Section E: Structure Plans

INDEX OF SHEETS -

Sheet El

			Sheet E2 Sheet E3 to E7 Sheet E8 to E16	Estimate of Structure (163' - 1¾'' Temporary Bric Layout, Notes and Detail:
BEGIN IM 2292(105)3 NB 1-229 Station 176+44.98 Str. No. 50-2	NUCL ST. VIONA ST. VIONA ST. VIONA ST. VIONA ST. VIONA ST. VIONA ST. VIONA ST. VIONA ST. VIONA ST. VIONA ST. VIONA ST. ST. ST. ST. ST. ST. ST. ST.	Rtpst 1	29TH ST. OAK 30TH 30T	NORLIN PARK WAY SIOUX FALLS SIOUX FALLS SIOUX FALLS SIOUX FALLS SIOUX FALLS SPENCER BLVD. TO REAL STRATE OF THE STRATE SPENCER BLVD. TO SPENCER BLVD. TO SPENCE
		163' - 1 ⅔'' Temporary Br. Sta. 5207 + 70.59 to 5209 + 3.	idge	ary Concrete Block Retaining Wall "B" 3 + 41.05 to 114 + 32.20
			Tempor Sta. 114	ary Concrete Block Retaining Wall "C" 4 + 62.64 to 115 + 33.89



FOR BIDDING PURPO

SECTION E – ESTIMATE OF STRUCTURE QUANTITIES

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
004E0060	Temporary Detour Structure	1	Each
420E0100	Structure Excavation, Bridge	57	CuYd
420E0300	Structure Excavation, Retaining Wall	35	CuYd
421E1000	Footing Undercut	102	CuYd
460E0050	Class A45 Concrete, Bridge	64.6	CuYd
480E0100	Reinforcing Steel	4,638	Lb
510E3120	HP 10 Pile Tip Reinforcement	16	Each
510E3365	HP 10x42 Steel Bearing Pile, Furnish and Drive	920	Ft
530E0470	Gravity Large Concrete Block Wall	2,592	SqFt
530E0718	Granular Backfill for Gravity Large Concrete Block Wall	386.8	CuYd
680E0040	4" Underdrain Pipe	659	Ft
680E2500	Porous Backfill	29.6	Ton

	STATE	PROJECT	SHEET NO	TOTAL SHEETS
SES ONL	s.d.	IM 2292(105)3	E2	E16
	L1			



FOR BIDDING PURPO

ESTIMATE OF STRUCTURE QUANTITIES

DESCRIPTION	QUANTITY	UNIT	REMARKS
Temporary Detour Structure	Lump Sum	LS	
Structure Excavation, Bridge	57.4	CuYd	
Class A45 Concrete, Bridge	64.6	CuYd	
Reinforcing Steel	4638	Lb	
HP 10 Pile Tip Reinforcement	16	Each	
HP10x42 Steel Bearing Pile, Furnish and Drive	920	Ft	

SPECIFICATIONS FOR BRIDGE

- 1. Design Specifications: AASHTO LRFD Bridge Design Specifications, 9th Edition.
- 2. Construction Specifications: South Dakota Standard Specifications for Roads and Bridges, 2015 Edition and required provisions, supplemental specifications and special provisions as included in the proposal.

BRIDGE DESIGN LOADING

AASHTO HL-93.

UNIT DESIGN STRESSES

1. Design Material Strengths:

Class A45 Concrete	f'c = 4500 psi
Reinforcing Steel (ASTM A615 Gr. 60)	fy = 60000 psi
Structural Steel (ASTM A709 Gr. 36)	fy = 36000 psi
Piling (ASTM A572 Grade 50)	fy = 50000 psi

2. Design unit stresses shall be as set forth in the Design Specifications.

DESIGN MIX OF CONCRETE

- 1. All structural concrete will be Class A45 unless otherwise indicated.
- 2. Type II cement is required.

ABUTMENTS

- 1. The HP10x42 Piling were designed using a factored bearing resistance of 77 tons per pile. Piling will develop a field verified nominal bearing resistance of 192 tons per pile.
- 2. All mild reinforcing steel will conform to ASTM A615, Grade 60.
- 3. All exposed concrete corners and edges will be chamfered ³/₄" unless noted otherwise.
- 4. Use 1" clear cover on all reinforcing steel except as shown.
- 5. Pile tip reinforcement will be required. See Standard Plate 510.30.

STRUCTURAL STEEL

Anchor bolts will conform to ASTM A307 or F1554. All costs for nuts. bolts and wedge type anchors will be incidental to the contract unit price per cubic yard for Class A45 Concrete, Bridge.

DELIVERY AND ERECTION

- 1. The Acrow temporary bridge will be supplied by and remain the property of the SDDOT.
- 2. An Acrow construction advisor will be hired by the Contractor to assist in erection of the temporary bridge. The Contractor shall notify the Department a minimum of 14 days prior to construction.
- 3. The Contractor will be required to load and transport the bridge from the City of Sioux Falls property at 3602/3604 S. Minnesota Ave to the erection site. The structure required 10 trucks to be delivered from the manufacturer for a total as delivered weight of 428,000 lbs. Contact Travis Dressen with the Mitchell Region at (605)995-8129
- 4. The Contractor will be responsible for any damage to the temporary bridge that occurs during the handling, erection and dismantling operations, as well as during transportation to and from the SDDOT vards.
- 5. All costs for delivery to the project site and erection of the temporary structure will be incidental to the contract unit price per each for Temporary Detour Structure.
- 6. A bridge assembly scope with approximate assembly times, crew requirements, tools and equipment needed is available upon request from Acrow (phone 303-279-9088).
- 7. After Notice to Proceed the Contractor will inventory parts of the temporary bridge to ensure all are present. Any missing pieces will be handle by CCO.

PILE DRIVING

- 1. Steel pilling will obtain bearing on Sioux Quartzite bedrock. This material is extremely hard and impenetrable by nature. The Site Plan & Subsurface Profile sheet should be reviewed to obtain approximate Sioux Quartzite elevation prior to pile driving operations. Some piles are likely to be shorter than the projected depth. Extreme care should be taken during pile driving operations not to over-stress the piles when the tips encounter bedrock.
- 2. A drivability analysis was performed using the wave equation analysis program (GRLWEAP). A list of acceptable hammers is provided below. Pile hammers not listed will require evaluation and approval prior to use from the Geotechnical Engineering Activity. Requests for evaluation of hammers not listed will be submitted a minimum of 5 business days prior to installation of piles.

Delmag D19-42 MVE M-19 ICE 42S APE D19-42

INSPECTION

- month inspections.

	STATE	PROJECT	SHEET	TOTAL	
SES ONL	OF S.D.	IM 2292(105)3	E4	E16	

3. Pile hammers not listed will require evaluation and approval prior to use from the Geotechnical Engineering Activity. Requests for evaluation of hammers not listed will be submitted a minimum of 5 business days prior to installation of piles.

1. The Acrow temporary bridge will be inspected prior to being opened to traffic. The Office of Bridge Design and Mitchell Region Bridge Engineer will be notified a minimum of 14 days prior to the bridge being open to traffic to allow for inspection.

2. The Acrow temporary bridge will be inspected every 24 months after being open to traffic. The Contractor will allow state inspectors access and provide the necessary traffic control to complete the 24-

> ESTIMATE OF STRUCTURE QUANTITIES AND NOTES FOR 163' - 1 ³/₄" TEMPORARY BRIDGE JULY 2023 (2) OF (

DESIGNED BY	CK. DES. BY	DRAFTED BY	Gt AND
CL	SK	BT	Pleve Al Jamson
MINN07CY	07CYGA02		BRIDGE ENGINEER



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	SES ONL	S.D.	IM 2292(105)3	E5	E16

Glaciated Terrain contains all sizes of natural mineral sediment ranging from clay to boulders. Streams originating in or flowing through glaciated topography contain sediment loads derived from glaciated sources. Stream and river crossings contain sediment naturally sorted and randomly concentrated. Alluvial sediment located at this project location may have concentrated coarser gravel such as pebbles, cobbles and boulders. The borings shown only represent material that was found at the exact location of the small diameter drill hole. Coarse granular material may be present in areas not penetrated by the depicted borings.

Sioux Quartzite is a pink to red, hard silica cemented sandstone. It is jointed, bedded, and crossbedded with thin red to purple pipestone shales and coarse conglomerate. Layers of poorly cemented sands may also be present. The surface of the quartzite is not flat. It may vary several feet vertically in a short horizontal distance.

The Geotechnical Engineering Activity has all of the boring logs and laboratory test results available for review at the Central Office in Pierre.

LEGEND



☑ Water

 \bigcirc Caved

All auger test holes are drilled with a $4\frac{1}{2}$ inch diameter continuous flight auger.

> **GROUNDWATER ELEVATIONS** JUNE 2022

A1		1392.5
A2		1392.2
A4	(CAVED)	1393.3
A5		1391.8
A7		1392.0
A8		1392.0
A10		1391.7
A11		1391.7

SUBSURFACE INVESTIGATION AND PILING LAYOUT FOR 163' - 1 ³/₄" TEMPORARY BRIDGE 30'-0 ROADWAY 0° SKEW OVER CLIFF AVENUE SEC. 28-T101N-R49W STA. 5207 + 70.59 TO 5209 + 33.74 IM 2292(105)3 STR. NO. 50-211-230T HL-93 MINNEHAHA COUNTY S. D. DEPT. OF TRANSPORTATION JULY 2023 (3) OF(5)

DESIGNED BY	CK. DES. BY	DRAFTED BY	GE AND
CL	SH/SK	HK/BT	Pleve A Musor
MINN07CY	07CYGA03		BRIDGE ENGINEER



	STATE	PROJECT	SHEET	TOTAL
	O⊦		NO.	SHEETS
SES ONL	S.D.	IM 2292(105)3	E6	E16

REINFORCING SCHEDULE (For 2 Abutments)					
Mk.	No.	Size	Length	Туре	
h1	54	4	6' - 5"	Str.	
k1	24	8	39' - 9"	Str.	
k2	118	7	5' - 9"	Str.	
k3	10	4	39' - 9"	Str.	
k4	54	4	5' - 9"	Str.	

(For 2 Abumenta)						
ITEM		QUANTITY				
		Abut. No. 1	Abut. No. 2			
Class A45 Concrete, Bridge	Cu. Yd.	32.3	32.3			
Reinforcing Steel	Lb.	2319	2319			
Structure Excavation	Cu. Yd.	28.7	28.7			
HP 10 x 42 Steel Bearing Pile, Furnish & Drive	Ft.	8 @ 55' = 440'	8 @ 60' = 480'			
HP 10 Pile Tip Reinforcement	Each	8	8			

FOR BIDDING PURPO





STATE PROJECT OF IM 2292(105)3	SHEET NO. E7	TOTAL SHEETS E16
SES ONLY S.D. IM 2292(105)3	E7	E16
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section on the ground and weld		
RATION WELD DETAIL		
TABLE 1 (BACKING PLATES)		
PILE 10" 12" 14" "F" FLANGE 6 ½" 8" 10" "W" WEB 4 ¾" 6 ¼" 7 ½"		
December 23 2012		
L PILE SPLICE DETAILS PLATE NUMBER 5/0.40 Sheet / of /		
163' - 1 ³ ⁄4" TEMPORARY BRII STR. NO. 50-211-230T JULY 2023	DGE 5	OF (5)



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PORTATION	MINN07CY	07CYGC91		BRIDGE ENGINEER

FOR BIDDING PURPC

△ ESTIMATE OF STRUCTURE QUANTITITES

DESCRIPTION	QUANTITY	UNIT	REMARKS
Gravity Large Concrete Block Retaining wall	2592	SqFt	
Granular Backfill for Gravity Large Concrete Block Wall	386.8	CuYd	
Structure Excavation, Retaining Wall	35.0	CuYd	
Footing Undercut	102.0	CuYd	
4" Underdrain Pipe	659	Ft	
Porous Backfill	29.6	Ton	

 Δ Quantities shown are for bidding purposes only. Actual quantities are to be determined by the wall designer and shown on the shop plans.

SPECIFICATIONS

- Design Specifications: AASHTO LRFD Bridge Design Specifications, 9th Edition.
- 2. Construction Specifications: South Dakota Standard Specifications for Roads and Bridges, 2015 Edition and Required Provisions, Supplemental Specifications, and Special Provisions as included in the Proposal.

RETAINING WALL GENERAL NOTES

- 1. The Gravity Large Concrete Block Retaining Wall will be on the current approved products list located at the following website address: http://apps.sd.gov/HC60ApprovedProducts/main.aspx.
- 2. The Contractor will consult with an approved wall company and obtain design calculations and construction plans prepared by a South Dakota Registered Professional Engineer. Two copies of this data will be forwarded to the Bridge Construction Engineer a minimum of 2 weeks in advance of construction for approval. Construction plans will include plan view, elevation view (to include elevations), typical cross sections, foundation and drainage details, material and construction specifications, and a detailed listing of all quantities required for wall construction including concrete retaining wall blocks, excavation, granular backfill and foundation preparation.
- 3. The minimum embedment depth to the bottom of gravity large concrete block retaining wall A will be 1.0-foot. The minimum embedment depth to the bottom of gravity large concrete block retaining walls B & C will be 2.0-feet.
- 4. Construction of the wall will begin at the lowest course and proceed upwards. The underdrain will be placed prior to wall backfill placement. The underdrain will also be functional to prevent water from backing up into the wall backfill. The lowest course must be placed and backfilled in its entirety prior to construction of any subsequent courses. Backfill placement must be placed in successive horizontal lifts.
- 5. The retaining wall will be installed in accordance to the selected wall companies' instructions, specifications, and approved shop drawings.

- 6. Drainage fill material for the gravity large concrete block retaining wall system will be granular material meeting the criteria as set by the wall block manufacturer and will be incidental to the bid item "Gravity Large Concrete Block Retaining Wall".
- 7. Quantities for Gravity Large Concrete Block Wall, Structure Excavation, Retaining Wall and Footing Undercut are for bidding purposes only. Actual quantities for the listed items must be determined from design calculations as incorporated in the shop drawings supplied by the wall designer and will be adjusted accordingly for pay purposes. The various bid items will be full compensation for the construction of the gravity large concrete block wall.
- 8. If Granular Backfill is required behind the wall to satisfy design requirements it will consist of crushed rock conforming to the following gradation:

Sieve Size	Percent Passing
1-1/2 inches	100
3/8 inch	0-15
#200 mesh sieve	0-10

The plasticity index (P.I.) will not exceed 2.

9. A layer of Type B Drainage Fabric will be placed over the top of the Granular Backfill prior to placing any soil over the granular backfill. The intent of the fabric is to act as a separator and keep fines from intruding into the granular material. All costs in furnishing and installing the Type B Drainage Fabric will be incidental to the contract unit price per cubic yard for "Granular Backfill for Gravity Large Concrete Block Wall."

UNDERDRAINS

- 1. An underdrain system will be placed behind the segmental blocks as shown in the plans.
- 2. The 4-inch diameter Perforated PVC Drain Pipe will be PS 46 Solvent Weld PVC pipe conforming ASTM F758 or SDR 35 Solvent Weld PVC Pipe conforming to ASTM D3034 with perforations in accordance with ASTM F758. The 4" Dia. PVC Outlet Pipe will be Schedule 40 PVC Pipe conforming to ASTM D1785 designated as PVC 1120, PVC 1220, or PVC 2120. Pipe sections will be connected using a PVC Solvent Cement conforming to ASTM D2564. The Drain Sleeve will conform to ASTM D6707
- 3. Care will be taken to ensure that the 4-inch diameter Perforated PVC Drain Pipe and the 4-inch diameter PVC Outlet Pipe are not damaged during construction. Sufficient cover material will be placed over the pipes before compaction equipment is allowed over the underdrain system. Any damaged pipes will be replaced by the Contractor at no additional cost to the Department.

- Underdrain Pipe.

FOUNDATION PREPARATION

Foundation Preparation for the retaining walls will consist of undercutting the in-place soil one foot below the bottom of the wall extending from one foot in front of to one foot behind the large concrete blocks. Backfill the undercut with one foot of granular material. Prior to placing any granular material all spoil or loose material will be removed, and the area wetted then proof rolled to ensure adequate density. The granular material for the leveling pad will conform to the requirements of Base Course in Section 882 of the Specifications and be compacted according to Section 260.3.B All costs for equipment, labor, tools, and incidentals required for the undercutting and use or disposal of the excavated material and for furnishing, placing, watering, and compacting the granular material used in the foundation preparation will be paid for at the contract unit price per cubic yard for Footing Undercut.

	STATE	PROJECT	SHEET	TOTAL
	OF		NO.	SHEETS
SES ONL	S.D.	IM 2292(105)3	E9	E16

4. All labor, tools, equipment, and any incidentals necessary for the Installation of 4-inch diameter Perforated PVC Drain Pipe, 4-inch diameter PVC Outlet Pipe, SDR Solvent Weld PVC Coupling, and PVC Cement will be incidental to the contract unit price per foot for 4"

5. The length of time that excavations required to construct the retaining walls are left open will be minimized. Construction of the retaining walls will begin immediately after excavation limits are completed and proceed in a continuous sequence until the walls and all backslopes are constructed to the final template.

ESTIMATE C	OF STRUCTURE QUANTITIES AND NOTES
	FOR
TEMP	ORARY CONCRETE BLOCK RETAINING WALLS
ADJ. TO I - 229	SEC. 28-T101N-R49W
	IM 2292(105)3

MINNEHAHA COUNTY S. D. DEPT. OF TRANSPORTATION OCTOBER 2023 (2) OF (9

DESIGNED BY	CK. DES. BY	DRAFTED BY	GE AND
CL	SK	MG	Tene A Muso
MINN07CY	07CYGC92		



ESTIMATED QUANTITIES					
ITEM	UNIT	QUANTITY			
Gravity Large Concrete Block	Sq. Ft.	829			
Porous Backfill	Ton	14.8			
4" Underdrain	Ft.	337			
Footing Undercut	Cu. Yd.	47.1			
Structure Excavation, Retaining Wall	Cu. Yd.	11.8			

DESIGNED BY	CK. DES. BY	DRAFTED BY	GE AND
CL	SK	MG	Plue A Muso
MINN07CY	07CYGC93		BRIDGE ENGINEER

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		STATE	PROJECT	SHEET NO	TOTAL SHEETS
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	Penet diame condu inches resista collect Samp uncon	ration test ter hollow cted by dr s to collect ance to pe ted using a ler. Penetr rected "N"	holes are drilled with a 6% in stem auger. Penetration test opping a 140 pound hammer samples and measure the netration of the soil. Samples a lined Modified California ration test results are listed as values in blows per foot.	nch is are · 30 s are s	
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))	C(ADJ. TC	ONCRE 01-229	TE BLOCK RETAININ SEC. 28- ⁻ II	IG WA 1101N-I M 2292(ALL R49W (105)3
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OCTOBER 2023

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CK. DES. BY

JT/SK 07CYGC94 DRAFTED BY HKING TENE A JAMUSO BRIDGE ENGINEER

(4) OF(9)

	STATE	PROJECT	SHEET	TOTAL
SES ONL	OF S.D.	IM 2292(105)3	E12	E16

ESTIMATED QUANTITIES							
ITEM UNIT QUANTITY							
Gravity Large Concrete Block	Sq. Ft.	1119					
Granular Backfill for Gravity Large Concrete Block	Cu. Yd.	242.5					
Porous Backfill	Ton	9.4					
4" Underdrain	Ft.	169					
Footing Undercut	Cu. Yd.	34.8					
Structure Excavation. Retaining Wall	Cu. Yd.	14.9					

TEMPORARY WALL "B"

LAYOUT

FOR CONCRETE BLOCK RETAINING WALL ADJ. TO I - 229 SEC. 28-T101N-R49W

IM 2292(105)3

5 OF 9

MINNEHAHA COUNTY

S. D. DEPT. OF TRANSPORTATION

OCTOBER 2023

DESIGNED BY	CK. DES. BY	DRAFTED BY	GE AND
CL	SK	MG	Pleve A Muso
MINN07CY	07CYGC95		BRIDGE ENGINEER

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	STATE	PROJECT	SHEET	TOTAL
	OF		NO.	SHEETS
SES UNL	S.D.	IM 2292(105)3	E13	E16

Glaciated Terrain contains all sizes of natural mineral sediment ranging from clay to boulders. Streams originating in or flowing through glaciated topography contain sediment loads derived from glaciated sources. Stream and river crossings contain sediment naturally sorted and randomly concentrated. Alluvial sediment located at this project location may have concentrated coarser gravel such as pebbles, cobbles and boulders. The borings shown only represent material that was found at the exact location of the small diameter drill hole. Coarse granular material may be present in areas not penetrated by the depicted borings.

The Geotechnical Engineering Activity has all of the boring logs and laboratory test results available for review at the Central Office in Pierre.

All auger test holes are drilled with a 4¹/₂ inch diameter continuous flight auger.

 \bigcirc Caved

Sample

Zone

Penetration test holes are drilled with a $6\frac{5}{8}$ inch diameter hollow stem auger. Penetration tests are conducted by dropping a 140 pound hammer 30 inches to collect samples and measure the resistance to penetration of the soil. Samples are collected using a lined Modified California Sampler. Penetration test results are listed as uncorrected "N" values in blows per foot.

> **GROUNDWATER ELEVATIONS JUNE 2022**

(CAVED) 1393.2 A4

NOVEMBER 2022

C4

(CAVED) 1393.3

TEMPORARY WALL "B"

SUBSURFACE INVESTIGATION

FOR

CONCRETE BLOCK RETAINING WALL ADJ. TO I - 229 SEC. 28-T101N-R49W

IM 2292(105)3

MINNEHAHA COUNTY

S. D. DEPT. OF TRANSPORTATION (6) OF (9)

OCTOBER	2023
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Granular Backfi	I for Gravity L	arge Concrete Bl	ock Cu. Yd.	144.3	3	
Porous Backfill 4" Underdrain			Ton Et	5.4		
Footing Underc	ut		гі. <u>Cu. Y</u> d.	20.0		
Structure Excav	ation, Retaini	ing Wall	Cu. Yd.	8.6		
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	Stream	ns or	iginating in	or flowing th	nrough glac	ciated	
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			TEMP	ORARY	WALL '	"C"	
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