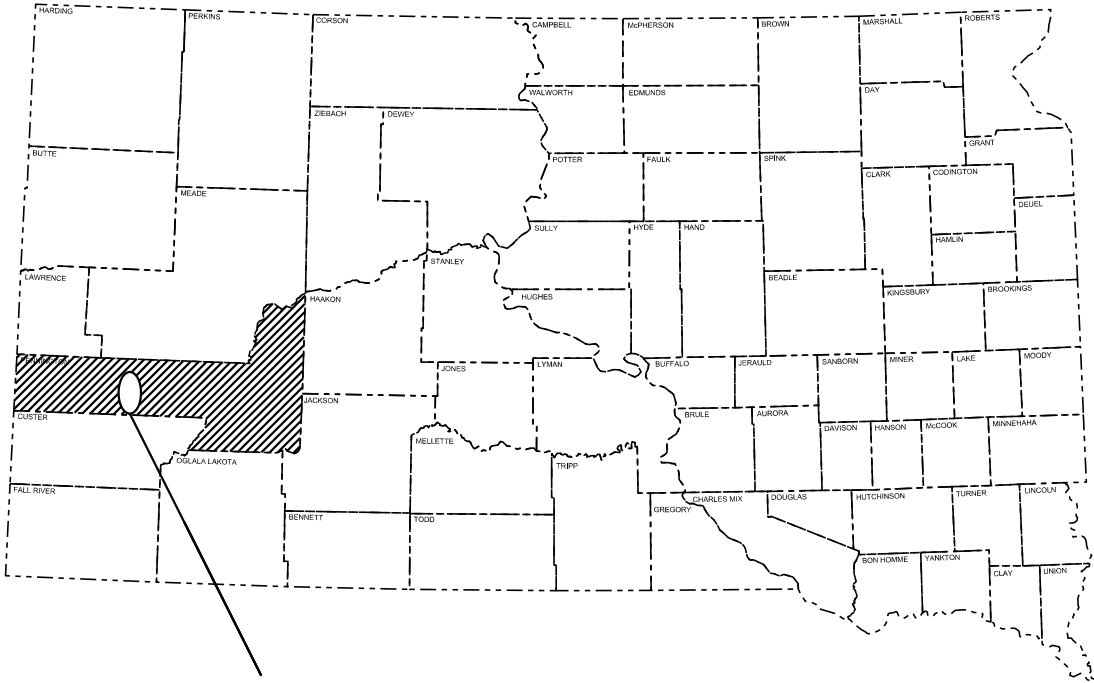


PLOT SCALE - 1:201.528

PLOTTED FROM - TRRC11951

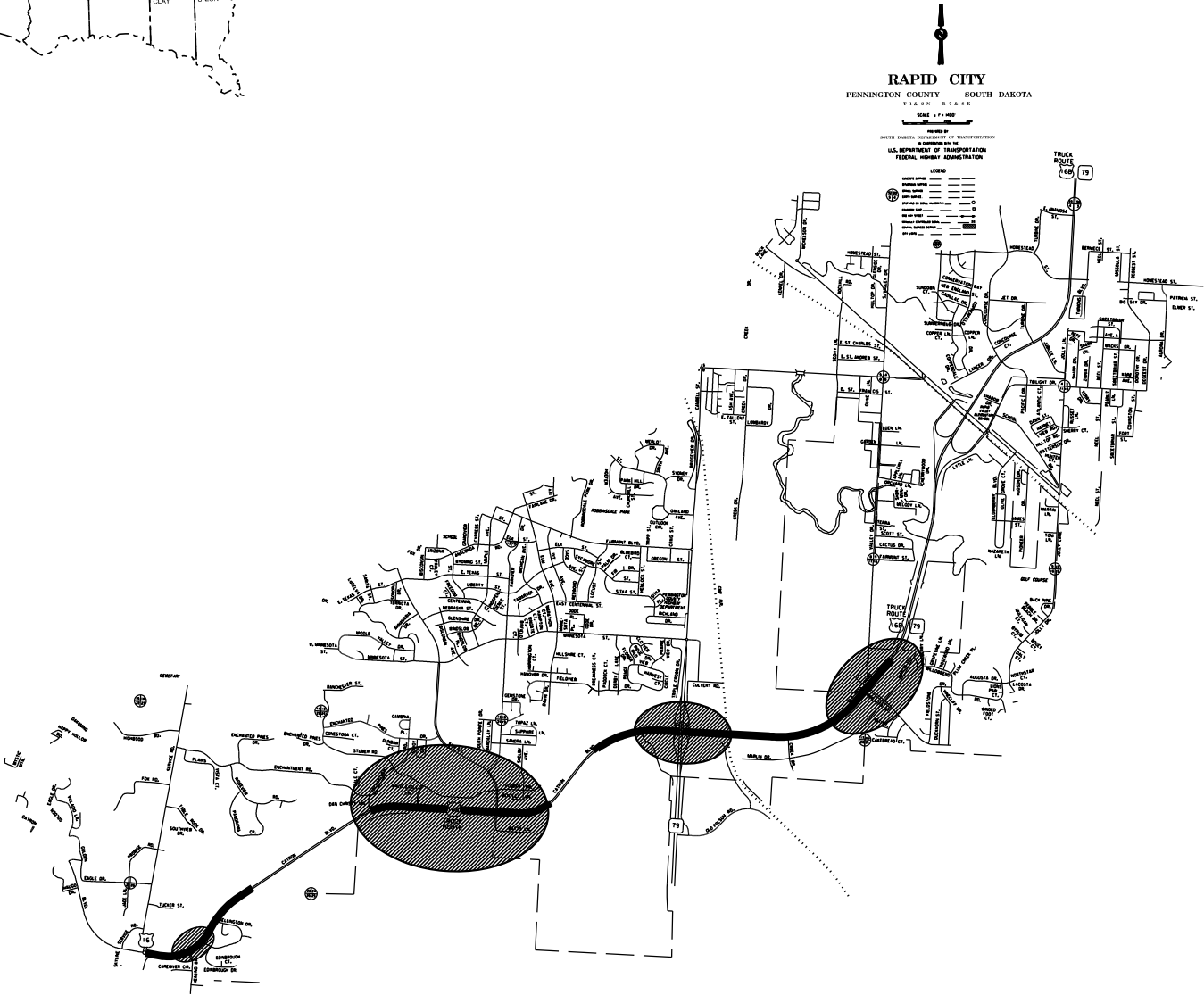


PROJECT

STATE OF SOUTH DAKOTA  
DEPARTMENT OF TRANSPORTATION  
PLANS FOR PROPOSED

PROJECT 000P-469  
PCN i5xh

US Highway 16B - Advance Warning Flashers



STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	000P-469	1	20

Plotting Date: 06/01/2020

NON SECTION: INDEX OF PAGES

Sheet 1 :	Title Sheet
Sheets 2-5:	Estimate of Quantities & Notes
Sheet 6:	Signing Table
Sheets 7-14:	Conduit Layouts
Sheet 15:	Sign Design
Sheet 16:	Sign & Flasher Installation Details
Sheets 17-20:	Standard Plates

DESIGN DESIGNATION US 16B

AADT (2017)	9659
AADT (2037)	16826
DHV	2053
D	50%
DHV T%	5.4%
AADT T%	11.8%
V	45/55 mph

STORM WATER PERMIT

No Permit Required

PLOT NAME - 1

FILE - ...\\15XH\_CONDUIT INSTALLATION DETAILS.DGN

ESTIMATE OF QUANTITIES

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
009E0010	Mobilization	Lump Sum	LS
250E0010	Incidental Work	Lump Sum	LS
632E1320	2.0"x2.0" Perforated Tube Post	96.0	Ft
632E1340	2.5"x2.5" Perforated Tube Post	224.0	Ft
632E3205	Flat Aluminum Sign, Nonremovable Copy Super/Very High Intensity	168.0	SqFt
634E0110	Traffic Control Signs	73.0	SqFt
635E4010	1 Section Vehicle Signal Head	8	Each
635E5301	Type 1 Electrical Junction Box	7	Each
635E6200	Miscellaneous, Electrical	Lump Sum	LS
635E8120	2" Rigid Conduit, Schedule 40	1,910	Ft
635E9020	1/C #10 AWG Copper Wire	21,020	Ft
734E0010	Erosion Control	Lump Sum	LS

SPECIFICATIONS

Standard Specifications for Roads & Bridges, 2015 Edition and Required Provisions, Supplemental Specifications and/or Special Provisions as included in the Proposal.

COMMITMENT E: STORM WATER

Construction activities constitute less than 1 acre of disturbance.

Action Taken/Required:

At a minimum and regardless of project size, appropriate erosion and sediment control measures must be installed to control the discharge of pollutants from the construction site.

COMMITMENT H: WASTE DISPOSAL SITE

The Contractor will furnish a site(s) for the disposal of construction and/or demolition debris generated by this project.

Action Taken/Required:

Construction and/or demolition debris may be disposed of within the Public ROW.

The waste disposal site(s) will be managed and reclaimed in accordance with the following from the General Permit for Construction/Demolition Debris Disposal Under the South Dakota Waste Management Program issued by the Department of Environment and Natural Resources.

The waste disposal site(s) will not be located in a wetland, within 200 feet of surface water, or in an area that adversely affects wildlife, recreation, aesthetic value of an area, or any threatened or endangered species, as approved by the Environmental Office and the Project Engineer.

If the waste disposal site(s) is located such that it is within view of any ROW, the following additional requirements will apply:

1. Construction and/or demolition debris consisting of concrete, asphalt concrete, or other similar materials will be buried in a trench completely separate from wood debris. The final cover over the construction and/or demolition debris will consist of a minimum of 1 foot of soil capable of supporting vegetation. Waste disposal sites provided outside of the Public ROW will be seeded in accordance with Natural Resources Conservation Service recommendations. The seeding recommendations may be obtained through the appropriate County NRCS Office. The Contractor will control the access to waste disposal sites not within the Public ROW with fences, gates, and placement of a sign or signs at the entrance to the site stating “No Dumping Allowed”.
2. Concrete and asphalt concrete debris may be stockpiled within view of the ROW for a period of time not to exceed the duration of the project. Prior to project completion, the waste will be removed from view of the ROW or buried and the waste disposal site reclaimed as noted above.

The above requirements will not apply to waste disposal sites that are covered by an individual solid waste permit as specified in SDCL 34A-6-58, SDCL 34A-6-1.13, and ARSD 74:27:10:06.

Failure to comply with the requirements stated above may result in civil penalties in accordance with South Dakota Solid Waste Law, SDCL 34A-6-1.31.

All costs associated with furnishing waste disposal site(s), disposing of waste, maintaining control of access (fence, gates, and signs), and reclamation of the waste disposal site(s) will be incidental to the various contract items.

COMMITMENT I: HISTORICAL PRESERVATION OFFICE CLEARANCES

The SDDOT has obtained concurrence with the State Historical Preservation Office (SHPO or THPO) for all work included within the project limits and all department designated sources and designated option material sources, stockpile sites, storage areas, and waste sites provided within the plans.

Action Taken/Required:

All earth disturbing activities not designated within the plans require a cultural resource review prior to scheduling the pre-construction meeting. This work includes, but is not limited to: Contractor furnished material sources, material processing sites, stockpile sites, storage areas, plant sites, and waste areas.

The Contractor will arrange and pay for a record search and when necessary, a cultural resource survey. The Contractor has the option to contact the state Archaeological Research Center (ARC) at 605-394-1936 or another qualified archaeologist, to obtain either a records search or a cultural resources survey. A record search might be sufficient for review if the site was previously surveyed; however, a cultural resources survey may need to be conducted by a qualified archaeologist.

The Contractor will provide ARC with the following: a topographical map or aerial view of which the site is clearly outlined, site dimensions, project number, and PCN. If applicable, provide evidence that the site has been previously disturbed by farming, mining, or construction activities with a landowner statement that artifacts have not been found on the site.

The Contractor will submit the cultural resources survey report to SDDOT Environmental Office, 700 East Broadway Avenue, Pierre, SD 57501-2586. SDDOT will submit the information to the appropriate SHPO/THPO. Allow **30 Days** from the date this information is submitted to the Environmental Engineer for SHPO/THPO review.

In the event of an inadvertent discovery of human remains, funerary objects, or if evidence of cultural resources is identified during project construction activities, then such activities will immediately cease and the Project Engineer will be immediately notified. The Project Engineer will contact the SDDOT Environmental Office to determine an appropriate course of action.

SHPO/THPO review does not relieve the Contractor of the responsibility The Contractor is responsible for obtaining any additional permits and clearances for Contractor furnished material sources, material processing sites, stockpile sites, storage areas, plant sites, and waste areas that affect wetlands, threatened and endangered species, or waterways. The Contractor will not utilize a site known or suspected of having contaminated soil or water. The Contractor will provide the required permits and clearances to the Project Engineer at the preconstruction meeting.

COMMITMENT K: RAPID CITY AREA AIR QUALITY CONTROL ZONE

Administrative Rule of South Dakota (ARSD) 74:36:18:03 states that "no state facility or state contractor may engage in any construction activity or continuous operation activity within the Rapid City air quality control zone which may cause fugitive emissions of particulate to be released into the ambient air without first obtaining a permit issued by the board or the secretary."

Construction activity is defined as any temporary activity which involves the removal or alteration of the natural or pre-existing cover of one acre or more of land. One acre of surface area is based on a cumulative area of disturbance to be completed for the entire project. Construction activity will include, but not be limited to, stripping of topsoil, drilling, blasting, excavation, dredging, ditching, grading, street maintenance and repair, or earth moving. It also includes stockpiles, access roads, and disposal areas. An off-site disposal area of excess material will require an additional permit.

SEQUENCE OF OPERATIONS

1. Set up traffic control.
2. Perform sign work.
3. Install conduit, wiring and junction boxes
4. Install erosion control.
5. Remove traffic control.

ADVANCE WARNING SIGNS

The Contractor will install diamond shaped “PREPARE TO STOP” signs with “WHEN FLASHING” W16-13P plaques directly below that. A 1 Section Vehicle Signal Head will be installed at the top of the sign (see sign design page in plans). The Contractor will install the signs onto two 2.5”x2.5” Perforated Tube Posts with breakaway bases. Sign mounting height and lateral offsets will conform to the criteria given in D of Figure 2A-2 in the MUTCD.

The Contractor will install diamond shaped signal ahead symbol W3-3 signs 400 ft upstream of advance warning flasher signs. These signs will be installed on one post of 2”x2” Perforated Tube Post.

PERMANENT SIGNING

The Contractor will furnish all signs, posts, stiffeners, bases, hardware, and labor for installation of permanent signs in size, type, and quantity as shown in these plans and/or as required by the Engineer.

The Contractor will provide all labor and equipment necessary to install permanent signing as detailed in these plans and/or as required by the Engineer. Payment for furnishing and installing permanent signs will be paid for at the contract unit price for each type of sign based on sheeting requirements per square foot of sign. All signs will have Type XI (Super/Very High Intensity) sheeting.

The Contractor will stake the signs and the Project Engineer will verify the location prior to installation. The lateral distance from the roadway and the height of the sign will be established by the Contractor according to the Standard Plates in the plans and the MUTCD.

Existing signing will be replaced, left in place, or temporarily covered as needed to safely direct traffic through the project or as directed by the Engineer.

SHEETING REQUIREMENTS

All legend and border utilizing the color black will be vinyl or screen printed black, non-reflectorized material. All other legend and border will be of same type of sheeting as the background of the same sign. All signs in the table for Permanent Signing will utilize Type XI sheeting, as per ASTM 4956.

FURNISH & INSTALL FLAT ALUMINUM SIGNS / NON-REMOVABLE COPY SUPER/VERY HIGH INTENSITY

Measurement of sign areas will include payment for the entire sign blank before trimming for rounded corners. The square unit measurement for each sign will be as shown in the Permanent Signing Table. Payment for signs designated as “Flat Alum” under the New Sign column in the table of Permanent Signing will include all labor (including installing date decals), equipment, and materials to complete the work, and will be paid for at the contract unit price per square foot for FLAT ALUMINUM SIGN / NON-REMOVABLE COPY SUPER/VERY HIGH INTENSITY.

PERFORATED TUBE POST

Payment for perforated tube post will include all cost for labor, equipment, and materials necessary to complete the following work:

1. Furnish all posts, stiffeners, breakaway bases, soil stabilizers, and hardware.
2. Assembly and installation of breakaway base sign supports as per details shown in these plans.
3. Assembly of sign(s) to sign post as per erection details for Highway Signs as shown in these plans.
4. Installation of signpost and sign(s).

When telescoping posts, the inner post will be a minimum length of 4’ measured from the base with a maximum length of that to where the bottom of the sign is.

HARDWARE

Aluminum U-Channel stiffeners will be used on all standard highway signs 36” or greater in width and will conform to the requirements of ASTM B221 Alloy 6063-T6 or 6061-T6. The U-Channel will be 2 inches in width and free of holes. The U-Channel stiffeners will also be used to connect various signs and perforated tube posts together so that an entire sign may be erected as a single installation if the contractor prefers that. Stiffeners may be fastened to signs by use of 1/4” drive rivets with a minimum of one on each end and one centered between each post. Installation of the stiffeners will be incidental to other contract items.

ADVANCE WARNING SIGNAL

The Contractor will install a 12” 1-Section Vehicle Signal Head above the “PREPARE TO STOP” signs at the various locations indicated on the Conduit Layout Sheets.

Costs for installing the signals will be incidental to the contract unit price per each for “1 Section Vehicle Signal Head”.

Costs for making electrical connections to junction boxes, pulling wire through existing conduit and connecting 1 Section Vehicle Signal Head wiring inside the traffic controller cabinet will be incidental to the contract lump sum price for “Miscellaneous Electrical”.

Costs for replacing existing junction boxes with new Type 1 Electrical Junction Boxes, restoring the surrounding grade surfaces, and redoing all previously existing connections in new junction boxes (if necessary) will be incidental to the contract unit price per each for “Type 1 Electrical Junction Box”.

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	000P-469	3	20

WIRING OF ADVANCE WARNING SIGNALS

Some existing junction boxes that new conduit joins to will be replaced with Type 1 Electrical Junction Boxes, they will be called out below.

Installation of the 1 Section Vehicle Signal Heads above the new “PREPARE TO STOP” signs at the various locations indicated on the Conduit Layout Sheets will require 3 # 10 AWG wires per signal. One of these #10 wires is the ground and will be bolted to the perforated tube post of the sign assembly. The 3 #10 AWG wires will be wired back to the signal controller cabinet in the following ways:

Minnesota St & 16B WB - Install approx. 700 ft. of conduit between existing junction box EJB1 and advance warning signal. Install a Type 1 Electrical Junction Box EJB1A at halfway point (350’) in 700’ conduit run, for purposes of pulling wire. Pull wire from EJB1 thru subsequent traffic junction boxes to traffic controller cabinet on SW corner of intersection.

Minnesota St & 16B EB - Install approx. 750 ft. of conduit between existing junction box EJB5 and advance warning signal. Install a Type 1 Electrical Junction Box EJB5A at halfway point (375’) in 750’ conduit run, for purposes of pulling wire. Pull wire from EJB5 to traffic controller cabinet on SW corner of intersection.

Cambell & 16B WB – Install approx. 80 ft. of conduit between advance warning signal and lighting/traffic junction box EJB3, replace EJB3 with a Type 1 Electrical Junction Box. Pull wire from EJB3 thru existing lighting junction boxes and conduit to traffic/lighting junction box EJB4, replace EJB4 with a Type 1 Electrical Junction Box. Pull wire from EJB4 thru existing traffic junction boxes and conduit to traffic controller cabinet on SE corner of intersection.

Cambell & 16B EB – Install approx. 100 ft. of conduit between advance warning signal and lighting/traffic junction box EJB49, replace EJB49 with a Type 1 Electrical Junction Box. Pull wire from EJB49 thru existing traffic junction boxes and conduit to traffic controller cabinet on SE corner of intersection.

5<sup>th</sup> St & 16B WB sign – Install approx. 100 ft. of conduit between advance warning signal and damaged lighting/traffic junction box EJB9 (600 ft from stop bar), replace EJB9 with a tier 22 Type 1 Electrical Junction Box. Pull wire from EJB9 thru existing traffic junction boxes and conduit to damaged traffic junction box EJB8 (375 ft from stop bar). Replace traffic junction box EJB8 with a tier 22 Type 1 Electrical Junction Box. Pull wire from EJB8 thru existing traffic junction boxes and conduit to traffic controller cabinet on NW corner of intersection.

5<sup>th</sup> St & 16B EB - Install approx. 80 ft. of conduit between advance warning signal and lighting/traffic junction box EJB10 (620 ft from stop bar). Pull wire from EJB10 thru existing traffic junction boxes and conduit to traffic controller cabinet on NW corner of intersection.

Black Hills Blvd & 16B WB - Install approx. 50 ft. of conduit between junction box EJB11 and advance warning signal. Pull wire from EJB11 thru existing traffic junction boxes and conduit to traffic controller cabinet on NE corner of intersection.

WIRING OF ADVANCE WARNING SIGNALS (continued)

Healing Way & 16B WB - Install approx. 50 ft. of conduit between lighting junction box EJB12 and advance warning signal. Pull wire from lighting junction box EJB12 thru existing lighting and traffic junction boxes and conduit to traffic controller cabinet on SW corner of intersection.

All costs for labor and material to install conduit will be incidental to the unit price per foot for “2” Rigid Conduit, Schedule 40.

All costs for labor and material to connect conduit and wiring to new and old junction boxes will be incidental to the contract lump sum price for “Miscellaneous, Electrical.”

REPLACEMENT JUNCTION BOXES FOR EJB8 & EJB9

In regards to the location at 5<sup>th</sup> St & 16B WB; the loading requirement for the replacement junction boxes for EJB8 and EJB9 will be Tier 22 of ANSI/SCTE 77 2007. All other requirements specified on Standard Plate 635.65 will remain in effect for these replacement junction boxes.

All costs associated with providing the higher strength replacement junction boxes will be incidental to the contract unit price per each for “Type 1, Electrical Junction Box.”

CONTROLLER PROGRAMMING

The Contractor will interconnect the 1 Section Vehicle Signal Head to the traffic signal controller at each respective intersection. The beacon will flash during the lead flash time, & yellow and red intervals of the associated traffic phase/movement. The beacon will be dark during the green intervals of the associated traffic phase/movement.

The designer has confirmed the controllers have adequate load switches to perform the function. The Contractor will complete all necessary connections to make the advance warning signal system operational.

The existing traffic signal controllers at the five respective intersections will be programmed with a lead flash time for the advance warning flasher. The lead signal flash times will be:

Minnesota & US 16B	EB	7 seconds
Minnesota & US 16B	WB	7 seconds
Cambell & US 16B	WB	7 seconds
Cambell & US 16B	EB	7 seconds
5 <sup>th</sup> St & US 16B	WB	7 seconds
5 <sup>th</sup> St & US 16B	EB	7 seconds
Black Hills Blvd & US 16B	WB	7 seconds
Healing Way & US 16B	WB	5 seconds

These lead flash time values were determined using the data in this table.

Intersection	Speed Limit	Beacon to Stop Bar (ft)
Minnesota WB	60	700
Minnesota EB	60	700
Cambell WB	60	700
Cambell EB	60	700
5th st WB	60	700
5th st EB	60	700
Black Hills Blvd WB	60	700
Healing Way WB	45	550

The Contractor will utilize an overlap to program the advance warning 1-section signal head. Black Hills Blvd & US Hwy 16B and 5<sup>th</sup> St & US Hwy 16B are operating in coordination and will have to be reprogrammed accordingly. Minnesota St & US Hwy 16B, Cambell St & US Hwy 16B, Black Hills Blvd & US Hwy 16B, and 5<sup>th</sup> St & US Hwy 16B have dilemma zone detection currently operating.

Costs for reprogramming the controllers will be incidental to the contract lump sum price for “Miscellaneous Electrical”.

INCIDENTAL WORK

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

TRAFFIC SIGNAL CONTROL WIRING LABELS

Wiring for the Advance Warning Flashers will be identified in junction boxes and controller cabinet. Labels will be wrapped around wiring to indicate the particular advance warning sign that it is connected to. Labels will be self-adhesive vinyl cloth. All costs associated with labeling will be incidental to the contract lump sum price for “Miscellaneous Electrical”.

SUPPLYING AS BUILT PLANS

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

SHOP DRAWING AND CATALOG CUTS SUBMITTALS

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

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

[kelly.vandewiele@state.sd.us](mailto:kelly.vandewiele@state.sd.us)  
[John.Less@state.sd.us](mailto:John.Less@state.sd.us)

ON-SITE INSPECTION

An on-site inspection of the advance warning 1-section signal head will be conducted before acceptance of the project, once the advance warning flashers are completed and operational. The on-site inspection will be conducted by the Project Engineer or Region Traffic Engineer with the Contractor, City Traffic Engineer, and the Traffic Design Engineer present.

EROSION CONTROL

All costs for the erosion control work for furnishing, placing, and maintaining erosion control including equipment, labor, seeding, fertilizing, and fiber mulching will be incidental to the contract lump sum price for “Erosion Control”.

The limits of erosion control work will be for all locations that have been disturbed during construction as determined by the Engineer.



FERTILIZING

The Contractor will apply an all-natural slow release fertilizer prior to seeding or placing sod. The all-natural fertilizer will have a minimum guaranteed analysis of 4-6-4 and be USDA Certified BioBased. It should provide a minimum of 4% (N) nitrogen with a minimum water insoluble nitrogen (WIN) fraction of 3.2%, a minimum of 6% (P2O5) available phosphate, a minimum of 4% (K2O) soluble potash, and a maximum carbon to nitrogen ratio (C:N ratio) of 5:1. The all-natural fertilizer will be free of weed-seed and pathogens accomplished through thermophilic composting, and not mechanical or chemical sterilization, to assure presence of beneficial soil microbiology. The fertilizer will have a near neutral pH, a low salt index, a low biological oxygen demand, contain organic humic and fulvic acids, and have high aerobic organism counts. The fertilizer will also be stable, free of bad odors, and be unattractive as a food source for animals. It should also be in a granular form that is easily spread.

The fertilizer will be applied at a rate of 1,500 pounds per acre in accordance with the manufacturer's recommended method of application. The all-natural slow release fertilizer will be as shown below or an approved equal:

Product Manufacturer:  
Sustane; Sustane Corporate Headquarters Cannon Falls, Minnesota Phone: 1-800-352-9245 www.sustane.com

Perfect Blend Perfect Blend, LLC Bellevue, WA Phone: 1-866-456-8890 www.perfect-blend.com

PERMANENT SEEDING

The areas to be seeded consist of disturbed areas within the project limits.

Type F Permanent Seed Mixture will consist of the following:

Grass Species	Variety	Pure Live Seed (PLS) (Pounds/Acre)
Western Wheatgrass	Arriba, Flintlock, Rodan, Rosana, Walsh	7
Green Needlegrass	Lodorm, AC Mallard Ecovar	4
Sideoats Grama	Butte, Pierre	3
Blue Grama	Bad River	2
Oats or Spring Wheat: April through May; Winter Wheat: August through November		10
Total:		26

FIBER MULCHING

Fiber mulch will be applied in a separate operation following permanent seeding.

The Contractor will allow the fiber mulch to cure a minimum of 18 hours prior to watering or any storm event to ensure proper cohesion between the soil and fiber particles.

TRAFFIC CONTROL

General Notes

Any delineators or signs damaged or lost will be replaced by the Contractor at no cost to the State.

- Non-applicable traffic control devices will be completely covered or removed during periods of inactivity. Periods of inactivity will be defined as no work taking place for a period of more than 2 calendar days.
- All regulatory signs will have a minimum mounting height of 5' in rural locations, even when mounted on portable supports.
- All materials and equipment will be stored a minimum distance of 30' from the traveled way during nonworking hours.
- The Contractor will provide installation details at the preconstruction meeting for all breakaway sign support assemblies.
- All construction operations will be conducted in the general direction of traffic movement.
- If there is a discrepancy between the traffic control plans, standard plates, and the MUTCD – whichever is more stringent will be used, as determined by the Engineer.

ITEMIZED LIST FOR TRAFFIC CONTROL SIGNS

SIGN CODE	SIGN DESCRIPTION	CONVENTIONAL ROAD			
		NUMBER	SIGN SIZE	SQFT PER SIGN	SQFT
W20-1	ROAD WORK AHEAD	2	48" x 48"	16.0	32.0
W21-5	SHOULDER WORK	2	48" x 48"	16.0	32.0
G20-2	END ROAD WORK	2	36" x 18"	4.5	9.0
		CONVENTIONAL ROAD TRAFFIC CONTROL SIGNS SQFT			
		73.0			

SIGNING LIST, LOCATIONS, AND QUANTITIES

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	000P-469	6	20

Permanent Signing for I5XH														
Hwy	MRM (approx)	SIGN							POST				Description	Work To Be Done
		Number (new signs)	Width (in)	Height (In)	Facing Traffic	New Sign	Breakaway Bases	Square Footage	New Post	Length (ft)	Size (in)	# of Posts		
16B	69.05	designed sign 1	36	36	Westbound	Flat Alum	Yes	9	Yes	28	2.5"	2	new advance warning sign w/ 1 section signal	install sign and conduit, tie to junction boxes, hookup wiring to traffic cabinet
16B	69.05	W16-13P	24	18	Westbound	Flat Alum		3					supplemental plaque	place on telespar below 36"x36" warning sign and beacon
16B	69.12	W3-3	36	36	Westbound	Flat Alum	No	9	Yes	12	2.0"	1	new signal ahead warning sign	install sign 400 ft upstream of warning flasher
16B	68.79	designed sign 1	36	36	Eastbound	Flat Alum	Yes	9	Yes	28	2.5"	2	new advance warning sign w/ 1 section signal	install sign and conduit, tie to junction boxes, hookup wiring to traffic cabinet
16B	68.79	W16-13P	24	18	Eastbound	Flat Alum		3					supplemental plaque	place on telespar below 36"x36" warning sign and beacon
16B	68.72	W3-3	36	36	Eastbound	Flat Alum	No	9	Yes	12	2.0"	1	new signal ahead warning sign	install sign 400 ft upstream of warning flasher
16B	67.81	designed sign 1	36	36	Westbound	Flat Alum	Yes	9	Yes	28	2.5"	2	new advance warning sign w/ 1 section signal	install sign and conduit, tie to junction boxes, hookup wiring to traffic cabinet
16B	67.81	W16-13P	24	18	Westbound	Flat Alum		3					supplemental plaque	place on telespar below 36"x36" warning sign and beacon
16B	67.88	W3-3	36	36	Westbound	Flat Alum	No	9	Yes	12	2.0"	1	new signal ahead warning sign	install sign 400 ft upstream of warning flasher
16B	67.51	designed sign 1	36	36	Eastbound	Flat Alum	Yes	9	Yes	28	2.5"	2	new advance warning sign w/ 1 section signal	install sign and conduit, tie to junction boxes, hookup wiring to traffic cabinet
16B	67.51	W16-13P	24	18	Eastbound	Flat Alum		3					supplemental plaque	place on telespar below 36"x36" warning sign and beacon
16B	66.44	W3-3	36	36	Eastbound	Flat Alum	No	9	Yes	12	2.0"	1	new signal ahead warning sign	install sign 400 ft upstream of warning flasher
16B	66.58	designed sign 1	36	36	Westbound	Flat Alum	Yes	9	Yes	28	2.5"	2	new advance warning sign w/ 1 section signal	install sign and conduit, tie to junction boxes, hookup wiring to traffic cabinet
16B	66.65	W16-13P	24	18	Westbound	Flat Alum		3					supplemental plaque	place on telespar below 36"x36" warning sign and beacon
16B	66.65	W3-3	36	36	Westbound	Flat Alum	No	9	Yes	12	2.0"	1	new signal ahead warning sign	install sign 400 ft upstream of warning flasher
16B	66.32	designed sign 1	36	36	Eastbound	Flat Alum	Yes	9	Yes	28	2.5"	2	new advance warning sign w/ 1 section signal	install sign and conduit, tie to junction boxes, hookup wiring to traffic cabinet
16B	66.25	W16-13P	24	18	Eastbound	Flat Alum		3					supplemental plaque	place on telespar below 36"x36" warning sign and beacon
16B	66.25	W3-3	36	36	Eastbound	Flat Alum	No	9	Yes	12	2.0"	1	new signal ahead warning sign	install sign 400 ft upstream of warning flasher
16B	66.15	designed sign 1	36	36	Westbound	Flat Alum	Yes	9	Yes	28	2.5"	2	new advance warning sign w/ 1 section signal	install sign and conduit, tie to junction boxes, hookup wiring to traffic cabinet
16B	66.22	W16-13P	24	18	Westbound	Flat Alum		3					supplemental plaque	place on telespar below 36"x36" warning sign and beacon
16B	66.22	W3-3	36	36	Westbound	Flat Alum	No	9	Yes	12	2.0"	1	new signal ahead warning sign	install sign 400 ft upstream of warning flasher
16B	64.58	designed sign 1	36	36	Westbound	Flat Alum	Yes	9	Yes	28	2.5"	2	new advance warning sign w/ 1 section signal	install sign and conduit, tie to junction boxes, hookup wiring to traffic cabinet
16B	64.65	W16-13P	24	18	Westbound	Flat Alum		3					supplemental plaque	place on telespar below 36"x36" warning sign and beacon
16B	64.65	W3-3	36	36	Westbound	Flat Alum	No	9	Yes	12	2.0"	1	new signal ahead warning sign	install sign 400 ft upstream of warning flasher
Totals/Notes								168 sq ft						

PLOT SCALE - 1:49.0104

PLOTTED FROM - TRRC12221

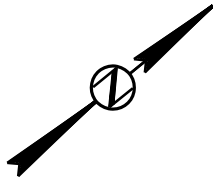
# CONDUIT LAYOUT

## MINNESOTA ST & US16B - WB

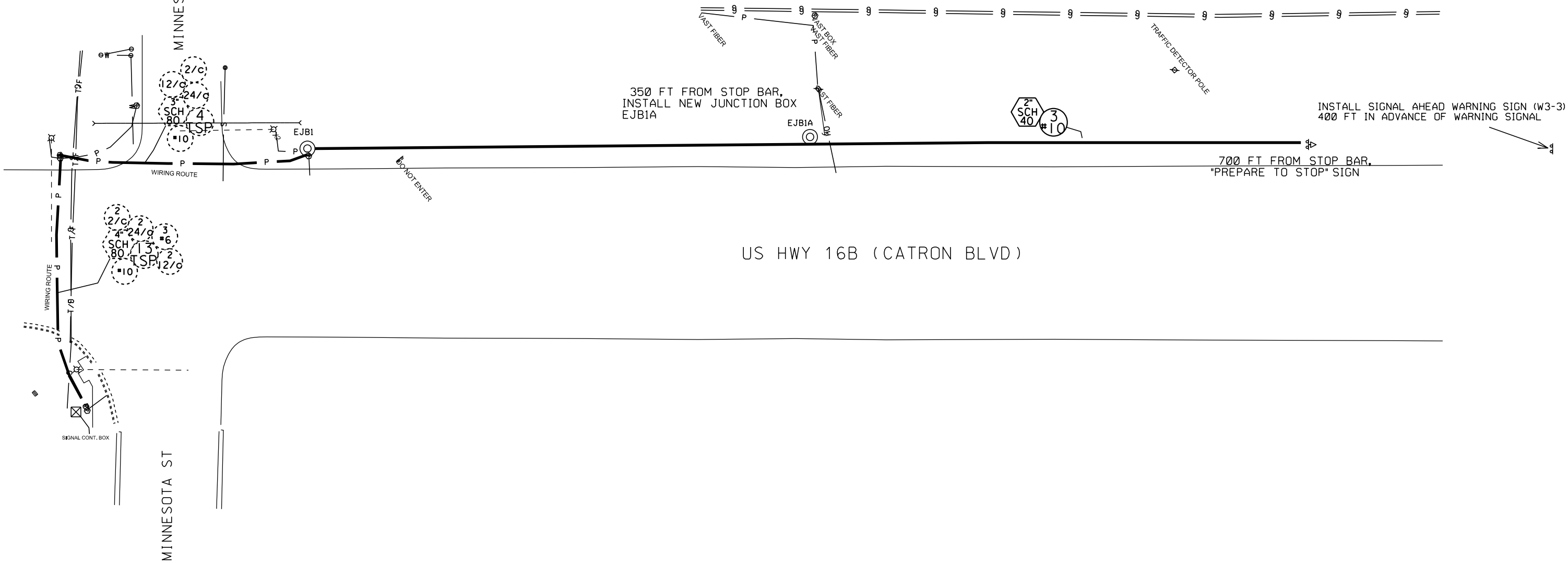
STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	000P-469	7	20

Plotting Date: 05/27/2020

ESTIMATE OF QUANTITIES			
KEY	ITEM	EST. QUANT	UNIT
	1 SECTION VEHICLE SIGNAL HEAD	1	EACH
	2\"/>	700	FT
	1/C #10 AWG COPPER WIRE	3090	FT
	TYPE 1 ELECTRICAL JUNCTION BOX (EJB1A)	1	EACH



Scale: Not To Scale



PLOT NAME - 2

FILE - ...\\15XH\\CONDUIT\\INSTALLATION DETAILS.DGN

PLOT SCALE - 1:49.0011

PLOTTED FROM - TRC12221

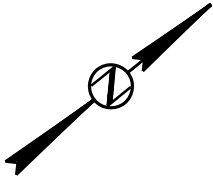
# CONDUIT LAYOUT

## MINNESOTA ST & US16B - EB

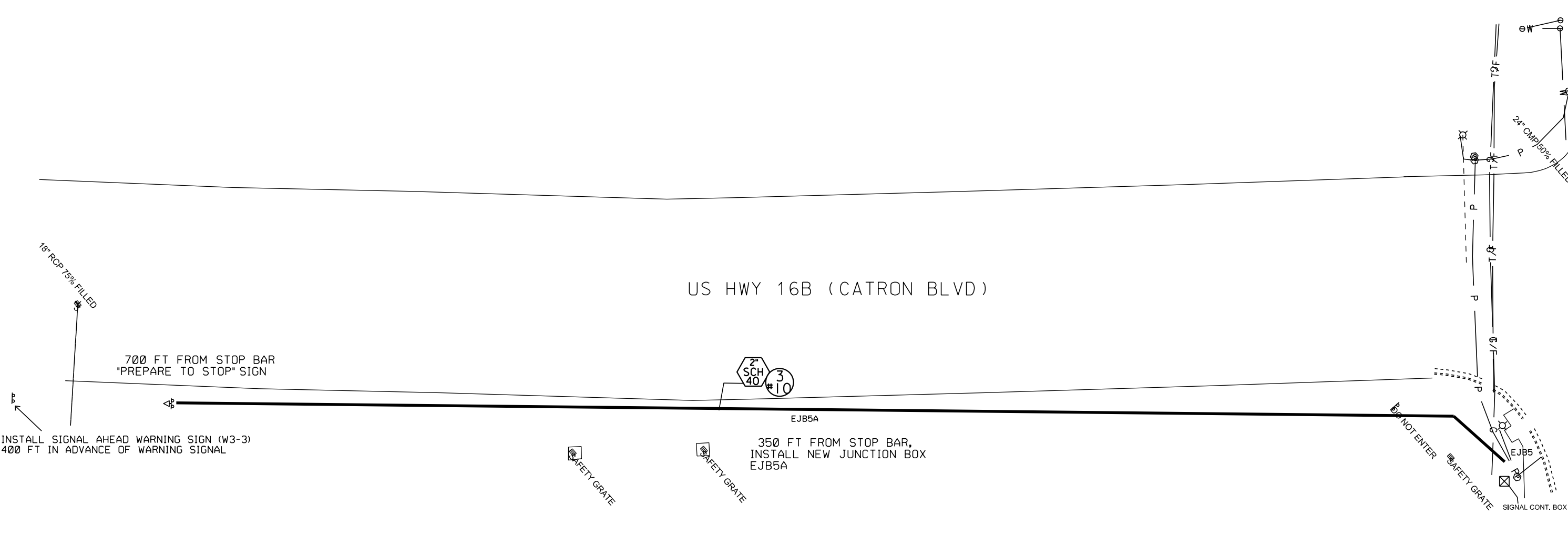
STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	000P-469	8	20

Plotting Date: 05/27/2020

ESTIMATE OF QUANTITIES			
KEY	ITEM	EST. QUANT	UNIT
	1 SECTION VEHICLE SIGNAL HEAD	1	EACH
	2" RIGID CONDUIT, SCHEDULE 40	750	FT
	1/C #10 AWG COPPER WIRE	2250	FT
	TYPE 1 ELECTRICAL JUNCTION BOX (EJB5A)	1	EACH



Scale: Not To Scale





PLOT SCALE - 1:49.016

PLOTTED FROM - TRRC12221

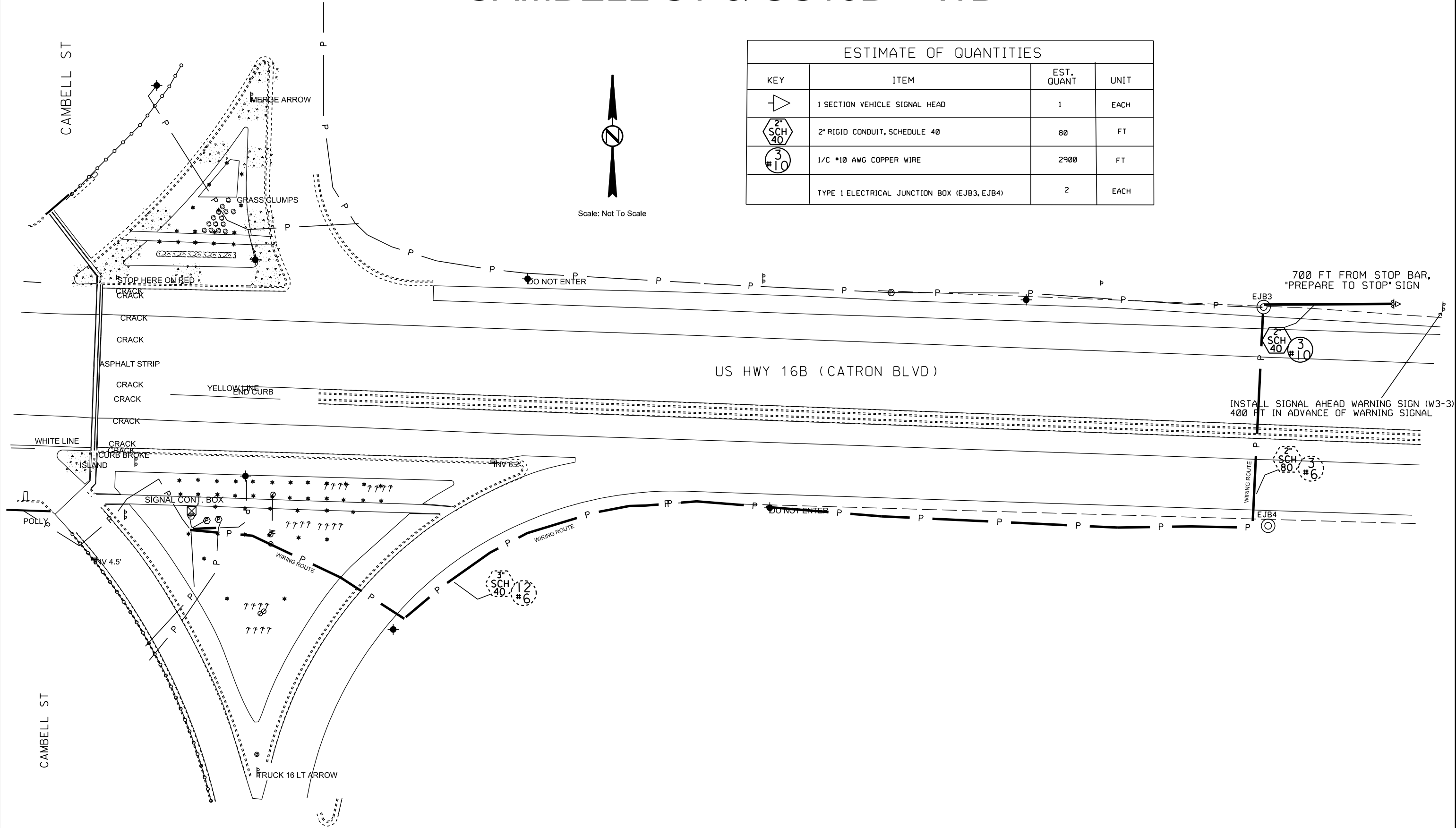
# CONDUIT LAYOUT

## CAMBELL ST & US16B - WB

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	000P-469	9	20

Plotting Date: 05/27/2020

ESTIMATE OF QUANTITIES			
KEY	ITEM	EST. QUANT	UNIT
	1 SECTION VEHICLE SIGNAL HEAD	1	EACH
	2\"/>	80	FT
	1/C #10 AWG COPPER WIRE	2900	FT
	TYPE 1 ELECTRICAL JUNCTION BOX (EJB3, EJB4)	2	EACH



FILE - ...\\15XH\_CONDUIT\\INSTALLATION DETAILS.DGN

PLOT NAME - 4

PLOT SCALE - 1:49.0079

PLOTTED FROM - TRRC12221

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	000P-469	10	20

Plotting Date: 05/27/2020

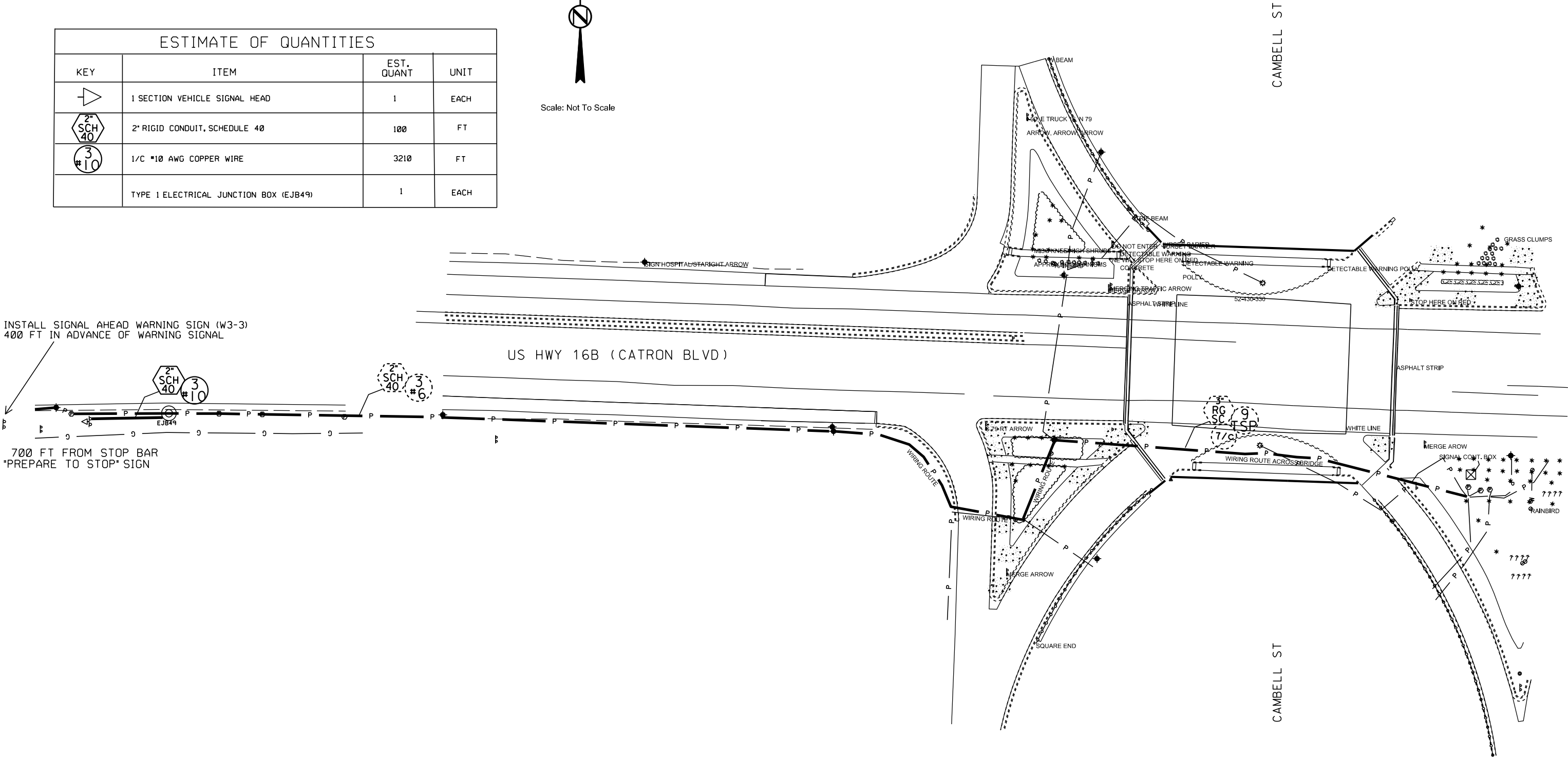
# CONDUIT LAYOUT

## CAMBELL ST & US16B - EB

ESTIMATE OF QUANTITIES			
KEY	ITEM	EST. QUANT	UNIT
	1 SECTION VEHICLE SIGNAL HEAD	1	EACH
	2" RIGID CONDUIT, SCHEDULE 40	100	FT
	1/C #10 AWG COPPER WIRE	3210	FT
	TYPE 1 ELECTRICAL JUNCTION BOX (EJB49)	1	EACH



Scale: Not To Scale



PLOT NAME - 5

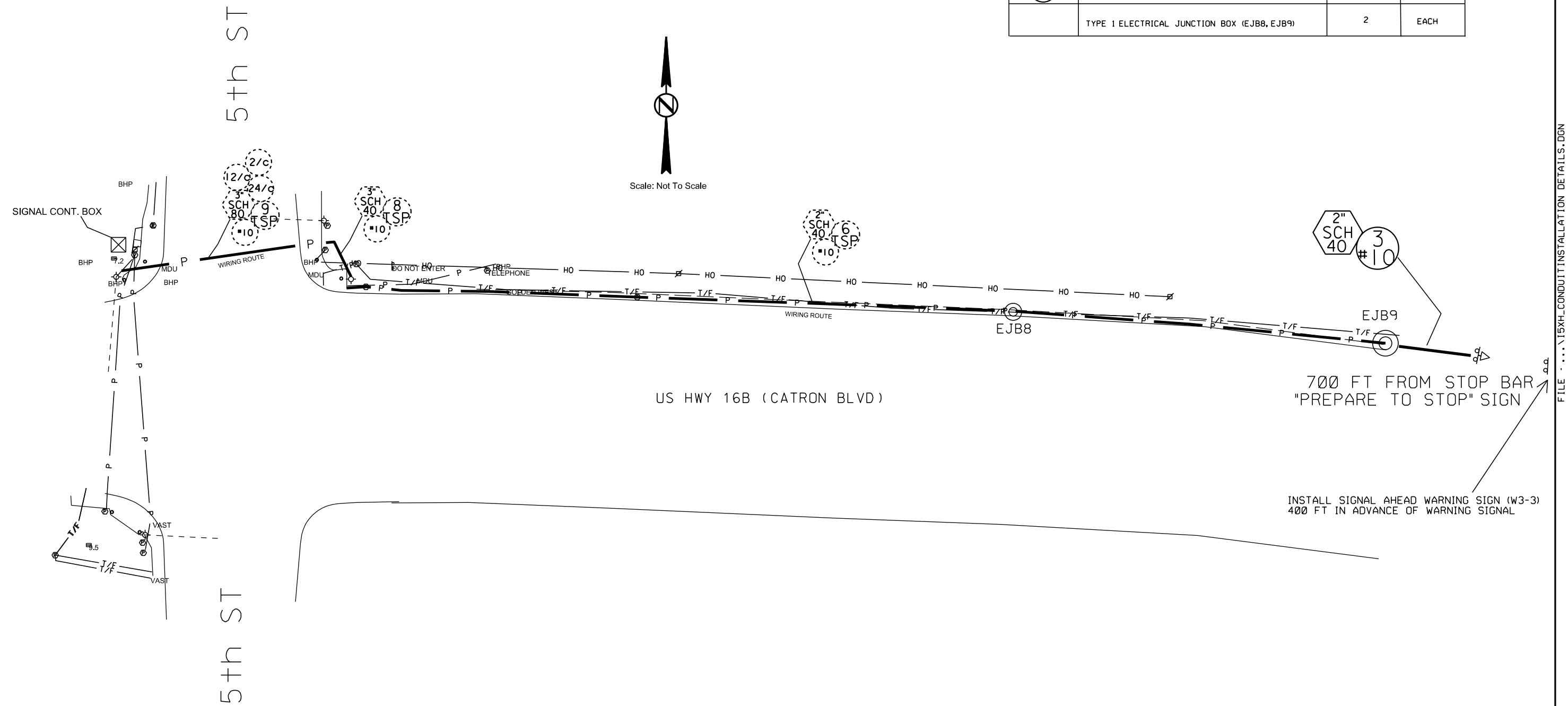
FILE - ...\\15XH\_CONDUIT\\INSTALLATION DETAILS.DGN

## PLOT SCALE - 1:49.0057

PLOTTED FROM - TRRC12221

PLOT NAME - 6

FILE - ... \15XH-CONDUIT INSTALLATION DETAILS.DGN



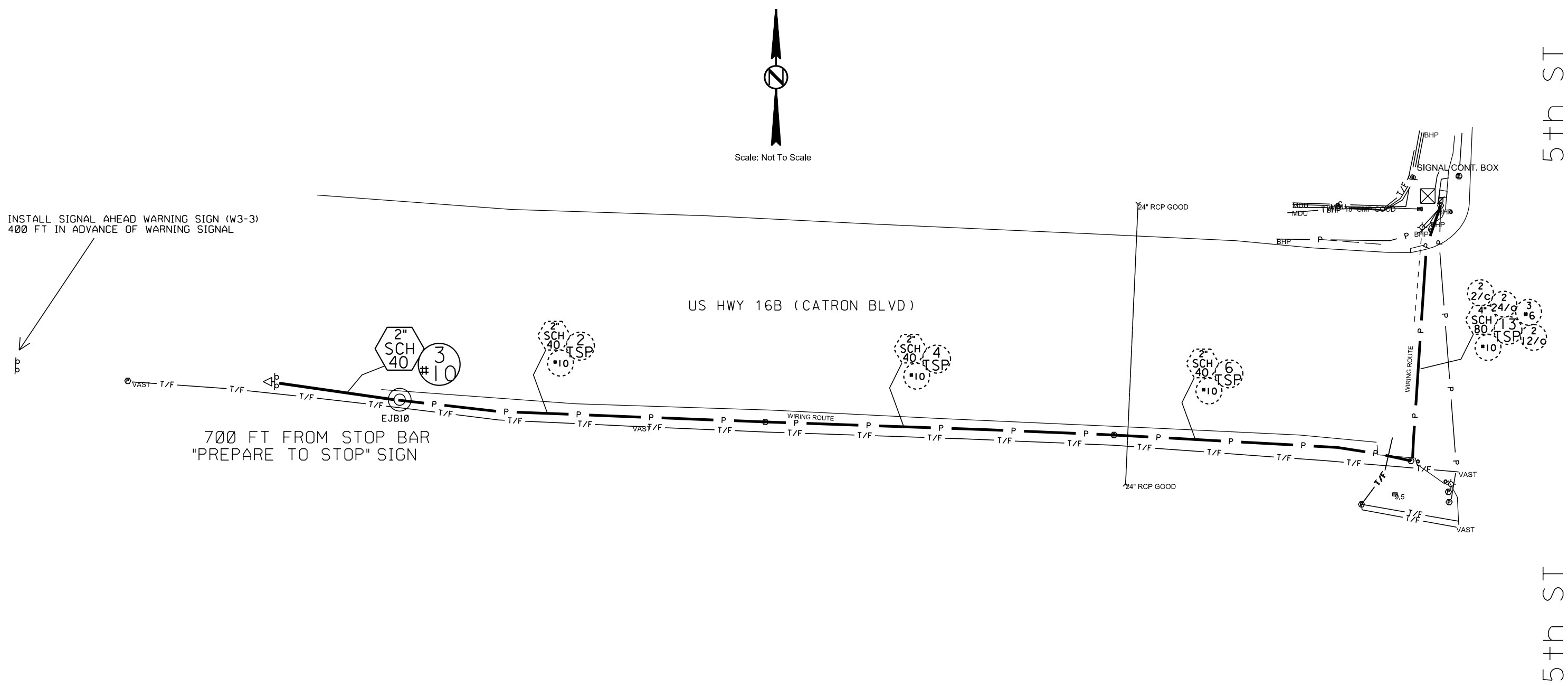
## PLOT SCALE - 1:49.0057

PLOTTED FROM - TRRC12221

---

PLOT NAME - 11

FILE - ... \I5XH\_CONDUIT INSTALLATION DETAILS.DGN



PLOT SCALE - 1:49.0057

PLOTTED FROM - TRRC12221

# CONDUIT LAYOUT

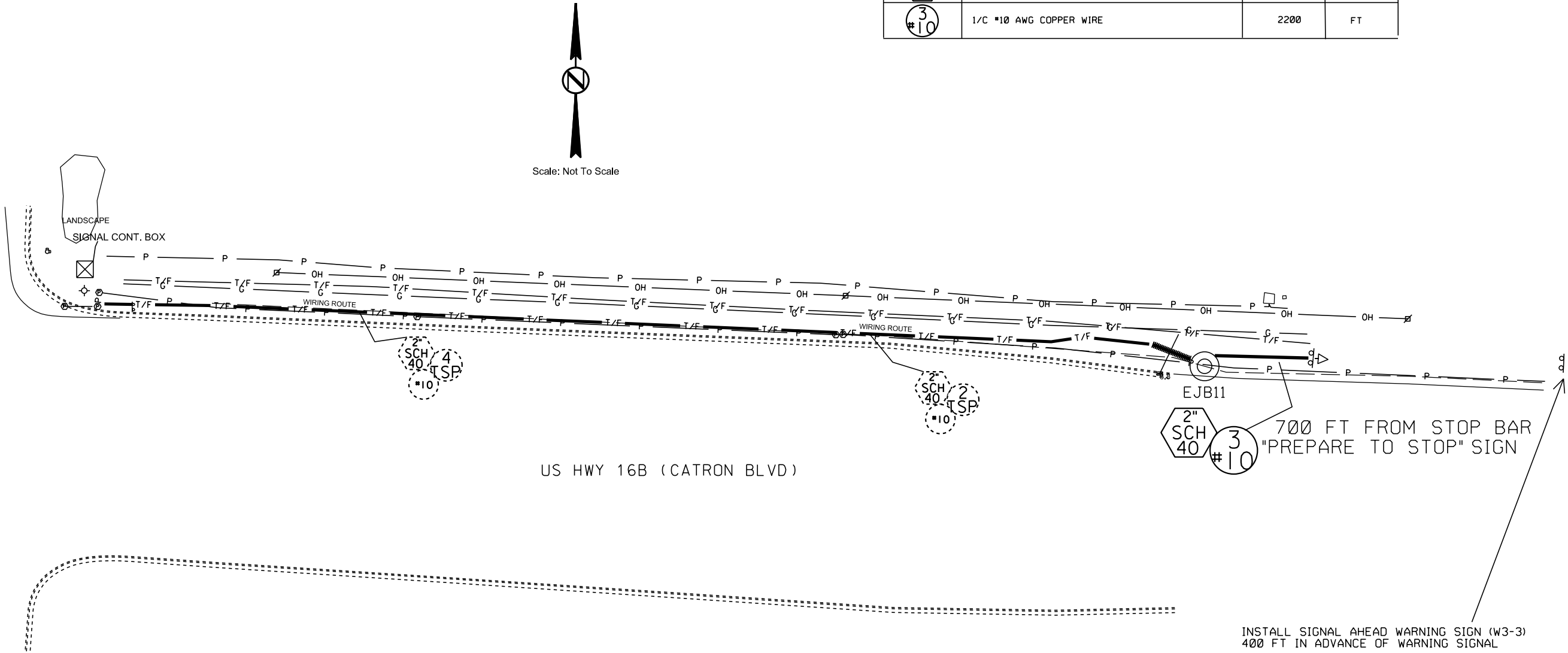
## BLACK HILLS BLVD & US16B - WB

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	000P-469	13	20

Plotting Date: 05/27/2020

ESTIMATE OF QUANTITIES			
KEY	ITEM	EST. QUANT	UNIT
	1 SECTION VEHICLE SIGNAL HEAD	1	EACH
	2' RIGID CONDUIT, SCHEDULE 40	50	FT
	1/C #10 AWG COPPER WIRE	2200	FT

Black Hills Blvd



PLOT NAME - 12

FILE - ...\\15XH\_CONDUIT\\INSTALLATION DETAILS.DGN

PLOT SCALE - 1:49.0057




PLOTTED FROM - TRRC12221

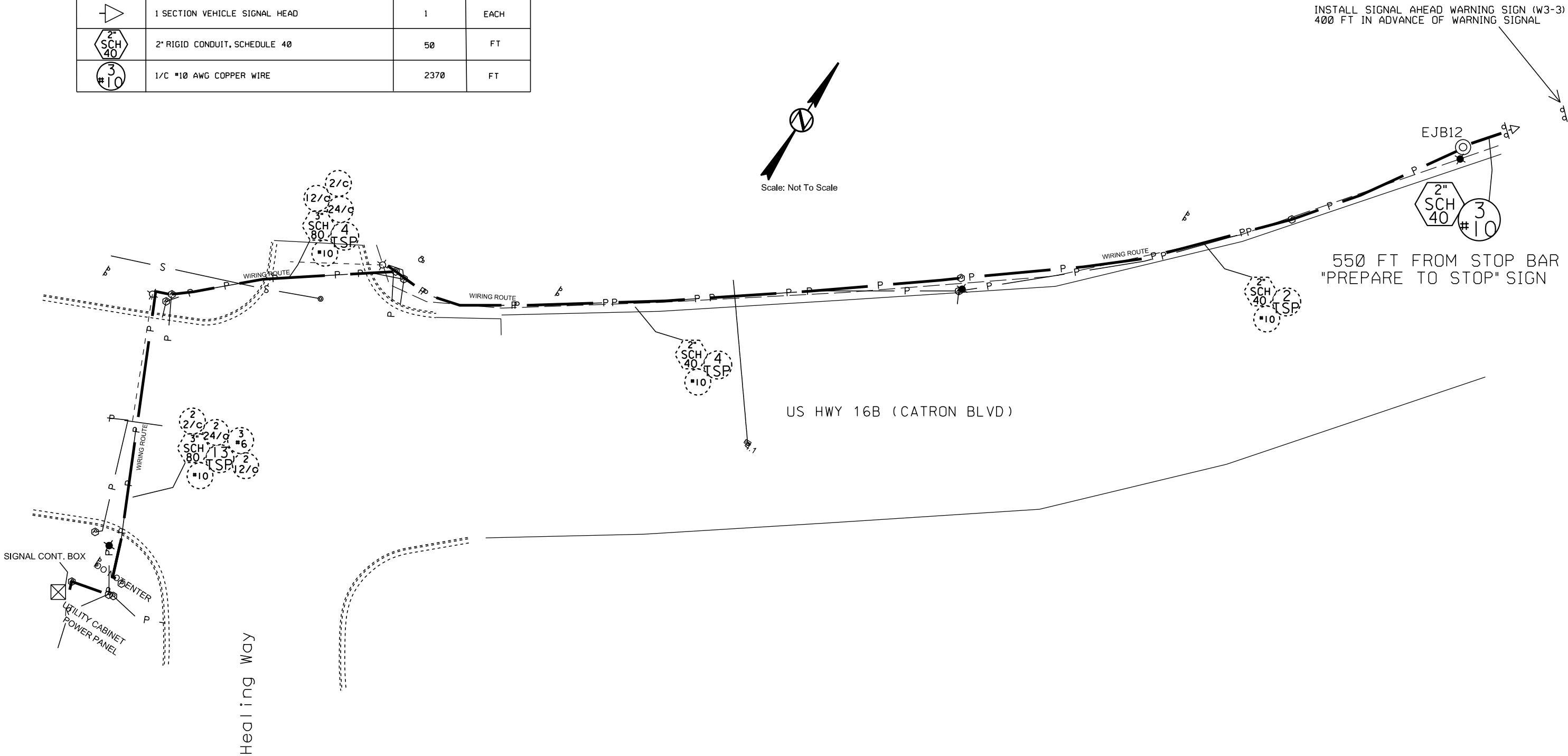
# CONDUIT LAYOUT

## HEALING WAY & US16B - WB

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	000P-469	14	20

Plotting Date: 05/27/2020

ESTIMATE OF QUANTITIES			
KEY	ITEM	EST. QUANT	UNIT
	1 SECTION VEHICLE SIGNAL HEAD	1	EACH
	2" RIGID CONDUIT, SCHEDULE 40	50	FT
	1/C #10 AWG COPPER WIRE	2370	FT



PLOT NAME - 13

FILE - ...\\15XH-CONDUIT\\INSTALLATION DETAILS.DGN



STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	000P-469	15	20

Plotting Date: 05/06/2020

SIGN DESIGN

SIGN DETAIL  
1:20



Panel Style: warning.ssi  
Dimensions are in inches,tenths

Letter locations are panel edge to lower left corner

SIGN NUMBER	designed sign 1
WIDTH x HGHT.	36" x 36"
BORDER WIDTH	2"
CORNER RADIUS	standard
MOUNTING	Overhead
BACKGROUND	TYPE: XI
	COLOR: flourescent Yellow
LEGEND/BORDER	TYPE: XI
	COLOR: Black/Black

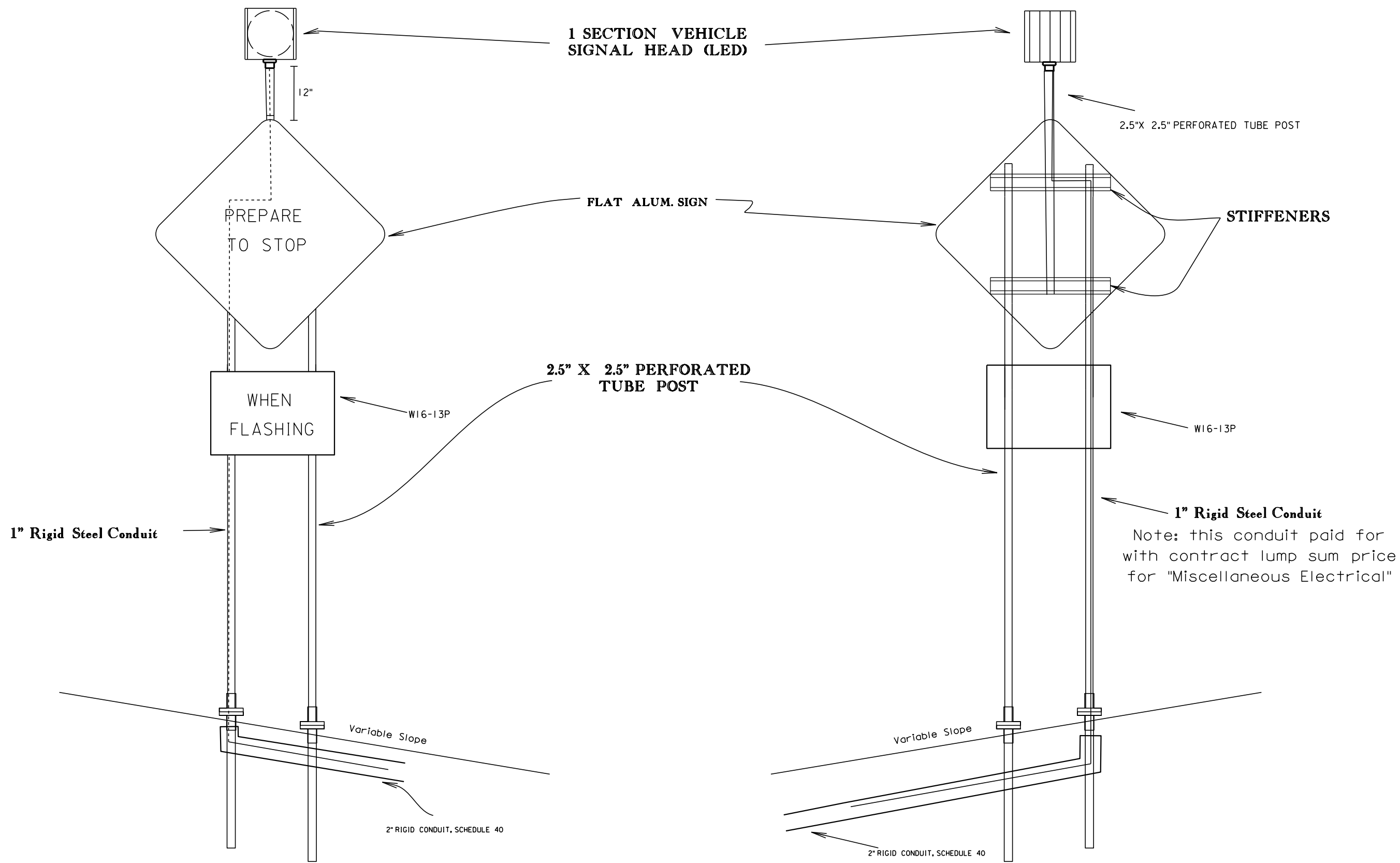
SYMBOL	ROT	X	Y	WID	HT

LETTER POSITIONS (X)																														LENGTH	SERIESSIZE
P	R	E	P	A	R	E																									D 2000
10.6	14.7	19	22.9	26.6	31.6	35.9																								28.4	5
T	O		S	T	O	P																									D 2000
10.6	14.3	17.9	22.9	26.7	30.4	35.1																								27.9	5

ADVANCE WARNING FLASHER SIGN ASSEMBLY DETAIL

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	000P-469	16	20

Plotting Date: 05/27/2020



PLOT SCALE - 1:24102.3

PLOTTED FROM - TRRC12221

PLOT NAME - 1

FILE - ... \FLASHER INSTALLATION DETAILS.DGN

The signs illustrated are not required if the work space is behind a barrier, more than 2 feet behind the curb, or 15 feet or more from the edge of any roadway.

The signs illustrated shall be used where there are distracting situations; such as: vehicles parked on shoulder, vehicles accessing the work site via the highway, and equipment traveling on or crossing the roadway to perform work operations.

The ROAD WORK AHEAD sign may be replaced with other appropriate signs, such as the SHOULDER WORK sign. The SHOULDER WORK sign may be used for work adjacent to the shoulder.

\* If the work space is on a divided highway, an advance warning sign should also be placed on the left side of the directional roadway.

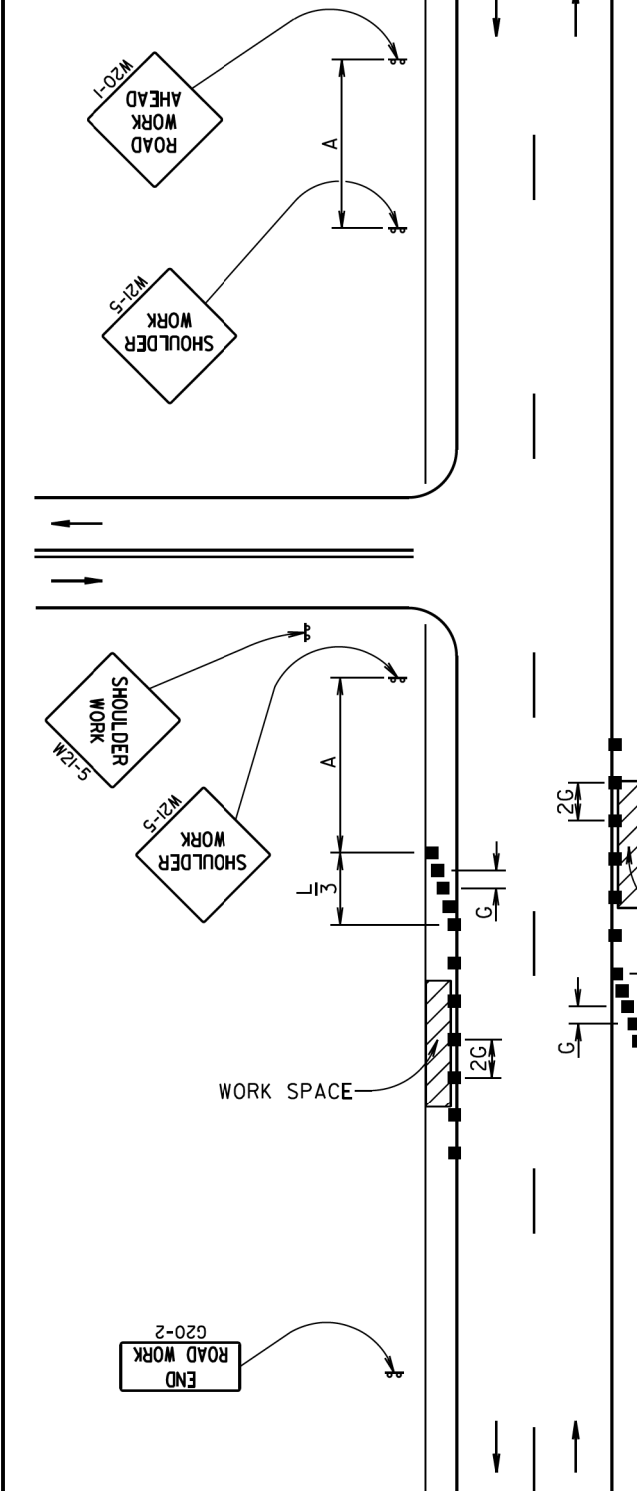
For short term, short duration, or mobile operations, all signs and channelizing devices may be eliminated if a vehicle with an activated flashing or revolving yellow light is used.

Posted Speed Prior to Work (M.P.H.)	Spacing of Advance Warning Signs (Feet) (A)
0 - 30	200
35 - 40	350
45 - 50	500
55	750
60 - 80	1000



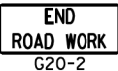
April 15, 2015

Published Date: 2nd Qtr. 2020	S D D O T	GUIDES FOR TRAFFIC CONTROL DEVICES WORK BEYOND THE SHOULDER	PLATE NUMBER 634.01
			Sheet 1 of 1



Posted Speed Prior to Work (M.P.H.)	Spacing of Advance Warning Signs (Feet) (A)	Taper Length (Feet) (L)	Spacing of Channelizing Devices (Feet) (G)
0 - 30	200	180	25
35 - 40	350	320	25
45	500	600	25
50	500	600	50
55	750	660	50
60 - 65	1000	780	50

■ Channelizing Device



The channelizing devices shall be drums or 42" cones if traffic control must remain overnight.

For short duration operations (1 hour or less) all channelizing devices may be eliminated if a vehicle with an activated flashing or revolving yellow light is used.

Worker signs (W21-1 or W21-1a) may be used instead of SHOULDER WORK signs.

A SHOULDER WORK sign should be placed on the left side of a divided or one-way roadway only if the left shoulder is affected.

The SHOULDER WORK sign on an intersecting roadway is not required if drivers emerging from that roadway will encounter another advance warning sign before they reach a work activity area.

WORK SPACE

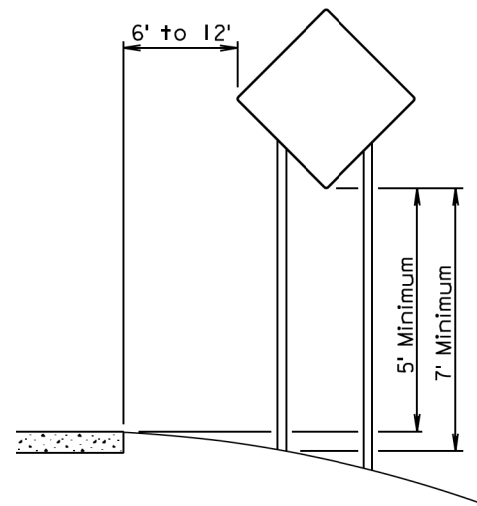


June 3, 2016

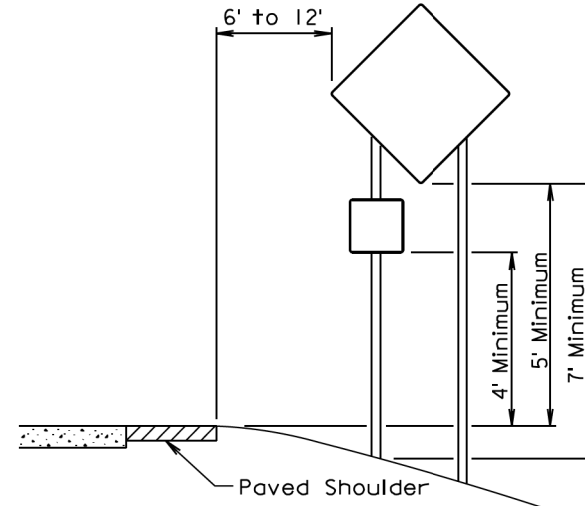
Published Date: 2nd Qtr. 2020	S D D O T	GUIDES FOR TRAFFIC CONTROL DEVICES WORK ON SHOULDERS	PLATE NUMBER 634.03
			Sheet 1 of 1

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	000P-469	18	20

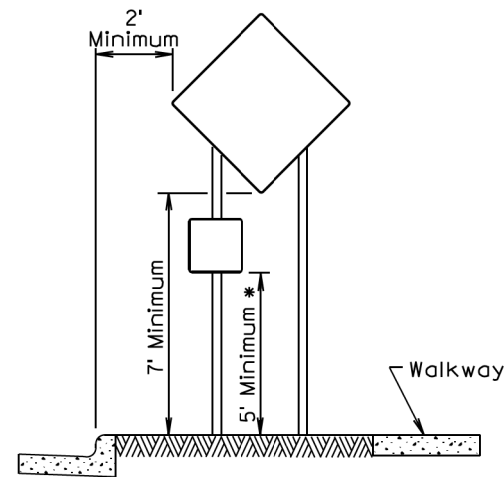
Plotting Date: 05/06/2020



RURAL DISTRICT

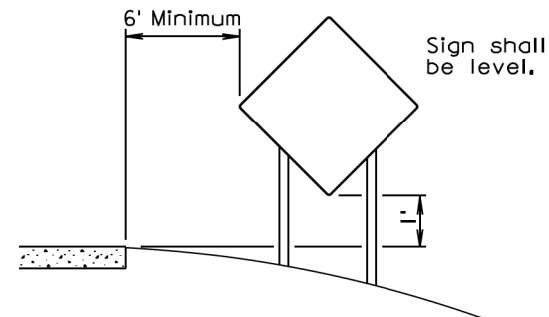


RURAL DISTRICT WITH  
SUPPLEMENTAL PLATE



URBAN DISTRICT

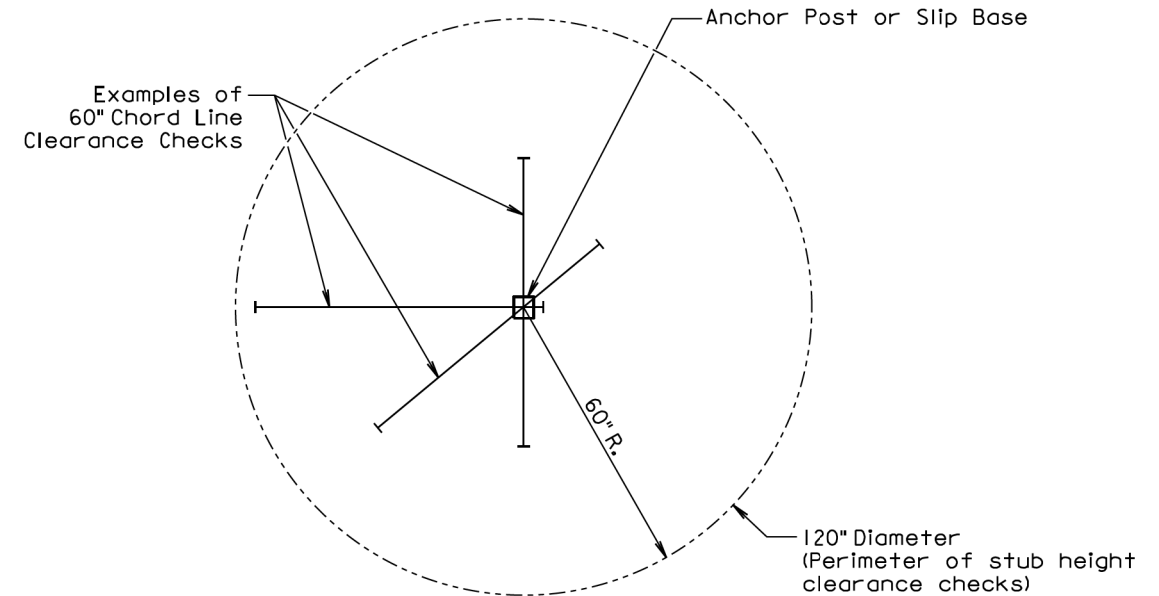
\* If the bottom of supplemental plate is mounted lower than 7 feet above a pedestrian walkway, the supplemental plate should not project more than 4" into the pedestrian facility.



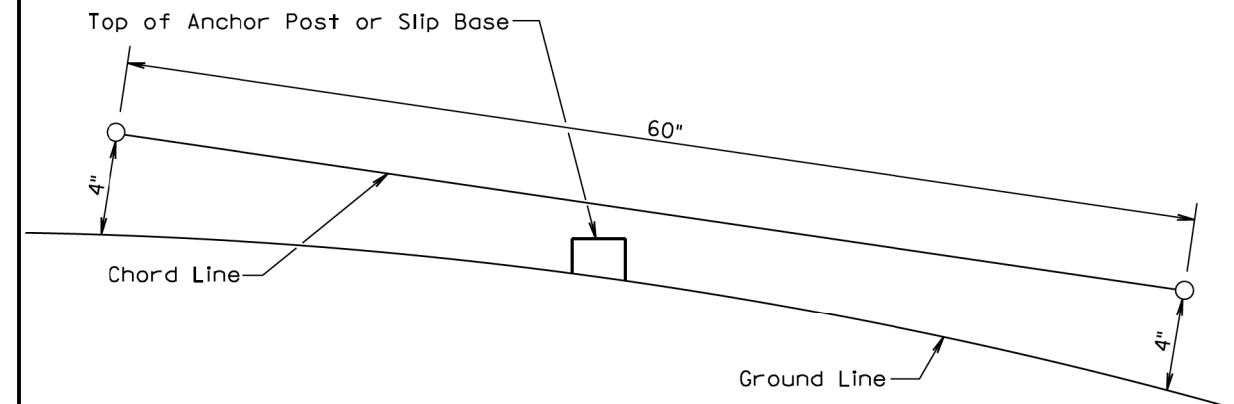
RURAL DISTRICT  
3 DAY MAXIMUM  
(Not applicable to regulatory signs)

September 22, 2014

Published Date: 2nd Qtr. 2020	S D D O T	CRASHWORTHY SIGN SUPPORTS (Typical Construction Signing)	PLATE NUMBER 634.85
			Sheet 1 of 1



PLAN VIEW  
(Examples of stub height clearance checks)



ELEVATION VIEW

GENERAL NOTES:

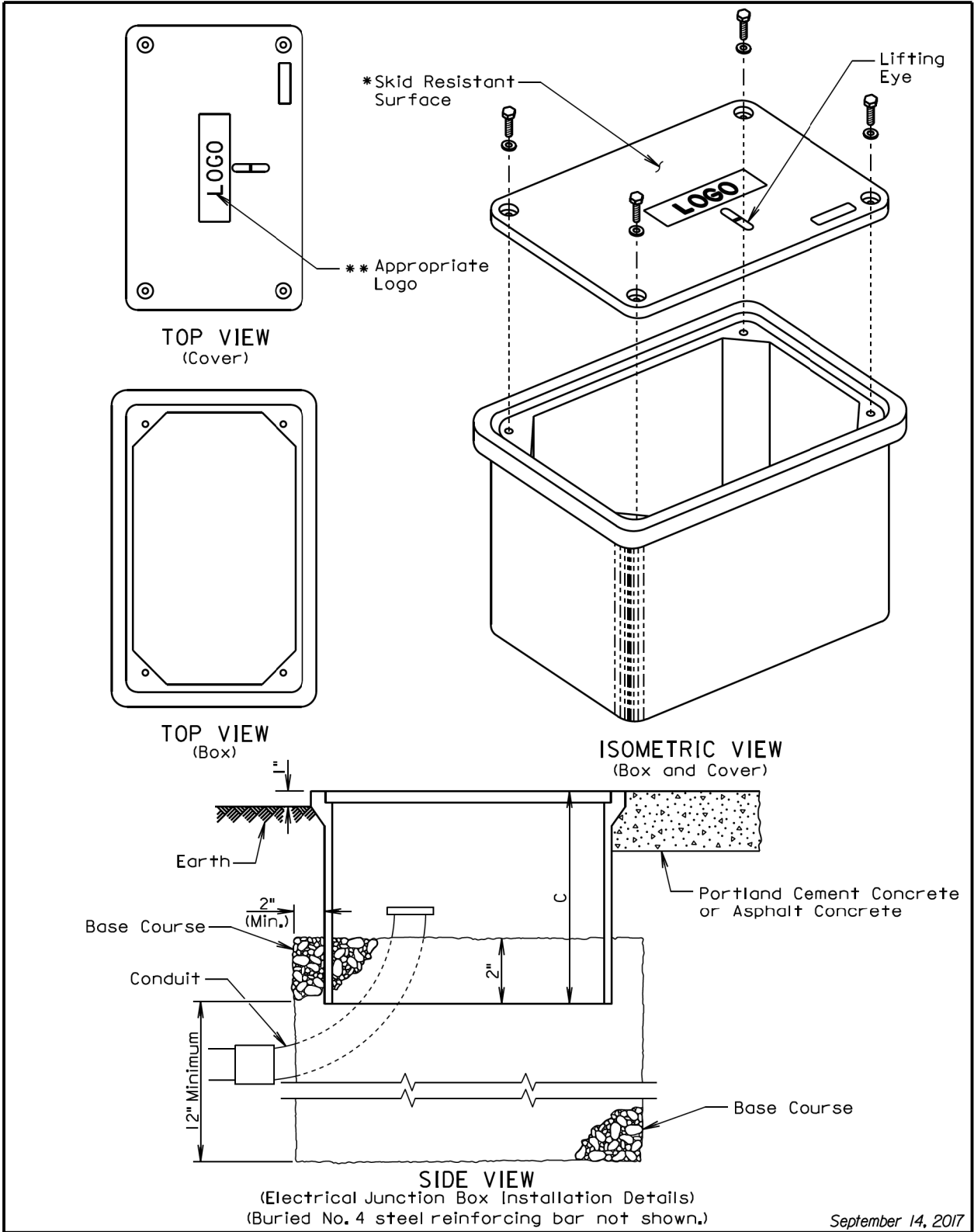
The top of anchor posts and slip bases SHALL NOT extend above a 60" chord line within a 120" diameter circle around the post with ends 4" above the ground.

At locations where there is curb and gutter adjacent to the breakaway sign support, the stub height shall be a maximum of 4" above the ground line at the localized area adjacent to the breakaway support stub.

The 4" stub height clearance is not necessary for U-channel lap splices where the support is designed to yield (bend) at the base.

July 1, 2005

Published Date: 2nd Qtr. 2020	S D D O T	BREAKAWAY SUPPORT STUB CLEARANCE	PLATE NUMBER 634.99
			Sheet 1 of 1



Published Date: 2nd Qtr. 2020	S D D O T	ELECTRICAL JUNCTION BOXES TYPE 1 THROUGH TYPE 4	PLATE NUMBER 635.65
			Sheet 1 of 2

ELECTRICAL JUNCTION BOX

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

GENERAL NOTES:

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

The cover shall have a lifting eye.

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

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

The electrical junction boxes shall comply with the American National Standards Institute (ANSI)/Society of Cable Telecommunications Engineers (SCTE) 77 2007 Specification for Underground Enclosure Integrity. The loading requirement for all the electrical junction boxes shall be Tier 8 of ANSI/SCTE 77 2007.

The electrical junction boxes shall be UL listed.

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

September 14, 2017

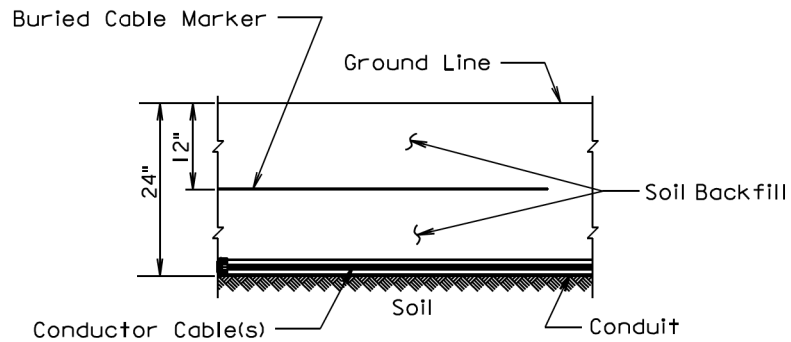
Published Date: 2nd Qtr. 2020	S D D O T	ELECTRICAL JUNCTION BOXES TYPE 1 THROUGH TYPE 4	PLATE NUMBER 635.65
			Sheet 2 of 2

PLOT SCALE - 1:119.828

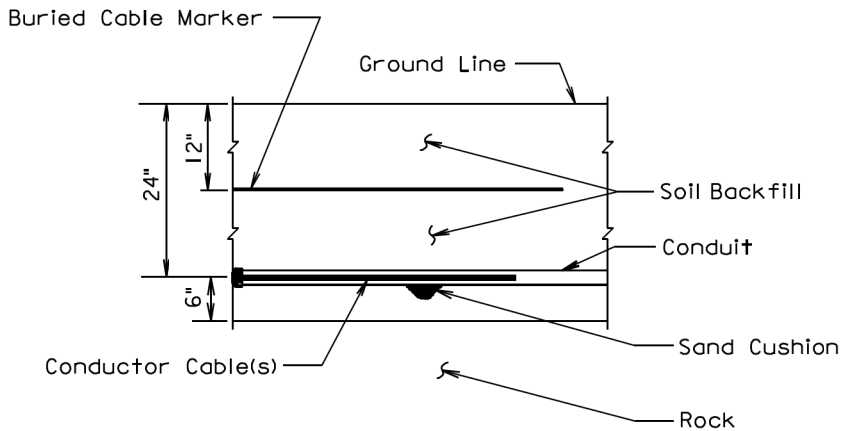
-PLOTTED FROM - TRRC12221

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	000P-469	20	20

Plotting Date: 05/06/2020



SECTION VIEW



SECTION VIEW

GENERAL NOTE:

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

March 31, 2000

<i>Published Date: 2nd Qtr. 2020</i>	<b>S D D O T</b>	<b>CONDUIT INSTALLATION</b>	PLATE NUMBER 635.76
			Sheet 1 of 1

PLOT NAME - 5

FILE - D:\15XH\CONDUIT\LAYOUTS06A.JC.DGN