



North Dakota Department of Transportation

Thomas K. Sorel
Director

Doug Burgum
Governor

November 9, 2017

ADDENDUM 1 – JOB 40

TO: All prospective bidders on project AC-NH-SOIB-7-023(041)925, Job No. 40 scheduled for the November 17, 2017 bid opening.

The following plan and request for proposal revisions shall be made:

Plan Revisions:

See attached summary from Jessica Karls, KLJ dated November 8, 2017 for an explanation.

Request for Proposal Revisions:

Remove and replace pages 5, 6, 7, 10, 11 and 12 of 14 of the Proposal pages located at the beginning of the Request for Proposal, with the enclosed pages revised 11/9/2017.

The following changes were made to the Bid Items:

Spec No.	Code No.	Description	Description of Change
202	0312	REMOVE EXISTING FENCE	Increased from 8,853 to 8,953 LF
203	0101	COMMON EXCAVATION-TYPE A	Increased from 676,176 to 678,962 CY
203	0109	TOPSOIL	Increased from 54,701 to 54,915 CY
203	0140	BORROW-EXCAVATION	Increased from 38,957 to 42,176 CY
216	0100	WATER	Increased from 8,048 to 8,104 M GAL
251	0200	SEEDING CLASS II	Increased from 45.32 to 46.05 ACRE
251	2000	TEMPORARY COVER CROP	Increased from 65.00 to 66.15 ACRE
253	0101	STRAW MULCH	Increased from 110.32 to 112.20 ACRE
261	0112	FIBER ROLLS 12IN	Increased from 53,061 to 55,669 LF
261	0113	REMOVE FIBER ROLLS 12IN	Increased from 33,753 to 35,057 LF
302	0120	AGGREGATE BASE COURSE CL 5	Increased from 50,014 to 50,482 TON
302	0356	AGGREGATE SUFRACE COURSE CL 13	Increased from 10,554 to 11,461 TON
752	0201	FENCE SMOOTH WIRE 4 STRAND	Increased from 9,566 to 9,661 LF
752	0911	TEMPORARY SAFETY FENCE	Increased from 2,938 to 4,738 LF
752	0993	FENCE TERMINAL	Increased from 4 to 5 EA
752	3140	CORNER BRACE BARBED WIRE	Increased from 28 to 29 EA
754	0110	FLAT SHEET FOR SIGNS-TYPE XI REFL SHEETING	Increased from 388.0 to 393.1 SF
754	0206	STEEL GALV POSTS-TELESCOPING PERFORATED TUBE	Increased from 1,438.0 to 1,492.1 LF
990	0230	TEMPORARY ACCESS	Added Bid Item at 1 L SUM

**Add Special Provision SP 509(14) MIGRATORY BIRD TREATY ACT AND
THREATENED AND ENDANGERED SPECIES ACT COMPLIANCE.**

Add Special Provision SP 557(14) FORT BERTHOLD RURAL WATER LINE.

This addendum is to be incorporated into the bidder's proposal for this project. AASHTOWare Project Bids files should be updated by downloading the addendum file from the Bid Express on-line bidding exchange at <http://www.bidx.com/> and load it into the AASHTOWare Project Bids program.



PHILLIP MURDOFF – CONSTRUCTION SERVICES ENGINEER

80:jwj

Enclosure



November 8, 2017

ADDENDUM 1 JOB 40

TO: All prospective bidders and suppliers on Project AC-NH-SOIB-7-023(041)925 scheduled for the November 17, 2017 bid opening.

Revisions for AC-NH-SOIB-7-023(041)925:

Remove & replace plan sheets:

- | | |
|------------------------------|--------------------|
| • Section 2 Sheet 1 | Revised 11/07/2017 |
| • Section 4 Sheet 1 - 4 | Revised 11/07/2017 |
| • Section 6 Sheet 1 - 3 | Revised 11/07/2017 |
| • Section 8 Sheet 1 | Revised 11/07/2017 |
| • Section 11 Sheet 1 | Revised 11/08/2017 |
| • Section 11 Sheet 2 - 3 | Revised 10/27/2017 |
| • Section 11 Sheet 12 | Revised 11/08/2017 |
| • Section 20 Sheet 4 | Revised 11/07/2017 |
| • Section 20 Sheet 14 | Revised 11/07/2017 |
| • Section 60 Sheet 6 & 7 | Revised 10/27/2017 |
| • Section 60 Sheet 21 | Added 10/27/2017 |
| • Section 70 Sheet 1-2 | Revised 11/08/2017 |
| • Section 76 Sheet 4 | Revised 10/27/2017 |
| • Section 76 Sheet 18 | Added 10/27/2017 |
| • Section 76 Sheet 19 | Added 11/07/2017 |
| • Section 77 Sheet 4 | Revised 10/27/2017 |
| • Section 77 Sheet 12 | Added 10/27/2017 |
| • Section 77 Sheet 13 | Added 11/07/2017 |
| • Section 82 Sheet 4 | Revised 10/27/2017 |
| • Section 82 Sheet 14 | Added 10/27/2017 |
| • Section 100 Sheet 13 & 25 | Revised 10/27/2017 |
| • Section 110 Sheet 1, 4 & 7 | Revised 10/30/2017 |
| • Section 199 Sheet 6 | Revised 11/07/2017 |
| • Section 200 Sheets 33-40 | Revised 10/27/2017 |
| • Section 200 Sheets 192-194 | Added 11/07/2017 |
| • SP 509(14) | Added 11/07/17 |
| • SP 557(14) | Added 11/06/17 |

with the enclosed revised sheets.

Electronic files will be made available through the NDDOT's Plans and Proposals Page.

SECTION 2

SHEET 1:

- Updated page numbers for Section 20, 60, 76, 77, 82 and 200 and Special Provisions.

SECTION 4

SHEETS 1-4:

- NDDOT Street has been added to plan view.
- Updated station range for ND 1804.
- Updated utility comments.

SECTION 6

SHEETS 1-3:

- Notes 100-P03, 107-P02, 107-P03, and 108-P02 have been updated.

SECTION 8

SHEET 1:

- The following bid items have been updated:

Spec	Code	Description	Unit	Previous Quantity	Addendum 1 Quantity
202	0312	REMOVE EXISTING FENCE	LF	8,853	8,953
203	0101	COMMON EXCAVATION-TYPE A	CY	676,176	678,962
203	0109	TOPSOIL	CY	54,701	54,915
203	0140	BORROW-EXCAVATION	CY	38,957	42,176
216	0100	WATER	M GAL	8,048	8,104
251	0200	SEEDING CLASS II	ACRE	45.32	46.05
251	2000	TEMPORARY COVER CROP	ACRE	65.00	66.15
253	0101	STRAW MULCH	ACRE	110.32	112.20
261	0112	FIBER ROLLS 12IN	LF	53,061	55,669
261	0113	REMOVE FIBER ROLLS 12IN	LF	33,753	35,057
302	0120	AGGREGATE BASE COURSE CL 5	TON	50,014	50,482
302	0356	AGGREGATE SURFACE COURSE CL 13	TON	10,554	11,461
752	0201	FENCE SMOOTH WIRE 4 STRAND	LF	9,566	9,661
752	0911	TEMPORARY SAFETY FENCE	LF	2,938	4,738
752	0993	FENCE TERMINAL	EA	4	5
752	3140	CORNER BRACE BARBED WIRE	EA	28	29
754	0110	FLAT SHEET FOR SIGNS-TYPE XI REFL SHEETING	SF	388.0	393.1
754	0206	STEEL GALV POSTS-TELESCOPING PERFORATED TUBE	LF	1438.0	1492.1
990	0230	TEMPORARY ACCESS	L SUM	-	1

SECTION 11

SHEETS 1:

- Quantities for Common Excavation-Type A, Topsoil, Embankment, Excess Excavation, and Borrow Excavation have been updated. Added footnote 9.

SHEETS 2:

- Added quantity for NDDOT Street
- Updated quantities for Embankment, Excavation and Borrow.

SHEETS 3:

- End area quantities for ND 23B Phase 1 have been updated.

SHEETS 12:

- Added note for additional widening on ND 1804.

SECTION 20

SHEET 4:

- Added detail for NDDOT Street.
- Quantities of Aggregate Surface Course CL 13 for NDDOT Street have been updated.

SHEET 14:

- Added detail for widening ND 1804.

SECTION 60

SHEET 6-7:

- Updated plan view of Uran Avenue.

SHEET 21:

- Sheet has been added showing plan and profile view of NDDOT Street.

SECTION 70

SHEET 1-2:

- Removed clubhouse from contours drawing.

SECTION 76

SHEET 4:

- Updated plan view of Uran Avenue.

SHEET 18:

- Sheet for NDDOT Street has been added.
- Quantities of Temporary Cover Crop, Straw Mulch, Fiber Rolls 12IN and Remove Fiber Rolls 12IN have been added.

SHEET 19:

- Sheet for widening ND 1804 has been added.
- Quantities of Temporary Cover Crop, Straw Mulch, Fiber Rolls 12IN and Remove Fiber Rolls 12IN have been added.

SECTION 77

SHEET 4:

- Updated plan view of Uran Avenue.

SHEET 12:

- Sheet for NDDOT Street has been added.
- Quantities of Seeding Class II, Straw Mulch and Fiber Rolls 12IN has been added.

SHEET 13:

- Sheet for widening ND 1804 has been added.
- Quantities of Seeding Class II, Straw Mulch and Fiber Rolls 12IN has been added.

SECTION 82

SHEET 4:

- Updated plan view of Uran Avenue.

SHEET 14:

- Added sheet and points for NDDOT Street.

SECTION 100

SHEET 13:

- Added Additional Aggregate Surface Course CL 13 to maintain traffic throughout construction of 40th. St NW.

SHEET 25:

- Quantities of temporary safety fence have been added.

SECTION 110

SHEET 1:

- Added Stop sign at Sta 48933+12 Rt.

SHEET 4:

- Updated Quantities of Sign Support Length and Flat Sheet for Signs XI.

SHEET 7:

- Added Stop sign at Sta 48933+12 Rt.

SECTION 200

SHEET 33-40:

- End area volumes have been updated.

SHEET 192-194:

- Added sheets for widening ND 1804.

SECTION 199

SHEET 6:

- Updated golf course planting plan.

SPECIAL PROVISIONS

SP 509(14):

- Added

SP 557(14):

- Added

This addendum is to be incorporated into bidder's proposal for this project.

Sincerely,
KLJ



Project Engineer

Enclosure(s): Revised Plan Sheets
-Project #: AC-NH-SOIB-7-023(041)925
c: Jen Einrem, NDDOT Design Division

BID ITEMS

Project: AC-NH-SOIB-7-023(041)925 (PCN-19862)

Bidder must type or neatly print unit prices in numerals, make extensions for each item, and total. Do not carry unit prices further than three (3) decimal places.

Item No.	Spec No.	Code No.	Description	Unit	Approx. Quantity	Unit Price		Amount	
						\$\$\$\$	000	\$\$\$\$	00
001	103	0100	CONTRACT BOND	L SUM	1.				
002	103	0200	ESCROW OF BID DOCUMENTATION	L SUM	1.				
003	201	0330	CLEARING & GRUBBING	L SUM	1.				
004	201	0380	REMOVAL OF TREES 18IN	EA	244.				
005	201	0390	REMOVAL OF TREES 30IN	EA	22.				
006	202	0136	REMOVAL OF PAVEMENT	TON	12,579.				
007	202	0174	REMOVAL OF PIPE ALL TYPES AND SIZES	LF	257.				
008	202	0279	REMOVAL OF BUILDINGS-SITE 3	L SUM	1.				
009	202	0281	REMOVAL OF BUILDINGS-SITE 1	L SUM	1.				
010	202	0282	REMOVAL OF BUILDINGS-SITE 2	L SUM	1.				
011	202	0312	REMOVE EXISTING FENCE	LF	8,953.				
012	203	0101	COMMON EXCAVATION-TYPE A	CY	678,962.				
013	203	0109	TOPSOIL	CY	54,915.				
014	203	0140	BORROW-EXCAVATION	CY	42,176.				
015	210	0050	BOX CULVERT EXCAVATION	EA	1.				
016	210	0210	FOUNDATION FILL	CY	2,441.				

BID ITEMS

Project: AC-NH-SOIB-7-023(041)925 (PCN-19862)

Bidder must type or neatly print unit prices in numerals, make extensions for each item, and total. Do not carry unit prices further than three (3) decimal places.

Item No.	Spec No.	Code No.	Description	Unit	Approx. Quantity	Unit Price		Amount	
						\$\$\$\$	000	\$\$\$\$	00
017	210	0405	FOUNDATION PREPARATION-BOX CULVERT	EA	1.				
018	216	0100	WATER	M GAL	8,104.				
019	230	0165	SUBGRADE PREPARATION-TYPE A-12IN	STA	70.200				
020	251	0200	SEEDING CLASS II	ACRE	46.050				
021	251	0300	SEEDING CLASS III	ACRE	21.390				
022	251	2000	TEMPORARY COVER CROP	ACRE	66.150				
023	253	0101	STRAW MULCH	ACRE	112.200				
024	253	0201	HYDRAULIC MULCH	ACRE	21.390				
025	253	0301	BONDED FIBER MATRIX	ACRE	66.270				
026	255	0103	ECB TYPE 3	SY	833.				
027	256	0300	RIPRAP GRADE III	CY	95.				
028	256	0600	RIPRAP-SALVAGED	CY	62.				
029	260	0200	SILT FENCE SUPPORTED	LF	5,834.				
030	260	0201	REMOVE SILT FENCE SUPPORTED	LF	5,834.				
031	261	0112	FIBER ROLLS 12IN	LF	55,669.				
032	261	0113	REMOVE FIBER ROLLS 12IN	LF	35,057.				

BID ITEMS

Project: AC-NH-SOIB-7-023(041)925 (PCN-19862)

Bidder must type or neatly print unit prices in numerals, make extensions for each item, and total. Do not carry unit prices further than three (3) decimal places.

Item No.	Spec No.	Code No.	Description	Unit	Approx. Quantity	Unit Price		Amount	
						\$\$\$\$	000	\$\$\$\$	00
033	261	0120	FIBER ROLLS 20IN	LF	15,392.				
034	261	0121	REMOVE FIBER ROLLS 20IN	LF	7,872.				
035	302	0120	AGGREGATE BASE COURSE CL 5	TON	50,482.				
036	302	0356	AGGREGATE SURFACE COURSE CL 13	TON	11,461.				
037	401	0050	TACK COAT	GAL	7,234.				
038	401	0060	PRIME COAT	GAL	12,473.				
039	401	0160	BLOTTER MATERIAL CL 44	TON	214.				
040	411	0105	MILLING PAVEMENT SURFACE	SY	103.				
041	430	0045	SUPERPAVE FAA 45	TON	15,719.				
042	430	1000	CORED SAMPLE	EA	82.				
043	430	5803	PG 58S-28 ASPHALT CEMENT	TON	392.				
044	430	5818	PG 58H-34 ASPHALT CEMENT	TON	552.				
045	550	0302	8.5IN NON-REINF CONCRETE PVMT CL AE-DOWELED	SY	21,241.				
046	602	1131	CLASS AE-3 CONCRETE-BOX CULVERT	CY	296.700				
047	612	0114	REINFORCING STEEL-GRADE 60-BOX CULVERT	LBS	63,116.				
048	702	0100	MOBILIZATION	L SUM	1.				

BID ITEMS

Project: AC-NH-SOIB-7-023(041)925 (PCN-19862)

Bidder must type or neatly print unit prices in numerals, make extensions for each item, and total. Do not carry unit prices further than three (3) decimal places.

Item No.	Spec No.	Code No.	Description	Unit	Approx. Quantity	Unit Price		Amount	
						\$\$\$\$	000	\$\$\$\$	00
081	722	1120	MANHOLE RISER 72IN	LF	10.800				
082	722	3300	SANITARY MANHOLE REPAIR	EA	3.				
083	722	4010	INLET CATCH BASIN 6IN BEEHIVE	EA	1.				
084	722	6140	ADJUST GATE VALVE BOX	EA	4.				
085	722	6200	ADJUST MANHOLE	EA	1.				
086	724	0427	ADJUST HYDRANT	EA	1.				
087	724	0891	WATERMAIN MODIFICATIONS	L SUM	1.				
088	744	0050	INSULATION BOARD	CF	234.				
089	750	0115	SIDEWALK CONCRETE 4IN	SY	564.				
090	750	0140	SIDEWALK CONCRETE 6IN	SY	105.				
091	750	2115	DETECTABLE WARNING PANELS	SF	50.				
092	752	0110	FENCE BARBED WIRE 3 STRAND-STEEL POST	LF	1,488.				
093	752	0201	FENCE SMOOTH WIRE 4 STRAND	LF	9,661.				
094	752	0911	TEMPORARY SAFETY FENCE	LF	4,738.				
095	752	0993	FENCE TERMINAL	EA	5.				
096	752	2100	VEHICLE GATE	EA	3.				

BID ITEMS

Project: AC-NH-SOIB-7-023(041)925 (PCN-19862)

Bidder must type or neatly print unit prices in numerals, make extensions for each item, and total. Do not carry unit prices further than three (3) decimal places.

Item No.	Spec No.	Code No.	Description	Unit	Approx. Quantity	Unit Price		Amount	
						\$\$\$\$	000	\$\$\$\$	00
097	752	2120	REMOVE VEHICLE GATE	EA	2.				
098	752	3140	CORNER ASSEMBLY BARBED WIRE	EA	29.				
099	752	4100	DOUBLE BRACE ASSEMBLY BARBED WIRE	EA	1.				
100	754	0110	FLAT SHEET FOR SIGNS-TYPE XI REFL SHEETING	SF	393.100				
101	754	0112	FLAT SHEET FOR SIGNS-TYPE IV REFL SHEETING	SF	546.				
102	754	0206	STEEL GALV POSTS-TELESCOPING PERFORATED TUBE	LF	1,492.100				
103	754	0563	REFERENCE MARKER-TYPE C	EA	6.				
104	754	0805	OBJECT MARKERS - CULVERTS	EA	28.				
105	762	0112	EPOXY PVMT MK MESSAGE	SF	960.				
106	762	0113	EPOXY PVMT MK 4IN LINE	LF	60,456.				
107	762	0114	EPOXY PVMT MK 6IN LINE	LF	240.				
108	762	0115	EPOXY PVMT MK 8IN LINE	LF	8,842.				
109	762	0117	EPOXY PVMT MK 24IN LINE	LF	240.				
110	762	0420	SHORT TERM 4IN LINE-TYPE R	LF	30,480.				
111	770	0003	LIGHTING SYSTEM A	EA	1.				
112	770	0004	LIGHTING SYSTEM B	EA	1.				

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	ND	AC-NH-SOIB-7-023(041)925	2	1

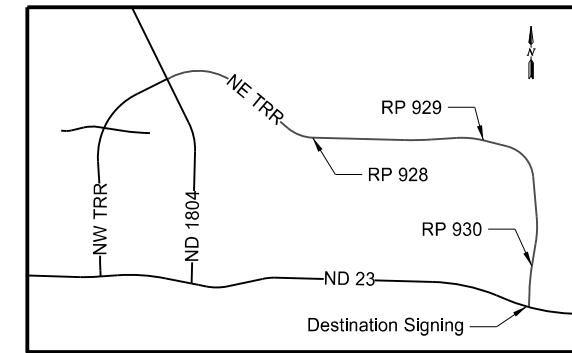
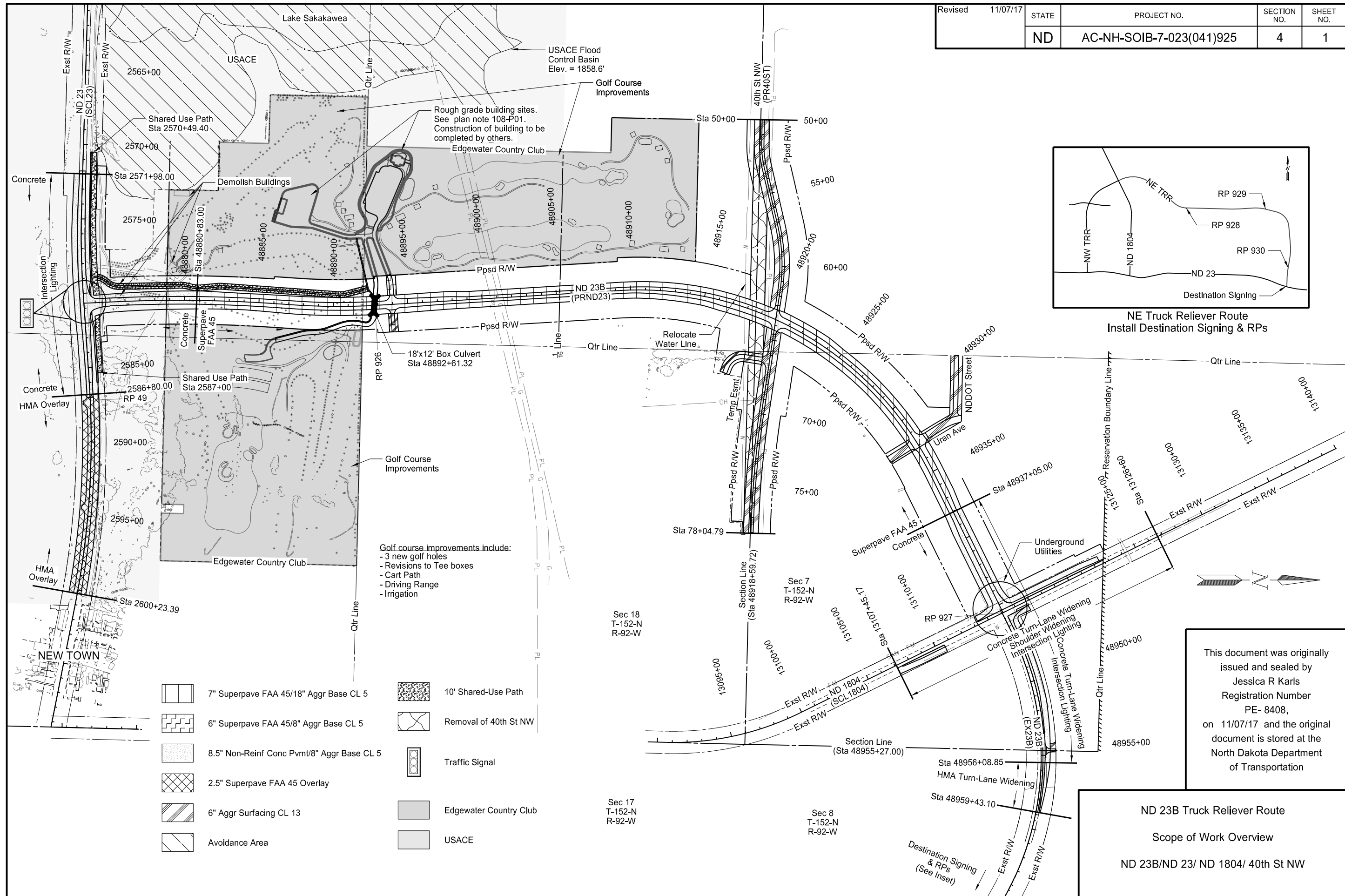
PLAN SECTIONS

Section	Page(s)	Description
1	1	Title Sheet
2	1 - 2	Table of Contents
4	1 - 5	Scope of Work
6	1 - 8	Notes
6	9	Environmental Notes
8	1	Quantities
10	1 - 3	Basis of Estimate
11	1 - 12	Data Tables
20	1 - 14	General Details
30	1 - 9	Typical Sections
40	1 - 9	Removals
50	1 - 2	Inlet and Manhole Summary
51	1 - 2	Allowable Pipe List
55	1	Drainage Layouts
60	1 - 21	Plan & Profile
70	1 - 2	Contours
75	1 - 4	Wetland Impacts
76	1 - 19	Temporary Erosion Control
77	1 - 13	Permanent Erosion Control
80	1 - 6	Fencing Layouts
81	1 - 9	Survey Coordinate and Curve Data
82	1 - 14	Survey Data Layouts
90	1 - 7	Paving Layouts
100	1 - 35	Work Zone Traffic Control
110	1 - 25	Signing
120	1 - 8	Pavement Marking
140	1 - 8	Lighting
150	1 - 10	Signals
170	1 - 9	Bridges and Box Culverts
195	1 - 8	Fort Berthold Rural Waterline
199	1 - 18	Golf Course Plans
200	1 - 194	Cross Sections

SPECIAL PROVISIONS

Number	Description
SP 003(14)	Temporary Erosion and Sediment Best Management Practices
SP 466(14)	Tribal Employment Rights Ordinance (TERO)
SP 505(14)	Golf Course
SP 509(14)	Migratory Bird Treaty Act and Threatened and Endangered Species Act Compliance
SP 511(14)	Machinery Hygiene
SP 513(14)	Construction Monitoring and Discovery Plan
SP 514(14)	Flexible Pavement Surface Tolerance
SP 515(14)	Removal of Buildings
SP 516(14)	Spill Prevention and Emergency Response
SP 5187(14)	Permits and Environmental Considerations
SP 557(14)	Fort Berthold Rural Waterline

Revised	11/07/17	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
		ND	AC-NH-SOIB-7-023(041)925	4	1

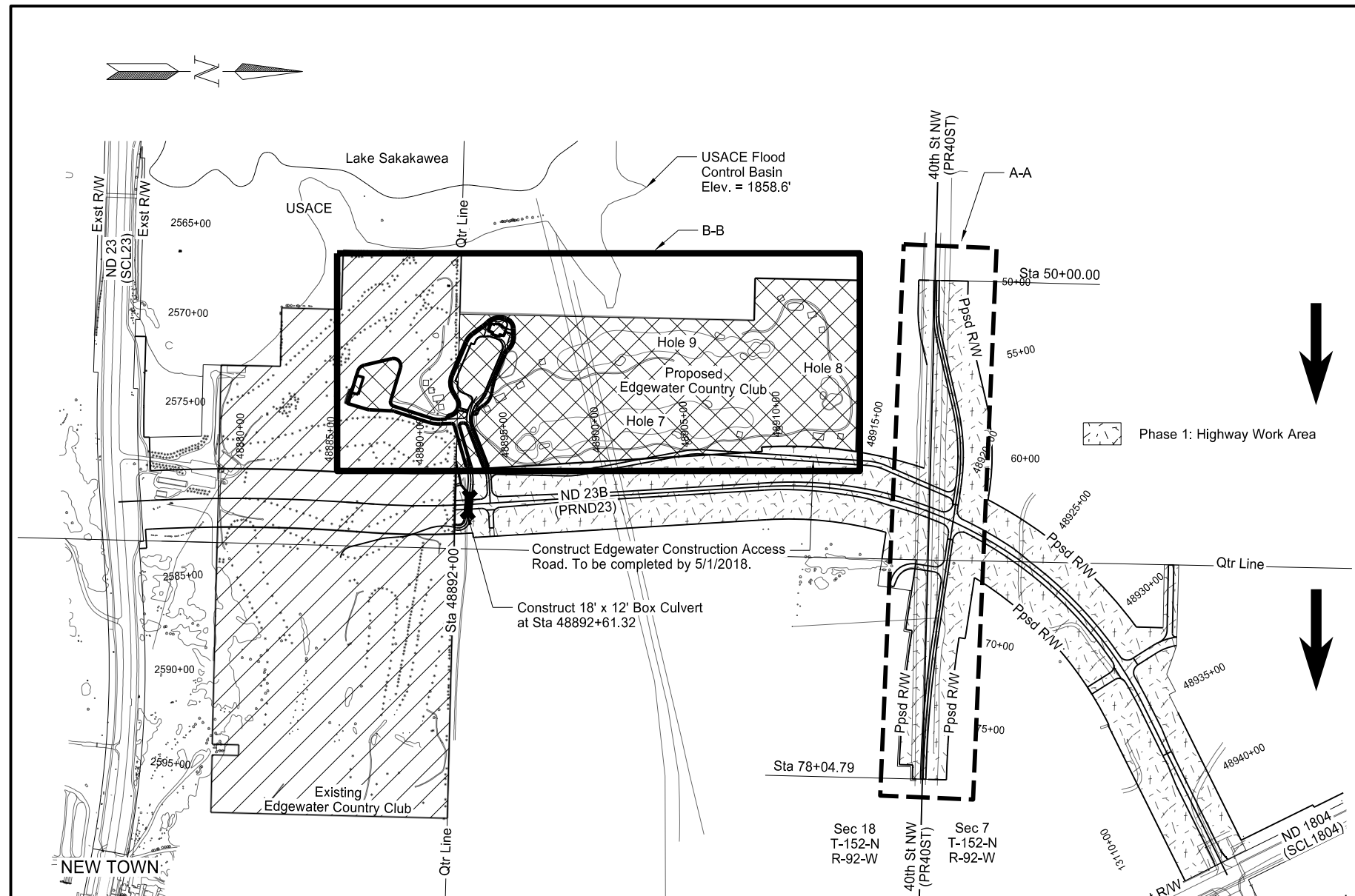


- | | | | |
|--|---|--|------------------------|
| | 7" Superpave FAA 45/18" Aggr Base CL 5 | | 10' Shared-Use Path |
| | 6" Superpave FAA 45/8" Aggr Base CL 5 | | Removal of 40th St NW |
| | 8.5" Non-Reinf Conc Pvm/8" Aggr Base CL 5 | | Traffic Signal |
| | 2.5" Superpave FAA 45 Overlay | | Edgewater Country Club |
| | 6" Aggr Surfacing CL 13 | | USACE |
| | Avoidance Area | | |

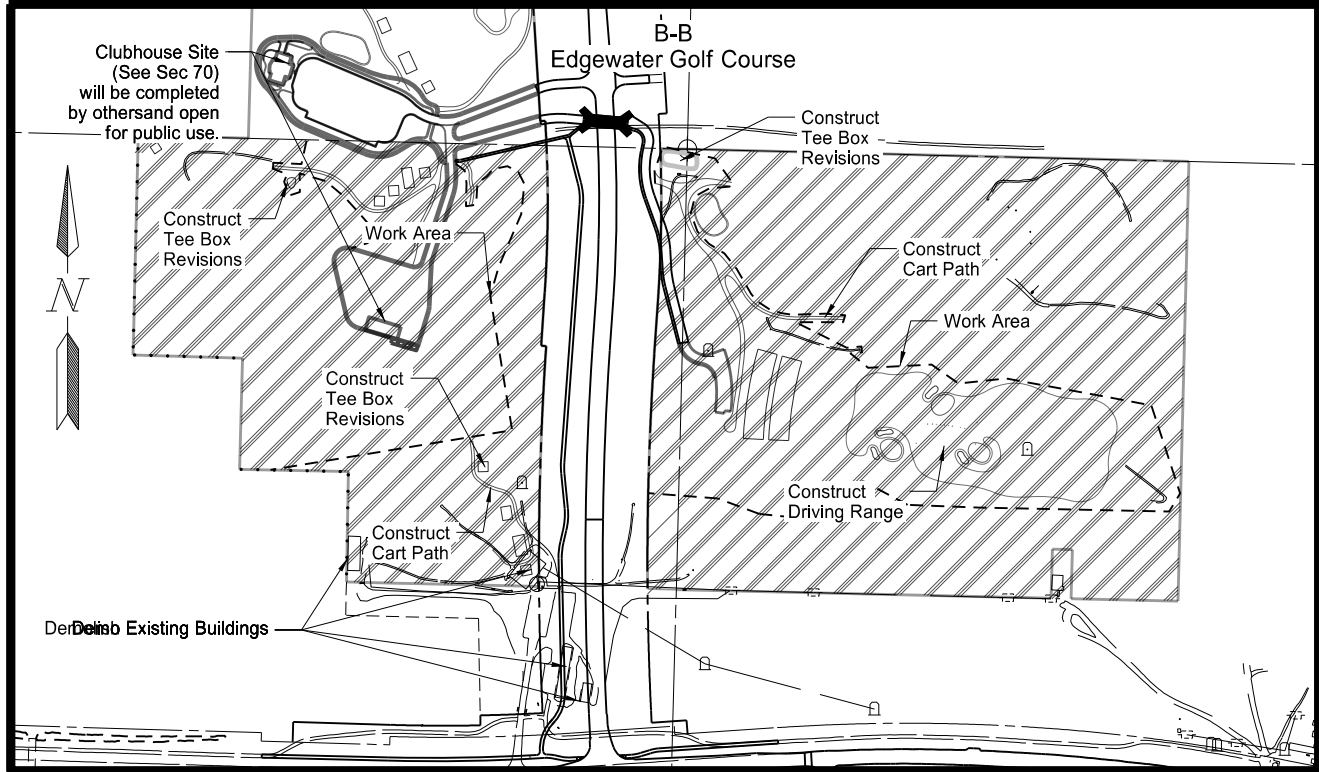
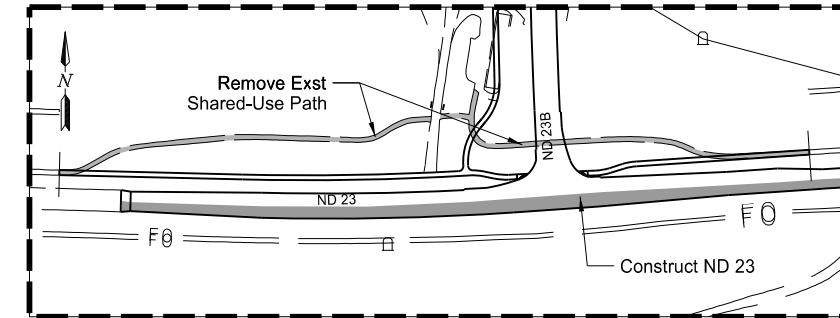
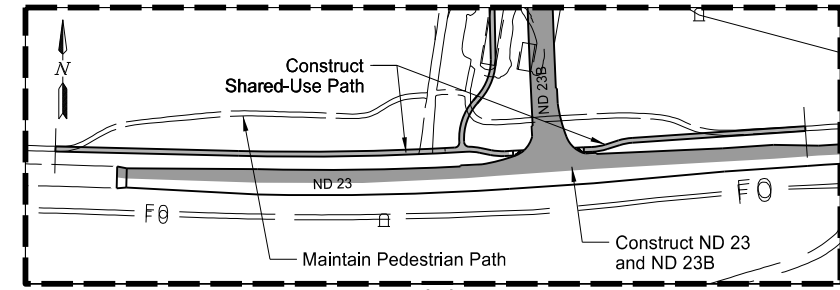
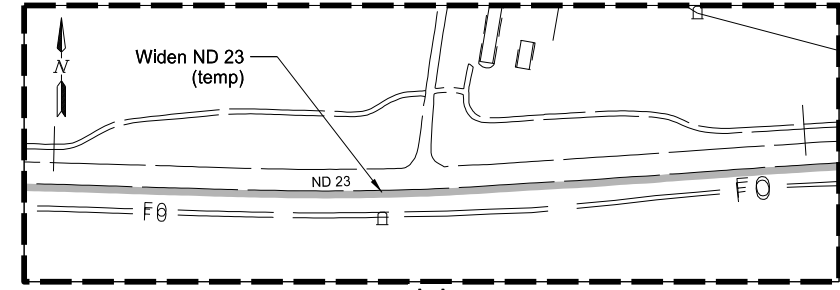
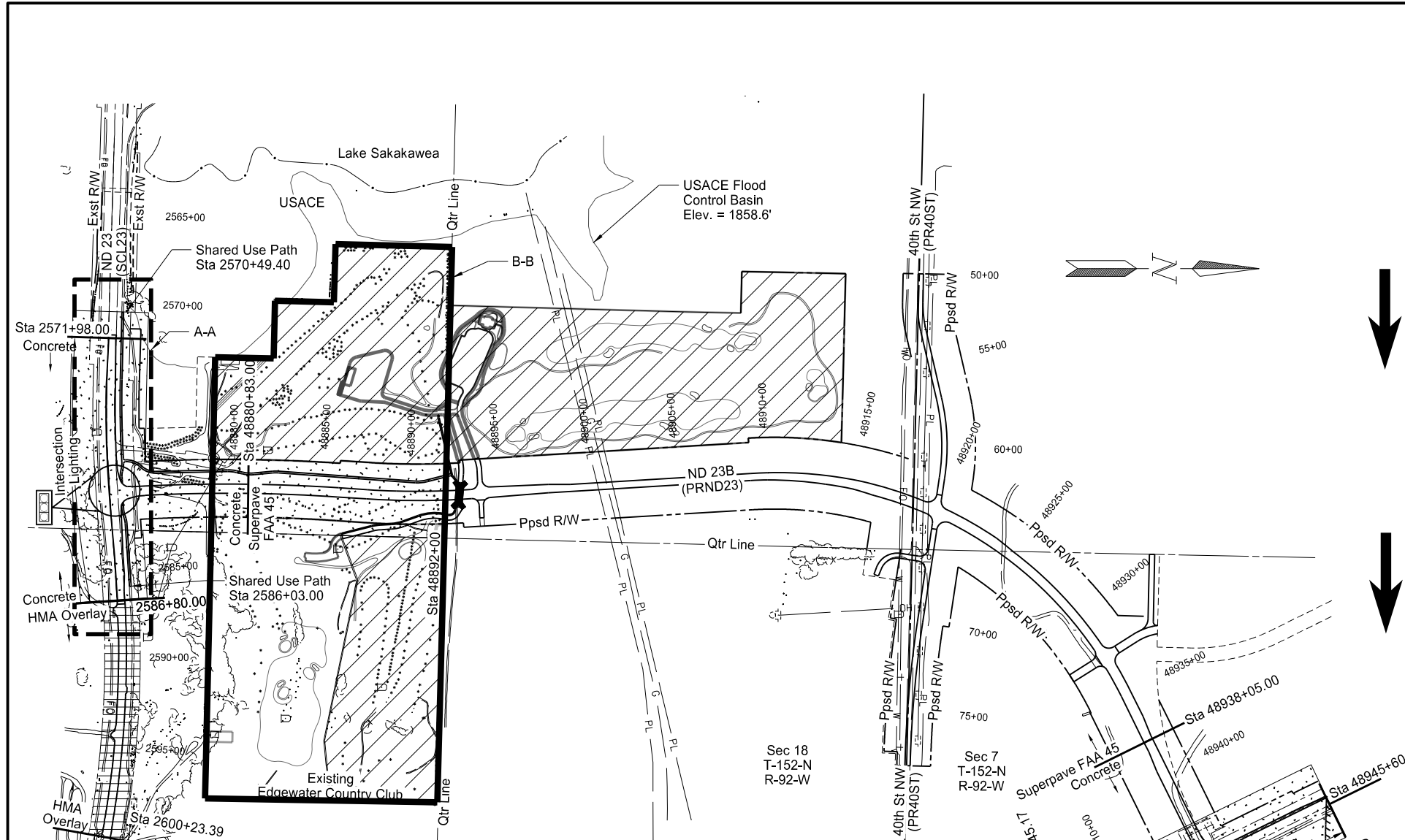
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 Registration Number
 PE- 8408,
 on 11/07/17 and the original document is stored at the
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 of Transportation

ND 23B Truck Reliever Route
 Scope of Work Overview
 ND 23B/ND 23/ ND 1804/ 40th St NW

Revised	11/07/17	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
		ND	AC-NH-SOIB-7-023(041)925	4	2



Revised	11/07/17	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
		ND	AC-NH-SOIB-7-023(041)925	4	3

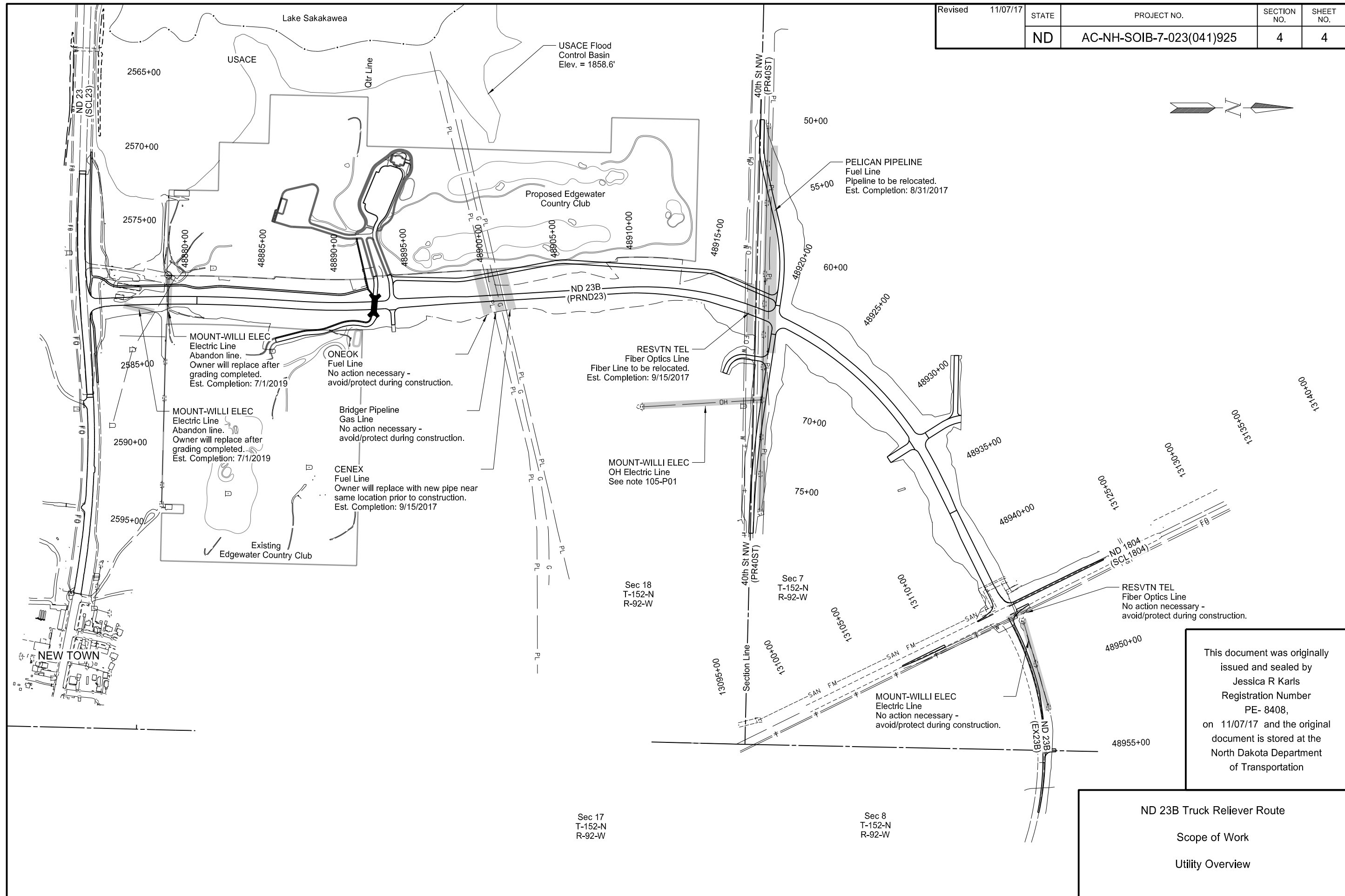


- Phase 1: Highway Work Area
- Phase 2: Golf Course Work Area (Driving Range to be completed by 8/5/2019)
- Phase 3: Highway Work Area
- Golf Course Open for play

This document was originally issued and sealed by Jessica R Karls, Registration Number PE- 8408, on 11/07/17 and the original document is stored at the North Dakota Department of Transportation.

ND 23B Truck Reliever Route
Scope of Work
Phase 2/Phase 3

Revised	11/07/17	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
		ND	AC-NH-SOIB-7-023(041)925	4	4



This document was originally issued and sealed by Jessica R Karls Registration Number PE- 8408, on 11/07/17 and the original document is stored at the North Dakota Department of Transportation

ND 23B Truck Reliever Route
Scope of Work
Utility Overview

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	AC-NH-SOIB-7-023(041)925	6	1

NOTES**GENERAL NOTES**

100-P01 COORDINATION OF PROJECTS: Project SOIB-7-023(056)925, PCN 21942 is in the vicinity of this project is under contract during the 2018-2019 construction season. The project consists of the clubhouse, cart storage, maintenance building and associated work. Construct the temporary access road and provide access at all times.

100-P02 LAKE SAKAKAWEA FLOOD CONTROL BASIN: Do not impact any areas below an elevation of 1,858.6 feet.

100-P03 LIMITED ACCESS: There are areas within this project that will not be available for the Contractor to access until a later date.

- Property owned by USACE along ND 23B from Sta. 48874+48 to Sta. 48878+79 and ND 23 from Sta. 2571+40 to Sta. 2583+34 (which includes existing ND 23). Anticipated access December 31, 2018.
- Edgewater Country Club (existing) from Sta. 48878+79 to Sta. 48892+00 until Edgewater Country Club is moved to the new Clubhouse and play has started on the three holes constructed in Phase 1 with the exception of the grading required for Project SOIB-7-023(056)925, PCN 21942. The existing pond is not to be used as a water source. Anticipated access June 1, 2019.
- ND 23B from Sta. 48918+75 to 48937+14. Anticipated access May 15, 2018. Existing stockpiles will be removed by others. Stockpiled material is not included in the earthwork quantities (refer to Section 60 for locations).

The Engineer will notify the Contractor if areas become available prior to the dates listed.

105-110 PAVEMENT SWEEPING: Sweep paved areas that were used by construction traffic before opening these areas to public traffic.

Sweep all newly constructed pavement no more than 24 hours before a scheduled final inspection.

Use a vacuum or pick-up type sweeper to perform this work.

105-200 UTILITY COORDINATION: A utility coordination meeting is required.

105-P01 UTILITY RELOCATION: Coordinate and phase grading work with Mountrail- Williams Electric Cooperative (MWE). There is an existing overhead line to the north along the proposed right of way for 40 Street NW. It is no longer in use. Contact MWE 14 business day prior to beginning work in the area.

107-100 LAWS TO BE OBSERVED: All or a portion of this project lies within the exterior boundaries of an Indian Reservation. Review laws and ordinances pertaining to the work contained within the boundaries of the reservation.

107-P01 MAINTAINING TRAFFIC –DROP-OFFS: If, at the end of the work-day, drop-offs greater than 2 inches and less than 18 inches or slopes steeper than 4:1 exist between the edge of a traffic lane and the outside edge of the proposed roadway, perform one of the following actions:

- Construct a traversable wedge in the area of the drop-off or steep slope; or
- Close the lane adjacent to the drop-off or steep slope and provide 24-hour flagging or pilot car operations.

When constructing a wedge, construct a wedge composed of aggregate or earthen materials with a 4:1 or flatter slope along the entire length of the area. Compact materials using Type C compaction, as specified in 203.04 E.4, "Compaction Control Type C".

Install stackable vertical panels that meet the requirements of Section 704.03 H, "Stackable Vertical Panels", along the edge of the driving lane closest to the wedge.

The Engineer will measure stackable vertical panels as specified in Section 704.05, "Method of Measurement" and will pay for panels as specified in Section 704.06, "Basis of Payment".

The Engineer will not measure material used to construct the wedge. Include the cost of materials, equipment, labor, and incidentals required for this operation in the price bid for aggregate pay items.

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If a 4:1 or flatter wedge is not installed, provide 24 hour flagging or pilot car operations and associated traffic control at no additional cost to the Department.

The requirements of Section 704.04 O, "Traffic Control for Uneven Pavement" apply to drop-offs created by milling or the placement of hot mix asphalt.

107-P02 **GOLF COURSE ACCESS:** Provide and maintain access to Edgewater Country Club until the project is complete. In addition to the safety fence provided in Section 100 a quantity of 500 linear feet to use as needed. The safety fence is to be used to delineate areas not open to the public. Coordinate with the Engineer and Edgewater Country Club to maintain access.

107-P03 **GRAVEL PIT ACCESS:** Gravel pit operations will be crossing ND 23B during construction. Coordinate with the Engineer and Eagle Rock Timber (gravel pit) to maintain access. Provide and maintain temporary approaches and crossing at approximately Station 48932+50 to the gravel pit located between Sta. 48918+75 to Sta. 48937+14 on ND 23B. Delineate the crossing location with safety fence. Once Uran Ave (on both sides of ND 23B) and NDDOT Street are completed remove the temporary approaches. Contact Eagle Rock Timber 7 business days prior to modifying access. Include all costs associated with constructing, maintaining and removing in the bid price for "Temporary Access."

Contact Information for Eagle Rock Timber:

Rick Gokey

Phone Number: (208) 529-4925

Email: rgokey@eaglerocktimber.com

108-100 **WEEKLY PLANNING & REPORTING MEETING:** A weekly planning and reporting meeting is required.

108-500 **TERO COORDINATION:** Invite the Tribal TERO Office to the Preconstruction Conference.

108-P01 **LIQUIDATED DAMAGES FOR FAILURE TO MEET REQUIRED MILESTONE DATES:** The following daily rates will be assessed to the Contractor to cover additional project costs, inconvenience to the public, as well as, additional expenses to the Contractor for Project SOIB-7-023(056)925, PCN 21942.

- \$15,000 per calendar day for failure to complete Phase 1a (refer to plan note 108-P02) by May 19, 2018.
- \$5,000 per calendar day for failure to complete the items below by the dates listed.
 - August 4, 2018
 - Phase 1b (refer to plan note 108-P02)
 - November 17, 2018
 - Phase 1c (refer to plan note 108-P02)
 - August 3, 2019
 - Phase 2a (refer to plan note 108-P02)

With the exception of the grass maturation as specified in SP 505(14), the Contractor will be assessed \$5,000 per calendar day for failure to meet the final completion date of October 12, 2019.

108-P02 **PROJECT PHASING:** The traffic control details, as indicated in Section 100, have been developed on the basis that this project will be constructed in three phases. Multiple construction phases may be constructed concurrently, with approval of the Engineer. Refer to Section 4 for an overview of construction phasing.

Phase 1:

- Phase 1a
 - Grade the proposed clubhouse site within 6 inches of the finished surface (refer to plan note 203-P02 and Section 70).
 - Complete the temporary construction access road for the clubhouse site. Maintain access to the proposed clubhouse site (refer to Section 100).
- Phase 1b
 - Complete the golf course north of the existing golf course including holes 7, 8 and 9, cart paths and the practice putting green (refer to SP 505(14) and Section 199).
- Phase 1c
 - Complete the construction for 40th St NW temporary roadway, maintain traffic on existing 40th St NW until the temporary roadway has been built. Relocate the waterline.
 - Complete the construction of 40th St NW while maintaining traffic on the temporary roadway, remove temporary roadway once 40th St NW has been completed.
 - Complete construction of ND 23B from Sta. 48892+00 to Sta. 48945+60. The top 2" of HMA will be placed after phase 2 has been completed. Remove the temporary construction access road. Maintain traffic on ND 23B to the clubhouse project. Install the Box Culvert and construct road to driving range and sidewalk within the highway site north of the Edgewater Country Club (See Section 4, Sheet 5).

Edgewater Country Club will move to their new location upon the completion of the new clubhouse, constructed by others in 2018-2019.

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Phase 2:

- Phase 2a
 - Complete the golf course features within the existing golf course (refer to SP 505(14) and Section 199).
 - Demolish existing buildings once Edgewater Country Club has been moved to their new location.
 - Maintain access and playability for pedestrians and golfers. Coordinate with the Engineer and Edgewater Country Club.
 - Remove and/or reset misc. golf course items as needed.
- Phase 2b
 - Complete construction of ND 1804 (Sta. 13107+45 to Sta. 13126+60)
 - Complete construction of ND 23B east of ND 1804 (Sta. 48945+60 to Sta. 48959+43)
 - Complete construction of ND 23 and shared use path. Maintain pedestrian access. (Sta. 2570+49 to Sta. 2586+80)
 - Complete construction of the shared use path to the proposed clubhouse.
 - Complete construction of ND 23B including final lift of HMA.

Phase 3:

- Overlay ND 23 from Sta. 2586+25 to Sta. 2600+23.39

- 203-385 AVERAGE HAUL: No average haul has been computed for this project.
- 203-P01 COMMON EXCAVATION-TYPE A: Excess excavation is to become property of the contractor. Include the cost to remove excess excavation from the project in the unit price bid for "Common Excavation-Type A".
- 203-P02 COMPACTION CONTROL: Compact all fill areas within Golf Course Site (See Section 4, Sheet 5) as Compaction Control Type C as specified in Section 203.04 E4.
- 203-P03 TOPSOIL DEPTH: Strip topsoil to its full depth except for the area within golf course site (see Section 4, Sheet 5). For estimated topsoil depths refer to Section 10.
- 203-P04 GOLF COURSE TOPSOIL: Remove topsoil within the golf course site to a depth of 6 inches. Spread topsoil uniformly throughout the golf course site (see Section 4, Sheet 5) as specified in Section 199 and/or SP 505(14). Quantities for topsoil within the golf course site are not included in the "Topsoil" bid item. Include the cost to strip, place and grade topsoil in the unit price for "Golf Course".

251-P01 SEEDING CLASS III:

Seed all disturbed areas along the proposed or existing golf course with Class III Seeding. The seed mix and application shall be as follows:

- | | |
|------------|--|
| 9 lbs/acre | Blue Grama Grass (<i>Bouteloua gracilis</i>) |
| 3 lbs/acre | Buffalo Grass |
| 1 lbs/acre | Little Bluestem (<i>Andropogon scoparius</i>) |
| 1 lbs/acre | Side Oats Grama (<i>Bouteloua curtipendla</i>) |
| 1 lbs/acre | June Grass |

302-110 BASE COURSE: Trim base course as specified in Section 302.04 C.1, "Surface Tolerance Type B."

430-100 HMA LONGITUDINAL JOINTS: Construct the joints within the final lift of pavement as detailed within this note.

Place a longitudinal joint at the centerline of the roadway.

Construct each lane and the adjoining shoulder using a single pass or a hot seam.

A hot seam is defined as follows:

- Constructed using two pavers simultaneously;
- No more than 300 feet between pavers; and
- Roll the seam between paver passes in a manner such that the seam is not visible

704-255 TRAFFIC CONTROL FOR SHOULDER DROP-OFF: If the shoulder and adjacent driving lane are not even at the end of the day, the following criteria will apply:

Place the following sign assembly at the locations listed below.

Sign Assembly: Sign No. W8-9a-48 "Shoulder Drop Off" and supplemental plate Sign No. W20-52-54 to identify the distance.

Locations:

- In advance of the drop off;
- Spaced at each mile from the advance sign; and
- At major intersections (CMC routes, state and US highways, and Interstate Ramps).

If the difference in elevation between the shoulder and the driving lane is 2" or greater, construct a slough on the driving lane that is 4:1 or flatter.

If the difference in elevation between the shoulder and driving lane is less than 2", no slough is required.

Sign assemblies will be measured and paid for according to Section 704 "Temporary Traffic Control".

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Estimate of Quantities

SPEC	CODE	ITEM DESCRIPTION	UNIT	TOTAL
103	0100	CONTRACT BOND	L SUM	1
103	0200	ESCROW OF BID DOCUMENTATION	L SUM	1
201	0330	CLEARING & GRUBBING	L SUM	1
201	0380	REMOVAL OF TREES 18IN	EA	244
201	0390	REMOVAL OF TREES 30IN	EA	22
202	0136	REMOVAL OF PAVEMENT	TON	12,579
202	0174	REMOVAL OF PIPE ALL TYPES AND SIZES	LF	257
202	0279	REMOVAL OF BUILDINGS-SITE 3	L SUM	1
202	0281	REMOVAL OF BUILDINGS-SITE 1	L SUM	1
202	0282	REMOVAL OF BUILDINGS-SITE 2	L SUM	1
202	0312	REMOVE EXISTING FENCE	LF	8,953
203	0101	COMMON EXCAVATION-TYPE A	CY	678,962
203	0109	TOPSOIL	CY	54,915
203	0140	BORROW-EXCAVATION	CY	42,176
210	0050	BOX CULVERT EXCAVATION	EA	1
210	0210	FOUNDATION FILL	CY	2,441
210	0405	FOUNDATION PREPARATION-BOX CULVERT	EA	1
216	0100	WATER	M GAL	8,104
230	0165	SUBGRADE PREPARATION-TYPE A-12IN	STA	70.20
251	0200	SEEDING CLASS II	ACRE	46.05
251	0300	SEEDING CLASS III	ACRE	21.39
251	2000	TEMPORARY COVER CROP	ACRE	66.15
253	0101	STRAW MULCH	ACRE	112.20
253	0201	HYDRAULIC MULCH	ACRE	21.39
253	0301	BONDED FIBER MATRIX	ACRE	66.27
255	0103	ECB TYPE 3	SY	833
256	0300	RIPRAP GRADE III	CY	95
256	0600	RIPRAP-SALVAGED	CY	62
260	0200	SILT FENCE SUPPORTED	LF	5,834
260	0201	REMOVE SILT FENCE SUPPORTED	LF	5,834
261	0112	FIBER ROLLS 12IN	LF	55,669
261	0113	REMOVE FIBER ROLLS 12IN	LF	35,057
261	0120	FIBER ROLLS 20IN	LF	15,392
261	0121	REMOVE FIBER ROLLS 20IN	LF	7,872
302	0120	AGGREGATE BASE COURSE CL 5	TON	50,482
302	0356	AGGREGATE SURFACE COURSE CL 13	TON	11,461
401	0050	TACK COAT	GAL	7,234
401	0060	PRIME COAT	GAL	12,473
401	0160	BLOTTER MATERIAL CL 44	TON	214
411	0105	MILLING PAVEMENT SURFACE	SY	103
430	0045	SUPERPAVE FAA 45	TON	15,719
430	1000	CORED SAMPLE	EA	82
430	5803	PG 58S-28 ASPHALT CEMENT	TON	392
430	5818	PG 58H-34 ASPHALT CEMENT	TON	552
550	0302	8.5IN NON-REINF CONCRETE PVMT CL AE-DOWELED	SY	21,241
602	1131	CLASS AE-3 CONCRETE-BOX CULVERT	CY	296.7
612	0114	REINFORCING STEEL-GRADE 60-BOX CULVERT	LBS	63,116
702	0100	MOBILIZATION	L SUM	1
704	0100	FLAGGING	MHR	3,590
704	1000	TRAFFIC CONTROL SIGNS	UNIT	4,735
704	1052	TYPE III BARRICADE	EA	37
704	1060	DELINEATOR DRUMS	EA	328
704	1067	TUBULAR MARKERS	EA	153
704	1080	STACKABLE VERTICAL PANELS	EA	106
704	1086	SEQUENCING ARROW PANEL-TYPE B	EA	1
704	1185	PILOT CAR	HR	120
704	1500	OBLITERATION OF PAVEMENT MARKING	SF	8,941
706	0400	FIELD OFFICE	EA	1
706	0500	AGGREGATE LABORATORY	EA	1
706	0550	BITUMINOUS LABORATORY	EA	1

SPEC	CODE	ITEM DESCRIPTION	UNIT	TOTAL
706	0600	CONTRACTOR'S LABORATORY	EA	1
709	0100	GEOSYNTHETIC MATERIAL TYPE G	SY	321
709	0151	GEOSYNTHETIC MATERIAL TYPE R1	SY	5,347
709	0155	GEOSYNTHETIC MATERIAL TYPE RR	SY	257
714	4099	PIPE CONDUIT 18IN-APPROACH	LF	372
714	4106	PIPE CONDUIT 24IN-APPROACH	LF	254
714	4110	PIPE CONDUIT 30IN	LF	518
714	4113	PIPE CONDUIT 30IN-APPROACH	LF	122
714	4115	PIPE CONDUIT 36IN	LF	312
714	4120	PIPE CONDUIT 42IN	LF	1,086
714	5015	PIPE CORR STEEL .064IN 18IN	LF	64
714	5041	PIPE CORR STEEL .064IN 30IN POLYMERIC COATED	LF	14
714	5051	PIPE CORR STEEL .064IN 42IN POLYMERIC COATED	LF	76
714	5056	PIPE CORR STEEL .064IN 48IN POLYMERIC COATED	LF	6
714	9660	REMOVE & RELAY END SECTION-ALL TYPE & SIZES	EA	6
720	0110	RIGHT OF WAY MARKERS	EA	82
720	0125	ALIGNMENT MONUMENTS	EA	30
720	0130	IRON PIN R/W MONUMENTS	EA	68
720	0135	IRON PIN REFERENCE MONUMENTS	EA	14
722	0120	MANHOLE 72IN	EA	1
722	1120	MANHOLE RISER 72IN	LF	10.8
722	3300	SANITARY MANHOLE REPAIR	EA	3
722	4010	INLET CATCH BASIN 6IN BEEHIVE	EA	1
722	6140	ADJUST GATE VALVE BOX	EA	4
722	6200	ADJUST MANHOLE	EA	1
724	0427	ADJUST HYDRANT	EA	1
724	0891	WATERMAIN MODIFICATIONS	L SUM	1
744	0050	INSULATION BOARD	CF	234
750	0115	SIDEWALK CONCRETE 4IN	SY	564
750	0140	SIDEWALK CONCRETE 6IN	SY	105
750	2115	DETECTABLE WARNING PANELS	SF	50
752	0110	FENCE BARBED WIRE 3 STRAND-STEEL POST	LF	1,488
752	0201	FENCE SMOOTH WIRE 4 STRAND	LF	9,661
752	0911	TEMPORARY SAFETY FENCE	LF	4,738
752	0993	FENCE TERMINAL	EA	5
752	2100	VEHICLE GATE	EA	3
752	2120	REMOVE VEHICLE GATE	EA	2
752	3140	CORNER ASSEMBLY BARBED WIRE	EA	29
752	4100	DOUBLE BRACE ASSEMBLY BARBED WIRE	EA	1
754	0110	FLAT SHEET FOR SIGNS-TYPE XI REFL SHEETING	SF	393.1
754	0112	FLAT SHEET FOR SIGNS-TYPE IV REFL SHEETING	SF	546.0
754	0206	STEEL GALV POSTS-TELESCOPING PERFORATED TUBE	LF	1,492.1
754	0563	REFERENCE MARKER-TYPE C	EA	6
754	0805	OBJECT MARKERS - CULVERTS	EA	28
762	0112	EPOXY PVMT MK MESSAGE	SF	960
762	0113	EPOXY PVMT MK 4IN LINE	LF	60,456
762	0114	EPOXY PVMT MK 6IN LINE	LF	240
762	0115	EPOXY PVMT MK 8IN LINE	LF	8,842
762	0117	EPOXY PVMT MK 24IN LINE	LF	240
762	0420	SHORT TERM 4IN LINE-TYPE R	LF	30,480
770	0003	LIGHTING SYSTEM A	EA	1
770	0004	LIGHTING SYSTEM B	EA	1
770	0005	LIGHTING SYSTEM C	EA	1
772	9811	TRAFFIC SIGNAL SYSTEM - SITE 1	EA	1
902	0400	MACHINE HYGIENE	L SUM	1
920	1241	BIOLOGIST	L SUM	1
970	0300	BENCH	EA	3
970	0700	GOLF COURSE	L SUM	1
990	0230	TEMPORARY ACCESS	L SUM	1
990	0400	PIPE CLEANOUT	EA	4

ND 23B Truck Reliever Route
Estimate of Quantities

LOCATION	EARTHWORK SUMMARY				TOPSOIL SUMMARY	TOPSOIL SUMMARY
	203 0101 COMMON EXCAVATION- TYPE A	Embankment ^{1,2}	Excess Excavation	203 0140 BORROW EXCAVATION	203 109 TOPSOIL	GOLF COURSE TOPSOIL
	A (CY)	B (CY)	C=A-B (CY)	D=B-A (CY)	(CY)	(CY)
Phase 1 ND23B/40th St NW/Access Road						
Sta 50+00 to Sta 78+04.79 (40th St NW Phase A: Temporary Roadway)	41,616	12,931	28,685	-	7,509	-
Sta 50+00 to Sta 78+04.79 (40th St NW Phase B: Proposed 40th St NW)	45,907 ⁸	21,278	24,629 ⁸	-	1,882	-
Sta 50+00 to Sta 78+04.79 (40th St NW Phase C: Remove Temp Roadway)	13,893	7,116	6,777	-	998	-
Sta. 10+00 to Sta. 38+17 (Construction Access Road)	8,264	37,743 ⁴	-29,479	-	4,794	-
Sta. 48892+00 to Sta. 48945+60 (ND 23B)	334,020 ³	302,976	31,044	-	25,448	-
<i>Phase 1 Roadway Grading Subtotals</i>	443,700	382,044	61,656	-	40,631	-
Sta. 48892+00 to Sta. 48914+00 Golf Course Grading	22,001	123,561 ⁴	-101,560	-	-	43,505 ⁷
<i>Phase 1 Edgewater Country Club Subtotals</i>	22,001	123,561	-101,560	-	-	43,505 ⁷
Phase 1 Totals	465,701	505,605	-	39,904	40,631	43,505⁷
Phase 2 (North) ND1804/ND23B						
Sta. 13107+45.17 to Sta. 13126+60.00 (ND 1804)	1,450	1,336	114 ⁵	-	800	-
Sta. 48945+60 to Sta. 48959+43.10 (ND 23B)	729	3,001	-	2,272	1,078	-
Phase 2 (North) Totals	2,179	4,337	114⁵	2,272	1,878	-
Phase 2 (South) ND 23/ND23B						
Sta. 2570+49.46 to Sta. 2586+05 (ND 23 Phase A: Temp Widening)	51	171 ⁴	-120	-	200	-
Sta. 2570+49.46 to Sta. 2586+05 (ND 23 Phase B: Construct Shared-Use Path)	792	5,150 ⁴	-4,358	-	1,354	-
Sta. 2570+49.46 to Sta. 2586+05 (ND 23 Phase C: Remove Shared Use Path)	6,813	12	6,801	-	1,846	-
Sta. 48873+23.45 to Sta. 48892+26 (ND 23B)	44,215	92,438 ⁴	-48,223	-	7,827	-
Sta. 10+65.83 to Sta. 20+40.58 (Driving Range Road)	18,019	5,534	12,485	-	1,179	-
<i>Phase 2 (South) Roadway Subtotals</i>	69,890	103,305	-33,415	-	12,406	-
Sta. 48875+00 to Sta. 48892+26 Golf Course Grading	141,192	53,583	87,609	-	-	17,114 ⁷
<i>Phase 2 Edgewater Country Club Subtotals</i>	141,192	53,583	87,609	-	-	17,114 ⁷
Phase 2 (South) Totals	211,082	156,888	54,194	-	12,406	17,114⁷
Grand Totals	678,962	666,830	54,308	42,176	54,915	60,619

Notes:

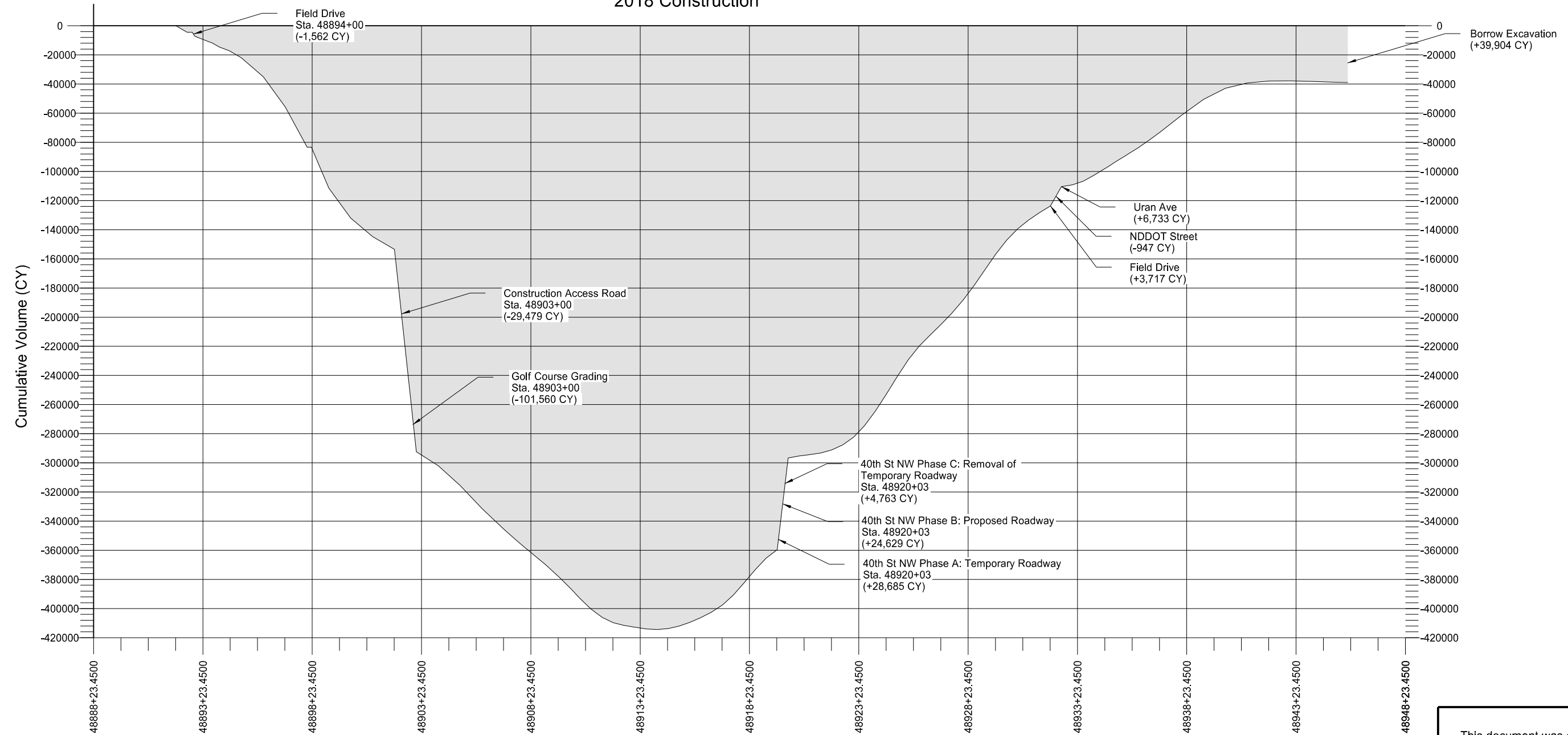
1. Additional 25% volume included for shrinkage.
2. Compact all fill areas within the Golf Course Site as Compaction Control Type C. See Section 4 Sheet 5.
3. Includes earthwork required to remove the Construction Access Road.
4. Obtain material needed to construct the embankment from excess excavation.
5. Waste excess material on the inslopes.
6. The aggregate surfacing from temporary roadways has been included in embankment quantities for removal. Include the cost to remove aggregate base from temporary roadways in the bid price for "Common Excavation-Type A".
7. Include the cost to strip, remove and replace topsoil in the pay limits of Edgewater Country Club in the bid price for "Golf Course". This quantity does not include specialty topsoil for the root zone.
8. Includes 2625 CY to remove existing 40th St NW.
9. Refer to Section 6 plan note 100-P03 for restricted access and plan note 108-P02 for project phasing.

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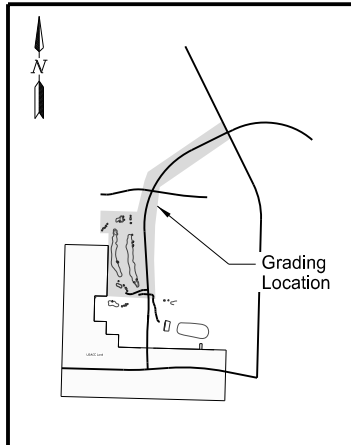
ND 23B Truck Reliever Route
Earthwork Summary

ND 23B Phase 1 Mass Haul Diagram 2018 Construction

Revised	10/27/17	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
		ND	AC-NH-SOIB-7-023(041)925	11	2



EMBANKMENT =	505,605.00
EXCAVATION =	465,701.00
BORROW =	39,904.00



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ND 23B Truck Reliever Route

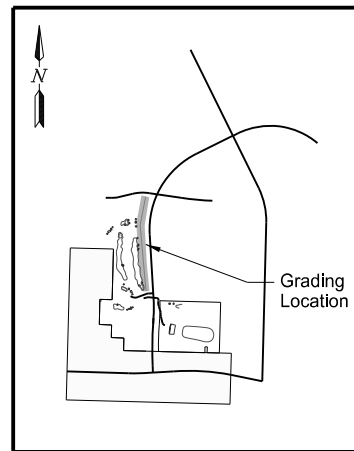
Mass Haul Diagram

Phase 1
2018 Construction

Construction Access Road

Table 1 of 1

STATION	END AREA (SF)		ADJUSTED VOLUME (CY)		
	EXC	FILL	EXC	FILL	MASS
10+00.00	5.43	5.33	29479	0	29479
11+00.00	0.00	158.43	10	379	29110
12+00.00	0.00	448.37	0	1405	27705
13+00.00	0.00	915.02	0	3156	24549
14+00.00	0.00	1680.30	0	6008	18542
14+49.00	0.00	1539.48	0	0	18542
15+00.00	0.00	1228.97	0	6734	11807
16+00.00	0.00	181.72	0	3266	8542
17+00.00	0.00	101.11	0	655	7887
18+00.00	0.00	140.13	0	558	7329
19+00.00	0.00	197.36	0	781	6547
20+00.00	0.00	93.13	0	672	5875
21+00.00	0.00	92.57	0	430	5445
22+00.00	0.00	264.70	0	827	4618
23+00.00	0.00	276.61	0	1253	3365
24+00.00	0.00	184.13	0	1067	2298
25+00.00	0.00	201.79	0	893	1405
26+00.00	0.00	158.13	0	833	572
26+19.05					0
27+00.00	0.00	462.31	0	1436	-864
28+00.00	0.00	503.35	0	2235	-3100
29+00.00	0.00	381.38	0	2048	-5148
30+00.00	0.00	342.39	0	1675	-6823
31+00.00	8.54	114.09	16	1057	-7864
32+00.00	114.08	2.77	227	271	-7907
33+00.00	110.02	3.86	415	15	-7508
34+00.00	222.58	12.84	616	39	-6930
35+00.00	921.02	2.83	2118	36	-4849
36+00.00	1054.18	2.11	3658	11	-1202
36+48.31	292.60	0.00	1205	2	0



ND 23B Phase 1

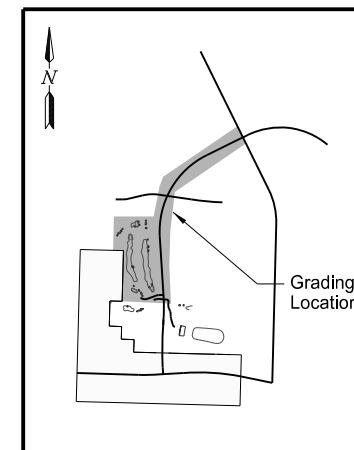
Table 1 of 2

STATION	END AREA (SF)		ADJUSTED VOLUME (CY)		ADDED VOLUME (CY)		
	EXC	FILL	EXC	FILL	EXC	FILL	MASS
48892+00.00	80.77	1885.92	0	0	0	0	0
48892+50.00	0.00	1931.26	75	4418	0	0	-4343
48892+50.90	0.00	1930.31	0	80	0	0	-4424
48892+75.00	0.00	1480.64	0	0	0	0	-4424
48892+85.34	171.88	1515.49	110	2747	0	0	-7061
48893+00.00	380.70	1644.12	150	1072	0	0	-7983
48893+50.00	26.49	1216.67	377	3311	0	0	-10917
48893+65.70	2.09	1034.80	8	818	0	0	-11727
48894+00.00	0.00	665.82	1	1350	0	1562	-14638
48894+46.06	414.19	2176.07	353	3030	0	0	-17315
48895+00.00	661.26	2535.54	1074	5883	0	0	-22124
48896+00.00	147.30	3710.68	1497	14459	0	0	-35085
48897+00.00	154.37	5432.10	559	21164	0	0	-55691
48898+00.00	276.68	6868.62	798	28474	0	0	-83366
48899+00.00	307.06	5750.46	1081	29211	0	0	-111496
48900+00.00	134.23	3469.64	817	21343	0	0	-132022
48901+00.00	0.00	2132.45	249	12968	0	0	-144741
48902+00.00	0.00	1654.43	0	8766	0	0	-153507
48903+00.00	0.00	1732.15	0	7839	0	131039	-292385
48904+00.00	0.00	2383.26	0	9526	0	0	-301911
48905+00.00	0.00	3499.01	0	13616	0	0	-315528
48906+00.00	0.00	3312.87	0	15768	0	0	-331296
48907+00.00	25.20	2865.55	47	14302	0	0	-345551
48907+25.44	0.00	2868.33	12	3377	0	0	-348916
48907+50.00	0.00	2875.25	0	3265	0	0	-352181
48908+00.00	9.90	2675.15	9	6424	0	0	-358596
48908+05.79	15.74	2671.56	3	717	0	0	-359310
48908+50.00	21.07	2695.15	30	5492	0	0	-364772
48908+75.00	38.86	2765.78	28	3160	0	0	-367905
48908+86.15	59.57	2786.48	20	1433	0	0	-369317
48909+00.00	41.16	2841.34	26	1804	0	0	-371096
48909+50.00	0.00	3135.53	38	6918	0	0	-377975
48909+81.81	0.01	3255.73	0	4706	0	0	-382682
48910+00.00	2.92	3310.20	1	2765	0	0	-385445
48910+22.00	4.08	3460.58	3	3448	0	0	-388891
48910+25.00	3.54	3461.58	0	481	0	0	-389371
48910+50.00	0.00	3351.17	2	3943	0	0	-393312
48911+00.00	49.61	2914.87	46	7252	0	0	-400518
48911+50.00	267.63	2123.81	294	5832	0	0	-406056
48912+00.00	381.52	1500.17	601	4194	0	0	-409650
48912+50.00	734.06	1034.45	1033	2934	0	0	-411550
48913+00.00	35.22	673.68	712	1977	0	0	-412815
48913+50.00	3.61	373.31	36	1212	0	0	-413991
48914+00.00	171.71	98.54	162	546	0	0	-414375
48914+50.00	611.28	0.39	725	114	0	0	-413764
48915+00.00	1248.30	16.80	1722	20	0	0	-412062
48915+50.00	1706.30	98.68	2736	134	0	0	-409460
48916+00.00	1909.61	59.89	3348	184	0	0	-406295
48916+50.00	2358.21	35.34	3952	110	0	0	-402454
48917+00.00	3119.59	63.39	5072	114	0	0	-397496
48917+50.00	4419.05	77.01	6980	163	0	0	-390679
48918+00.00	5289.59	237.19	8989	364	0	0	-382053
48918+50.00	4856.23	270.07	9394	587	0	0	-373246
48919+00.00	4069.86	1.66	8265	314	0	0	-365295
48919+50.00	2101.33	0.00	5714	2	0	0	-359583
48920+00.00	936.74	0.00	2813	0	60091	0	-296679
48920+50.00	601.91	5.45	1425	6	0	0	-295261
48921+00.00	575.23	120.17	1090	145	0	0	-294316
48921+50.00	810.24	41.88	1283	188	0	0	-293221
48922+00.00	1478.10	4.53	2119	54	0	0	-291156
48922+50.00	2252.91	0.99	3455	6	0	0	-287707
48923+00.00	3536.58	0.93	5361	2	0	0	-282349
48923+50.00	4974.74	0.66	7881	2	0	0	-274470

ND 23B Phase 1

Table 2 of 2

STATION	END AREA (SF)		ADJUSTED VOLUME (CY)		ADDED VOLUME (CY)		
	EXC	FILL	EXC	FILL	EXC	FILL	MASS
48924+00.00	5950.32	0.96	10116	2	0	0	-264356
48924+50.00	6555.71	0.30	11580	1	0	0	-252778
48925+00.00	6557.28	0.52	12142	1	0	0	-240637
48925+50.00	5771.50	0.00	11416	1	0	0	-229222
48926+00.00	4345.95	0.00	9368	0	0	0	-219854
48926+50.00	3887.48	0.00	7624	0	0	0	-212231
48927+00.00	3993.68	0.00	7297	0	0	0	-204933
48927+50.00	4472.93	0.00	7839	0	0	0	-197094
48928+00.00	4891.58	0.00	8671	0	0	0	-188423
48928+50.00	5811.18	0.00	9910	0	0	0	-178513
48929+00.00	6033.11	0.00	10967	0	0	0	-167546
48929+50.00	5629.35	0.00	10799	0	0	0	-156747
48930+00.00	4726.87	0.00	9589	0	0	0	-147158
48930+50.00	3650.97	0.00	7757	0	0	0	-139401
48931+00.00	2847.96	0.00	6018	0	0	0	-133384
48931+50.00	2659.84	0.00	5100	0	0	0	-128284
48932+00.00	2352.02	0.00	4641	0	0	0	-123643
48932+50.00	612.56	0.00	2745	0	9503	0	-111396
48933+00.00	699.85	0.00	1215	0	0	0	-110180
48933+50.00	2065.32	0.00	2560	0	0	0	-107620
48934+00.00	2403.13	0.00	4137	0	0	0	-103483
48934+50.00	2557.50	0.00	4593	0	0	0	-98889
48934+56.06	2606.33	0.00	580	0	0	0	-98310
48935+00.00	2588.76	0.00	4227	0	0	0	-94083
48935+50.00	2383.88	0.00	4604	0	0	0	-89478
48935+51.72	2360.91	0.00	151	0	0	0	-89327
48936+00.00	2743.84	0.00	4564	0	0	0	-84763
48936+32.08	2731.49	0.00	3253	0	0	0	-81510
48936+50.00	2860.80	0.00	1856	0	0	0	-79655
48937+00.00	3156.24	0.00	5571	0	0	0	-74083
48937+12.43	3279.41	0.00	1481	0	0	0	-72602
48938+00.00	3081.32	0.20	10315	0	0	0	-62287
48939+00.00	2763.17	21.85	10823	51	0	0	-51515
48940+00.00	1426.21	43.67	7758	152	0	0	-43909
48941+00.00	665.59	51.65	3874	221	0	0	-40256
48942+00.00	402.84	185.54	1979	549	0	0	-38826
48943+00.00	312.57	335.86	1325	1207	0	0	-38708
48943+25.00	302.89	361.73	285	404	0	0	-38827
48944+00.00	282.60	298.97	813	1147	0	0	-39161
48945+00.00	108.91	242.29	725	1253	0	0	-39689
48945+60.00	0.00	0.00	121	337	0	0	-39904



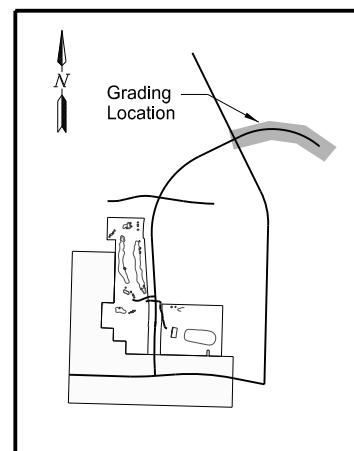
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ND 23B Truck Reliever Route
Earthwork Summary
Phase 1
2018 Construction

*ND 23B Phase 2

Table 1 of 1

STATION	END AREA (SF)		ADJUSTED VOLUME (CY)		
	EXC	FILL	EXC	FILL	MASS
48946+50.00	7.02	51.04	10	39	-31
48947+00.00	3.39	64.25	10	107	-128
48947+50.00	3.11	98.91	6	151	-273
48948+00.00	2.87	116.36	6	199	-467
48948+06.83	3.42	148.13	0	0	-467
48948+50.00	2.75	96.87	5	197	-659
48949+00.00	2.74	95.87	5	178	-833
48949+50.00	2.15	84.56	5	167	-995
48950+00.00	2.56	88.94	4	161	-1151
48950+50.00	2.90	85.74	5	162	-1308
48951+00.00	2.97	78.45	5	152	-1455
48951+50.00	2.83	86.33	5	153	-1602
48952+00.00	2.84	81.75	5	156	-1752
48952+50.00	2.77	75.84	5	146	-1893
48952+81.03	3.20	85.45	0	0	-1893
48953+00.00	6.24	45.08	8	112	-1997
48953+50.00	67.02	21.41	68	62	-1990
48954+00.00	52.17	20.70	110	39	-1919
48954+50.00	7.56	3.47	55	22	-1886
48955+00.00	92.86	1.03	93	4	-1797
48955+50.00	5.32	50.97	91	48	-1754
48956+00.00	4.41	88.10	9	129	-1874
48956+06.87	6.60	98.93	0	0	-1874
48956+50.00	18.57	66.53	21	143	-1996
48957+00.00	17.49	56.92	33	114	-2077
48957+50.00	17.88	45.16	33	95	-2139
48958+00.00	17.69	42.88	33	82	-2187
48958+50.00	17.31	41.21	32	78	-2233
48959+00.00	18.14	30.42	33	66	-2266
48959+21.62	18.02	30.63	0	0	-2266
48959+42.75	17.85	12.84	28	34	-2272

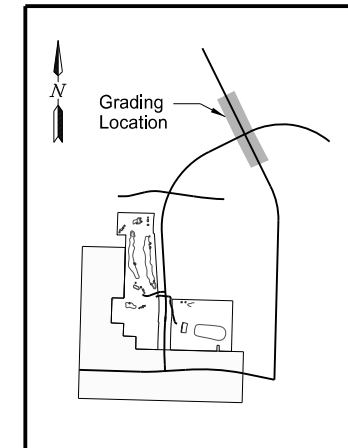


*ND 1804

**Table 1 of 1

STATION	END AREA (SF)		ADJUSTED VOLUME (CY)		
	EXC	FILL	EXC	FILL	MASS
13107+50	2.53	3.58	0	0	0
13108+00	2.55	5.42	5	10	-5
13109+00	3.24	13.71	11	44	-38
13110+00	4.09	4.84	14	43	-67
13110+56	4.71	3.51	9	11	-69
13113+30	6.76	2.13	0	0	-69
13113+94	8.60	21.25	18	35	-86
13115+54	0.00	0.00	25	79	-140
13115+74	0.00	0.00	0	0	-140
13116+00	17.02	0.39	8	0	-132
13117+00	76.55	27.92	173	66	-25
13117+31	0.00	0.00	0	0	-25
13118+00	53.66	42.50	241	163	53
13118+53	0.00	0.00	0	0	53
13119+00	12.64	53.82	123	223	-47
13120+00	37.28	43.43	92	225	-180
13121+00	79.69	37.95	217	188	-151
13122+00	47.83	17.79	236	129	-44
13122+36	0.00	0.00	0	0	-44
13122+70	41.53	1.31	117	31	42

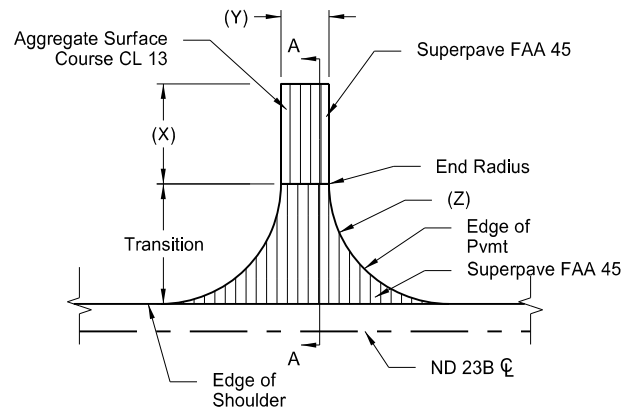
**Additional 160 CY of Common Excavation and 88 CY of embankment included in the earthwork summary for additional widening in Section 20 Sheet 14



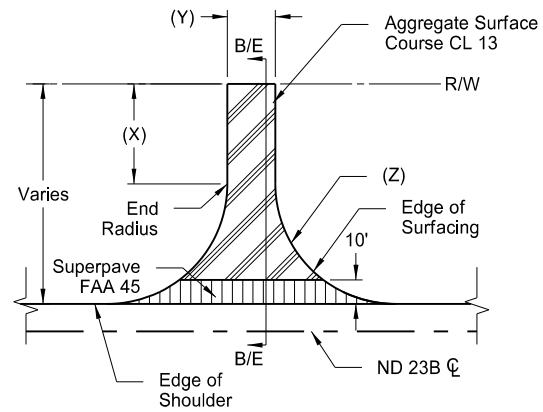
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ND 23B Truck Reliever Route
Earthwork Summary
Phase 2
2019 Construction

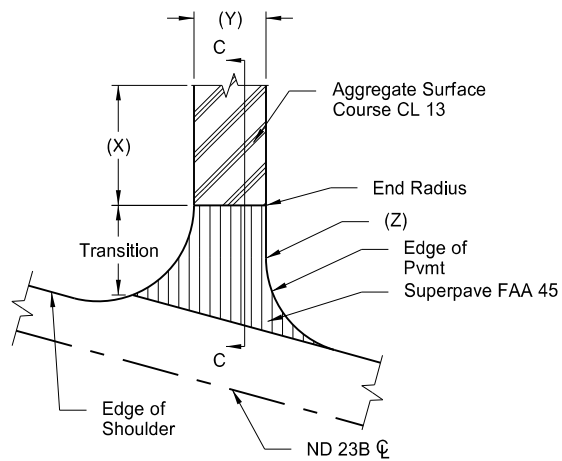
*Widening of turn lanes not included on the Mass Haul for ND 23B



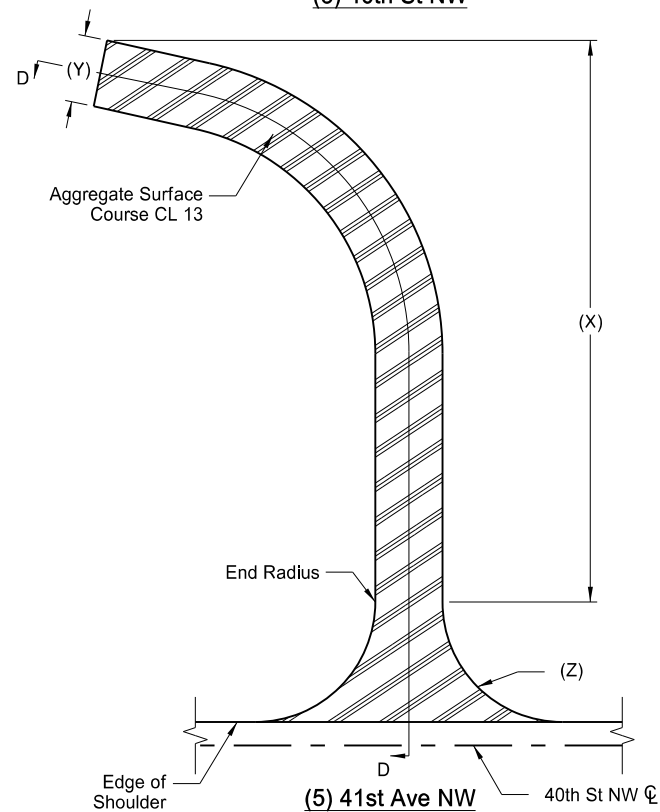
(1) Edgewater Country Club



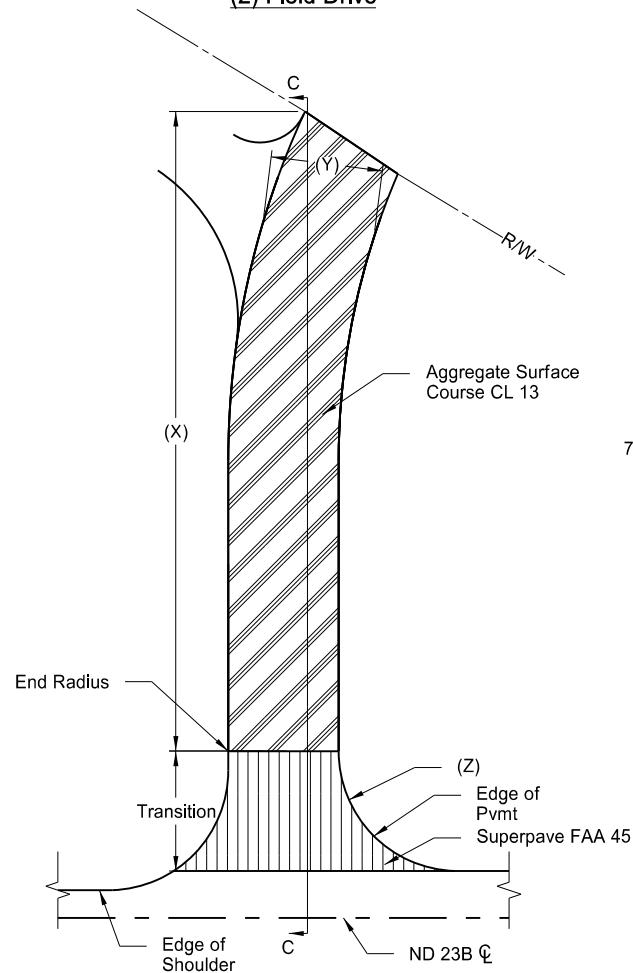
(2) Field Drive



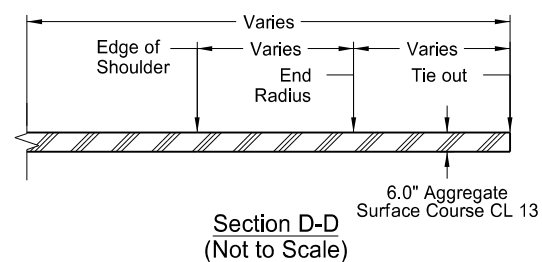
(3) 40th St NW



(5) 41st Ave NW



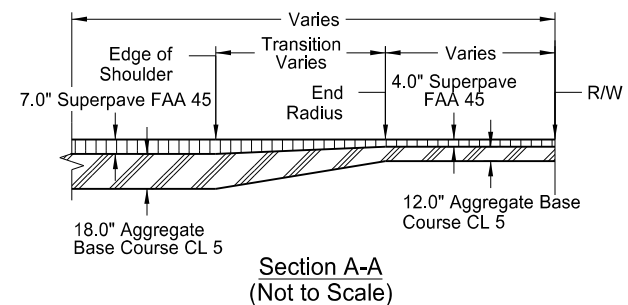
(4) Uran Ave



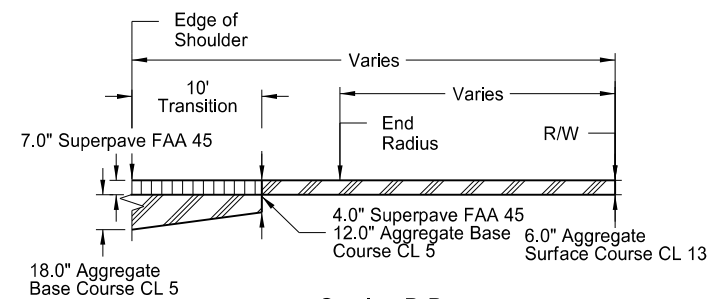
Section D-D (Not to Scale)

Approach Details

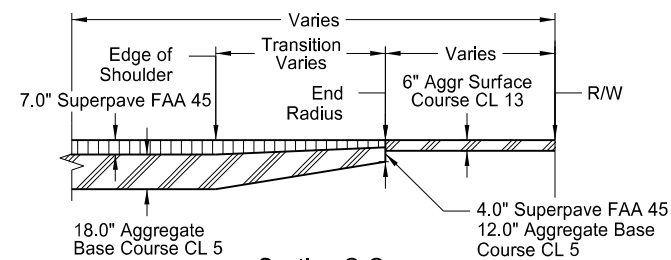
Station	Offset (Lt/Rt)	Approach Type	Tie-Out Length (X)	Roadway Width (Y)	Radius (Z)	302 0120	302 0356	401 0050	430 0045	430 5818	Description
						Aggregate Base Course CL 5 (TON)	Aggregate Base Course CL 13 (TON)				
48893+95	Lt	1	130	26	40	403	-	85	141	9	Edgewater Country Club
48893+95	Rt	2	119	24	40	76	132	14	27	2	Field Drive
48920+03	Lt	3	-	30	50	264	-	47	95	6	40th St NW
48920+03	Rt	3	-	30	50	286	-	51	103	7	40th St NW
48932+73	Lt	6	382	30	4	-	446	-	-	-	NDDOT Street
48932+75	Lt	4	266	46	50	291	411	53	107	7	Uran Ave
48932+75	Rt	2	153	46	40	92	306	17	34	2	Field Drive
48955+29	Lt	2	32	20	40	66	56	13	25	2	Field Drive
66+37	Rt	5	234	28	50	-	400	-	-	-	41st Ave NW



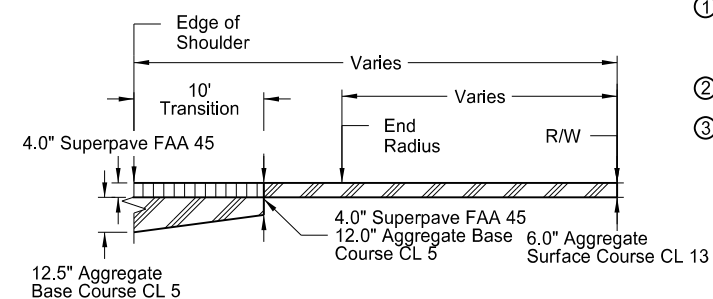
Section A-A (Not to Scale)



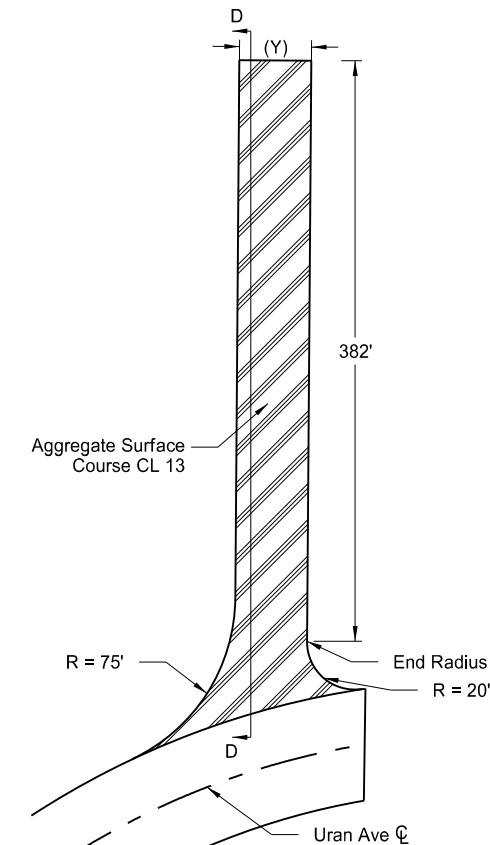
Section B-B (Not to Scale)



Section C-C (Not to Scale)



Section E-E (Not to Scale)

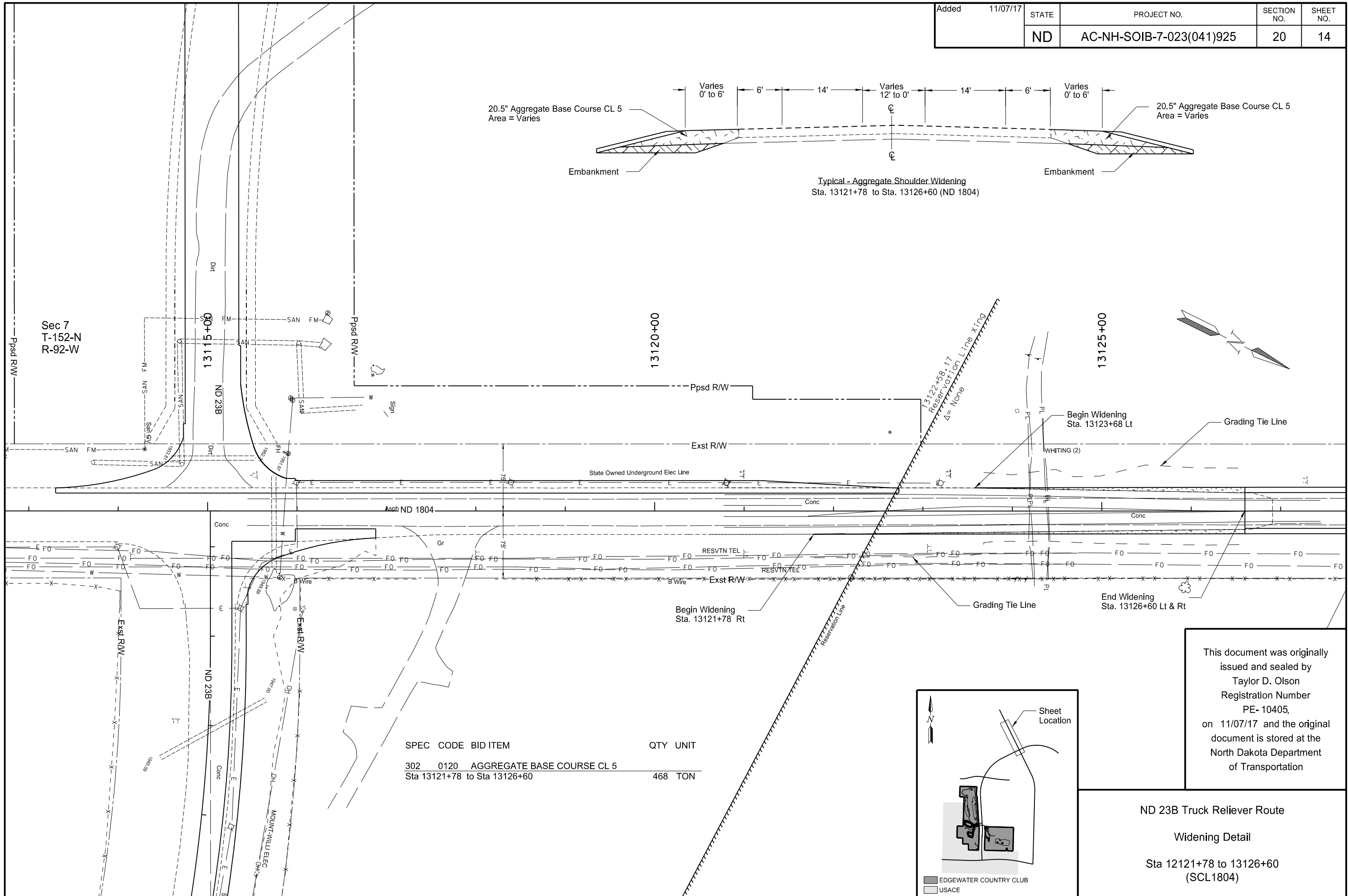
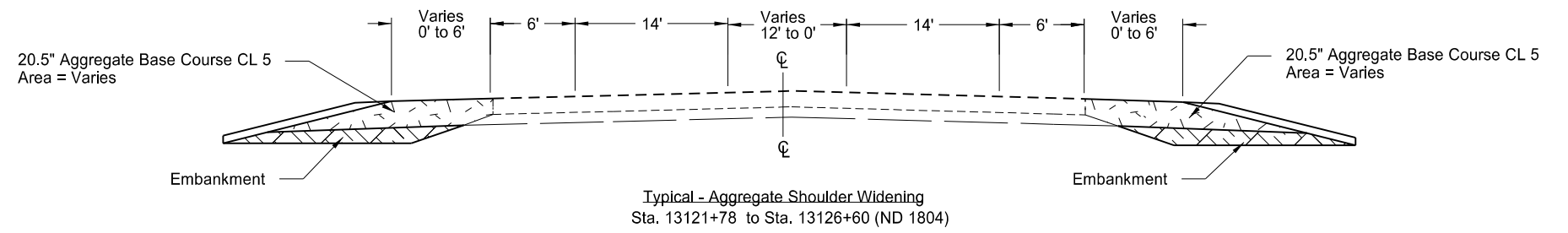


(6) NDDOT Street

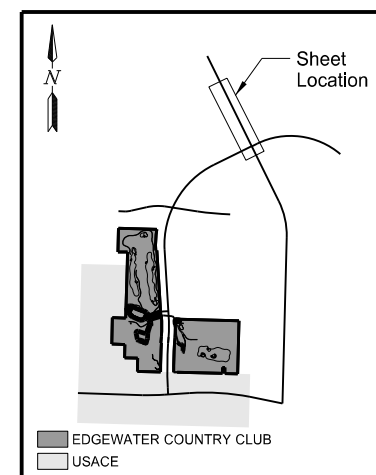
- Notes:**
- Refer to Standard Drawing D-203-8, and to Section 200 Cross Sections for grading details.
 - Match into existing approach width.
 - Approach slough rate will be 4:1

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ND 23B Truck Reliever Route
Approach Details



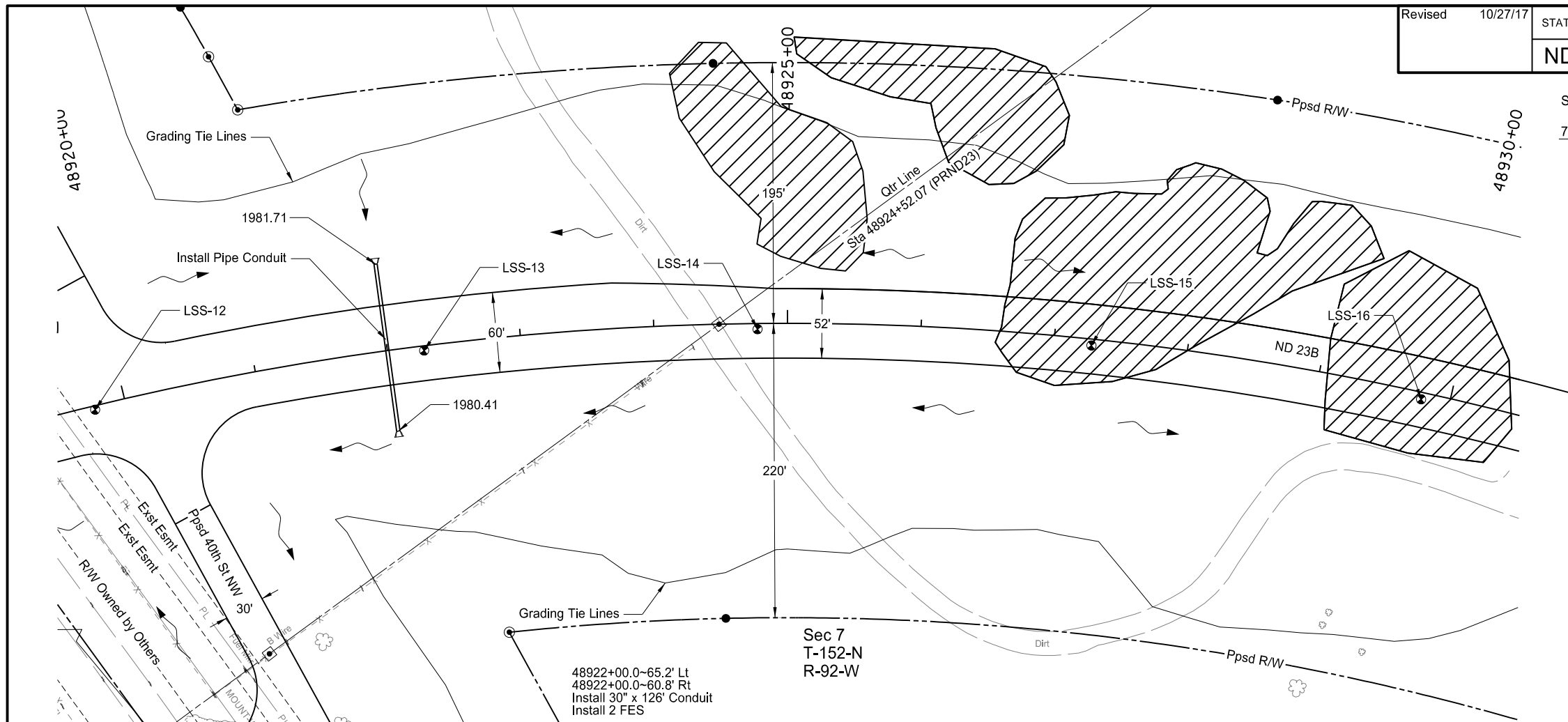
SPEC	CODE	BID ITEM	QTY	UNIT
302	0120	AGGREGATE BASE COURSE CL 5 Sta 13121+78 to Sta 13126+60	468	TON



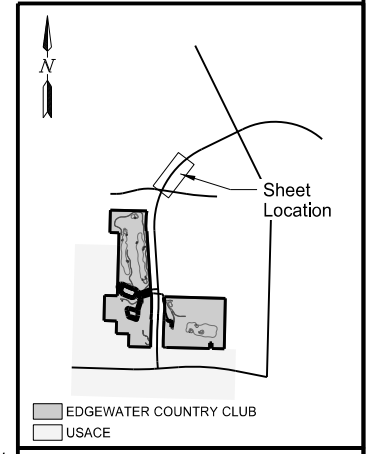
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ND 23B Truck Reliever Route
Widening Detail
Sta 12121+78 to 13126+60 (SCL1804)

SPEC CODE	BID ITEM	QTY	UNIT
714	4110 PIPE CONDUIT 30IN		
Sta 48922+00.0-65.2' Lt to Sta 48922+00.0-60.8' Rt		126	LF



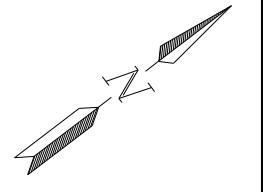
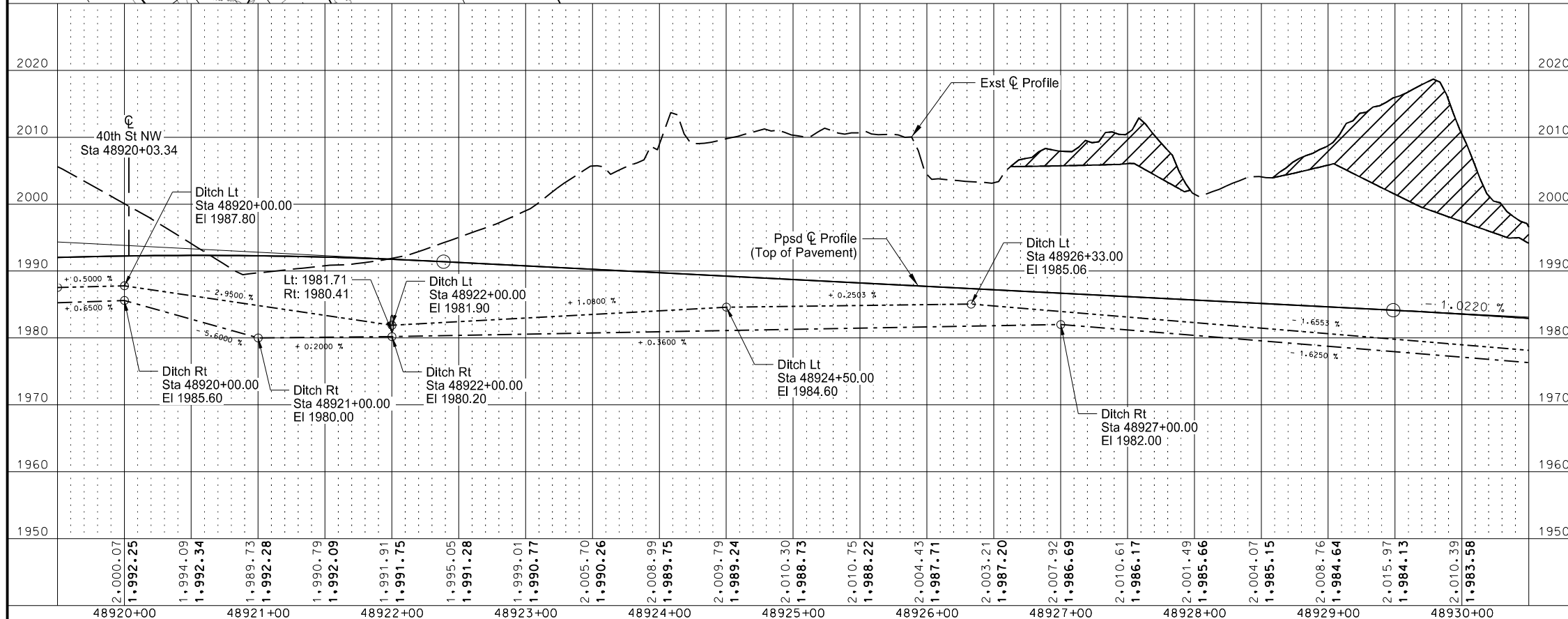
- Alignment Monument
- Iron Pin R/W Monument
- Iron Pin Reference Monument
- ⊕ Soil Boring Location



- Notes:
- Refer to Sec 10 for HMA paving quantities
 - Refer to Sec 90 for concrete paving quantities
 - Refer to Sec 40 for removal of pipe and pavement quantities.
 - Refer to Sec 50 & 55 for utility schedule
 - Refer to Sec 20 Sheet 11 for insulation board quantities

Stockpiled material to be removed by others.

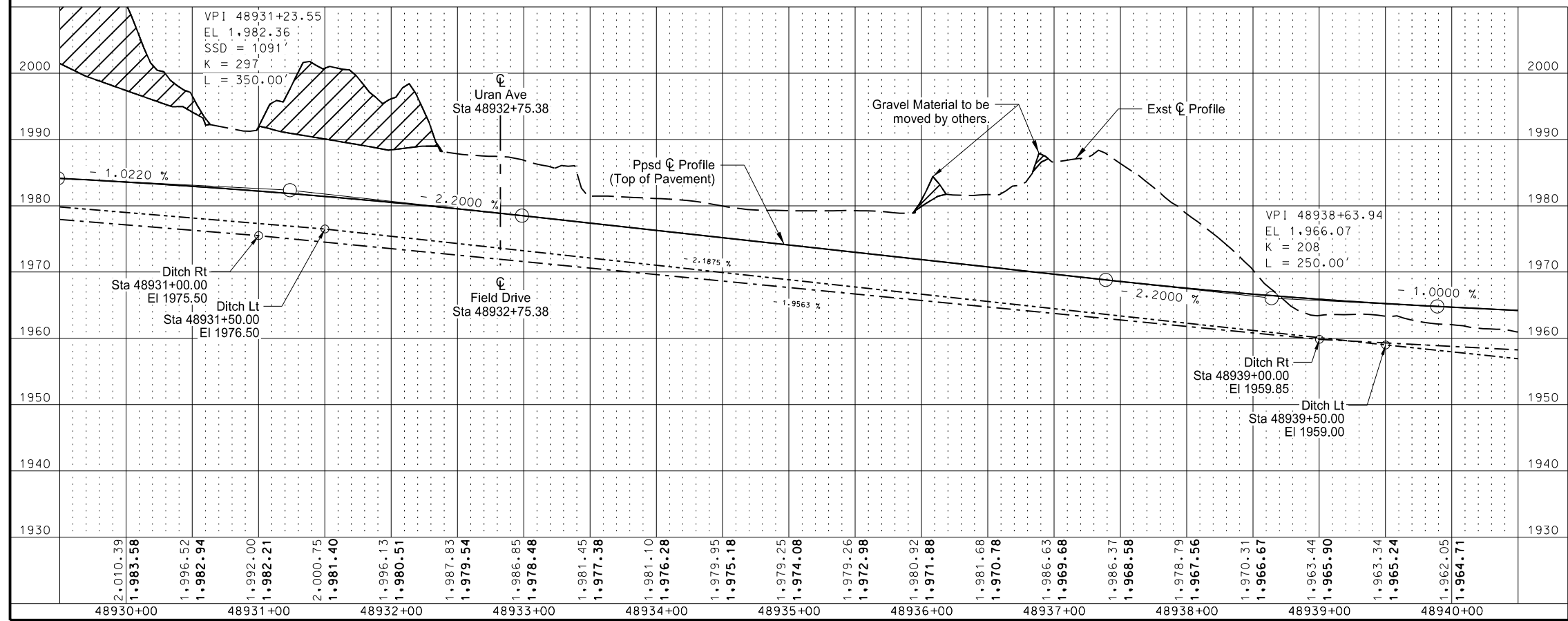
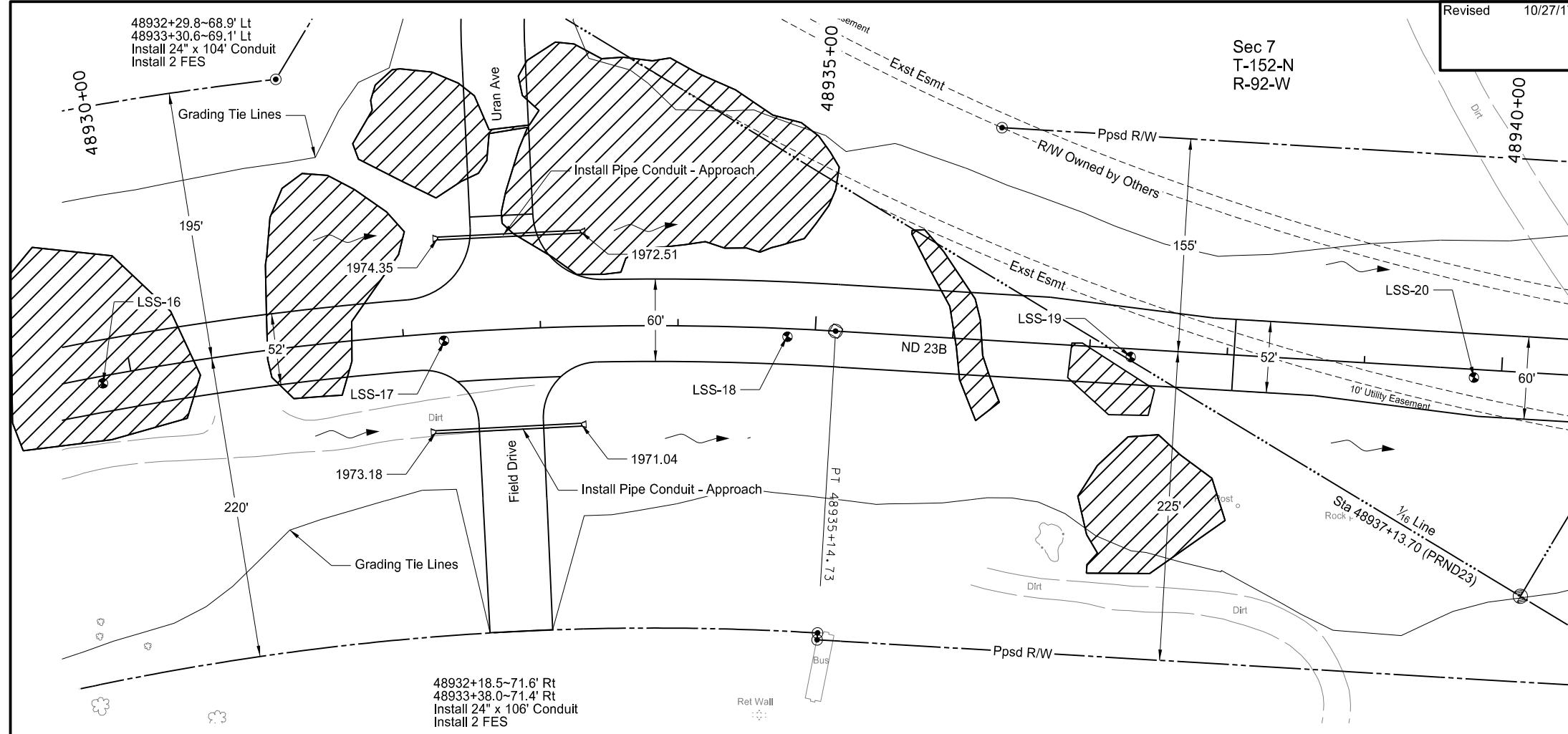
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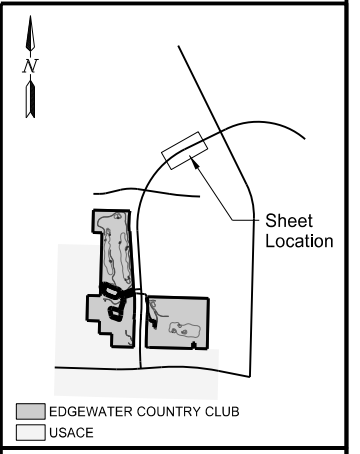
ND 23B Truck Reliever Route
Plan & Profile
Sta 48920+00 to Sta 48930+00
(PRND23)

Sec 7
T-152-N
R-92-W

SPEC CODE	BID ITEM	QTY	UNIT
714	4106 PIPE CONDUIT 24IN-APPROACH		
	Sta 48932+18.5-71.6' Rt to Sta 48933+28.0-71.4' Rt	106	LF
	Sta 48932+29.8-68.9' Lt to Sta 48933+30.6-69.1' Lt	104	LF

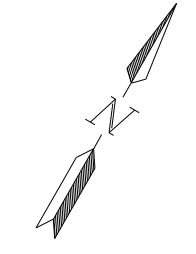


- Alignment Monument
- Iron Pin R/W Monument
- Iron Pin Reference Monument
- ⊕ Soil Boring Location



- Notes:
- Refer to Sec 10 for HMA paving quantities
 - Refer to Sec 90 for concrete paving quantities
 - Refer to Sec 40 for removal of pipe and pavement quantities.
 - Refer to Sec 50 & 55 for utility schedule
 - Refer to Sec 20 Sheet 11 for insulation board quantities

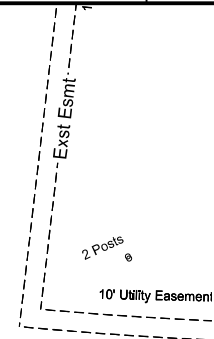
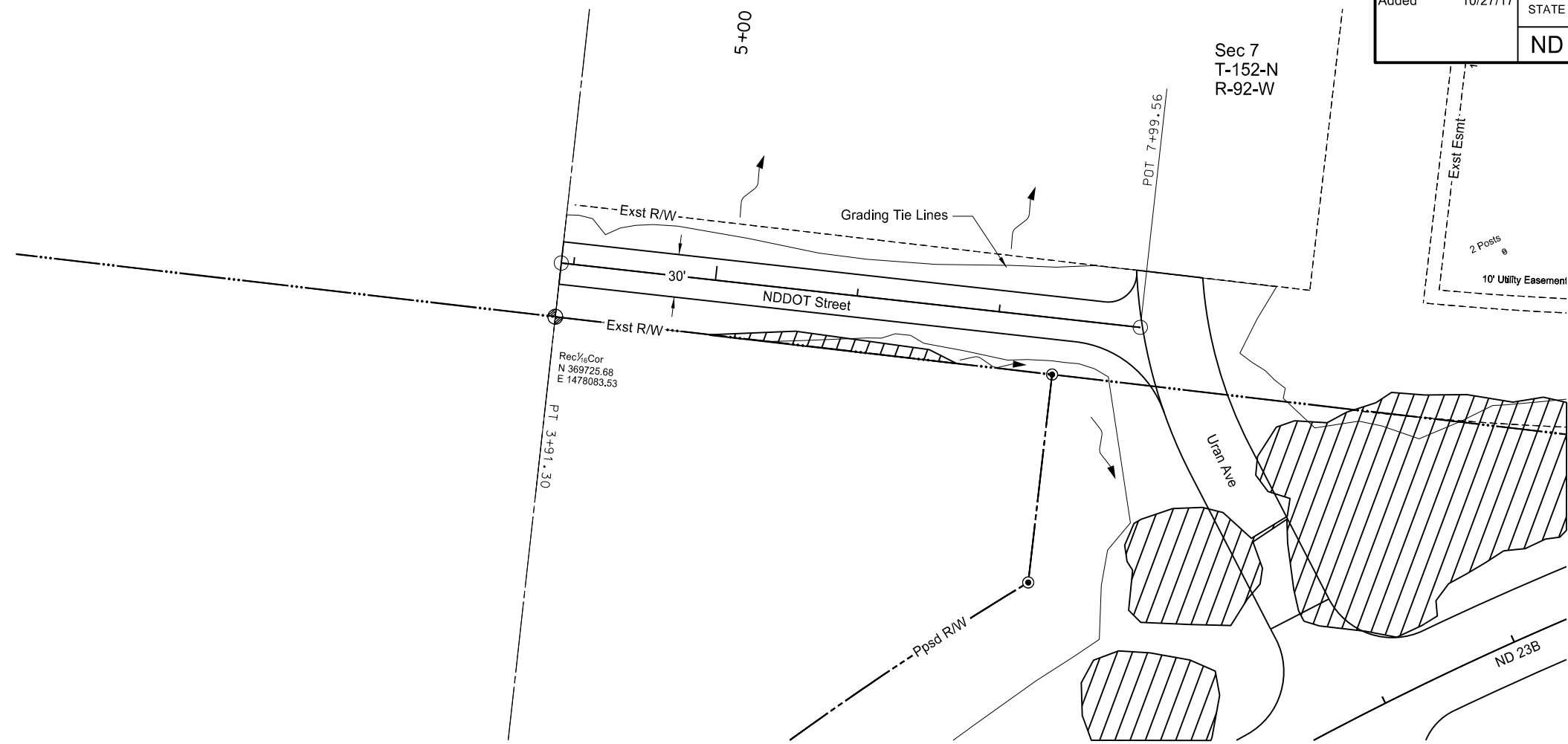
Stockpiled material to be removed by others.



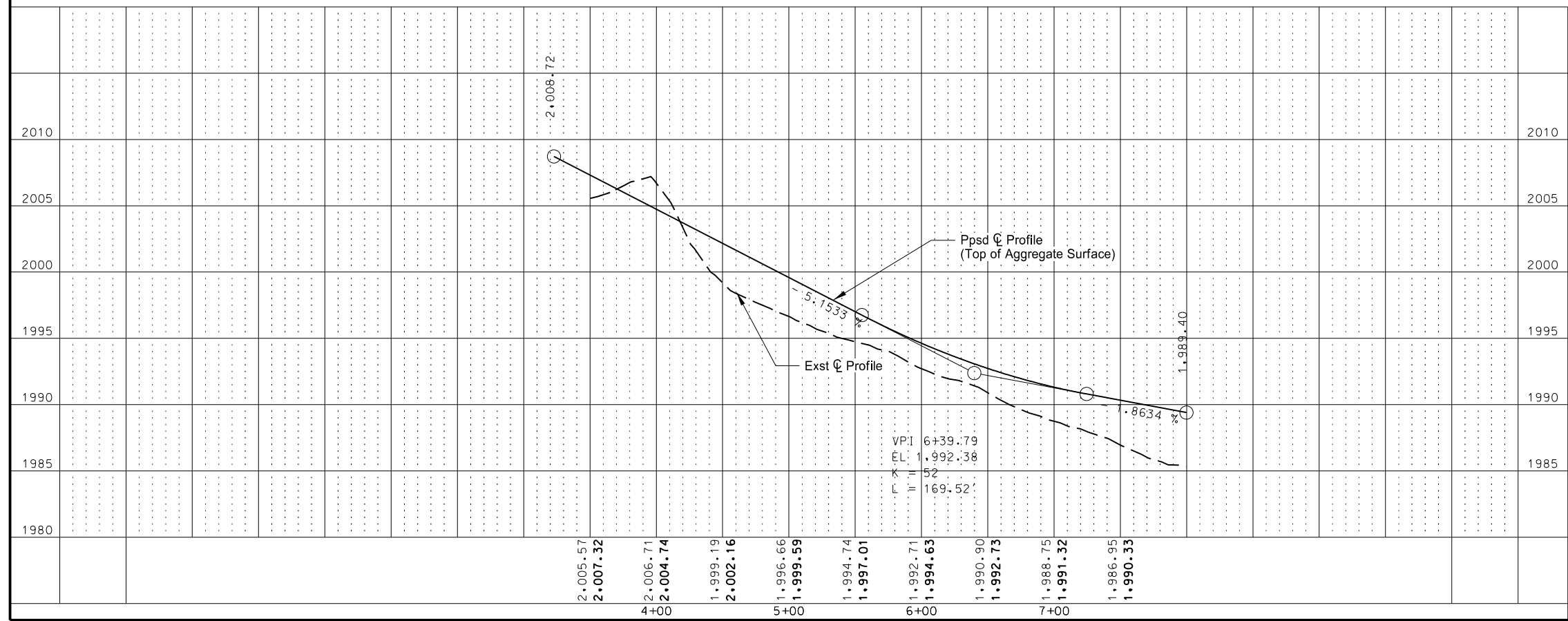
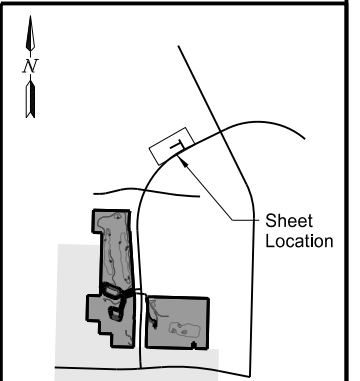
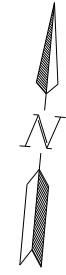
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ND 23B Truck Reliever Route
Plan & Profile
Sta 48930+00 to Sta 48940+00
(PRND23)

Added	10/27/17	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
		ND	AC-NH-SOIB-7-023(041)925	60	21



- Alignment Monument
- Iron Pin R/W Monument
- Iron Pin Reference Monument
- ⊕ Soil Boring Location

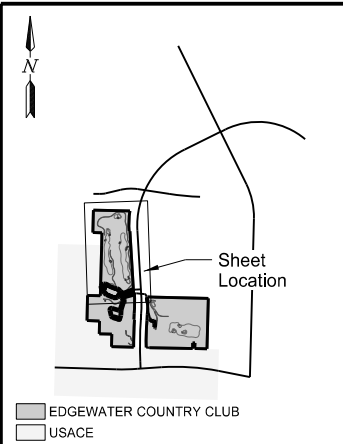
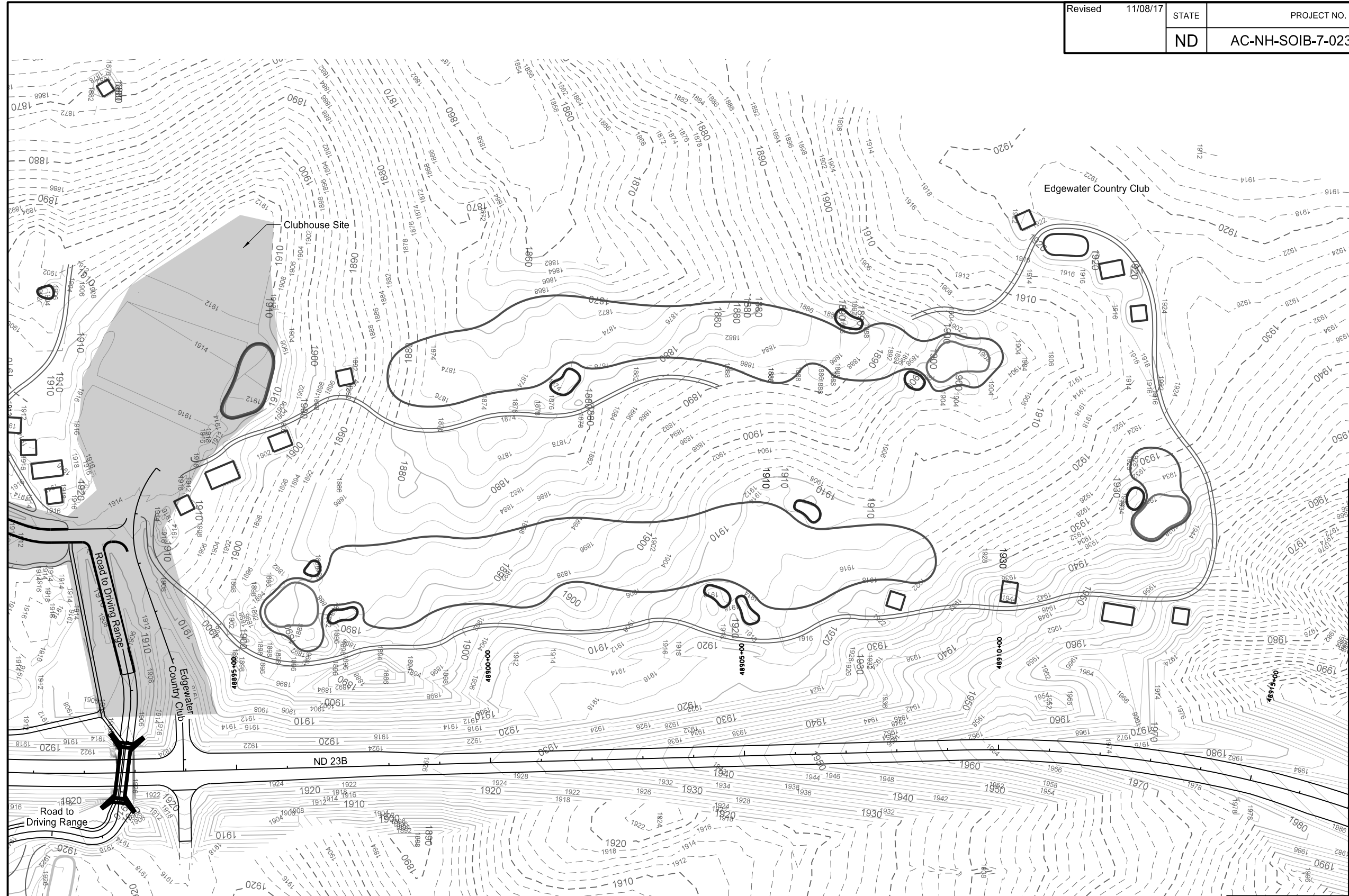


- Stockpiled material to be removed by others.
 - EDGEWATER COUNTRY CLUB
 - USACE
- Notes:
- Refer to Sec 10 for HMA paving quantities
 - Refer to Sec 90 for concrete paving quantities
 - Refer to Sec 40 for removal of pipe and pavement quantities.
 - Refer to Sec 50 & 55 for utility schedule
 - Refer to Sec 20 Sheet 11 for insulation board quantities

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Jessica R. Karls
 Registration Number
PE- 8408,
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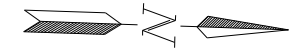
ND 23B Truck Reliever Route
 1988 Plan & Profile
 Sta 3+91.30 to Sta 7+99.56
 (NDDOT_ST)

Revised	11/08/17	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
		ND	AC-NH-SOIB-7-023(041)925	70	1



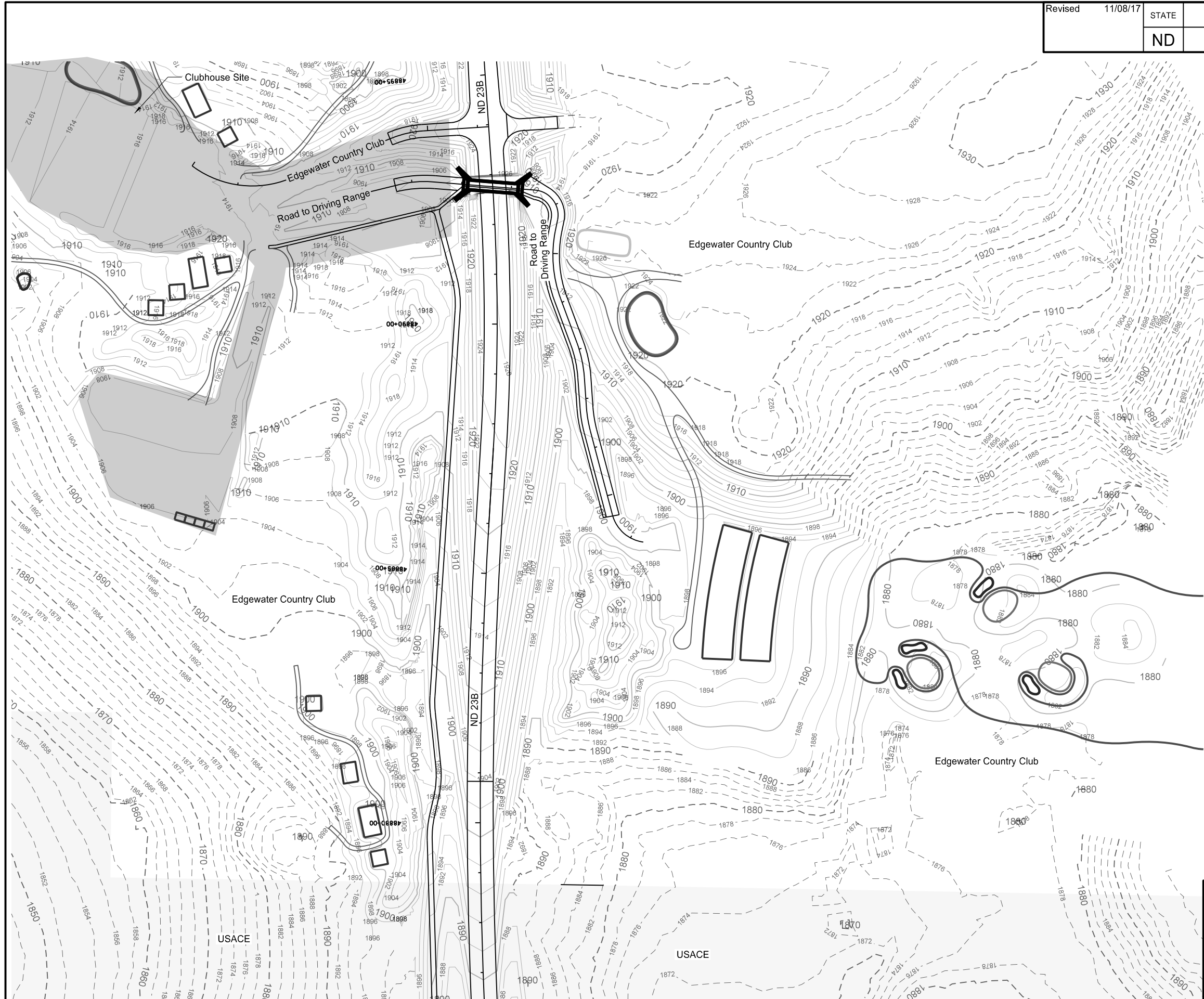
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- Legend**
- Proposed Minor Contour
 - Proposed Major Contour
 - - - Existing Minor Contour
 - - - Existing Major Contour

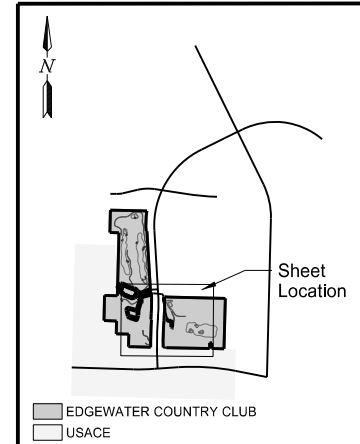


ND 23B Truck Reliever Route
Contours

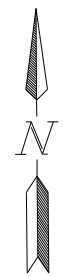
Revised	11/08/17	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
		ND	AC-NH-SOIB-7-023(041)925	70	2



- Legend**
- Proposed Minor Contour
 - Proposed Major Contour
 - - - Existing Minor Contour
 - - - Existing Major Contour



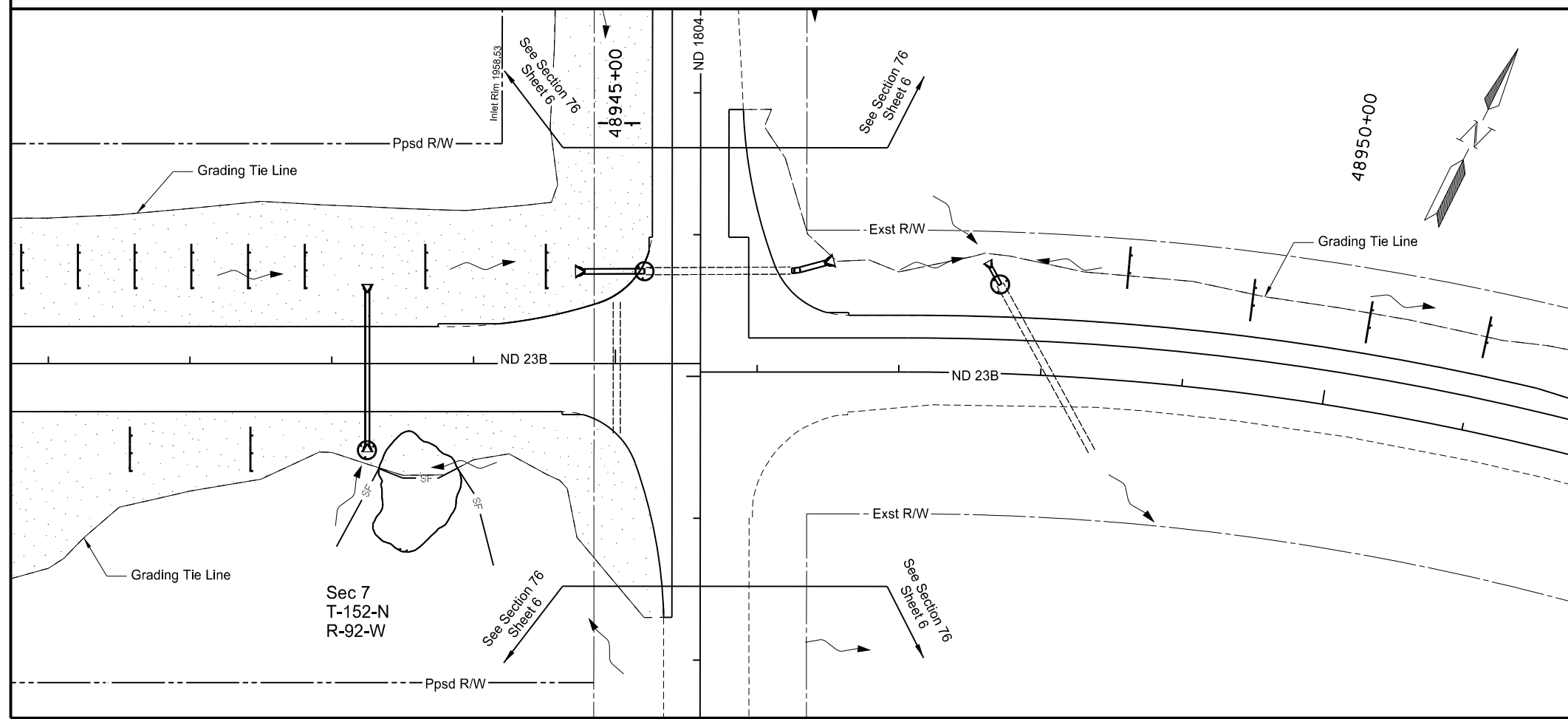
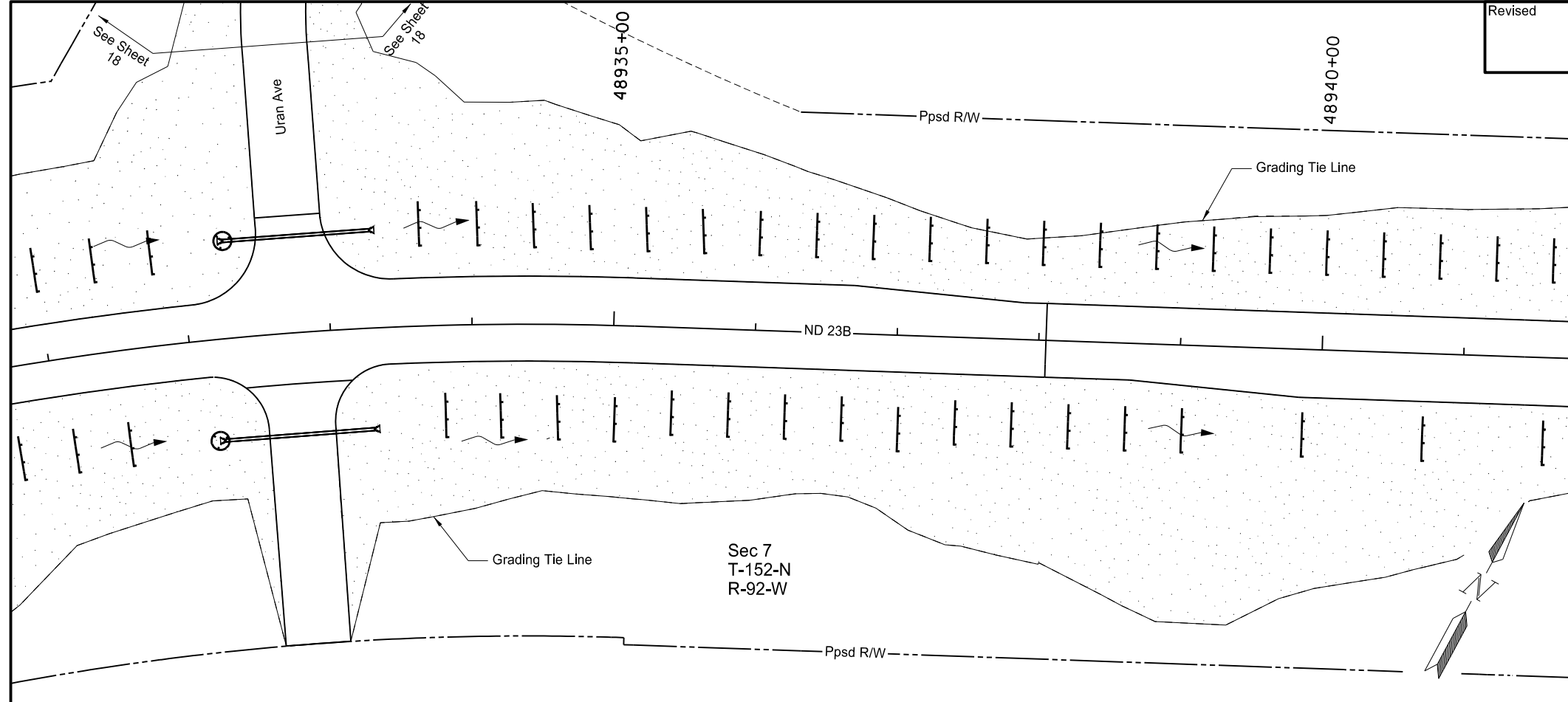
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ND 23B Truck Reliever Route
Contours

Revised 10/27/17

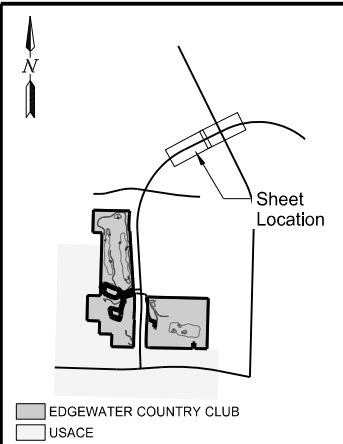
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	AC-NH-SOIB-7-023(041)925	76	4



SPEC	CODE	BID ITEM	QTY	UNIT
251	2000	TEMPORARY COVER CROP		
		Sta 48931+00 to Sta 48945+60 Rt (2 applications)	12.36	ACRE
		Sta 48931+00 to Sta 48945+60 Lt (2 applications)	9.72	ACRE
253	0101	STRAW MULCH		
		Sta 48931+00 to Sta 48945+60 Rt (2 applications)	12.36	ACRE
		Sta 48931+00 to Sta 48945+60 Lt (2 applications)	9.72	ACRE
260	0200	SILT FENCE SUPPORTED		
		Sta 48931+00 to Sta 48945+60 Rt	198	LF
260	0201	REMOVE SILT FENCE SUPPORTED		
		Sta 48931+00 to Sta 48945+60 Rt	198	LF
261	0112	FIBER ROLLS 12IN		
		Sta 48931+00 to Sta 48945+60 Rt	720	LF
		Sta 48931+00 to Sta 48945+60 Lt	936	LF
261	0113	REMOVE FIBER ROLLS 12IN		
		Sta 48931+00 to Sta 48945+60 Rt	720	LF
		Sta 48931+00 to Sta 48945+60 Lt	936	LF

Grade	Fiber Roll Diameter	
	12"	20"
4:1	60'	80'
3:1	45'	60'

Ditch Grade	Fiber Roll Diameter	
	12"	20"
1%	85'	140'
2%	40'	70'
3%	30'	45'
4%	20'	35'
5%	15'	30'



- Fiber Roll
- Wetland Delineated Exst
- Silt Fence
- Temporary Cover Crop & Straw Mulch
- Bonded Fiber Matrix

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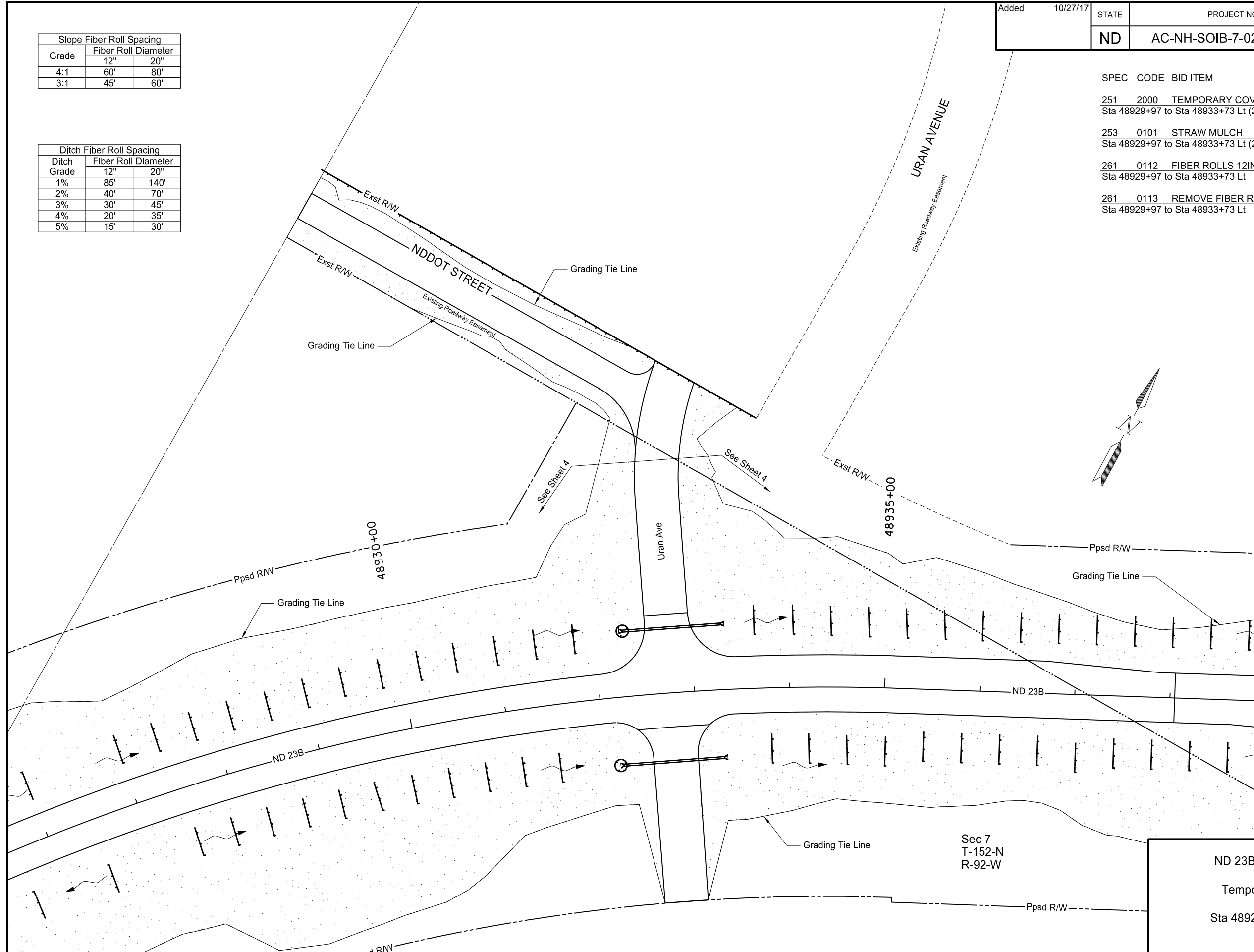
ND 23B Truck Reliever Route
 Temporary Erosion Control
 Sta 48931+00 to Sta 48945+60 (PRND23)

Added	10/27/17	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
		ND	AC-NH-SOIB-7-023(041)925	76	18

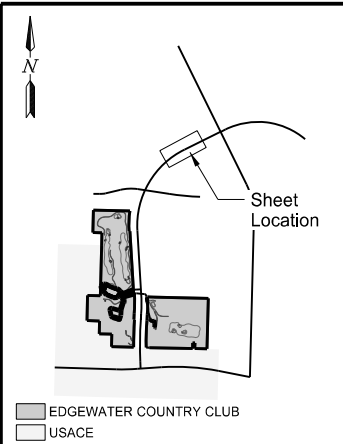
Slope Fiber Roll Spacing		
Grade	Fiber Roll Diameter	
		12"
4:1	60'	80'
3:1	45'	60'

Ditch Fiber Roll Spacing		
Ditch Grade	Fiber Roll Diameter	
		12"
1%	85'	140'
2%	40'	70'
3%	30'	45'
4%	20'	35'
5%	15'	30'

SPEC	CODE	BID ITEM	QTY	UNIT
251	2000	TEMPORARY COVER CROP		
		Sta 48929+97 to Sta 48933+73 Lt (2 applications)	0.84	ACRE
253	0101	STRAW MULCH		
		Sta 48929+97 to Sta 48933+73 Lt (2 applications)	0.84	ACRE
261	0112	FIBER ROLLS 12IN		
		Sta 48929+97 to Sta 48933+73 Lt	530	LF
261	0113	REMOVE FIBER ROLLS 12IN		
		Sta 48929+97 to Sta 48933+73 Lt	530	LF



- Fiber Roll
- Wetland Delineated Exst
- Silt Fence
- Temporary Cover Crop & Straw Mulch
- Bonded Fiber Matrix

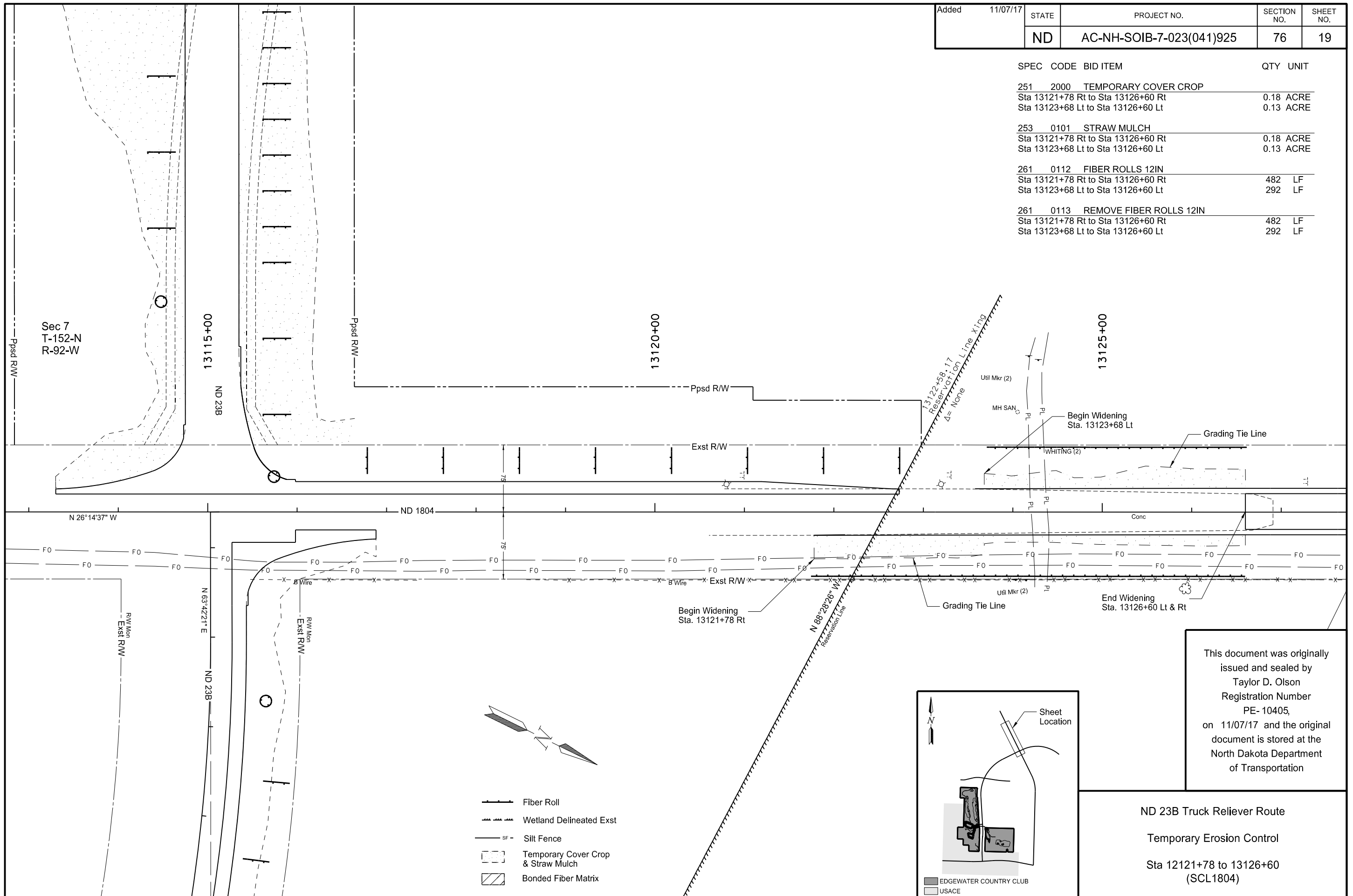


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ND 23B Truck Reliever Route
 Temporary Erosion Control
 Sta 48929+97 to Sta 48933+73 (PRND23)

Added	11/07/17	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
		ND	AC-NH-SOIB-7-023(041)925	76	19

SPEC	CODE	BID ITEM	QTY	UNIT
251	2000	TEMPORARY COVER CROP		
		Sta 13121+78 Rt to Sta 13126+60 Rt	0.18	ACRE
		Sta 13123+68 Lt to Sta 13126+60 Lt	0.13	ACRE
253	0101	STRAW MULCH		
		Sta 13121+78 Rt to Sta 13126+60 Rt	0.18	ACRE
		Sta 13123+68 Lt to Sta 13126+60 Lt	0.13	ACRE
261	0112	FIBER ROLLS 12IN		
		Sta 13121+78 Rt to Sta 13126+60 Rt	482	LF
		Sta 13123+68 Lt to Sta 13126+60 Lt	292	LF
261	0113	REMOVE FIBER ROLLS 12IN		
		Sta 13121+78 Rt to Sta 13126+60 Rt	482	LF
		Sta 13123+68 Lt to Sta 13126+60 Lt	292	LF

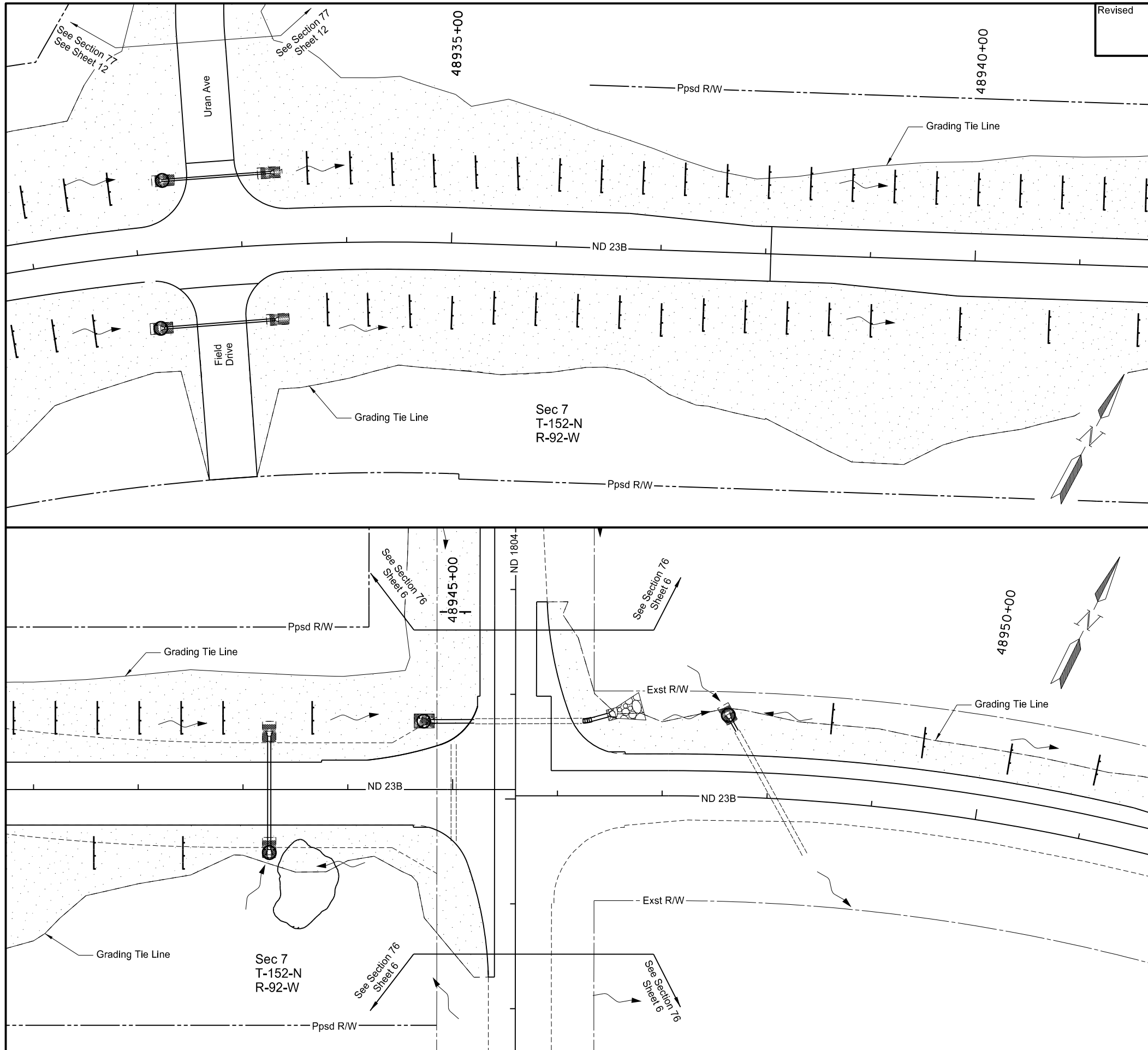


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ND 23B Truck Reliever Route
 Temporary Erosion Control
 Sta 12121+78 to 13126+60 (SCL1804)

Revised 10/27/17

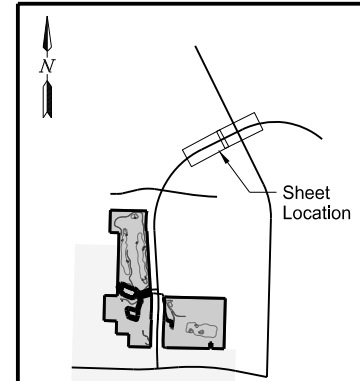
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	AC-NH-SOIB-7-023(041)925	77	4



SPEC	CODE	BID ITEM	QTY	UNIT
251	0200	SEEDING CLASS II		
		Sta 48931+00 to Sta 48945+60 RT	6.16	ACRE
		Sta 48931+00 to Sta 48945+60 LT	4.80	ACRE
253	0101	STRAW MULCH		
		Sta 48931+00 to Sta 48945+60 RT	6.16	ACRE
		Sta 48931+00 to Sta 48945+60 LT	4.80	ACRE
261	0112	FIBER ROLLS 12IN		
		Sta 48931+00 to Sta 48945+60 RT	720	LF
		Sta 48931+00 to Sta 48945+60 LT	936	LF

Grade	Fiber Roll Diameter	
	12"	20"
4:1	60'	80'
3:1	45'	60'

Ditch Grade	Fiber Roll Diameter	
	12"	20"
1%	85'	140'
2%	40'	70'
3%	30'	45'
4%	20'	35'
5%	15'	30'



- Fiber Roll
- Wetland Delineated Exst
- Seeding CL II & Straw Mulch
- Seeding CL III & Hydraulic Mulch
- Erosion Control Blanket (See Sec 20 Sheet 3)
- Riprap (See Sec 20 Sheet 5)

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ND 23B Truck Reliever Route
 Permanent Erosion Control
 Sta 48931+00 to Sta 48945+60
 (PRND23)

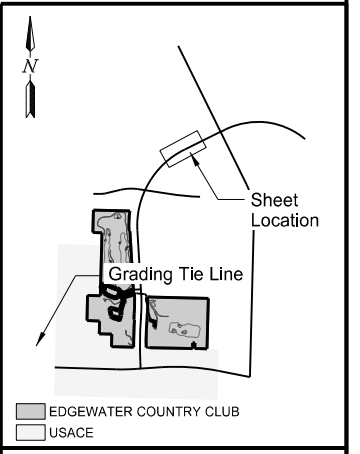
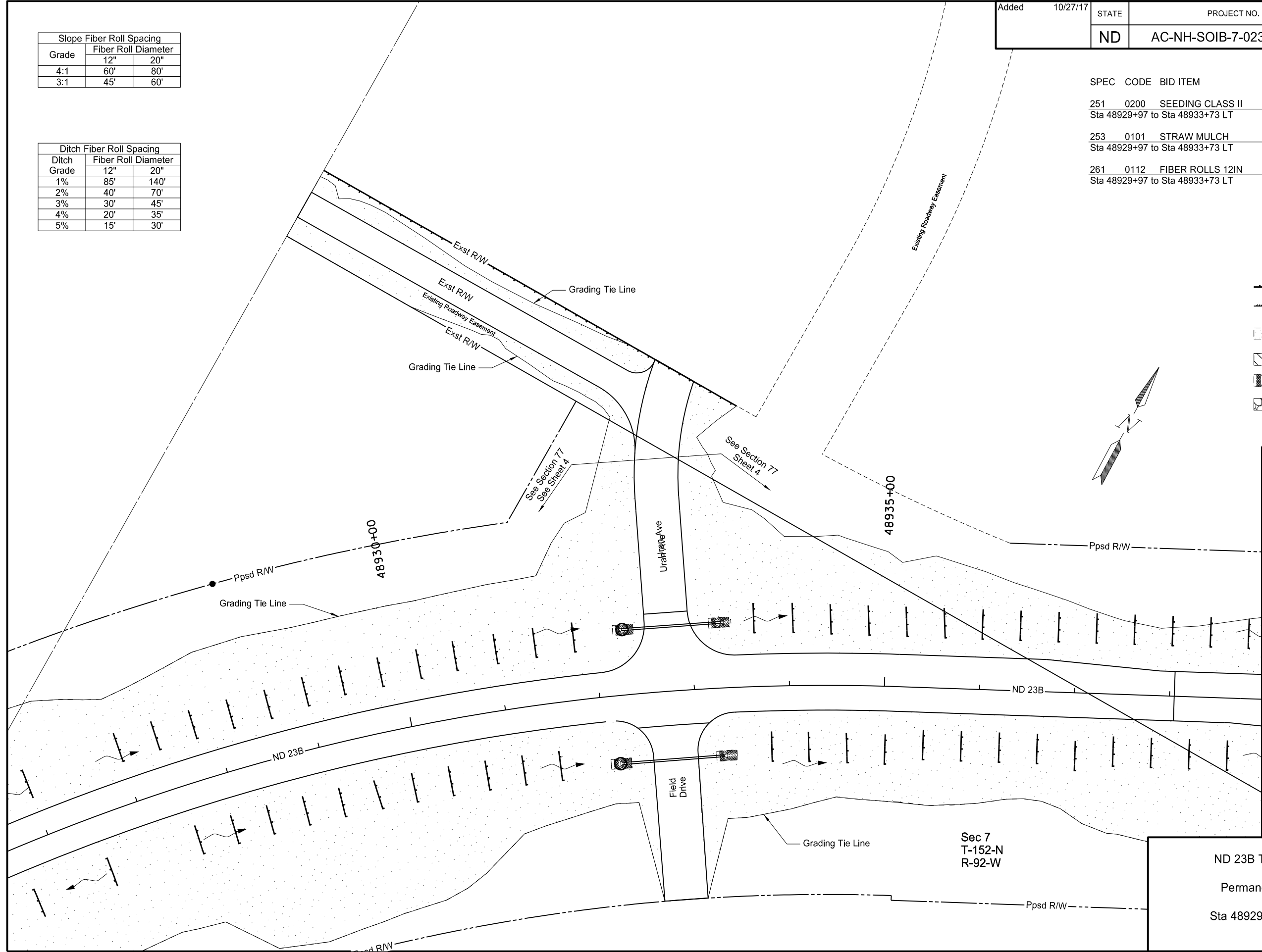
Added	10/27/17	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
		ND	AC-NH-SOIB-7-023(041)925	77	12

Grade	Fiber Roll Diameter	
	12"	20"
4:1	60'	80'
3:1	45'	60'

Ditch Grade	Fiber Roll Diameter	
	12"	20"
1%	85'	140'
2%	40'	70'
3%	30'	45'
4%	20'	35'
5%	15'	30'

SPEC	CODE	BID ITEM	QTY	UNIT
251	0200	SEEDING CLASS II		
Sta 48929+97 to Sta 48933+73 LT			0.42	ACRE
253	0101	STRAW MULCH		
Sta 48929+97 to Sta 48933+73 LT			0.42	ACRE
261	0112	FIBER ROLLS 12IN		
Sta 48929+97 to Sta 48933+73 LT			530	LF

- Fiber Roll
- Wetland Delineated Exst
- Seeding CL II & Straw Mulch
- Seeding CL III & Hydraulic Mulch
- Erosion Control Blanket (See Sec 20 Sheet 3)
- Riprap (See Sec 20 Sheet 5)

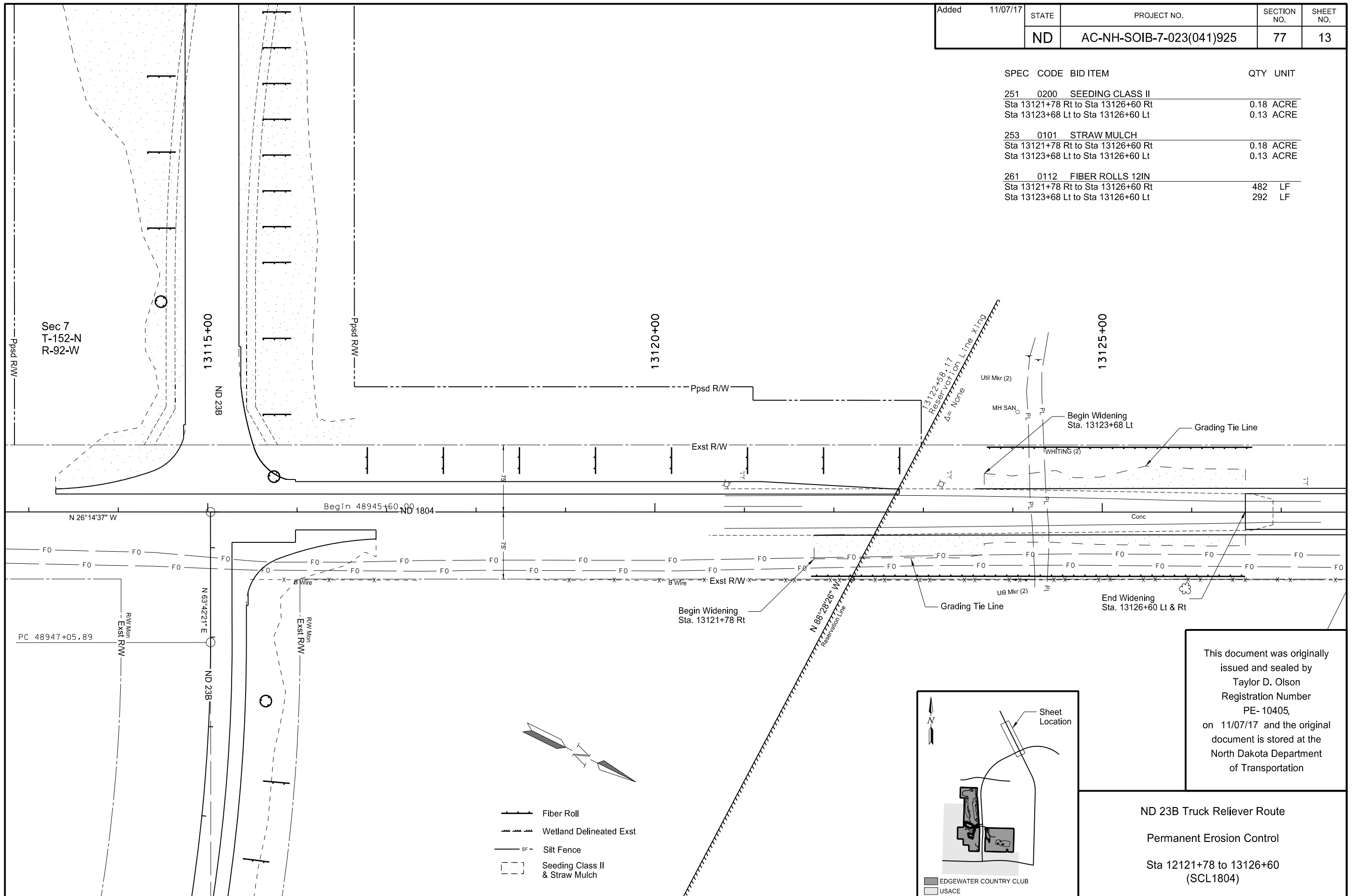


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ND 23B Truck Reliever Route
 Permanent Erosion Control
 Sta 48929+97 to Sta 48933+73 (PRND23)

Added	11/07/17	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
		ND	AC-NH-SOIB-7-023(041)925	77	13

SPEC	CODE	BID ITEM	QTY	UNIT
251	0200	SEEDING CLASS II		
		Sta 13121+78 Rt to Sta 13126+60 Rt	0.18	ACRE
		Sta 13123+68 Lt to Sta 13126+60 Lt	0.13	ACRE
253	0101	STRAW MULCH		
		Sta 13121+78 Rt to Sta 13126+60 Rt	0.18	ACRE
		Sta 13123+68 Lt to Sta 13126+60 Lt	0.13	ACRE
261	0112	FIBER ROLLS 12IN		
		Sta 13121+78 Rt to Sta 13126+60 Rt	482	LF
		Sta 13123+68 Lt to Sta 13126+60 Lt	292	LF

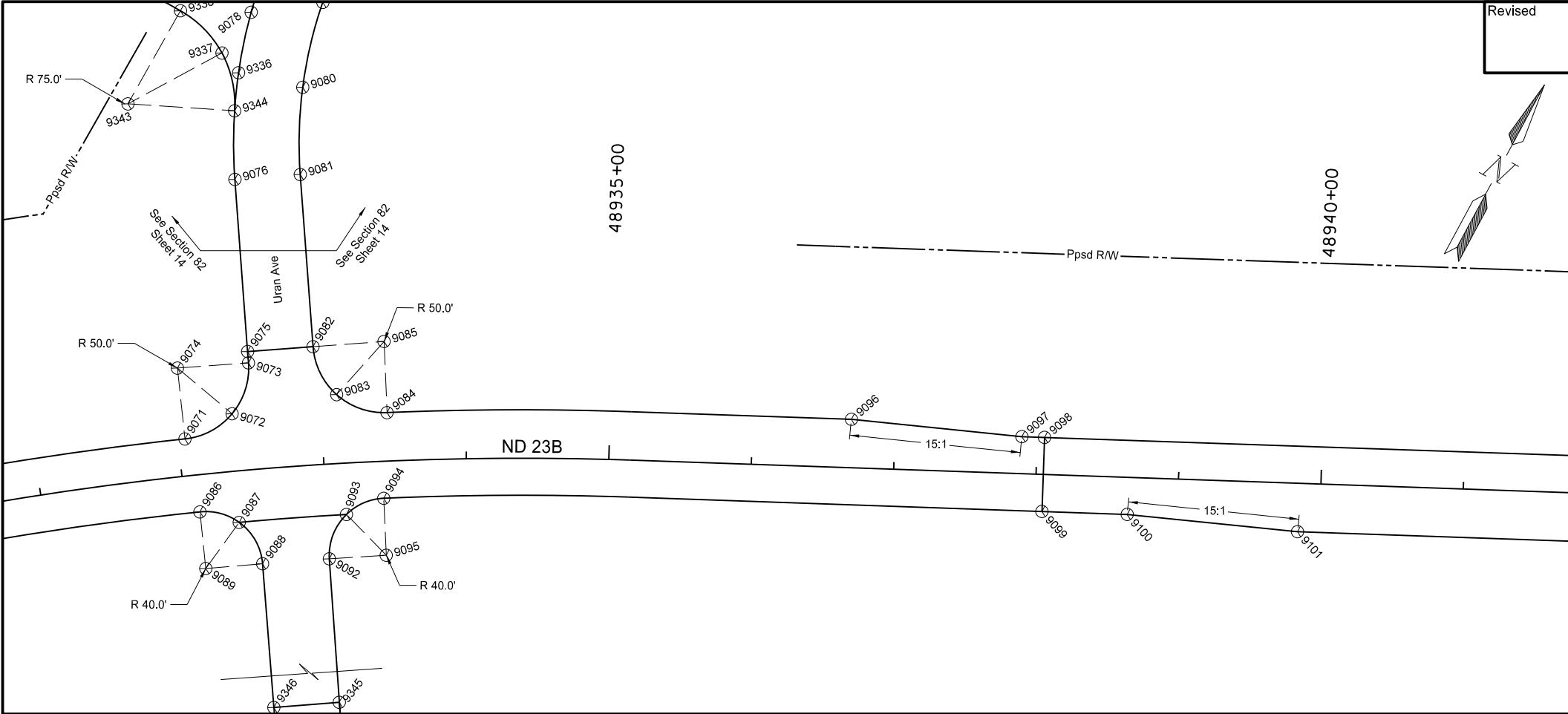


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ND 23B Truck Reliever Route
 Permanent Erosion Control
 Sta 12121+78 to 13126+60 (SCL1804)

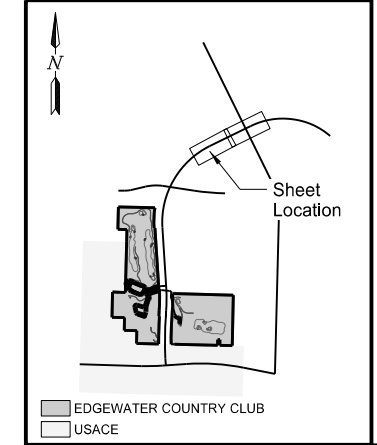
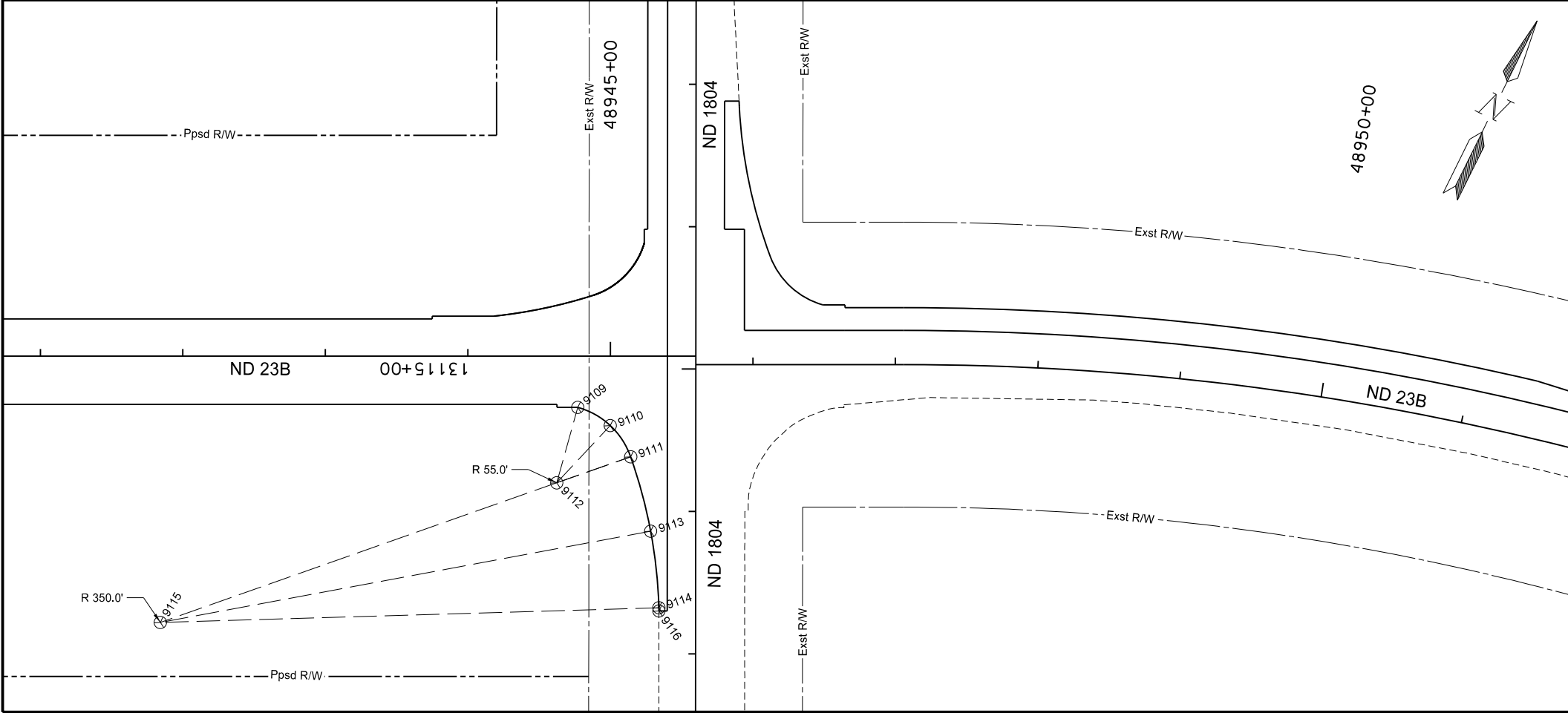
Revised 10/27/17

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	AC-NH-SOIB-7-023(041)925	82	4



Stations and offsets based off PRND23 alignment

Point	Northing	Easting	Station	Offset	Description
9071	369478.16	1478592.88	48932+04.80	-26.00	EDGE OF PVMT
9072	369509.41	1478613.67	48932+38.96	-40.35	EDGE OF PVMT
9073	369546.31	1478606.85	48932+53.14	-74.95	EDGE OF PVMT
9074	369519.45	1478564.68	48932+04.80	-76.00	CENTER OF RADIUS
9075	369553.06	1478602.55	48932+53.21	-82.95	HMA APPR
9082	369577.78	1478641.35	48932+97.55	-82.95	EDGE OF PVMT
9083	369556.01	1478671.92	48933+11.68	-48.35	EDGE OF PVMT
9084	369561.64	1478709.03	48933+45.72	-34.00	EDGE OF PVMT
9085	369604.64	1478683.52	48933+45.72	-84.00	CENTER OF RADIUS
9086	369438.08	1478626.41	48932+09.95	26.00	EDGE OF PVMT
9087	369444.65	1478654.16	48932+37.03	36.00	EDGE OF PVMT
9088	369426.85	1478682.39	48932+51.18	66.37	AGGR APPR
9089	369404.99	1478648.89	48932+09.95	66.00	CENTER OF RADIUS
9090	369374.11	1478716.81	48932+51.18	129.36	AGGR APPR
9091	369398.59	1478755.25	48932+99.59	129.36	AGGR APPR
9092	369452.08	1478721.99	48932+99.59	66.37	AGGR APPR
9093	369485.19	1478717.80	48933+13.74	36.00	EDGE OF PVMT
9094	369507.56	1478735.48	48933+40.82	26.00	EDGE OF PVMT
9095	369473.20	1478755.96	48933+40.82	66.00	CENTER OF RADIUS
9096	369711.86	1478998.25	48936+69.13	-34.00	EDGE OF PVMT
9097	369757.85	1479109.38	48937+89.13	-26.00	EDGE OF PVMT
9098	369764.88	1479123.60	48938+05.00	-26.01	EDGE OF PVMT
9099	369718.26	1479146.64	48938+05.00	26.00	EDGE OF PVMT
9100	369744.78	1479200.31	48938+64.87	26.00	EDGE OF PVMT
9101	369790.71	1479311.32	48939+84.73	33.99	EDGE OF PVMT
9109	370007.01	1479753.62	48944+77.09	36.00	EDGE OF PVMT
9110	370005.65	1479779.76	48944+99.93	48.80	EDGE OF PVMT
9111	369992.36	1479802.32	48945+14.26	70.71	EDGE OF PVMT
9112	369952.99	1479763.92	48944+62.39	89.00	CENTER OF RADIUS
9113	369951.72	1479838.00	48945+28.24	122.95	EDGE OF PVMT
9114	369906.08	1479866.99	48945+34.02	176.72	EDGE OF PVMT
9115	369741.80	1479557.94	48941+84.17	187.08	CENTER OF RADIUS
9116	369904.08	1479868.05	48945+34.08	178.98	EDGE OF PVMT
9345	369322.26	1478803.87	48933+00.69	219.85	AGGR APPR
9346	369297.78	1478765.44	48932+50.08	219.85	AGGR APPR



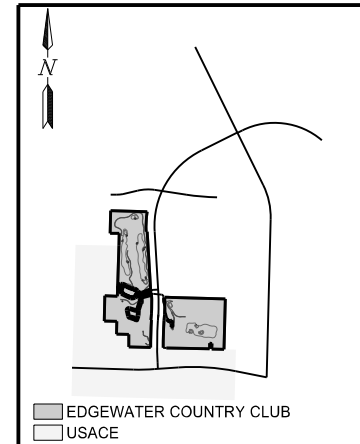
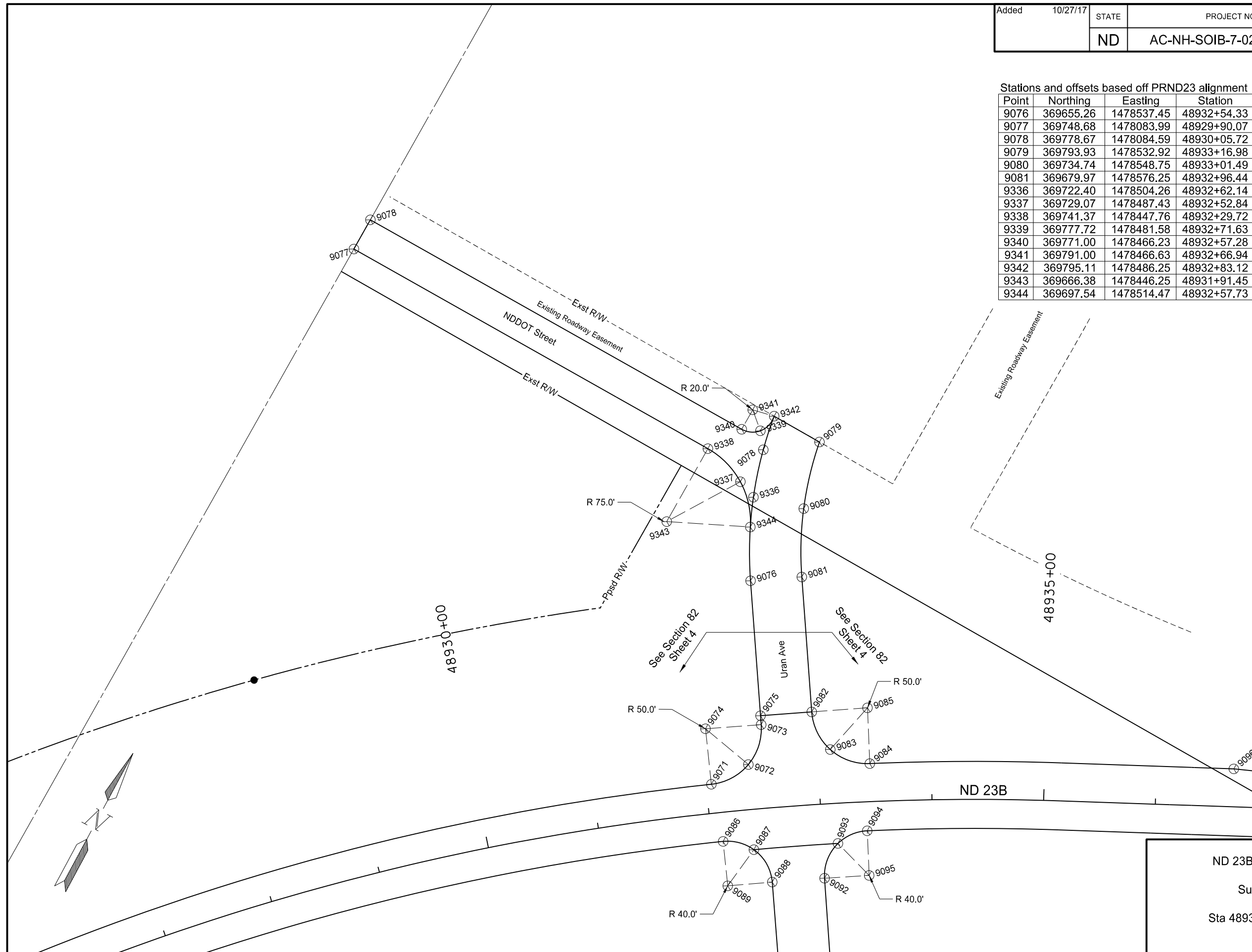
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ND 23B Truck Reliever Route
Survey Data Layout
Sta 48931+00 to Sta 48945+60 (PRND23)

Added	10/27/17	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
		ND	AC-NH-SOIB-7-023(041)925	82	14

Stations and offsets based off PRND23 alignment

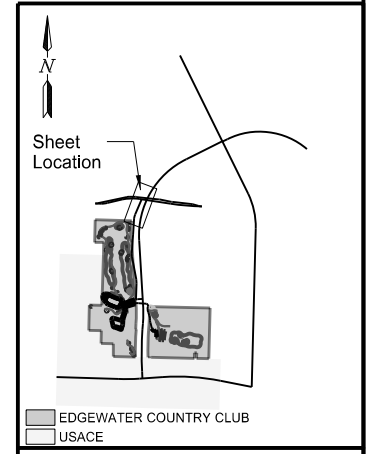
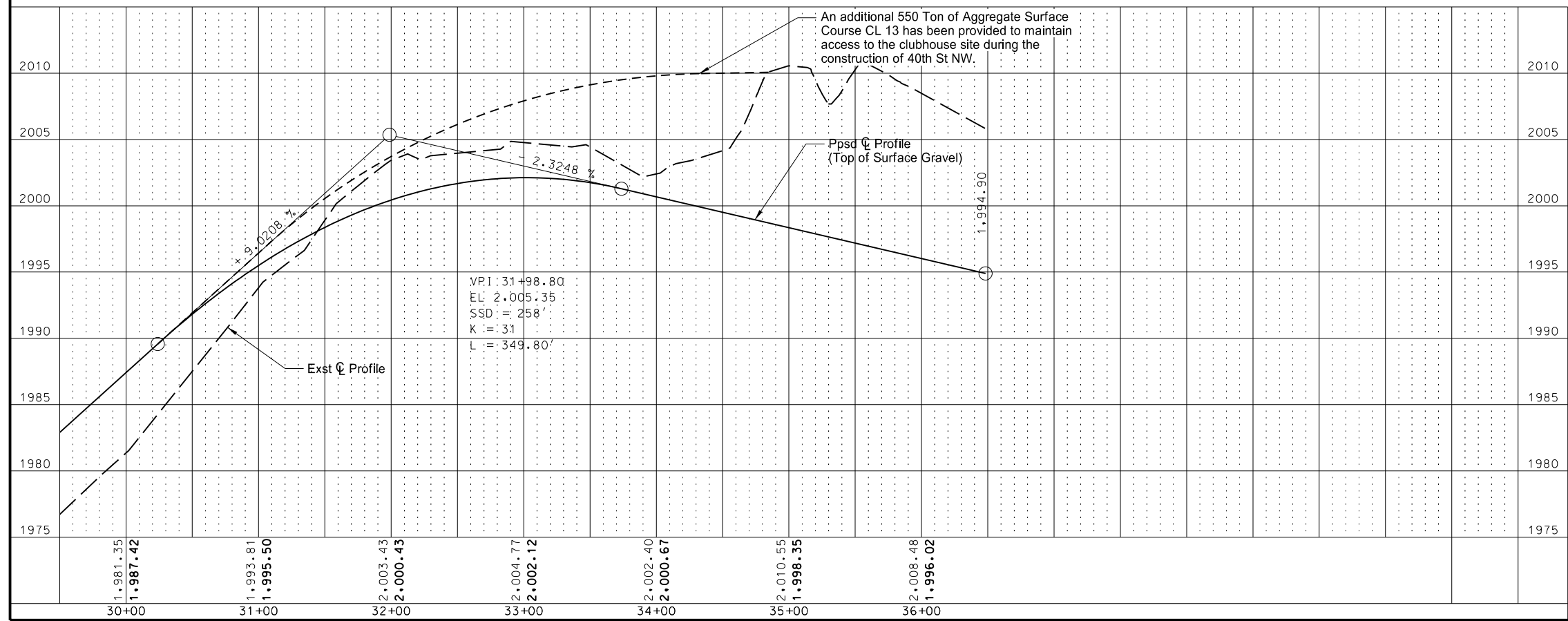
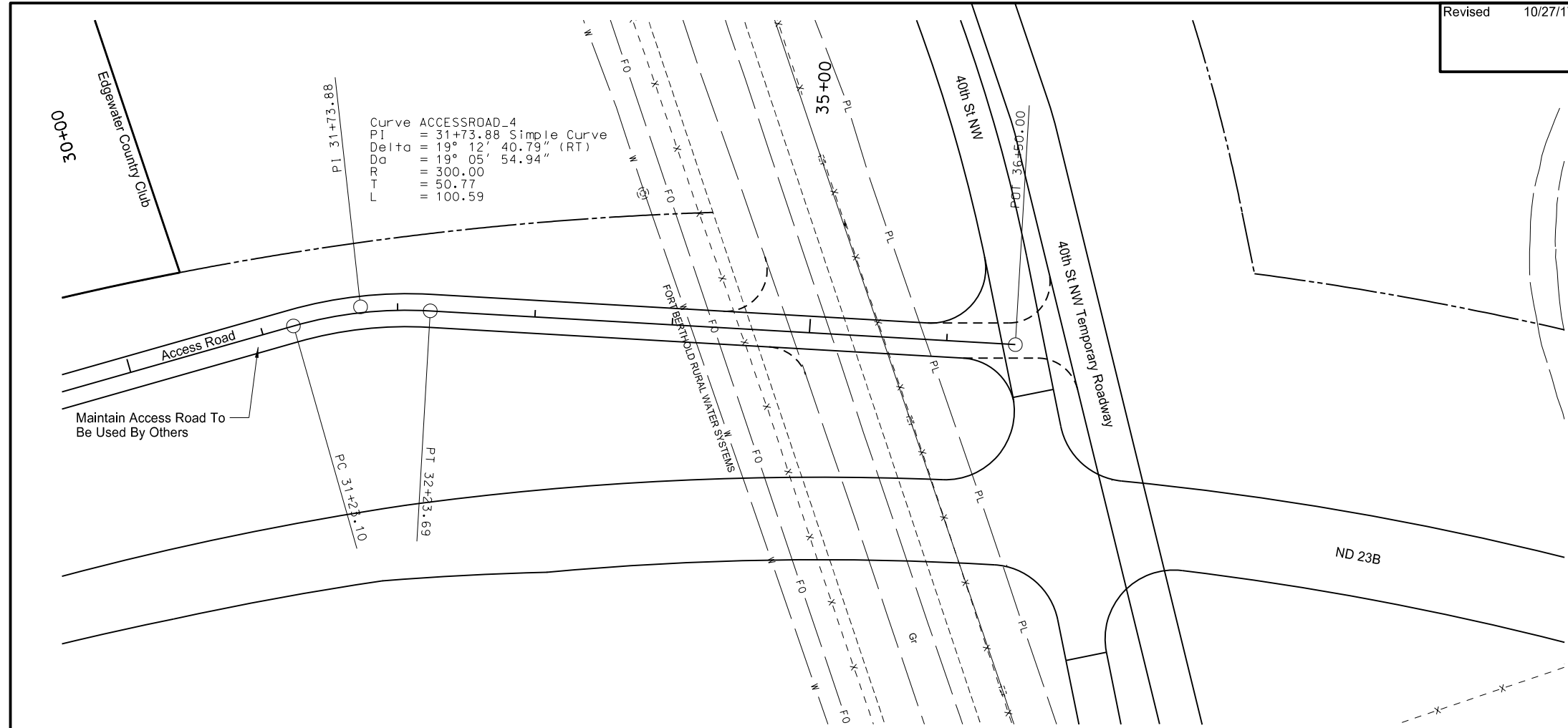
Point	Northing	Easting	Station	Offset	Description
9076	369655.26	1478537.45	48932+54.33	-204.12	AGGR APPR
9077	369748.68	1478083.99	48929+90.07	-549.40	AGGR APPR
9078	369778.67	1478084.59	48930+05.72	-572.10	AGGR APPR
9079	369793.93	1478532.92	48933+16.98	-323.85	AGGR APPR
9080	369734.74	1478548.75	48933+01.49	-265.14	AGGR APPR
9081	369679.97	1478576.25	48932+96.44	-204.12	AGGR APPR
9336	369722.40	1478504.26	48932+62.14	-278.52	CENTER OF RADIUS
9337	369729.07	1478487.43	48932+52.84	-293.27	AGGR APPR
9338	369741.37	1478447.76	48932+29.72	-325.37	AGGR APPR
9339	369777.72	1478481.58	48932+71.63	-337.31	AGGR APPR
9340	369771.00	1478466.23	48932+57.28	-339.98	AGGR APPR
9341	369791.00	1478466.63	48932+66.94	-356.56	CENTER OF RADIUS
9342	369795.11	1478486.25	48932+83.12	-349.48	AGGR APPR
9343	369666.38	1478446.25	48931+91.45	-264.18	CENTER OF RADIUS
9344	369697.54	1478514.47	48932+57.73	-252.09	AGGR APPR



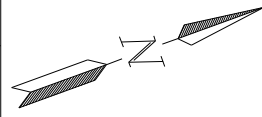
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ND 23B Truck Reliever Route
 Survey Data Layout
 Sta 48931+00 to Sta 48945+60
 (PRND23)

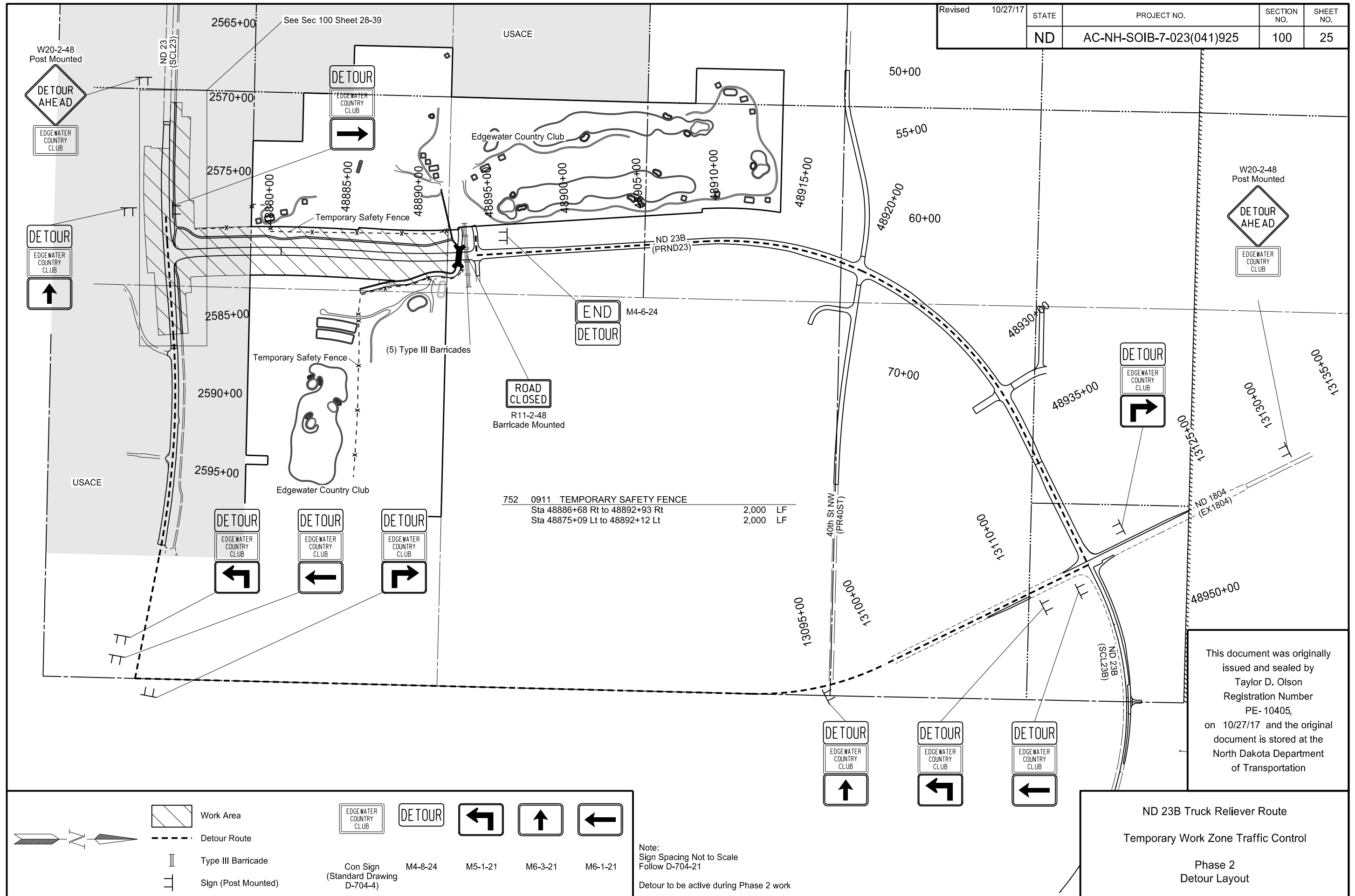
SPEC CODE	BID ITEM	QTY	UNIT
302	0356 AGGREGATE SURFACE COURSE CL 13		
	Sta 30+00 to Sta 36+50	607	TON
	Maintain Traffic	550	TON



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ND 23B Truck Reliever Route
 Temporary Work Zone Traffic Control
 Construction Access Road
 Phase 1
 Sta 30+00 to Sta 36+50
 (ACCESSROAD)



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ND 23B Truck Reliever Route
 Temporary Work Zone Traffic Control
 Phase 2
 Detour Layout

		Work Area					
		Detour Route					
		Type III Barricade	Con Sign (Standard Drawing D-704-4)	M4-8-24	M5-1-21	M6-3-21	M6-1-21
		Sign (Post Mounted)					

Note:
 Sign Spacing Not to Scale
 Follow D-704-21
 Detour to be active during Phase 2 work

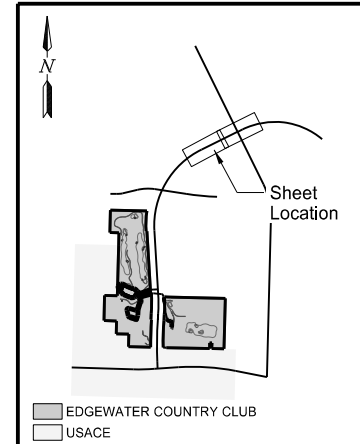
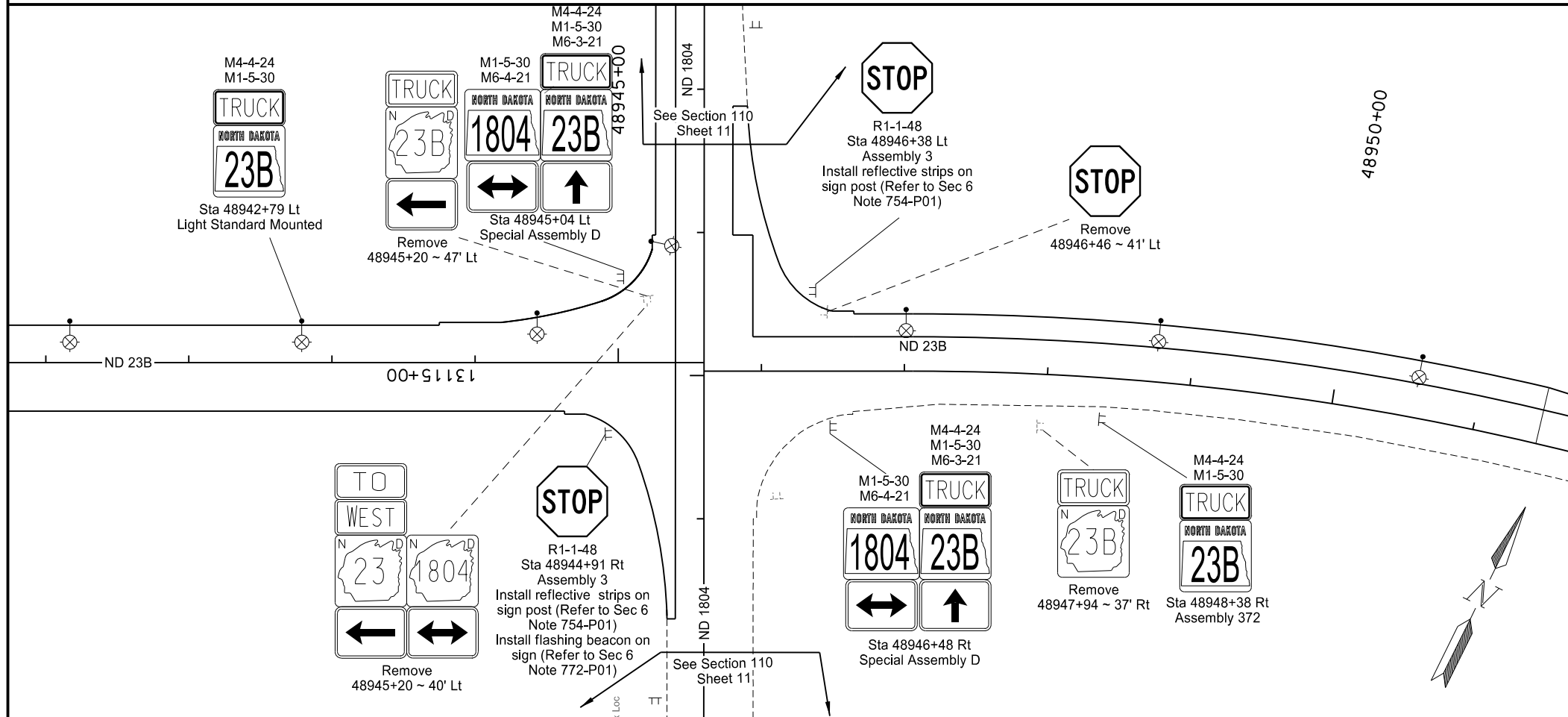
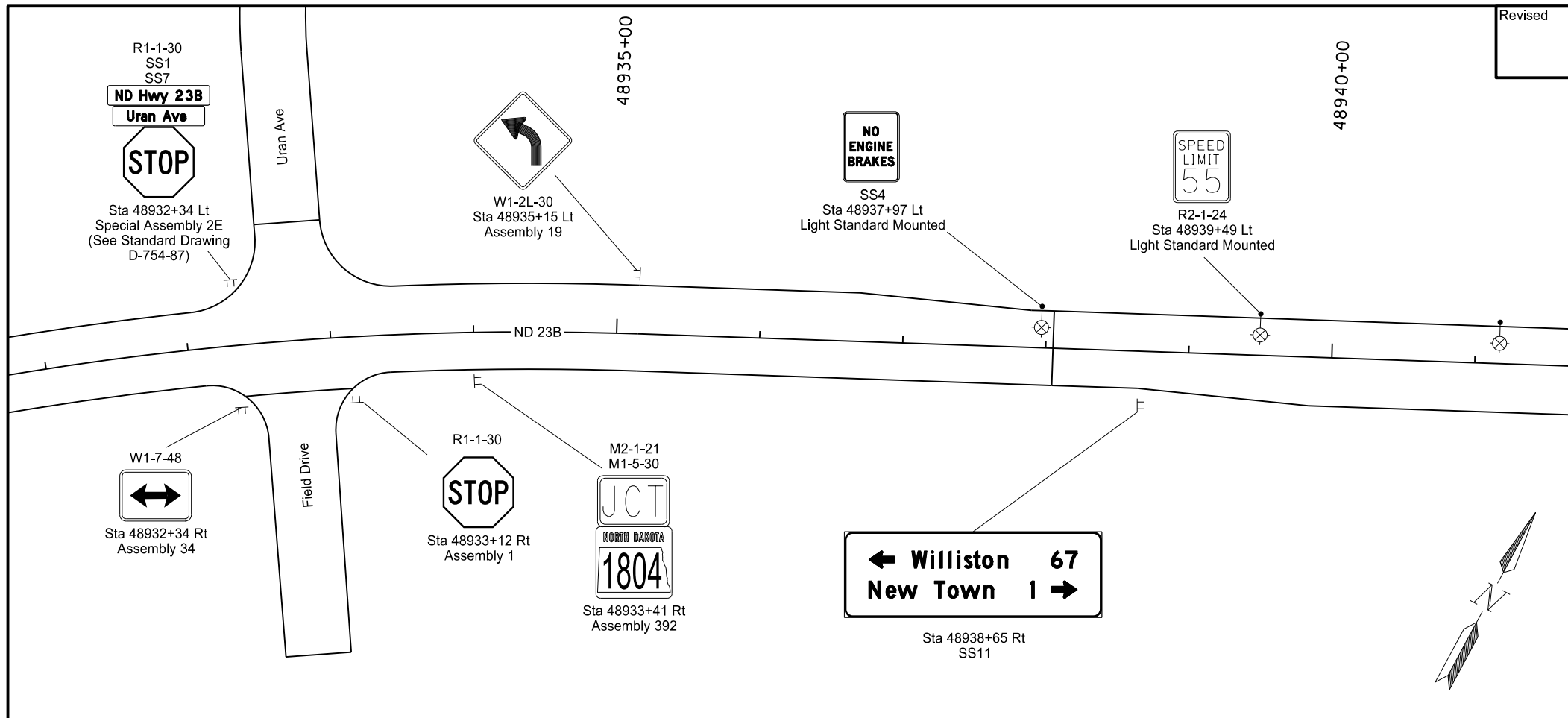
Station / RP	Sign No.	Assembly No.	Flat Sheet For Signs		Sign Support Length				Vert Clearance FT	Support Size	Max Post Len LF	Sleeve Length				Sleeve Size	Anchor EA	Anchor LF	Anchor Size	Reset Sign Panel EA	Reset Sign Support EA	Break-Away EA	Comments
			IV SF	XI SF	1st LF	2nd LF	3rd LF	4th LF				1st LF	2nd LF	3rd LF	4th LF								
ND 23 B (Proposed)																							
48876+00 Rt	M1-5	372	7.0		12.2				5.0	2.5 x 2.5 12 ga	14.1							1	4	3 x 3 7 ga			
48877+00 Lt	W2-4	19		6.3	12.4				5.0	2.5 x 2.5 12 ga	14.6							1	4	3 x 3 7 ga			
48879+00 Lt	SA-A		15.2		13.2				5.0	2.5 x 2.5 10 ga	14.4	4.1			2.19 x 2.19 10 ga			1	4	3 x 3 7 ga		1	
48880+00 Rt	R2-1	9		5.0	11.6				5.0	2.25 x 2.25 12 ga	15.0							1	4	2.5 x 2.5 12 ga			
48881+80 Lt	SS8		28.0		11.9	12.9			5.0	2.5 x 2.5 10 ga	13.9	3.4	4.4		2.19 x 2.19 10 ga			2	8	3 x 3 7 ga		2	
48884+00 Rt	SS4	9		5.0	11.6				5.0	2.25 x 2.25 12 ga	15.0							1	4	2.5 x 2.5 12 ga			
48885+80 Lt	M1-5	391	6.2		12.4				5.0	2.25 x 2.25 12 ga	12.7							1	4	2.5 x 2.5 12 ga			
48889+80 Lt	W3-3	19		6.3	12.4				5.0	2.5 x 2.5 12 ga	14.6							1	4	3 x 3 7 ga			
48891+76 Rt	SA-F			6.3					5.0														
48892+00 Lt	R2-1	9		5.0	10.6				5.0	2 x 2 12 ga	11.5							1	4	2.25 x 2.25 12 ga			
48892+66 Lt	SA-E		4.0	4.0	12.9				5.0	2.5 x 2.5 10 ga	15.4							1	4	3 x 3 7 ga		1	
48892+86 Rt	SA-E		4.0	4.0	12.9				5.0	2.5 x 2.5 10 ga	15.4							1	4	3 x 3 7 ga		1	
48893+67 Lt	R1-1	1		5.2	10.6				5.0	2.25 x 2.25 12 ga	13.7							1	4	2.5 x 2.5 12 ga			
48894+25 Rt	W1-7	34		8.0	10.2				5.0	2.5 x 2.5 12 ga	11.3							1	4	3 x 3 7 ga			
48896+00 Rt	R2-1	9		5.0	11.6				5.0	2.25 x 2.25 12 ga	15.0							1	4	2.5 x 2.5 12 ga			
48909+23 Rt	W1-2R	19		6.3	12.3				5.0	2.5 x 2.5 12 ga	14.6							1	4	3 x 3 7 ga			
48919+58 Lt	SA-2E		19.0	5.2	11.5				5.0	2.5 x 2.5 12 ga	12.6	3.3			2.25 x 2.25 12 ga			1	4	3 x 3 7 ga		1	
48920+53 Rt	SA-2E		19.0	5.2	11.5				5.0	2.5 x 2.5 12 ga	12.6	3.3			2.25 x 2.25 12 ga			1	4	3 x 3 7 ga		1	
48928+91 Rt	W3-1	20		9.0	12.6				5.0	2.25 x 2.25 12 ga	14.1	3.9			2 x 2 12 ga			1	4	3 x 3 7 ga		1	
48932+34 Rt	W1-7	34		8.0	10.9				5.0	2.5 x 2.5 10 ga	13.6							1	4	3 x 3 7 ga		1	
48932+34 Lt	SA-2E		17.0	5.2	13.5				5.0	2.5 x 2.5 10 ga	15.5	3.6			2.19 x 2.19 10 ga			1	4	3 x 3 7 ga		1	
48933+12 Rt	R1-1	1		5.2	11.7				5.0	2.25 x 2.25 12 ga	13.7							1	4	2.5 x 2.5 12 ga			
48933+41 Rt	M1-5	392	7.2		12.5				5.0	2.5 x 2.5 12 ga	13.9							1	4	3 x 3 7 ga			
48935+15 Lt	W1-2L	19		6.3	12.3				5.0	2.5 x 2.5 12 ga	14.6							1	4	3 x 3 7 ga			
48937+97 Lt	SS4	9		5.0					5.0													Mount on Light Standard	
48938+65 Rt	SS11		18.8		11.4	12.4			5.0	2.25 x 2.25 12 ga	12.9	3.6	4.6		2 x 2 12 ga			2	8	3 x 3 7 ga		2	
48939+49 Lt	R2-1	9		5.0					5.0													Mount on Light Standard	
48942+79 Lt	M1-5	372	7.0						5.0													Mount on Light Standard	
48944+91 Rt	R1-1	3		13.3	10.1				5.0	2.5 x 2.5 12 ga	12.4	2.6			2.25 x 2.25 12 ga			1	4	3 x 3 7 ga		1	
48945+04 Lt	SA-D		15.4		14.8	15.4			5.0	2.5 x 2.5 10 ga	16.9							2	8	3 x 3 7 ga		2	
Sub Total			167.8	133.8		Total	352.4										Total	116		0	0	15	

<p>This document was originally issued and sealed by Jessica R. Karls, Registration Number 8408, on 10/30/2017 and is stored at the North Dakota Department of Transportation.</p>	<p>Sign Summary Perforated Tube</p>
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Station / RP	Sign No.	Assembly No.	Flat Sheet For Signs		Sign Support Length				Vert Clearance FT	Support Size	Max Post Len LF	Sleeve Length				Sleeve Size	Anchor EA	Anchor LF	Anchor Size	Reset Sign Panel EA	Reset Sign Support EA	Break-Away EA	Comments
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ND 1804																							
13102+75 Rt	M1-5	394	9.2		13.0				5.0	2.5 x 2.5 10 ga	13.9						1	4	3 x 3 7 ga			1	
13106+75 Rt	SS13		9.8		10.9	11.9			5.0	2.25 x 2.25 12 ga	13.3						2	8	2.5 x 2.5 12 ga				
13108+75 Lt	R2-1	9		5.0	11.2				5.0	2 x 2 12 ga	11.5						1	4	2.25 x 2.25 12 ga				
13110+75 Rt	SA-B		16.4		13.1	13.7			5.0	2.5 x 2.5 10 ga	14.7						2	8	3 x 3 7 ga			2	
13112+75 Lt	M1-5	372	7.0		12.2				5.0	2.5 x 2.5 12 ga	14.1						1	4	3 x 3 7 ga				
13117+50 Rt	M1-5	372	7.0		12.2				5.0	2.5 x 2.5 12 ga	14.1						1	4	3 x 3 7 ga				
13119+50 Lt	SA-B		16.4		13.1	13.7			5.0	2.5 x 2.5 10 ga	14.7						2	8	3 x 3 7 ga			2	
13121+50 Rt	R2-1	9		5.0	11.6				5.0	2.25 x 2.25 12 ga	15.0						1	4	2.5 x 2.5 12 ga				
13121+50 Lt	R2-1	9		5.0	11.6				5.0	2.25 x 2.25 12 ga	15.0						1	4	2.5 x 2.5 12 ga				
13124+50 Lt	SS14		10.5		11.0	12.0			5.0	2.25 x 2.25 12 ga	12.4						2	8	2.5 x 2.5 12 ga				
13127+50 Lt	M1-5	394	9.2		13.3				5.0	2.5 x 2.5 10 ga	13.9						1	4	3 x 3 7 ga			1	
13135+43 Lt	SS5			34.0	13.2	13.9	14.7		5.0	2.5 x 2.5 12 ga	15.0	3.9	4.6	5.3	2.25 x 2.25 12 ga		3	12	3 x 3 7 ga			3	
Sub Total			85.5	49.0	Total	226.6											Total	72		0	0	9	
40th St NW																							
50+60 Rt	R2-1	9		5.0	11.7				5.0	2.25 x 2.25 12 ga	15.0						1	4	2.5 x 2.5 12 ga				
59+00 Rt	M1-5	394		9.2	13.3				5.0	2.5 x 2.5 10 ga	13.9						1	4	3 x 3 7 ga			1	
61+25 Rt	W3-1	20		9.0	13.0				5.0	2.25 x 2.25 12 ga	14.1	4.2		2 x 2 12 ga			1	4	3 x 3 7 ga			1	
62+00 Lt	R2-1	9		5.0	11.7				5.0	2.25 x 2.25 12 ga	15.0						1	4	2.5 x 2.5 12 ga				
65+30 Rt	R2-1	9		5.0	12.0				5.0	2.25 x 2.25 12 ga	15.0						1	4	2.5 x 2.5 12 ga				
65+95 Lt	W3-1	20		9.0	12.5				5.0	2.5 x 2.5 10 ga	12.9						1	4	3 x 3 7 ga			1	
68+20 Lt	M1-5	394		9.2	12.9				5.0	2.5 x 2.5 10 ga	13.9						1	4	3 x 3 7 ga			1	
Sub Total			0.0	51.4	Total	87.0											Total	28		0	0	4	
Grand Total			545.5	393.1	Total	1,124.1											Total	368	0	2	0	51	

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Revised	10/30/17	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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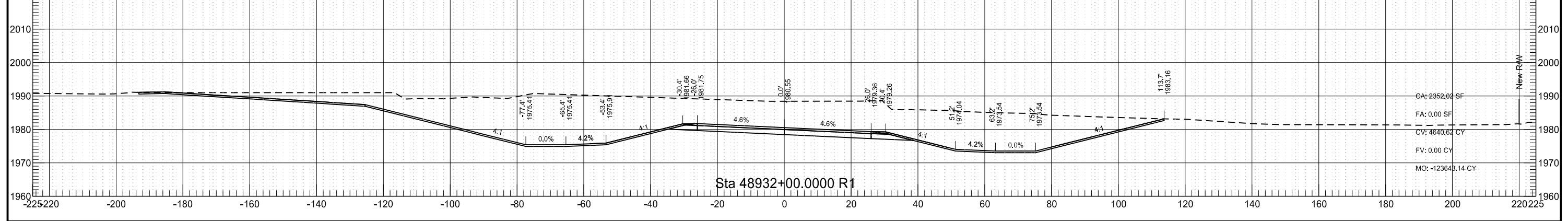
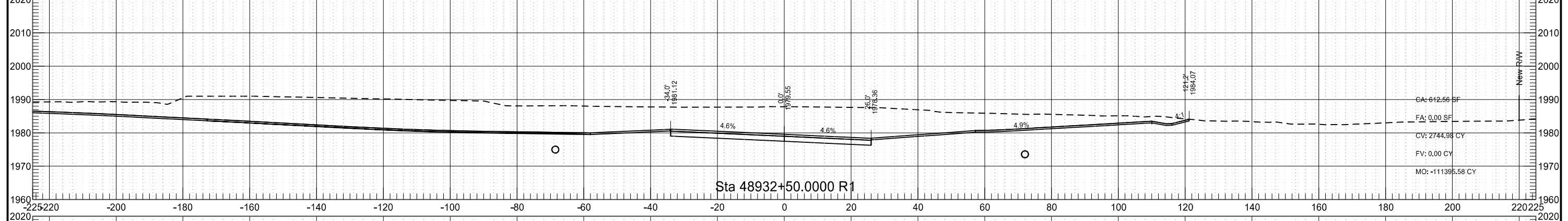
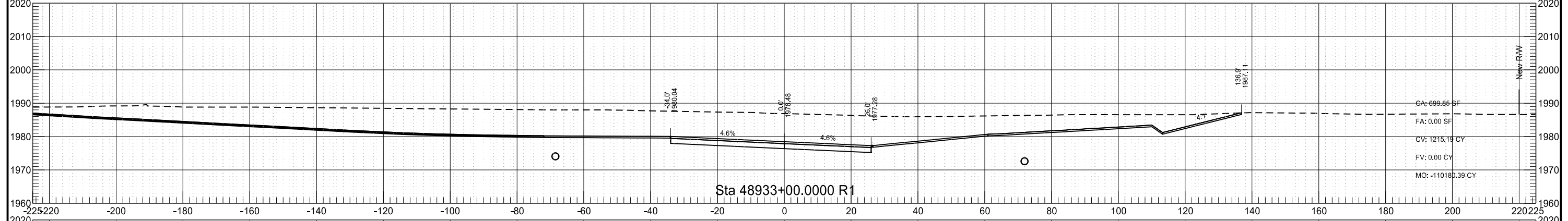
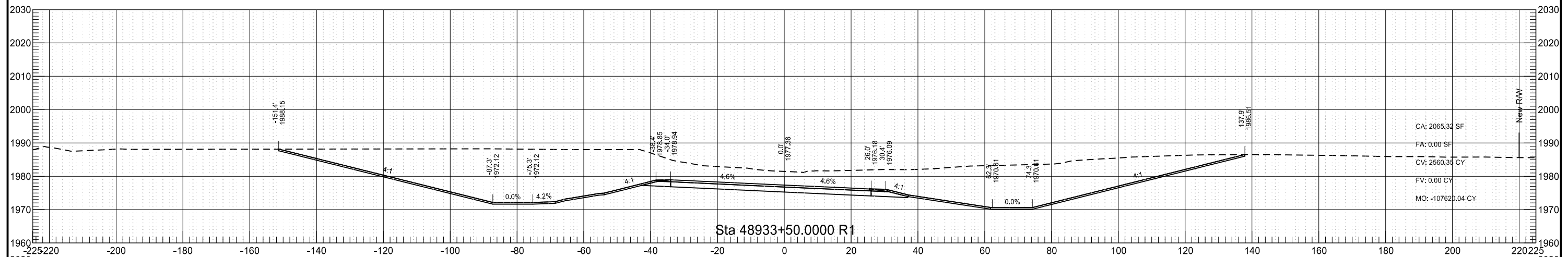


This document was originally issued and sealed by Jessica R. Karls Registration Number PE- 8408, on 10/30/17 and the original document is stored at the North Dakota Department of Transportation

ND 23B Truck Reliever Route
 Permanent Signing Layout
 Sta 48931+00 to Sta 48945+60
 (PRND23)

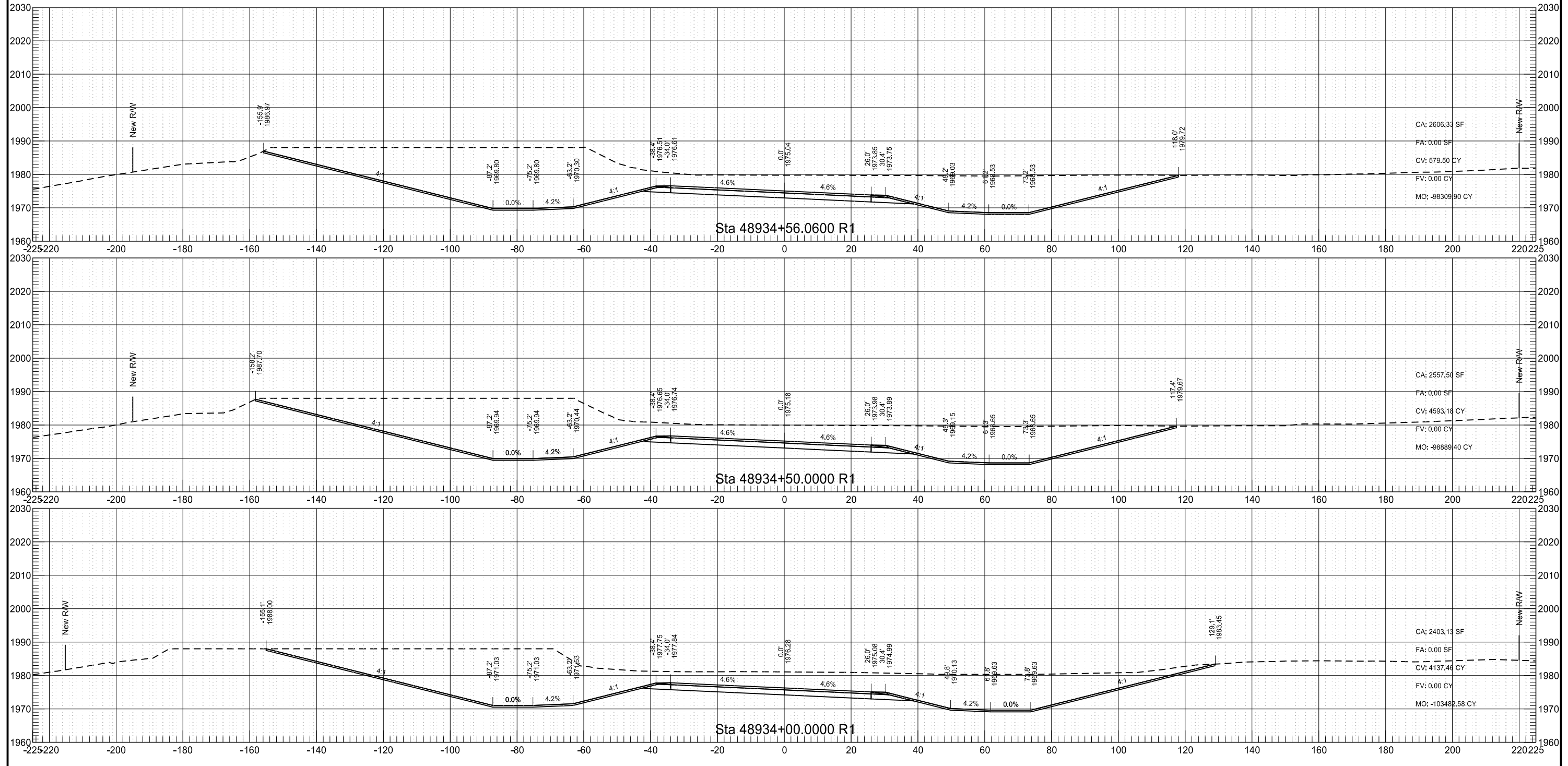
ND 23B Phase 1

Revised 10/27/17	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	AC-NH-SOIB-7-023(041)925	200	33



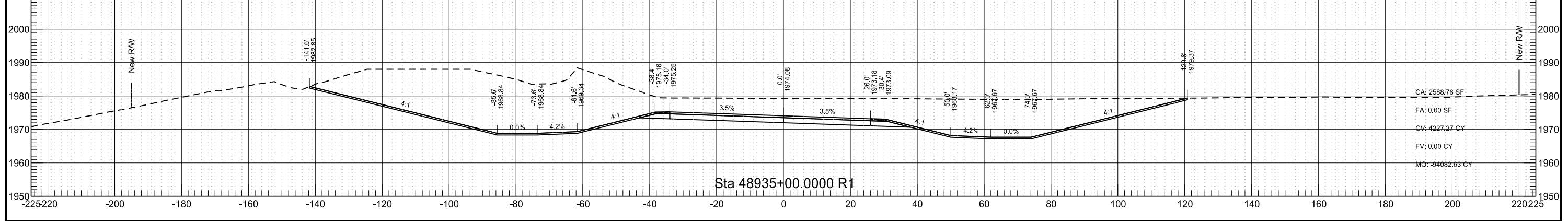
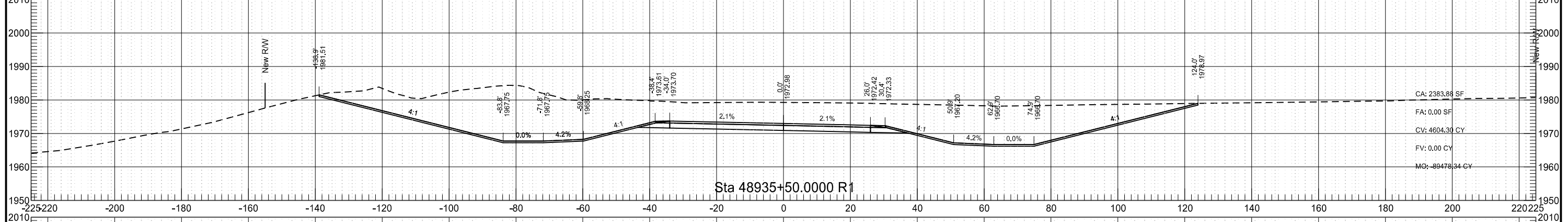
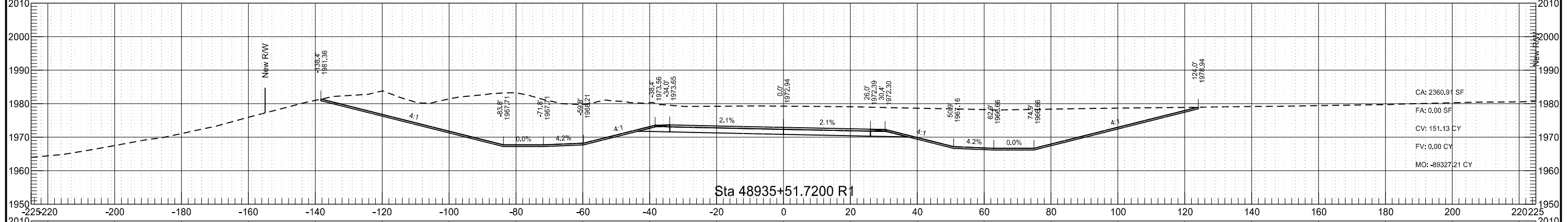
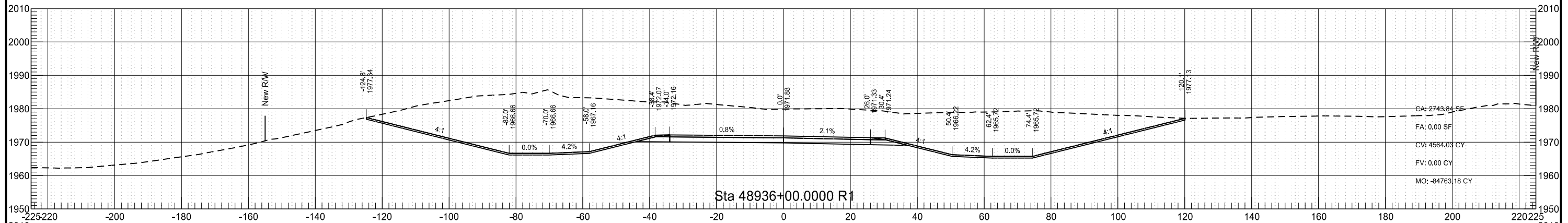
ND 23B Phase 1

Revised	10/27/17	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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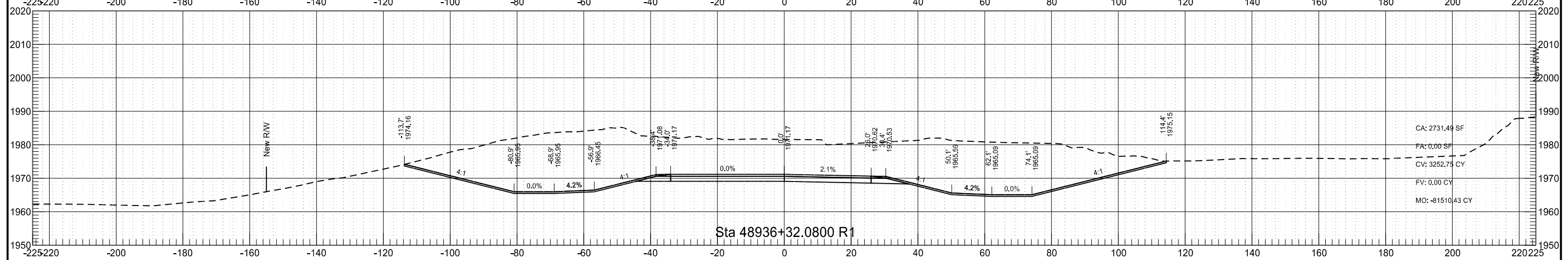
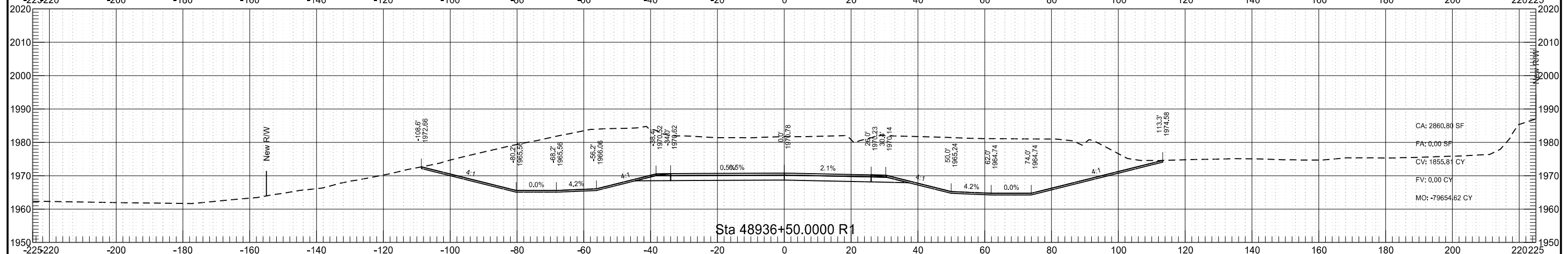
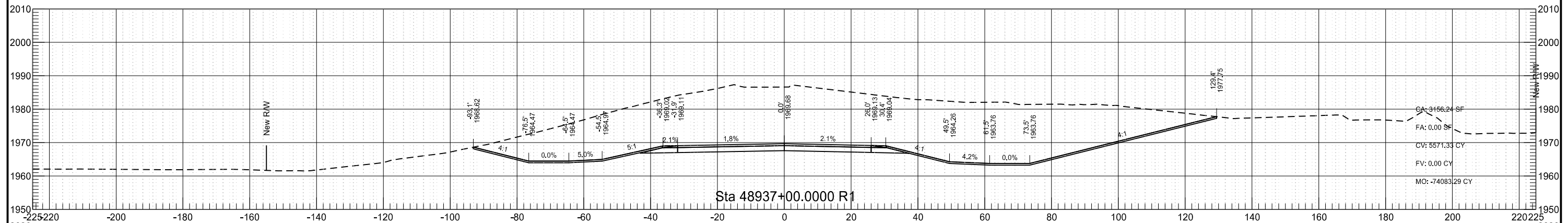
ND 23B Phase 1

Revised 10/27/17	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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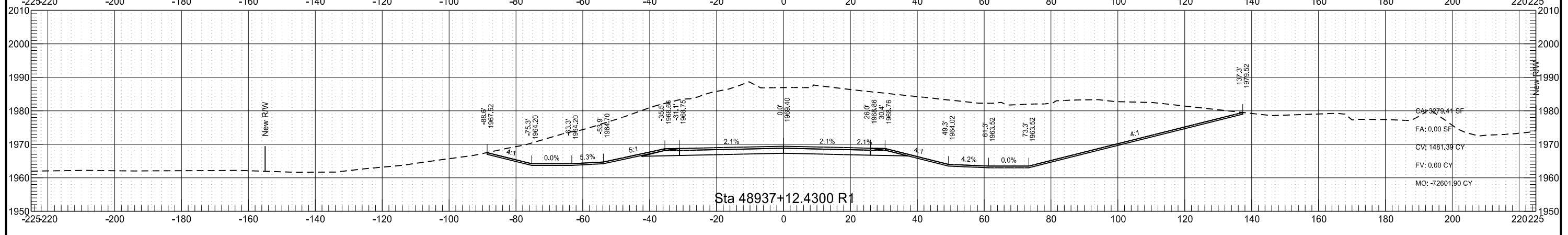
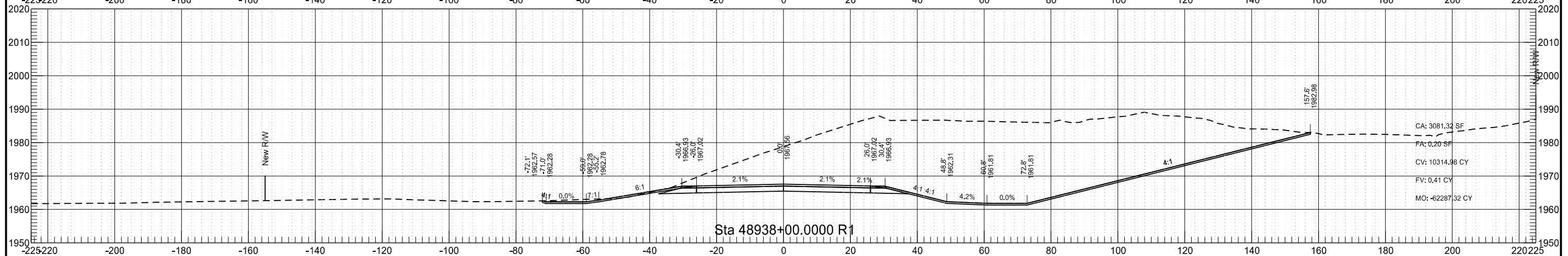
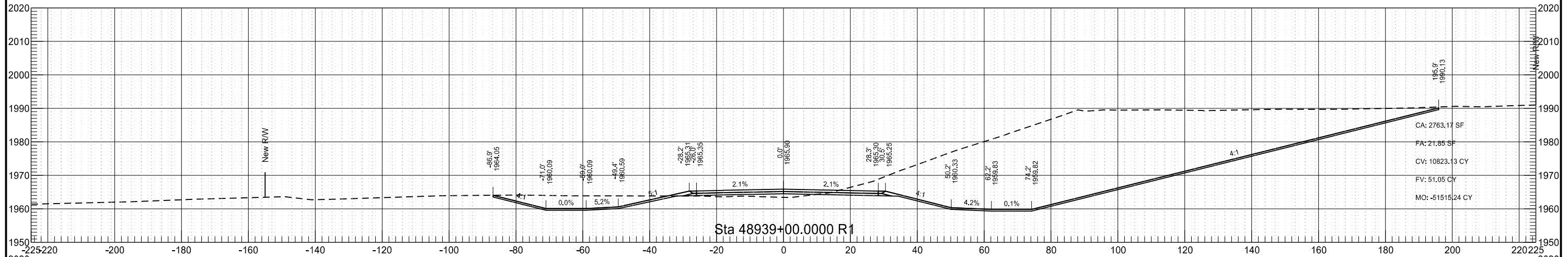
ND 23B Phase 1

Revised 10/27/17	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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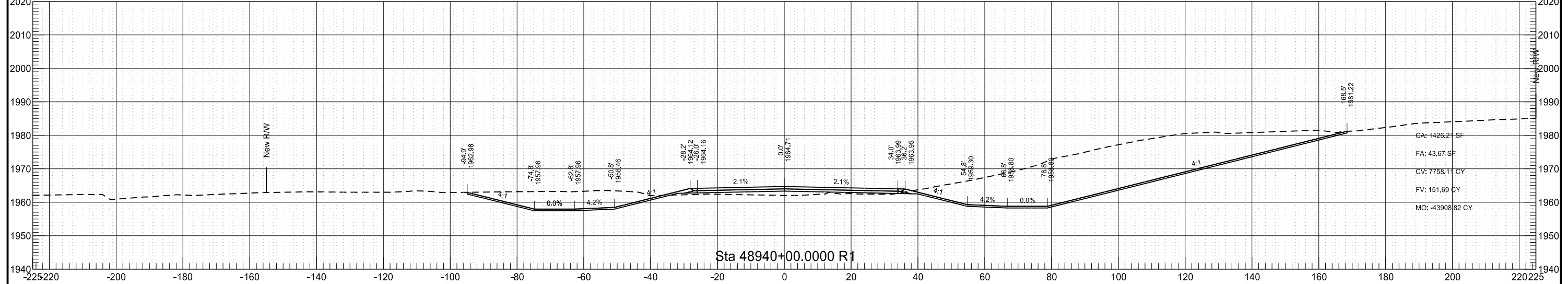
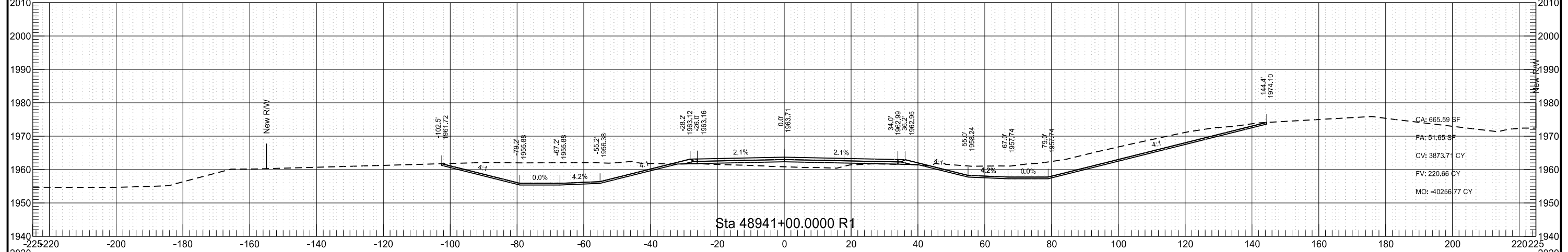
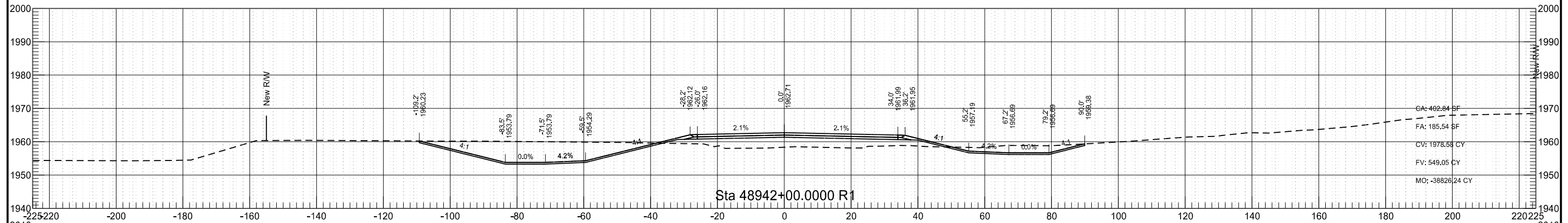
ND 23B Phase 1

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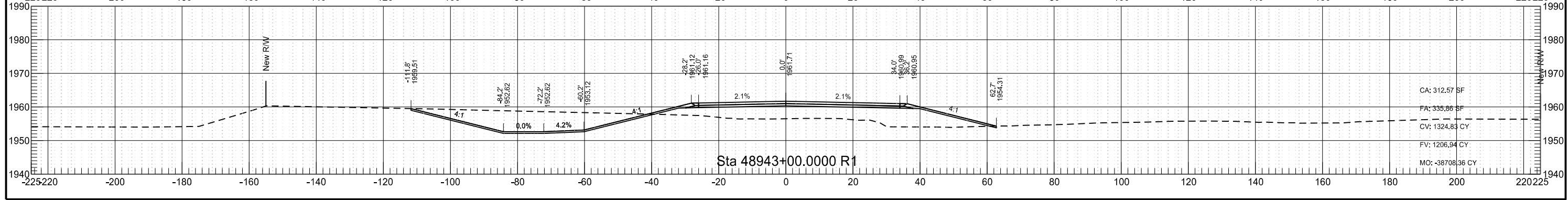
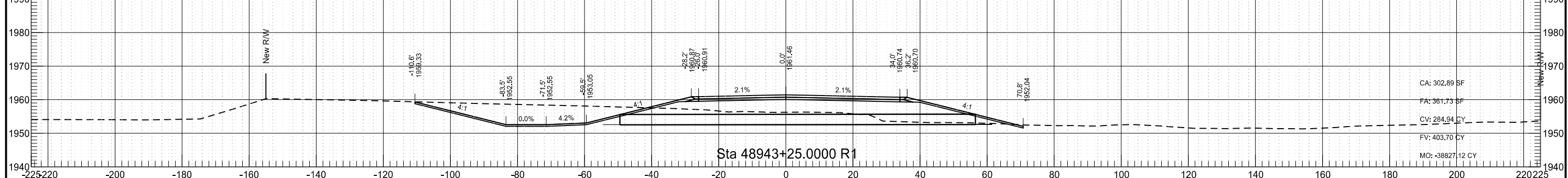
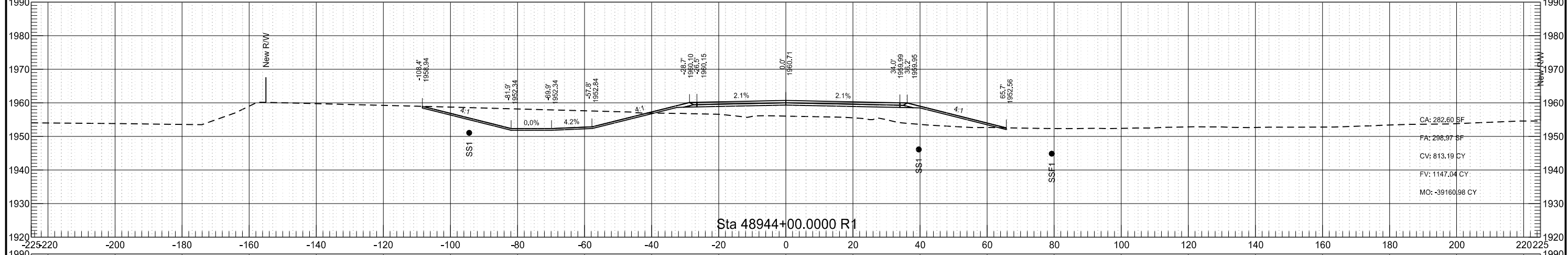
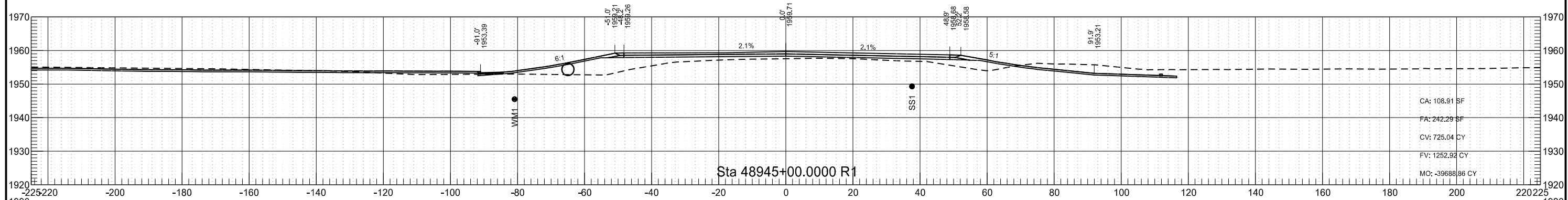
ND 23B Phase 1

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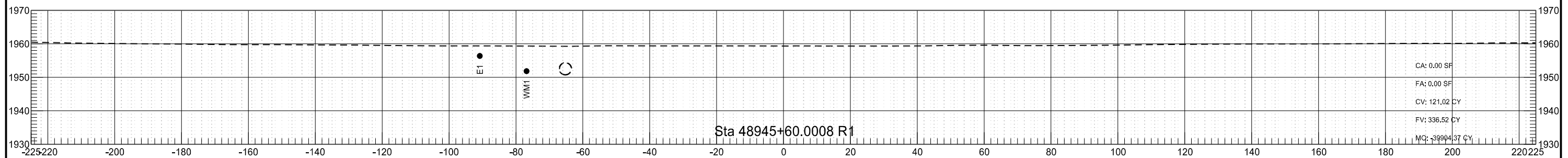
ND 23B Phase 1

Revised 10/27/17	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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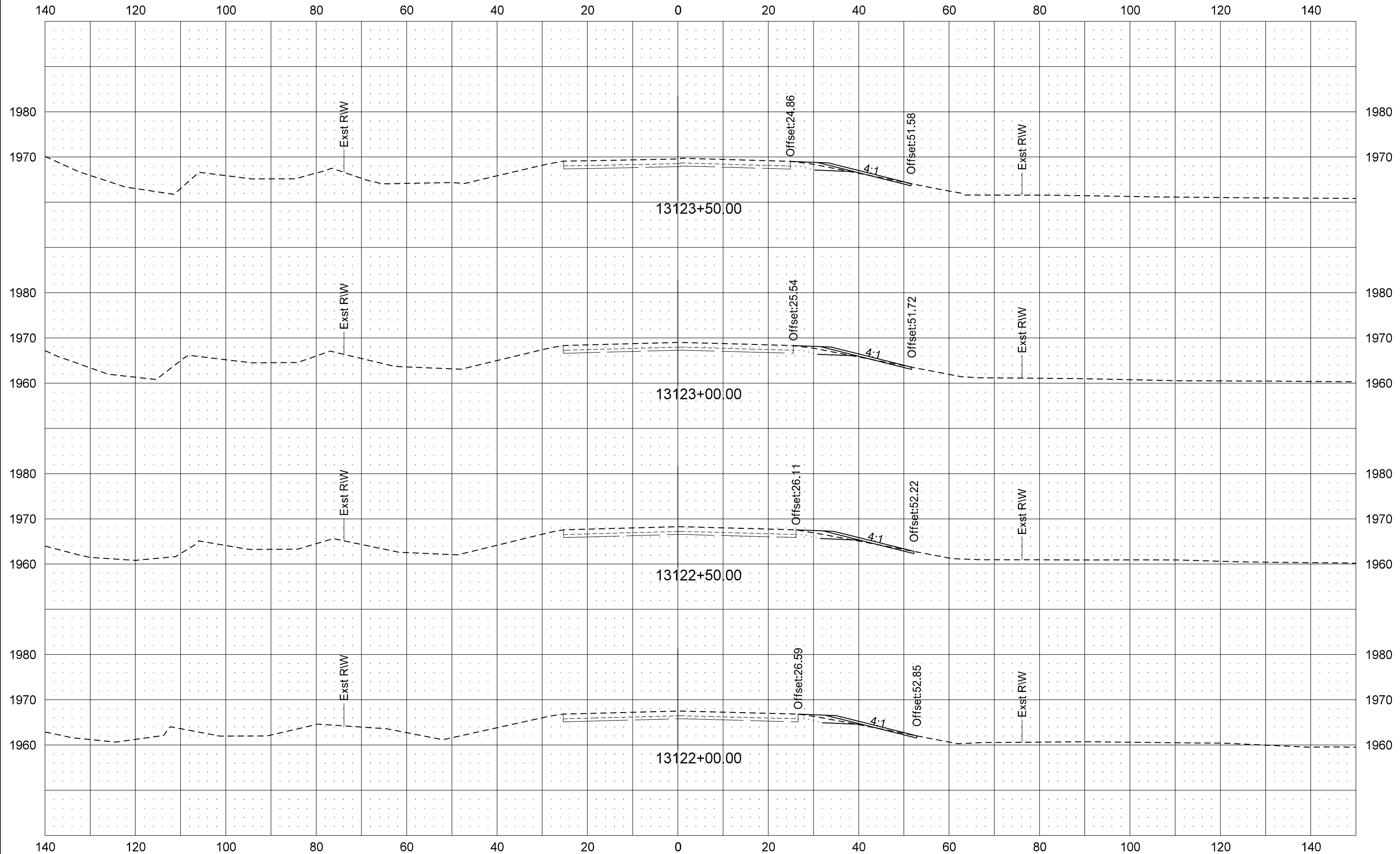


ND 23B Phase 1

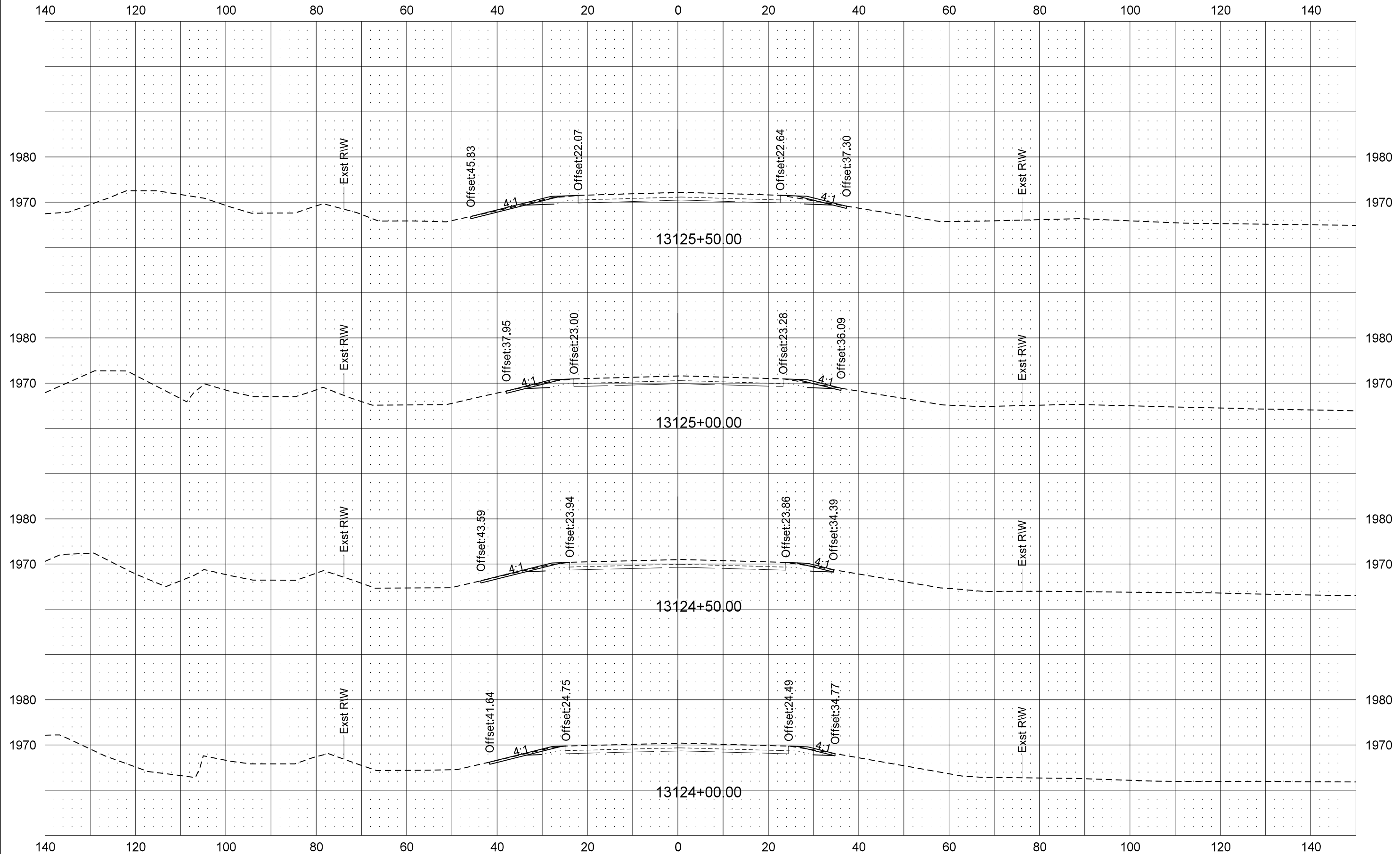
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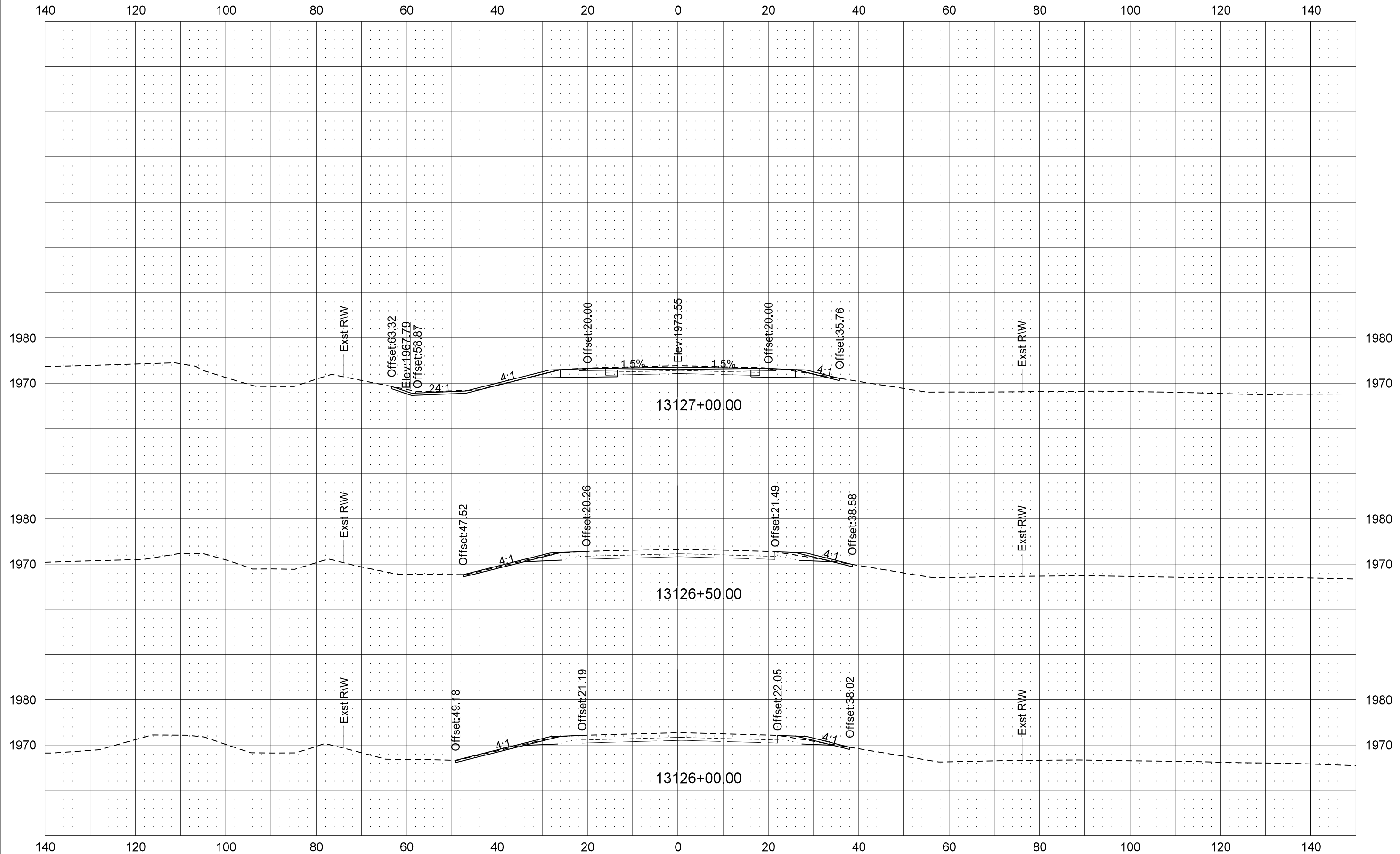


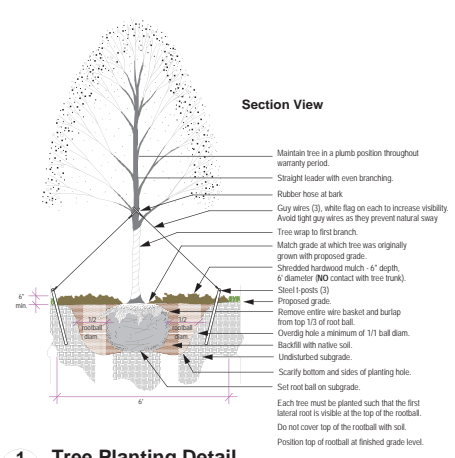
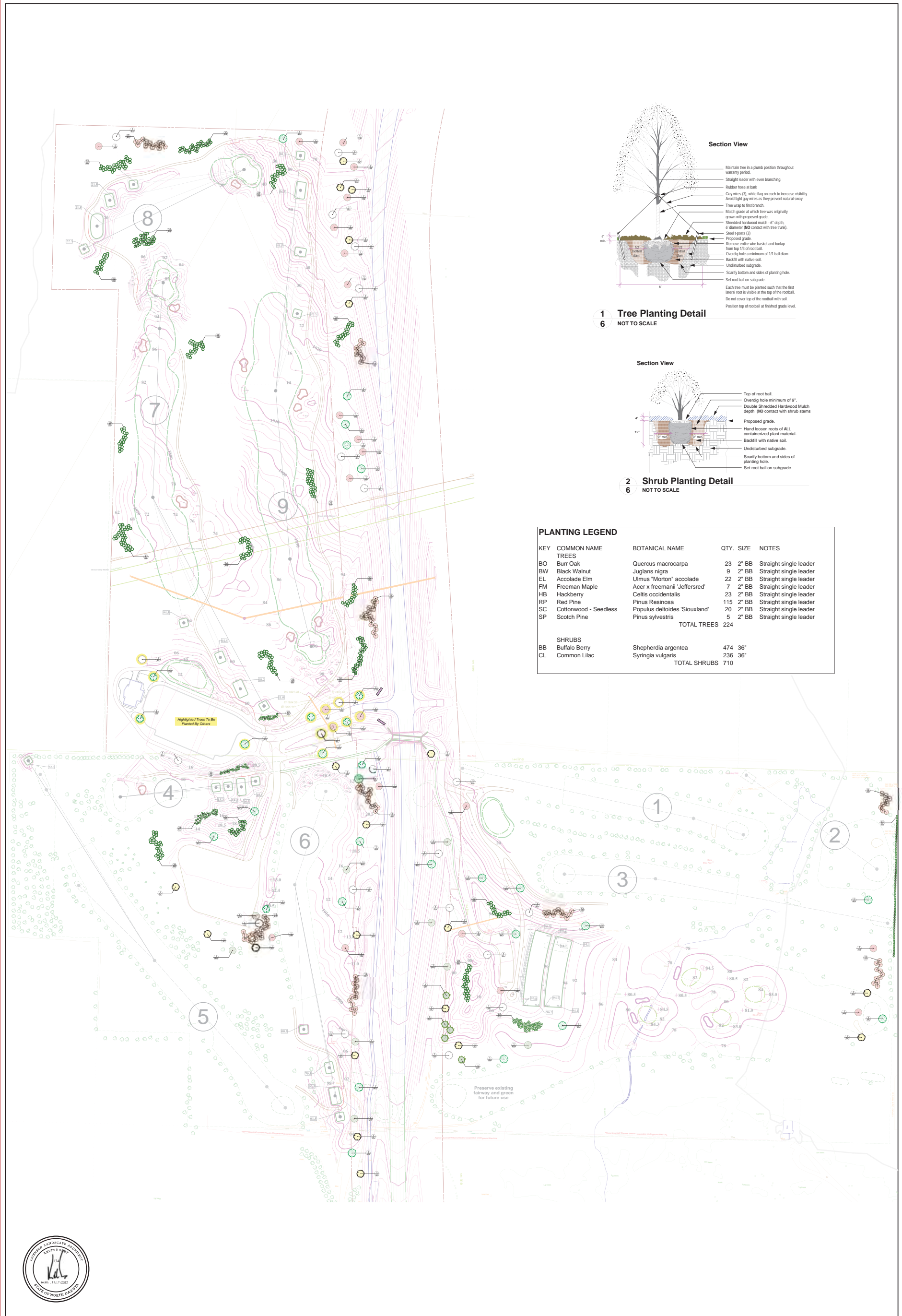
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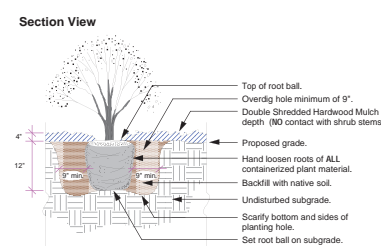
Added	11/07/17	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
		ND	AC-NH-SOIB-7-023(041)935	200	193







1 Tree Planting Detail
6 NOT TO SCALE



2 Shrub Planting Detail
6 NOT TO SCALE

PLANTING LEGEND

KEY	COMMON NAME	BOTANICAL NAME	QTY.	SIZE	NOTES
TREES					
BO	Burr Oak	Quercus macrocarpa	23	2" BB	Straight single leader
BW	Black Walnut	Juglans nigra	9	2" BB	Straight single leader
EL	Accolade Elm	Ulmus "Morton" accolade	22	2" BB	Straight single leader
FM	Freeman Maple	Acer x freemanii 'Jeffersred'	7	2" BB	Straight single leader
HB	Hackberry	Celtis occidentalis	23	2" BB	Straight single leader
RP	Red Pine	Pinus Resinosa	115	2" BB	Straight single leader
SC	Cottonwood - Seedless	Populus deltoides 'Siouxland'	20	2" BB	Straight single leader
SP	Scotch Pine	Pinus sylvestris	5	2" BB	Straight single leader
			TOTAL TREES	224	
SHRUBS					
BB	Buffalo Berry	Shepherdia argentea	474	36"	
CL	Common Lilac	Syringia vulgaris	236	36"	
			TOTAL SHRUBS	710	



Sheet:
GOLF COURSE PLANTING PLAN

Golf Course Architect:
HERFORD NORBY
ARCHITECTS
100 East Second Street, Suite 200
Chaska, MN 55318
(952) 361-0644
email: gcln@herfnorby.com
web: herfnorby.com

Engineers:
KLJ
3203 32nd Ave. S., Suite 201
Fargo, ND 58103
(701) 232-5353
web: kljeng.com

October 4, 2017
Revisions:
11/7/17 Added trees and shrubs, updated plant list

This plan and the concepts represented herein are the property of Herford Norby Golf Course Architects. Use of this plan shall require prior written approval by Herford Norby Golf Course Architects.

6



**THREE AFFILIATED TRIBES
FORT BERTHOLD RURAL WATER – OWNER FOR
SP 557 (14)**

**SPECIAL PROVISIONS 557 (14) -
FORT BERTHOLD RURAL WATER
LINE**

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION

FORT BERTHOLD RURAL WATER LINE

Project: AC-NH-SOIB-7-023(041)925 – PCN 19862

(1) - Maintenance Warranty of Pipelines

DESCRIPTION

A. Maintenance Warranty of Pipelines

A maintenance warranty period of five (5) years beginning on the date of substantial completion, shall be provided by the Contractor. The Contractor shall be responsible for the repair of all defects, leaks, or failures occurring in the pipe, pipe joints, fittings and valves, at air chambers, and connections to vaults, or other appurtenances from any cause whatsoever, and for all damages to property, and crops resulting from such defects, leaks, failures, or repair of same, except for such leaks, defects, or failures which are as determined by the Owner (Fort Berthold Rural Water, FBRW), due to defects in materials, pipeline corrosion, or negligence in the operation of the system by the Owner (FBRW) or its agents, acts of third parties, acts of God, or acts of the common enemy. The Contractor shall also be responsible for repair of all settlement around buried prefabricated vaults, and associated damage caused to equipment, and electrical components including conduits, and wiring from any cause whatsoever.

The Contractor, upon notice from the Owner (FBRW), shall promptly commence and diligently prosecute the repair of any defects, leaks, or failures that develop during the maintenance warranty period. The work of repairing any defects, leaks, or failures includes the necessary excavation, pipe repair, backfill, compacting backfill and replacement of any appurtenances destroyed or disturbed by reason of such work. Repairs as may be required, in the opinion of the Owner (FBRW), shall be made by the Contractor in such a manner as to cause the least practicable interference with the use of the pipelines in service. The Contractor shall immediately notify the utility locating service and make necessary arrangements to have competent personnel and suitable equipment available so that repairs may be commenced within 48 hours after receipt of notice from the Owner (FBRW).

If the Contractor fails or refuses to make required repairs or replacements with due promptness and diligence as determined by the Owner, the Owner shall have the right to make repairs and replacements and pay personal property and crop damages that result from such pipeline defects, leaks, or failures and their repair and, unless it is determined that the costs of such work is chargeable to the Owner, the entire costs thereof shall be paid by the Contractor and may be collected from the Contractor.

B. Cost

The cost of furnishing the maintenance warranty of the pipelines therefore shall be included in the price for the Lump Sum Bid of all 557 (14) items of work and no separate payment shall be made therefore.

(2) – Coordination of Work

DESCRIPTION

A. INTERFERENCE WITH THE OWNER'S EXISTING LINES

The Owner (FBRW) advises that the location of the existing water pipelines are generally known. However, exact locations are not available. The Owner (FBRW) will provide flagging of lines to be installed. If an existing line (currently in use) is accidentally or incidentally damaged during construction of new lines, the Contractor will provide the materials necessary to make the repair. The Contractor shall have the necessary materials on hand. The Owner (FBRW) will provide personnel to assist in isolating the repair area and to put the system back into operation upon completion of the repair work. The Contractor shall provide the necessary tools, labor, equipment, and personnel to make the repair. Such work, if necessary, shall be subsidiary to the pipeline installation. If existing lines are hit due to negligence of the Contractor as determined by the Owner (FBRW) or Owner's Representative, the Contractor shall be wholly responsible for all costs associated with the necessary repairs. The hitting, breaking, or encountering of existing pipelines during construction shall not be grounds for an extension of time, grounds for a claim of lost production or other work, or the basis for a change order.

(3) – Cooperation with Others, Sequence of Construction, & Related Construction Requirements

DESCRIPTION

A. Cooperation With Landowners

At all times, the Contractor shall extend full cooperation to all landowners performing necessary private work including private use of land. The Contractor shall notify each owner and tenant of land or other property not less than five days prior to occupation of such land by the Contractor. The landowner will be requested to assist the Owner's Representative in locating all underground constructions within their property as required by Specification Section 557.09 (14), Part 3, Subsection E. Utility Crossings.

B. Related Construction Requirements

Listed below are construction related items which may impact the sequence of construction and which shall be complied with throughout construction:

1. Winter Pipelaying:

Trenching and pipelaying operations as well as structural excavation and backfill shall not commence prior to April 15 of each year involving construction and such operations shall cease by November 30th (onset of the winter season) or earlier if, in the opinion of the Owner's Representative, the backfill material begins to form frozen chunks. Exceptions will be considered for road crossings, restrained joint areas, and stream crossings. Consideration will be given by the Owner (FBRW) in allowing winter pipelaying construction and structural work if the Contractor can demonstrate his ability to meet the Contract requirements on a continuous basis. If, in the judgement of the Owner (FBRW), the Contractor's pipe laying progress during the winter season falls below that achieved during the normal construction season, the Contractor shall cease all pipelaying operations as ordered by the Owner.

The Time For Completion is based on consecutive calendar days which considered a winter shutdown period from November through April. Therefore, no time extension will be given for cessation of work during the winter period unless specifically approved by the Owner. The Owner and its Representatives and Engineer shall not be held liable for any expenses incurred by the Contractor for a winter shutdown.

2. Gravel Surfacing:

In areas where existing gravel surfacing is disturbed by construction, gravel surfacing shall be placed to the depths and widths which existed prior to construction or as shown on the Drawings. Materials and placement shall be in accordance with NDDOT Section 302 of the Specifications. Additional gravel shall be placed at a minimum rate of 18 c.y. per 100 ft. of roadway on any road section which has been used as a temporary stockpile site for excavated trench material. Replacement of gravel surfacing shall be made within one day of completion of the backfill of the affected area. Unless otherwise noted, restoration of gravel surfacing shall be subsidiary to the work.

3. Stringing of Pipe for Trench Installation

No stringing of pipe for installation shall be made until the line segment has been flagged by the Owner's Representative. Pipe stringing operations shall not precede pipeline installation by more than 2 miles or the amount of pipeline which can be installed in five (5) normal working days based on performance on this project, whichever is more.

4. Length of Open Trench

In City and rural subdivision areas, limit the length of open trench to 500 feet in advance of pipelaying or amount of pipe installed in one working day, whichever is less. Complete the backfilling operations not more than 500 feet in the rear of pipelaying or the amount of pipe installed in one working day, whichever is less. Limit the length of open trenches in railroad, state, county, or township right-of-way as required by the encroachment permit(s) or as detailed in these Specifications or Contract Drawings. All open trenches shall be backfilled or must be barricaded, at the end of each working day.

5. Excess Excavated Over-Burden in City Limits or Subdivisions:

The Contractor shall remove excess trench zone material from the construction sites located within City Limits or rural subdivisions and dispose at a suitable disposal area. Removal of excess material in City work areas and rural subdivisions shall not lag pipelaying operations by more than 500 feet or the amount of pipe installed in one working day, whichever is less.

6. Construction Within Yard Areas:

Any work performed in a yard area shall be installed and clean-up accomplished within two (2) calendar days of the start of such work. All topsoil excavated from a yard area shall be stockpiled and replaced within the total yard area. Areas within a 50' radius around meter pits or curbstops in yard areas shall also be raked within this time period. The Contractor shall clean up all portions of the project and signed releases by the landowner shall not relieve the Contractor of the responsibility of clean-up to an equal or better condition of the site prior to construction.

7. Crossing of Water and Sewer Mains:

Existing water and sewer mains may be encountered during construction. Crossing made over or under sewer mains shall be in accordance with the N.D. State Health Department Requirements. Additional crossing requirements are given in Specification Section 557.09 (14). Criteria for water mains crossing sewers according to the "Recommended Standards for Water Works" - Great Lakes, Upper Mississippi River Board of State Sanitary Engineers are also attached to the Appendix. These criteria are provided as a supplement to the N.D. State Health Department Criteria and Contract Document requirements.

8. Moving Conflicting Utilities (Including Sewer & Water Services):

Sewer services, water services, and other utility service lines are not shown on the Contract Drawings. Interference with these services may occur. If such situations arise, the Contractor shall move the conflicting utilities (such as water service leads, sewer service lines, gas lines, etc.) or adjust the FBRW pipeline vertical and/or horizontal alignment to maintain required vertical and/or horizontal separations. All proposed modifications to the pipeline alignment shall be presented to the Owner's Representative for review and all changes made shall conform to the recommendations of the Owner's Representative.

9. Disruption of Water Service:

The Owner (FBRW) requires that the interruption of service to the Owner's customers and other private individuals and businesses be held to an absolute minimum. The Owner shall be given at least two (2) days notice prior to making any of the connections to the existing pipelines. All fittings, materials, and appurtenances required to complete the connection and place the system back into operation shall be present prior to shutting down the line and cutting the pipeline to make the actual connection.

Disruption of water service to residential and/or places of business as a result of the Contractor's operations shall be limited to a maximum of 8 (eight) hours. In the event that disruption of a particular service will be longer than 8 hours, the Contractor shall provide temporary potable water service which meets the N.D. Dept. of Health requirements for potable water to the affected residence or place of business for drinking purposes. In the event that disruption of a particular service will be longer than 24 hours, the Contractor shall provide temporary potable water service which meets the entire domestic water demands of the affected residence or place of business. The Contractor shall at all times maintain on site, the materials required for providing temporary water services.

10. Water for Hydrostatic Testing:

It is anticipated that the Contractor will be able to utilize treated water provided from the existing facilities for the purpose of hydrostatic testing all pipelines in accordance with Section 557.05 (14), Part C.

The Contractor shall be responsible for providing all necessary materials, equipment, tools and labor for the connection to the existing facilities.

C. Pre-Final Review and Acceptance

The Contractor shall notify the Owner's Representative, in writing, of his request for a Pre-Final Review for the project or a segment thereof (if sectionalized by the Owner's Representative). A representative from the Owner, the Owner's Representative and the Contractor shall be present for this field review. Representatives from the US Bureau of Reclamation, the Bureau of Indian Affairs, the US Natural Resource and Conservation Service, and Fort Berthold Rural Water may also be present for this review. The representatives will review the completed work and advise the Contractor of any items which require correction. If a list of items requiring correction is provided to the Contractor, said list shall not be construed as the only work remaining to be completed on the

project and relieving the Contractor of their contractual obligations.

Any problems or items requiring corrections which are noted or which arise after the Pre-Final Review shall be considered after the fact and may be recognized as being included under the Contractor Guarantee.

D. Clean-up After Backfilling

See Section 557.07 (14), Part 3, Subsection E.

E. Contractor Responsibility for Backfill Settlement

See Section 557.07 (14), Part 3, Subsection P.

F. Repairs After Job Completion

See Section 557.07 (14), Part 3, Subsection Q.

G. Contract Special Provisions

The specifications, drawings, and other contract documents are essential parts of the Contract, and a requirement occurring in one shall be considered as a binding requirement occurring in all. The Special Provisions are intended to be complimentary and to describe and provide for the complete work. In the event of an apparent difference or contradiction in the drawings and specifications, reference shall be made to the Owner's Representative for a decision. The decision of the Owner's (FBRW) Representative shall be final. In resolving any apparent difference or contradiction, the hierarchy to be used by the Owner's Representative shall be as follows:

1. Addenda.
2. Special Provisions (All Sections).
3. Specifications and Drawings (The specification or drawing listing or showing the higher quality material or workmanship shall prevail.).
4. USBR Supplemental General Provisions.
5. Road and Bridge Construction, 2014

In any event the more stringent requirement shall apply.

Before submitting a proposal, the Contractor, his sub-contractors and material suppliers shall review all contract drawings and specifications and should any material and/or its installation be indicated or specified in a manner not approved by the material manufacturer, they shall notify the Engineer or Owner's Representative promptly.

Several paragraphs found in these specifications may not apply to this Contract. Should items of equipment, materials or work be added to the project, then the appropriate paragraph or section shall apply. Should details of any of these items appear on the plans, they shall be considered the same as the above paragraphs.

H. Owner's Construction Representative at Project

The Owner (FBRW) may appoint or employ a person(s) acceptable to the Engineer to work as the Owner's Representative (Resident Project Representative) on the project. The Owner's Representative (the Engineer or others appointed by the Owner) shall represent the Owner (FBRW) as specifically set forth in the Contract, and shall observe the work performed under this Contract to the end that such work is performed in substantial accordance with the drawings and specifications. Such observation shall in no way remove any obligations on the part of the contractor to provide all required supervision and quality control necessary to perform the work in accordance

with the Contract. The Contractor shall communicate and coordinate all daily construction activities directly through the Owner's Representative. The Owner's Representative shall coordinate and communicate construction activities to the Owner (FBRW).

If the Owner's Representative observes departures from the drawings and specifications, the Owner's Representative will call them to the attention of the Contractor, who shall promptly correct the unsatisfactory conditions. If the Contractor believes there has been no departure from the drawings and specifications, the Contractor may make written appeal to the Engineer for his decision.

The presence or absence of the Owner's Representative, or the failure of the Owner's Representative to detect faulty work shall in no way relieve the Contractor from his obligation to perform the work strictly in accordance with the drawings and specifications.

(4) – Record Drawings & Shop Drawings

DESCRIPTION

A. Record Drawings

Maintain on the site and in good condition a complete set of blueline drawings, which include modifications made by addenda, staking changes, field orders, change orders, addendum drawings, clarification drawings, and any other drawings which are a part of the Contract Documents. After each portion of work is completed mark upon these drawings, neatly and legibly, and in red ink any variances from the original design. Prepare additional plans, elevations, sections or details necessary to clearly show the construction. Make drawings to scale and provide all dimensions, notes and callouts which would be necessary for construction of that portion of the work. Turn over all drawings to the Owner's Representative upon completion of the project. Quality and completeness of the records must be such that the Engineer can accurately transfer the information to the Contract Drawing originals. The Contractor shall also be responsible for updating and keeping current all drawings utilized by construction personnel to complete the Project.

B. Shop Drawings (SUBMITTALS)

Submit shop drawings (also referred to as Submittals) in accordance with the following:

1. Complete shop drawings shall be submitted to Bartlett & West utilizing the process described herein, and as required by the appropriate Specification Section(s). At minimum, Contractor shall submit shop drawings/product data for the following items listed (a-d). Shop drawings not containing the Contractor's mark of approval will be returned unreviewed. The Contractor's approval shall be evidenced by a stamp on the shop drawings or a certification on the letter of transmittal stating that the shop drawings have been reviewed and are in compliance with the Contract Documents, or exceptions are noted.
 - a. Pipe and Fittings.
 - b. Valves.
 - c. Casing Pipe.
 - d. Appurtenance Assemblies. Combination air valve assemblies, air release valve assemblies, blowoff assemblies, pressure reducing assemblies, cleanout assemblies, turnouts, in-valve assemblies, meters, special meters, etc.

The Owner's Representative may require additional submittals or certifications.

Submittals are required for all proposed substitutions.

Prior to submittal to the Owner's Representative for review, the Contractor shall fully review the items to be submitted. The review is to include verification of all dimensions, interfacing, catalog numbers, field data and conditions, and other similar data.

2. All submittals are to be made far enough in advance of scheduled dates of installation to provide all parties adequate time for review (assume 30 day review time by the Owner's Representative), possible revision, and resubmittal. Adequate time should also be scheduled to allow for placing of orders and securing delivery. Delays or extra costs incurred by improper scheduling of submittals shall be the responsibility of the Contractor.
3. Submit eight (8) copies of shop drawings. The specification section and drawing number to which each shop drawing is referenced shall be clearly indicated on each drawing. ALL DEVIATIONS FROM THE CONTRACT DOCUMENTS WILL BE CLEARLY INDICATED ON THE SHOP DRAWINGS AND IN THE LETTER OF TRANSMITTAL. The Owner's Representative will keep five copies and return three copies. If the Contractor desires more than three copies, he shall transfer the Owner's Representative's comments onto additional copies at his own expense.
4. If the Contractor submits shop drawings of equipment by manufacturers other than those listed in the specifications, he shall provide the following information with the submittal:
 - a. The name and address of at least three companies or agencies that are currently using the equipment.
 - b. The name and telephone number of at least one person at each of the above companies or agencies whom the Owner's Representative may contact.
 - c. A description of the equipment that was installed at the above locations. The description shall be in sufficient detail to allow the Owner's Representative to compare it with the equipment that is proposed to be installed in this project.
5. If the substitution of a component or material results in a change being required in the Work to be performed by the Contractor or other Contractors involved at the contract site, the Contractor proposing the substitution shall be responsible for all costs associated with the substitution.
6. The Contractor shall have readily available a copy of the approved submittals pertaining to the work in progress at a particular location.
7. The Contractor shall submit the completed Certificate of Warranty for prefabricated vaults. The Certificate shall be signed by the vault manufacturer and shall be in the name of the Owner (FBRW).

SHOP DRAWING SUBMITTAL NO. _____

Bartlett & West Engineers, Inc.
3456 E. Century Ave.
PO Box 1077
Bismarck, ND 58502-1077

(Contractor Name)
(Contractor's street address)
(Contractor's city, state and zip)

ATTN: (Contractor's contact name and phone number)

ATTN: Troy Vossler

FORT BERTHOLD RURAL WATER NEWTOWN BYPASS CONFLICT

BW PROJECT NO.

OWNER PROJECT NO.

CONTRACTOR PROJECT NO.

012483.013

ITEM NO.	COPIES	DESCRIPTION	PREVIOUS SUBMITTAL NO.	SPEC. SECTION NO.	PLAN SHEET NO.

SUBMITTED BY: _____
DATE

CONTRACTOR

SUBMITTAL RETURN (TO BE COMPLETED BY ENGINEER)

ITEM NO.	COPIES	RESUBMIT		COMMENTS
		YES	NO	

COPY: _____ RETURNED BY: _____
ENGINEER

_____ DATE

(5) – Construction Facilities & Temporary Utilities

DESCRIPTION

A. General

Provide the following utilities and facilities. Maintain the site and environment at an acceptable standard throughout the course of the project. Costs for providing these facilities and services shall be included in the base bid for the project and shall be included in the ~~unit or lump~~ sum price of the work items to which it is appurtenant.

B. Construction Water

The Contractor shall make his own arrangements for all labor and equipment to collect, load, transport and apply water as necessary for compaction and consolidation of materials, construction operations, dust control and other construction uses.

C. Filling & Hydrostatic Testing Water

1. The Contractor shall make arrangements with Fort Berthold Rural Water (FBRW) in New Town, N.D. for obtaining potable water from the existing FBRW facilities. The filling rate shall not exceed one (1) fps.
2. The Contractor shall coordinate his water use with the FBRW. Requests for water shall be made at least three (3) working days in advance of the planned usage. The Contractor shall provide the FBRW with a schedule of intended usage, delivery rate desired, and time requested. The FBRW retains authority to decrease or increase the flowrate requested depending on affects to customer service and other pertinent factors. The Contractor shall be responsible for all labor, equipment, or materials required to temporarily connect to and obtain service from the existing FBRW facilities.
3. The Contractor shall purchase FBRW potable (treated) water to be used for filling, pigging, hydrotesting, disinfection, and flushing purposes of new pipelines and reservoirs from the Fort Berthold Rural Water (FBRW). The Contractor will be charged at the rate of \$3.50/1000 gallons for the actual FBRW treated water used to complete the work. The Contractor shall provide the necessary meters, piping, valves and connections to measure the actual amount of FBRW water used. Accurate registers or meter heads shall be utilized. The actual amount of water utilized will be dependent on the Contractor's methods, quality control, and techniques utilized. The Contractor will either be billed quarterly, in some other increment, or at the end of the Contract by the FBRW. The Contractor shall render payment to the FBRW within fifteen (15) calendar days of billing.
4. Work under this Contract will not be accepted until after the hydrostatic tests, disinfection and flushing processes have been successfully completed in accordance with the Contract Documents. The pipelines shall be full of potable water and ready for use by the FBRW. No credit will be given for water purchased to fill the pipelines, which remains in the pipelines after Contract completion

D. Rights-of-Way, Permits, Laws, and Ordinances

The Owner (FBRW) will procure all rights-of-way except the additional rights-of-way for the work which may be required by the Contractor due to construction techniques utilized.

1. The Contractor shall confine his construction to the area within the right-of-way or easement designated on the drawings. The Contractor shall be responsible for all damage to crops and property outside the boundaries of the right-of-way and shall make satisfactory settlement for such damage directly with the property owner and/or tenants involved.
2. The rights-of-way and temporary working easements shown on the plans have been acquired, or will be acquired by the Owner (FBRW) prior to the time the Contractor's work is commenced in the field.
3. The Owner (FBRW) and Owners Representative are not responsible for the necessary permits to cross State highway, County road and railroad rights-of-way, etc. The Contractor shall comply with all pertinent provisions of the permits obtained.
4. After completion of construction, the Contractor shall, within the length of time stipulated in these specifications, restore the permanent and temporary construction easements, as nearly as possible to the condition in which they existed prior to the Contractor's use.
5. If it is necessary or desirable that the Contractor use or occupy land outside of the Owner's (FBRW) easement, the Contractor shall obtain written consent from or execute a written agreement with the owner and tenant of such land permitting such operation and furnish a copy of the signed consent form or written agreement to the Owner (FBRW). The Contractor shall not enter for pipe delivery or occupy for any other purpose with men, tools, equipment, construction materials, or with materials excavated from the pipe trench, any private property outside the designated easement boundaries without such written permission from the owner, and tenant of the entered or occupied property.
6. The Contractor shall, at his own expense, procure all permits, certificates, and licenses required of him by law for the execution of his work. He shall comply with all Federal, State, or Local Law ordinances or rules and regulations relating to the performance of the work. Unless otherwise shown in the plans and specifications, all plumbing work shall be in accordance with the North Dakota Plumbing Code.

The permits obtained contain requirements which affect the cost of project work and some permanent permits may require supplementary work permits and fees to execute construction. Comply with the permit requirements and obtain and pay the fees involved with the supplementary work permits.

(6) – Earthwork

PART 1 - GENERAL

A. Work Included

Provide all operations necessary to complete clearing, grubbing, excavation, embankment, preparation of subgrade, structural excavation, backfilling, sloping, trimming the subgrade, and finish grading at appurtenance and structure locations which include existing structures, prefabricated steel vault items, air valves, manholes, pressure reducing valves, and other appurtenances. Work also includes removal of water and disposal of excess material, vegetation and rubbish.

Construct and maintain all temporary drainage swales, berms, and diversions; furnish, operate, and maintain all necessary pumping and other equipment for dewatering. After above items have served their purpose, remove them and restore site.

B. Related Work Described Elsewhere

1. Trenching, Backfilling, and Compacting: 557.07(14).

C. Submittals

None required, unless material gradations are requested by Owner's Representative.

D. Testing for Compaction

1. Determine the density of soil in place by the sand cone method, ASTM D 1556; or rubber-balloon method, ASTM D2167; or by nuclear methods, ASTM D 2922 and D 3017.
2. Determine laboratory moisture-density relations of soils by ASTM D 698.
3. In the event that the material does not produce a well defined moisture density relationship when tested in accordance with ASTM D 698, determine maximum density in accordance with ASTM Test Method D 4253. The highest maximum density shall govern.
4. Determine relative compaction by calculating the ratio, expressed as a percentage, of the in-place (dry) density to the laboratory maximum (dry) density.
5. The Owner (FBRW) shall conduct the compaction testing. The Contractor shall pay the costs of any retesting of work not conforming to specifications.
6. Sample backfill materials by ASTM D 75.

E. Disposal of Excess Materials

Excess site excavation materials shall be disposed of on the site by depositing the excess material on the site and blending with existing contours. Wasted material such as large rocks or other material unsuitable for fills, embankments, or backfill shall be removed from the site and suitably disposed of. The Contractor shall coordinate with local landowners and officials regarding the disposal of such materials.

PART 2 - MATERIALS

A. Gravel Base

Gravel base is defined as natural or crush rock free from organic matter, and meeting the following gradation:

<u>Sieve Size</u>	<u>Percent Passing By Weight</u>
1-1/2 inches	100
1 inch	95 - 100
1/2 inch	25 - 65
3/8 inch	15 - 55
No. 4	0 - 10
No. 8	0 - 5

B. Earth Backfill

Earth material from the excavation is considered to be an acceptable backfill material provided it is free of vegetal matter, roots, debris, frozen matter, and stones larger than 3 inches in the greatest dimension. Moisture content is to be maintained at a level sufficient to obtain the specified compaction.

C. Water for Compaction

Water shall be clean and free of acid, alkali, or organic materials and shall have a pH of 7.0 to 9.0, a maximum chloride concentration of 500 mg/l. Provide all water needed for earthwork. Provide temporary piping and valves to convey water from the source to the point of use. Provide any meters required if the water is taken from a water district or agency pipeline.

PART 3 - EXECUTION

A. Open Excavations and Stockpiles

Control excavation to prevent water from running in. Do not obstruct surface drainage or existing waterways with stockpiles.

B. Dewatering

Provide and maintain devices at all times during the construction to remove and dispose of all water from any source from the excavation.

Dispose of water in a manner that will not damage adjacent property or be a menace to public health. Water may be discharged into the public road ditches located adjacent to the project site.

Excavations that may entrap snow and subject the subgrade soils to a change in the moisture content shall not be left open during winter construction shut-down periods. Any snow that does become entrapped in excavations shall be removed within twenty-four hours.

C. Excavation

1. General: Perform all excavations required regardless of type, nature, or condition of the material encountered. The types of excavations shall be as defined in Section 557.07 (14), Part 1. Excavation includes the removal and selected disposal of all excess or unsuitable materials of whatever nature.
2. Sections and Slopes: Excavate to full depth and width required to accommodate the lines and grades shown on the design drawings for the vault or appurtenance to be constructed. Remove all materials which become blown or washed into excavations.
3. Placement of Materials: Excavated material which meets required specifications may be used in backfill.
4. The Contractor shall select sloping or near-vertical trench and structure excavation slopes as he finds compatible with the soil conditions. The Contractor shall select any shoring which he deems appropriate and compatible with the soil conditions. These selections shall be exercised as a portion of the Contractor's responsibility for safety of site operations. The Contractor is responsible for conforming to OSHA requirements as may be applicable during structural excavating, trench excavations, site work, and in other areas of the work.

D. Structural Earthwork

1. General: Structural earthwork shall be completed at all vaults, manholes, existing structures, valves, blowoff assemblies, and other such similar appurtenances. Structural excavation is the removal of all material of whatever nature to approved structural subgrade as necessary for construction of the structures. Where excavation is inadvertently carried below the design elevation or approved structural subgrade, adjust the construction as required to meet the structural requirements.

Rectify over-depth excavation in such locations by backfilling with native material compacted to 95 percent maximum density in accordance with ASTM D698. Side slopes of excavation shall be only as steep as is safe for material to stand. Avoid unnecessary disturbance of adjacent ground.

2. Subgrade:
 - a. Remove all loose natural clays, sands and compressible materials under proposed structures. Excavate to depths as indicated.
 - b. The exposed bottoms of excavations shall consist of undisturbed native material.
 - c. Exercise careful excavation procedures to provide relatively smooth subgrade.
3. Earth Backfill:

Place backfill in 6-inch maximum loose lifts and compact to at least 90 percent relative compaction in accordance with ASTM D698. Larger lifts may be utilized if it is demonstrated to the Owner's Representative that satisfactory results can be obtained.

 - a. Backfill shall be placed and compacted in uniform lifts.
4. Compaction: Compact backfill by mechanical means. Jetting or flooding is not permitted. Compact each layer with mechanical tampers. Use light vibratory or hand tamping equipment adjacent to the structures. Protect pipe spools during placing and compacting of backfill.

E. Finish Grading

Upon completion of appurtenances and all underground work, clean the entire site area affected by the construction of trash and debris and grade and smooth to drain all areas not covered with sod or other permanent vegetation so that no depressions, vehicle tracks, or ridges are left which could accumulate rainwater.

(7) – Trenching, Backfilling, & Compacting

PART 1 - GENERAL

A. Description

Work under this section consists of materials, equipment and testing for pipeline installation, trenching and excavation for pipeline, backfilling trenches, and compacting (where specified) as a unit of work operation in connection with the construction of the water pipeline system. This includes preparatory work necessary such as incidental clearing, grading through steep banks, ravines, terraces, backslopes, and road ditches as may be necessary to provide uniform and adequate cover over the pipeline.

Excavation and trenching work shall also include the removal, handling, and disposal of all materials so removed and shall further include:

1. Removal as required for construction purposes all pavement, road surfacing, concrete, junk, and structures or parts thereof.
2. Sheeting, shoring, bracing, and protection of adjacent property, trees, and structures.
3. Protection and maintenance, and crossing of existing pipelines, telephone lines, electric lines, drains, conduits, sewers, poles and overhead utilities.
4. Preparation of subgrades, bedding for pipe, backfilling, and disposal of excess excavation as required.
5. Removal of cobble, stones, boulders, and other isolated materials commonly found in the soils to be encountered.

All trenching, except where otherwise stated, shall be done with a ladder or wheel type machine, commonly referred to as "trenching machines", or earth excavating machines such as backhoes. In areas where trenching of pipeline occurs by the use of a backhoe, or if the trenching machine's excavated trench is 18-inches or more, or where initial earth removal is required to achieve the specified depth of bury when using a trenching machine, the topsoil shall be stripped in accordance with spec. If adequate cover can be obtained with a trenching machine, and the width of the trenched excavation is less than 18-inches, stripping of topsoil will not be required. On all pipeline excavations, the topsoil shall be stripped in accordance with spec.

In areas where installation of pipelines occur by the use of any boring method, restrained joint pipe, such as Certa-Lok, Yelomine, Fusible PVC, or PE pipe, shall be used. Refer to Section 557.08 (14), 557.09 (14), 557.13 (14), and 557.14 (14) and the Contract Drawings for specific requirements on the restrained joint pipe. Mechanical locking devices at the pipe joint are not acceptable. Restraining couplings are required at each end of a restrained joint area.

The end of the pipe which is in the direction of drilling shall be capped or plugged with an acceptable pipe plug. The plug shall be capable of preventing drilling fluid from entering the pipe.

This section also includes work and equipment required for completion of landscaping and seedbed preparation of all disturbed ground. This work shall include blading, chisel plowing, discing, rock picking, harrowing or any other operation necessary to return the ground surface as nearly as practical to its original condition.

Such preparation shall also include the removal and disposal of all rock exceeding three inches, trees, debris, or other foreign material. This work shall conform to the provisions of these specifications.

B. Class of Material Excavated

Excavated or trenched materials shall be one of the following:

1. Class "A" Material

Class "A" Material is defined as being hard shale, sandstone, limestone, granite or similar materials which is encountered in monolithic ledges greater than 8" in thickness and which, in the opinion of the Owner's Representative, requires jackhammering, or use of a special headache ball or hydrohammer for removal. A toothed bucket is not considered as special "ripping" equipment. Blasting of Class "A" Material will only be allowed on a case- by-case basis, by the Owner (FBRW), in accordance with Special Condition Section 557.03 (14).

Class "A" Material encountered in two or more ledges with inter-lying strata of earth, clay, or gravel not more than eight (8) inches in thickness in each strata will be classified as a solid monolithic formation from the top of the top ledge to the bottom of the bottom ledge. Boulders which are encountered within glacial till or other soil and are not a portion of a continuous monolithic formation shall not be considered Class "A" Material under the provisions of these Specifications. Blasting of Class "A" Excavation Material shall not be permitted.

Fragments of the Class "A" Material shall not be used in the trench zone backfill unless particle sizes are less than 12-inches in diameter and/or length. However, in no event shall Class "A" Material or rubble from the excavation be placed in the upper 18 inches of the trench. Class "A" material shall not be placed in the pipe zone.

2. Class "B" Material

Class "B" Material is defined as common or unclassified excavation and includes all earth or other materials which do not meet the requirements of Item 1 above.

C. Related Work Specified Elsewhere

1. Earthwork: 557.06 (14).
2. Restrained Joint Areas: 557.08 (14).
3. Underground Crossings: 557.09 (14).
4. Hydrostatic Testing of Pressure Pipelines: 557.12 (14).
5. PVC Distribution Pipe (AWWA C900 and C905): 557.13 (14).
6. PVC Distribution Pipe (ASTM D2241): 557.14 (14)

D. Testing for Compaction

1. Determine the density of soil in place by the sand cone method, ASTM D 1556 or rubber-balloon method, ASTM D 2167.
2. Determine laboratory moisture-density relations of soils by ASTM D 698.
3. In the event that the material does not produce a well defined moisture density relationship when tested in accordance with ASTM D 698, determine maximum density in accordance with ASTM Test Method D 4253. The highest maximum density shall govern.
4. Determine relative compaction by calculating the ratio, expressed as a percentage, of the in place (dry) density to the laboratory maximum (dry) density.
5. The Owner (FBRW) will conduct the compaction testing. The Contractor shall pay the costs of any retesting of work not conforming to specifications.

PART 2 - MATERIALS

A. Pipe Zone

Material for backfill of the pipe zone shall consist of native earth material which consists of fine, loose material, free from stones, hard frozen clods, or other material that may cause damage to the pipe. The pipe zone shall extend to 12-inches above the pipe.

B. Trench Zone

Material for the backfill of the trench zone shall consist of native earth material which is free from boulders and Class "A" Material exceeding 12-inches in length and/or diameter, except in areas where Class A Material excavation occurs and loose dirt is not available from the trench excavation.

C. Aggregate Base

Aggregate base material shall be used in wet areas or subcut areas for the development of the required uniform bearing of the pipe. The aggregate base material shall consist of angular aggregates or sands which meet the following gradation:

<u>Sieve Size</u>	<u>Percent Passing By Weight</u>
3/4 inch	100
No. 4	0 - 35
No. 8	0 - 17
No. 200	0 - 10

Other gradations may be utilized provided all the material passes the 3/4 inch sieve and it can be demonstrated that they provide adequate base support for the pipe.

D. Pipeline Marker Tape

The pipeline marker tape shall be visual non-detectable (by electronic means) type marker tape and shall have a minimum width of 3 inches. The marker tape shall be designed for prolonged underground use and shall be highly resistant to alkalies, acids, and other destructive elements found in the soil. The tape shall be colored safety blue and contain a continuous warning message repeated a minimum of every 30-inches. Acceptable products shall be Terra-Tape, or approved equal. Samples of the type of material to be used shall be submitted to the Owner's Representative for review.

E. Water for Compaction

Water used in compaction shall have a maximum chloride concentration of 500 mg/l, a maximum sulfate concentration of 500 mg/l, and shall have a pH of 7.0 to 9.0. Water shall be clean and free of acid, alkali, or organic materials injurious to the pipe or pipe coatings.

PART 3 - EXECUTION

A. Pipeline Trenching and Excavation

Perform all excavation necessary to accomplish the construction regardless of type, nature or condition of the material encountered.

Pipelines shall be located approximately as shown on the drawings. Pipelines shall be installed within ± 2 feet of the alignment staked (flagged) by the Owner's Representative. Appurtenances shall be located adjacent to right-of-way lines or fencelines where required. Where the grade, elevation, or minimum depth of cover of any pipe part thereof is shown on the drawings, the pipe shall be installed to conform to such requirement. Where not otherwise specified, the minimum depth of cover for the pipe shall be ninety (90) inches over proposed surface, except services lines, which shall be ninety-six (96) inches minimum over proposed service. Service lines are those pipelines (1½" or larger) which serve one user and may include installation of pipeline in yard areas. The minimum depth shall be measured from the original ground line level to the nearest surface (including bells or couplings) of the pipe. Where the pipe elevation is determined by minimum depth only, excavations at all points shall be of sufficient depth to properly grade the pipe on tangents and vertical curves as dictated by the minimum bending radius of the pipe recommended by the manufacturer. The maximum depth of cover on the pipe shall not be more than 108-inches except beneath roadways, railroads, through terraces, in stream banks, or in special conditions where greater pipe depths cannot be avoided.

The bottom of all trenches regardless of type of pipe, shall be graded to provide uniform bearing and support for the pipe. Each section of pipe in the trench shall rest upon the pipe bed for the full length of the pipe barrel. The bottom of the trench (pipe bed) shall be free from rocks, cobble, clods, frozen chunks, or other sharp-edged objects. If uniform support cannot be obtained along the entire length of pipe due to unstable soil conditions or hardness of ground conditions, the excavations shall be carried to a depth of not less than four (4) inches, nor more than six (6) inches below the grade, and a sand or earth fill or cushion provided for the purpose of bedding and grading the pipe. The bedding material shall be sufficiently damp to insure the proper compaction and shaping of the bed. Class "A" Material, boulders and large stones shall be removed to provide a minimum clearance of six (6) inches on all pipe, fittings and valves.

When Class "A" Material, and/or isolated cobble, stones, and boulders common to glacial till is encountered in trenches, it shall be removed to a level of at least 6-inches below grade. Where blasts are allowed per Special Provisions Section 557.03 (14), the Contractor shall cover the trench with such suitable brush, timber or matting as required to prevent injury to persons or property. Before the pipe is laid, all irregularities of the Class "A" Material or the trench bottom in cobble or glacial till areas shall be filled with earth or sand well tamped into place and the bottom of the trench shall be brought to the proper grade elevation for pipe laying

using sand, native earth, or other suitable bedding material. The embedment and the first foot of backfill shall be made in accordance with these specifications. All embedment and backfilling in Class "A" Material excavation shall be completed in the presence of the Owner's Representative.

B. Trench Widths

Trench width at the ground line may vary with and depend upon the type of soils encountered and the position of surface structures. If the pipe is joined in the trench, the minimum clear width of trenches at the top of the pipe shall be twelve (12) inches greater than the outside diameter of the pipe. If the pipe is to be joined above the trench, the width of the trench shall provide adequate space for the placement of the joined pipe in the trench. In no case shall there be less than four (4) inches clear on both sides of the pipe between the widest part of the joint and the narrowest part of the trench wall.

C. Backfilling of Pipe

Backfilling of the pipe shall be made by depositing backfill materials of fine, loose material, free from stones greater than 3/4 inch in diameter, hard or frozen clods, or other material that may cause damage to the pipe to a depth of not less than twelve (12) inches above the top of the pipe. The placing of this portion of the backfill shall be done by hand if the trench is dug with a backhoe, or may be placed by mechanical means if the trench is dug with a trenching machine or other excavation equipment which breaks the soil into a fine loose material. The Owner's Representative may approve the use of mechanical methods for placement of this portion of the backfill for trenches dug with a backhoe if the Contractor can demonstrate that the particle size of the backfill material is sufficiently fine in relation to the pipe size. Equipment to be utilized for mechanical backfill shall use an angled approach and be an angle blade dozer, motor patrol, or similar equipment. Perpendicular backfill methods are not allowed. The method shall be such that the material is not dropped from the top of the trench onto the unprotected pipe.

D. Backfilling of Trenches

After the bedding and first one foot of backfill above the top of pipe has been made, the remainder of the backfill shall be in accordance with this provision of the specifications. The remainder of the backfill shall be placed by hand or mechanical methods, compacted, and shall be left in a uniform mound over the centerline of the trench, as detailed in the Construction Drawings. Compaction shall be in accordance with Subsection L. When compaction is required, the backfill shall be deposited and compacted in layers. The thickness of the layers shall be such that the compaction requirements can be met. When trenching machines, either of the wheel or ladder type, are used to excavate the trench, the backfill must be placed back into the trench in multiple layers to prevent bridging of the backfill material. Deposit the "trenched" backfill material in three equal lifts, however, more layers may be required if the material consists of cohesive soils. The backfill shall be made of fill material which shall be free from rock or Class "A" excavation of over 12-inches in length and/or diameter. Where suitable backfill material is not available from the excavation, the required material shall be obtained from a borrow area arranged for by the Contractor. No topsoil shall be stripped from the adjacent area of the trench and used for backfill material. The upper 18 inches, measured from the original ground surface, of the trenches in all disturbed areas shall be rock-free for seeding purposes. The character of the land adjacent to the trench shall be maintained. The requirement for the rock free zone is within the limits of the trench and backfill only and does not pertain to removal of the rock from areas adjacent to the trench which were not disturbed or brought to the surface by the trenching operation. All backfilling shall be carefully done in a manner that shall not harm the pipe. Wherever trench settlement occurs, the trench shall be refilled, compacted (where required), and mounded so that any further settlement will leave the ditch to conform to the surface of the original ground.

Backfill through wetland will be such that the original basin contours shall be maintained. Backfill material will be compacted sufficiently to prevent wetland drainage along the trench through the trench bottom. Stream channels shall be restored to original contours and drainage lines.

At locations in fields where contour farming practices (such as terraces) are encountered, special care shall be taken to replace the contours as originally encountered. Said practices shall also apply to road crossings, including ditches, backslope and roadway.

At locations where soil conditions or slopes are such that erosion may occur along the pipeline trench, the Contractor will be required to construct earth berms perpendicular to the trench line at intervals sufficient to divert water from the trench.

E. Clean-Up and Landscaping After Backfilling

The accomplishment of clean-up including the removal of construction and utility staking (flags) by the Contractor and landscaping of the pipeline trenches shall be made as soon as possible and shall be considered as a factor of prime importance in the completion of the project. Components of the clean-up and landscaping work shall conform to the following provisions:

1. Uniform mounding of soil over the trench, replacement of topsoil (if applicable), and landscaping of the trenches and disturbed area shall be completed at the time of installation of the pipeline.
2. Major clean-up items including removal of brush, branches, stumps, rock, Class A Material (not used in backfill), debris, utility flags, and Owner (FBRW) flags shall be completed within fourteen (14) calendar days of the installation of pipeline through each quarter (1/4) section of land. This work shall include chisel plowing of the completed trench in cropland areas which shall be completed prior to picking of rock from the trench. For this purpose, all cultivated field, legumes, and CRP land is cropland.
3. All backfill within a 20' radius of appurtenances and within 50' of meter pits and curbstops shall, upon completion of the installation, be raked and left in a manner that the landowner may re-establish his yard. This work shall be completed at the time of installation of the work.

No segment of pipeline (within each quarter (1/4) section of land) shall be eligible for payment as pipeline installation until the clean-up and landscaping requirements are met.

F. Material Replacement

Remove and replace any trenching and backfilling material which does not meet the specifications at the Contractor's expense.

G. Sheeting, Shoring, and Bracing of Trenches

Trenches shall have sheeting, shoring, and bracing conforming to 29 CFR 1926 Subpart P - Excavations and OSHA Requirements. Sheeting or shoring may be required in areas where the pipeline parallels a particular utility's facilities and which may be disturbed if a sloped trench configuration is utilized. If such situations arise, precautions shall be taken by the Contractor to avoid or minimize disturbance of the utility and such precautions shall be discussed with the respective utility prior to construction. All sheeting, shoring and bracing shall be subsidiary to pipeline installation.

H. Dewatering and Installation in Wet Areas

Provide and maintain means and devices to maintain proper pipe cover in all areas of high groundwater, waterways, or drainage areas; to remove and dispose of all water entering the trench excavation during the time the trench is being prepared for the pipe laying and during the laying of the pipe and backfilling of the pipe zone. These provisions shall apply during the noon hour as well as overnight. Dewatering operations shall be implemented if pipe is assembled in the trench and/or in areas where the pipe begins to float. Pipe weights (such as earth backfill, imported materials, etc.) may be used as an alternate to dewatering in pipe floatation areas. Pipe weights shall not damage the pipe and shall be acceptable to the Owner's Representative. Dispose of the water in a manner to prevent damage to adjacent property. Do not drain trench water through the pipeline under construction. All dewatering shall be subsidiary to pipeline installation.

I. Location of Excavated Material

During trench excavation, place excavated material only within the working area. Minimize obstructing any roadways or streets. The Contractor shall provide access for Law Enforcement and/or Emergency/Medical units if a particular street or city block in city areas or subdivisions is closed to traffic at any time. In City work areas and subdivisions, the Contractor may elect to temporarily haul material off the construction site until the pipe zone has been completed. Additional gravel shall be placed at a minimum rate of 18 c.y. per 100 ft. of roadway on any road section which has been used as a temporary stockpile site for excavated trench material. Conform to federal, state, and local codes governing the safe loading of trenches with excavated material.

J. Trench Excavation in Backfill and Embankment Areas

Construct trench excavation for pipe, pipes, or conduit in backfill or embankment areas in accordance with the following procedures:

1. Construct and compact the embankment to an elevation of 1 foot minimum over the top of the largest pipe or conduit to be installed.
2. Excavate trench in the compacted backfill or embankment. Place pipe base material, install pipe or conduit, and backfill with pipe zone material. Compact backfill above the pipe zone to the same density requirement as the adjacent embankment as specified in NDDOT spec book.

K. Compaction Requirements

Unless otherwise shown on the drawings or otherwise described in the specifications for the particular type of pipe installed, relative compaction throughout the pipe trenches shall be as follows:

1. Backfill above pipe zone beneath asphalt/concrete paved streets, roadways, and aprons: 95% relative compaction.
2. Backfill above pipe zone at gravel surfaced county road crossings, at gravel surfaced subdivision or city streets/roadways, at driveways: 95% relative compaction.
3. Backfill above pipe zone in cultivated fields, haylands, and pastures; (except at trails and field entrances): No compaction required.

Backfill above pipe zone not beneath paving or road surface but at trails, field entrances, in subdivisions or City Limits, and in yard areas: A compactive effort of 90% relative compaction. Refer to General Notes on the Contract Drawings for method of compaction required. Compaction tests will not generally be taken unless deemed necessary by the Owner's Representative. The Contractor shall provide assistance to the Owner's Representative as requested during any testing to verify that the effort being applied by the Contractor meets the Contract requirements. Other methods of Compaction may be implemented by the Contractor, if acceptable to the Owner's Representative, and if it achieves the percent of compaction required.

4. Backfill above pipe zone in state or county right-of-way: As required by encroachment permit(s). In any event, the minimum level of compaction shall be 90% relative compaction. The method of compaction is stipulated in the General Notes on the Contract Drawings and shall be utilized to obtain the level of compaction required. Other methods of compaction may be implemented by the Contractor, if acceptable to the Owner's Representative, and if it achieves the percent of compaction required.
5. Backfill above pipe zone at utility crossings (water, sewer, gas, etc.): As required by the respective utility. In any event, the minimum level of compaction shall not be less than 90% relative compaction.

L. Surface Obstructions

Surface obstructions such as curb and gutter, pavement, culverts, utilities, streams, drives and sidewalks may be tunneled or bored under; otherwise the obstruction shall be cut in straight lines parallel to the pipeline or along the nearest parallel construction joint located not more than five (5) feet from the centerline of the trench, except that the line of cut shall not be closer than one (1) foot to the edge of the trench.

Surface obstructions removed shall be reconstructed in accordance with standard practice and to the lines and grades of the original structure. Backfill of tunneled sections shall be carefully rammed in place at no additional cost to the Owner (FBRW).

M. Subsurface Obstructions

Trenching or excavation may encounter other water mains, pipe culverts, gas lines, telephone conduit, and other buried obstructions. The Contractor shall locate the obstructions by digging in advance of the trench when information is not available as to the exact locations (i.e., flagging by utility owner or landowner). Care must be taken in excavating around all obstructions to see that they are not damaged. If, however, damage should occur, repairs shall be made quickly as possible at the Contractor's expense.

N. Excess Excavated Material

Excess excavated material not required for backfill or grading shall be removed from the site of excavation when within streets, roadways, highways, parking and driveways, both public and private, by and at the expense of the Contractor. The Contractor shall be responsible for obtaining a proper disposal site. Excess excavated earth material free from rock shall be distributed directly over the pipe trench located in open fields to a depth of 18-inches above the original ground surface across the trench width. The mounding over the trench shall be uniform and shall extend not greater than 3 feet from each side of the center of the trench. Other limits on mounding are stipulated on the drawings. Rock material excavated and not used or too large to be used in the backfill provisions of these specifications shall be hauled from the site by and at the expense of the Contractor. The Contractor shall be responsible for obtaining suitable disposal sites. With the landowner's written permission, rocks may be buried so as not to interfere with farming operations in lieu of hauling and shall not be buried within the pipeline easement area or other existing utility easements. The Contractor shall supply the Owner's Representative a copy of such written landowner permission before the rocks are buried. Any topsoil removed to bury rocks shall be stripped, stockpiled and replaced.

O. Pipeline Marker Tape

Pipeline marker tape shall be installed in the trench backfill at a depth of 24-inches below the original ground line. Pipeline marker tape shall be installed above the pipeline centerline within all subdivisions, within the City Limits and in locations required in accordance with the utility permits. It shall also be installed in the areas or locations designated on the drawings. The marker tape shall be subsidiary to the pipeline installation.

P. Responsibility of Contractor for Backfill Settlement

The Contractor shall be responsible, financially and otherwise for:

1. Any and all settlement of trench and other backfill which may occur from the time of original backfilling until the expiration of a period of two years from and after the date of substantial completion of the entire Contract under which the backfilling work was performed. Substantial completion for this purpose is defined as the entire system is operational.
2. The refilling and repair of all backfill settlement and the repair or replacement to the original or better condition of all pavement, top surfacing, driveways, areaways, curbs, gutters, walks, surface structures, utilities, drainage facilities, sod and shrubbery which have been damaged as a result of said backfill settlement or which have been removed or destroyed in connection with backfill replacement operations.

3. Any and all damage claims filed with or court actions brought against the Owner (FBRW) for and on account of any damage(s) directly or indirectly caused by said backfill settlement.

The Contractor shall make or cause to be made all necessary backfill replacements and repairs or replacements appurtenant thereto, within ten (10) days from and after due notification by the Owner (FBRW) or his representative, of backfill settlement and resulting damage at any designated location(s).

Q. Repairs After Job Completion

It is understood that repairs, due to faulty workmanship or materials, shall be covered by the Performance Bond. However, a break in the lines or backfill settlement presenting a potential hazard shall be deemed as an emergency and must be repaired immediately. The Contractor, therefore, prior to leaving the project, shall have an understanding and agreement by signed letter addressed to the Owner as to the procedure for making said emergency repairs and notification to the Contractor. Said procedure shall include a local agent of the Contractor or a local contractor (who will perform as a subcontractor to the general contractor) acceptable to the Owner. Upon notice from the Owner, the local agent or local contractor shall notify the utility locating service and make the necessary repairs as stipulated in Specification Section 557.01 (14).

R. Contract Quantities

The Contractor is advised that the owner has additional user sign-ups and pipeline, and appurtenances will be added to the Contract when easement is secured, users may also be deleted from the Contract. The Contractor is also advised the pipeline routes currently shown on the plans may change due to addition of users and due to easement acquisition. The adding or deleting of users, pipeline, and appurtenances, or pipeline route changes, will be based on the unit prices provided within the successful Bidder's Proposal. Adjustments to quantities will be made to the Contract through a future change order at bid unit prices.

(8) – Restrained Joint Areas

PART 1 - GENERAL

A. Description

Work under this section consists of furnishing all necessary materials and labor to complete the installation of restrained joint areas in the general locations designated on the Drawings for the pipelines to be installed. The restrained joint areas are to be complete with all materials, excavation, backfill, drilling, boring, and casings as required to complete the work as specified herein and as detailed on the Drawings.

B. Related Work Specified Elsewhere

1. Earthwork: 557.06 (14).
2. Trenching, Backfilling, and Compacting: 557.07 (14).
3. Underground Crossings: 557.09 (14).
4. PVC Pipe (AWWA C900 & C905): 557.13 (14).
5. PVC Pipe (ASTM D2241): 557.14 (14).

C. Testing for Compaction

Per Section 557.06 (14), Part 1.D. PART 2

MATERIALS

A. PVC Casing Pipe

PVC casing pipe where required for restrained joint areas shall comply with Sections 557.13 (14) and/or 557.14 (14), with the exception that the joints shall be of the heat fusion (butt fusion) or may be restrained joint PVC pipe. Minimum pipe class shall be as noted on the Drawings. Materials to be utilized for the solvent weld joints of the casing pipe shall be in accordance with the manufacturer's recommendations and shall be compatible with the pipe utilized. As an alternate, Polyethylene (PE) pipe may be used as casing pipe. Minimum class of PE pipe shall be SDR 17. The PE pipe shall be of the heat fusion (butt fusion) joining system, PLEXCO HDPE 3408 or equal. A schedule of casing pipe sizes for the carrier pipe is provided on the Contract Drawings.

B. Steel Casing Pipe

Casing pipe where required for restrained joint areas shall be smooth steel pipe. Steel pipe used for steel casing shall meet one of the following material specifications: ASTM A53, Grade B; ASTM A139, Grade B; or ASTM A135, Grade B.

C. Pipe for Restrained Joint Areas

1. Restrained joint areas shall be installed utilizing restrained joint PVC piping. Minimum wall thickness of the piping shall be the same as the carrier pipe adjacent to the restrained joint areas unless otherwise indicated on the drawings. The pipe shall conform to the requirements of Specification Section 557.13 (14) and/or 557.14 (14) depending on the adjacent pipe and pressure ratings and shall be 'Certa-Lok' as manufactured by CertainTeed Corp. or equal. Yelomine 2" and 3" shall have a minimum pressure class of Cl. 250 and 4" and 6" shall have a minimum pressure class of Cl. 200. 4" and larger restrained joint pipe may also utilize fusible PVC, of equivalent pressure rating, as an equal to the Yelomine restrained joint PVC pipe.

Fusible PVC pipe shall conform to the requirements of specification Section 557.13 (14) and/or 557.14 (14) depending on the adjacent pipe and pressure ratings. The PVC pipe shall be of the heat fusion (butt fusion) joining system as manufactured by Underground Solutions or equal.

Polyethylene (PE) pipe two inch and larger may be substituted for the Yelomine restrained joint PVC pipe, except when in subdivisions and City Limits. The PE pipe shall be of the heat fusion (butt fusion) joining system, PLEXCO HDPE 3408, or equal. For all PE pipe in Diameters 8" and larger, the size of the PE pipe shall be one size larger than the PVC pipe being substituted.

To maintain a comparable pressure rating to the ASTM and AWWA PVC Pipe being substituted, the Standard Dimension Ratio (SDR) for the PE pipe (as compared to the ASTM and AWWA PVC pipe being substituted) shall be as follows:

<u>PE Pipe</u>	<u>ASTM PVC Pipe</u>	<u>AWWA C-900 PVC PIPE</u>
SDR 7.3	Cl. 250	Cl. 150
SDR 9	Cl. 200	-
SDR 11	Cl. 160	Cl. 100

2. For restrained joint areas where AWWA C-900, Cl. 200 PVC pipe is required, and equivalent pressure rated restrained joint pipe is not available, a restrained joint casing pipe shall be used in the restrained joint areas to 'encase' the AWWA C-900 Cl. 200 PVC pipe. The casing pipe shall be Yelomine or equal and shall be restrained for the entire length of the restrained joint areas specified on the drawings. The AWWA C-900, Cl. 200 PVC pipe shall be non-restrained integral bell. The casing pipe and pressure class to encase the various sizes of AWWA C-900 Cl. 200 PVC pipe shall be as follows:

<u>Carrier Pipe</u>	<u>Restrained Casing Pipe</u>
10" C-900, Cl. 200	16" Cl. 125, SDR 26 (Yelomine)
12" C-900, Cl. 200	20" x 0.250" Thick Welded Steel
14" C-905, Cl. 235	24" x 0.312" Thick Welded Steel

Restrained joint PVC pipe, fusible PVC pipe or fusible poly pipe shall be utilized for all restrained joint areas unless noted otherwise on the Drawings. In those instances, ductile iron pipe shall be utilized for restrained joint area and shall be of a flexible restrained joint system. External locking fasteners such as retainer glands for mechanical joints are not acceptable. The pressure class of the ductile iron pipe shall be the same or greater than the carrier pipe adjacent to the restrained joint area unless specifically indicated on the drawings. The ductile iron pipe shall conform to the requirements of AWWA C150. The ductile iron pipe segment will not be required to be laid to line and grade. The pipeline grading requirements shall be no less than that required for PVC pipe and the ductile iron pipe manufacturer.

PART 3 - EXECUTION

A. Restrained Joint Areas

Pipelines which have been designated as Restrained Joint Areas on the Drawings and which have been flagged as such in the field by the Owner's Representative shall be installed by the 'Directional Drilling' method. The Contractor shall make a minimum of two (2) attempts to 'Directional Drill' in the restrained joint area before resorting to an open-cut installation. No additional payment will be made to the Contractor for any such subsequent attempts. The length of restrained joint pipe at each area is denoted on the Drawings and is included in the bid quantity for each size of pipe required in the Restrained Joint Area. The Contractor shall provide additional restrained joint pipe per the provisions of the specifications at each side of the restrained joint area designated on the drawings as may be requested by the Owner (FBRW) during installation, due to actual field conditions, when authorized by the Owner's Representative.

All pipelines provided in the restrained joint area shall be installed to a minimum depth of 96". All work associated with installing restrained joint pipe in the designated areas and if crossing wetlands, creeks, rivers, streams or other waterways, shall conform to all permit requirements and to state and federal regulations. A listing of criteria and guidelines is contained in Appendix A. The restrained joint areas depicted on the drawings are not to be considered exact and represent the generalized location of the restrained joint pipe. The actual location, length, and size of the restrained joint area will be staked in the field by the Owner's Representative and may differ from that shown on the drawings. The actual field location, length and size may differ due to, but not limited to, staking the pipelines alignment to avoid or minimize disturbance to surface obstructions, reroutes due to pipeline easement changes, reroutes authorized by the Owner (FBRW) or Owner's Representative based on actual field conditions, and or any other reasons deemed necessary by the Owner (FBRW) or Owner's Representative.

When the 'Directional Drilling' method is used, the following provisions apply.

1. Pipe specified in Part 2.D.1. of this Specification shall be used.
2. Maintain the eight foot minimum cover required at each restrained joint area. Do not exceed the pipe manufacturer's minimum pipe bending radius. Provide a written statement from the pipe manufacturer as to the minimum pipe bending radius allowed and as to the acceptance/requirements of using their pipe in the Directional Drilling method. Provide this information during the submittal phase of the project.
3. Provide the required long body transition couplings and reducers/increasers as necessary to complete the connection to the adjoining pipe. The Contractor shall provide the required depth of cover over the pipe upon tie-ing in the restrained joint pipe with the adjoining pipeline. The total length of restrained pipe specified on the drawings in the designated areas shall be provided prior to the transition area of the restrained joint piping to the ground surface as denoted on the construction details.

4. A factory trained, licensed representative from the Contractor shall be on-site to complete the heat fusing of each section of PE or PVC pipe, if used. The Contractor's representative shall be trained and licensed by the pipe manufacturer. The Contractor shall be prepared to provide the Owner's representative such training certification of the individuals performing the on-site heat fusing of the pipe.
5. If at the time of construction any of the following conditions should appear the Owner's Representative shall be notified:
 - a. Evidence of recent severe cutting or erosion.
 - b. Crossing of recent channel improvements where new stream location is not stabilized such as pilot channels, newly constructed pond spillways, etc.
 - c. Crossing of proposed channel improvements.

The Owner's Representative shall review said areas following notification. If, in the opinion of the Owner's Representative, such areas warrant the addition of a restrained joint section, the Owner's Representative shall authorize the addition of a restrained joint area under the provisions of this section.

6. The end of the pipe which is in the direction of drilling shall be capped or plugged with an acceptable pipe plug. The plug shall be capable of preventing drilling fluid from entering the pipe.
7. The Contractor shall take into consideration the anticipated expansion and contraction of PE pipe after it has been directionally drilled before connecting the ends of the PE pipe to the PVC pipe. The Contractor shall not immediately connect the PE pipe to the PVC pipe after the directional drilling has been completed until the expansion and contraction effects are minimized. The length of this time period will be affected by the length and size of the bore and by the air temperature at the time of the bore. The Contractor shall proceed per the pipe manufacturers' recommendations.

(9) – Underground Crossings

PART 1 - GENERAL

A. Description

Work under this section consists of materials and installation of crossings utilized on the pipelines to be installed. The crossings are to be complete with all materials, excavation, backfill, drilling, boring, and casings as required to complete the crossings as specified herein or as detailed on the Drawings.

B. Related Work Specified Elsewhere

1. Earthwork: 557.06 (14).
2. Trenching, Backfilling, and Compacting: 557.07 (14).
3. Restrained Joint Areas: 557.08 (14).
4. PVC Pipe (AWWA C900 & C905): 557.13 (14).
5. PVC Pipe (ASTM D2241): 557.14 (14).

C. Testing for Compaction

Per Section 557.06 (14)., Part 1.D.

D. Measurement and Payment

Sewer crossings, utility crossings, and stream crossings (including rivers, creeks, wetlands, and other waterways) are not specifically designated on the drawings and shall be considered subsidiary to the pipeline unit prices. No additional payment shall be made for those crossings. There may be locations where the restrained joint areas designated on the Drawings may coincide with a stream crossing. The Contractor shall make his own assessment of the existing terrain and soil conditions, the presence of utilities and stream crossings in conjunction with the pipeline routings shown on the drawings and with the designated restrained joint areas and shall prepare his bid accordingly.

PART 2 - MATERIALS

A. PVC Casing Pipe

PVC casing pipe shall comply with Section 557.14 (14), with the exception that the joints shall be of the heat fusion (butt fusion) jointing system, or may be restrained joint PVC pipe. Minimum pipe class shall be as noted on the Drawings. Materials to be utilized for the solvent weld joints of the casing pipe shall be in accordance with the manufacturer's recommendations and shall be compatible with the pipe utilized. As an alternate, Polyethylene (PE) pipe may be used as casing pipe. Minimum class of PE pipe shall be SDR 17. The PE pipe shall be of the heat fusion (butt fusion) jointing system, PLEXCO HDPE 3408, or equal. A schedule of casing pipe sizes for the carrier pipe is provided on the Contract Drawings.

B. Steel Casing Pipe

Casing pipe shall be smooth steel pipe. Steel pipe used for steel casing shall meet one of the following material specifications: ASTM A53, Grade B; ASTM A139, Grade B; or ASTM A135, Grade B.

PART 3 - EXECUTION

A. Cased Underground Crossings

Cased underground crossings for pipelines which pass under railroad tracks, State or Federal paved highways, designated county paved roads, or other designated roads or facilities as staked in the field by the Owner's Representative shall be encased with the type of encasement pipe necessary to meet the requirements of the Railroad, Highway Department, County, or other governing agencies. Material type and wall thickness shall be as shown on the Drawings. The crossing permits will be obtained by the Owner (FBRW). The Contractor shall post any bonds or cash deposits, obtain any additional insurance required, or provide other required assurances required by the governing authority of the facility being crossed.

The pipeline and casing shall be installed by dry boring within the limits shown on the Drawings. Open trench excavation or casing installation may be utilized for areas outside the boring limits. Railroad crossings require encasement from R/W line to R/W line as detailed on the Drawings. Work within the R/W shall conform to the requirements of the applicable permit and shall be completed to the limits shown on the Drawings. Compaction of backfill within these areas shall conform to the requirements of Section 557.07 (14), Part 3.L. The Contractor shall notify the responsible officials of the Railroad, Highway Department, or County Road Department prior to commencing the work and shall obtain clearance for installation of the work. At the points of entry and exit from the casing, the plastic pipe shall be protected from cutting and pinching by a sleeve which extends at least 12" from the end of the casing. Such sleeve may be made of sections of larger sizes of PVC pipe. Where space permits the sleeve shall be doubled.

Carrier pipe shall be a restrained joint type pipe (such as Yelomine or polyethylene pipe). The restrained joint carrier pipe shall extend a minimum of 10' beyond ends of casing pipe.

Backfill at the ends of the casing pipe shall be hand placed and shall be thoroughly compacted for a distance along the axis of the pipe at least 3 feet out from the end of the casing for the full width of the trench and to a height at least 1 foot above the pipe. This also pertains to all over-excavated areas along the alignment of the pipe. Following completion of the installation and prior to final acceptance, approval of the installation must be obtained from the governing authority.

B. Uncased Underground Road Crossings

Pipeline crossings of other roads may be designated by the Owner's Representative as uncased road crossings (Type 2, Type 3 and Type 4 crossings). Permits for crossing these roads will be obtained by the Owner (FBRW); however, the Contractor will be required to post any bond or cash deposit required by the governing agency to ensure satisfactory installation. The pipeline shall be installed beneath the road bed by dry boring within the limits shown on the drawings. Carrier pipe shall be provided in standard laying lengths. The Contractor shall make every attempt to eliminate installation of pipe joints beneath the limits of the road bed. If joints need to be installed beneath the road bed the Contractor shall review the installation with the Owner's Representative to determine the most desirable placing of those joints. Open trench excavation for the pipeline shall be used outside the boring limits and shall conform to the requirements of Section 557.07 (14). Complete the installation of the pipeline from the boring pits at the road crossing to the R/W lines such that the installation is complete as one continuous segment to the R/W lines. Upon completion of the work and prior to final acceptance, approval must be obtained from the governing agency. Restrained joint pipe, per Section 557.08 (14) is required if more than one length of pipe (one pipe stick) is to be installed within the bore area. This applies to all boring methods. No additional payment will be made for the use of restrained joint pipe at road crossings.

The Contractor may submit a boring procedure utilizing lubricating water on the uncased "dry bored" road crossings to the Owner's Representative for consideration. In addition to approval by the Owner's Representative, the Contractor shall obtain written approval from the respective governing agencies prior to utilizing this procedure. Under no circumstances shall wet boring or jetting be allowed.

Some pipelines crossing roadways, approaches, or trails may not be designated as road crossings and shall be installed as a portion of and subsidiary to pipeline installation. Compaction of such crossings is required and shall be in accordance with Section 557.07 (14).

C. Stream Crossings

Pipelines which cross under streams, waterways and drainage areas are not specifically shown or designated on the drawings. The Contractor shall be responsible for reviewing the work site and making his own investigations and determinations of the types of stream crossings, waterway crossings, drainage crossings, and soil conditions to be encountered. All stream crossings, and crossings of waterways and other drainage areas shall be subsidiary to pipeline installation. No additional compensation shall be made for the additional depth required in the stream channel or stream banks. Some stream crossings may coincide with specified restrained joint areas. All pipelines placed beneath streams and/or drainage crossings having a defined channel shall be installed to a minimum depth of 96" below the bottom of the stream bed. All work associated with the stream crossing shall conform to the permit requirements and to State and Federal regulations. A listing of criteria and guidelines is contained in Appendix A.

D. Sewage Systems, High Pressure Water Lines for Oil Wells, and Crude Oil Line Crossings

The following provisions shall pertain to crossings of high pressure water lines for oil wells, crude oil lines, sewage system crossings, septic tanks, lateral fields, waste stabilization ponds, sewer lines discharging to the ditch, or when other sources of pollution are encountered. These crossings and the cost of all materials and labor shall be subsidiary to pipeline installation.

1. All water main distribution and supply lines shall be installed at least 25 feet (horizontal distance) from any septic tank or waste stabilization pond.

When it is necessary for a water line to cross high pressure water lines for oil wells, crude oil lines, or a non-perforated sewer line such as a sewer drain, a sewer lateral, or a sewer draining to the road ditch, the water line shall be encased for 20 feet (horizontal distance) either side of the high pressure water line, crude oil line, sewer line or point of discharge with solvent weld PVC pipe. Casing pipe size shall be the size used for Type 1 Road Crossings as described in the detailed drawings. Center the waterline at the crossing, such that the waterline pipe joint is located at least 10 ft. horizontally from the crossing.

2. When it is absolutely necessary for a water line to cross a perforated sewer line or pass through a drainfield, the water line shall be encased for the entire distance of the drainfield plus 25 feet on either side of the drainfield with solvent weld PVC pipe. Casing pipe size shall be the size used for Type 1 Road Crossings as described in the detailed drawings. However, prior to making the proposed crossing, a written request asking for approval shall be submitted to the N.D. State Health Department.
3. When it is necessary to install a water service line parallel to a sewer drain, a minimum horizontal distance of 10 feet shall be maintained.
4. Maintain at least 18" vertical separation between the waterline and the crossing. In any event the vertical separation requirements and encasement shall be no less than the requirements of the N.D. State Health Department. Such requirements are contained in Appendix A.

E. Utility Crossings

Utility crossings are not shown either expressed or implied on the drawings. Generalized locations of some utilities may be shown on the drawings. If shown, such locations were derived from the utility's general location maps and are not to be considered exact.

The following items shall pertain to utility crossings encountered on the Project.

1. All utility crossings shall be made in accordance with the provisions of the utility permit, including compaction of backfill.
2. If a utility crossing permit is not required, the crossing shall be made in accordance with the guidelines of the utility.
3. Excavation and backfill shall comply with Section 557.07 (14).
4. Unless specifically denoted as a separate pay item and shown as such by a pay item note on the drawings, utility crossings shall be subsidiary to pipeline installation.
5. Prior to crossing any utility, proper notification shall be provided to the utility as required by Special Provisions 557.02 (14), and in accordance with applicable laws, regulations, and ordinances.

(10) – Horizontal Directional Drilling of Pipe

GENERAL

A. Description

1. The work under this section includes materials and installation of ASTM 2241 PVC pipe, and AWWA C900 & C905 PVC pipe, by the horizontal directional boring method. Furnish all labor, equipment, materials and supplies and perform all work necessary to provide the Owner (FBRW) with a complete, finished water pipeline crossing. The finished work includes proper installation, testing, restoration of underground utilities and environmental protection and restoration.

B. Related Work Specified Elsewhere

1. Trenching, Backfilling, and Compacting: 557.07 (14).
2. Restrained Joint Areas: 557.08 (14)..
3. Underground Crossings: 557.09 (14).

4. Hydrostatic Testing of Pressure Pipelines: 557.12 (14).
5. PVC Distribution Pipe (AWWA C900 & C905): 557.13 (14).
6. PVC Distribution Pipe (ASTM 2241): 557.14 (14).

C. Quality Assurance

1. Perform the work in general conformance with ASTM F1962, current revision, "Standard Guide for Use of Maxi-Horizontal Direction Drilling for Placement of Polyethylene Pipe or Conduit under Obstacles, Including River Crossings."
2. Contours, topography, and profiles of the ground as may be shown on the Drawings are believed to be reasonable correct, but are not guaranteed to be absolutely correct and presented only as an approximation. It is the Contractor's responsibility to verify all elevations required to successfully complete the crossing.
3. Maintain adequate number of skilled workers who are trained and experienced in the necessary craft, and completely familiar with the specifications herein. Maintain a complete set of Contract Documents on site. Maintain a daily log during the entire HDD operation.

D. Permitting

The contractor shall be responsible for all construction permitting required as part of the HDD activities.

E. Submittals

1. Submit shop drawings in accordance with the Special Conditions Section 557.04 (14).
2. Submit list and description of materials and equipment to be used.
3. Submit a time schedule for completing the Directional Bore, including any delays due to anticipated soil conditions. Include an appropriate contingency plan for potentially encountered obstacles or delays including but not limited to: naturally occurring hazardous gas or petroleum occurrences, down-hole equipment failure, equipment loss, or loss of control, inadvertent returns, or frac-outs.
4. Submit proposed pressure testing location for pipe before directional boring.
5. Submit an accurate record of the crossing location in plan view and profile depth. Record all changes on the contract drawings as work progresses.
6. Product pipe testing and inspection, and Certificates of Compliance.
7. Drawings showing proposed method of construction including layout for each work area showing set-up and layout of all HDD equipment, location of receiving and sending pit, and proposed sequence of construction.
8. Drawing of the drill path showing confirmed location of all known utilities and that excavation will avoid all known utilities by required separation.
9. Drawing showing anticipated drill tool, reamer, pullback assembly configuration, and all other down-hole tools.
10. For carrier pipe 16" and larger, or total bore lengths of 500 feet or greater, submit an additional Work Plan describing in detail the proposed equipment and key procedural steps, calculations and drawings signed and sealed by a professional engineer licensed in the state of North Dakota including but not limited to:

- a. Setup and configuration of drilling equipment including size, capacity, arrangement of equipment, storage of fuel, pipe, expendables, drill fluid containment locations and details, assembled pipe storage, and location and size of pits as applicable.
- b. Product pipe pullback. Include details of staging area, floatation (if used), mobilizing assembled pipe to pull back location, prevention of damage to bore exit hole during pull back, and equipment to be employed.
 - i. Theoretical pullback force calculations for the product pipe, given for the proposed installation geometry and method, compared to the calculated maximum allowable pulling capacity. Calculations shall also address the following loading conditions:
 - ii. Pre-installation: Hoop and longitudinal stress during hydrostatic test; spanning stress with pipe full of water and supported on installation blocks or rollers, and maximum roller/support spacing.
 - iii. Installation/Post-Installation: Longitudinal stress from pulling force; longitudinal curvature stress at point of entry and in final position; external pressure from drilling fluid, overburden, and loads from the obstacle being crossed.

Initial drill fluid design: bentonite clay and all anticipated additives including product information, material specifications, material specifications, material safety data sheets (MSDS), special precautions. The drilling fluid mixture and content of additives including generic mixing instructions. Provide a volume estimate of the drilling fluids to be utilized for each reaming cycle.

11. Submit records of construction permits obtained.

12. As-Built Records:

- a. The guidance system records (magnetic guidance system) pullback data shall be recorded for every pilot hole drill stem length during the actual crossing operation. The contractor shall furnish "as-built" plan and profile drawings, on the same horizontal and vertical control datum shown on the Drawings, based on these recordings showing the actual horizontal and vertical location of the installation, and all utility facilities found during the installation. Departure from the proposed drill path shall be noted.

PART 1 PRODUCTS

F. PVC Distribution Pipe (AWWA C900 & C905)

1. See Section 557.13 (14).

G. PVC Distribution Pipe (ASTM D2241)

1. See Section 557.14 (14).

H. Drilling Fluid

1. Drilling fluid shall be bentonite and water or a combination of bentonite and polymers and water formulated to ensure hole stabilization, cuttings transport, bit and electronics cooling, and hole lubrication to reduce drag on the pipe during pullback.
2. Obtain, transport, and store water required for drilling fluids. Drilling fluids shall be mixed with water to ensure no contamination is introduced into the ground during the drilling, reaming, or the pipe installation process. All water shall be tested by the Contractor for pH and treated with soda ash, or accepted equal, to adjust the pH of the water as required in the accepted mix design(s).

I. Grout

1. Grout shall have a minimum unconfined compressive strength (UCS) of 500 psi at 28-days. Mix shall be acceptable to the Owner (FBRW).

J. Concrete

1. Concrete shall have a minimum unconfined compressive strength (UCS) of 4,500 psi at 28-days. Mix shall be acceptable to Owner (FBRW).

K. Drill Pipe

1. Drill pipe shall be steel with sufficient strength to withstand 100% of the maximum rated pullback and pushing load of the drilling equipment. Drill pipe joints shall be flush and capable of transmitting maximum rated torque of the drilling equipment.

L. Drilling Equipment

Drilling equipment shall, at a minimum be capable of supplying the greater of; 120 percent of the maximum anticipated reaming force and torque or the minimum torque as specified herein and 150 percent of the maximum anticipated pullback force without showing undue stress or failure. It shall be the responsibility of the Contractor to assure that the equipment to be used is in sound operating condition.

1. Provide drilling equipment with a grounding system to prevent electrical shock in the event of a high voltage underground cable strike. The grounding system shall connect all pieces of interconnecting machinery; the drill, mud mixing system, drill power unit, drill rod trailer, operators' booth, worker grounding mats and any other interconnected equipment, to a common ground. The drilling equipment shall be equipped with an "electrical strike" audible and visual warning system that notifies the system operators of an electrical strike.
2. Mixing, pumping, and holding/separation tanks shall be capable of delivering mixed drilling fluid to the cutting head. Drilling fluids circulating equipment shall be designed to minimize spillage. Drilling fluid shall be formulated for the specific project and anticipated conditions.
3. Magnetic Guidance System: A magnetic Guidance System (MGS) shall consist of a probe and tracker that is capable of monitoring the location of the frill head during the drilling operation. The tracker shall be capable of tracking at minimum all depths anticipated or shown on the Drawings in any soil conditions including hard rock. It shall enable the driller to guide the drill head by providing immediate information on the tool face, azimuth, and inclination. The tracker shall be accurate to +/- 2% of the vertical depth. Ferrous materials shall not influence or affect the MGS readings or accuracy. The MGS shall be a Tensor TruTracker MGS, or Engineer approved equal.

M. Down Hole Tools

1. Cutting heads, backreamers, and hole openers shall be suitable for the soil and rock conditions anticipated by the Contractor.
2. Grips, pulling heads, and swivels shall be compatible with the pipe material. Design to transmit without distortion the maximum rated pullback force of the equipment used. Grips, pulling heads, and swivels shall be specifically engineered for directional drilling applications.
3. Tracking equipment shall be capable of determining the location of the cutting head at depth within ± 1 foot.

PART 2 EXECUTION

A. Installation

1. The pipe shall follow the line and grade shown in the drawings. Pipes shall exit the ground within 3 feet of the design location.
2. Install the pipe in a manner that does not cause upheaval, settlement, cracking, movement, or distortion of the surface material including bridge walls, rock retaining walls, and channel bottom.
3. Locate the entrance and exit pits to be within the Owner's (FBRW) right-of-way.
4. Vertical and horizontal tolerance shall be ± 3 feet from the centerline of the theoretical alignment for pipes of diameter 16" and greater, and shall be ± 5 feet from the centerline of the theoretical alignment for pipes of diameter 14" and smaller as shown on the Contract Drawings.
5. At no location shall the pilot hole excavation create a path that locates the intake pipe or excavation in violation of any permit or easement.
6. It is the Contractor's responsibility to verify all elevations required to successfully complete the crossing in accordance with this specification.
7. The contractor shall be responsible for all damages incurred during construction.

B. Trenching and Earthwork

1. Accomplish trenching and earthwork in accordance with Section 557.06 (14) and Section 557.07 (14).

C. Pipe Joining

1. PVC Pipe (AWWA C900 & C905): See Section 557.13 (14), and 557.08 (14).
2. PVC Pipe (ASTM 2241): See Section 557.14 (14), and 557.08 (14).
3. Where the staging area permits, join entire length of pipe to be pulled through bore prior to commencement of pullback operation. If not feasible because of the length of the bore and the size of the staging area, each pipe section may be fused or welded to the previous section before the pull back. Support weight of joined pipe suspended on rollers to minimize pulling forces.

D. Pre-Bore and Post-Bore Pressure Testing

1. Prior to pulling the DIP, HDPE, or PVC pipe through the directional bore hole, the pipe shall be pressure tested in accordance with Section 557.12 (14). Perform pressure testing again after final installation of the HDPE or PVC pipe and before final acceptance by the Owner (FBRW).
2. At the Contractor's option, pipe need not be pressure tested before pulling the pipe through the bore hole. In such case, if the pipe does not pass the pressure test after installation, then remove the entire pipe from the bore hole, repair the pipe, and perform pressure testing prior to reinstalling the pipe and again after reinstallation.
3. The Owner's Representative will witness the pressure tests and shall be informed 48 hours in advance of pressure tests.

E. Pilot Bore

1. Construct a pilot bore in incremental hole enlargements as required to permit the pullback of the pipe at the centerline alignment and grade as shown in the drawings. Circulate drilling fluids to maintain an open bore at all times. If the path of the pilot bore is successfully completed, then proceed with the reaming procedure, and pull the pipe from the receiving location (exit pit) to the sending location (entry pit). If the pilot bore could not be successfully completed, then do not proceed with the reaming procedure until the Owner (FBRW), Owner's Representative, Engineer, and Contractor have met to discuss alternative options for the pipeline crossing. The pilot bore and reaming procedure shall be controlled by a magnetic guidance system including accelerometers, magnetometers, connector wire, and survey probe and in accordance with Part I.4 of this specification.

F. Drilling Fluids

1. Contain and dispose of the drilling mud in accordance with state regulations and permit conditions. Install erosion and sedimentation control measures including straw bales to prevent drilling mud from inadvertently spilling out of the entrance/exit pit. Monitor drilling fluids at the surface to avoid excessive down-hole pressures which may buckle the surface or the pipe during installation.

G. Back-reaming Bore and Pipe Installation

Upon completing the pilot bore, pull the drill pipe back through the bore using an oversized backreamer larger than the proposed pipe to be pulled back through the bore hole. Repeat back-reaming as necessary to enlarge the bore to provide sufficient clearance for the pipe. Attach pulling head and swivel and pull pipe through with closed end. Pull pipe back in one continuous pull to avoid closure of the bore hole.

(11) – Disinfection of Piping and Structures

PART 1 - GENERAL

A. Description

This section includes materials and procedures for disinfection of water mains by the continuous feed method and by the slug method and disinfection of structures. Do not use the tablet method to disinfect pipelines. Disinfect piping in accordance with AWWA C651 and disinfect structures in accordance with AWWA C652 as modified below.

B. Related Work Described Elsewhere

1. Construction Facilities & Temporary Utilities: 557.05(14).
2. Pressure Testing of Piping: 557.12(14).

C. Job Conditions

1. Discharge of chlorinated water into watercourses or surface waters is regulated by the National Pollutant Discharge Elimination System (NPDES). Apply to the N.D. State Department of Health and obtain permit for permission to discharge chlorinated water and water utilized for dewatering and/or hydrostatic testing. Disposal of the chlorinated disinfection water and the flushing water shall be in accordance with N.D. Pollutant Discharge Elimination System (NDPDES) Permit Application and is the Contractor's

responsibility. The State of North Dakota has advised that the highly chlorinated water in the pipeline shall not be flushed into a creek, stream, lake or other waterways. Past experience has demonstrated the highly toxic effect chlorine has on fish and aquatic life. It may be necessary to eliminate the chlorine induced toxicity by dechlorination.

2. Schedule the rate of flow and locations of discharges in advance to permit review and coordination with Owner (FBRW) and cognizant regulatory authorities.
3. Use only potable water for cleaning, disinfecting, and flushing. It is anticipated that the Owner will be able to supply potable water at those points which connect to the existing system. The Contractor shall be cognizant of the requirements stipulated in Special Condition Section 557.05 (14), Part C. for hydrotesting and disinfecting.

PART 2 - MATERIALS

A. Liquid Chlorine

Inject with a solution feed chlorinator and a water booster pump. Use an experienced operator and follow the instructions of the chlorinator manufacturer.

B. Calcium Hypochlorite (Dry)

Dissolve in water to a known concentration in a drum and pump into the pipeline at a metered rate.

C. Sodium Hypochlorite (Solution)

Further dilute in water to desired concentration and pump into the pipeline at a metered rate.

D. Chlorine Residual Test Kit (ByOwner)

For measuring chlorine concentration, the Owner (FBRW) will supply and use a medium range, drop count, titration kit or an orthotolidine indicator comparator with wide range color discs. Range 1.0 to 20 mg/l. The product used may be Hach Chemical or Hellige.

PART 3 - EXECUTION

A. Disinfection

After segments of new pipelines have been completed, tested, and pigged, all pipelines, valves, and appurtenances to be in contact with potable water and affected by construction shall be disinfected in accordance with AWWA C651. Disinfection shall be scheduled to maintain maximum continuity of the completed pipeline segments. The highly chlorinated water shall be allowed to stand in the pipeline segment for a minimum of 48 hours after which there should be at least a 25 parts per million chlorine residual in the water. Additional requirements are as follows:

1. Continuous Feed Method for Pipelines

Introduce potable water into the pipeline at a constant measured rate. Feed the chlorine solution into the same water at a measured rate. Proportion the two rates so that the chlorine concentration in the pipeline is maintained at a minimum concentration of 50 mg/l throughout the entire segment of pipeline being disinfected. Check the concentration at points downstream during the filling to ascertain that sufficient chlorine is being added. The Contractor shall provide the Owner's Representative documentation of high chlorine levels at all locations requested by the Owner's Representative.

After the system has been chlorinated, the heavily chlorinated water shall be flushed from the system by the Contractor. Upon the expiration of at least 48 hours after flushing by the Contractor, two (2) consecutive samples of water from each sampling point taken at least 24 hours apart will be obtained by the Owner's Representative and submitted to a certified laboratory. The Contractor shall assist the Owner's Representative in collecting the samples. Assistance shall include operation of valves and any other incidental work deemed necessary by the Owner's Representative. The Contractor shall continue with disinfection until the samples or additional samples, if necessary, are found to be free of coliform bacteria. The Owner's Representative shall determine the number and location of sampling points.

B. Disinfection of Valves and Appurtenances

During the period that the chlorine solution is in the section of pipeline, open and close valves to obtain a chlorine residual at hydrants and other pipeline appurtenances.

C. Disinfection of Connections to Existing Pipelines

Prior to disinfection, the Contractor shall flush the pipeline with potable water until discolored water, mud, and debris are eliminated. Disinfect per AWWA C651, Section 9, or Part 3.A. of this specification section, whichever is more stringent. After disinfection, flush with potable water in accordance with Paragraph E. of this Section.

D. Confirmation of Residual

1. After the chlorine solution applied by the continuous feed method has been retained in the pipeline for 48 hours, confirm that a chlorine residual of 25 mg/l minimum exists along the pipeline by sampling at air valves and other points of access. The Contractor shall supply the Owner's Representative written and signed documentation of sampling points, verifying locations of high chlorine levels, before flushing of highly chlorinated water of points which have been sampled.

E. Pipeline Flushing

After confirming the chlorine residual, flush the excess chlorine solution from the pipeline until the chlorine concentration in the water leaving the pipe is within 0.5 mg/l of the replacement water.

F. Bacteriologic Tests

Two samples taken at least twenty-four (24) hours apart will be collected by Owner's Representative from each selected sampling point. The samples will be collected at least 48 hours after the Contractor has flushed the applicable pipeline segments. The samples collected will be delivered to a certified laboratory within twenty-four hours of obtaining the samples. The Contractor may be asked to assist in delivery of the samples to the certified laboratory. A bacteriologic quality test will be conducted by the certified laboratory to demonstrate the absence of coliform organisms and/or high background bacteria in each separate section of the pipeline and in each structure after chlorination and refilling. Two consecutive passing tests are required to demonstrate successful disinfection. If two bacteriological tests have failed within a pipeline segment, a Heterotrophic Plate Count Test may be performed on the pipeline segment area. All costs for the third and higher bacteriological tests and the Heterotrophic Plate Count Test will be paid by the contractor. The contractor shall rechlorinate the pipeline segment that is being tested after (3) three bacteriological tests have failed.

When the samples are taken by the Owner's Representative, the chlorine residual in the applicable segment(s) must be at least 1.5 mg/l. If less than 1.5 mg/l, the Contractor will be required to flush the applicable pipeline segment(s). If less than 0.5 mg/l, the Contractor will be responsible to rechlorinate and flush the applicable pipeline segment(s). No samples will be submitted for testing

until the chlorine residual is maintained at 1.5 mg/l upon the expiration of at least 48 hours after flushing has ceased by the Contractor. No flushing will be allowed by the Contractor within this minimum 48 hour time period. The Contractor may also be required to re-pig the pipeline segment(s) if the pipeline segment cannot meet the aforementioned requirements.

G. Repetition of Procedure

If the initial chlorination fails to produce required residuals and bacteriologic tests, repeat the chlorination, pigging (if necessary), and retesting until satisfactory results are obtained. After all chlorination and flushing and the chlorine residual requirements in subsection F. are met, either the Owner's Representative or Fort Berthold Rural Water will test the applicable pipeline segments for the following chlorine residuals:

1. A chlorine residual of at least 1.2 mg/l must be maintained in each pipeline segment upon the expiration of one week after both bacteriologic test samples have been taken. The Contractor will not be permitted to flush the pipeline segment(s) within this time period unless specifically requested by the Owner's Representative or Fort Berthold Rural Water.
2. A chlorine residual of at least 1.0 mg/l must be maintained in each pipeline segment upon the expiration of two weeks after both bacteriologic test samples have passed and 0.8 mg/l after a three week time period. The Contractor will not be permitted to flush the pipeline segment(s) within this time period unless specifically requested by the Owner's Representative or Fort Berthold Rural Water.
3. The chlorine residuals will be randomly checked by the Owner's Representative or Fort Berthold Rural Water on a weekly basis. If the above stipulated residuals cannot be maintained through their respective time periods, the Contractor shall repeat the chlorination and/or flushing operations until such residuals can be maintained. The Contractor shall be responsible for all costs associated for retesting, repigging and the costs for the water being flushed.

H. Test Facility Removal

After satisfactory disinfection, replace air valves, restore the pipe coating, and complete the pipeline where temporary disinfection or test facilities were installed.

I. Piping to be Disinfected

1. Disinfect all watermain piping including:
 - a. Piping and appurtenances for town and bulk user connections.
 - b. Connections to existing pipelines.
 - c. Service line piping and appurtenances.
2. Disinfect all water piping to prefabricated steel vaults.

J. Wet Trench Construction

If it is not possible to keep the pipe and fittings dry during installation, every effort shall be made to ensure that any of the water that may enter the pipe-joint spaces contains an available chlorine concentration of approximately 25 mg/L. This may be accomplished by adding calcium hypochlorite granules or tablets to each length of pipe before it is lowered into a wet trench, or by treating the trench water with hypochlorite tablets.

(12) – Hydrostatic Testing of Pressure Pipelines

PART 1 - GENERAL

A. Work Included

Pigging, pressure and leakage testing of new pressure pipelines and those pipelines and appurtenances affected by construction. All segments of pipeline shall be tested. Provide test bulkheads at ends of piping runs and other locations as necessary depending upon the methods of testing employed.

B. Submittals

None.

C. Payment

1. Payment for costs associated with the utilization of FBRW required for pigging, flushing, disinfection, and hydrostatic testing shall be in accordance with Special Provisions Sections 557.05 (14), and included in overall lump sum bid for 557 (14).

PART 2 - MATERIALS

A. Pigs

The swab type pigs shall be properly sized for Cl. 160 pipe and all other classes of pipe. Pigs shall be suitable for removal of the dirt and debris in the pipeline. No undersized pigs shall be allowed. Pigs shall be properly labeled for each size and class of pipe.

B. Water

Water to be utilized for pigging, flushing, and hydrotesting shall be as specified in Special Condition Section 557.05 (14), Subsection C.

PART 3 - EXECUTION

A. Pigging

Prior to testing and disinfection, pig all new pipelines 2-inch and larger to remove dirt, debris, and foreign material. On all pipelines three pigs shall be used, in series. The three pigs shall consist of swab-type having a density of 8-10 pounds per cubic foot (Pipeline Pigging Products #C3 or equal). Pigs shall be properly sized for Cl. 160 and all other classes of pipe. Pigs shall be labeled for each size and class of pipe. No undersized pigs will be allowed. In no case shall a pigging segment be longer than 5 miles. At that time, the pigs shall be flushed out at pig-out points, and examined before reusing. The Contractor shall not re-use any damaged pigs. Any pigs that are found to be damaged shall be disposed of immediately. If leaks occur or are encountered after pigging, the Contractor may be required to re-pig the line. After the pigs have been flushed from a pipeline segment, the Contractor shall temporarily plug the pig-out points and fill the pipeline

segment. After at least 48 hours has expired, the Contractor shall again flush the entire segment of pipeline using the pig-out points to discharge water. The Contractor shall flush the pipeline at least one times the volume of the pipeline segment after the pigs have been removed.

B. Air Gap Separation

Locate and install test bulkheads, valves, connections to existing pipelines, and other appurtenances in a manner to provide air gap separation between existing potable water pipelines and pipelines being tested.

C. Initial Pipeline Filling

The Contractor shall coordinate filling of the pipeline with the Owners Representative and Fort Berthold Rural Water. Refer to Section 557.05 (14). Maximum rate of filling shall not cause water velocity in pipeline to exceed 1 fps. Filling may be facilitated by removing automatic air valves and releasing air manually.

D. Testing New Pipe Which Connects to Existing Pipe

Test new pipelines which are to be connected to existing pipelines by isolating the new line from the existing line by means of pipe caps, spectacle flanges, or blind flanges, or if authorized by the Owner's Representative, test to the nearest existing valve. After the new line has been successfully tested, remove caps or flanges and connect to the existing piping. After completing the connection and permitting the water to enter the pipeline, visually inspect the connection for leakage. Correct any leakage.

E. Hydrostatic Testing of Aboveground or Exposed Piping

1. Fill the pipe to be tested with water and allow it to soak at least 48 hours to absorb water before conducting the pressure test.
2. Open vents at high points of the piping system to purge air while the pipe is being filled with water. Venting during system filling may also be provided by temporarily loosening flanges. Subject the piping system to the test pressure indicated in Part 3.F.1. Maintain the test pressure for a minimum of eight hours plus additional time required to inspect the system for leakage. Examine joints, fittings, valves, and connections for leaks. The piping system shall show zero leakage or weeping. Correct leaks and retest until zero leakage is obtained.

F. Pressure and Duration of Test

1. Pipelines installed in trenches shall be tested with water to a pressure equal to the rated working pressure of the pipe for ASTM D2241 and AWWA C905 PVC pipe. AWWA C-900 Cl. 200 pipe shall be tested to 250 psi, AWWA C-900, Cl. 150 pipe shall be tested to 150% of the rated working pressure. At locations where 1-1/2" PVC Cl. 200 pipe is used but a pressure rating of Cl. 160 would have been adequate, such Cl. 200 pipe shall be considered as Cl. 160 for testing purposes.
2. The test point pressure shall be corrected so as not to exceed the pressure rating calculated to the lowest ground elevation in the test section. A test section shall be no greater than 1 mile except where required due to the lack of valves, and at such time the section shall be no greater than the distance to the next valve.
3. All tests and testing equipment shall be provided by the Contractor. Prior to the testing, all air shall be expelled from the pipeline. The test shall be conducted with all appurtenances in place. The test shall be made by pumping water into a test section through one of the meter setters, ball valves for an appurtenance, or through corporation cocks installed for

testing purposes and bringing the pressure up to the corrected pressure rating.

4. The test section shall be closed and allowed to remain for 30 minutes, after which time the pressure shall be released approximately 10 pounds and then repumped up to the test pressure.
5. Following the reaching of the test pressure, the test pressure shall be maintained for a minimum of two hours. If at any time during the test the gauge reading falls 10 psi below the beginning test pressure, repump the section to the initial pressure reading and record the amount of water required to do so.
6. All exposed pipes, fittings, valves, hydrants, and joints shall be examined for leakage during the test. Any joint having visible leakage or seepage shall be repaired at the expense of the Contractor. Anytime that the pressure has dropped by 10 psi or at the end of the test, the pressure shall be brought back to the test pressure by pumping a measured amount of water into the test section.
7. Following the completion of the test period (2 hour minimum) repump the test section to the pressure reading at the beginning of the test and record the amount of water required to do so.
8. Add the amount of water added during the test period to maintain the test pressure (per 5. above) to the amount of water required to bring the ending pressure back to the pressure at the beginning of the test. The total water added shall not exceed that calculated according to the formula in Subsection G.

G. Allowable Leakage of Buried Piping

Permit one to three days for the filled pipeline to soak and to release entrapped air. Apply the test pressure with a positive displacement pump. Provide a snubber or dampener between the pump and the pipeline to reduce pressure pulses to 10% of the specified test pressure. Draw from containers in which the volume of water can be readily measured or through a positive displacement meter. The amount of water used to maintain the test pressure during the test period shall be the rate of leakage.

The allowable leakage for the test section during the test period at the pressure specified for each segment of the test section shall be calculated as follows:

$$L = \frac{NDP}{C}$$

- Where: L = allowable leakage (gallon/hour)
 during the test period.
 N = number of joints in the length of
 pipeline tested
 D = diameter of the pipe (inches)
 P = square root of the specified test
 pressure (psig)
 C = 7,400

The total allowable leakage for the test section shall be the sum of the allowable leakage for each of the pipeline segments (at various size and class) which comprise the test section.

Regardless of the rate of leakage, all detectable leaks shall be stopped.

H. Repetition of Test

If the actual leakage exceeds the allowable, locate and correct the faulty work and repeat the test. Restore the work and all damage resulting from the leak and its repair. All visible leakage shall be eliminated.

I. Bulkhead and Test Facility Removal

After a satisfactory test, drain the water, remove test bulkheads and other test facilities.

(13) – PVC Distribution Pipe (AWWA C900 & C905)

PART 1 - GENERAL

A. Description

This section includes materials, installation, and testing of polyvinyl chloride (PVC) distribution pipe conforming to AWWA C900 and C905.

B. Related Work Specified Elsewhere

1. Trenching, Backfilling and Compacting: (7).
2. Disinfection: (11).
3. Hydrostatic Testing of Pressure Pipelines: (12).
4. Miscellaneous Piping Specialties: (15).
5. Manual Valves and Check Valves: (16).

C. Submittals

1. Submit shop drawings in accordance with the Special Provisions Section (4).
2. Provide an affidavit of compliance with AWWA C900 and/or AWWA C905 and these specifications. The certificate forms are included in Appendix A.
3. Submit manufacturer's literature of ductile-iron fittings including dimensions, thickness, weight, coating, lining, and a statement of inspection and compliance with the acceptance tests of AWWA C110.
4. Submit outline drawings and materials description of service connection saddles and pipe plugs

PART 2 - MATERIALS

A. Pipe

AWWA C900 and C905, rubber-ring gasket bell end or plain end with elastomeric gasket coupling, DR 14, 18, or 25. Cast iron equivalent OD, material and hydrostatic design stress designation: PVC 1120. Regrind material shall not be used in the manufacturing process. Pipe shall be extruded through a die and pin set(s) specifically sized for each DR required.

The manufacturer's recommended minimum pipe bending radius shall be not greater than 300

times the nominal diameter of the pipe. The joined pipeline shall be suitable for installation in trenches curved at radii equal to or greater than the above without requiring thrust blocking or backfill compaction. The pipeline shall be capable of sustaining the short term stresses imposed by joining the pipe above the trench, and then lowering the joined pipeline into the trench. Any restrictions pertaining to installation by this method shall be provided (in writing) to the BIDDERS and the ENGINEER by the pipe manufacturer at least seven (7) days prior to bid opening.

Integral bell joints shall be capable of being stressed as required to obtain horizontal and vertical curvature of the pipeline without causing joint leakage due to stressing and distortion of the bell joint. Integral bell joints shall have a depth **(measured from the end of the bell to the point of beginning of the convergence of the bell into the pipe section)** not less than those following:

<u>Nominal Pipe Diameter Inches</u>	<u>Minimum Bell Depth Inches</u>
14	10.0
16	10.0
18	11.0

B. Restrained Joint PVC Pipe and Fittings

Restrained joint PVC pipe and fittings shall comply with the manufacturing requirements stated in Paragraph A. of this section. The restrained joint shall be non-corrosive and shall be accomplished by utilizing precision machined grooves on the pipe and in the coupling locked together by the insertion of a nylon spline resulting in a 360° restrained joint or fusible PVC pipe of the heat fusion (butt fusion) joining system. The restrained joint shall meet the requirements of ASTM D3139. Gaskets shall comply with ASTM F477.

Provide restrained joint PVC pipe and fittings where indicated on the Contract Drawings. Fusible PVC pipe shall be of the heat fusion (butt fusion) joining system as manufactured by Underground Solutions or equal. Restrained joint PVC pipe and fittings shall be Certa-Lok as manufactured by CertainTeed Corp. or equal. PVC pipe sizes 2" and 3" shall have a minimum of Class 250 psi rating. PVC pipe sizes 4" and 6" shall have a minimum class rating of Class 200 psi. 8" and larger shall have a minimum class rating of Class 160 psi.

C. Ductile Iron Fittings

Fittings for 4-inch and larger PVC pipe shall conform to the following requirements:

Fittings shall conform to AWWA C110 or C153 with a minimum rated working pressure not less than that required for the pipeline as shown on the Construction Drawings. Fittings shall be ductile iron. Fittings shall be cement-mortar-lined as specified in AWWA C104, Section 4.8. It shall be the responsibility of the Contractor to verify compatibility of all pipe ends, flanges, and appurtenances. Size bells specifically for OD of PVC pipe including rubber-ring retaining groove. Fittings shall use push-on style connections if available. If unavailable, mechanical joint style connections to PVC pipeline may be used. All bolts and nuts shall be stainless steel, Type 304.

1. Grooved-end fittings shall conform to AWWA C110 and ANSI B16.1 with grooved ends conforming to AWWA C606, radius cut rigid joints. Fitting material shall conform to ASTM A48, Class 30, or ASTM A126, Class B.
2. Fittings with weld-on bosses (which includes straight pipe with weld-on bosses) shall conform to the following requirements:
 - a. Material for fittings shall have a Charpy notch impact value of minimum 10 ft-lb. under the conditions defined in AWWA C151.

b. Fittings shall be designed for the pressure class shown on the Construction Drawings. Minimum pipe wall thickness shall be Class 52 for pipe sized up to 12-inch diameter and Class 51 for pipe sizes greater than 12-inch diameter.

c. Maximum diameter of bossed outlet shall be as follows:

Pipe Diameter (inches)	Maximum Boss Diameter (inches)
-----	-----
12	4
10	3
8	2
6	2

3. Steel Flexible Pipe Couplings shall meet the following requirements.

Steel coupling bodies shall be made of center sleeves fabricated of high strength carbon steel tubing meeting ANSI/AWWA C200. The coupling shall have one gasket compression end ring per coupling end. End rings shall be of either one or two bolt design, fabricated of carbon steel meeting ASTM A576. Interior and exterior coating shall be NSF-61 approved fusion bonded epoxy coating. The epoxy coating shall be 12 mils, DFT and conform to the requirements of AWWA C213-01 section 4.5.

- a. Gaskets shall be chloramines resistant NSF-61 approved EPDM designed with a multi-layered wide range removable outer layer. Gaskets shall be hydraulically actuated with a pressure-equalizing dam, pressure cavity and sealing lip for working pressures of 260 psi (16-inch and smaller) and 230 psi (18-inch to 24-inch)
- b. Nuts and Bolts shall be ANSI 304 Stainless Steel.
- c. Flexible pipe couplings shall be Romac Alpha restrained joint couplings as manufactured by Romac Industries, Inc. or approved equal.

D. Coating for Metal Fittings

Coating for metal fittings shall have an interior and exterior epoxy coating of 6 mil minimum thickness conforming to AWWA C550. Wrap buried metal fittings with two wraps of 8 mil polyethylene per AWWA C105.

E. Mechanical Joint Transition Gaskets

When required for valve settings or other various specified connections to ductile iron size mechanical joint fittings, connections shall be made by using transition gaskets especially manufactured for use in converting ductile iron mechanical joint fittings for use on PVC pipe.

F. Gaskets for Flanges

Gaskets for flanges shall be fullface, 1/8 inch thick, cloth-inserted rubber: Johns-Manville 109, John Crane Co. Style 777, or equal. Gaskets shall be suitable for a water pressure of 350 psi at a temperature of 180°F

G. Bolts and Nuts for Fittings

- 1. Bolts and nuts for flanges or mechanical joints located indoors and in enclosed vaults and structures shall be stainless steel, Type 304, anti-seize lubricant shall be applied.

2. Bolts and nuts for buried and submerged flanges or mechanical joints and flanges located outdoors above ground or in open vaults in structures shall be stainless steel, Type 304.
3. For flanged fittings, provide washers for each nut. Washers shall be of the same material as the nuts.
4. Lubricate all bolt threads with graphite and oil prior to installation.

H. Outlets and Small Line Connections

1. Provide outlets 2 inches and smaller by tapping the pipe and attaching a service saddle/tapping sleeve as specified in Section (15), Part 2.F.
2. For outlets larger than 2 inches, use a tee.

I. Factory Testing

1. In accordance with AWWA C900 and C905.
2. Do not use test results from other projects.

PART 3 - EXECUTION

A. Product Marking

Legibly mark pipe at 5-foot intervals and each coupling to identify the nominal diameter, the OD base, that is, cast-iron or steel pipe (IPS), the material code PVC 1120 for pipe and PC 1 for couplings, the dimension ratio number, AWWA C900 or C905, and the seal of the testing agency that verified the suitability of the material for potable water service (NSF in the United States).

B. Delivery and Temporary Storage of Pipe

1. Ship, store, and place pipe at the storage yard or installation site supporting the pipe uniformly. Avoid scratching the pipe surface. Do not stack higher than recommended by the pipe manufacturer nor stack with weight on bells. Do not subject the pipe to undue stresses while shipping, loading, unloading, or stacking.

Unload pipe close to point of installation to avoid handling damage. Avoid scratching the pipe surface.

2. Remove and do not install pipe that is gouged, scratched forming a clear depression, scratched (having a depth equal to or greater than 5% of the wall thickness of the pipe), or marred.
3. Provide to the Owner's Representative a listing of the quantity of PVC pipe shipped to the jobsite for each code. The Owner (FBRW) may require that factory "Quality Control Reports" for each code also be provided.

C. Pipe Layout for Curved Alignment

Pipe lengths may be bent for curved alignment as allowed by the manufacturer's recommended minimum pipe bending radius. Joint deflections shall be per the manufacturer's recommendations.

D. Handling Pipe

Hoist pipe with mechanical equipment using a cloth belt sling or a continuous fiber rope which avoids scratching the pipe. Do not use a chain. Pipe up to 14 inches in diameter may be lowered by rolling on two ropes controlled by snubbing. Pipe up to 6 inches in diameter can be lifted by hand.

During hauling, stringing, and laying operations the pipe shall be kept clean. Pipe which is strung out and assembled prior to installation in the trench shall have the ends of the assembled segment properly capped. Pipe which is rejected because of foreign matter may be cleaned by passing a swab, of sufficient size to lightly touch the walls, through the pipe until all foreign matter is removed.

E. Installing Pipe in Trenches

1. Inspect each pipe and fitting before lowering the pipe or fitting into the trench. Clean ends of pipe thoroughly. Remove foreign matter and dirt from inside of pipe and keep clean during and after laying.
2. Handle pipe in a manner to avoid any damage to the pipe. Do not drop or dump pipe into trenches under any circumstances.
3. Deflections from a straight line or grade made necessary by vertical or horizontal curves shall not exceed the tolerances as recommended by the pipe and joint manufacturer. Should the alignment require deflections in excess of those stipulated, the Contractor shall provide special fittings or use shorter lengths of pipe. The location shown on the plans is approximate and necessary minor deviations to avoid obstacles may necessitate deflections not indicated by the plans. The Contractor shall maintain a supply of fittings at the job site to maintain continuity of construction.
4. The trench bottom shall form a continuous and uniform bearing and support for the pipe, except that the grade may be disturbed for the removal of lifting tackle.
5. Keep the trench in a dewatered condition during pipelaying in areas where buoyancy of the pipe is a concern by the Owner's Representative, if the pipe is assembled in the trench, and as stipulated in Section (7).

Piping installed by directional drilling, such as in restrained joint areas, stream crossings, waterways, drainage areas, applicable road crossings, open areas, and other areas selected by the Contractor, shall be restrained joint pipe (Certa-Lok or PE pipe per Section (8)). Mechanical restraining devices will not be acceptable. Wide range restrained joint couplings are required on each end of the restrained area. The end of the pipe which is in the direction of drilling shall be capped or plugged. The plug shall be capable of preventing drilling fluid from entering the pipe. Except for designated restrained joint areas, no additional payment will be made for the use of restrained joint pipe. The end of the pipe which is in the direction of the drilling shall be capped with an approved pipe plug.

6. When the pipelaying is not in progress, including the noon hours, close the open ends of pipe. Do not permit trench water, animals, or foreign material to enter the pipe.
7. Provide thrust blocks at all fittings as required by the Construction Drawings.

F. Assembly of Pipe Joint

1. The spigot and bell or bell coupling shall be dirt free and slide together without displacing the rubber ring. Lay the pipe section with the bell coupling facing the direction of laying.
2. Insert the rubber ring into the groove in the bell just before joining the pipes. First clean the groove. Observe the correct direction of the shaped ring. Feel that the ring is completely seated.

3. Lubricate the spigot over the taper and up to the full insertion mark, with the lubricant supplied by the pipe manufacturer. If the lubricated pipe end touches dirt, clean the pipe end and reapply lubricant. Do not use lubricant in excess of the pipe manufacturer's recommendations. Provide written recommendations or an on-site demonstration by the pipe manufacturer on the proper amount of lubricant to be used on the joint.
4. Insert the spigot into the bell and force it slowly into position.
5. Check that the rubber has not left the groove during assembly by passing a feeler gage around the completed joint.
6. Tighten mechanical joint bolts to the torque recommended by the manufacturer with a torque wrench. When tightening bolts, it is essential that the gland be brought up toward the flange evenly, maintaining approximately the same distance between the gland and the face of the flange at all points around the socket.
7. Assemble the joint per the pipe manufacturer's recommendations.
8. After the pipe has been installed in the trench and prior to backfilling, the Contractor shall check to make sure that the joint has not been partially separated in handling.

G. Factory Representative

The Contractor shall make arrangements with the pipe manufacturer to have a factory representative, skilled in the installation of the specified pipe to be present for a minimum of one day at the starting of the laying of the pipe. A pipe supply house representative will not be considered as being a factory representative. Following the visit the factory representative shall provide a letter regarding the site visit and the Contractor's procedures which were observed. The Contractor shall be advised of any practices which are not acceptable to the factory representative.

H. Field Hydrostatic Testing

Test in accordance with Section (13).

I. Thrust Blocking

All fittings at bends in the pipeline and at points where the pipe is reduced in size shall be firmly blocked against the undisturbed face of the trench. This blocking shall be completed by placing 2000 psi concrete in the opening between the fitting and the undisturbed trench face. Thrust blocking shall be required at all points where the pipeline changes direction, such as the following: tees, elbows, wyes, caps, valves, hydrants, blow-offs, reducers, etc. except at restrained joint PVC fitting unless shown otherwise on the Drawings. The thrust blocks should be constructed so that the bearing surface is in direct line with the major force created by the pipe or fitting. The earth bearing surface shall be undisturbed and only the simplest of forms shall be required.

The minimum distance from the fitting or pipe being blocked to the bearing face at the undisturbed trench face shall be twice the pipe diameter but not less than twelve (12) inches. Minimum sizes of blocking shall be as outlined on the Drawings. Immediately after placement of concrete, the Contractor will be allowed to cover the fresh concrete block with 8 mil polyethylene and commence backfilling operations except in locations which require compactions. Such locations shall be left open a minimum of 24 hours.

J. Pipe Sampling

The Owner (FBRW) may obtain samples of pipe to be utilized for this work, excluding restrained joint PVC pipe, at the time of delivery to the jobsite. Samples obtained may be used for impact testing as well as other applicable tests. Pipe samples may be taken from each production length

provided. The Contractor shall inform the Owner's Representative at least 48 hours in advance of the time and place of pipe delivery so that the Owner's Representative can schedule obtaining the necessary samples. The Contractor shall be responsible for providing the necessary assistance in obtaining the samples and shall be responsible for rebeveling the pipe from which samples are taken.

K. Installation of Flexible Couplings or Solid Sleeves

1. Couplings or sleeves shall be used as shown on the Drawings. The coupling or sleeve joints shall be completed in the trench after the pipe has been laid. Each pipe end for a sufficient distance back from the end shall be thoroughly cleaned to remove oil, dirt, and other foreign matter to effectively seal the joint. Remove burrs from pipe ends. Clean gaskets before installing. Glands, gaskets, and sleeves shall then be assembled on the pipe ends, in accordance with the manufacturer's recommendations. Glands and sleeves shall be accurately centered over the pipe ends and one pipe end shall touch the coupling sleeve centering stop if the coupling sleeve is so equipped.
2. Install couplings and sleeves per manufacturer's recommendations. Install couplings and sleeves so that 50% of the total travel is available for expansion and 50% is available for contraction. The maximum distance between two ends of pipe to be connected by a long-body coupling shall be two (2) inches.
4. Bolts shall be tightened to the torque recommended by the manufacturer with a torque wrench. When tightening bolts, it is essential that the gland be brought up toward the pipe flange evenly, maintaining approximately the same distance between the gland and the face of the flange at all points around the socket.
5. Wrap complete assembly with two wraps of 8-mil polyethylene tubing per AWWA C105.

(14) – PVC Distribution Pipe (ASTM D2241)

PART 1 - GENERAL

A. Description

This section includes materials, installation, and testing of polyvinyl chloride (PVC) pipe conforming to ASTM D 2241 and as modified herein.

B. Related Work Specified Elsewhere

1. Trenching, Backfilling and Compacting: (7).
2. Disinfection: (11).
3. Hydrostatic Testing of Pressure Pipelines: (12).
4. Miscellaneous Piping Specialties: (15).
5. Manual Valves and Check Valves: (16).

C. Submittals

1. Submit shop drawings in accordance with the General Provisions and Special Condition Section (4).
2. Provide an affidavit of compliance with ASTM D2241, ASTM D3139, ASTM D1784, ASTM

F477, National Sanitation Foundation Standards 14 and 61 and these specifications. The certificate form is included in Appendix A.

3. Submit manufacturer's literature of ductile-iron fittings including dimensions, thickness, weight, coating and lining and a statement of inspection and compliance with the acceptance tests of AWWA C110.
4. Submit outline drawings and materials description of service connection saddles, corporation stops, and pipe plugs.

PART 2 - MATERIALS

A. Pipe

The pipe shall be manufactured of Class 12454-B Polyvinyl Chloride Compound, 2000 psi design stress for water at 73.4° F. and shall conform to ASTM D-1784 compound specifications. All pipe shall conform to the requirements of ASTM D-2241. Pipe products shall be included under the NSF Standard 14 and 61 Listings. The pipe shall be homogeneous throughout and shall be free from cracks, holes, foreign inclusions, or other defects. Regrind material shall not be used in the manufacturing process. Provide pipe of the pressure classes shown on the Drawings. Pipe shall be extruded through a die and pin set(s) specifically sized for each pressure class required. Provide elastomeric seal joints of the twin gasket or integral bell type conforming to ASTM D 3139. Gaskets shall comply with ASTM F 477. Twin gasket couplings shall have a positive stop in the center that will automatically position the pipe ends within the coupling. The pressure rating of the couplings shall equal or exceed that of the pipe and shall be marked on each coupling. The couplings shall permit up to 3° of deflection (1-1/2" each side of coupling) at each joint creating stress at the joint.

Couplings shall be CertainTeed Fluid-Tite twin gasket or equal. Integral bell joints shall be capable of being stressed as required to obtain horizontal and vertical curvature of the pipeline without causing joint leakage due to stressing and distortion of the bell joint. Integral bell joints shall have a depth **(measured from the end of the bell to the point of beginning of the convergence of the bell into the pipe section)** not less than those following:

<u>Nominal Pipe Diameter Inches</u>	<u>Minimum Bell Depth Inches</u>
6	6.5
8	7.5
10	8.0
12	9.0

The manufacturer's recommended minimum pipe bending radius shall be not greater than 300 times the nominal diameter of the pipe. The joined pipeline shall be suitable for installation in trenches curved at radii equal to or greater than the above without requiring thrust blocking or backfill compaction. The pipeline shall be capable of sustaining the short term stresses imposed by joining the pipe above the trench, and then lowering the joined pipeline into the trench. Any restrictions pertaining to installation by this method shall be provided (in writing) to the BIDDERS and the ENGINEER by the pipe manufacturer at least seven (7) days prior to bid opening.

PVC pipe 12" and smaller shall be supplied in standard laying lengths of 40 feet nominal. A limited quantity of pipe may be supplied in shorter lengths of 20 or 30 feet to accommodate installation in wet areas and in areas of obstruction. The Contractor shall verify prior to bidding the work that he has equipment capable of fully supporting the pipe while being transported and distributed over the Project.

B. Restrained Joint PVC Pipe and Fittings

Restrained joint PVC pipe and fittings shall comply with the manufacturing requirements stated in Paragraph A. of this section. The restrained joint shall be non-corrosive and shall be accomplished by utilizing precision machined grooves on the pipe and in the coupling locked together by the insertion of a nylon spline resulting in a 360° restrained joint. The restrained joint shall meet the requirements of ASTM D3139. Gaskets shall comply with ASTM F477. Minimum physical property values shall be as follows:

<u>Property</u>	<u>Min. Value</u>	<u>ASTM Method</u>
Tensile Strength	7,000 psi	D638
Modulus of elasticity	400,000 psi	D638
Izod Impact	0.65 ft. lbs/inch of notch	D256
Deflection Temp.	150° F	D648
Flammability	Self-Extinguishing	D635
Chemical Resistance	B	D543

Provide restrained joint PVC pipe and fittings where indicated on the Contract Drawings. Restrained joint PVC pipe and fittings shall be Yelomine Certa-Lok as manufactured by CertainTeed Corp. or equal.

Yelomine pipe and fittings are available for working pressures up to 250 psi, in pipe sizes up to 8". Unless written notification is received from the pipe manufacturer to indicate otherwise, Class 200 10" and 12" yelomine is rated for a maximum working pressure of 160 psi and can only be used in areas designated on the drawings for Class 160 pipe. PVC pipe sizes 2" and 3" shall have a minimum of Class 250 psi rating. Yelomine or equal PVC pipe sizes 4" and 6" shall have a minimum class rating of Class 200 psi rating. 8" and larger shall have a minimum class rating of Class 160 PVC.

C. PVC Fittings

Fittings for 5-inch and smaller diameter PVC pipe shall be PVC gasket joint fitting designed for use with ASTM D2241 pipe. The fittings shall be sized specifically for use with ASTM D2241 PVC pipe. Fittings shall be of the same material as the pipe, have a pressure rating no less than the adjoining pipe, and shall bear the NSF seal of approval. Solvent weld fittings shall not be used except for 1½" to 1" reducing couplings or bushings, and for couplings used with casing pipe.

PVC long body repair couplings shall be used in lieu of the metallic pipe couplings. However, for 10" and 12" Cl. 250 PVC Pipe, metallic pipe couplings, as specified, shall be used.

Factory produced High Density Polyethylene (HDPE) reducing fittings may be used for pipe size reductions or increases when polyethylene pipe is used at restrained joint areas. HDPE reducers shall be of a gradual concentric reduction. HDPE reducers which consist of sharp or abrupt size changes will not be allowed. The portion of the HDPE reducer which connects to the adjacent PVC

pipe shall have a uniform diameter for at least 12". The length of the HDPE reducer which will be fused to the adjacent PE restrained joint pipe shall be at least 6". Dimensions and tolerances of the HDPE reducer shall conform to AWWA C906. Heat fusing of HDPE fittings shall be accomplished by trained personnel in accordance with Specification Section (8).

D. Ductile-Iron Fittings

Fittings for 6-inch and larger PVC pipe shall conform to the following requirements.

1. Size bells specifically for OD of ASTM PVC pipe including rubber-ring retaining groove. Fittings shall use push-on style connections, if available. If unavailable, mechanical joint style connections to PVC pipeline may be used. All bolts shall be stainless steel, Type 304.
2. Fittings shall conform to AWWA C110 or C153 with a minimum rated working pressure not less than that required for the pipeline as shown on the Construction Drawings. Fittings shall be ductile iron. It shall be the responsibility of the Contractor to verify compatibility of all pipe ends, flanges, and appurtenances.
3. Grooved-end fittings shall conform to AWWA C110 and ANSI B16.1 with grooved ends conforming to AWWA C606, radius cut rigid joints. Fitting material shall conform to ASTM A48, Class 30, or ASTM A126, Class B.
4. Fittings with weld-on bosses (which includes straight pipe with weld-on bosses) shall conform to the following requirements:

- a. Material for fittings shall have a Charpy notch impact value of minimum 10 ft-lb. under the conditions defined in AWWA C151.
- b. Fittings shall be designed for the pressure class shown on the Construction Drawings. Minimum pipe wall thickness shall be Class 52 for pipe sized up to 12-inch diameter and Class 51 for pipe sizes greater than 12-inch diameter.
- c. Maximum diameter of bossed outlet shall be as follows:

Pipe Diameter (inches) -----	Maximum Boss Diameter (inches) -----
12	4
10	3
8	2
6	2

5. Steel Flexible Pipe Couplings shall meet the following requirements.
 - a. Steel coupling bodies shall be made of center sleeves fabricated of high strength carbon steel tubing meeting ANSI/AWWA C200. The coupling shall have one gasket compression end ring per coupling end. End rings shall be of either one or two bolt design, fabricated of carbon steel meeting ASTM A576. Interior and exterior coating shall be NSF-61 approved fusion bonded epoxy coating. The epoxy coating shall be 12 mils, DFT and conform to the requirements of AWWA C213-01 section 4.5.
 - b. Gaskets shall be chloramines resistant NSF-61 approved EPDM designed with a multi-layered wide range removable outer layer. Gaskets shall be hydraulically

actuated with a pressure-equalizing dam, pressure cavity and sealing lip for working pressures of 260 psi (16-inch and smaller) and 230 psi (18-inch to 24-inch)

- c. Nuts and Bolts shall be ANSI 304 Stainless Steel.
- d. Flexible pipe couplings shall be Romac Alpha restrained joint couplings as manufactured by Romac Industries, Inc. or approved equal.

E. Coating for Metal Fittings

Ductile iron fittings shall have an interior and exterior epoxy coating of 6 mil minimum conforming to AWWA C550. Wrap buried metal fittings with two wraps of 8 mil polyethylene per AWWA C105.

F. Mechanical Joint Transition Gaskets

When required for valve settings or other various specified connections to ductile iron size mechanical joint fittings, connections shall be made by using transition gaskets especially manufactured for use in converting ductile iron mechanical joint fittings for use on PVC pipe.

G. Gaskets for Flanges

Gaskets for flanges shall be fullface, 1/8 inch thick, cloth-inserted rubber: Johns-Manville 109, John Crane Co. Style 777, or equal. Gaskets shall be suitable for a water pressure of 350 psi at a temperature of 180° F.

H. Bolts and Nuts for Flanges

- 1. Bolts and nuts for flanges located indoors and in enclosed vaults and structures shall be stainless steel, Type 304.
- 2. Bolts and nuts for buried and submerged flanges and flanges located outdoors above ground or in open vaults in structures shall be stainless steel, Type 304.
- 3. Provide washers for each nut. Washers shall be of the same material as the nuts.
- 4. Lubricate all bolt threads with graphite and oil prior to installation.

I. Outlets and Small Line Connections on New Pipelines

- 1. For outlets 2" and smaller, refer to Specification Section (15), Part 2.F.
- 2. For outlets larger than 2 inches or for outlets on pipe 2½" and smaller, use a tee.

J. Factory Testing

- 1. In accordance with ASTM D2241.
- 2. The phrase "beginning of production" means the beginning of production of pipe for this project. Do not use test results from other projects.

PART 3 - EXECUTION

A. Product Marking

Legibly mark pipe at 5-foot intervals and each coupling to identify the nominal diameter, the material code for pipe, the dimension ratio number, ASTM D 2241, and the seal of the testing agency that verified the suitability of the material for potable water service (NSF in the United States).

B. Delivery and Temporary Storage of Pipe

1. Ship, store, and place pipe at the storage yard or installation site supporting the pipe uniformly. Avoid scratching the pipe surface. Do not stack higher than recommended by the manufacturer, nor stack with weight on bells. Do not subject the pipe to undue stresses while shipping, loading, unloading, or stacking.
2. Unload pipe close to point of installation to avoid handling damage. Avoid scratching the pipe surface.
3. Remove and do not install pipe that is gouged, scratched forming a clear depression, scratched (having a depth equal to or greater than 5% of the wall thickness of the pipe), or marred.
4. Provide to the Owner's Representative a listing of the quantity of PVC pipe shipped to the jobsite for each code. The Owner (FBRW) may require that factory "Quality Control Reports" for each code also be provided.

C. Pipe Layout for Curved Alignment

Pipe lengths may be bent for curved alignment as allowed by the manufacturer's recommended minimum pipe bending radius. Joint deflections shall be per the manufacturer's recommendations.

D. Handling Pipe

Hoist pipe with mechanical equipment using a cloth belt sling or a continuous fiber rope which avoids scratching the pipe. Do not use a chain. Pipes up to 12 inches in diameter may be lowered by rolling on two ropes controlled by snubbing. Pipe up to 6 inches in diameter can be lifted by hand.

During hauling, stringing, and laying operations the pipe shall be kept clean. Pipe which is strung out and assembled prior to installation in the trench shall have the ends of the assembled segment properly capped. Pipe which is rejected because of foreign matter may be cleaned by passing a swab, of sufficient size to lightly touch the walls, through the pipe until all foreign matter is removed.

E. Installing Pipe in Trenches

1. Inspect each pipe and fitting before lowering the pipe or fitting into the trench. Clean ends of pipe thoroughly. Remove foreign matter and dirt from inside of pipe and keep clean during and after laying.
2. Handle pipe in a manner to avoid any damage to the pipe. Do not drop or allow pipe to fall into trenches.
3. Deflections from a straight line or grade made necessary by vertical or horizontal curves shall not exceed the tolerances as recommended by the pipe and joint manufacturer. Should the alignment require deflections in excess of those stipulated, the Contractor shall provide special fittings or use shorter lengths of pipe. The location shown on the plans is approximate and necessary minor deviations to avoid obstacles may necessitate deflections not indicated by the plans. The Contractor shall maintain a supply of fittings at the job site to maintain continuity of construction.
4. The trench bottom shall form a continuous and uniform bearing and support for the pipe, except that the grade maybe disturbed for the removal of lifting tackle.

5. Keep the trench in a dewatered condition during pipe laying in areas where buoyancy of the pipe is a concern by the Owner's Representative, if the pipe is installed in the trench, and as stipulated in Section (7).
6. Piping installed by any boring method, such as in restrained joint areas, stream crossings, waterways, drainage areas, applicable road crossings, open areas, and other areas selected by the Contractor, shall be restrained joint pipe (Certa-Lok or PE pipe per Section (8)). Mechanical restraining devices will not be acceptable. Wide range restrained joint couplings are required on each end of the restrained area. The end of the pipe which is on the direction of drilling shall be capped or plugged with an acceptable pipe plug. The plug shall be capable of preventing drilling fluid from entering the pipe. Except for designated restrained joint areas, no additional payment will be made for the use of restrained joint pipe.
7. When the pipe laying is not in progress, including the noon hours, close the open ends of pipe. Do not permit trench water, animals, or foreign material to enter the pipe.
8. Provide thrust blocks at all fittings as required by the Construction Drawings.

F. Assembly of Pipe Joint

1. The spigot and bell or bell coupling shall be dirt free and slide together without displacing the rubber ring. Lay the pipe section with the bell coupling facing the direction of laying.

Insert the rubber ring into the groove in the bell just before joining the pipes. First clean the groove. Observe the correct direction of the shaped ring. Feel that the ring is completely seated.
2. Lubricate the spigot over the taper and up to the full insertion mark, with the lubricant supplied by the pipe manufacturer. If the lubricated pipe end touches dirt, clean the pipe end and reapply lubricant. Do not use lubricant in excess of the pipe manufacturer's recommendations. Provide written recommendations or an on-site demonstration by the pipe manufacturer on the proper amount of lubricant to be used on the joint.
3. Insert the spigot into the bell and force it slowly into position.
4. Check that the rubber has not left the groove during assembly by passing a feeler gage around the completed joint.
5. Tighten mechanical joint bolts to the torque recommended by the manufacturer with a torque wrench. When tightening bolts, it is essential that the gland be brought up toward the flange evenly, maintaining approximately the same distance between the gland and the face of the flange at all points around the socket.
6. Assemble the joint per the pipe manufacturer's recommendations.
7. After the pipe has been installed in the trench and prior to backfilling, the Contractor shall check to make sure that the joint has not been partially separated in handling.

G. Solvent Weld Joints

Solvent welding may be used to join separate pieces of casing pipe. A complete description of the process recommended by the pipe manufacturer shall be maintained on the jobsite and shall be followed by the Contractor. The description shall include, but not limited to the following: Instructions of procedures; materials including solvents, cements and fittings; tools required; set- up times before handling joints and testing; and the pipe size, type and size of fittings and temperature or humidity range for which the methods are recommended. Solvent welding shall be done in strict

conformance with the method recommended by the manufacturer. All solvent weld joints shall be made under "shop conditions". Field welding of solvent joints will not be allowed except for casings.

H. Factory Representative

The Contractor shall make arrangements with the pipe manufacturer to have a factory representative, skilled in the installation of the specified pipe to be present for a minimum of one day at the starting of the laying of the pipe. A pipe supply house representative will not be considered as being a factory representative. Following the visit the factory representative shall provide a letter regarding the site visit and the Contractor's procedures which were observed. The Contractor shall be advised of any practices which are not acceptable to the factory representative.

I. Field Hydrostatic Testing

Test in accordance with Section (12).

J. Thrust Blocking

All fittings at bends in the pipeline and at points where the pipe is reduced in size shall be firmly blocked against the undisturbed face of the trench. This blocking shall be completed by placing 2000 psi concrete in the opening between the fitting and the undisturbed trench face. Thrust blocking shall be required at all points where the pipeline changes direction, such as the following: tees, elbows, wyes, caps, valves, hydrants, blow-offs, reducers, etc. except at restrained joint PVC fitting unless shown otherwise on the Drawings. The thrust blocks should be constructed so that the bearing surface is in direct line with the major force created by the pipe or fitting. The earth bearing surface shall be undisturbed and only the simplest of forms shall be required. The minimum distance from the fitting or pipe being blocked to the bearing face at the undisturbed trench face shall be twice the pipe diameter but not less than twelve (12) inches. Minimum sizes of blocking shall be as outlined on the Drawings. Immediately after placement of concrete, the Contractor will be allowed to cover the fresh concrete block with 8 mil polyethylene and commence backfilling operations except in locations which requires compaction. Such locations shall be left open a minimum of 24 hours.

K. Pipe Sampling

The Owner (FBRW) may obtain samples of pipe to be utilized for this work, excluding restrained joint PVC pipe, at the time of delivery to the jobsite. Samples obtained may be used for impact testing as well as other applicable tests. Pipe samples may be taken from each production length provided. The Contractor shall inform the Owner's Representative at least 48 hours in advance of the time and place of pipe delivery so that the Owner's Representative can schedule obtaining the necessary samples. The Contractor shall be responsible for providing the necessary assistance in obtaining the samples and shall be responsible for rebeveling the pipe from which samples are taken.

L. Installation of Flexible Couplings or Solid Sleeves

1. Couplings or sleeves shall be used as shown on the Drawings. The coupling or sleeve joints shall be completed in the trench after the pipe has been laid. Each pipe end for a sufficient distance back from the end shall be thoroughly cleaned to remove oil, dirt, and other foreign matter to effectively seal the joint. Remove burrs from pipe ends. Clean gaskets before installing. Glands, gaskets, and sleeves shall then be assembled on the pipe ends, in accordance with the manufacturer's recommendations. Glands and sleeves shall be accurately centered over the pipe ends and one pipe end shall touch the coupling sleeve centering stop if the coupling sleeve is so equipped.

2. Install couplings and sleeves per manufacturer's recommendations. Install couplings and sleeves so that 50% of the total travel is available for expansion and 50% is available for contraction.
3. Widerange restraint couplings shall be Romac Alpha or Alpha XL.
4. Bolts shall be tightened to the torque recommended by the manufacturer with a torque wrench in the presence of the Owner's Representative. When tightening bolts, it is essential that the gland be brought up toward the pipe flange evenly, maintaining approximately the same distance between the gland and the face of the flange at all points around the socket.
5. Wrap complete assembly with two wraps of 8-mil polyethylene tubing per AWWA C105.

(15) – Miscellaneous Appurtenances and Piping Specialties

PART 1 - GENERAL

A. Description

This section includes materials and installation of the miscellaneous appurtenances and piping specialties.

B. Related Work Specified Elsewhere

1. Record Drawings and Shop Drawings: (4).
2. PVC Pipe (AWWA C900 & C905): (13).
3. PVC Pipe (ASTM D2241): (14).
4. Manual Valves and Check Valves: (16).

C. Submittals

1. Submit shop drawings in accordance with Section (4), "Record Drawings and Shop Drawings".
2. Submit manufacturer's catalog data showing dimensions and materials of construction by ASTM reference and grade. Show coatings where coatings are to be applied.

PART 2 - MATERIALS

A. Stainless Steel Threaded Nipples

Threaded nipples shall be stainless steel, Type 304. Threads shall conform to ANSI B2.1.

B. Galvanized Steel Pipe

Pipe shall be galvanized steel conforming to ASTM A 53, Type E or S, or ASTM A 135. Pipe 12 inches and smaller shall be standard weight per ANSI B36.10.

C. Galvanized Steel Fittings

Fittings 3 inches and smaller shall be Class 300, threaded, malleable iron (ASTM A 47, Grade 35018) conforming to ANSI B16.3. Alternatively, use threaded forged steel fittings (ASTM A 105)

conforming to ANSI B16.11, 3,000-pound CWP. Threads shall conform to ANSI B2.1.

D. Galvanized Steel Unions

Unions shall be class 300, malleable iron (ASTM A 47, Grade 35018) brass to iron seat, conforming to ANSI B16.39. Ends shall be threaded per ANSI B2.1.

E. Thread Lubricant

Use teflon thread lubricating compound.

F. Saddles for PVC Pipe

Saddles shall be sized specifically for use with the size and type (AWWA C-900, AWWA C-905, or ASTM D2241) of pipe to be tapped. The saddles shall be pressure rated for the pressure rating of the pipe shown on the Construction Drawings (including test pressures). Saddles for Class 250 PVC Pipe shall be certified by the manufacturer for working pressures up to 225 psi and test pressure up to 250 psi.

1. Appurtenance Vaults, Manholes, or Well Curbing:

- a. Saddles used on 6" and larger PVC pipe shall be full body stainless steel, Romac 306, PowerSeal Model 3412, orequal.
- b. Saddles used on 4" and smaller PVC pipe shall be dual strap stainless steel, Ford Style FC202, Romac Style 202N orequal.

2. Small Line Connections:

- a. Saddles for making 1" connections to 6" and larger PVC distribution pipe shall be full body stainless steel, Romac 306 orequal.
- b. Saddles for making 1" connections to 4" and smaller PVC distribution pipe may be bronze 2-piece service saddles, Ford Style S71 or equal. However, saddles on Class 250 PVC pipe shall be of the type specified in Item No. 1.b. above.
- c. 1½" and larger connections shall use tees, or stainless steel saddles of the size and type specified in Item No. 1 above.

G. Pipe Restraint at 10" and Larger Valve Locations

Restraint devices on ASTM or C-900 PVC pipe at connections to 10" and larger valves (unless specifically specified otherwise) shall incorporate a series of machined serrations on the inside diameter to provide positive restraint, 360° contact and support of the pipe wall. Restraint at valve connections shall be UNI-FLANGE Block Buster 1300 or approved equal sized for ASTM or C-900 PVC pipe. A portion of the PVC pipe joints adjacent to the valve shall be restrained also in accordance with the construction details. Restraint devices for bell and spigot joints of PVC pipe shall consist of a split restraint ring installed on the spigot, connected to a solid back-up ring seated behind the bell. Restraint device at PVC pipe joints shall be UNI-FLANGE Block Buster 1350 (or 1390) or approved equal, sized for ASTM or C-900 PVC pipe. Restraint devices shall be manufactured of high strength ductile iron, ASTM A536, Grade 65-45-12. Bolts and connecting hardware shall conform to ANSI/AWWA C11/A21.11. Restraint devices shall have a working pressure rating equal to the full rated pressure of the adjoining PVC pipe. The use of these restraint devices are not allowed as a substitute of Yelomine or Certa-Lok restraint joint pipe at

designated restrained joint areas or at any stream crossing.

H. 3" Blowoffs

The 3" blowoff assemblies shall be a non-freezing, self-draining type. The hydrant shall be furnished with a non-turning operating rod and shall open by turning left. All working parts shall be of the bronze-to-bronze design and be serviceable from above grade with no digging. The outlet shall be 2-1/2". The 3" blowoff assembly shall be a Eclipse #85 as manufactured by the Kupferle Foundry Company or equal.

I. Fire Hydrants

Hydrants shall be manufactured in accordance with the requirements of AWWA C502. The hydrants shall be equipped with a break-a-way type traffic flange and two (2) 2½-inch hose connections with National Standard Threads and one (1) 4½-inch pumper connection with National Standard Threads. The hydrants shall be 4½-inch American Darling MK-73-5 as manufactured by American Flow Control or approved equal. Fire hydrants shall be installed with markers with flags. The markers shall be Hydra-Finder as manufactured by RoDon Corporation or approved equal.

J. 4" Cleanouts

The 4" cleanout assemblies shall consist of a mainline size by 4" outlet tee, 4" resilient seat gate valve with valve & box, 4" PVC Cl. 250 pipe and fittings, Sch. 80 PVC threaded nipple, 1" curbstop assembly and service saddle with 1" IPS outlet, curbstop extension stem and valve box, thrust blocking, and aggregate drain around terminus of curbstop piping. The curbstop assembly shall be placed downstream of 4" gate valve to drain water from 4" riser pipe.

K. 2" Cleanouts

The 2" cleanout assemblies shall consist of a service saddle with 2" IPS outlet, a Ford 2" IPS x pack joint coupling (or equal) and a 2" Ford No. B77-777 ball valve with stop and waste feature (or equal). The valve shall have a 2" pack joint on both ends. Pipe for the cleanout assembly shall be Schedule 80 PVC meeting the requirements of this section. Fittings for the PVC portion of the cleanout shall be solvent welded under "shop conditions". Field welding of solvent joints will not be allowed.

L. 1-1/2" Cleanouts

The 1-1/2" cleanout assemblies shall consist of a service saddle and a 1-1/2" Ford No. B77-666 ball valve with stop and waste feature (or equal). The valve shall have a 1-1/2" pack joint on both ends. Pipe for the cleanout assembly shall be Schedule 80 PVC meeting the requirements of this section. Fittings for the PVC portion of the cleanout shall be solvent welded under "shop conditions".

M. Schedule 40 and 80 PVC Pipe

Schedule 40 and 80 PVC pipe shall be manufactured in accordance with ASTM D-1784. Materials used shall meet or exceed the requirements of ASTM D-1785. The pipe shall bear the NSF seal of approval. Schedule 40 or Schedule 80 pipe nipples as shown on the drawings or as required in the Specifications shall be used to connect to all pack joints.

N. Testing Tap Boxes

Testing tap boxes at designated stream crossings shall be a Mueller meter box. Mueller meter box shall be of extrusion grade PVC material with a diameter of 15 inches and a wall thickness of .300 inches. The lid shall be cast iron, tar coated, designed with a rim extending 1/2-inch below the top

of the box. The lid shall be complete with a lifting device and clearly marked "Water Meter". The lid shall be the locking style lid. All fittings, valves and connections shall be manufactured of red brass. The setting shall be complete with the following equipment, or approved equals:

Angle Valve	-	Mueller Ball Valve Rated for 300 psi
Pipeline Adapter Polybutylene	-	Ford C16XX
Coil (250 psi) D2666;	-	Conform to ASTM D1598; ASTM D2581; and ASTM as manufactured by Van Guard Plastics, Inc.

The meter box and setting shall be as manufactured by Mueller Company and as detailed on the drawings.

O. Type 2 Pressure Reducing Valves (T-2PRV's)

The pressure reducing valve shall be a Clayton Model 90G-01BCDSY (or equal) with check feature, valve position indicator, sight tube, opening and closing speed controls with stainless steel needles and seats, "Y"-strainers, shutoff cocks to isolate the pilot control system, female iron pipe thread end connections, ductile iron body with stainless steel trim, and adjustable from 30 to 300 psi. A bronze meter flange shall be installed on each end of the pressure reducing valve, Ford No. CF31, or approved equal.

The valve shall have an exterior and interior protective coating of 6-mil minimum thickness conforming to AWWA C550 and certified to meet NSF Standard 61. The valve shall be installed in a Coppersetter by Ford, No. VBB77-15B x length (or equal). A PVC pack joint coupling shall be installed on each end of the setter and shall be Ford No. C87-77 (or equal).

Gauges shall be 4-1/2 inch dial pressure gauges, Marsh Type 7, graduated in psi and feet of head, or approved equal. Gauges shall have a range suitable for the pressures indicated on the drawing and shall be furnished with maximum pressure indicator hands. Each gauge shall be furnished with a pulsation dampener, a gauge cock, copper sensing line containing a tee and valve located below the gauge to be utilized for flushing the sensing line, and shall be securely fastened to the concrete manhole. Insulation, such as polystyrene Board, one-inch thick shall be provided between the pressure gauge and the concrete wall. Gauge sensing lines shall be connected to the line with stainless steel double strap or full body tapping saddles as manufactured by Ford, Romac, (or equal) with 1/2 inch I.P.T. outlet. The PRV shall be housed in a precast concrete manhole with appurtenant items as detailed on the drawings.

Special configurations of T-2 PRV's (such as T-2A, T-2M) may be shown on the drawings. The requirements specified in this section for the pressure reducing valve shall apply to these types of T-2 PRV's. The piping configuration and associated connections may differ and are shown on the drawings.

P. Type 3 Pressure Reducing Valves (T-3PRV's)

Type 3 PRV assemblies shall consist of a Mueller meter box of the type described in Part 2, Subsection M. All fittings, valves and connections shall be manufactured of red brass. The setting shall be complete with the following equipment, or approved equals:

Angle Valve	-	Mueller Ball Valve Rated for 300 psi
Dual Check Backflow Preventor	-	Mueller H-14244

- Pressure Reducing Valve - Watts 5M3-Z6 (1" or 3/4" as designated on the Drawings) or equal
- Pipeline Adapter - Mueller 700065 or 700066
- Polybutylene Coil (250 psi) - Conform to ASTM D1598; ASTM D2581, and ASTM D2666; as manufactured by Van Guard Plastics, Inc.

The meter box and setting shall be as manufactured by Mueller Company, and as detailed on the Drawings.

Q. 2" Special Meter in Manhole

The 2" special meter shall consist of a 72" I.D. precast concrete manhole, frame and cover, insulation cover, ladder, concrete slab and other appurtenant items as detailed on the drawings. The meter shall be a 2-inch turbine type meter, as manufactured by Sensus Technologies, Inc. or equal and shall have flanged connections as shown on the drawings. The meter shall be furnished with the High Speed Pickup Register to provide high frequency digital signal suitable for operation of ACT- PAK instruments. A flange coupling adapter shall be provided on one side of the meter to facilitate the removal of the meter for maintenance.

Gauges shall be 4-½ inch dial pressure gauges, Marsh Type 7, graduated in psi and feet of head, or approved equal. Gauges shall have a range suitable for the pressures indicated on the drawing and shall be furnished with maximum pressure indicator hands. Each gauge shall be furnished with a pulsation dampener, a gauge cock, copper sensing line containing a tee and valve located below the gauge to be utilized for flushing the sensing line, and shall be securely fastened to the concrete manhole. Insulation, such as polystyrene Board, one-inch thick shall be provided between the pressure gauge and the concrete wall. Gauge sensing lines shall be connected to the line with stainless steel double strap or full body tapping saddles as manufactured by Ford, Romac,(or equal), with 1/2 inch I.P.T. outlet.

R. 1" Special Meter

The 1" Special Meter shall consist of a Mueller Meter Box constructed of extrusion grade PVC material with a diameter of 18 inches and a wall thickness of .300 inches. The lid shall be cast iron, tar coated, designed with a rim extending 1/2 inch below the top of the box. The lid shall be complete with a locking device, a lifting device and clearly marked "Water Meter". All fittings, valves and connections shall be manufactured of red brass. The signal cable to the remote register shall exit the side of the meter box as shown on the drawings. The setting shall be complete with the following equipment, or approved equals:

- 1" Displacement Type Meter - Badger or equal
- Angle Valve - Mueller Ball Valve Rated for 300
- psi Dual Check Backflow Preventer - Mueller
- Pressure Reducing Valve - Watts 5M3-Z6
- Pipeline Adapter - Mueller 700066
- Polybutylene Coil(250 psi) - Conform to ASTM D1598; ASTM D2581; ASTM D2666 as manufactured by Van Guard Plastics, Inc.
- Flow Control valve - Dole
- SSGX (if required on plans)

The displacement meter shall be in accordance with Section 15110. Meter setters shall be assembled for a 1" meter and a pressure reducing valve. The setter assembly shall include all items detailed on the Drawings including necessary support and anchoring brackets. All fittings shown shall be constructed of brass and shall be equivalent to items manufactured by the Ford Meter Box Company. The pressure gauge shall be a 2½" No. 800 Series TRERICE, or equal. The assembly

shall be configured in such a manner to achieve the most efficient layout for the equipment used and for maintenance.

S. 2½" and Larger Connections (Taps) to Existing Pipelines

2½" and larger connections to existing pipelines shall be the same size as the new pipe being connected. The connections shall be rated for the pressure rating of the pipe and shall be accomplished by the following methods as designated on the drawings:

1. Wet tap the existing pipeline within the pipe size range provided on the drawings or in accordance with the pipe manufacturer's recommendations, whichever results in the smaller tap size. The wet tap shall be accomplished with a ductile iron tapping sleeve and valve. Tapping sleeve shall be mechanical joint with flange outlet, Mueller H-615 or equal. Provide reducers on 3" branches. Wrap ductile iron tapping sleeves, valves, and fittings with two wraps of 8-mil polyethylene tubing per AWWA C105. Stainless steel tapping sleeves with S.S. flange outlet may be substituted for the ductile iron tapping sleeves. S.S. tapping sleeves shall be Romac or equal. Polyethylene wrap is not required for S.S. tapping sleeves.
2. Cut open the existing pipeline for those pipelines which are not wet taps as indicated on the drawings or as directed by the 's Representative. Install tees and couplings of the type specified in the piping specifications for the appropriate branch size valve. Wrap ductile iron fittings with two wraps of 8-mil polyethylene tubing per AWWA C105.

Provide valves of the type specified in Section (16). Provide any other items, transition gaskets, reducers, etc. to complete the connection.

T. 2" and Smaller Connections (Taps) to Existing 3" and Larger Pipelines.

2" and smaller connections to existing pipelines shall be the same size as the new pipe being connected and shall be completed as shown on the drawings. The connections shall be made as detailed on the drawings. Wet taps for 2" connections shall not be made on existing pipe sizes less than 4". Wet taps for 1-1/2" connections shall not be made on existing pipe sizes less than 3". Tees shall be cut-in on pipes less than 4" in diameter for 2" connections and on pipes less than 3" in diameter for 1-1/2" connections. The connections shall be rated for the pressure rating of the pipe and shall be accomplished with a service saddle or tees, pack joint couplings, and valves of the type specified in these Specifications. Wet taps (if necessary) shall be accomplished by using corporation stops with MIP inlet threads. Provide any other items to complete the connection.

PART 3 - EXECUTION

A. Installation of Saddles

1. Clean all dirt, oil, or other foreign material from pipe to be saddled.
2. Install saddle per manufacturer's recommendations, including recommended torquing of bolts and nuts.
3. Pipe cutting tool used to tap pipe shall conform to the pipe manufacturer's recommendations.

B. Installing Threaded Piping

Ream, clean, and remove burrs from threaded piping before making up joints. Apply thread

lubricant to threaded ends before installing fittings, couplings, unions, or joints.

C. 6" Flush Hydrants, 3" Blowoffs, and 4", 2" and 1-1/2" Cleanouts

The above items shall be installed per manufacturer's recommendations and as shown on the Drawings. Installation shall include all blocking and aggregate drain materials.

D. Type 2 Pressure Reducing Valves (PRV)

Type 2 pressure reducing valves shall be installed in a concrete manhole as detailed on the Drawings. Excavation, backfilling and compaction shall be in accordance with Section (6). The concrete manhole shall be set on an aggregate base. The Contractor shall furnish Sch. 80 PVC pipe and other materials as shown on the Drawings. Sch. 80 PVC shall be part of the lump sum bid of the Type 2 PRV. Pressure gauges shall be installed on the inlet and outlet side of the installation as shown. Brace assemblies to the concrete manhole as shown on the Drawings. Alternate configurations of the bracing will be considered.

E. Testing Tap Boxes and Type 3 PRV

Install assemblies as detailed on the drawings. Mueller meter boxes shall be set plumb on top of three (3) equally spaced concrete blocks and backfilled in uniform layers. Each layer shall be compacted to 85% relative compaction per ASTM D698. The area around the box shall be sloped to drain and blended to match existing groundlines.

F. 2" Special Meter in Manhole

2" special meter shall be installed in a precast concrete manhole as detailed on the Drawings.

G. 1" Special Meter

Assemble the meter and setter as shown on the Drawings. The assembly shall be complete with all items detailed including the remote readout, remote readout cable, mounting brackets, ball valves, backflow preventer, meter, pressure reducing valve, and fittings.

Meter boxes are to be set on 3 equally spaced concrete blocks as detailed on the Drawings. Meter boxes are to be plumb. Backfill to be completed in uniform layers, each layer compacted to 85% compaction per ASTM D698. Area around meter box to be sloped to drain and blended to match existing groundlines. The contractor shall assemble the 3/4" rigid PVC conduit in the field and extend from the meterbox to the remote readout as shown on the drawings. The contractor shall pull the readout cable through the conduit and secure to remote readout and post. Sufficient slack in the readout cable shall be provided inside the meter box. Care shall be exercised not to damage the conduit during backfilling operations. The 5" x 6" post used for the remote readout support shall be installed as shown on the drawings.

H. Connections to Existing Pipelines

Connections to existing pipelines shall be accomplished as specified herein and as detailed on the Drawings. 2" connections to pipe sizes less than 4" in diameter and 1-1/2" connections to pipe sizes less than 3" in diameter shall be accomplished by cutting in gasketed tees. The Contractor has the option to preassemble the tees and adjoining piping (to the couplings) as one complete unit and solvent weld the tees in a "dirt-free" and in an "environmentally controlled" shop. All solvent welds shall be performed in accordance with the pipe manufacturer's written recommendations.

I. Installation of Restraint Devices at Valve Locations

1. Clean all dirt, oil, or other foreign material from pipe to be restrained.
2. Install restraint device per manufacturer's recommendations, including recommended torquing of bolts and nuts.
3. Wrap restraint devices with two wraps of 8 mil polyethylene per AWWA C105.

(16) – Manual Valves & Check Valves

PART 1 - GENERAL

A. Description

This section includes materials, testing and installation of manually operated valves and check valves.

B. Related Work Specified Elsewhere

1. Disinfection: (11).
2. Hydrostatic Testing of Pressure Pipelines: (12).
3. PVC Pipe (AWWA C-900 & C-905): (13).
4. PVC Pipe (ASTM D2241): (14).

C. Submittals

1. Submit manufacturer's catalog data and detail construction sheets showing all valve parts and describing material of construction by material and specification (such as AISI, ASTM, SAE or CDA).
2. Show valve dimensions including laying lengths. Show dimensions and orientation of valve operators, as installed on the valves.
3. Show valve linings and coatings.

PART 2 - MATERIALS

A. General

1. Valves are identified on the plans by size.
2. Valves shall be installed complete with appropriate gaskets, nuts and bolts, operating handwheels, extension stems, floor stands, operating nuts and wrenches required for operation.
3. Valves shall bear the AWWA seal and have the name of the manufacturer, year, size and pressure rating of the valve cast or molded onto the valve body or bonnet or shown on a permanently attached plate.

B. Valve Operators

Provide 2-inch AWWA operating nuts for 2-inch and larger buried valves. Provide handwheels for butterfly and gate valves in prefabricated steel vaults, manholes, and others structures. Provide

factory assembled handles for ball valves in prefabricated steel vaults, manholes, and structures.

1. For buried or submerged service, provide watertight shaft seals and watertight valve and actuator cover gaskets. Provide totally enclosed operators designed for buried or submerged service.
2. Design operators on buried valves to produce the required torque on the operating nut with a maximum input of 150 foot-pounds.
3. Valve operators, handwheels or levers shall open by turning counterclockwise.

C. Valve Boxes for Buried Valves

Valve boxes shall be as shown on the drawings.

D. Extension Stems for Buried Valve Operators

1. 2-Inch and Larger Buried Valves:

Provide extension stems in standard lengths of 5'-0". Extension stems shall be steel and shall be complete with 2-inch square operating nut and centering device. Coat stems per Section (17), System L. For lump sum bid (not each service area) provide two "T"- handle wrenches which adapt to the 2" operating nut.

2. 1 and 1½-Inch Buried Valves:

Provide standard stationary rods in lengths of 6'± with centering device and pinned to the valve operator nut. For each Segment provide only two 'T'-handle keys which adapt to the stationary rod. The centering device for each stationary rod shall consist of a 3-inch Sch. 40 PVC slip-on cap and a steel cable clamp. A 3/4-inch ± hole shall be drilled in the center of the cap to allow the rod to be inserted through the cap. The cable clamp shall be secured to the stationary rod beneath the PVC cap. Install the centering device near the top of the stationary rod above or below the "rod bend" as space permits.

E. Bolts and Nuts for Flanged Valves or Mechanical Joint Valves

Bolts and nuts for flanged or mechanical joint valves shall be as described in the detail piping specifications.

F. Gaskets

Gaskets for flanged end valves shall be as described in the detail piping specifications.

G. Lining and Coating

1. All gate and butterfly valves shall have an exterior and interior protective coating of 6-mil minimum thickness conforming to AWWA C550. Interior coating shall be certified as meeting NSF Standard 61.
2. Wrap buried ferrous metal valves with two wraps of 8 mil polyethylene per AWWA C105.

H. Valves

1. Gate Valves:

Valves 2-inch through 14-inch shall be resilient seat gate valves with non-rising stems (NRS) conforming to AWWA C509 or AWWA C515, with ductile iron bodies. Stem sealing shall be accomplished with O-Ring gaskets. All gaskets shall be constructed of a non-asbestos material. The following items shall be stainless steel Type 304 or 306: exposed body capscrews, exposed nuts and bolts, and fastening devices. The valves shall have a minimum working pressure of 200 psi cold water.

2. Butterfly Valves:

Butterfly valves shall conform the latest edition of AWWA C504 with the exception of those items specified elsewhere within this section and the following:

- a. Minimum working differential pressure across the valve disc shall be 200 psi.
- b. Valve discs shall be made of Type 304 stainless steel or cast iron with Type 304 stainless steel edge trim.
- c. Where the rubber seat is applied to the disc, it shall be vulcanized to a stainless steel seat which is clamped to the disc by Type 304 or 316 stainless steel screw fasteners.
- d. The following items shall be stainless steel Type 304 or 306: exposed body cap screws, exposed nuts and bolts, disc fasteners, seat retention and fasteners, seat retention and fastening devices.
- e. Hand wheel operators for valves in steel vaults need not comply with the requirement of AWWA C504.

3. Plug Valves:

Class 300 -- Non-Lubricated Plug Valves

Non-lubricated plug valves shall have carbon steel (ASTM A216, Grade WCB) bodies and plugs. Valve shall be of the venturi or regular pattern with bolted or screwed glands. Plug coating shall be Teflon, permanently bonded to the plug. Valve ends shall be flanged, Class 300, ANSI B16.5. Valve shall have a pressure rating of 285 psi CWP. Valves shall be DeZurik Series 100, or equal.

4. Ball Valves; 2-inches and Smaller:

- a. Bronze ball valves, in vaults or structures shall be rated at 300 psi minimum working pressure. Ends shall be threaded ends, NP. Ball and stem material shall be stainless steel Type 316. Ball valves shall be of the pad-locking type. Valves shall be Apollo or equal.
- b. Ball valves for 1½" lines shall be 1½" ball valves with compression type ends (pack joint) for PVC pipe. The valves shall be manufactured by Ford, No.B77- 666, with quarter turn check, or approved equal.
- c. Ball valves for 1" curb stops shall be 1" ball valves with a compression type connection for PVC pipe (one side) and connections for HDPE 3408 SDR7 pipe at other side of valve. Provide stiffeners at compression type ends for connections to PE pipe. The valves shall be manufactured by Ford, No.B61-444, with quarter turn check, and PVC pack joint coupling No. C87-46, or approved equal.

Ball valves for 1" curb stops on HDPE pipe only shall be 1" ball valves with compression type connections for PE pipe on both sides of the valve. Provide

stiffeners at compression type ends for connections to PE pipe. The valves shall be manufactured by Ford, No. B66-444, with quarter turn check, or approved equal.

5. Valve Ends:

The type of valve end shall be appropriate for the piping system and appurtenances of which they are a part. The Contractor shall verify the compatibility of valve ends, including class of flanges. End fittings for various types of pipe shall be as follows:

- a. PVC pipe (2 inch through 8 inch) shall have hubs and compression gaskets especially designed for PVC pipe. The hub depth shall be 3/4 the diameter of the pipe (+/- 1/2"), but never less than 3 inches.
- b. PVC pipe (10-inch and larger) shall be standard mechanical joint ends with duck-tipped transition gaskets for adaption to PVC pipe, if required. All 10-inch and larger valves shall be restrained in accordance with the drawings.
- c. Ductile iron pipe (all sizes) shall be standard mechanical joint ends unless otherwise specifically called for on the Drawings.

PART 3 - EXECUTION

A. Joints

1. Boltholes of flanged valves shall straddle the horizontal and vertical centerlines of the pipe run to which the valves are attached. Clean the faces of flanges by wire brushing to bare metal before installing flanged valves. Clean flange bolts and nuts, lubricate threads with oil and graphite, and tighten nuts uniformly and progressively. If flanges leak under pressure testing, loosen or remove the nuts and bolts, reseal or replace the gasket, reinstall or retighten the bolts and nuts, and retest the joints. Joints shall be watertight.
2. Clean threaded joints by wire brushing or swabbing. Apply Teflon joint compound or Teflon tape to pipe threads before installing threaded valves. Joints shall be watertight.
3. Compression and push-on joints shall be made per the manufacturer's recommendations. Connections to compression type joints shall be made with Schedule 40 or Schedule 80 pipe nipples a minimum of one (1) foot in length, or as shown on the drawings, whichever is greater.
4. The Contractor shall be responsible for correcting and repairing leakage at all joints, including the compression joint on the downstream side (user side) of the 1" curb stops and meter pits.

B. Valve Installation

Valves, curb stops, and valve or service boxes installed in trenches shall be placed where shown on the drawings. Valves, curb stops and valve or service boxes shall be set plumb with the valve or service box positioned directly over the valve. After being correctly positioned, the earth fill shall be carefully tamped around the valve or service box for a distance of 4 feet on all sides of the box.

Before installing any valve or curb stop, care shall be taken to see that all foreign material and objects are removed from the interior of the barrel. Stuffing boxes shall be tightened and the valve, hydrant or stop shall be opened and closed to see that all moving parts are in working order.

Wrap buried ferrous valves with two wraps of 8-mil polyethylene per AWWA C 105.

C. Valve Leakage Testing

Test valves for leakage at the same time that the connecting pipelines are tested. See Section (12) for pressure testing requirements. Protect or isolate any parts of valves, operators, or control and instrumentation systems whose pressure rating is less than the test pressure.

(17) – Painting and Coating

PART 1 - GENERAL

A. Work Included

Provide all labor, materials and equipment and perform all operations required to paint the facilities including, but not limited to, metal, equipment surfaces, piping, and valves.

B. Submittals

1. Submit shop drawings in accordance with the General Provisions.
2. Submit manufacturer's data sheets showing the following information:
 - a. Percent solids by volume.
 - b. Minimum recommended dry-film thickness per coat for prime, intermediate, and finish coats.
 - c. Recommended surface preparation.
 - d. Recommended thinners.
 - e. Statement verifying that the prime coat used is recommended by the manufacturer for use with the intermediate and finish coats.
 - f. Application instructions including recommended equipment and temperature limitations.
 - g. Curing requirements and instructions.

C. Workmanship

Perform all painting to meet standards of the best grades of painting using only thoroughly experienced workmen. Place drop cloths as required to protect floors and equipment from sprays, spatter, and droppings. Make the finished surfaces free from runs, drops, ridges, waves, laps, holidays, brush marks, or other imperfections. Use particular care to obtain an unbroken coating over bolts, threads, nuts, welds, edges and corners. Apply all coats in a manner to obtain even films of uniform thickness completely coating all corners and crevices.

Use only good, clean brushes and other equipment. Clean brushes, buckets and spraying equipment immediately at the end of each painting period.

Do not damage adjacent work during sandblasting operations. Do not leave blasted surfaces overnight before coating. Remove dust from the surface immediately prior to painting. Conduct spray painting under controlled conditions. Prevent damage to other facilities as a result of the spraying work. Correct any that does occur. Use air pressures consistent with recommendations of both the paint and spray equipment manufacturers. Use properly sized nozzles. Equip the

spraying equipment with mechanical agitators, pressure gauges, and pressure regulators. Exercise care during spraying to hold the nozzle sufficiently close to the surface being painted to avoid excessive evaporation of the volatile constituents and loss of material into the air, or the bridging over of crevices and corners.

D. Inspection of Surfaces

Obtain an inspection by the Owner's Representative of each surface to be painted subsequent to surface preparation and prior to application of each field coat of paint. Obtain inspection initially before beginning any surface preparation or painting operations on each surface.

Tint alternate coats of paint to ensure all surfaces are properly coated with the specified number of coats. Match the color of each undercoat to the color of the final finish coat unless directed otherwise as provided in this paragraph.

E. Special Attention Coating

Prior to application of each complete coat, apply a brush coat of the specified paint to surfaces that are difficult to coat, including sharp edges, nuts, bolts, and welds.

F. Film Thickness and Continuity

Do not exceed surface coverage rates specified by the manufacturer. References to the first coat mean the first full coat of paint and not surface preparation or pretreatment coatings. Dry film thickness indicated for each coat in each system represent minimums unless otherwise indicated (for example: a range -- 0.8 mils to 1.2 mils, or a maximum -- 6 mils maximum).

During and after final application of protective coatings, check all metal surfaces with a dry film thickness gauge to ensure specified dry film thickness have been attained. Check the thickness mechanically with an Elcometer, Mikrotest, or equivalent. Check all submerged or intermittently wetted metal surfaces for film continuity electrically using an approved low voltage flow detector such as Tinker-Rasor's M-1, K-D's "Bird Dog", or equivalent. In testing for continuity in the vicinity of welds, projections such as nuts and bolts, and crevices, the Owner's Representative will determine the minimum conductivity for smooth areas of like coating found adequate and apply it to these rough, irregular areas. Repaint pinholes and holidays to the required coat coverage. Make all metal surfaces meet the minimum continuity requirements for their coating.

G. Paint Properties, Mixing and Thinning

Assure all paints provide a satisfactory film with a smooth, even surface. Lightly sand glossy undercoats to provide a suitable surface for the proper application and adhesion of subsequent coats. Thoroughly stir, strain and keep paints at a uniform consistency during applications. Add paste pigments at the time of use and mix as follows: Place the pigment in a separate container and add small increments of the required vehicle or base paint with thorough stirring until a viscous smooth, homogeneous, lump-free paste is obtained. Mix in the remainder of the vehicle or base paint by boxing or stirring. Mix powdered metallic pigments at the time of use by adding the powder in small increments to about one third of the required base paint or vehicle with thorough mixing to obtain a smooth paste. Thoroughly stir in the remainder of the vehicle or base paint.

When necessary to suit conditions of the surface, temperature, weather, and method of applications, thin packaged paint immediately prior to use. Use the proper thinner as recommended by the manufacturer of the paint. Do not exceed either the maximum recommended thinning rate per the manufacturer or a thinning rate of 10% by volume. In no case, thin paint more than is absolutely necessary to obtain the proper application characteristics. Thinning in no way reduces the required film thicknesses specified for each system. If approved by the Owner's Representative, film thickness per coat may be reduced if the number of coats is increased to result in the same overall thickness of each type of paint in each system. In no case

will a dry film thickness less than the minimum recommended by the manufacturer be allowed.

H. Atmospheric Conditions

Except as specified or required for water thinned paint, apply paints only to thoroughly dry surfaces which are free of rust and condensation. Apply paint only when the dewpoint is adequately below the temperature of the surface. Do not apply paint during rainy, misty weather without protecting the area to be painted in a manner satisfactory to the Owner's Representative. Do not apply paint when the surrounding air temperature is below 40 degrees F. Do not apply paint when the temperature is expected to drop to 32 degrees F before the paint has dried. Do not apply paint to metal that is more than 5 degrees F cooler than the surrounding air or hotter than 120 degrees F. In no case, apply paint to metal which is at a temperature that will cause blistering or porosity or otherwise will be detrimental to life of the paint. When metal is painted in hot weather, special precautions are necessary to ensure that the specified thickness of paint is obtained. Do not apply paint during rain, fog, snow or mist when the relative humidity exceeds 85%. Do not apply paint when there is visible water, ice, or frost on the surface. In no case, apply paints under atmospheric conditions contrary to recommendations of the paint manufacturer.

I. Protection of Painted Surfaces

Where protection is provided for a surface during paint application, maintain such protection until the paint film has properly dried. Do not handle, work on, or otherwise disturb an item or surface that has been painted until the paint is completely dry and hard.

J. Transitions at Dissimilar Metals

At junctions of dissimilar metals, one of which does not require a protective coating, carry the coating across the juncture point onto the surface not requiring the coating in a manner that will preclude the presence of any cracks or pinholes. Properly prepare the surface of the metals to receive the coatings applied. If other preparations are unspecified, use a solvent cleaning and a commercial grade blast (SSPC-SP6) cleaning.

K. Special Instructions

1. Furnish, at no charge for use during this project, necessary dry film thickness gauges and electrical flaw detection equipment.
2. Furnish all necessary equipment and protective clothing as well as be responsible for proper instruction and supervision of their use.
3. Two weeks prior to the beginning of any painting deliver the specified test equipment and establish with the Owner's Representative a mutually agreeable schedule for the painting work. Design the schedule to allow for all inspections required. Include the entire duration of the project in the schedule.
4. Immediately prior to expiration of the guarantee period, the Owner's Representative will inspect the project and require all defects revealed to be corrected. Provide all work and materials necessary to eliminate the defects. Complete repair work within one calendar month of notification of the defects.

L. Color Schedule

The color schedule is located at the end of this section.

M. Measurement and Payment

Payment for the work in this section shall be included as part of the lump-sum bid amounts for items to which it is appurtenant in the 557 (14) Bid Schedule, and no additional payment shall be made therefore.

PART 2 - PRODUCTS

A. General

Deliver materials to the job site in their original unopened containers bearing the manufacturer's name, brand, and batch number. Do not use materials until the contents are inspected and data obtained from the label. Store materials in enclosed structures to protect them from the weather and excessive heat and cold. Protect materials from freezing.

All coatings applied to the interior of valves, piping, fittings, and pumps, and which convey potable water shall meet American National Standards Institute/National Sanitation Foundation International (ANSI/NSF) Standard 61. Coatings shall be considered as meeting this standard if certified as such by the NSF, UL, or other organizations accredited by ANSI to test and certify such materials.

B. Manufacturers and Distributors

Paint listed in the system description refers to the following manufactures and distributors:

1. Ameron, Protective Coatings Division, Brea, California
2. Koppers Company, Inc., Pittsburgh, Pennsylvania
3. Tnemec Company, Inc., Kansas City, Missouri

C. Touch-Up Paint

Furnish a minimum of 1 gallon of each paint in each color used for touch-up and minor repair work. Furnish the paints in unbroken containers clearly labeled with the manufacturer's name, product number or name, color, date of manufacture and coating system used.

PART 3 - EXECUTION

A. Surface Preparation

1. General: Properly condition all surfaces to be painted or coated before performing any work. Perform no more sandblasting or surface preparation than can be painted or coated in a normal working day. Remove all sharp edges, burrs, and weld splatter. Suppliers are instructed to provide shop work, in accordance with these specifications. Remove, suitably mask or protect hardware, electrical fixtures, and similar accessories. Disconnect and move equipment adjacent to walls as necessary to permit cleaning and painting, and replace such equipment subsequent to work.
2. Preliminary cleaning: Remove oil, grease, dirt, rust, loose mill scale, and other foreign substances. Remove oil and grease prior to any mechanical cleaning. Minor amounts of grease and oil contaminates will be tolerated on the surface prior to sandblasting, provided the abrasive is not reclaimed and reused.
3. Surface preparation methods:
 - a. General: Use clean cloths and fluids in solvent cleaning to avoid leaving a film or greasy residue. Program work to prevent dust or spray from the cleaning process from falling on wet, newly painted surfaces. Produce an adequate surface to securely bond the products used for initial, intermediate and final coats.

- b. Metal Surfaces: Prepare surfaces in accordance with the Steel Structures Painting Council (SSPC) method specified for the particular system used. When reference to a particular method is omitted, use SSPC-SP-2 (Hand Tool Cleaning). A brief summary of the SSPC methods presented below refer to the SSPC Manual for complete text of the specifications.

(1) SSPC-SP1 Solvent Cleaning

The removal of dirt, oil, grease and foreign matter with solvents or commercial cleaners using various methods of cleaning such as wiping, dipping, steam cleaning or vapor degreasing.

(2) SSPC-SP2 Hand Tool Cleaning

The removal of loose rust and mill scale by hand wire brushing, scraping, chipping or sanding. Hand Tool Cleaning will not remove all rust residue or intact, firmly adhering, mill scale.

(3) SSPC-SP3 Power Tool Cleaning

The removal of loose rust and mill scale by mechanical means such as power sanders, wire brushes, chipping, hammers, abrasive grinding wheels or needle guns. Power Tool Cleaning provides a slightly higher degree of cleanliness than Hand Tool Cleaning, but is not regarded as adequate surface preparation for long-term exterior exposure of most high performance coating systems.

(4) SSPC-SP5 White Metal Blast Cleaning

The complete removal of all visible rust, mill scale, paint and foreign matter by compressed air nozzle blasting, centrifugal wheels or other specified method, leaving an overall, uniformly gray-white metallic appearance.

(5) SSPC-SP6 Commercial Blast Cleaning

The removal of at least two-thirds of all visible rust, mill scale, paint and other foreign matter from each square inch of surface by compressed air nozzle blasting, centrifugal wheels or other specified method.

(6) SSPC-SP7 Brush-Off Blast Cleaning

The removal of loose rust, mill scale, paint and foreign matter from the surface by compressed air nozzle blasting, centrifugal wheels or other specified methods.

(7) SSPC-SP10 Near-White Metal Blast Cleaning

The removal of 95% of all visible rust, mil scale, paint and other foreign material from each square inch of surface by compressed air blasting, centrifugal wheels or other specified method.

B. Paint Application

1. Conform to the requirements of SSPC PA-1. Follow the recommendations of the coating manufacturer including the selection of spray equipment, brushes, rollers, cleaners, thinners, mixing, drying time, temperature and humidity of application, and safety precautions.

Stir, strain, and keep coating materials at a uniform consistency during application. Apply each coating evenly, free of brush marks, sags, runs, and other evidence of poor

workmanship. Use a different shade or tint on succeeding coating applications to indicate coverage where possible. Finished surfaces shall be free from defects or blemishes.

2. Do not use thinners unless recommended by the coating manufacturer. If thinning is allowed, do not exceed the maximum allowable amount of thinner per gallon of coating material. Stir coating materials at all times when adding thinner. Do not flood the coating material surface with thinner prior to mixing. Do not reduce coating materials more than is absolutely necessary to obtain the proper application characteristics and to obtain the specified dry-film thicknesses.
3. Remove dust, blast particles, and other debris from blast cleaned surfaces by dusting, sweeping, and vacuuming. Allow ventilator fans to clean airborne dust to provide good visibility of working area prior to coating applications. Remove dust from coated surfaces by dusting, sweeping, and vacuuming prior to applying succeeding coats.
4. Apply coating systems to the specified minimum dry-film thicknesses as measured from above the peaks of the surface profile.
5. Apply primer immediately after blast cleaning and before any surface rusting occurs, or any dust, dirt, or any foreign matter has accumulated. Reclean surfaces by blast cleaning that have surface colored or become moist prior to coating application.
6. Apply a brush coat of primer on welds, sharp edges, nuts, bolts, and irregular surfaces prior to the application of the primer and finish coat. The brush coat shall be done prior to and in conjunction with the spray coat application. Apply the spray coat over the brush coat.

C. Paint Systems

1. General: Paint systems include surface preparations, prime coatings, and finish coatings. Field clean and touch up with the same shop applied primers. Paint materials specified herein are given to illustrate the type, quantity and quality of materials required. Thickness as shown represents dry film requirements.
2. System A: Not used.
3. System B: Metal exposed to normal interior and exterior moisture.
 - a. Work Included: Exposed steel work, handrails, pipework, valves and appurtenances, fittings, mechanical equipment.
 - b. Surface Preparation: SSPC-SP10 (Near-White)
 - c. Alternate Coatings:

<u>Manufacturer</u>	<u>Product</u>	<u>Description</u>
(1) Ameron	5101 Primer 5401 Enamel	One 1.5 mil coating Two or more 1.5 mil coats
(2) Kop-Coat	622 Primer 500 Enamel	One 1.5 mil coat Two or more 1.5 mil coats
(3) Tnemec	66 Color Epoxoline	Pretreatment 3.0 dry mils

(Primer)

Finish (Interior)	66-Color Epoxoline	3.0 dry mils
Finish (Exterior)	74-Color Endurashield IV	2.0 dry mils

d. Note: Use Product 32-1210 as a pretreatment for galvanized metals and non-ferrous metals only. The pretreatment specified for these metals in System F may be omitted with the use of Product 21-1210.

4. System C: Not Used.

5. System D: Not Used.

6. System E: Not used.

7. System F: Not used.

8. System G: Factory painted metal items with additional field applied coats.

a. Work Included: Manufactured items which are factory painted.

b. Surface Preparation: SSPC-SP1 (solvent) and as recommended by the manufacturer for damaged areas requiring special attention. Apply touch-up priming as recommended by the manufacturer or in accordance with these specifications as applicable. Apply an intermediate special coating if the factory applied coating and the coating applied under these specifications are incompatible.

c. Alternate Coating:

<u>Manufacturer</u>	<u>Product</u>	<u>Description</u>
(1) Ameron	5401 Enamel	Two 1.5 mil coats
(2) Kop-Coat	500 Enamel	Two 1.5 mil coats
(3) Tnemec	135 Chembuild	One coat 5.0 dry mils

9. System H: Insulation between Aluminum and Concrete

a. Work Included: All locations where aluminum items are to be placed against Portland cement work.

b. Surface Preparations: Clean concrete surface to remove all dirt and loose matter. Use SSPC-SP-1 on respective aluminum surfaces.

c. Alternate Coatings:

<u>Manufacturer</u>	<u>Product</u>	<u>Description</u>
(1) Kop-Coat	40	One wash coat on aluminum
	654 Epoxy	Primer, 2 mil Coat

- | | | | |
|--|------------|-----------------------|--------------------------------|
| | | 200HB Epoxy | Two or more 6 mil |
| | (2) Tnemec | 66-Color
Epoxoline | Two coats
4.0 dry mils/coat |
10. System I: Not Used.
11. System J: Submerged metal, potable water.
- a. Work Included: Valves, sluice gates, bolts, nuts, structural steel, fittings, pump columns, hydraulic diffuser cone, discharge elbows (interior), exterior of bowl assemblies, and suction bell.
 - b. Surface Preparation: SSPC SP10.
 - c. Requirements: Must be NSF - Approved for use in potable water.
 - d. Color of Topcoat: White
 - e. Alternative Coatings:
- | <u>Manufacturer</u> | <u>Product</u> | <u>Description</u> |
|---------------------|----------------------|--------------------|
| Tnemec | Series 20 (Pota-Pox) | Two 8.0 mil coats |
| Kop-Coat | Hi-Gard | Two 8.0 mil coats |
| Ameron | 395 | Two 8.0 mil coats |
12. System K: Nongalvanized, ferrous metalburied.
- a. Work Included: Nongalvanized ferrous metalburied.
 - b. Surface Preparation: SSPC-SP10.
 - c. Alternate Coatings:
- | <u>Manufacturer</u> | <u>Product</u> | <u>Description</u> |
|---------------------|---------------------|--------------------------------------|
| Kop-Coat | Bitumastic 300-M | Two 8.0 mil coats |
| Ameron | 71
78 HB | Primer 2 mil coat
One 16 mil coat |
| Tnemec | 46-413
Tneme-tar | Two 8.0 mil coats |
13. System L: Submerged, Exposed Metal and Buried Metal Coating System:
- a. Type: Coal-tar epoxy having a minimum volume solids of 70%, conforming to MIL-P-23236.
 - b. Service Conditions: For use with metal structures, pipes, and buried metal; such as valves, flanges, bolts, nuts, structural steel, and fittings.
 - c. Surface Preparation: SSPC SP-10.

- d. Prime Coat: As per manufacturer's written recommendations, to be compatible with finish coat, Carboline, or equal.
- e. Finish Coat: Carboline Kop-Coat (300-M), 16 mils; Ameron 78, 16 mils; Tnemec 46H413, 16 mils; or equal.

D. Surfaces Not To Be Painted

The following surfaces shall not be painted and shall be protected during the painting of adjacent areas:

1. Reinforcement for reinforced concrete.
2. Interior and exterior concrete surfaces.
3. Stainless steel.
4. Fencing.
5. Electrical fixtures except for factory coatings.
6. Nameplates.
7. Grease fittings.
8. Buried pipe, unless specifically required in the piping specification.
9. PVC piping.
10. Galvanized handrails, grating, ladders, and framework.

E. Protection Of Surfaces Not To Be Painted

Remove, mask, or otherwise protect hardware, lighting fixtures, switchplates, aluminum surfaces, machined surfaces, couplings, shafts, bearings, nameplates on machinery, galvanized metal including conduits, and other surfaces not intended to be painted. Provide drop cloths to prevent paint materials from falling on or marring adjacent surfaces. Protect working parts of mechanical and electrical equipment from damage during surface preparation and painting process. Mask openings in motors to prevent paint and other materials from entering the motors.

F. Cleanup

Remove surplus materials and rubbish upon completion of work. Repair damage caused by the painting operations and leave the premises in a clean and orderly condition.

COLOR SCHEDULE

<u>SERVICES</u>	<u>COLOR (see note below)</u>
1. All piping, valves, and other equipment inside, above grade structures or inside below grade, vaults	BB42 Clear Sky
2. Outdoor, exposed;above ground metal, pipes, and accessories	AP62 Putty
3. Electrical Panels Gray,	BJ45 #70 Light ANSI No. 70

NOTE: Color names are based on Tnemec Company Chromacolors

BASIS OF PAYMENT

- Include the labor, materials, permits, disposal requirements and equipment described in this SP and Section 195 of the plans in the following bid item:
 - "Watermain Modifications"

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION
SPECIAL PROVISION

**MIGRATORY BIRD TREATY ACT AND THREATENED AND ENDANGERED
SPECIES ACT COMPLIANCE**

PROJECT # 7-023(041)048 – PCN 19862

DESCRIPTION

This work consists of hiring a qualified Biologist to conduct Migratory Bird and Threatened and Endangered (T&E) species surveys.

A Biologist is required between the dates of February 1st and April 14th to conduct Migratory Bird Surveys if preventative measures are not implemented before February 1st. Preventive measures are described within this Special Provision.

A Biologist is required between the dates of April 15th and August 31st to conduct T&E Species Surveys.

Definitions

A. Take.

For the purpose of this SP, “take” is defined in 50 CFR 10.12 is: to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect.

B. Avoidance Area.

1. Migratory Birds.

Avoidance Area is defined for Migratory Birds as an area within 50 feet of an active nest.

2. T&E Species.

Avoidance Area is defined for T&E Species as an area within 0.5 mile of a Piping Plover, Interior Least Tern, Rufa Red Knot or their nests.

C. Buffer.

Buffer is defined for the T&E Species as an area within 0.5 mile of Lake Sakakawea.

QUALIFICATIONS

A Biologist is required to have a four year Bachelor of Science degree in wildlife management, biology/zoology, or closely related natural resources degree from an accredited university. The Biologist is also required to be employed as an environmental professional and have at least one year of experience performing migratory bird surveys, including the interior least tern, piping plover, and rufa red knot and their habitat.

CONSTRUCTION REQUIREMENTS

A. General.

This work may impact migratory birds or active migratory bird nests located on building structures, trees, brush, sandy, or grassy areas. A nest is considered active when it contains eggs or chicks.

B. Migratory Birds

1. General.

Nests are active during the primary breeding season for migratory birds in North Dakota from February 1 to July 15.

All reasonable, prudent, and effective measures should be identified and implemented to avoid take of any migratory bird, nests, or eggs of such bird.

2. Preventive Measures.

a. Mowing or Grubbing.

Grub all trees and shrubs before February 1st.

Mow all other vegetation to a height of 6 inches or less before April 1st. Repeat mowing as required throughout the nesting season to maintain vegetation at a height of 6 inches or less.

If inactive nests are discovered during the initial mowing or grubbing, destroy the discovered nests on site. No nests can be transported intact off of the job site.

b. Surveys.

(1). General.

If mowing or grubbing is not completed before the nesting season, hire a qualified Biologist to conduct an active nest survey no more than 5 working days before starting work at the site.

When conducting the survey, the Biologist will record the following information:

- Date of survey;
- Time of survey;
- Method; and
- Result of survey.

(2). No Nests Identified.

If no active nests are identified, the Biologist will submit the report with the record of survey to the Engineer, Contractor, and NDDOT ETS Environmental Section I Biologist within 7 days of the survey.

(3). Nests Identified.

If active nests are identified perform the following actions:

- Create a 50 foot avoidance area around active nests using high visibility fencing. The buffer area around the nest may need to be increased or

- decreased depending on the species identified; and
- The Biologist will notify the Engineer and the NDDOT ETS Environmental Section I Biologist.

The NDDOT ETS Environmental Section I Biologist will determine if the buffer size needs to be revised.

The Biologist will record the following:

- Location of each protected nest;
- Bird species;
- Protection method used;
- Buffer distance; and
- The date installed.

The Biologist will submit a report with the record of survey to the Engineer, Contractor, and the NDDOT ETS Environmental Section I Biologist.

Work will not be allowed within the buffer area until weekly surveys show that the young have fledged or the nest(s) have become inactive.

The Biologist will report any taking of a migratory bird to the Engineer. Any penalties levied by USFWS for the taking of a migratory bird will be the responsibility of the Contractor.

C. T & E Species (Interior Least Tern, Piping Plover, and Rufa Red Knot).

1. General.

The summer nesting season for Interior Least Tern, Piping Plover, and Rufa Red Knot occurs between April 15 and August 31. Conduct surveys within an area 0.5 mile along Lake Sakakawea.

The potential for habitat can be found between the following stations:

- ND 23 from 2570+45 to 2600+23;
- ND 23B from 48873+55 to 48920+00; and
- 40th St NW from 50+00 to 64+00.

2. Initial Survey.

The Biologist will conduct an initial field survey within the 0.5 mile buffer area of Lake Sakakawea 2 days before beginning construction activities to identify suitable habitat (e.g. islands or shoreline habitat).

3. No Habitat Present.

If no suitable habitat is identified during the initial survey, conduct a weekly survey to identify any new habitat uncovered by the lake.

End surveys July 15th if no suitable nesting habitat, nesting pairs, or nests have been identified. Construction within the 0.5 mile buffer area can resume without surveys on July 16th.

4. Habitat Present.

If suitable habitat has been identified and construction activities will take place within 0.5 mile of the suitable habitat, conduct 2 daily surveys within the suitable habitat:

- Conduct the first survey for 2 hours during daylight before starting construction activities for that day.
- Conduct a second survey for 1 hour beginning after work has stopped for that day. Stop construction activities early enough to allow for the survey to be completed no later than 30 minutes after sunset.

If an individual or pairs of birds are discovered during surveys, the Biologist will determine if the species is exhibiting nesting behavior or territorial displays.

If the birds are exhibiting nesting behavior or territorial displays, the Biologist will notify the Engineer and create a 0.5 mile avoidance area around the identified area. The Engineer will contact NDDOT ETS Environmental Section I Biologist.

If the birds are not exhibiting nesting behavior or territorial displays (e.g. resting or feeding), construction can resume provided that the Biologist continues to monitor the bird behavior.

Do not resume construction activities within the avoidance area until one of the following has been fulfilled:

- Mitigation measures determined by the contacted agencies have been installed;
- Daily surveys show that the birds have vacated the area; or
- September 1 has been reached.

5. Survey Report.

The Biologist will submit a weekly report to the Engineer, Contractor, and the NDDOT ETS Environmental Section I Biologist detailing the following information:

- Date and time of surveys;
- Locations of suitable habitat; and
- Results of the surveys.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Bid Item	Unit
Biologist	Lump Sum

Such payment is full compensation for furnishing all materials, equipment, labor, and incidentals to complete the work as specified.