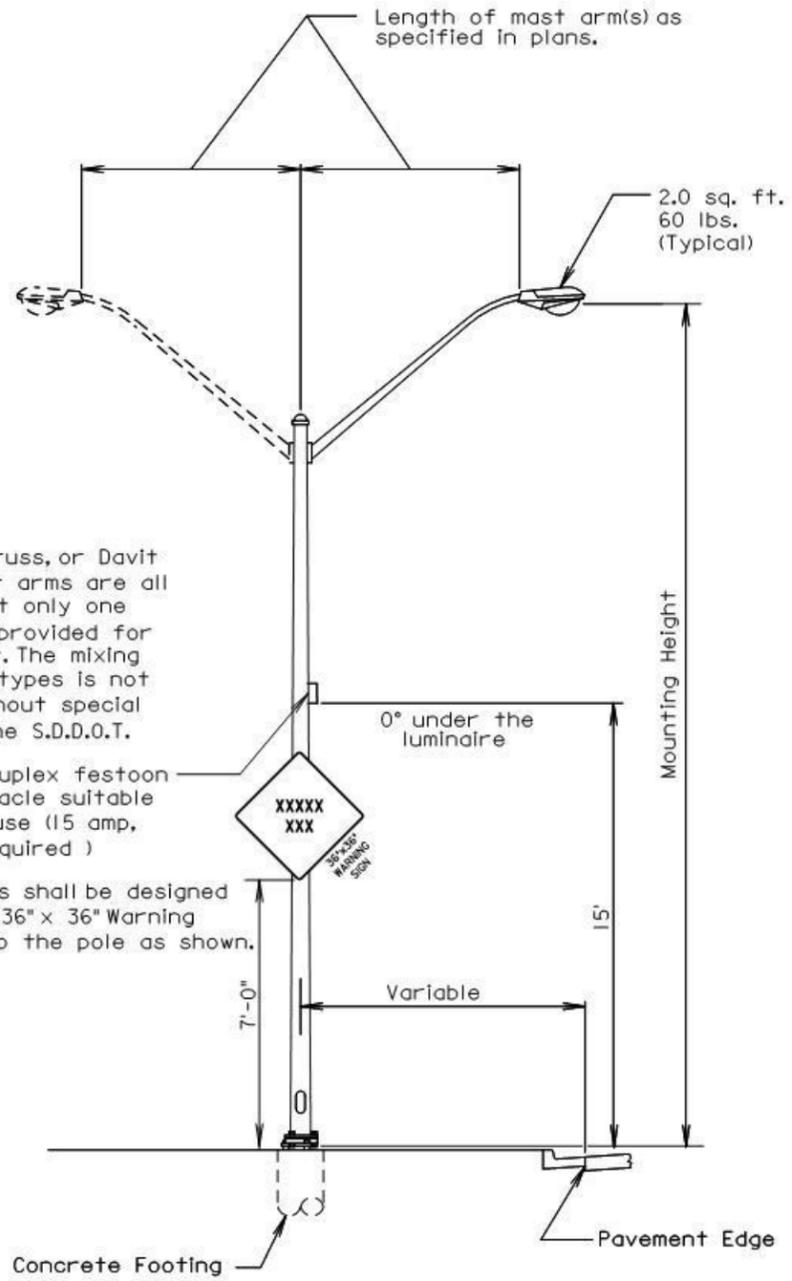
FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH 0100(105)419	L34	L46

FILE: ...Fiber Wiring  
PLOTING DATE: 06-09-2016

REV DATE:  
INITIAL:





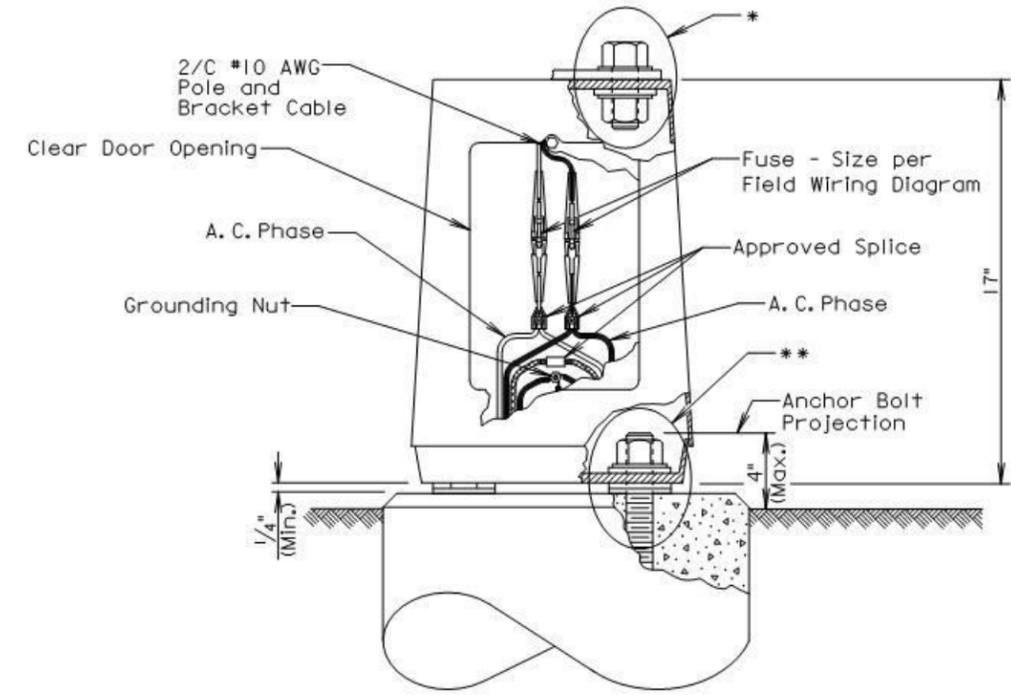
Single Tube, Truss, or Davit types of mast arms are all acceptable, but only one type shall be provided for each contract. The mixing of different types is not permitted without special approval by the S.D.O.O.T.

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

Published Date: 2nd Qtr. 2016	S D D O T	STEEL ROADWAY LUMINAIRE POLE WITH MAST ARM(S)	PLATE NUMBER 635.01
			Sheet 1 of 1



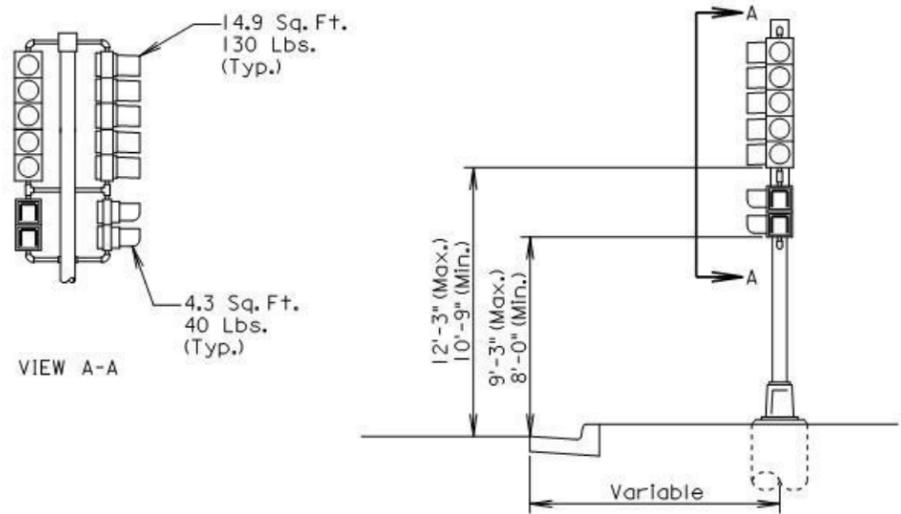
GENERAL NOTES:

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

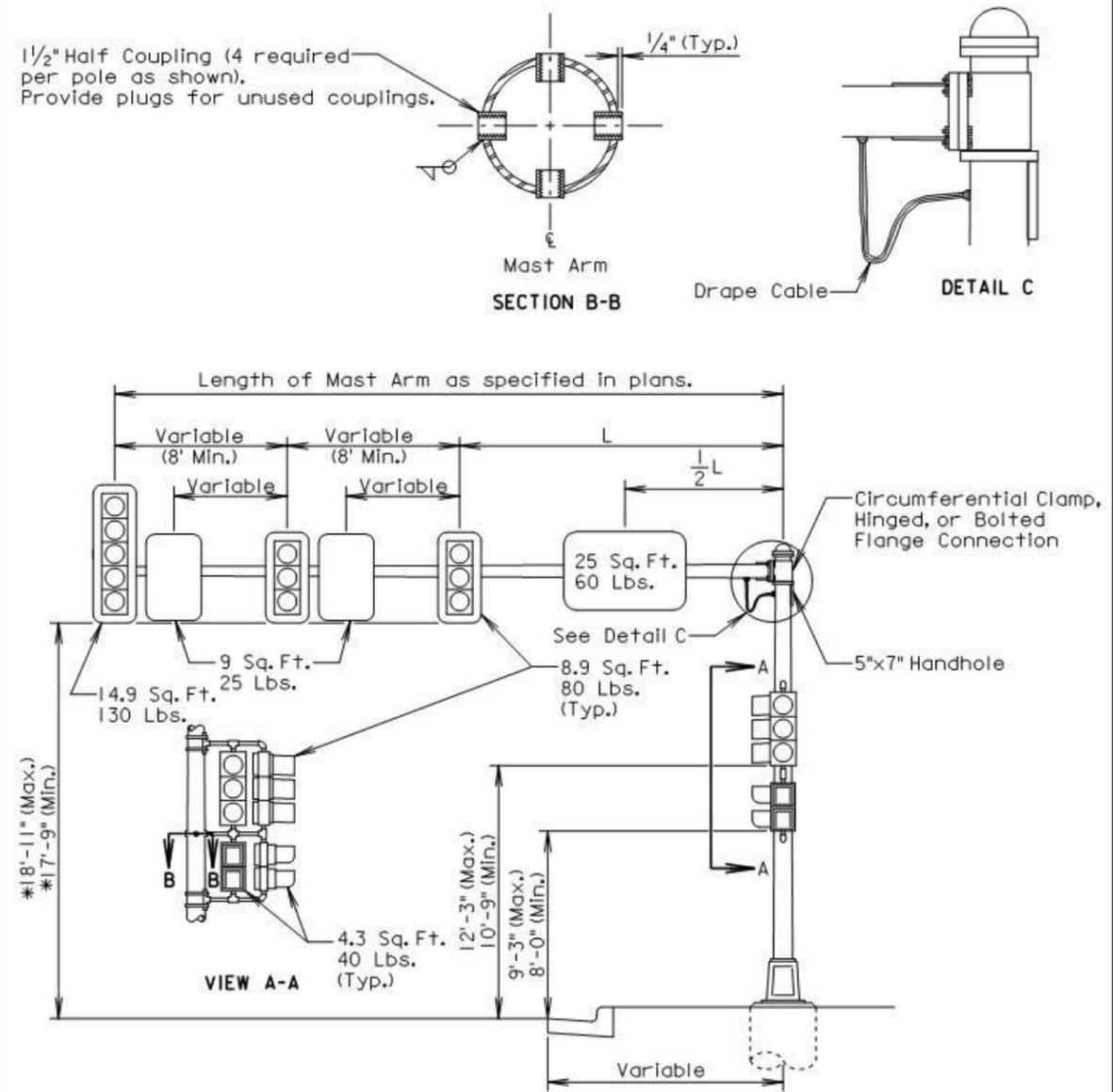
Published Date: 2nd Qtr. 2016	S D D O T	ROADWAY LUMINAIRE POLE BREAKAWAY TRANSFORMER BASE	PLATE NUMBER 635.21
			Sheet 1 of 1



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

October 15, 2007

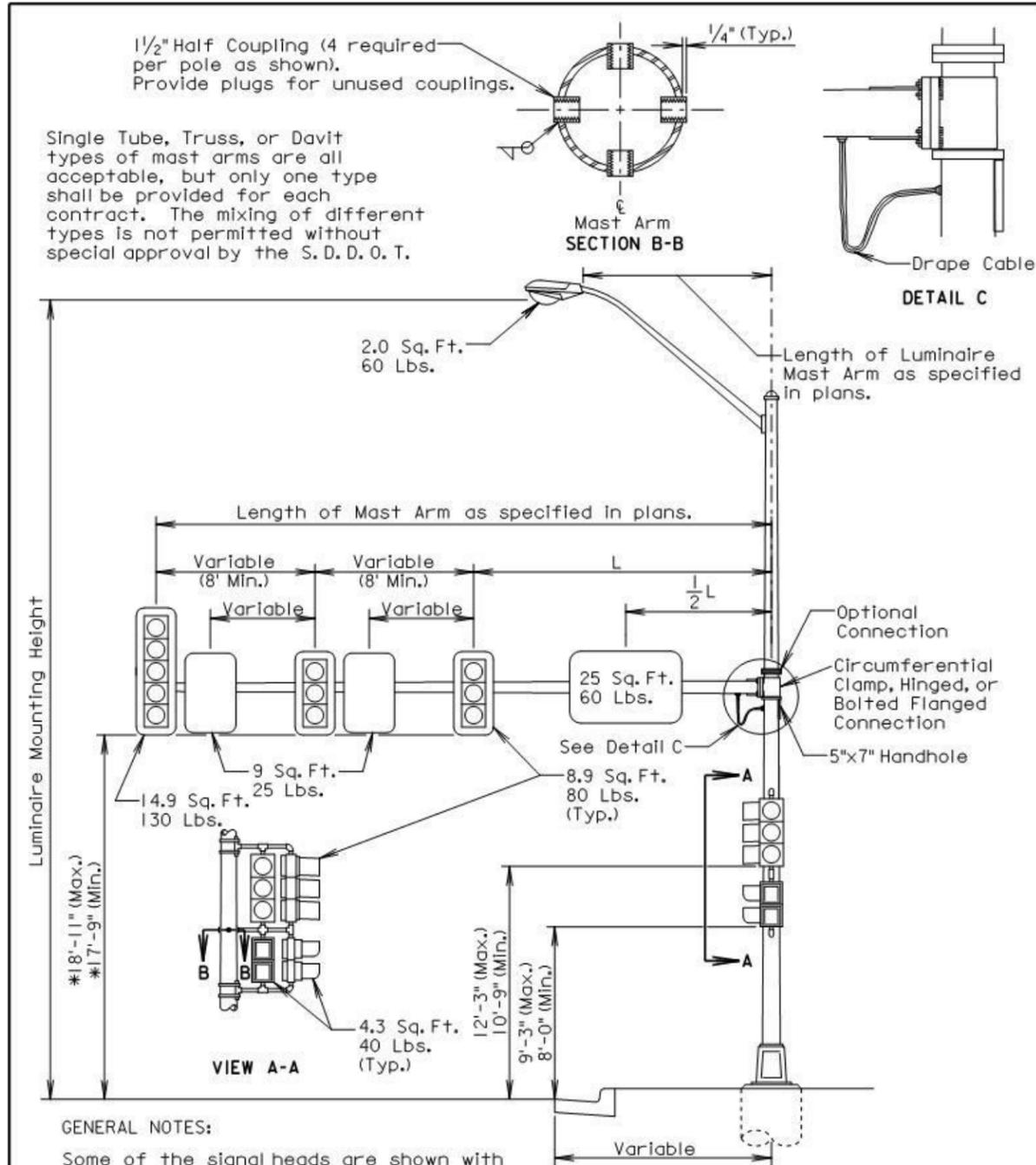
Published Date: 2nd Qtr. 2016	S D D O T	SIGNAL POLE (PEDESTAL)	PLATE NUMBER 635.30
			Sheet 1 of 1



GENERAL NOTES:  
Some of the signal heads are shown with backplates removed so that the mounting hardware is visible.  
\*The signal height allowances shown above are based on a horizontal distance greater than 53' between the signals and stop line. For horizontal distance of 53' and less between the signals and the stop line, the height allowances shall be as specified in Section 4D.15 of the MUTCD.

December 23, 2008

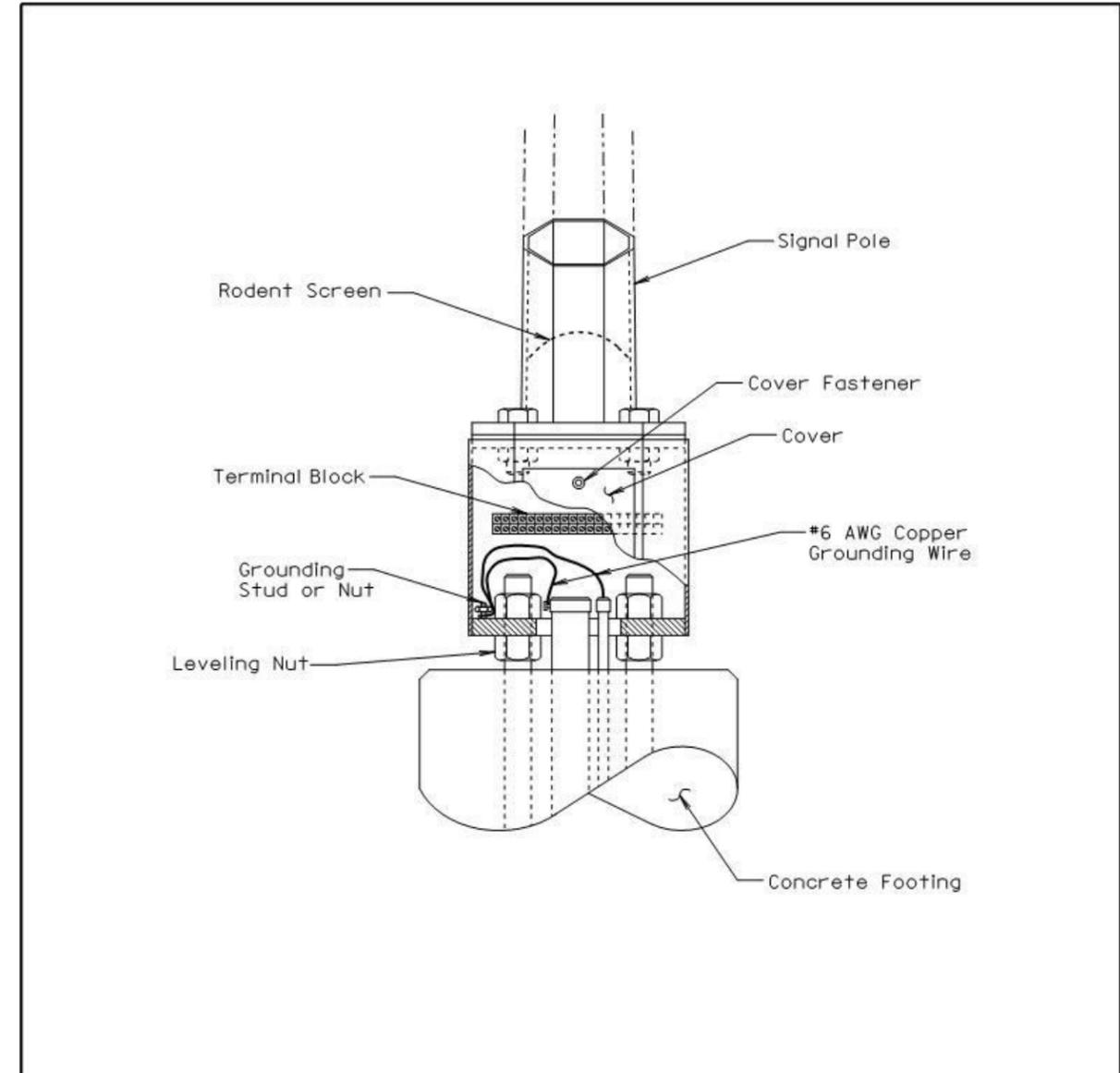
Published Date: 2nd Qtr. 2016	S D D O T	SIGNAL POLE (WITH MAST ARM)	PLATE NUMBER 635.31
			Sheet 1 of 1



**GENERAL NOTES:**  
 Some of the signal heads are shown with backplates removed so that the mounting hardware is visible.  
 \* The signal height allowances shown above are based on a horizontal distance greater than 53' between the signals and stop line. For horizontal distance of 53' and less between the signals and the stop line, the height allowances shall be as specified in Section 4D.15 of the MUTCD.

December 23, 2008

Published Date: 2nd Qtr. 2016	S D D O T	SIGNAL POLE (WITH MAST ARM AND LUMINAIRE EXTENSION)	PLATE NUMBER 635.32
			Sheet 1 of 1

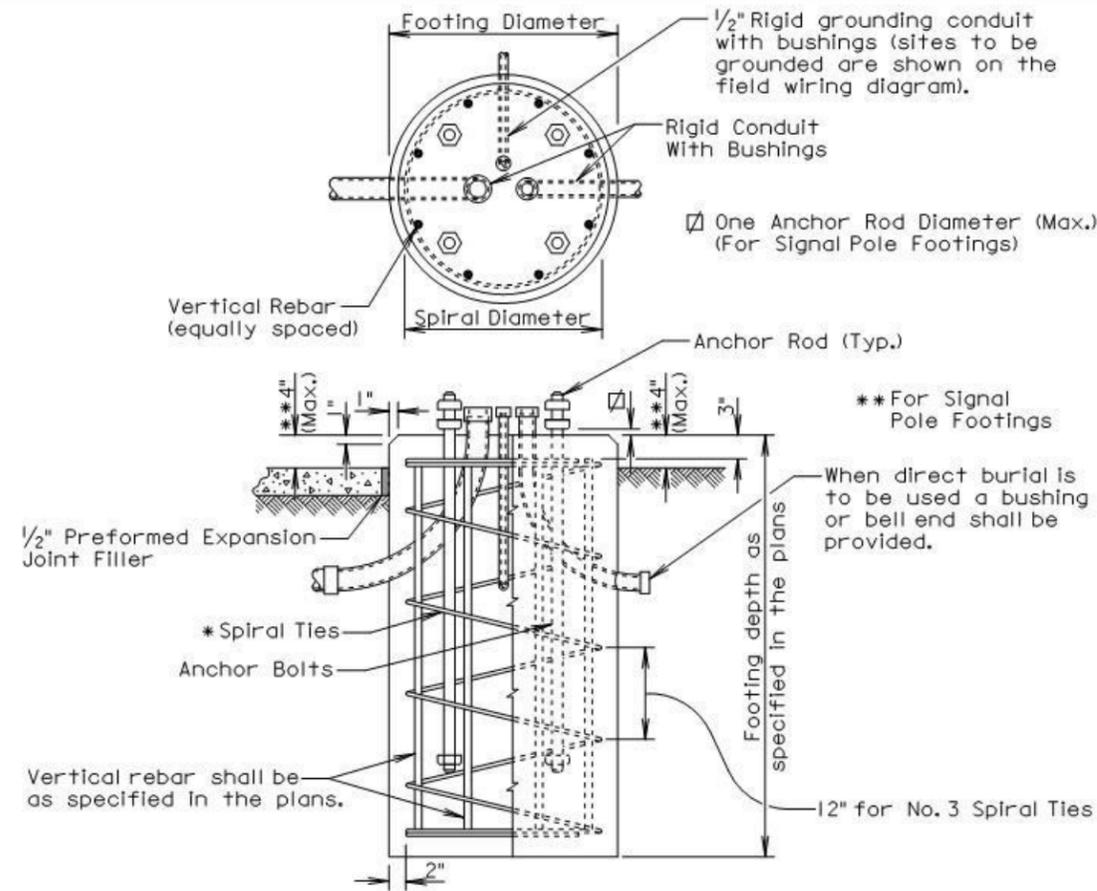


**GENERAL NOTES:**  
 Base details are provided for example only and are not intended to be a complete design.  
 The Contractor shall furnish and install a rodent screen in the signal pole above the transformer base. The rodent screen shall be a galvanized steel mesh with a maximum opening size of 1/4 inch. The rodent screen shall be friction fitted or installed by other methods approved by the Engineer.  
 All costs for furnishing and installing the rodent screen including labor, equipment, and materials shall be incidental to the contract unit price per each for the corresponding signal pole bid item.

December 23, 2008

Published Date: 2nd Qtr. 2016	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 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.

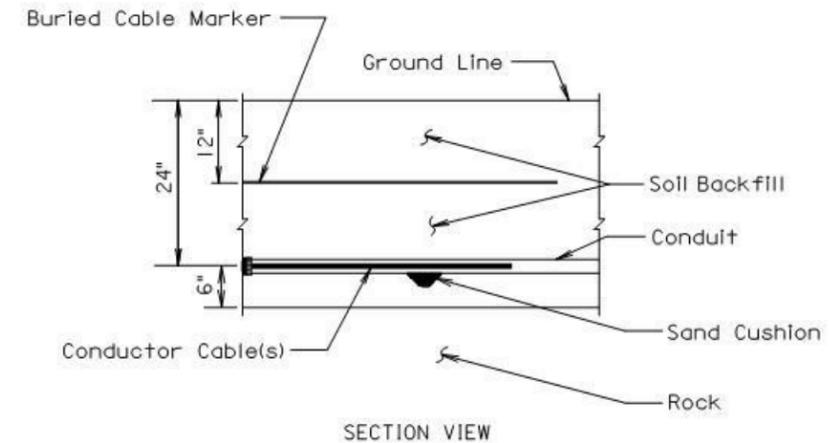
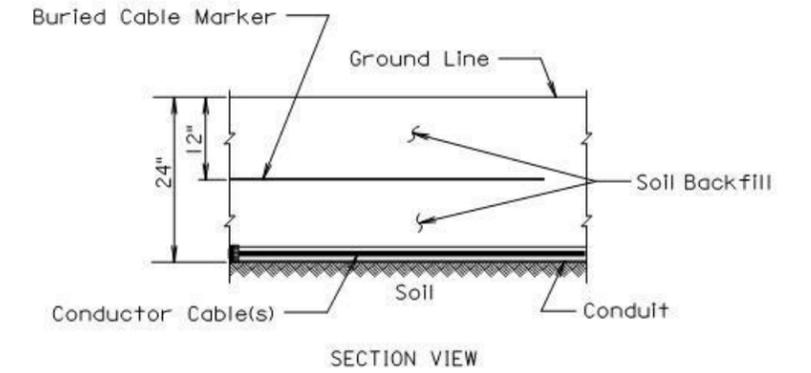
Costs of conduit and conduit bushings shown on footing detail shall be incidental to the footing bid item(s).

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

Published Date: 2nd Qtr. 2016	S D D O T	POLE FOOTING	PLATE NUMBER
			635.55
			Sheet 1 of 1

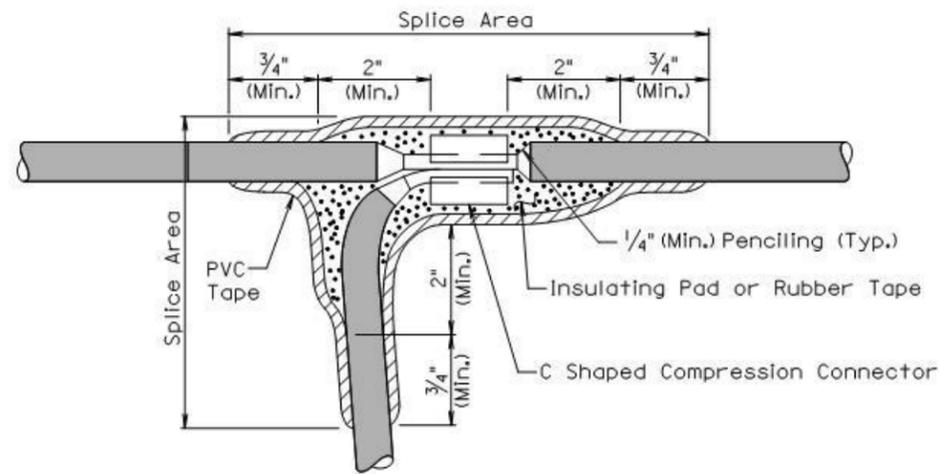


**GENERAL NOTE:**

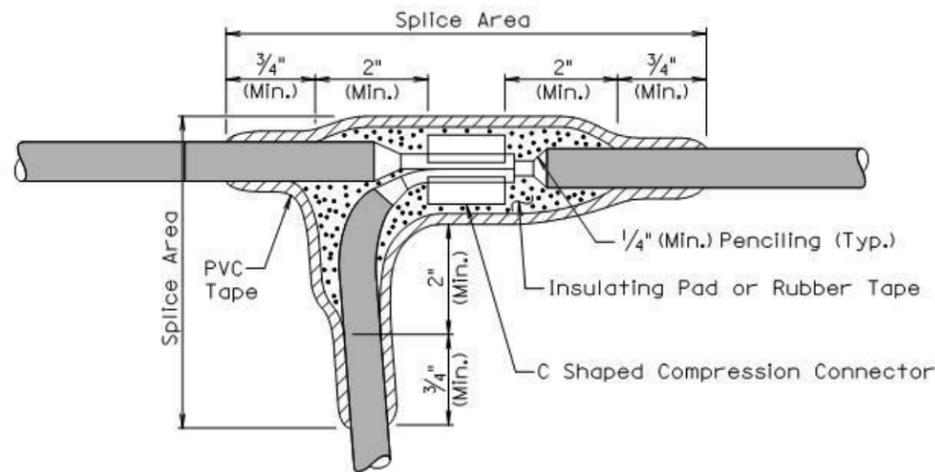
The Buried Cable Marker shall be plastic, approximately 6" wide, and shall be capable of sustaining a minimum of a 350% tolerance of elongation without tearing. The Buried Cable Marker shall have a life expectancy approximately equal to that of the conductor(s) beneath it. A phrase indicating the presence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

March 31, 2000

Published Date: 2nd Qtr. 2016	S D D O T	CONDUIT INSTALLATION	PLATE NUMBER
			635.76
			Sheet 1 of 1



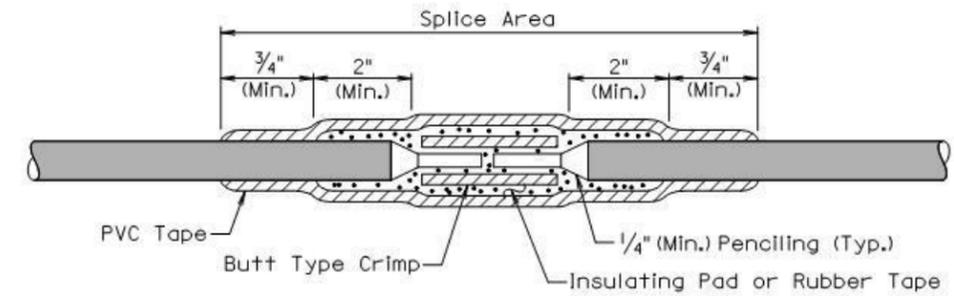
**TYPE C SPLICE**  
(Between 1 free end and 1 through conductor)



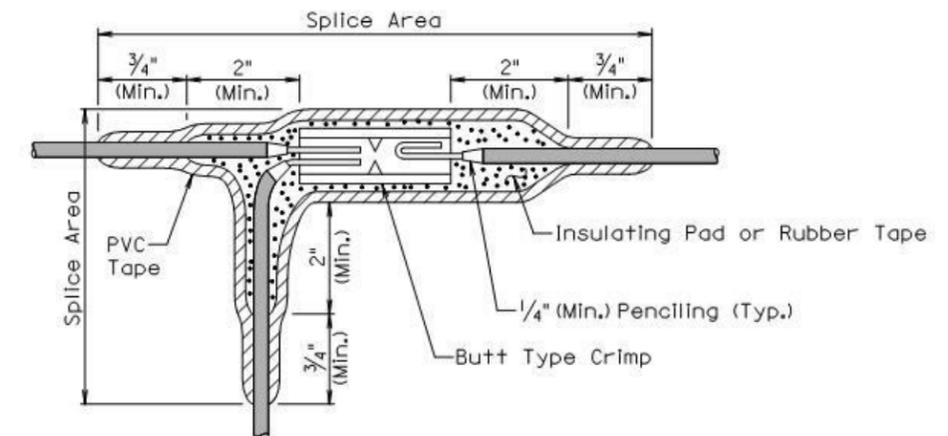
**TYPE T SPLICE**  
(For 3 free ends)

February 14, 2010

Published Date: 2nd Qtr. 2016	S D D O T	WIRE SPlicing FOR LIGHTING (LOW VOLTAGE CIRCUITS (0 to 600 V))	PLATE NUMBER 635.80
			Sheet 1 of 2



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



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

GENERAL NOTES:

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

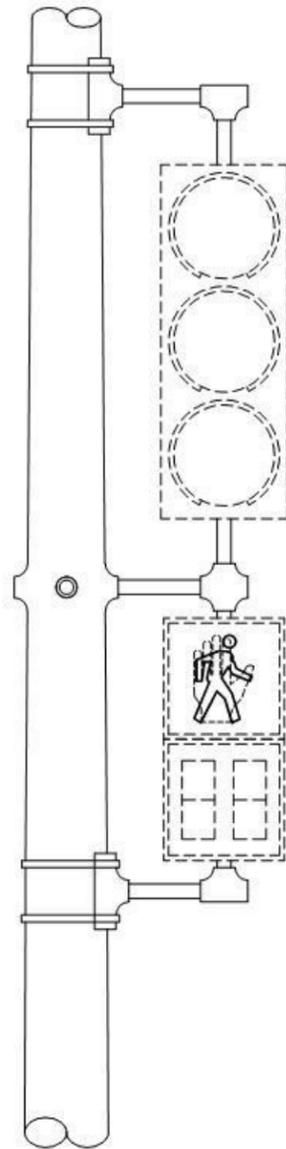
The rubber tapes shall be rolled after application.

Method for insulating splice area:

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

February 14, 2010

Published Date: 2nd Qtr. 2016	S D D O T	WIRE SPlicing FOR LIGHTING (LOW VOLTAGE CIRCUITS (0 to 600 V))	PLATE NUMBER 635.80
			Sheet 2 of 2



TYPICAL SECTION  
TYPE 10B

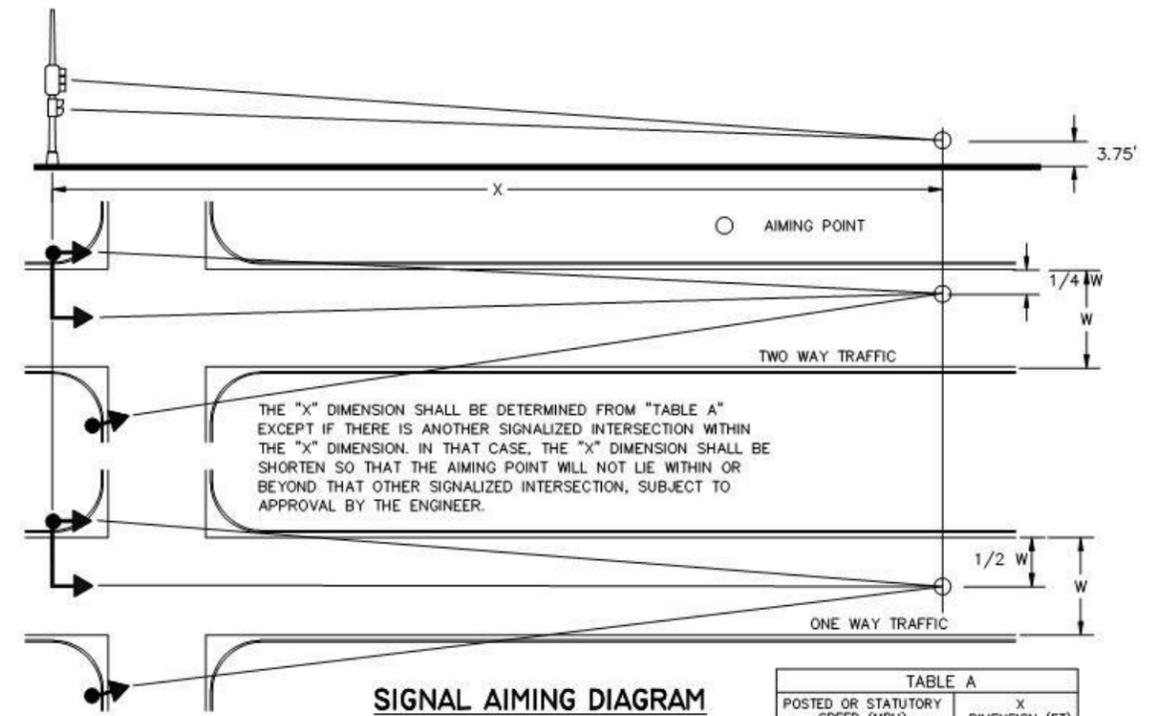
REVISED: NOVEMBER 2013

SPECIFICATION  
REFERENCE  
NO.  
635A



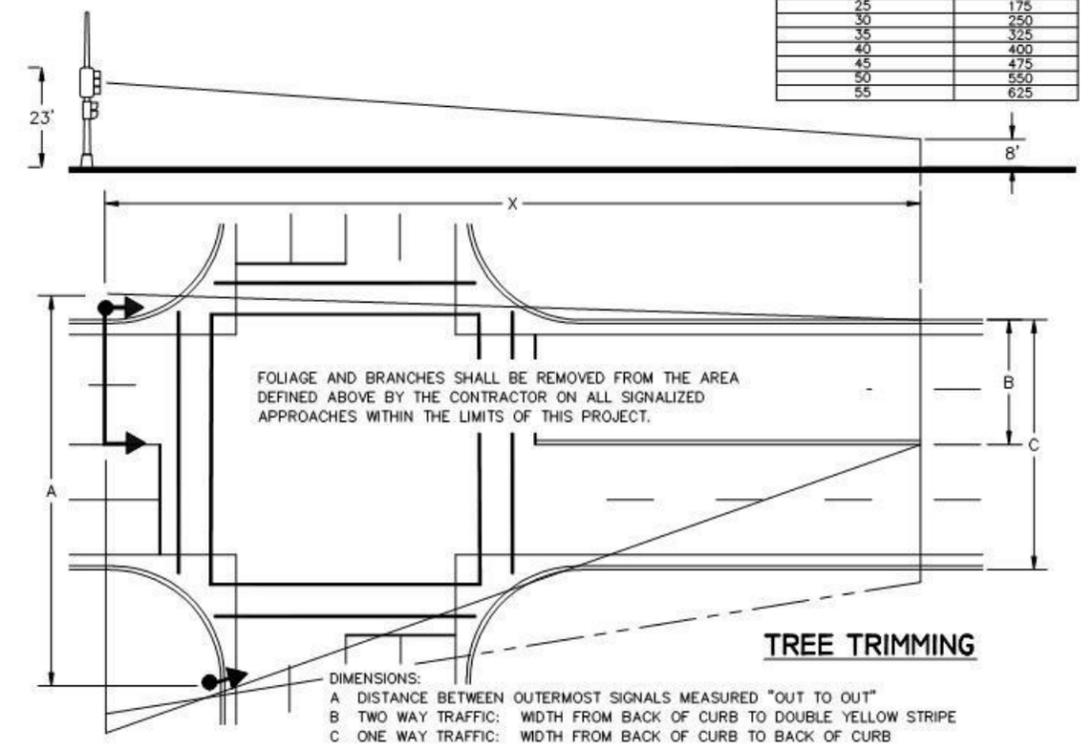
CITY OF SIOUX FALLS  
ENGINEERING DIVISION  
SIGNAL AND PEDESTRIAN  
HEAD MOUNTING BRACKETS

PLATE  
NUMBER  
635.05



SIGNAL AIMING DIAGRAM

POSTED OR STATUTORY SPEED (MPH)	X DIMENSION (FT)
20	100
25	175
30	250
35	325
40	400
45	475
50	550
55	625



TREE TRIMMING

DIMENSIONS:  
A DISTANCE BETWEEN OUTERMOST SIGNALS MEASURED "OUT TO OUT"  
B TWO WAY TRAFFIC: WIDTH FROM BACK OF CURB TO DOUBLE YELLOW STRIPE  
C ONE WAY TRAFFIC: WIDTH FROM BACK OF CURB TO BACK OF CURB

REVISED: DECEMBER 2007

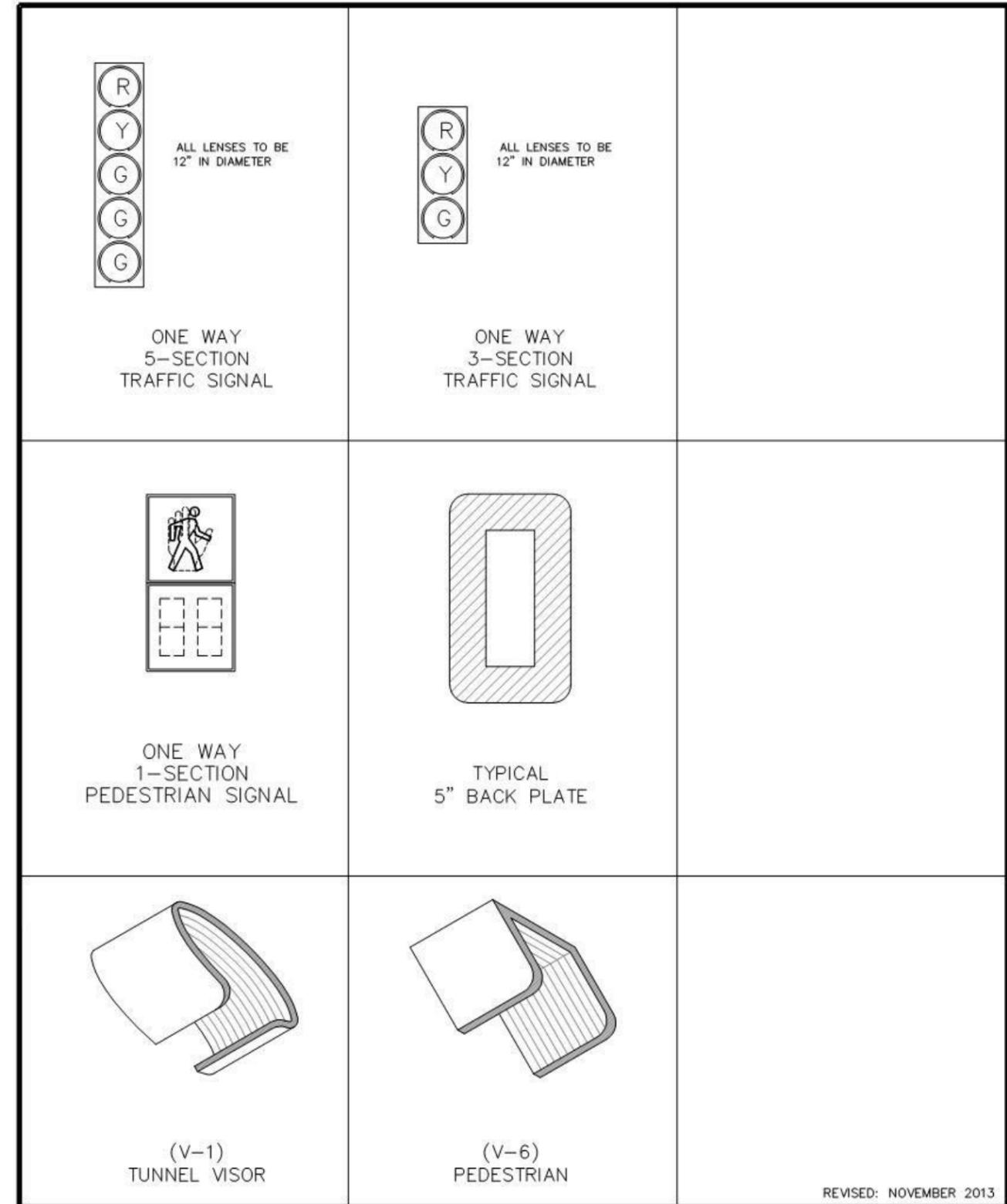
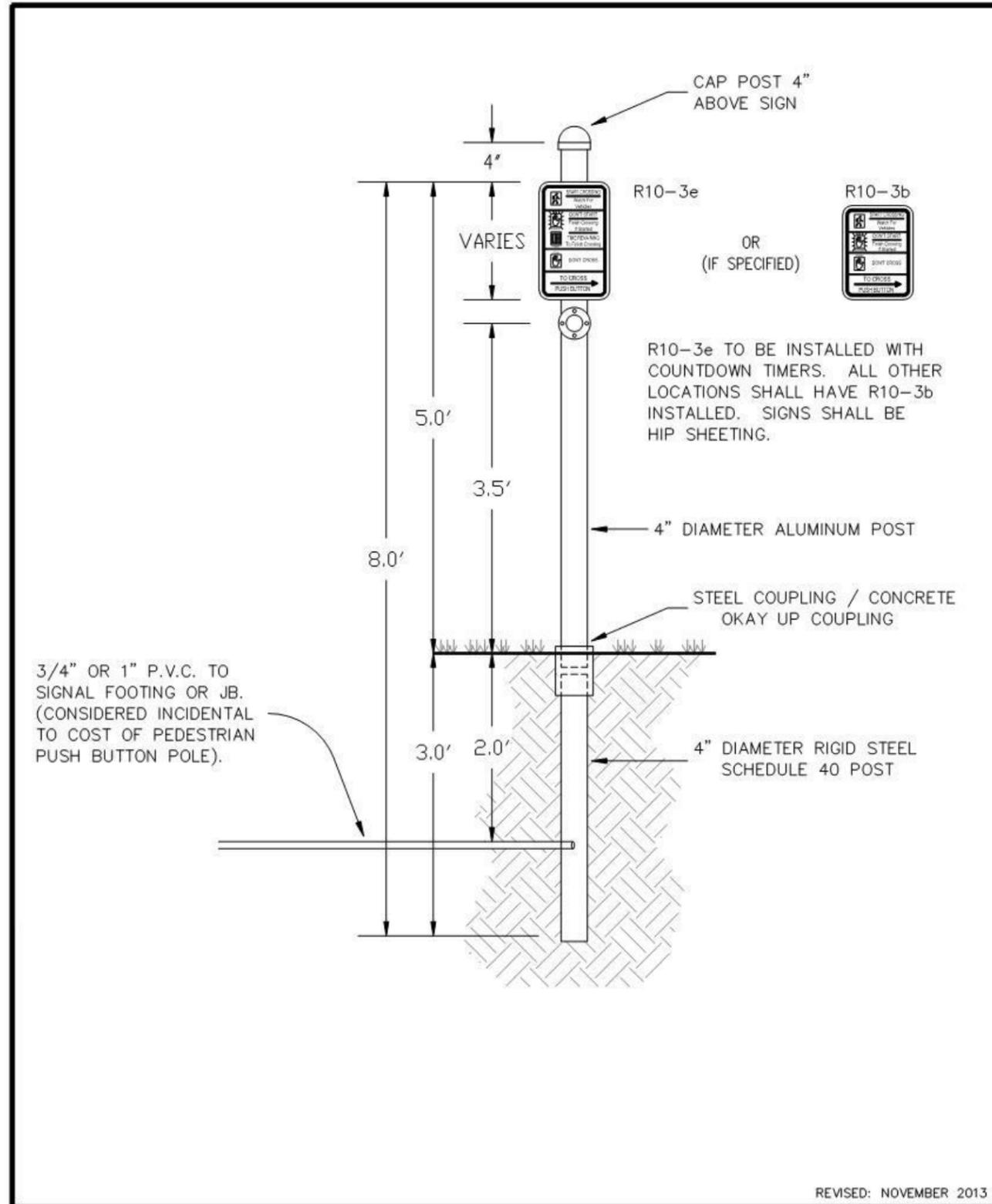
SPECIFICATION  
REFERENCE  
NO.  
635A

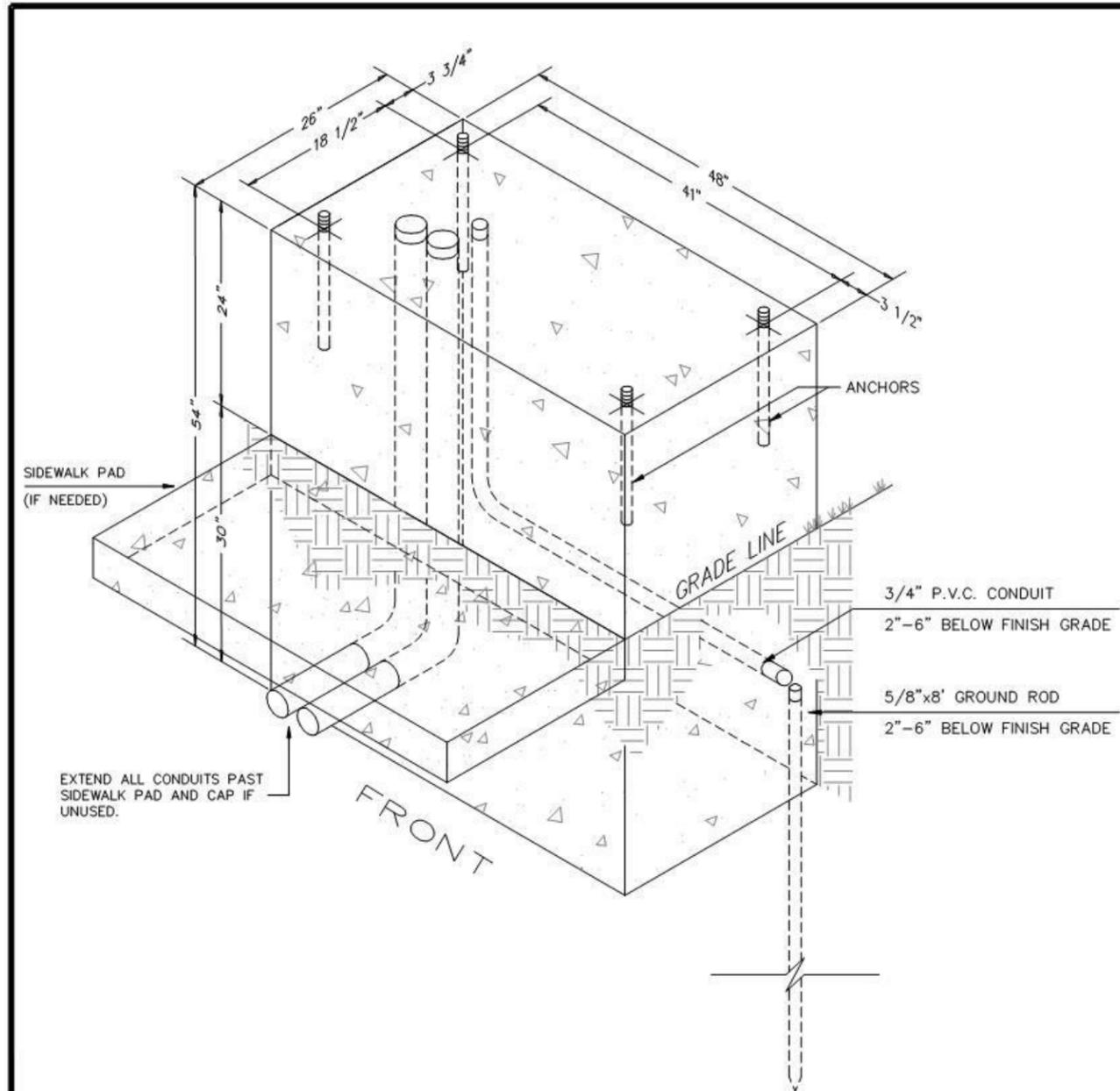


CITY OF SIOUX FALLS  
ENGINEERING DIVISION  
TRAFFIC SIGNAL  
HEAD ALIGNMENT

PLATE  
NUMBER  
635.08







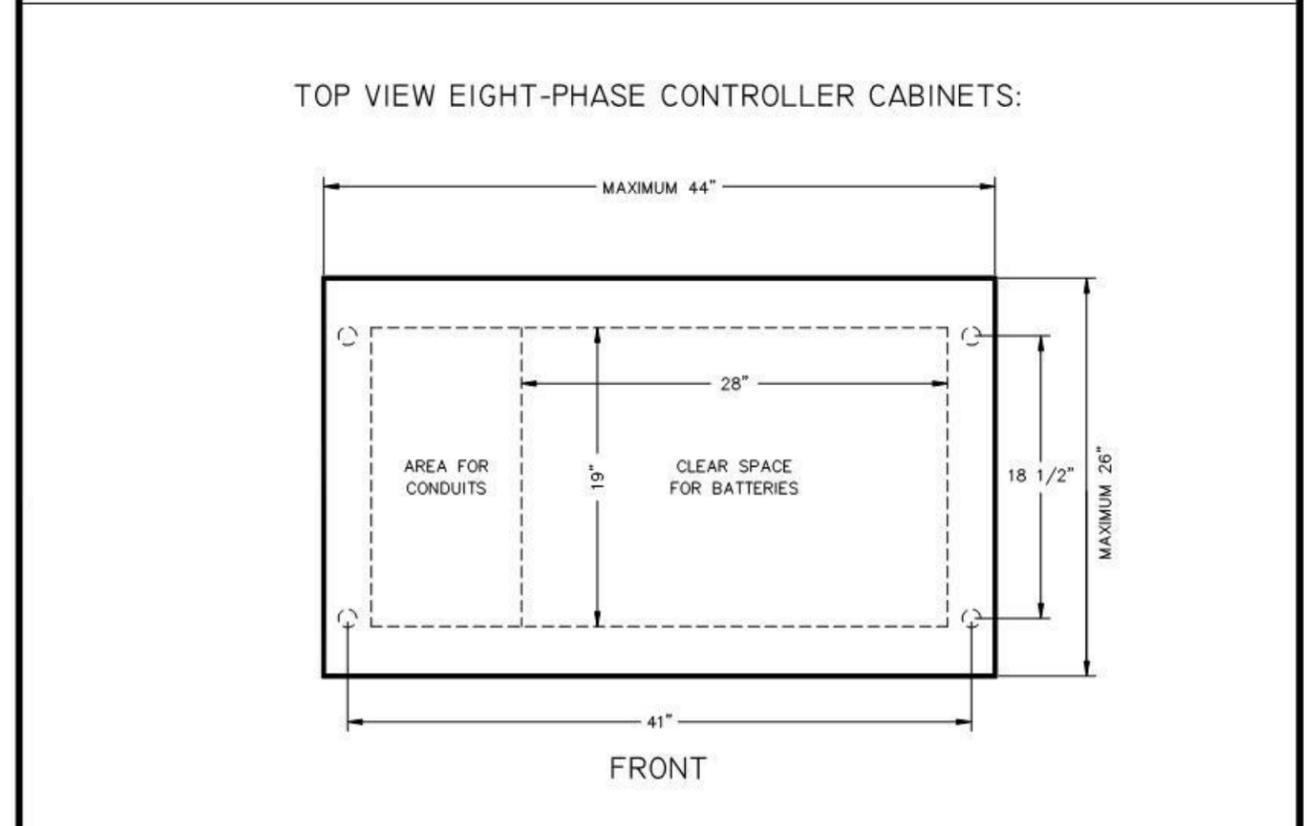
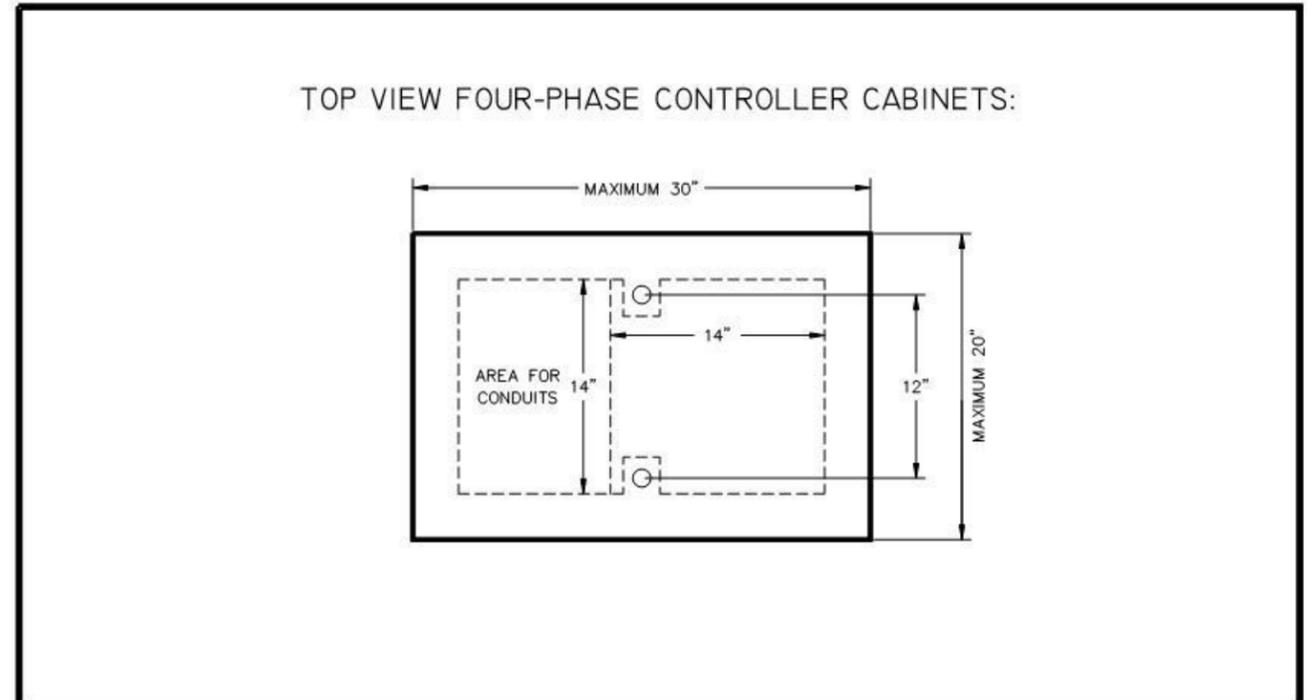
EXTEND ALL CONDUITS PAST SIDEWALK PAD AND CAP IF UNUSED.

GENERAL NOTES:

1. 5/8" DIA. x 18" GALVANIZED ANCHORS SHALL BE 2" ABOVE FINISHED CONCRETE.
2. CONDUITS SHALL BE 2" TO 3" ABOVE FINISHED CONCRETE.
3. CONDUIT TO BE RIGID STEEL AND HAVE THREADS SO THE GROUNDING BUSHINGS CAN BE INSTALLED.
4. CONCRETE SHALL BE LEVEL AND STEEL TROWEL FINISHED.
5. 5/8"x8' GROUND ROD SHALL BE INSTALLED 2"-6" BELOW FINISHED GRADE.
6. 3/4" P.V.C. CONDUIT SHALL END ADJACENT TO THE GROUND ROD.

REVISED: NOVEMBER 2013

SPECIFICATION REFERENCE NO. 635A	 CITY OF SIOUX FALLS ENGINEERING DIVISION CONTROLLER CABINET FOOTING FOR EIGHT PHASE SIGNAL	PLATE NUMBER 635.17	
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REVISED: NOVEMBER 2013

SPECIFICATION REFERENCE NO. 635A	 CITY OF SIOUX FALLS ENGINEERING DIVISION TRAFFIC SIGNAL CONTROLLER CABINET SIZE AND BOLT HOLE REQUIREMENTS	PLATE NUMBER 635.19	
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**CAST IRON COVER**

- 12" JB - NEENAH FOUNDRY CO. R-5900-A SERIES OR ENGINEER APPROVED.
- 18" JB - NEENAH FOUNDRY CO. R-5900-C SERIES OR ENGINEER APPROVED.
- 24" JB - NEENAH FOUNDRY CO. R-5900-E SERIES OR ENGINEER APPROVED.
- 30" JB - NEENAH FOUNDRY CO. R-5900-G SERIES OR ENGINEER APPROVED.

**NOTES:**

ALLOW SUFFICIENT SLACK SO THAT CABLE ENDS CAN BE PULLED TO 30" ABOVE JUNCTION BOX.

NUMBER OF CONDUIT ENTRANCES VARIES WITH LOCATION OF JUNCTION BOX.

ANCHOR FRAME TO PIPE AS APPROVED BY THE ENGINEER.

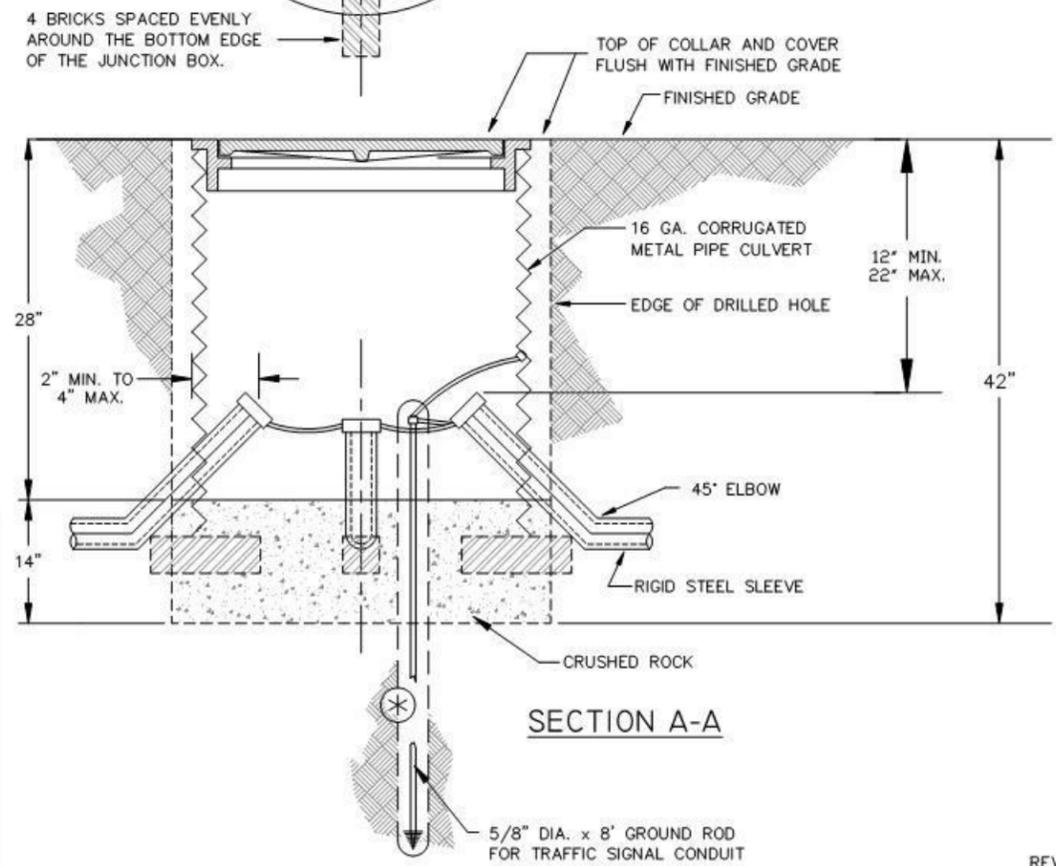
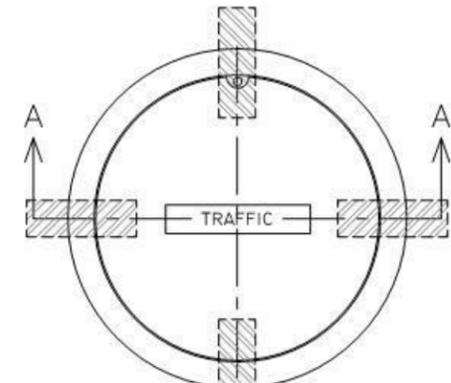
COVER SHALL BE STAMPED TRAFFIC.

ALL CONDUITS COMING INTO AND LEAVING THE JUNCTION BOX WILL BE RIGID STEEL AND FOR AT LEAST (5) FEET OUTSIDE OF THE JUNCTION BOX. THESE CONDUIT WILL HAVE A GROUNDING BUSHING ATTACHED AND A GROUNDING WIRE INSTALLED TO BOND ALL CONDUITS TO THE JUNCTION BOX USING AN APPROPRIATELY SIZED TERMINAL LUG BOLTED TO THE WALL OF THE JUNCTION BOX.

SLOTS CUT IN CULVERT MUST BE REPAIRED. PERMANENTLY FASTENED FROM THE OUTSIDE AND MADE OUT OF CULVERT MATERIAL. INFILTRATION POINT SHALL BE SPRAYED WITH FOAM FROM THE OUTSIDE.

THE JUNCTION BOX SIZES AND QUANTITIES ARE SHOWN ON THE PLAN SHEETS.

⊛ WHEN JUNCTION BOX IS USED FOR TRAFFIC SIGNAL CONDUIT A GROUND ROD WILL BE INSTALLED IN THE BOTTOM OF THE JUNCTION BOX. IT SHALL NOT PROTRUDE MORE THAN (6) INCHES OUT OF THE CRUSHED ROCK.



SECTION A-A

REVISED: NOVEMBER 2013

SPECIFICATION REFERENCE NO. 635A



CITY OF SIOUX FALLS ENGINEERING DIVISION JUNCTION BOX - TRAFFIC

PLATE NUMBER 635.31

**CAST IRON COVER**

- 18" JB - NEENAH FOUNDRY CO. R-5900-C SERIES OR ENGINEER APPROVED.
- 24" JB - NEENAH FOUNDRY CO. R-5900-E SERIES OR ENGINEER APPROVED.
- 30" JB - NEENAH FOUNDRY CO. R-5900-G SERIES OR ENGINEER APPROVED.

**NOTES:**

ALLOW SUFFICIENT SLACK SO THAT CABLE ENDS CAN BE PULLED TO 30" ABOVE JUNCTION BOX.

NUMBER OF CONDUIT ENTRANCES VARIES WITH LOCATION OF JUNCTION BOX.

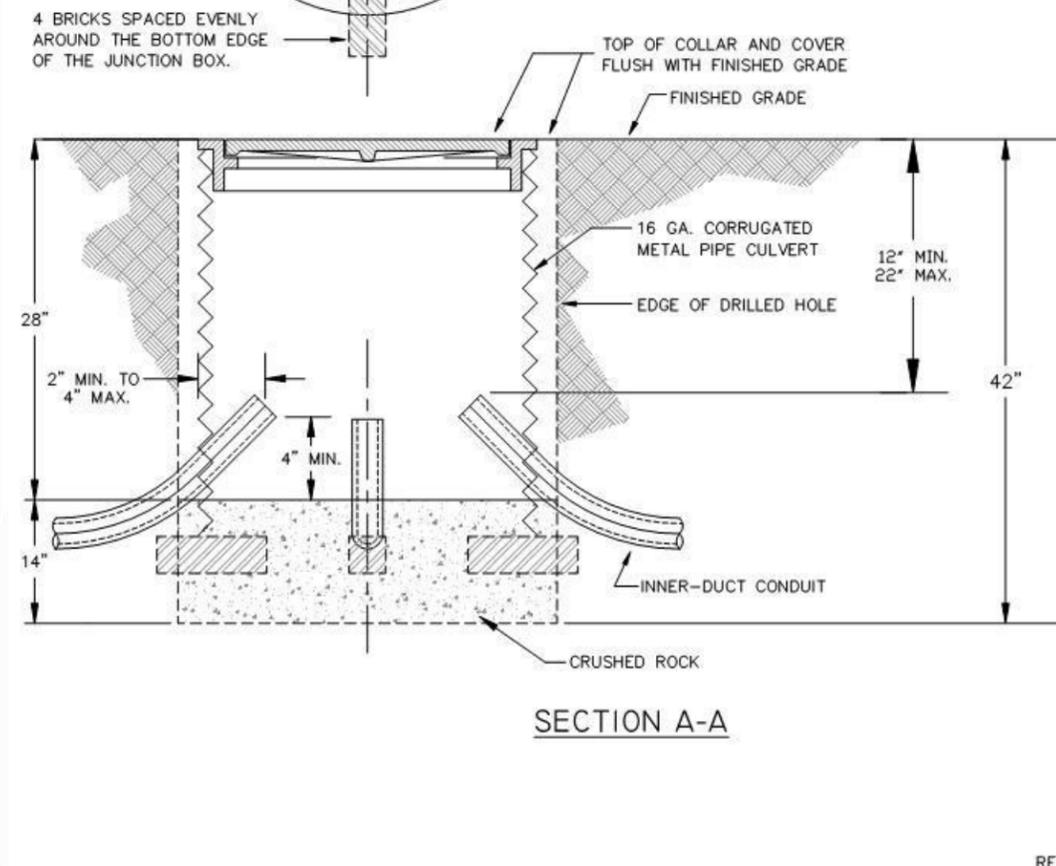
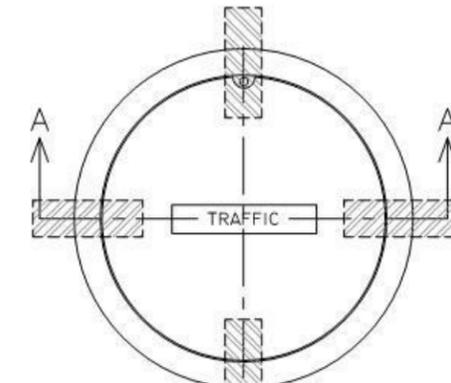
ANCHOR FRAME TO PIPE AS APPROVED BY THE ENGINEER.

COVER SHALL BE STAMPED TRAFFIC.

THE ENDS OF THE INNERDUCT CONDUIT IN THE JUNCTION BOX SHALL BE SEALED WITH A WATER PROOF SEALANT TO PREVENT WATER INFILTRATION INTO THE CONDUIT.

SLOTS CUT IN CULVERT MUST BE REPAIRED. PERMANENTLY FASTENED FROM THE OUTSIDE AND MADE OUT OF CULVERT MATERIAL. INFILTRATION POINT SHALL BE SPRAYED WITH FOAM FROM THE OUTSIDE.

THE JUNCTION BOX SIZES AND QUANTITIES ARE SHOWN ON THE PLAN SHEETS.



SECTION A-A

REVISED: NOVEMBER 2013

SPECIFICATION REFERENCE NO. 635A

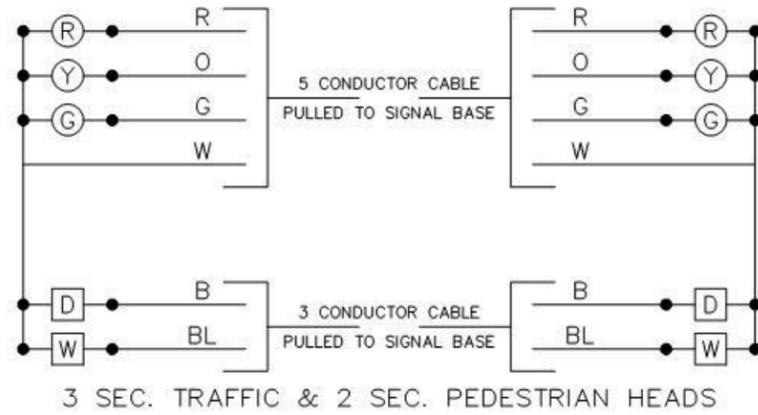


CITY OF SIOUX FALLS ENGINEERING DIVISION JUNCTION BOX - INNERDUCTS

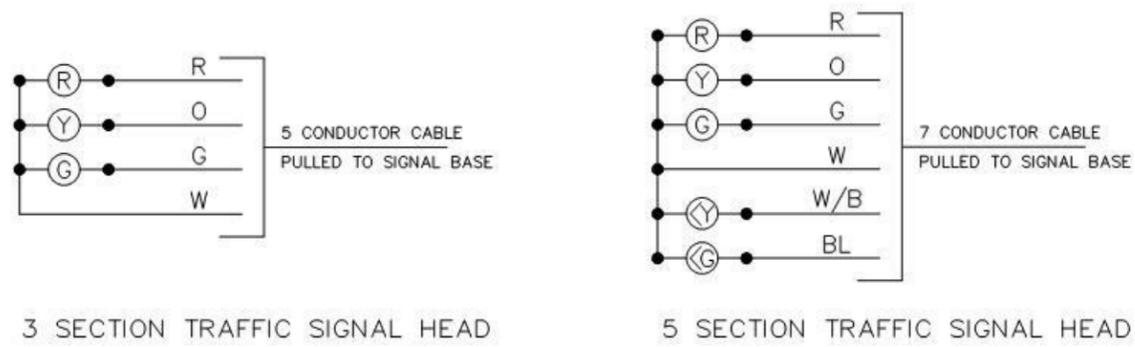
PLATE NUMBER 635.33



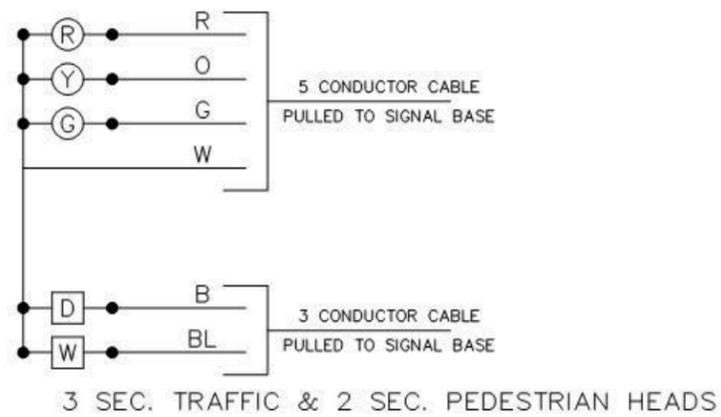
POST TOP MOUNTED



MAST ARM MOUNTED



SIDE OF POST MOUNTED



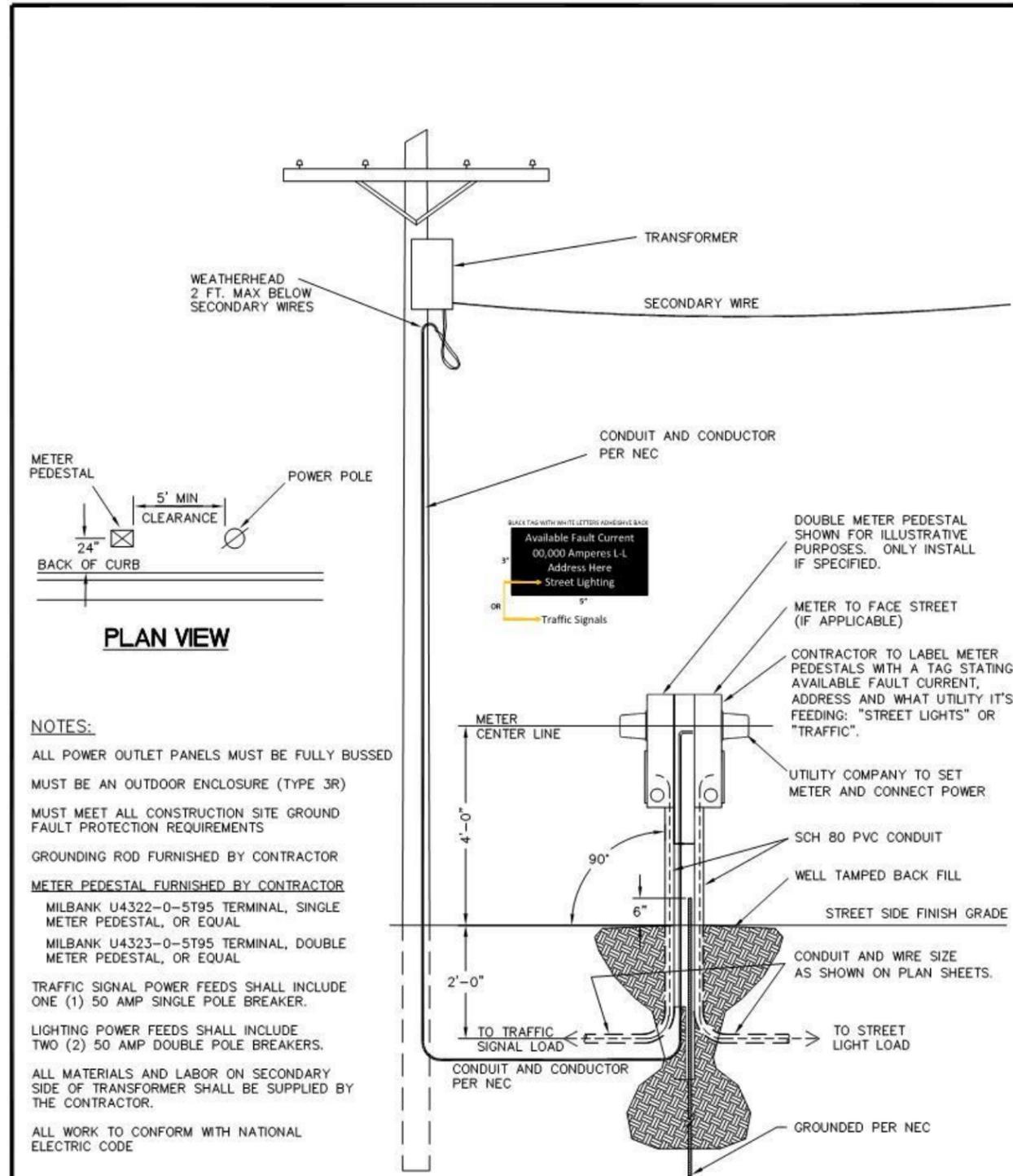
REVISED: NOVEMBER 2013

SPECIFICATION  
REFERENCE  
NO.  
635A



CITY OF SIOUX FALLS  
ENGINEERING DIVISION  
TRAFFIC SIGNAL HEAD  
WIRING DIAGRAM

PLATE  
NUMBER  
635.39



**NOTES:**

- ALL POWER OUTLET PANELS MUST BE FULLY BUSSED
- MUST BE AN OUTDOOR ENCLOSURE (TYPE 3R)
- MUST MEET ALL CONSTRUCTION SITE GROUND FAULT PROTECTION REQUIREMENTS
- GROUNDING ROD FURNISHED BY CONTRACTOR
- METER PEDESTAL FURNISHED BY CONTRACTOR
- MILBANK U4322-0-5T95 TERMINAL, SINGLE METER PEDESTAL, OR EQUAL
- MILBANK U4323-0-5T95 TERMINAL, DOUBLE METER PEDESTAL, OR EQUAL
- TRAFFIC SIGNAL POWER FEEDS SHALL INCLUDE ONE (1) 50 AMP SINGLE POLE BREAKER.
- LIGHTING POWER FEEDS SHALL INCLUDE TWO (2) 50 AMP DOUBLE POLE BREAKERS.
- ALL MATERIALS AND LABOR ON SECONDARY SIDE OF TRANSFORMER SHALL BE SUPPLIED BY THE CONTRACTOR.
- ALL WORK TO CONFORM WITH NATIONAL ELECTRIC CODE

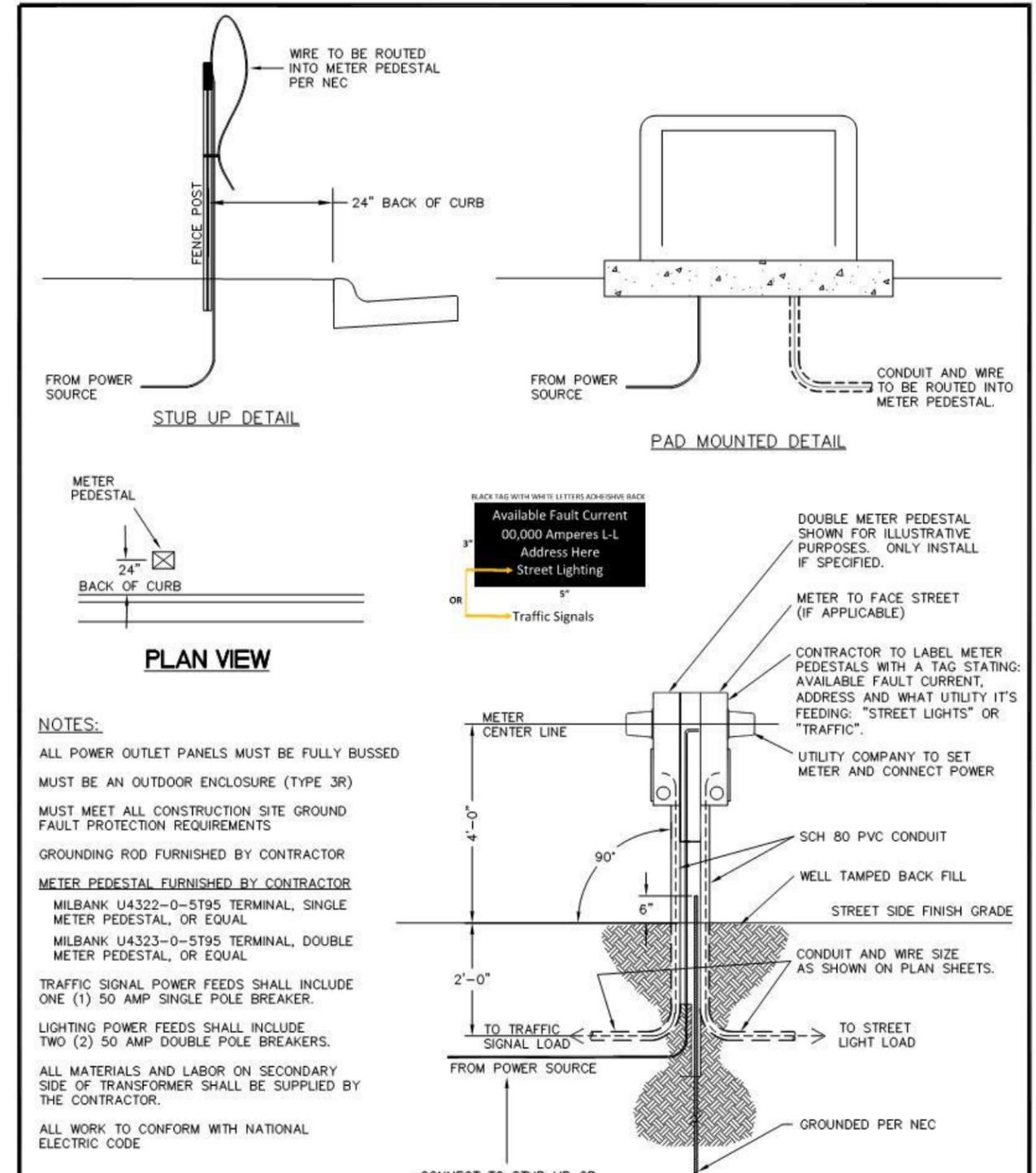
REVISED: NOVEMBER 2015

SPECIFICATION  
REFERENCE  
NO.  
635A/B



CITY OF SIOUX FALLS  
ENGINEERING DIVISION  
POWER FEED FROM  
ELEVATED TRANSFORMER

PLATE  
NUMBER  
635.41



**NOTES:**

- ALL POWER OUTLET PANELS MUST BE FULLY BUSSED
- MUST BE AN OUTDOOR ENCLOSURE (TYPE 3R)
- MUST MEET ALL CONSTRUCTION SITE GROUND FAULT PROTECTION REQUIREMENTS
- GROUNDING ROD FURNISHED BY CONTRACTOR
- METER PEDESTAL FURNISHED BY CONTRACTOR
- MILBANK U4322-0-5T95 TERMINAL, SINGLE METER PEDESTAL, OR EQUAL
- MILBANK U4323-0-5T95 TERMINAL, DOUBLE METER PEDESTAL, OR EQUAL
- TRAFFIC SIGNAL POWER FEEDS SHALL INCLUDE ONE (1) 50 AMP SINGLE POLE BREAKER.
- LIGHTING POWER FEEDS SHALL INCLUDE TWO (2) 50 AMP DOUBLE POLE BREAKERS.
- ALL MATERIALS AND LABOR ON SECONDARY SIDE OF TRANSFORMER SHALL BE SUPPLIED BY THE CONTRACTOR.
- ALL WORK TO CONFORM WITH NATIONAL ELECTRIC CODE

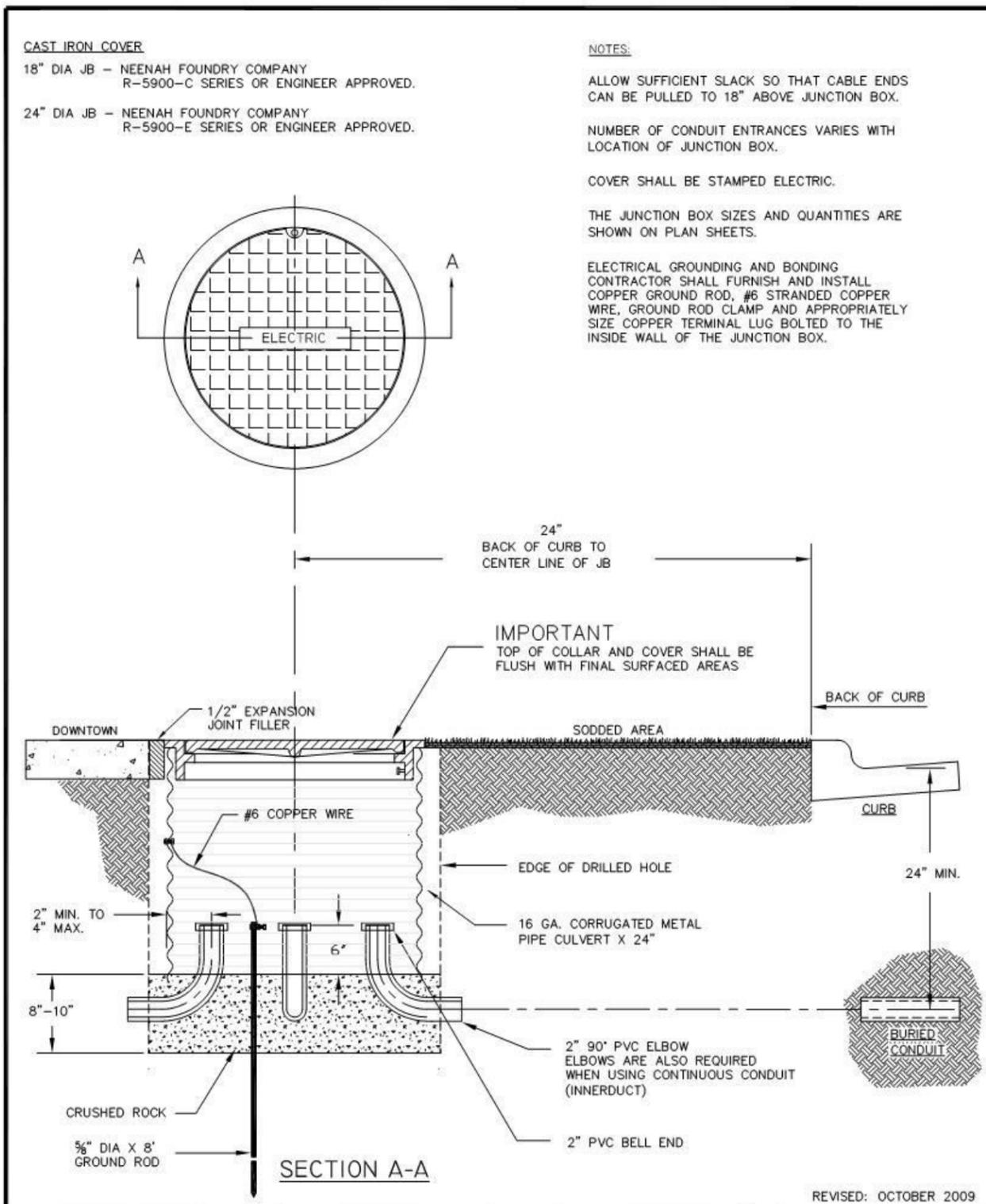
REVISED: NOVEMBER 2015

SPECIFICATION  
REFERENCE  
NO.  
635A/B

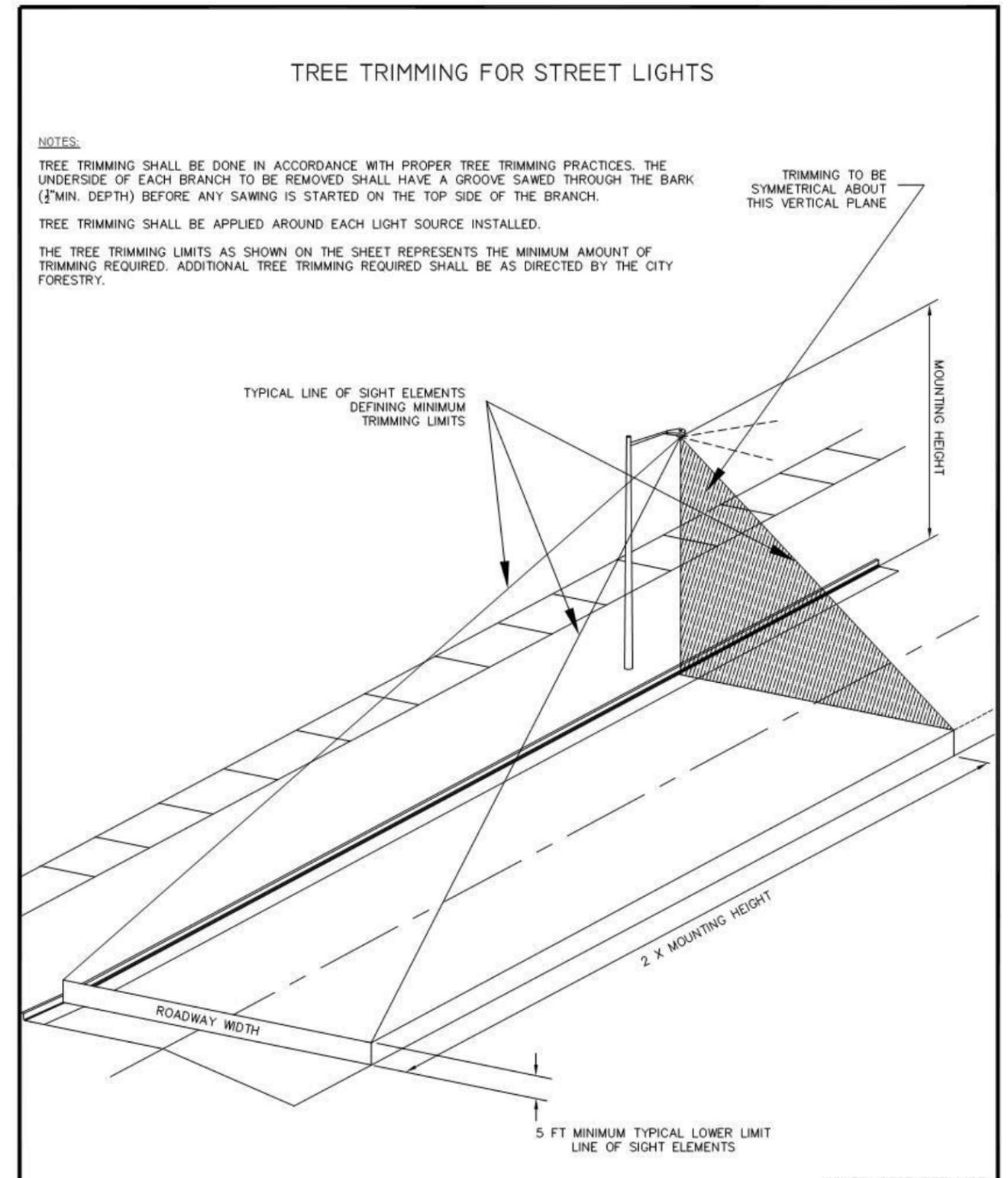


CITY OF SIOUX FALLS  
ENGINEERING DIVISION  
POWER FEED FROM  
GROUND POWER SOURCE

PLATE  
NUMBER  
635.42



SPECIFICATION REFERENCE 635B		CITY OF SIOUX FALLS ENGINEERING DIVISION JUNCTION BOX - LIGHTING	PLATE NUMBER 635.70
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SPECIFICATION REFERENCE NO. 635B		CITY OF SIOUX FALLS ENGINEERING DIVISION TREE TRIMMING FOR STREET LIGHTS	PLATE NUMBER 635.84
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