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DESIGN DATA				
Traffic	Average Daily			
Current 2020	Pass: 13,320	Trucks: 3,115	Total: 16,435	
Forecast 2040	Pass: 17,865	Trucks: 4,210	Total: 22,075	
Preventive Maintenance				

STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	HEN-X-8-029(200)069	22888	1	1

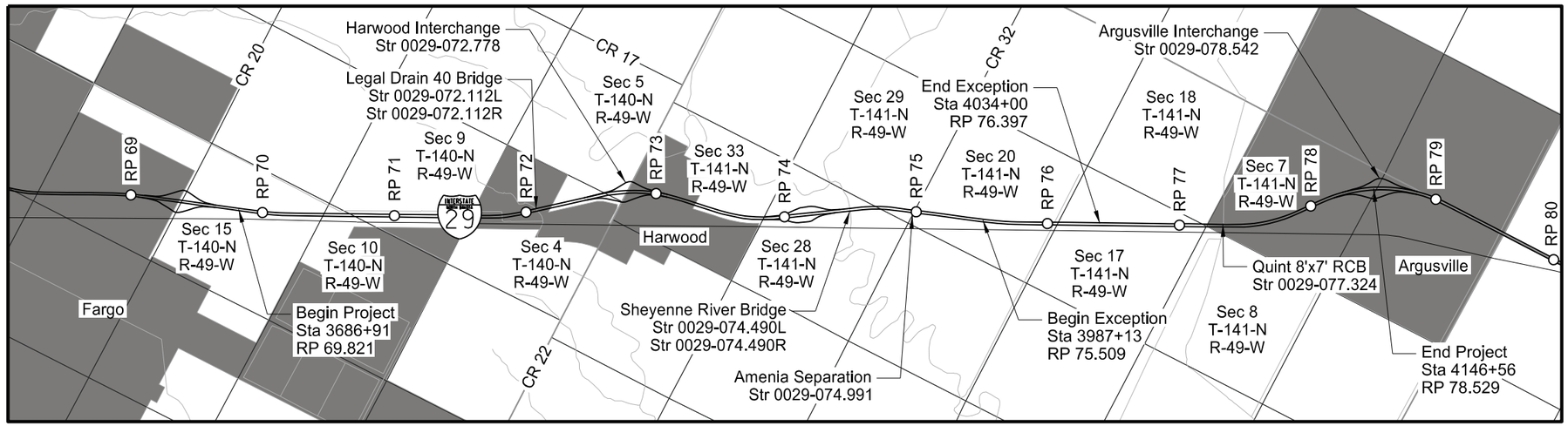
NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

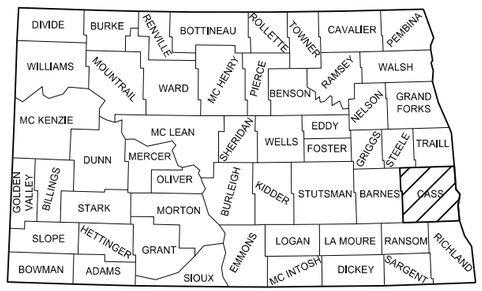
HEN-X-8-029(200)069

Cass County
Interstate 29 Median
Cass Co 20 to Argusville Interchange
High Tension Cable Median Barrier
Foreslope Flattening & Incidentals

GOVERNING SPECIFICATIONS	Date Published and Adopted by the North Dakota Department of Transportation
Standard Specifications	7/1/2024
Supplemental Specifications	NONE

PROJECT NUMBER \ DESCRIPTION	NET MILES	GROSS MILES
HEN-X-8-029(200)069	7.818	8.705





STATE COUNTY MAP

DESIGNER
Scott Middaugh, PE
Jeff Daley, PE
Frankie Halter, PE
Kyle Huffman, PE
Samantha Dvorak
Mason Heustis
Jonathon Backer

ND DEPARTMENT OF TRANSPORTATION
OFFICE OF PROJECT DEVELOPMENT

Kirk Hoff

Kirk Hoff 07/23/25

KLJ

REGISTERED PROFESSIONAL ENGINEER
SCOTT MIDDAUGH
PE-7499
DATE 07/23/25
NORTH DAKOTA

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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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2	1	Table of Contents
4	1	Scope of Work
6	1	Notes
8	1	Quantities
10	1	Basis of Estimate
20	1 - 3	General Details
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81	1 - 2	Survey Coordinate and Curve Data
82	1 - 4	Survey Data Layouts
100	1	Work Zone Traffic Control
130	1 - 36	High Tension Cable Guardrail
200	1 - 43	Cross Sections

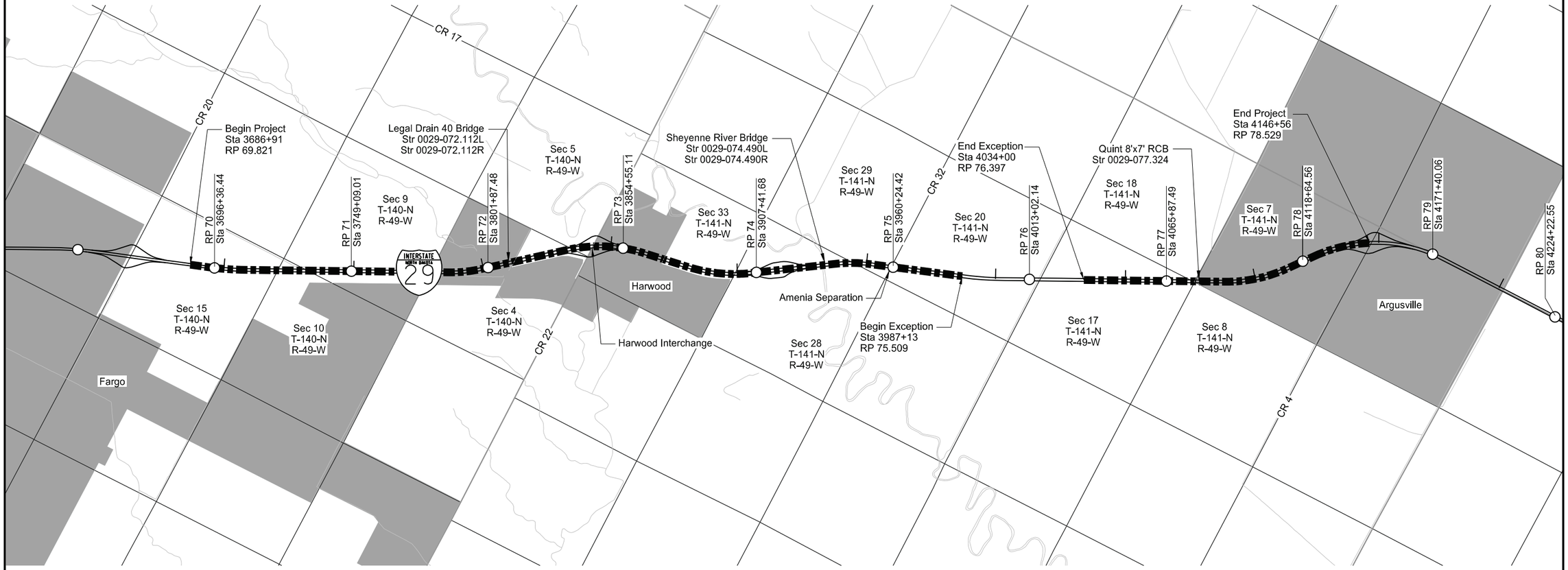
LIST OF STANDARD DRAWINGS

Number	Description
D-101-1, 2, 3, 4	NDDOT Abbreviations
D-101-10	NDDOT Utility Company and Organization Abbreviations
D-101-20, 21	Line Styles
D-101-30, 31, 32, 33	Symbols
D-101-40	Cross Section Legend
D-256-1	Erosion And Siltation Controls
D-261-1	Erosion Control - Fiber Roll Placement Details
D-704-7	Breakaway Systems For Construction Zone Signs - Perforated Tube
D-704-8	Breakaway Systems For Construction Zone Signs - U-Channel Post
D-704-9	Construction Sign Details - Terminal And Guide Signs
D-704-10	Construction Sign Details - Regulatory Signs
D-704-11, 11 A	Construction Sign Details - Warning Signs
D-704-13	Barricade And Channelizing Device Details
D-704-14	Construction Sign Punching And Mounting Details
D-704-24	Shoulder Closures And Bridge Painting Layouts
D-704-35	Sign Layout For One Lane Closure - Interstate System
D-704-50	Portable Sign Support Assembly
D-708-6	Erosion And Siltation Controls - Median Or Ditch Inlet Protection

SPECIAL PROVISIONS

Number	Description
PSP 85(24)	Permits and Environmental Considerations
SP 532(24)	High Tension Cable Guardrail
SP 534(24)	Utility Coordination
SP 592(24)	Drilled Shaft Foundations for High Tension Median Guardrail
SSP 1	Temporary Erosion and Sediment Best Management Practices

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SCOTT MIDDAUGH
PE-7499
DATE 07/22/25
NORTH DAKOTA

LEGEND

■■■ High Tension Cable Guardrail Installation

High Tension Cable Guardrail

Scope of Work

I-29 - Cass Co 20 to Argusville Interchange

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NOTES

GENERAL NOTES

100-P01 COORDINATION OF PROJECTS: Other construction projects will be under contract and taking place within the highway right of way which may be in the vicinity of this project. Coordinate all activities, schedules, and traffic control with all other contractors working within the highway right of way.

105-P01 MEDIAN MOWING: NDDOT District forces will mow the median within the project limits one time during construction. Provide the Engineer two weeks' notice for the mowing.

The median cannot be mowed by anyone other than NDDOT staff unless approved in writing by the Engineer.

203-010 SHRINKAGE: 25 percent additional volume is included for shrinkage in earth embankment.

203-P01 EMBANKMENT: Flatten the median inslopes as shown in the plans. Use Compaction Control Type B for the embankment material (embankment, borrow, or imported topsoil) used for the median inslope flattening.

Include all costs to flatten the median inslopes in the price bid for "Borrow-Excavation", and "Topsoil-Imported".

203-P02 ADDITIONAL DAMAGE: If additional damage is incurred to topsoil, seed and mulch areas at the Contractor's expense.

SECTION 100

704-P01 HIGH TENSION CABLE BARRIER TRAFFIC CONTROL: Provide traffic control according to the following layouts on the Standard Drawings for traffic control:

D-704-24 Type HH, left shoulder closed: For use on left shoulder on the opposite side of median where guardrail work is being performed and for use on left shoulder adjacent to work area where no guardrail work is being performed the following day. Use tubular markers in place of portable barriers. One 2-mile shoulder closure (2-miles in one direction) was provided so that work can progress at a constant pace.

D-704-35, left lane closed: For use on lane adjacent to work area when guardrail work is being performed. One 2-mile lane closure (2-miles in one direction) was provided so that work can progress at a constant pace.

Lane closure and shoulder closure traffic control device quantities are limited to an 10,000-foot work zone. 4-mile closures (2-miles in each direction) were provided so that work can progress at a constant pace.

Change adjacent lane closure to shoulder closure at the end of the workday if no guardrail work is scheduled for the following day.

704-P02 TRAFFIC CONTROL FOR DIRT WORK IN THE MEDIAN: Provide traffic control according to the following layouts on the Standard Drawings for traffic control:

D-704-24 Type HH, left shoulders closed: For use on adjacent shoulders of median where no dirt work is being performed the following day. Use tubular markers in place of portable barriers.

D-704-35, left lanes closed: For use on lanes adjacent to the work area when dirt work is being performed in the median.

Lane closure and shoulder closure traffic control device quantities are limited to one day's production. For estimating purposes, the traffic control device list is based on a 1-mile closure (1/2-mile closure in each direction).

Change adjacent lane closures to shoulder closures at the end of the workday if no median work is scheduled for the following day.

REGISTERED PROFESSIONAL ENGINEER
SCOTT MIDDAUGH
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NORTH DAKOTA

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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Estimated Quantities

SPEC	CODE	ITEM DESCRIPTION	UNIT	QUANTITIES				TOTAL
103	0100	CONTRACT BOND	L SUM	1				1
203	0109	TOPSOIL	CY	559				559
203	0119	TOPSOIL-IMPORTED	CY	1006				1006
203	0140	BORROW-EXCAVATION	CY	329				329
251	0200	SEEDING CLASS II	ACRE	6.55				6.55
251	2000	TEMPORARY COVER CROP	ACRE	6.55				6.55
253	0101	STRAW MULCH	ACRE	13.1				13.1
261	0112	FIBER ROLLS 12IN	LF	640				640
261	0113	REMOVE FIBER ROLLS 12IN	LF	320				320
702	0100	MOBILIZATION	L SUM	1				1
704	0100	FLAGGING	MHR	275				275
704	1000	TRAFFIC CONTROL SIGNS	UNIT	2436				2436
704	1052	TYPE III BARRICADE	EA	2				2
704	1060	DELINEATOR DRUMS	EA	78				78
704	1067	TUBULAR MARKERS	EA	225				225
704	1087	SEQUENCING ARROW PANEL-TYPE C	EA	2				2
764	0100	HIGH TENSION CABLE GUARDRAIL	LF	39157				39157
764	0105	HIGH TENSION CABLE ANCHOR ASSEMBLY	EA	22				22

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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HEN-X-8-029(200)069								
LOCATION	TYPE OF WORK		EARTHWORK SUMMARY				TOPSOIL	TOPSOIL
			Excavation	Embankment ①	203 0140 BORROW-EXCAVATION		203 0109 TOPSOIL	203 0119 TOPSOIL - IMPORTED
			(CY)	(CY)	(CY)		(CY)	(CY)
			A	B	C = B - A		D	E
Cass County								
Sta 3782+00 to Sta 3786+73 (OCL29_CASS)	Inslope Flattening		-	-	-		-	24
Sta 3785+52 to Sta 3805+57 (OCL29_CASS)	Median Ditch Reshaping		-	-	-		6	85
Sta 3813+00 to Sta 3821+00 (OCL29_CASS)	Inslope Flattening		-	-	-		-	36
Sta 3868+00 to Sta 3878+00 (OCL29_CASS)	Inslope Flattening		-	-	-		-	79
Sta 3877+00 to Sta 3905+02 (OCL29_CASS)	Median Ditch Reshaping		-	-	-		27	119
Sta 3904+85 to Sta 3911+00 (OCL29_CASS)	Inslope Flattening		-	-	-		-	18
Sta 3939+00 to Sta 3943+00 (OCL29_CASS)	Inslope Flattening		-	-	-		-	48
Sta 3947+50 to Sta 3958+00 (OCL29_CASS)	Inslope Flattening		-	-	-		-	170
Sta 3960+50 to Sta 3966+00 (OCL29_CASS)	Inslope Flattening		-	138	138		231	-
Sta 3984+50 to Sta 3987+13 (OCL29_CASS)	Inslope Flattening		-	-	-		-	34
Sta 4033+85 to Sta 4039+00 (OCL29_CASS)	Inslope Flattening		-	191	191		276	-
Sta 4051+50 to Sta 4060+00 (OCL29_CASS)	Inslope Flattening		-	-	-		14	134
Sta 4071+50 to Sta 4081+00 (OCL29_CASS)	Inslope Flattening		-	-	-		2	136
Sta 4083+11 to Sta 4113+69 (OCL29_CASS)	Median Ditch Reshaping		-	-	-		3	123
	Total =		-	329	329		559	1,006

Notes:
① Additional 25% volume included for shrinkage.

SPEC	CODE	BID ITEM	QTY	UNIT
203	0109	TOPSOIL		
		Topsoil	559	CY
203	0119	TOPSOIL-IMPORTED		
		Topsoil	1,006	CY
203	0140	BORROW-EXCAVATION		
		Earthwork Summary	329	CY
764	0100	HIGH TENSION CABLE GUARDRAIL		
		Guardrail Runs	39,157	LF
764	0105	HIGH TENSION CABLE ANCHOR ASSEMBLY		
		Guardrail Runs	22	EA

Guardrail Runs							
Segment	RP		Station		Location	764 0100 HIGH TENSION CABLE GUARDRAIL	764 0105 HIGH TENSION CABLE ANCHOR ASSEMBLY
	Start	Stop	Start	Stop		(LF) ②	(EA)
A	69.843	71.707	3687+21	3786+43	LT	9,920	2
B	71.696	72.067	3785+82	3805+42	CL	1,961	2
C	72.218	72.762	3813+36	3842+03	LT	2,871	2
D	72.804	73.504	3844+22	3881+17	LT	3,702	2
E	73.492	73.949	3880+56	3904+72	CL	2,416	2
F	73.958	74.455	3905+19	3931+46	LT	2,627	2
G	74.593	74.973	3938+76	3958+83	LT	2,012	2
H	75.011	75.504	3960+83	3986+83	LT	2,600	2
I	76.403	77.311	4034+30	4082+31	LT	4,801	2
J	77.332	77.900	4083+41	4113+39	CL	2,998	2
K	77.909	78.524	4113+86	4146+27	LT	3,249	2
					Total =	39,157	22

Notes:
② Guardrail quantity measured along the guardrail, not along the alignment.

* WATER			
Material	Basis	Basis Quantity	Quantity (MGAL)
Embankment	10 Gal/CY	329	4
		Total =	4

* Not a pay item. To be included in the unit bid price for "BORROW-EXCAVATION".

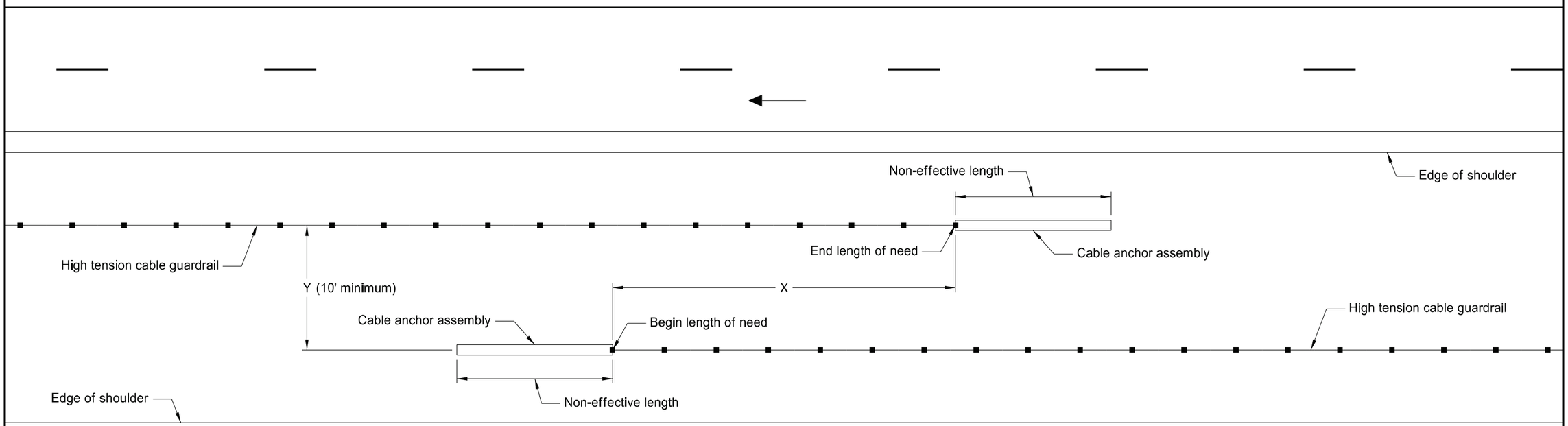
REGISTERED PROFESSIONAL ENGINEER
SCOTT MIDDAUGH
PE-7499
DATE 07/22/25
NORTH DAKOTA

High Tension Cable Guardrail

Basis of Estimate

I-29 - Cass Co 20 to Argusville Interchange

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-X-8-029(200)069	20	1



Y	X
10'	28'
14'	39'
18'	50'
22'	61'
26'	72'
30'	83'
34'	94'
38'	105'
42'	116'
46'	127'

NOTE: Round the measured Y value up to the nearest whole number to find the appropriate X (overlap) value.

Overlap at Approach Ends of Cable Guardrail Detail

Sta 3687+21 to 3687+41 (Segment A & Existing)

Sta 3785+82 to 3786+43 (Segments A & B)

Sta 3880+56 to 3881+17 (Segments D & E)

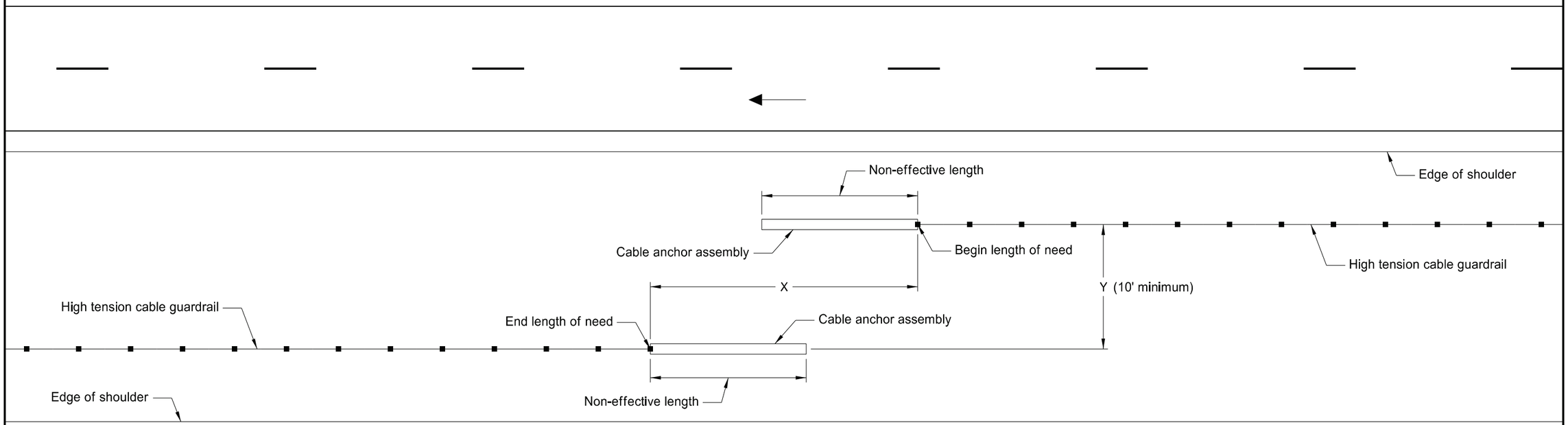
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SCOTT MIDDAUGH
PE-7499
DATE 07/22/25
NORTH DAKOTA

High Tension Cable Guardrail

Overlap at Approach Ends of Cable Guardrail Detail

I-29 - Cass Co 20 to Argusville Interchange

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HEN-X-8-029(200)069	20	2



Y	X
10'	21'
14'	30'
18'	38'
22'	47'
26'	55'
30'	64'
34'	72'
38'	81'
42'	90'
46'	98'

NOTE: Round the measured Y value up to the nearest whole number to find the appropriate X (overlap) value.

Overlap at Exit Ends of Cable Guardrail Detail

Sta 3904+72 to 3905+19 (Segments E & F)

Sta 4113+39 to 4113+86 (Segments J & K)

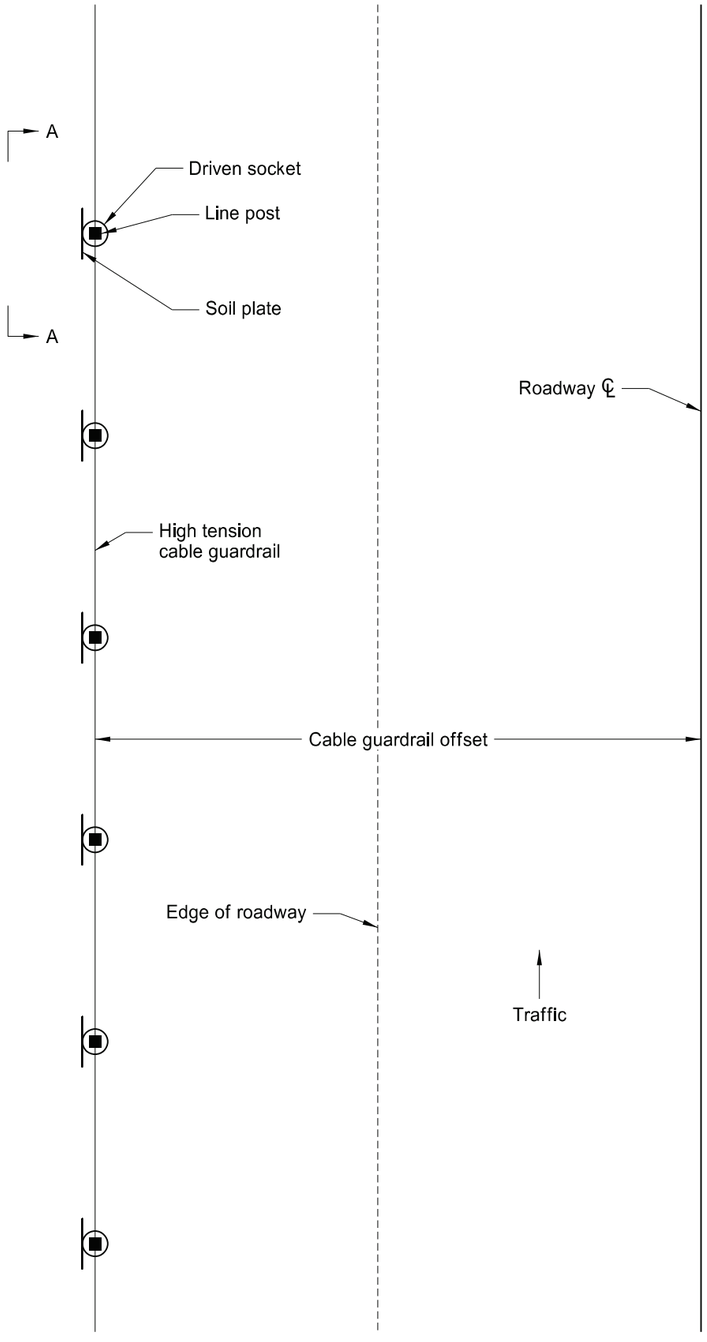
REGISTERED PROFESSIONAL ENGINEER
SCOTT MIDDAUGH
PE-7499
DATE 07/22/25
NORTH DAKOTA

High Tension Cable Guardrail

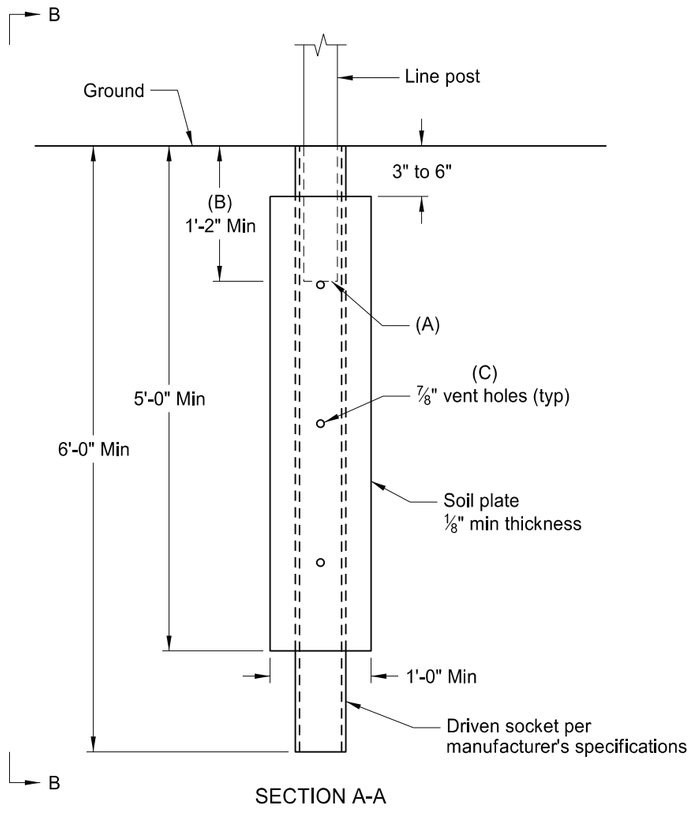
Overlap at Exit Ends of Cable Guardrail Detail

I-29 - Cass Co 20 to Argusville Interchange

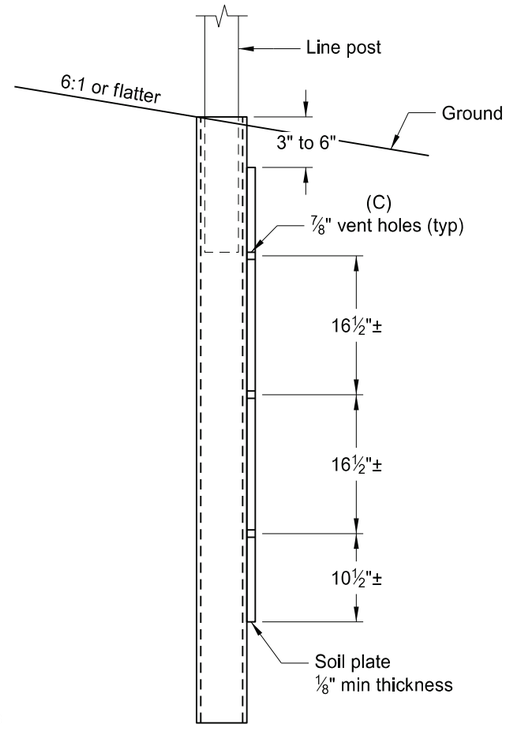
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PLAN VIEW



SECTION A-A



SECTION B-B

DESIGN REQUIREMENTS:

1. Design socket for a maximum deflection of 1" at ground level.
2. Sockets to have a yield strength equal to or greater than that of the crash tested line posts.
3. Design socket for line posts to yield above ground.

NOTES:

(A) Provide post stop per manufacturer's recommendation.

(B) Line post depth as per manufacturer's specifications.

(C) Provide three ⅞" diameter vent holes for galvanizing. Upper hole may be used for post stop. Vent holes are optional per manufacturer's recommendation.

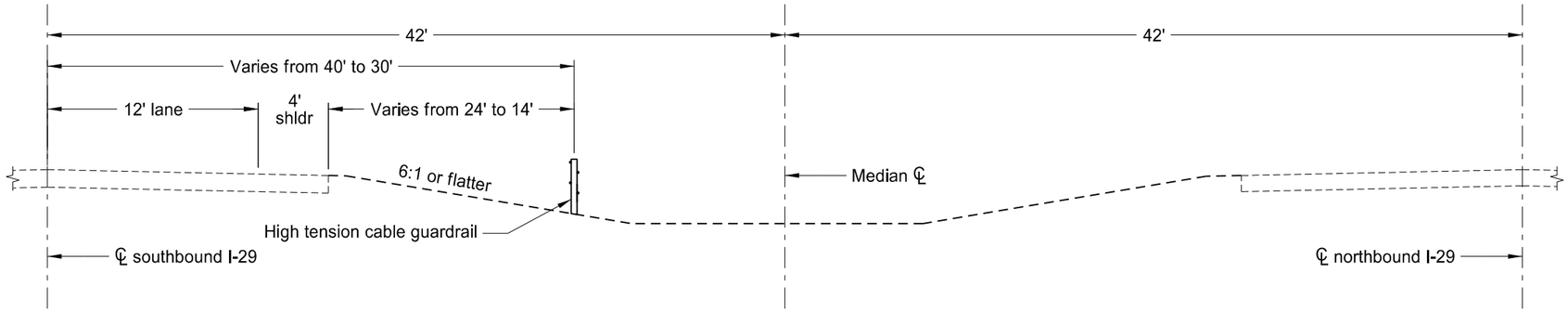
REGISTERED PROFESSIONAL ENGINEER
SCOTT MIDDAUGH
PE-7499
DATE 07/22/25
NORTH DAKOTA

High Tension Cable Guardrail

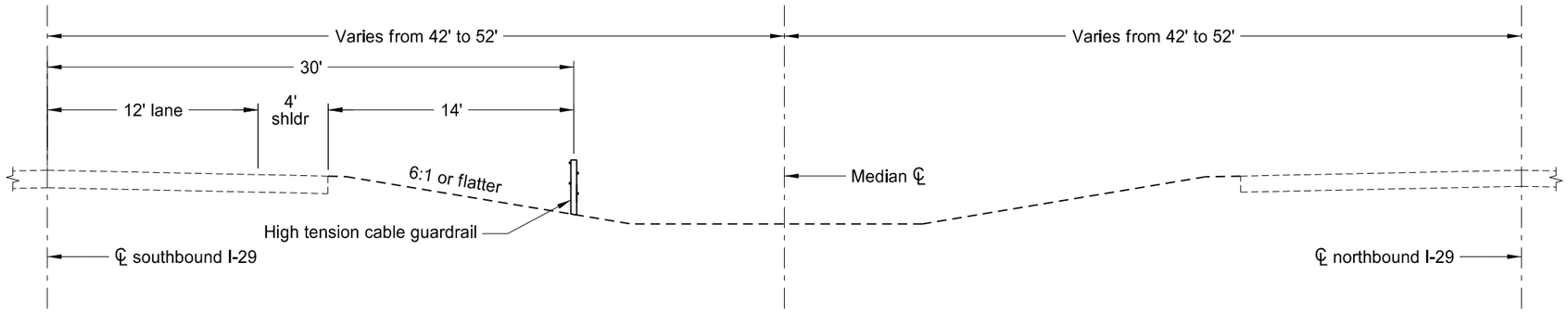
Steel Driven Socket Detail

I-29 - Cass Co 20 to Argusville Interchange

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Section A - A
Sta 3687+21 to 3690+71



Section B - B
Sta 3690+71 to 3708+30

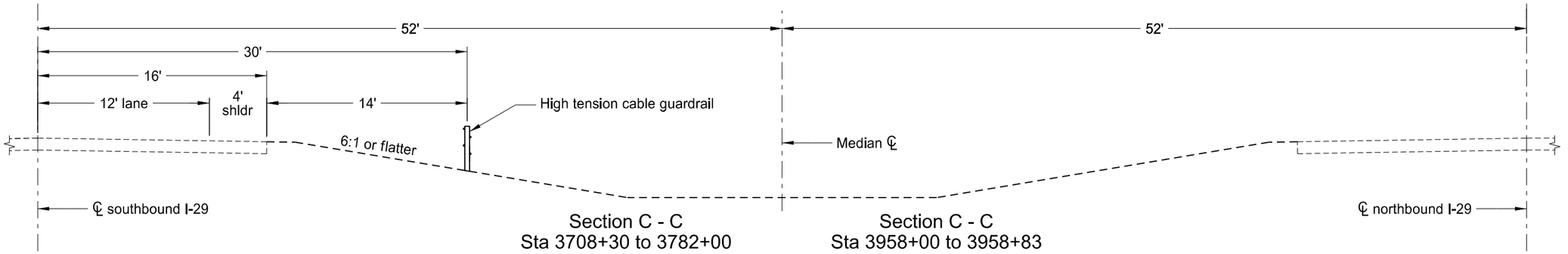
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SCOTT MIDDAUGH
PE-7499
DATE 07/22/25
NORTH DAKOTA

High Tension Cable Guardrail

Proposed Typical Sections

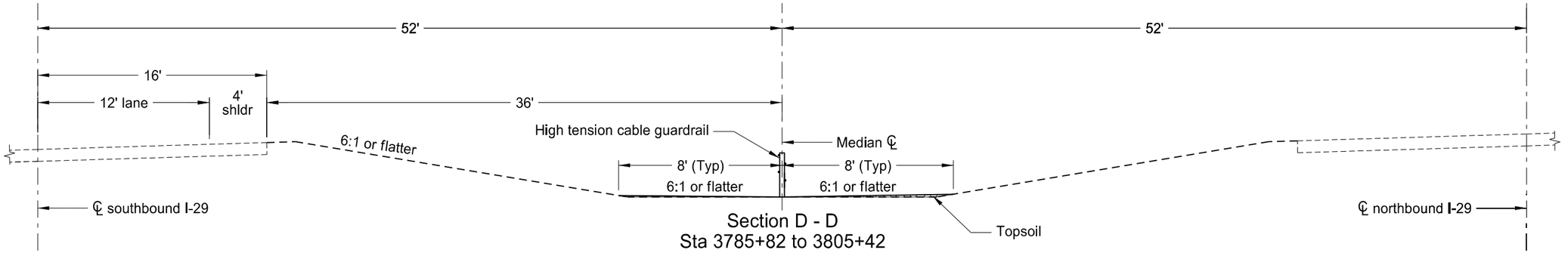
I-29 - Cass Co 20 to Argusville Interchange

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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Section C - C
Sta 3708+30 to 3782+00
Sta 3821+00 to 3842+03
Sta 3844+22 to 3868+00
Sta 3878+00 to 3881+17
Sta 3911+00 to 3931+46
Sta 3943+00 to 3947+50

Section C - C
Sta 3958+00 to 3958+83
Sta 3966+00 to 3984+50
Sta 4039+00 to 4051+50
Sta 4060+00 to 4071+50
Sta 4081+00 to 4082+31
Sta 4113+87 to 4146+27



Section D - D
Sta 3785+82 to 3805+42
Sta 3880+56 to 3904+72
Sta 4083+41 to 4113+39

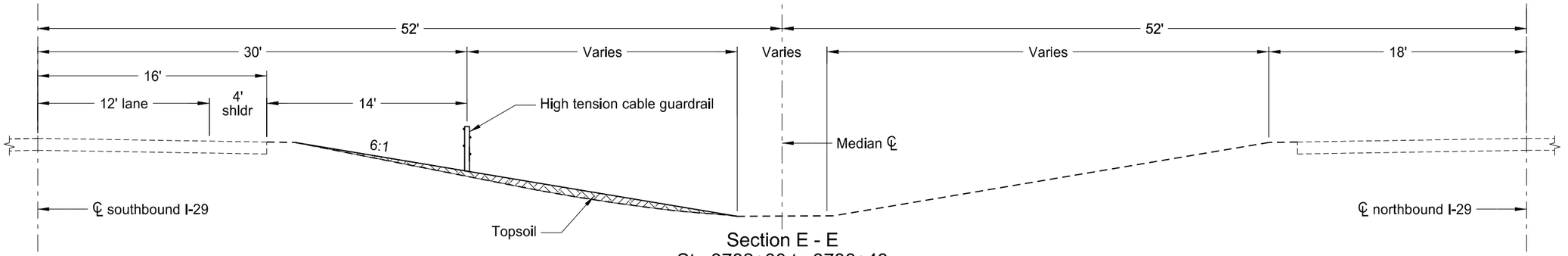
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High Tension Cable Guardrail

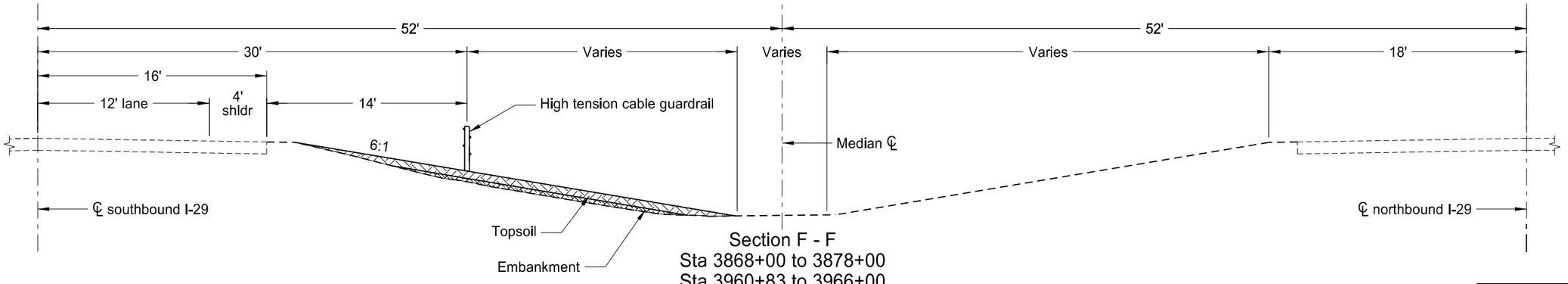
Proposed Typical Sections

I-29 - Cass Co 20 to Argusville Interchange

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HEN-X-8-029(200)069	30	3



Section E - E
Sta 3782+00 to 3786+43
Sta 3813+36 to 3821+00
Sta 3905+19 to 3911+00
Sta 3938+76 to 3943+00
Sta 3947+50 to 3958+00
Sta 3984+50 to 3986+83
Sta 4051+50 to 4060+00
Sta 4071+50 to 4081+00



Section F - F
Sta 3868+00 to 3878+00
Sta 3960+83 to 3966+00
Sta 4034+30 to 4039+00

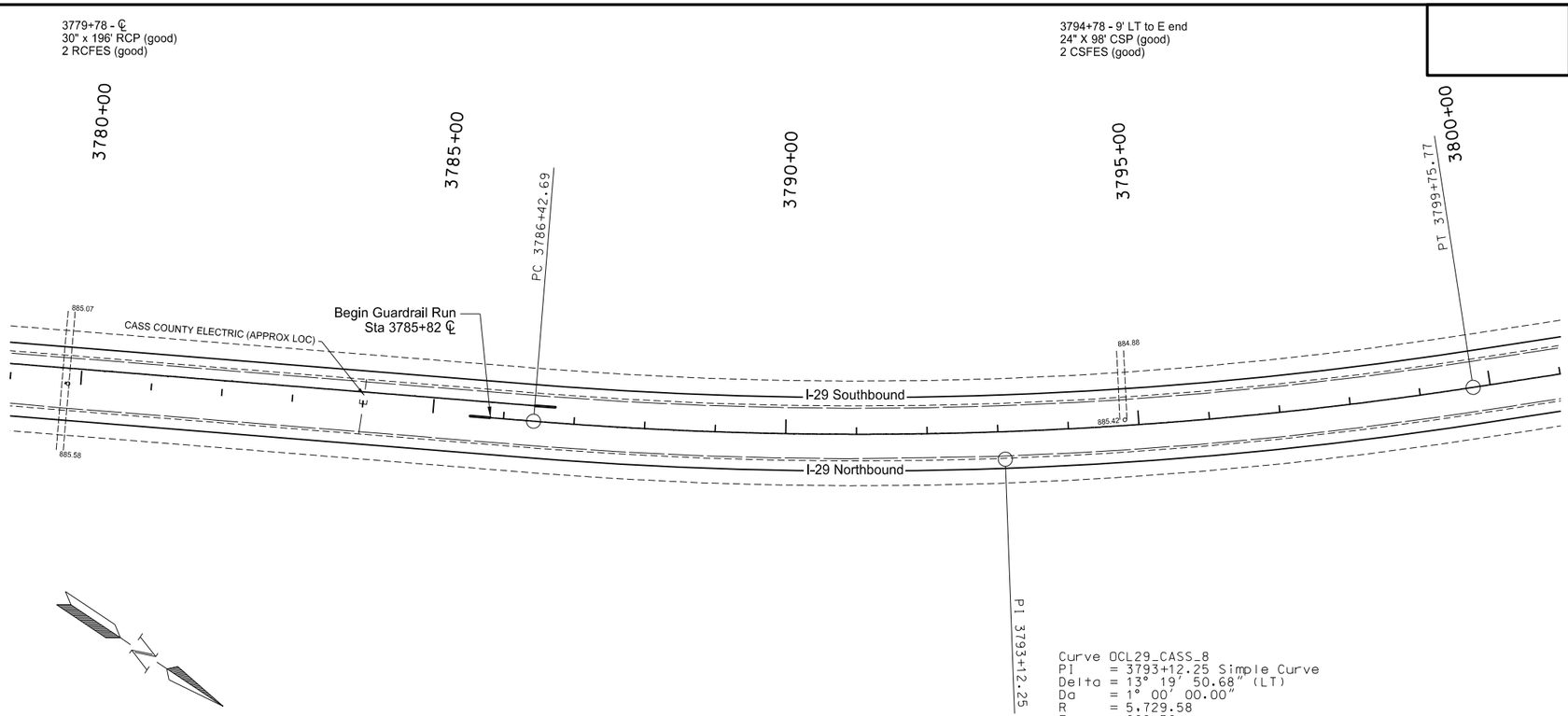
REGISTERED PROFESSIONAL ENGINEER
SCOTT MIDDAUGH
PE-7499
DATE 07/22/25
NORTH DAKOTA

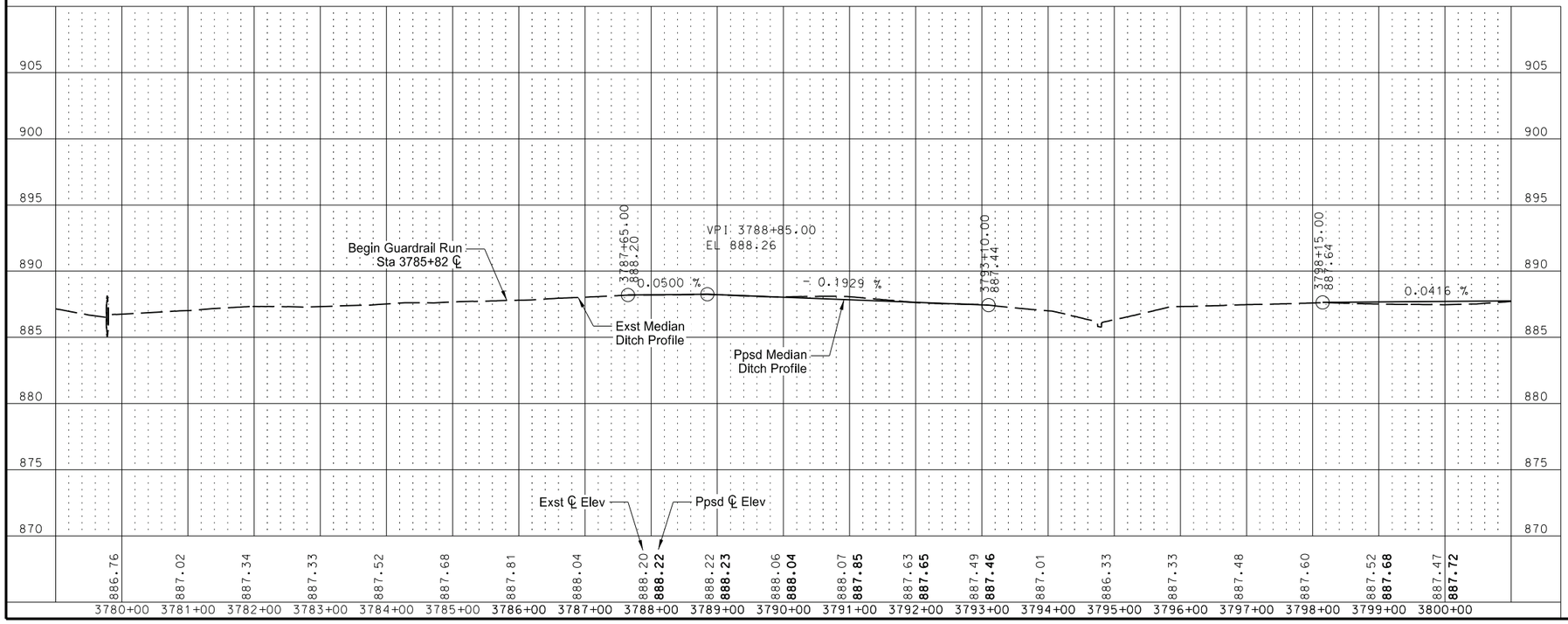
High Tension Cable Guardrail

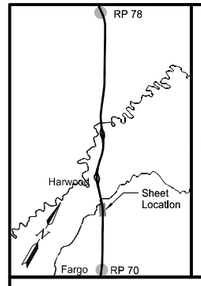
Proposed Typical Sections

I-29 - Cass Co 20 to Argusville Interchange

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HEN-X-8-029(200)069	60	1







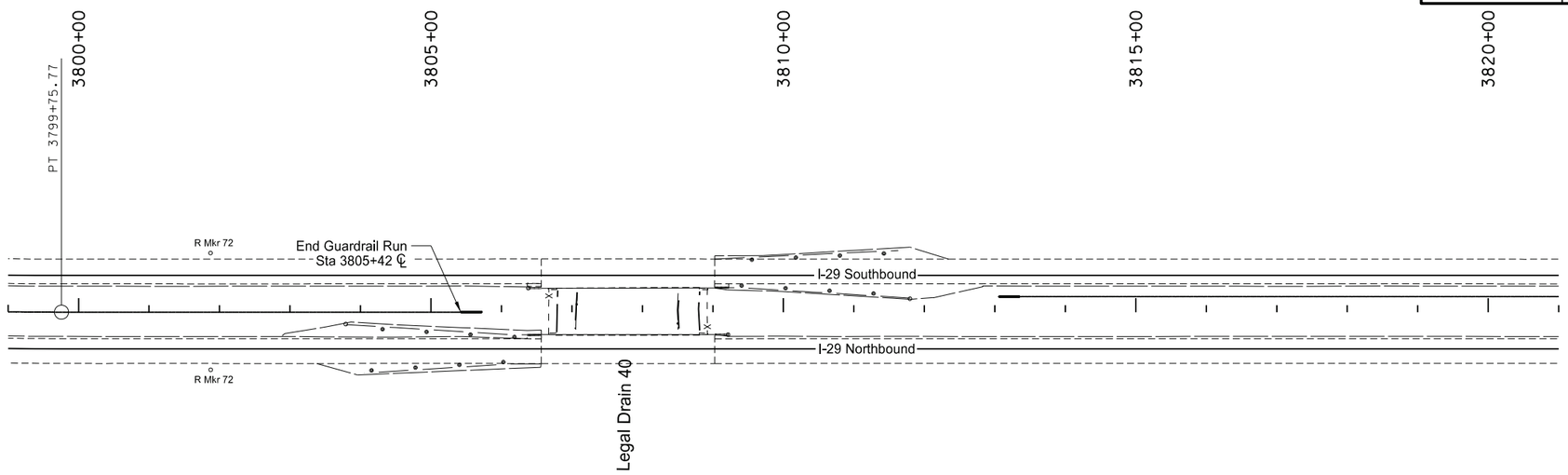


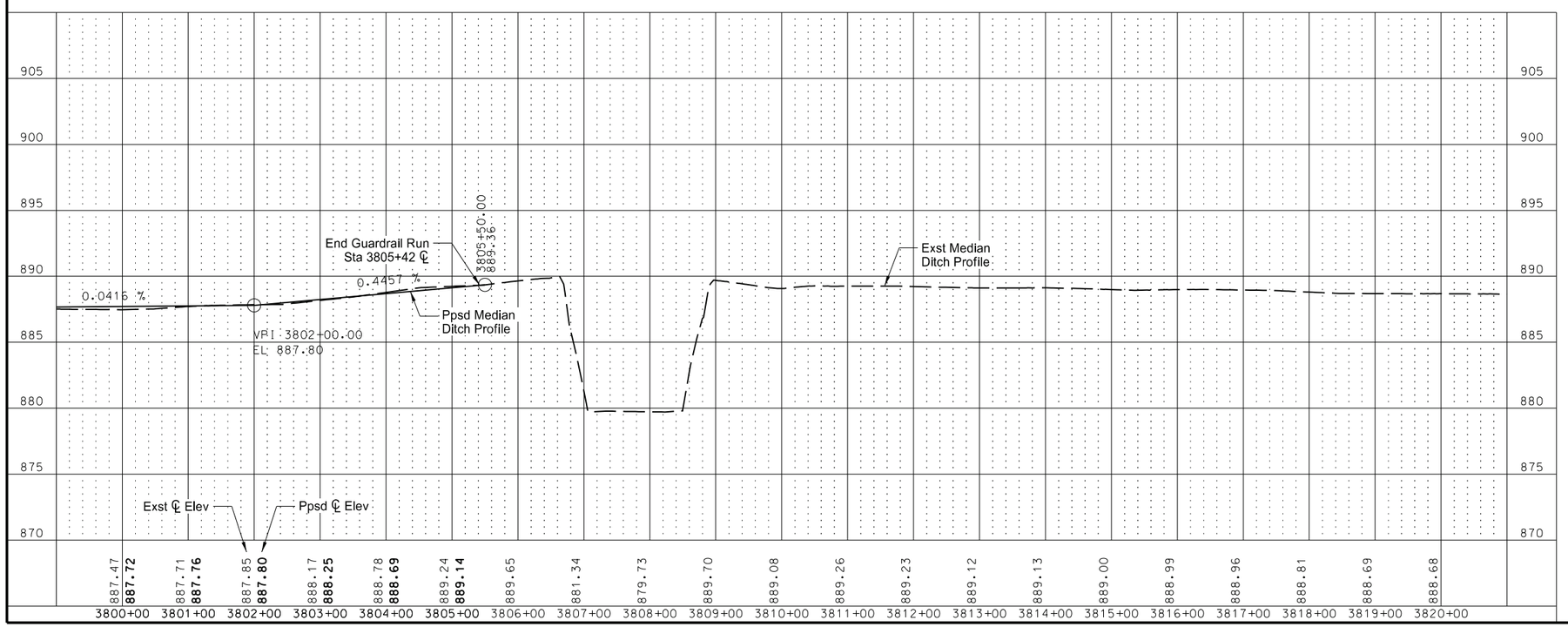
High Tension Cable Guardrail

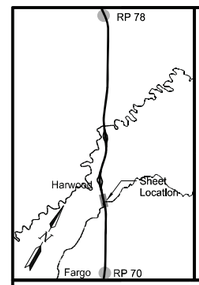
Plan & Profile
Sta 3780+00 to Sta 3800+00 (OCL29_CASS)

I-29 - Cass Co 20 to Argusville Interchange

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HEN-X-8-029(200)069	60	2







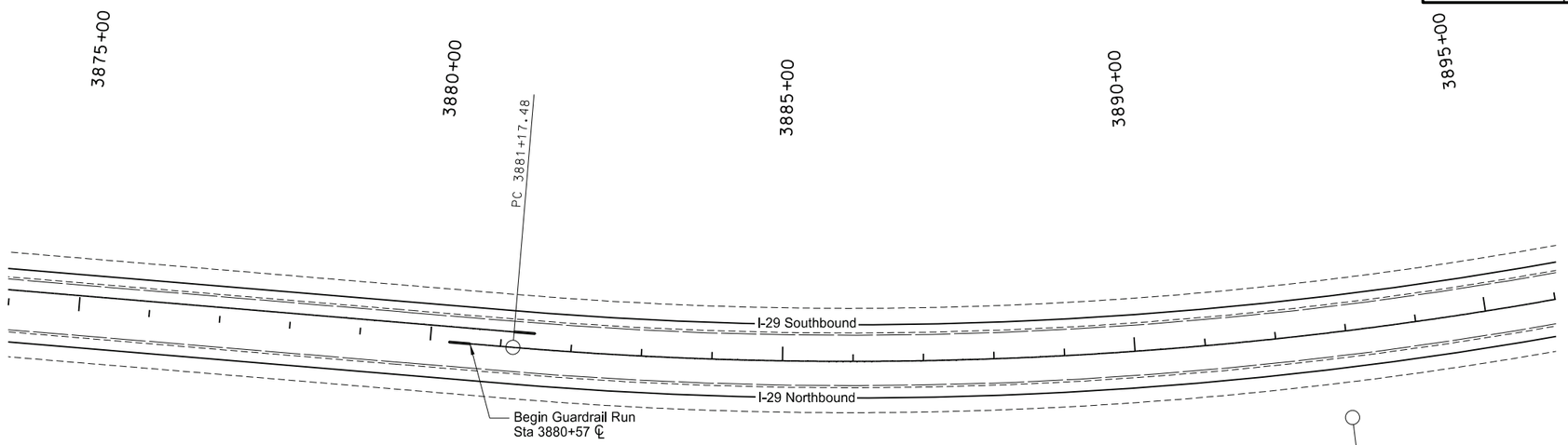
REGISTERED PROFESSIONAL ENGINEER
SCOTT MIDDAUGH
PE-7499
DATE 07/22/25
NORTH DAKOTA

High Tension Cable Guardrail

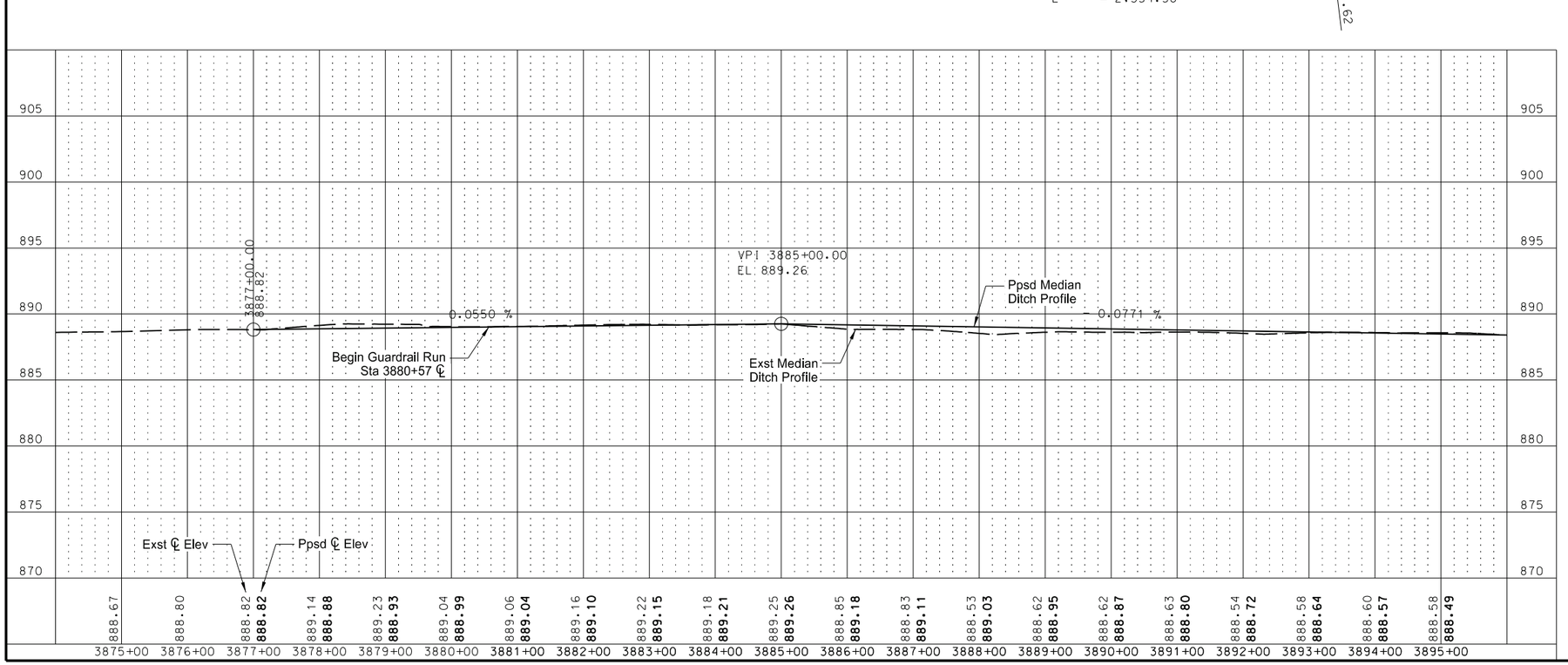
Plan & Profile
Sta 3800+00 to Sta 3820+00 (OCL29_CASS)

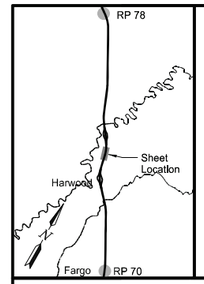
I-29 - Cass Co 20 to Argusville Interchange

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HEN-X-8-029(200)069	60	3



Curve OCL29_CASS_14
PI = 3893+11.62 Simple Curve
Delta = 23° 32' 44.89" (LT)
Da = 1° 00' 00.00"
R = 5,729.58
T = 1,194.14
L = 2,354.58





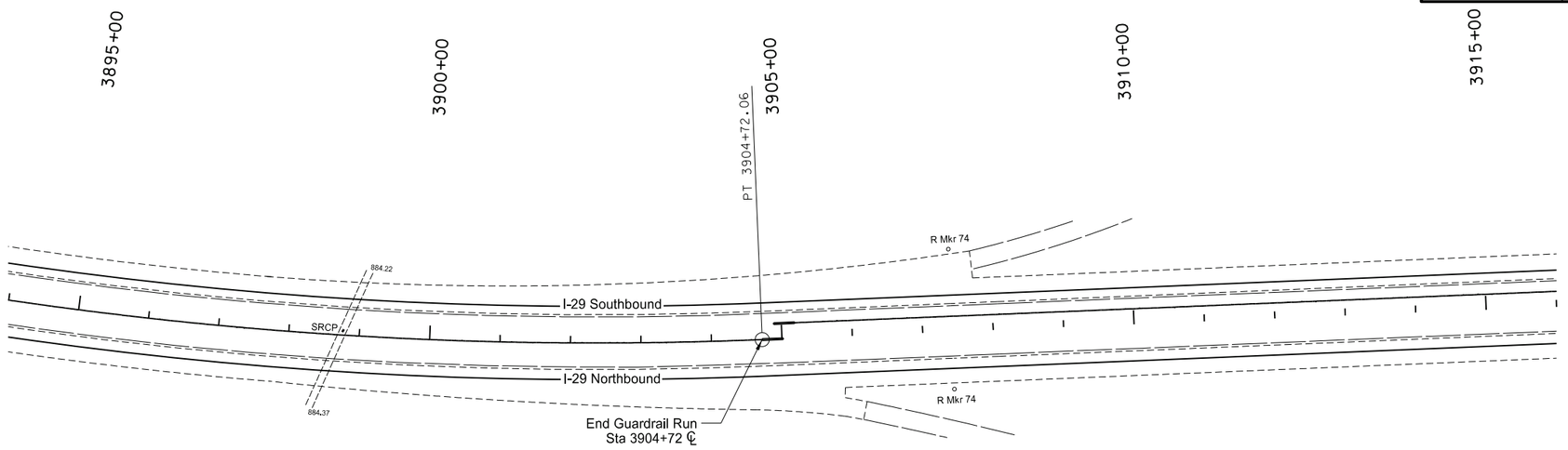


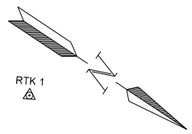
High Tension Cable Guardrail

Plan & Profile
Sta 3875+00 to Sta 3895+00 (OCL29_CASS)

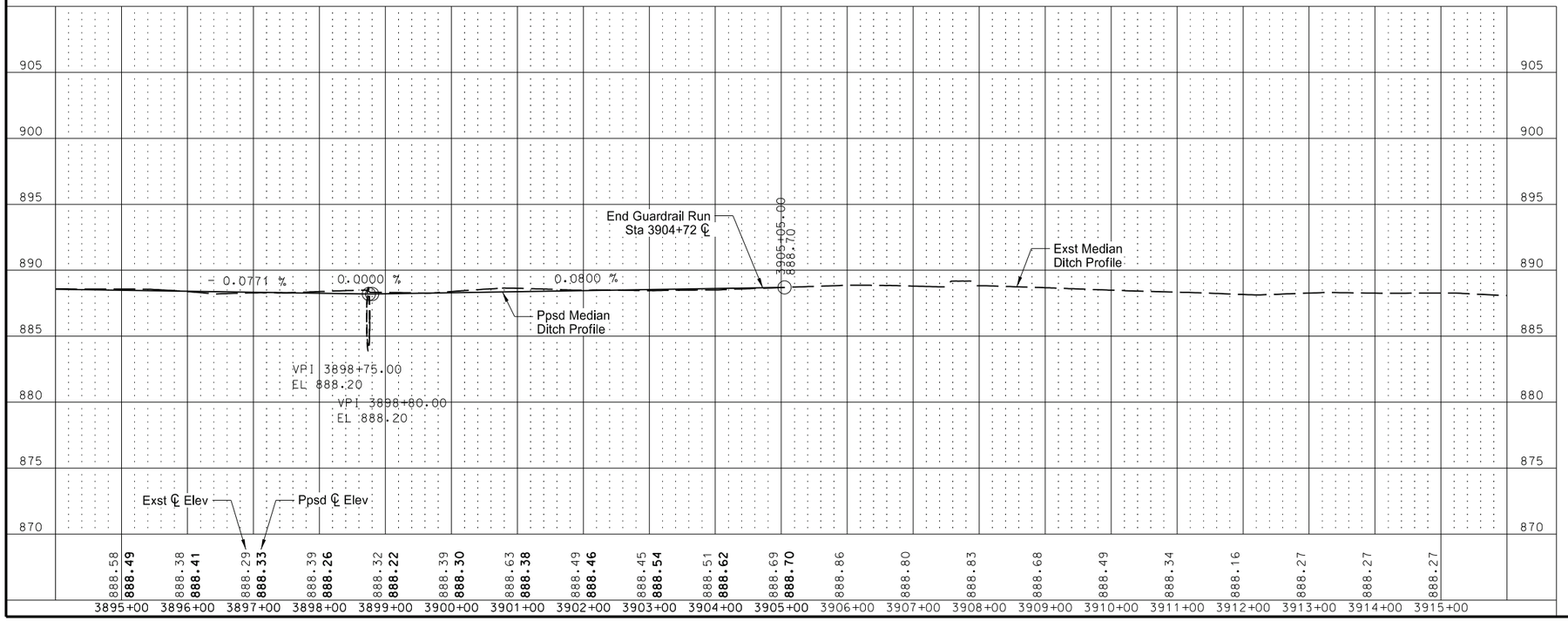
I-29 - Cass Co 20 to Argusville Interchange

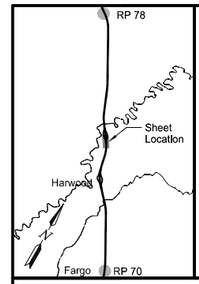
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HEN-X-8-029(200)069	60	4





3898+36 - 104' Rt to SE end
3899+10 - 93' Lt to NW end
48" X 210' RCP (good, skew)
2 RCFES (good)





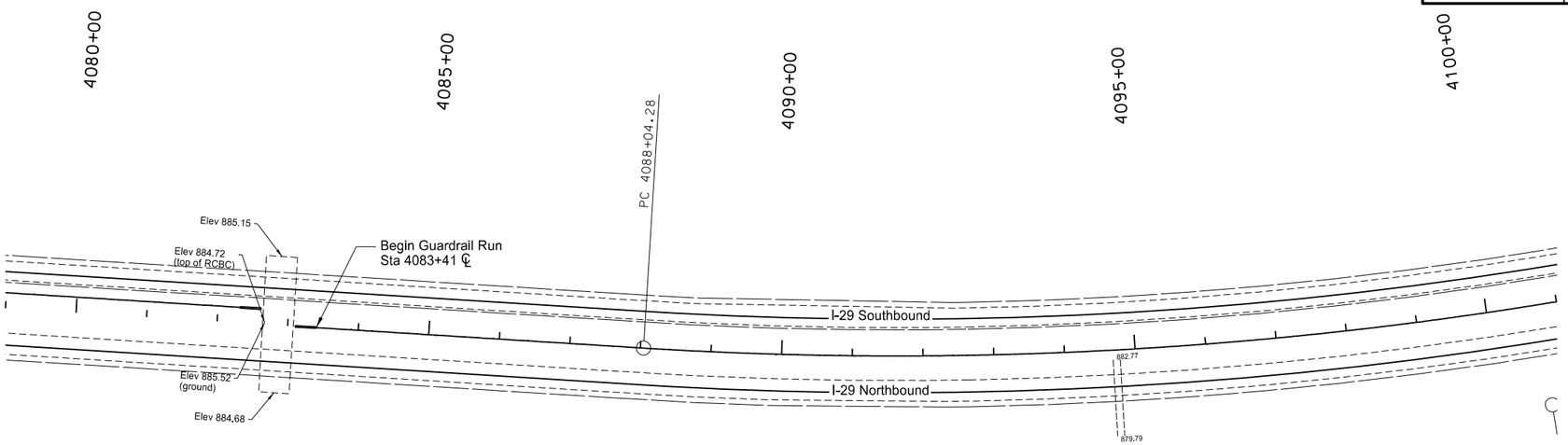
REGISTERED PROFESSIONAL ENGINEER
SCOTT MIDDAUGH
PE-7499
DATE 07/22/25
NORTH DAKOTA

High Tension Cable Guardrail

Plan & Profile
Sta 3895+00 to Sta 3915+00 (OCL29_CASS)

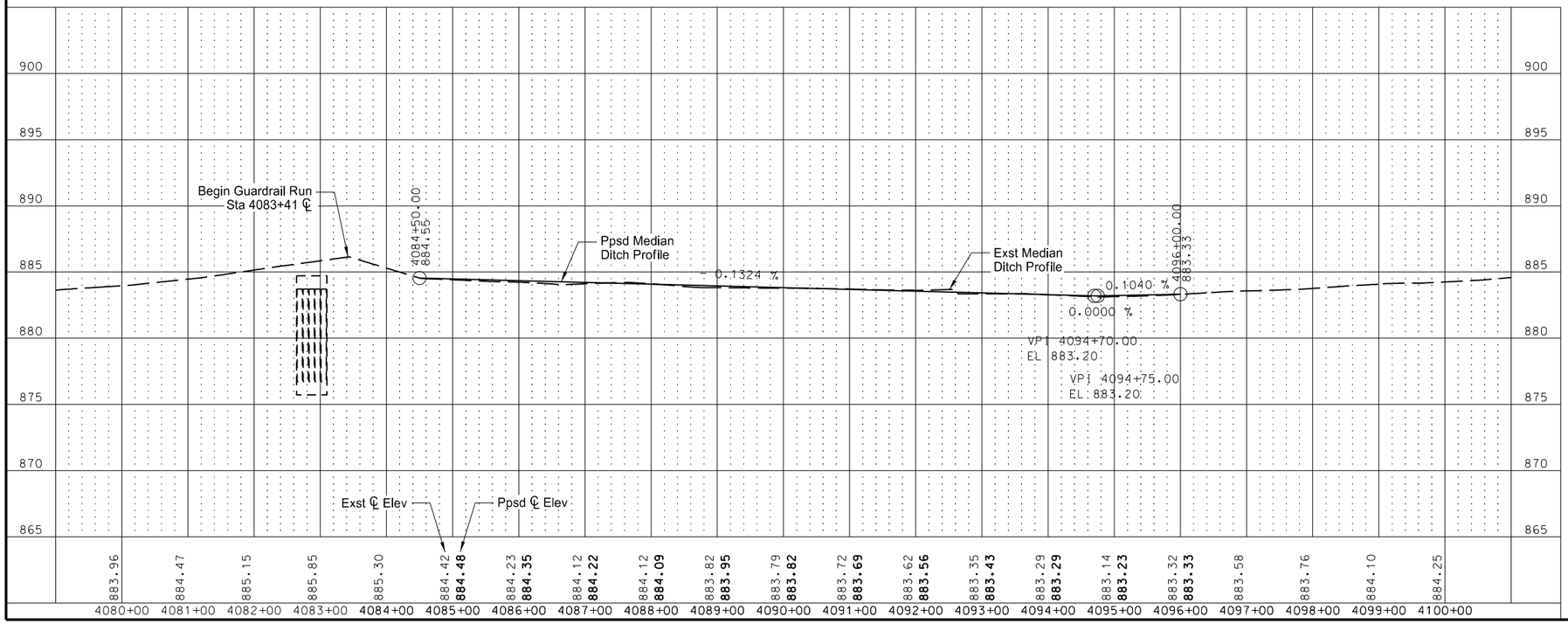
I-29 - Cass Co 20 to Argusville Interchange

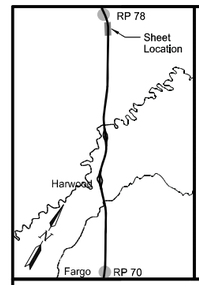
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HEN-X-8-029(200)069	60	5

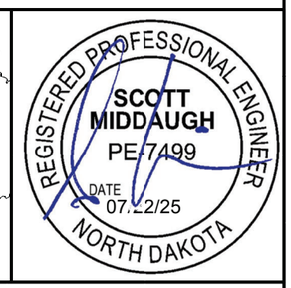


Str # 29-077.324
N 520,020.30 E 2,860,255.33
N 520,114.93 E 2,860,423.93
Quint, 8' x 7' x 188' RCB
Winged HDWLS

4094+73 - 14' to W end
30" X 108' CSP (good)
2 CSFES (good)





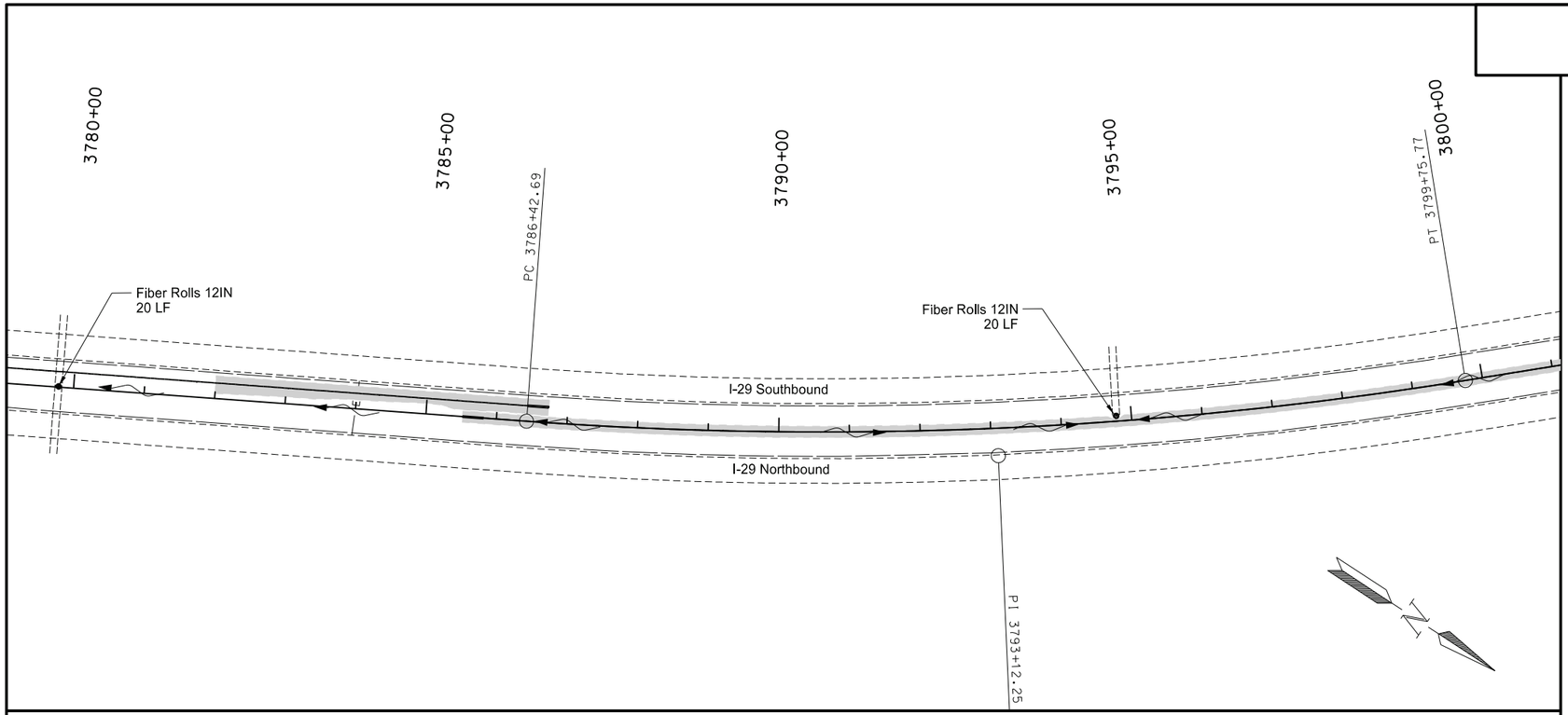


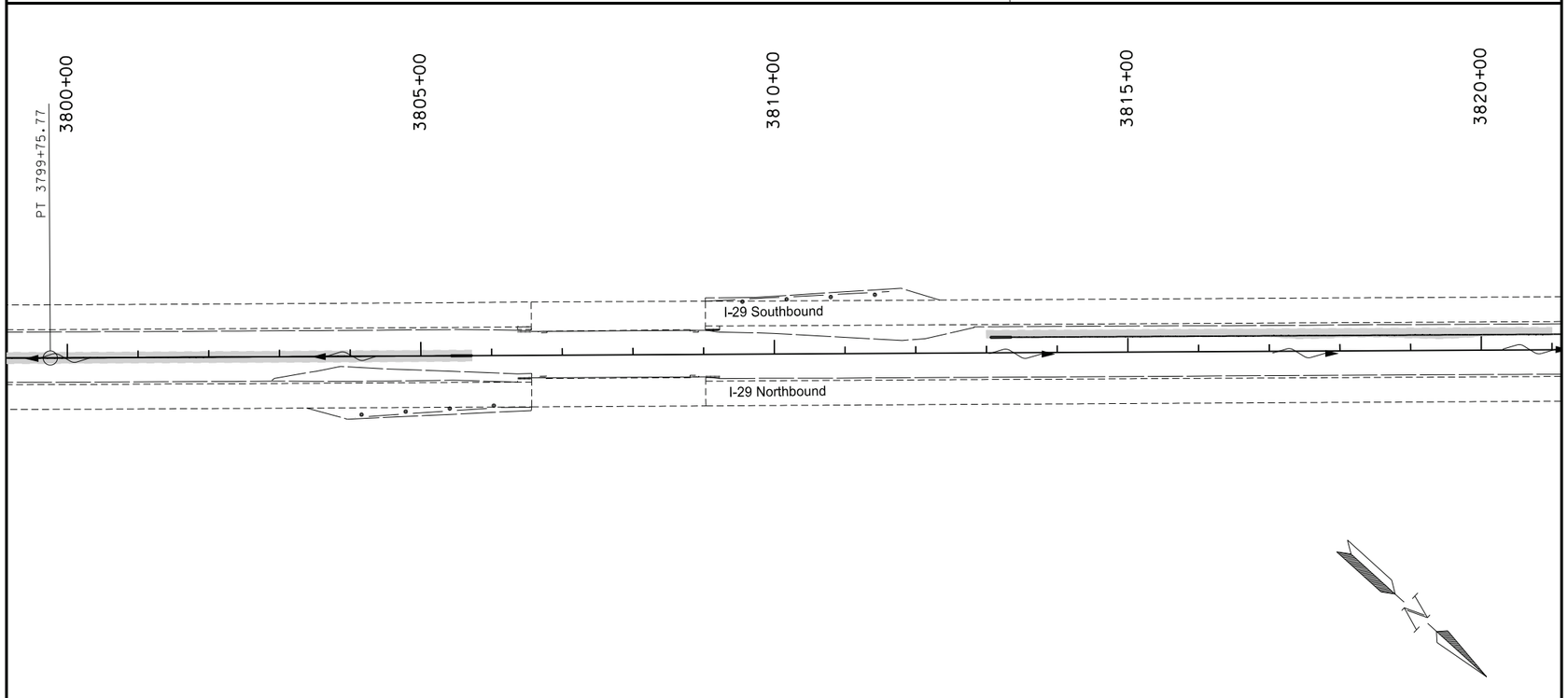
High Tension Cable Guardrail

Plan & Profile
Sta 4080+00 to Sta 4100+00 (OCL29_CASS)

I-29 - Cass Co 20 to Argusville Interchange

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-X-8-029(200)069	76	1



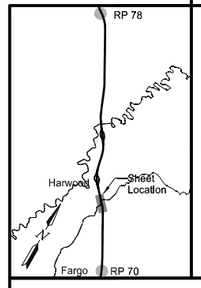


SPEC	CODE	BID ITEM	UNIT
251	2000	TEMPORARY COVER CROP	
		Sta 3782+00 to Sta 3786+73	0.23 ACRE
		Sta 3785+82 to Sta 3805+42	0.74 ACRE
		Sta 3813+00 to Sta 3820+00	0.19 ACRE
253	0101	STRAW MULCH	
		Sta 3782+00 to Sta 3786+73	0.23 ACRE
		Sta 3785+82 to Sta 3805+42	0.74 ACRE
		Sta 3813+00 to Sta 3820+00	0.19 ACRE
261	0112	FIBER ROLLS 12IN	
		Sta 3779+78 Inlet Structure	20 LF
		Sta 3794+78 SB CL Pipe	20 LF
261	0113	REMOVE FIBER ROLLS 12IN	
		Sta 3779+78 Inlet Structure	20 LF
		Sta 3794+78 SB CL Pipe	20 LF

LEGEND

Temporary Cover Crop & Straw Mulch

Fiber Rolls



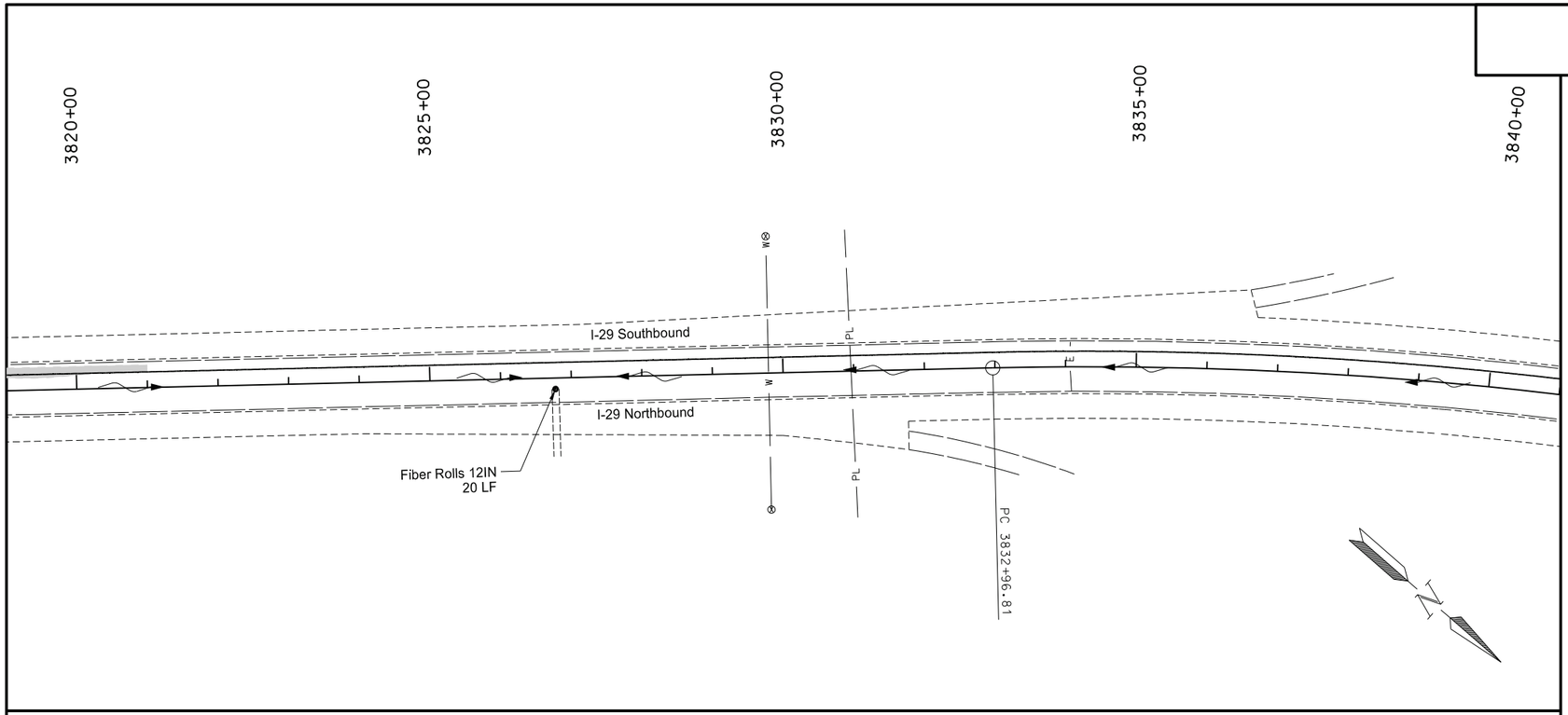
REGISTERED PROFESSIONAL ENGINEER
SCOTT MIDDAUGH
PE 7499
DATE 07/22/25
NORTH DAKOTA

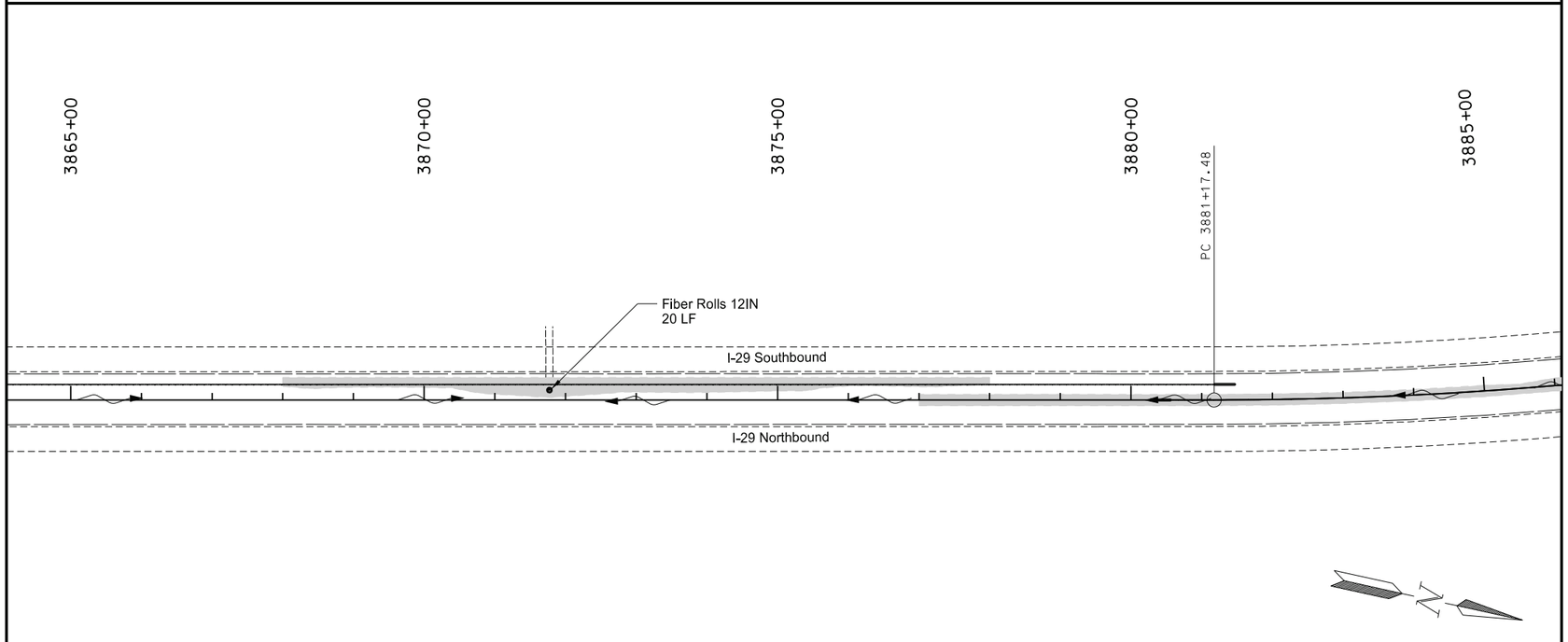
High Tension Cable Guardrail

Temporary Erosion Control

I-29 - Cass Co 20 to Argusville Interchange

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-X-8-029(200)069	76	2



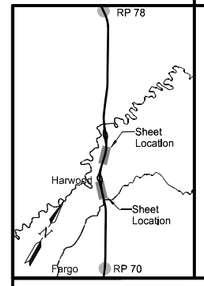


SPEC	CODE	BID ITEM	QTY	UNIT
251	2000	TEMPORARY COVER CROP		
		Sta 3820+00 to Sta 3821+00	0.02	ACRE
		Sta 3868+00 to Sta 3878+00	0.41	ACRE
		Sta 3877+00 to Sta 3885+00	0.29	ACRE
253	0101	STRAW MULCH		
		Sta 3820+00 to Sta 3821+00	0.02	ACRE
		Sta 3868+00 to Sta 3878+00	0.41	ACRE
		Sta 3877+00 to Sta 3885+00	0.29	ACRE
261	0112	FIBER ROLLS 12IN		
		Sta 3826+78 NB CL Pipe	20	LF
		Sta 3871+77 SB CL Pipe	20	LF
261	0113	REMOVE FIBER ROLLS 12IN		
		Sta 3826+78 NB CL Pipe	20	LF
		Sta 3871+77 SB CL Pipe	20	LF

LEGEND

Temporary Cover Crop & Straw Mulch

Fiber Rolls



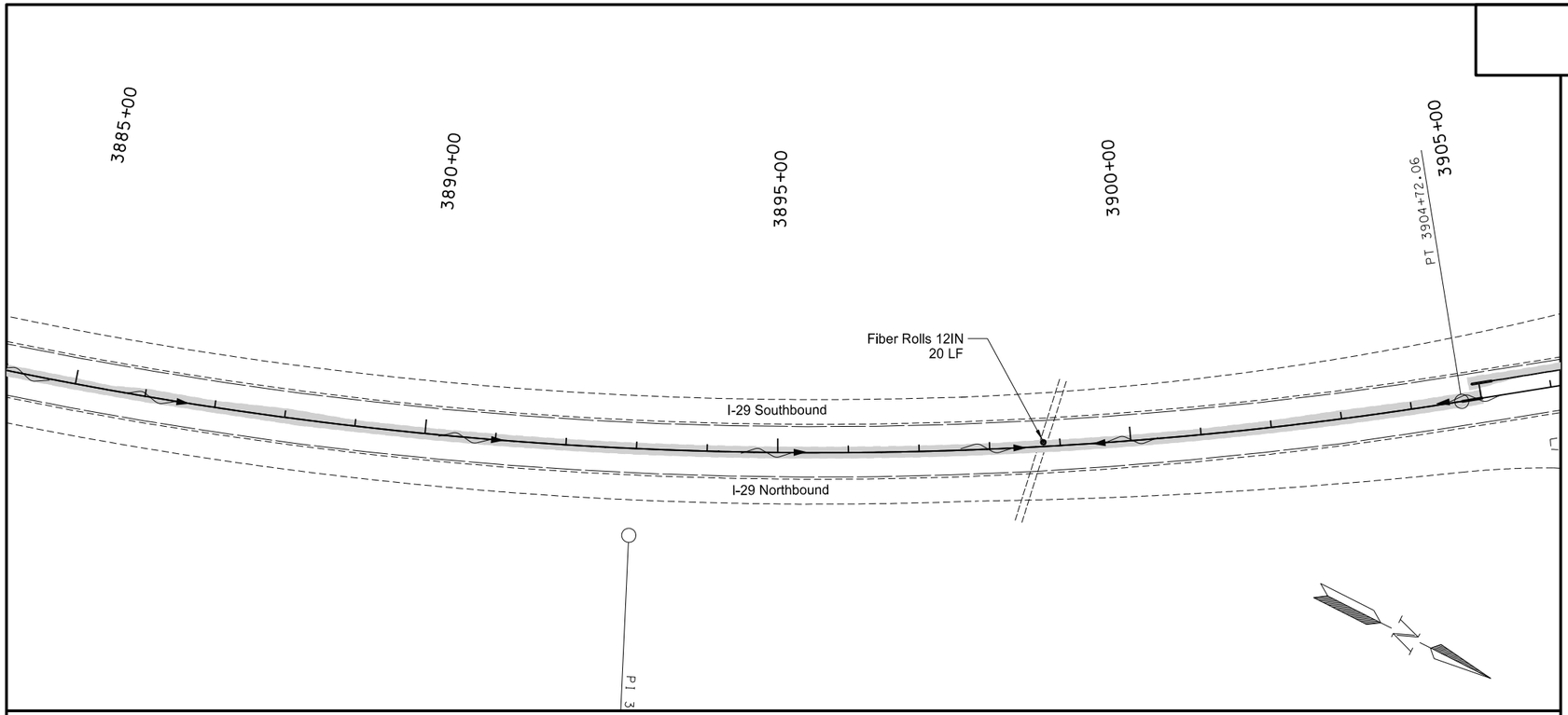
REGISTERED PROFESSIONAL ENGINEER
SCOTT MIDDAUGH
PE-7499
DATE 07/22/25
NORTH DAKOTA

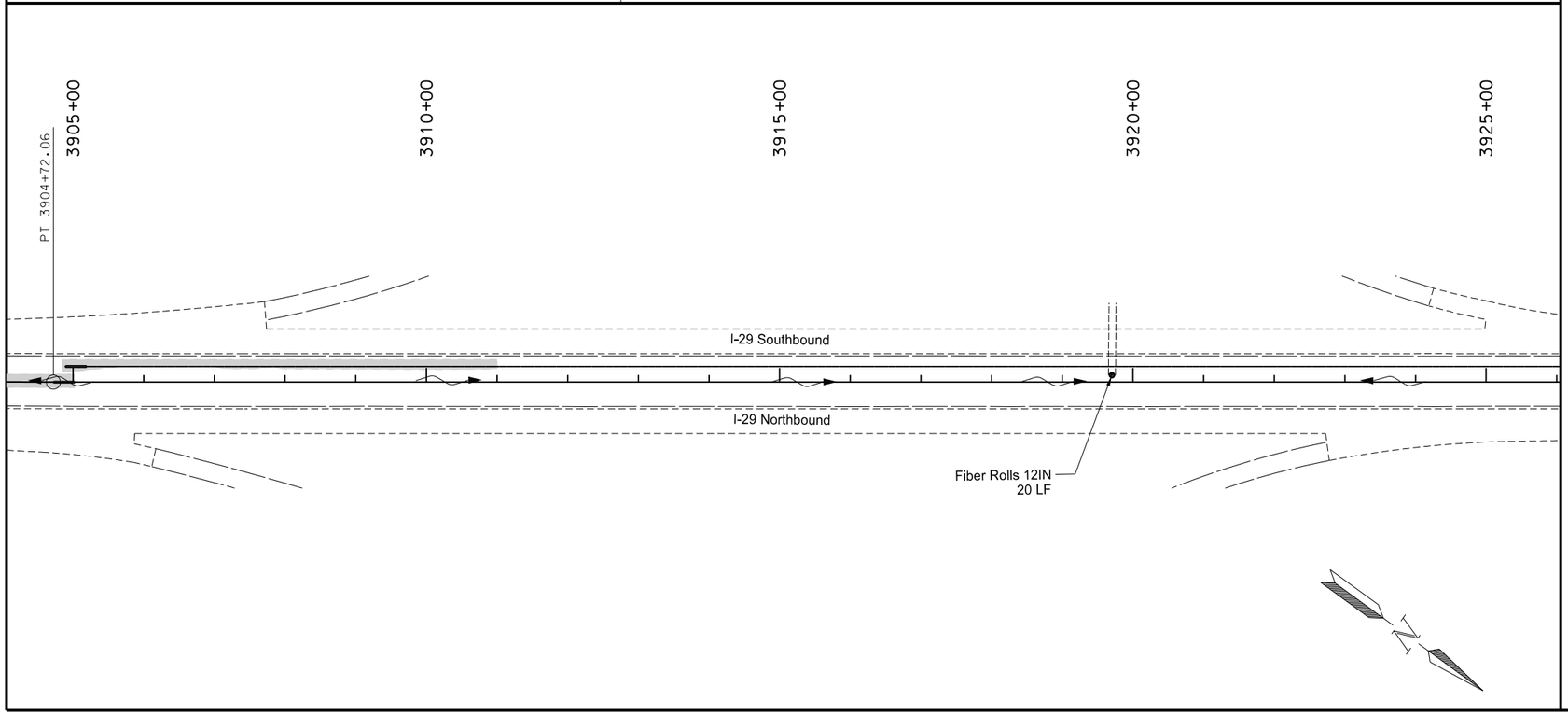
High Tension Cable Guardrail

Temporary Erosion Control

I-29 - Cass Co 20 to Argusville Interchange

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-X-8-029(200)069	76	3



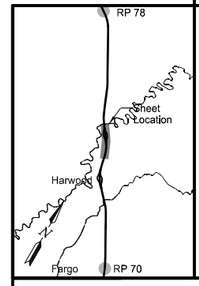


SPEC	CODE	BID ITEM	QTY	UNIT
251	2000	TEMPORARY COVER CROP		
		Sta 3885+00 to Sta 3905+02	0.78	ACRE
		Sta 3904+85 to Sta 3911+00	0.18	ACRE
253	0101	STRAW MULCH		
		Sta 3885+00 to Sta 3905+02	0.78	ACRE
		Sta 3904+85 to Sta 3911+00	0.18	ACRE
261	0112	FIBER ROLLS 12IN		
		Sta 3898+77 CL Median Inlet	20	LF
		Sta 3919+70 SB CL Pipe	20	LF
261	0113	REMOVE FIBER ROLLS 12IN		
		Sta 3898+77 CL Median Inlet	20	LF
		Sta 3919+70 SB CL Pipe	20	LF

LEGEND

Temporary Cover Crop & Straw Mulch

Fiber Rolls



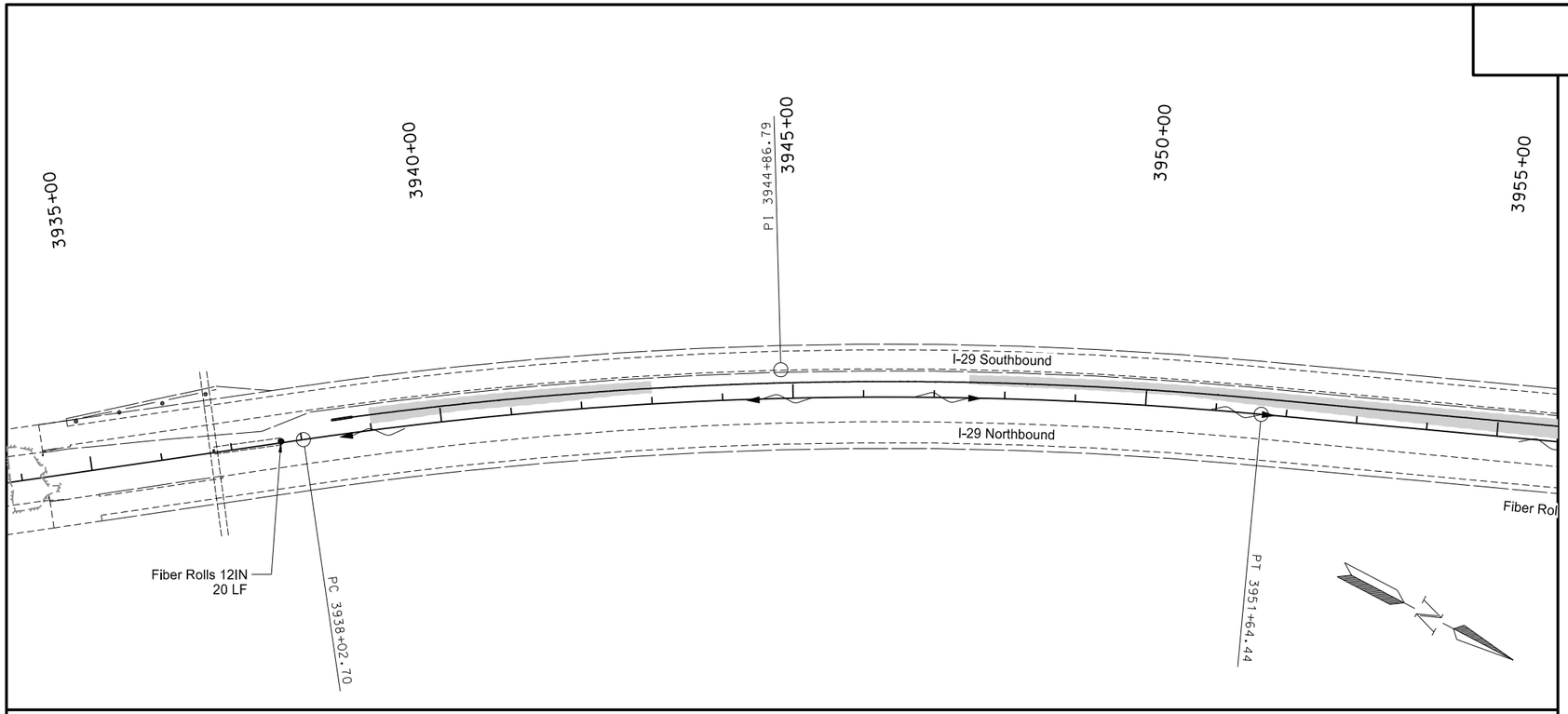
REGISTERED PROFESSIONAL ENGINEER
SCOTT MIDDAUGH
PE-7499
DATE 07/22/25
NORTH DAKOTA

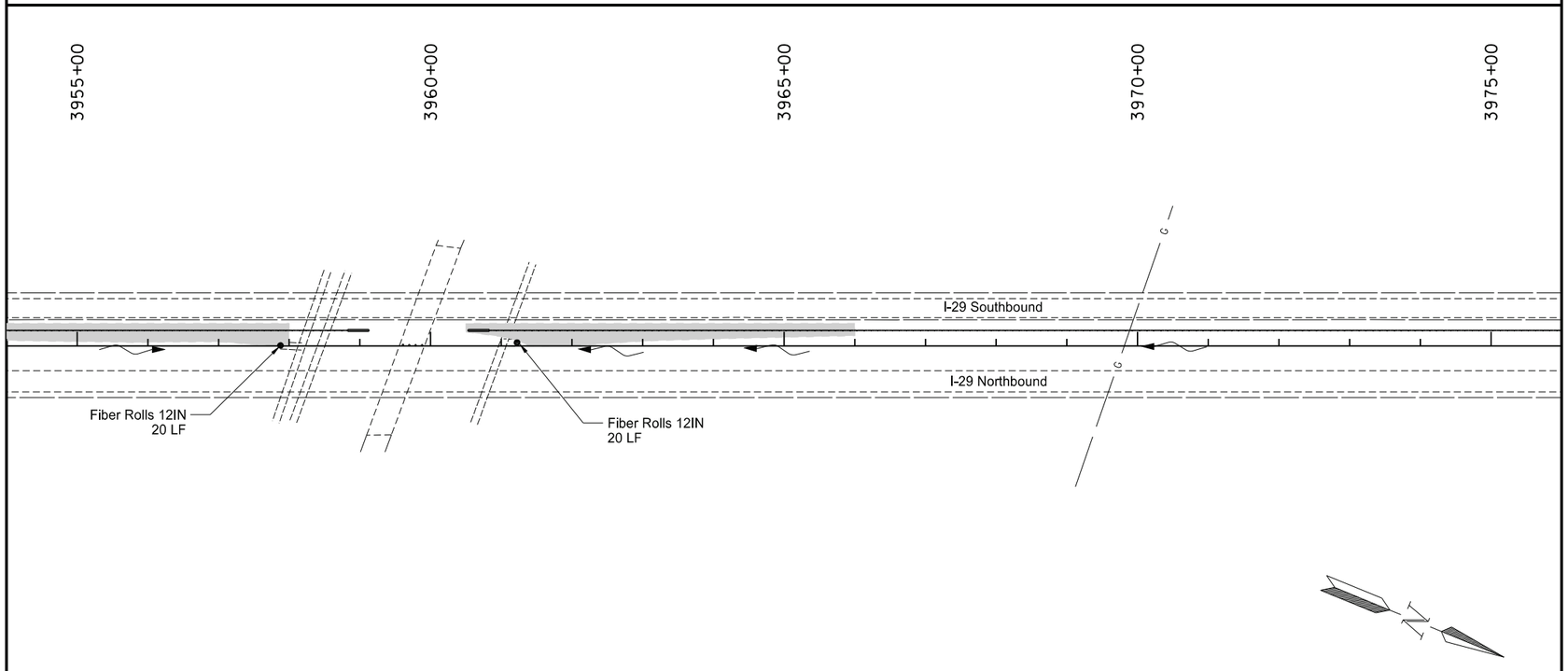
High Tension Cable Guardrail

Temporary Erosion Control

I-29 - Cass Co 20 to Argusville Interchange

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-X-8-029(200)069	76	4



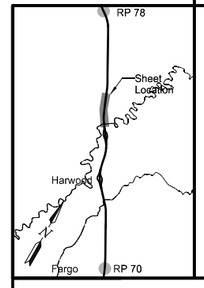


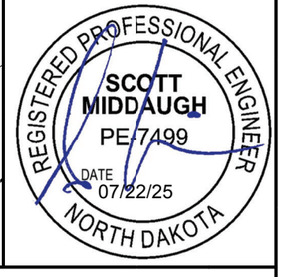
SPEC	CODE	BID ITEM	QTY	UNIT
251	2000	TEMPORARY COVER CROP		
		Sta 3939+00 to Sta 3943+00	0.18	ACRE
		Sta 3947+50 to Sta 3958+00	0.51	ACRE
		Sta 3660+50 to Sta 3966+00	0.30	ACRE
253	0101	STRAW MULCH		
		Sta 3939+00 to Sta 3943+00	0.18	ACRE
		Sta 3947+50 to Sta 3958+00	0.51	ACRE
		Sta 3660+50 to Sta 3966+00	0.30	ACRE
261	0112	FIBER ROLLS 12IN		
		Sta 3937+71 CL Catch Basin	20	LF
		Sta 3957+88 CL Catch Basin	20	LF
		Sta 3961+22 CL Pipe	20	LF
261	0113	REMOVE FIBER ROLLS 12IN		
		Sta 3937+71 CL Catch Basin	20	LF
		Sta 3957+88 CL Catch Basin	20	LF
		Sta 3961+22 CL Pipe	20	LF

LEGEND

Temporary Cover Crop & Straw Mulch

Fiber Rolls



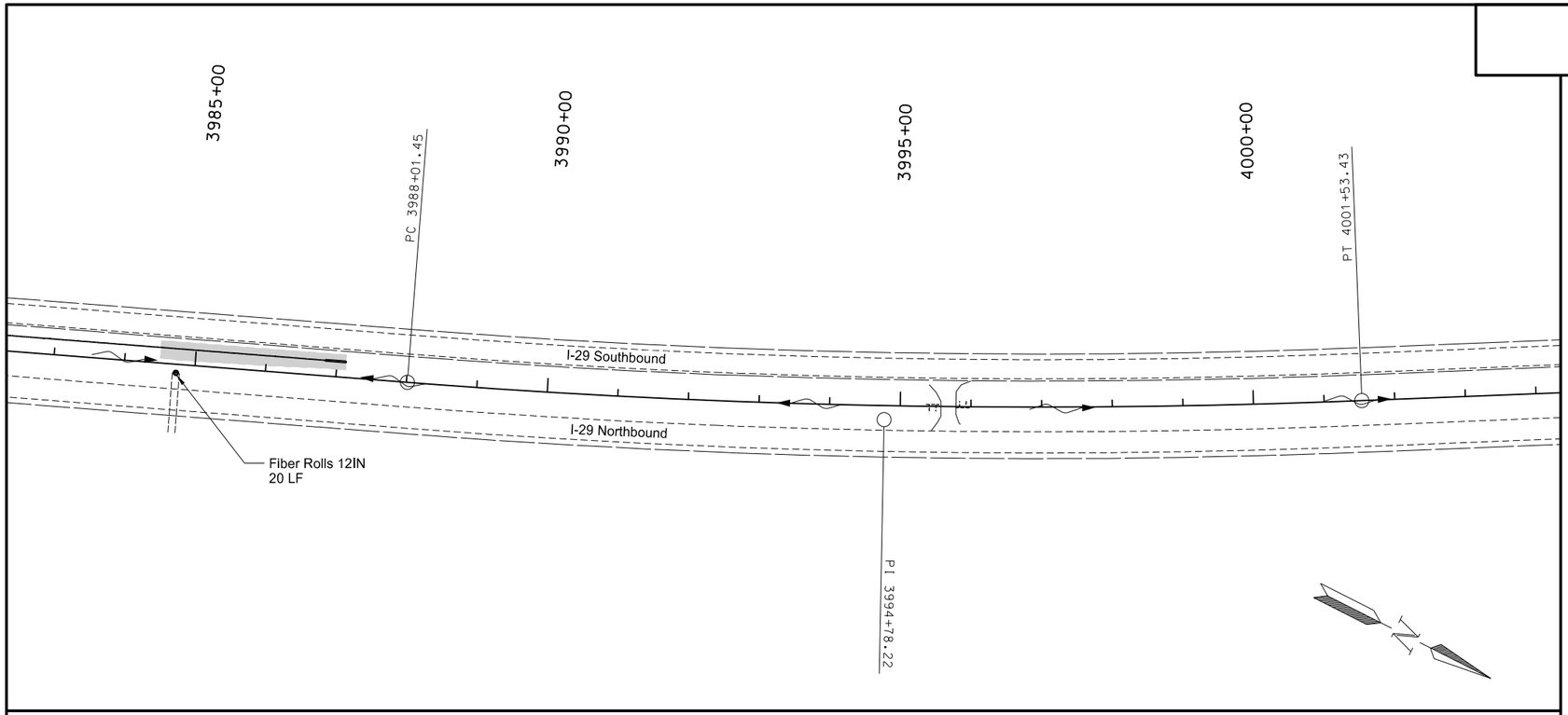


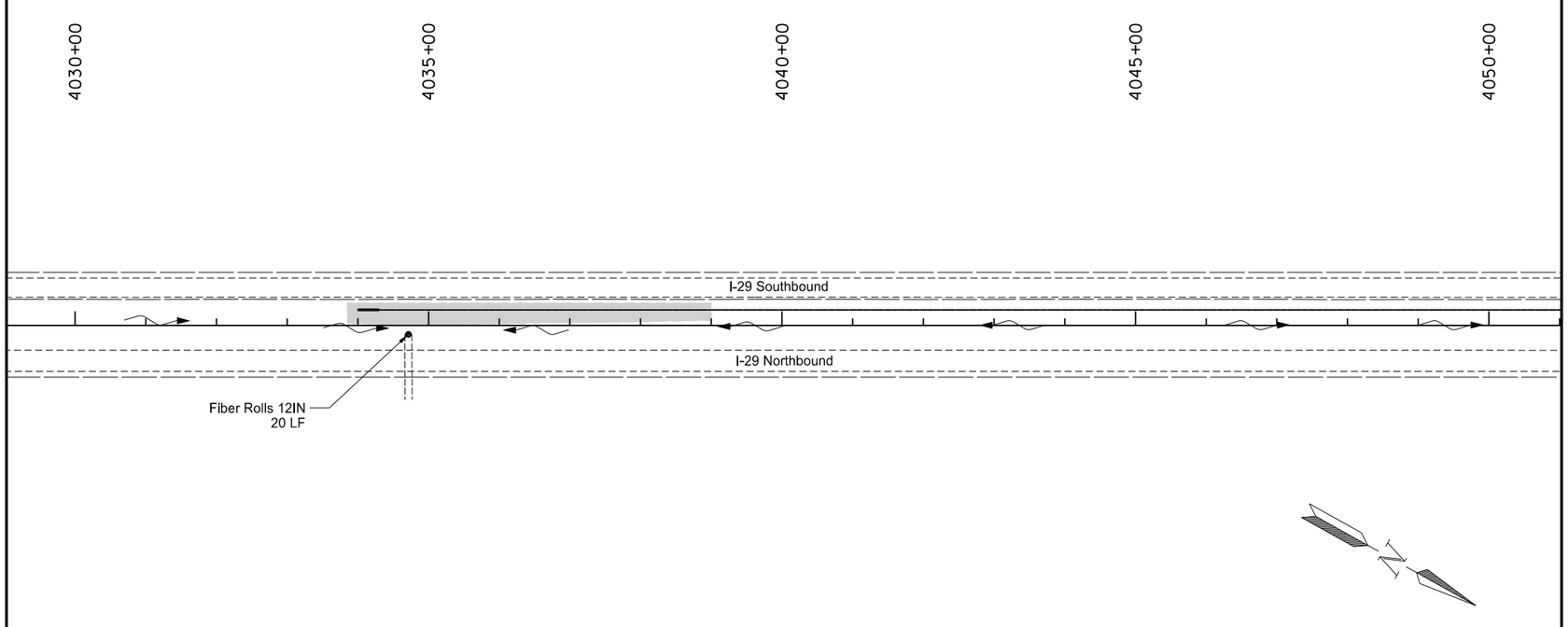
High Tension Cable Guardrail

Temporary Erosion Control

I-29 - Cass Co 20 to Argusville Interchange

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-X-8-029(200)069	76	5



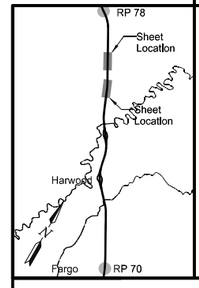


SPEC	CODE	BID ITEM	QTY	UNIT
251	2000	TEMPORARY COVER CROP		
		Sta 3984+50 to Sta 3987+13	0.15	ACRE
		Sta 4033+85 to Sta 4039+00	0.34	ACRE
253	0101	STRAW MULCH		
		Sta 3984+50 to Sta 3987+13	0.15	ACRE
		Sta 4033+85 to Sta 4039+00	0.34	ACRE
261	0112	FIBER ROLLS 12IN		
		Sta 3984+74 NB CL Pipe	20	LF
		Sta 4034+72 NB CL Pipe	20	LF
261	0113	REMOVE FIBER ROLLS 12IN		
		Sta 3984+74 NB CL Pipe	20	LF
		Sta 4034+72 NB CL Pipe	20	LF

LEGEND

Temporary Cover Crop & Straw Mulch

Fiber Rolls



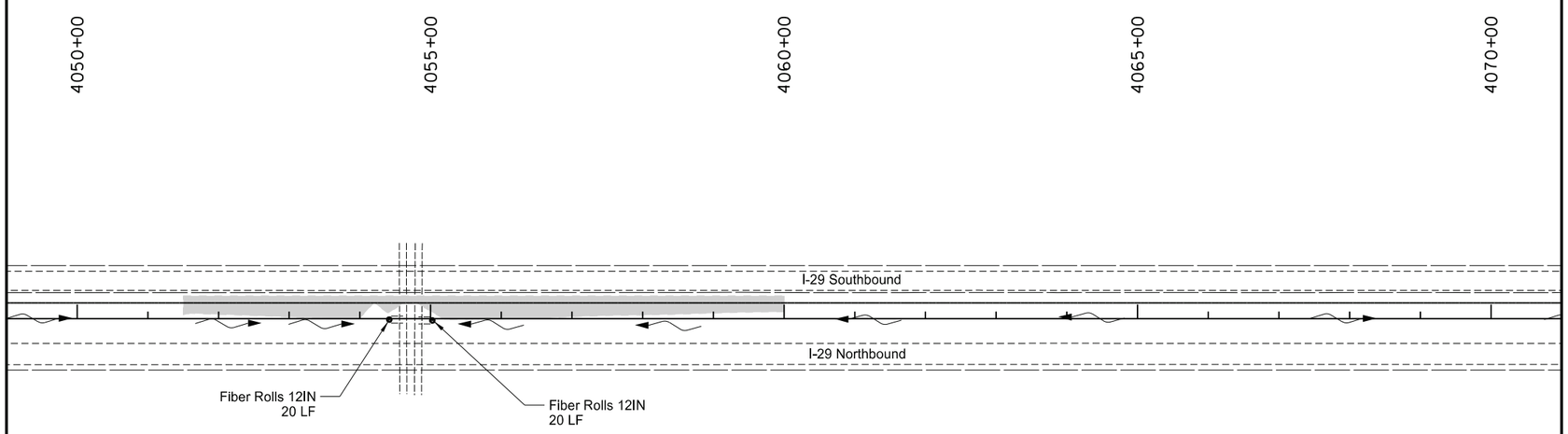


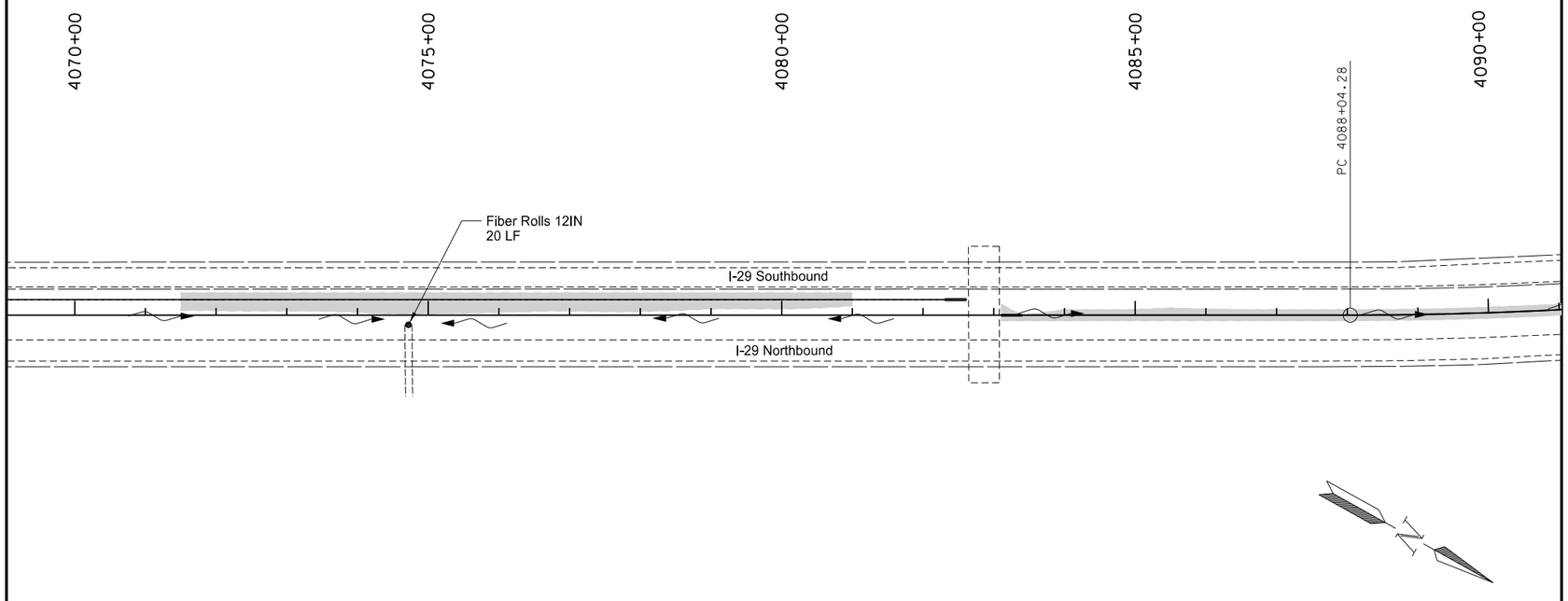
High Tension Cable Guardrail

Temporary Erosion Control

I-29 - Cass Co 20 to Argusville Interchange

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-X-8-029(200)069	76	6



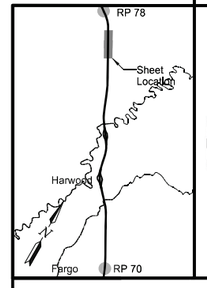


SPEC	CODE	BID ITEM	QTY	UNIT
251	2000	TEMPORARY COVER CROP		
		Sta 4051+50 to Sta 4060+00	0.53	ACRE
		Sta 4071+50 to Sta 4081+00	0.58	ACRE
		Sta 4083+11 to Sta 4090+00	0.25	ACRE
253	0101	STRAW MULCH		
		Sta 4051+50 to Sta 4060+00	0.53	ACRE
		Sta 4071+50 to Sta 4081+00	0.58	ACRE
		Sta 4083+11 to Sta 4090+00	0.25	ACRE
261	0112	FIBER ROLLS 12IN		
		Sta 4054+42 CL Pipe	20	LF
		Sta 4055+02 CL Pipe	20	LF
		Sta 4074+72 NB CL Pipe	20	LF
261	0113	REMOVE FIBER ROLLS 12IN		
		Sta 4054+42 CL Pipe	20	LF
		Sta 4055+02 CL Pipe	20	LF
		Sta 4074+72 NB CL Pipe	20	LF

LEGEND

Temporary Cover Crop & Straw Mulch

Fiber Rolls



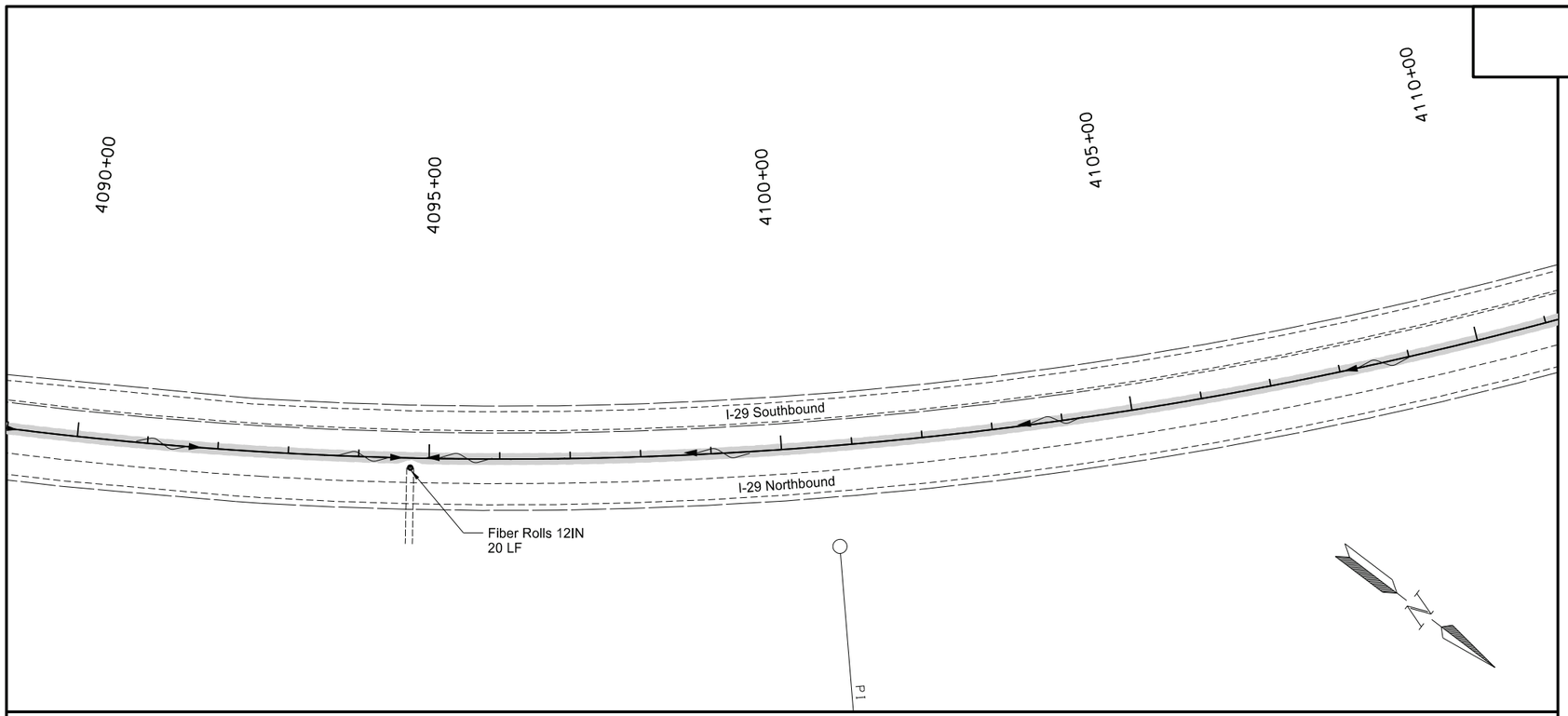
REGISTERED PROFESSIONAL ENGINEER
SCOTT MIDDAUGH
PE-7499
DATE 07/22/25
NORTH DAKOTA

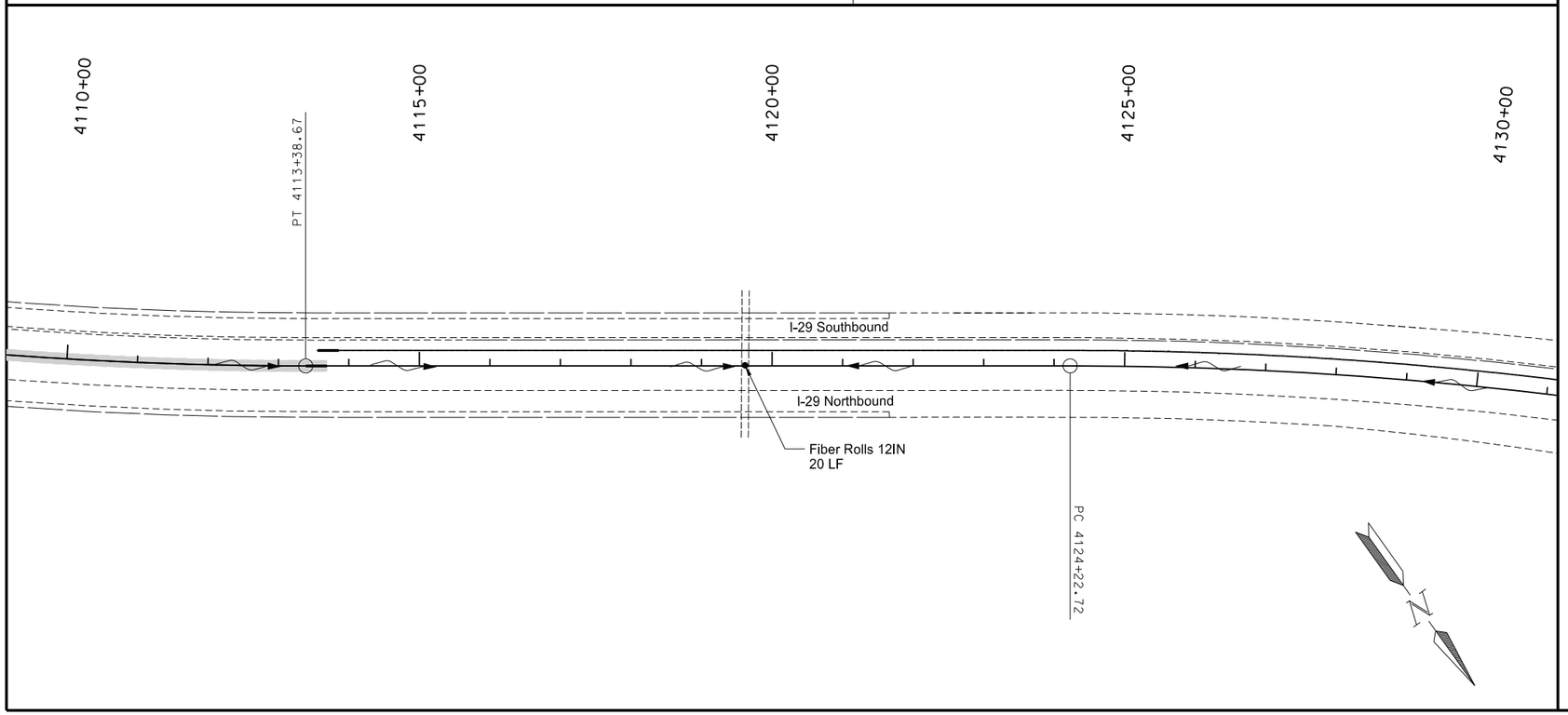
High Tension Cable Guardrail

Temporary Erosion Control

I-29 - Cass Co 20 to Argusville Interchange

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-X-8-029(200)069	76	7



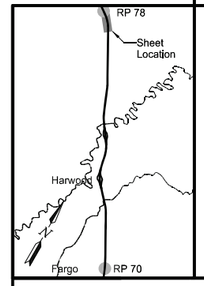


SPEC	CODE	BID ITEM	QTY	UNIT
251	2000	TEMPORARY COVER CROP		
		Sta 4090+00 to Sta 4113+69	0.87	ACRE
253	0101	STRAW MULCH		
		Sta 5693+00 to Sta 5710+00	0.87	ACRE
261	0112	FIBER ROLLS 12IN		
		Sta 4094+74 NB CL Pipe	20	LF
		Sta 4119+62 CL Pipe	20	LF
261	0113	REMOVE FIBER ROLLS 12IN		
		Sta 4094+74 NB CL Pipe	20	LF
		Sta 4119+62 CL Catch Basin	20	LF

LEGEND

Temporary Cover Crop & Straw Mulch

Fiber Rolls



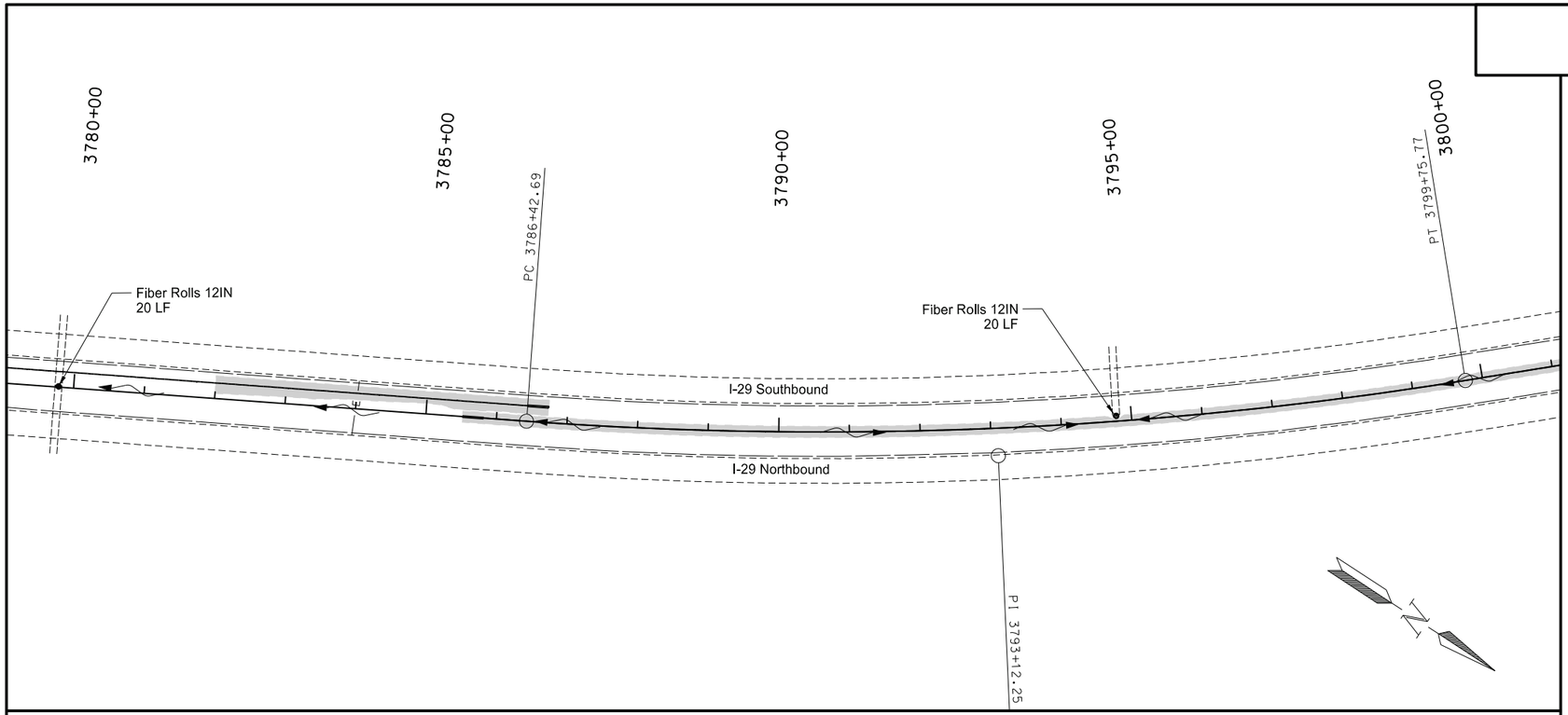


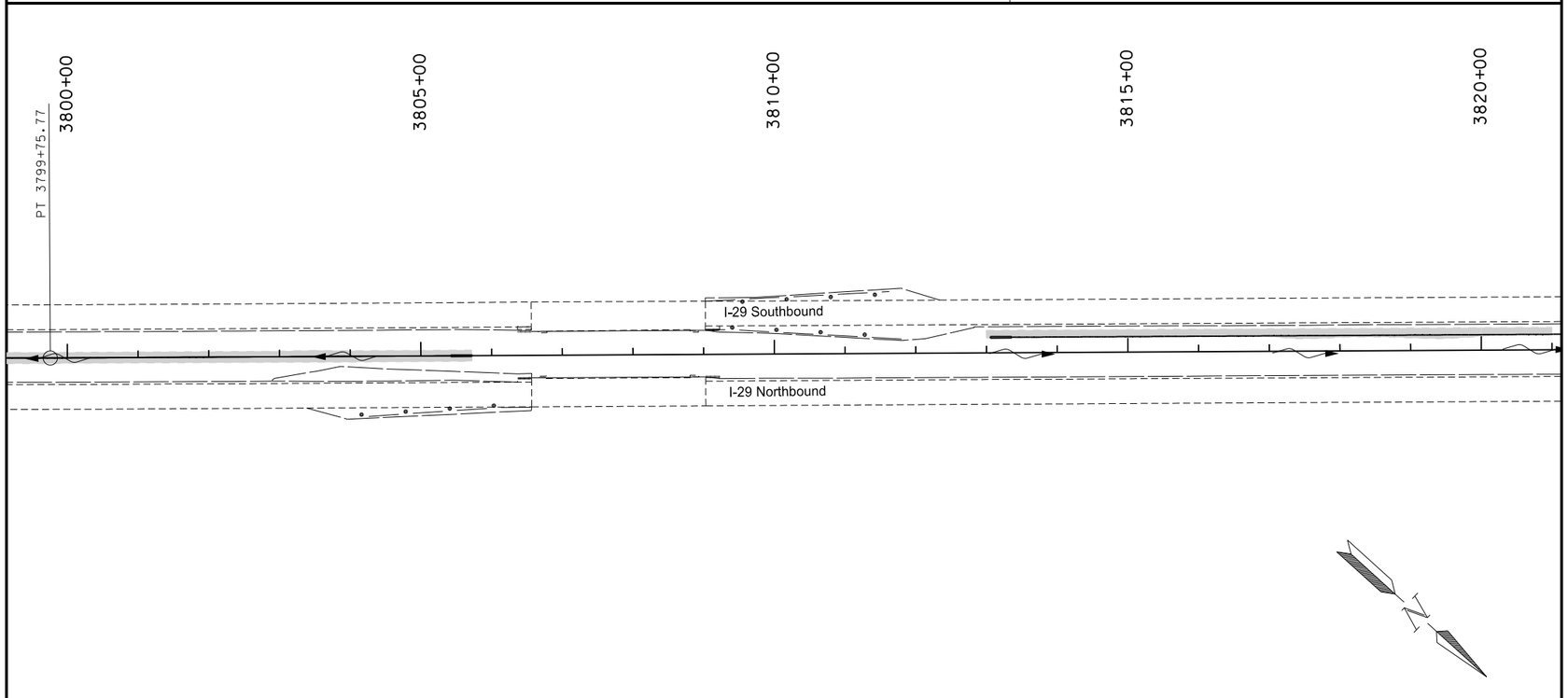
High Tension Cable Guardrail

Temporary Erosion Control

I-29 - Cass Co 20 to Argusville Interchange

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-X-8-029(200)069	77	1



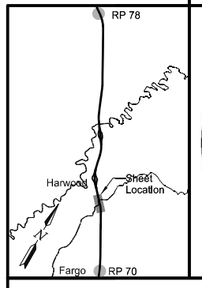


SPEC	CODE	BID ITEM	QTY	UNIT
251	0200	SEEDING CLASS II		
		Sta 3782+00 to Sta 3786+73	0.23	ACRE
		Sta 3785+82 to Sta 3805+42	0.74	ACRE
		Sta 3813+00 to Sta 3820+00	0.19	ACRE
253	0101	STRAW MULCH		
		Sta 3782+00 to Sta 3786+73	0.23	ACRE
		Sta 3785+82 to Sta 3805+42	0.74	ACRE
		Sta 3813+00 to Sta 3820+00	0.19	ACRE
261	0112	FIBER ROLLS 12IN		
		Sta 3779+78 Inlet Structure	20	LF
		Sta 3794+78 SB CL Pipe	20	LF

LEGEND

Seeding Class II & Straw Mulch

Fiber Rolls



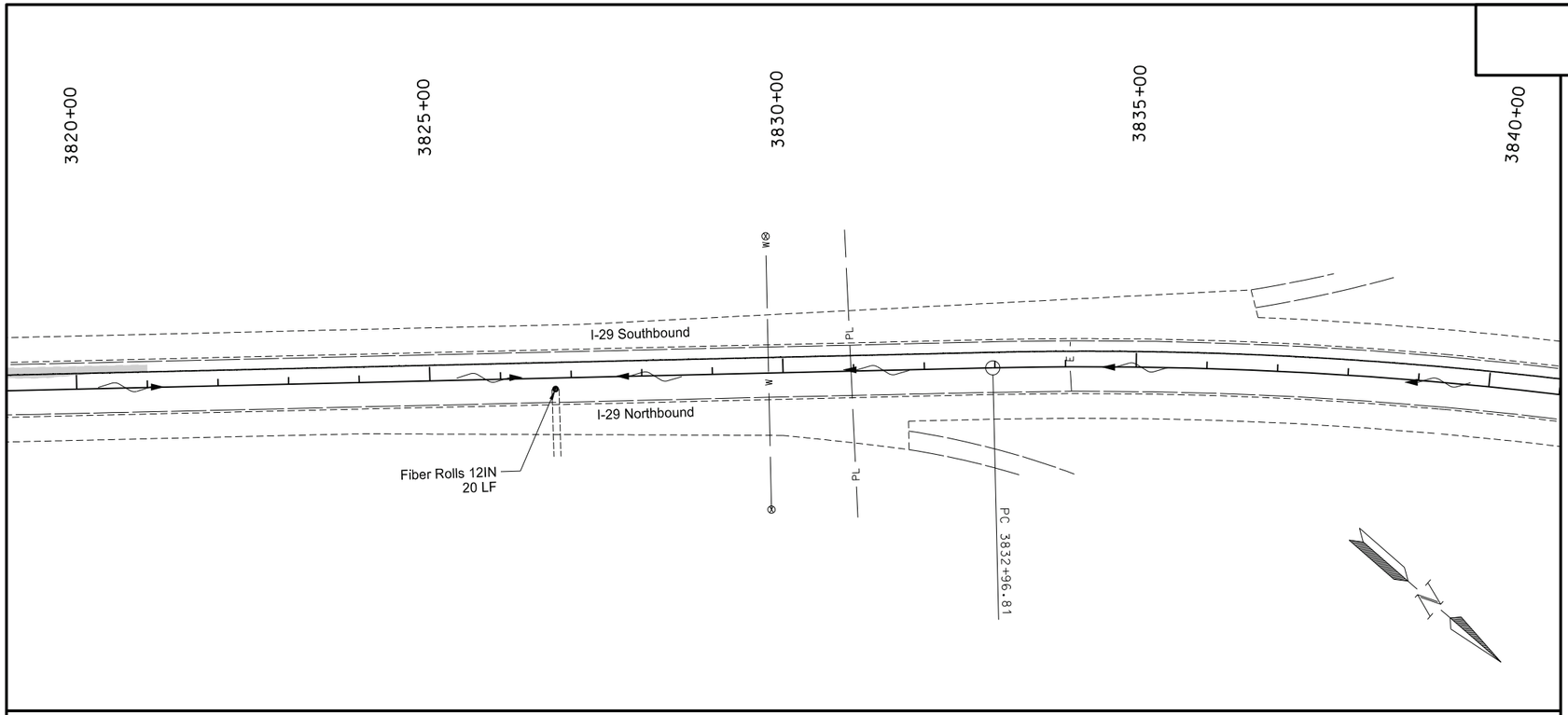
REGISTERED PROFESSIONAL ENGINEER
SCOTT MIDDAUGH
PE-7499
DATE 07/22/25
NORTH DAKOTA

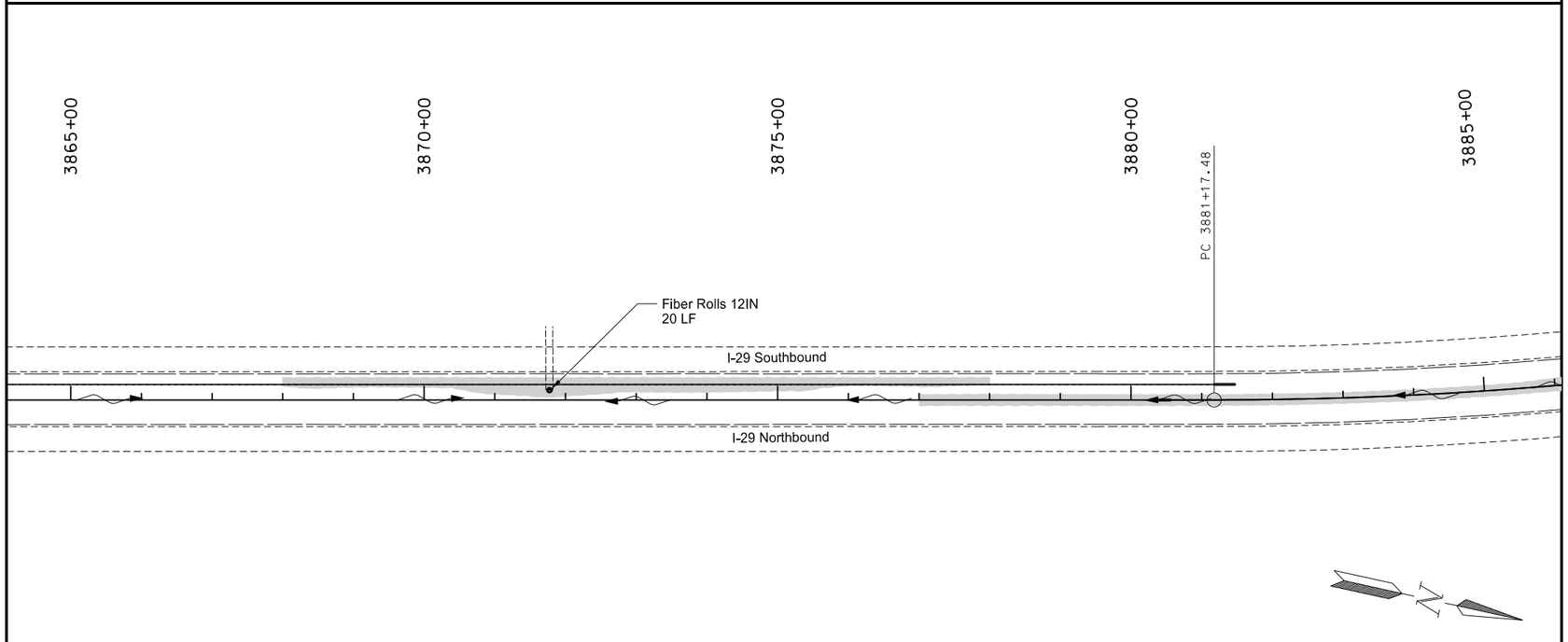
High Tension Cable Guardrail

Permanent Erosion Control

I-29 - Cass Co 20 to Argusville Interchange

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-X-8-029(200)069	77	2



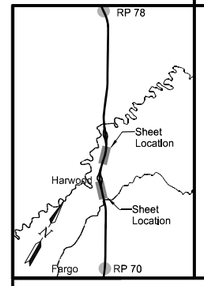


SPEC	CODE	BID ITEM	QTY	UNIT
251	0200	SEEDING CLASS II		
		Sta 3820+00 to Sta 3821+00	0.02	ACRE
		Sta 3868+00 to Sta 3878+00	0.41	ACRE
		Sta 3877+00 to Sta 3885+00	0.29	ACRE
253	0101	STRAW MULCH		
		Sta 3820+00 to Sta 3821+00	0.02	ACRE
		Sta 3868+00 to Sta 3878+00	0.41	ACRE
		Sta 3877+00 to Sta 3885+00	0.29	ACRE
261	0112	FIBER ROLLS 12IN		
		Sta 3826+78 NB CL Pipe	20	LF
		Sta 3871+77 SB CL Pipe	20	LF

LEGEND

Seeding Class II & Straw Mulch

Fiber Rolls



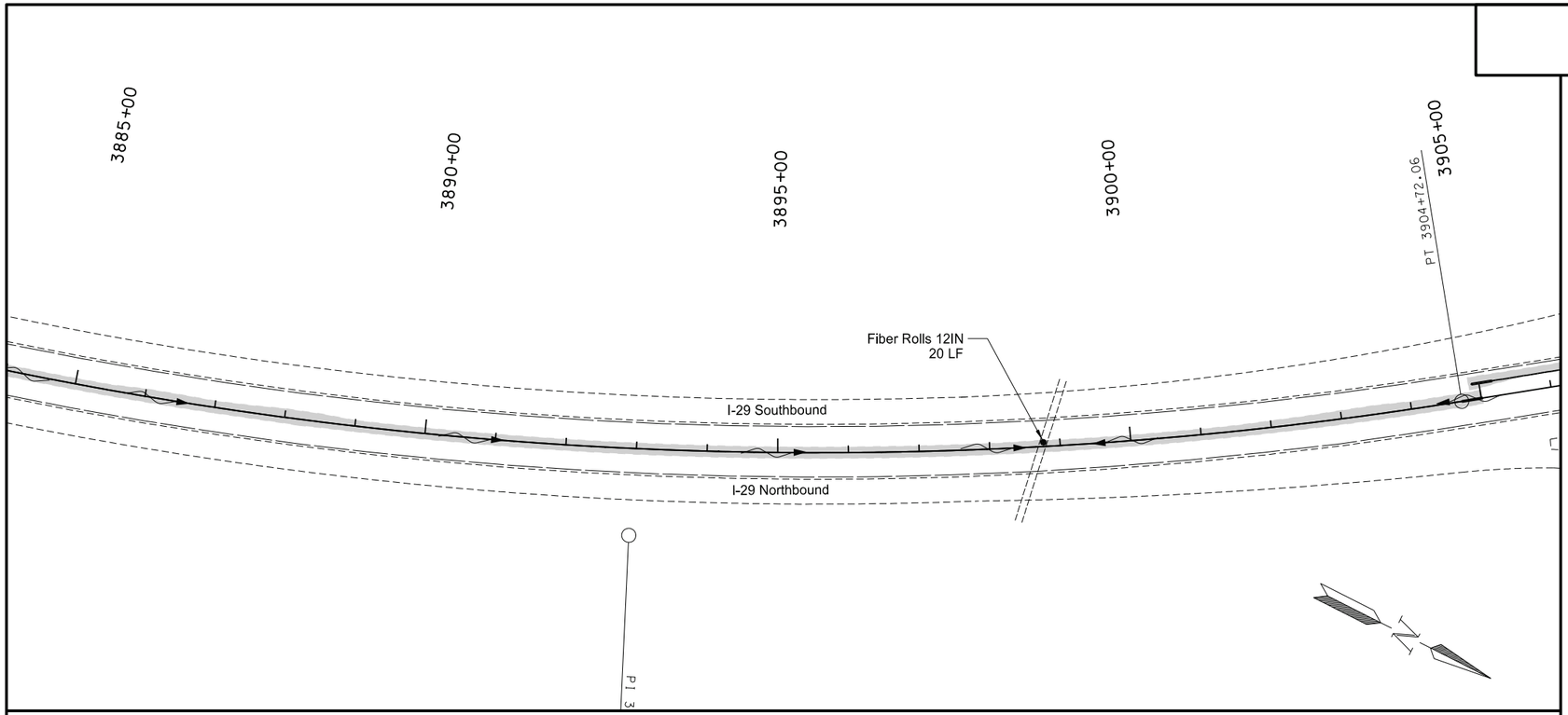
REGISTERED PROFESSIONAL ENGINEER
SCOTT MIDDAUGH
PE-7499
DATE 07/22/25
NORTH DAKOTA

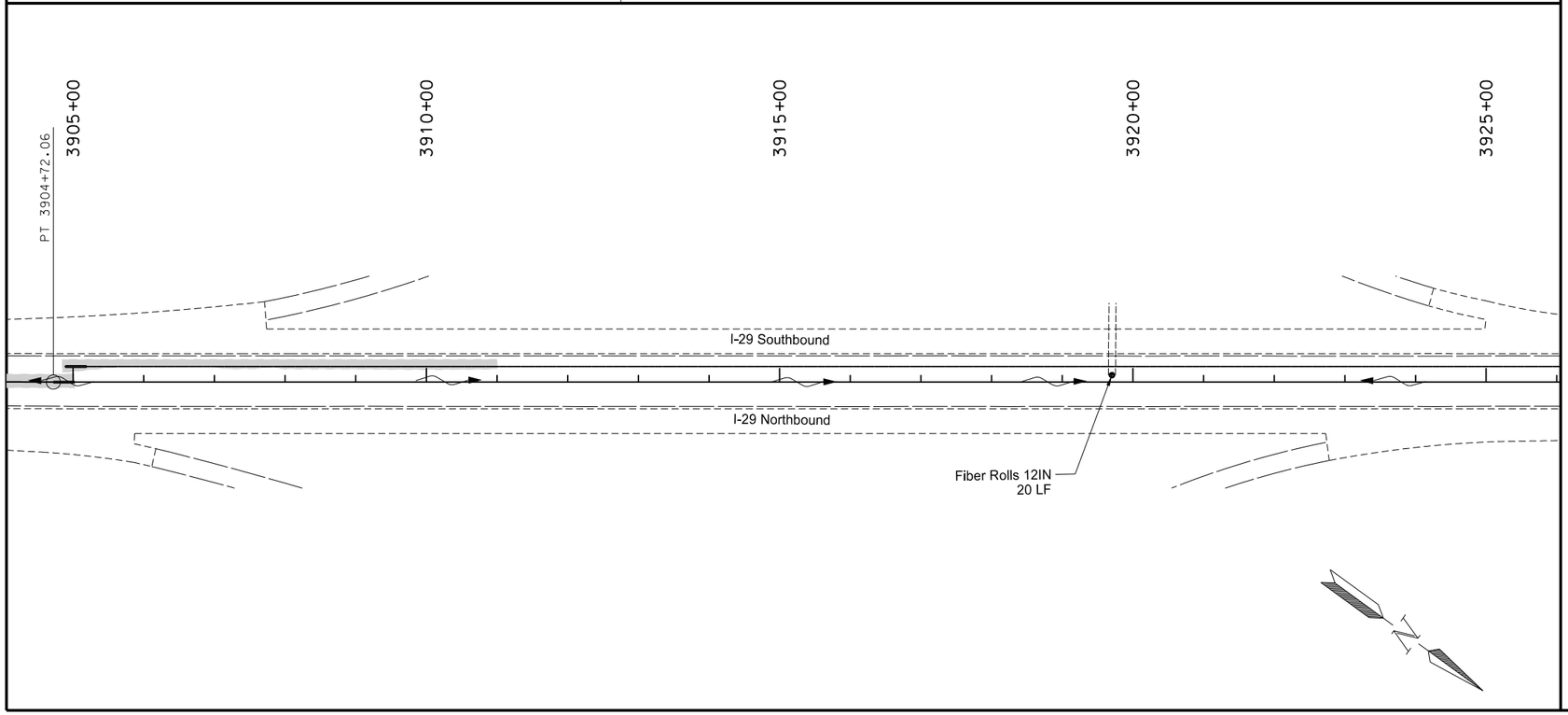
High Tension Cable Guardrail

Permanent Erosion Control

I-29 - Cass Co 20 to Argusville Interchange

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-X-8-029(200)069	77	3



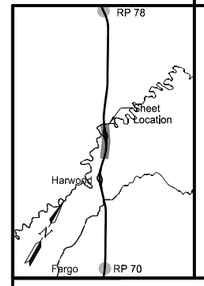


SPEC	CODE	BID ITEM	QTY	UNIT
251	0200	SEEDING CLASS II		
		Sta 3885+00 to Sta 3905+02	0.78	ACRE
		Sta 3904+85 to Sta 3911+00	0.18	ACRE
253	0101	STRAW MULCH		
		Sta 3885+00 to Sta 3905+02	0.78	ACRE
		Sta 3904+85 to Sta 3911+00	0.18	ACRE
261	0112	FIBER ROLLS 12IN		
		Sta 3898+77 CL Median Inlet	20	LF
		Sta 3919+70 SB CL Pipe	20	LF

LEGEND

Seeding Class II & Straw Mulch

Fiber Rolls



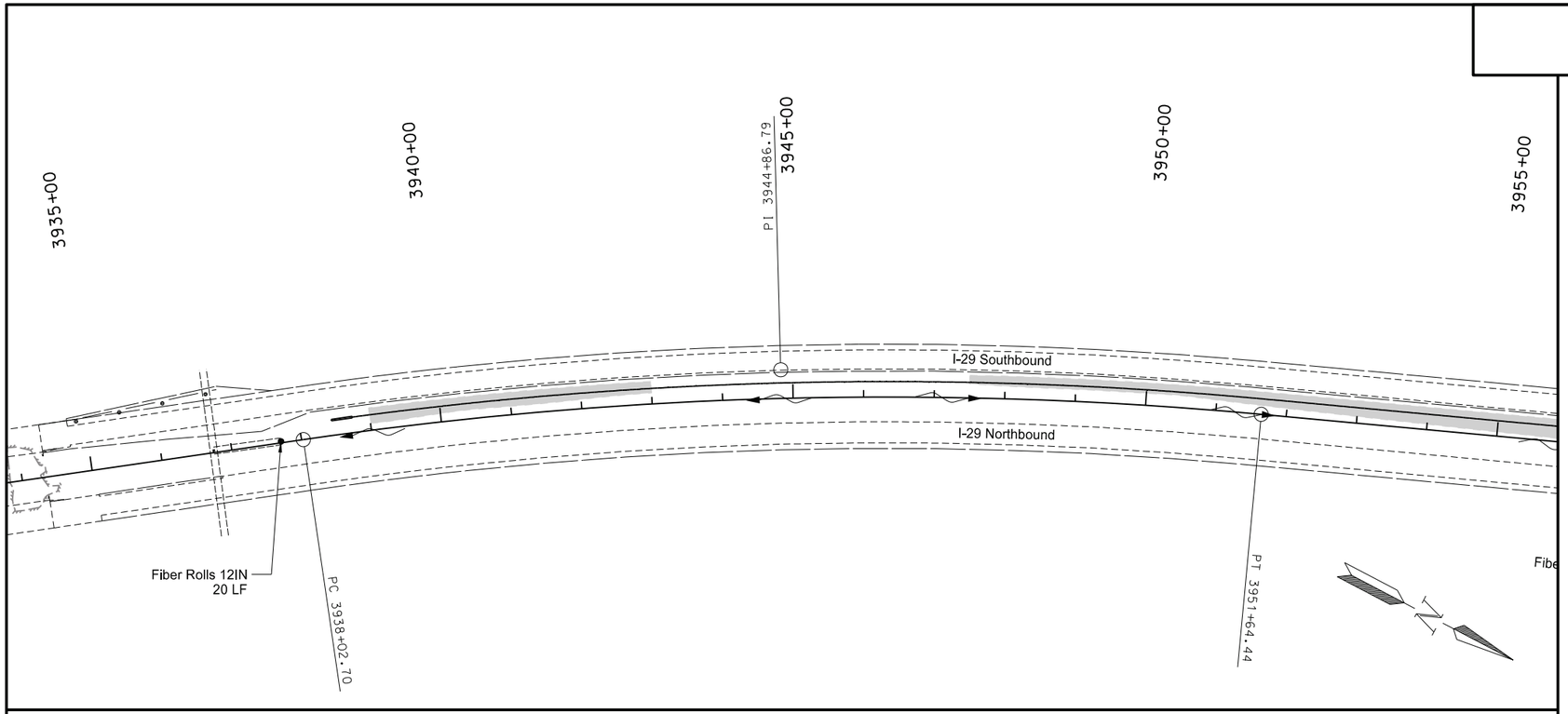
REGISTERED PROFESSIONAL ENGINEER
SCOTT MIDDAUGH
PE-7499
DATE 07/22/25
NORTH DAKOTA

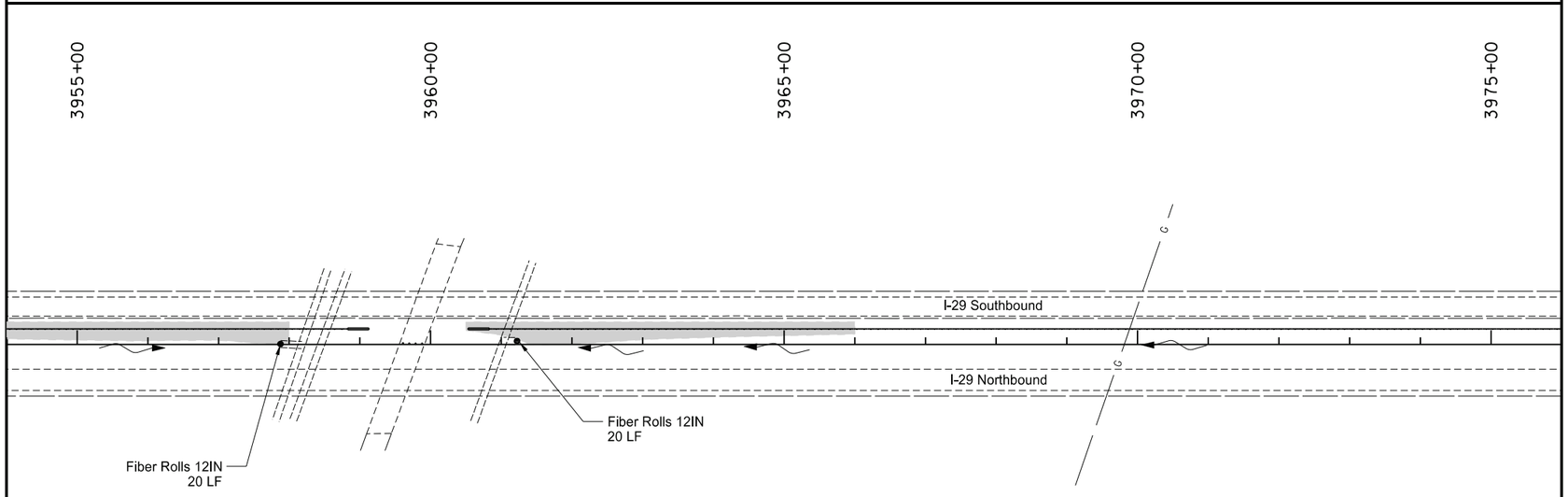
High Tension Cable Guardrail

Permanent Erosion Control

I-29 - Cass Co 20 to Argusville Interchange

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-X-8-029(200)069	77	4



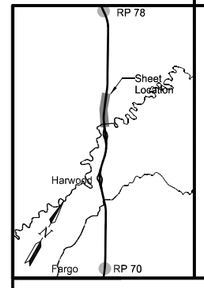


SPEC	CODE	BID ITEM	QTY	UNIT
251	0200	SEEDING CLASS II		
		Sta 3939+00 to Sta 3943+00	0.18	ACRE
		Sta 3947+50 to Sta 3958+00	0.51	ACRE
		Sta 3660+50 to Sta 3966+00	0.30	ACRE
253	0101	STRAW MULCH		
		Sta 3939+00 to Sta 3943+00	0.18	ACRE
		Sta 3947+50 to Sta 3958+00	0.51	ACRE
		Sta 3660+50 to Sta 3966+00	0.30	ACRE
261	0112	FIBER ROLLS 12IN		
		Sta 3937+71 CL Catch Basin	20	LF
		Sta 3957+88 CL Catch Basin	20	LF
		Sta 3961+22 CL Pipe	20	LF

LEGEND

Seeding Class II & Straw Mulch

Fiber Rolls



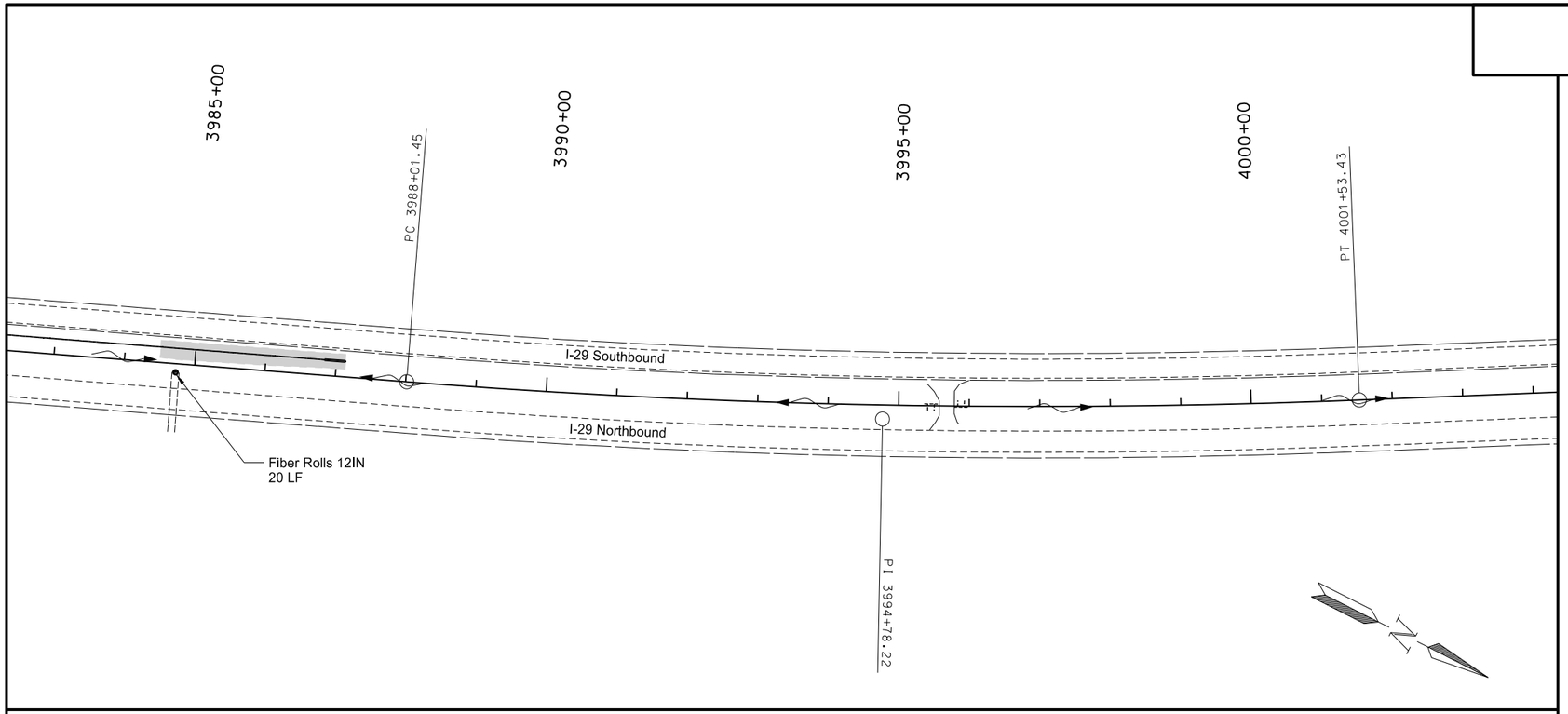
REGISTERED PROFESSIONAL ENGINEER
SCOTT MIDDAUGH
PE-7499
DATE 07/22/25
NORTH DAKOTA

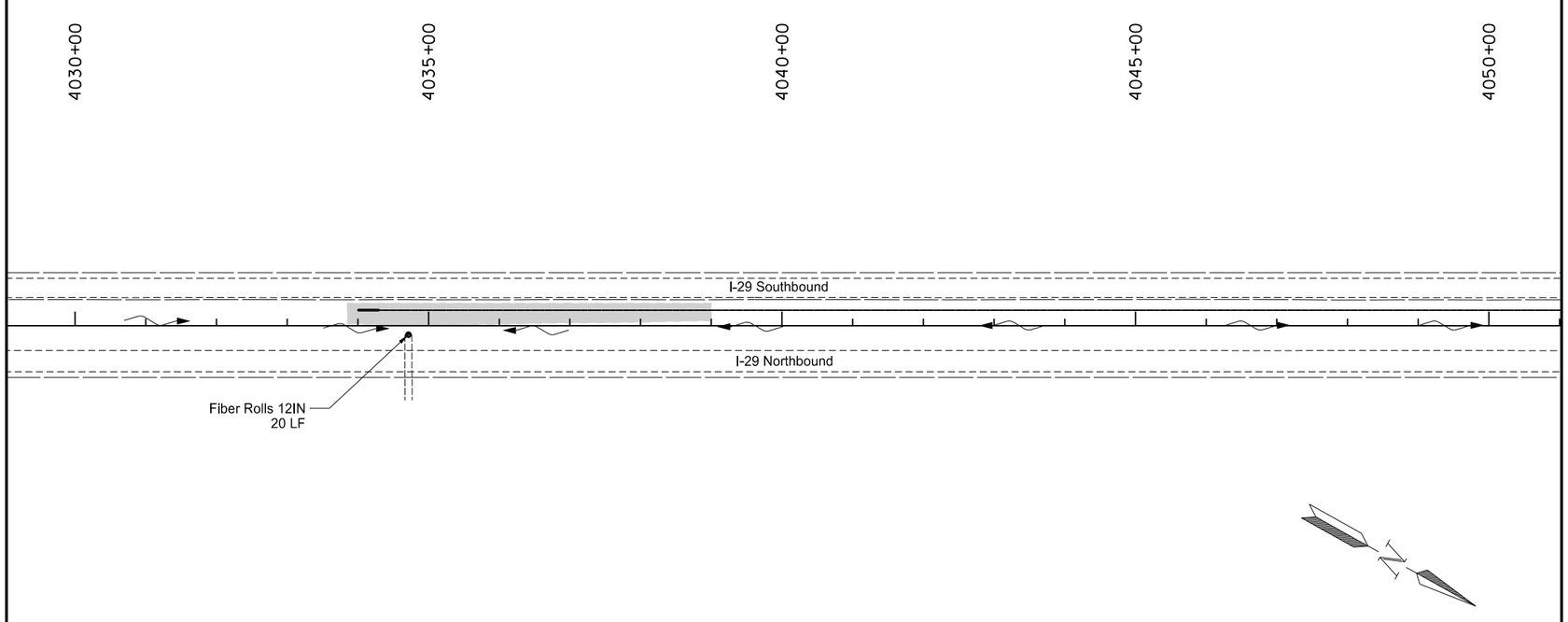
High Tension Cable Guardrail

Permanent Erosion Control

I-29 - Cass Co 20 to Argusville Interchange

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-X-8-029(200)069	77	5



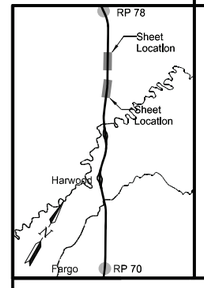


SPEC	CODE	BID ITEM	QTY	UNIT
251	0200	SEEDING CLASS II		
		Sta 3984+50 to Sta 3987+13	0.15	ACRE
		Sta 4033+85 to Sta 4039+00	0.34	ACRE
253	0101	STRAW MULCH		
		Sta 3984+50 to Sta 3987+13	0.15	ACRE
		Sta 4033+85 to Sta 4039+00	0.34	ACRE
261	0112	FIBER ROLLS 12IN		
		Sta 3984+74 NB CL Pipe	20	LF
		Sta 4034+72 NB CL Pipe	20	LF

LEGEND

Seeding Class II & Straw Mulch

Fiber Rolls



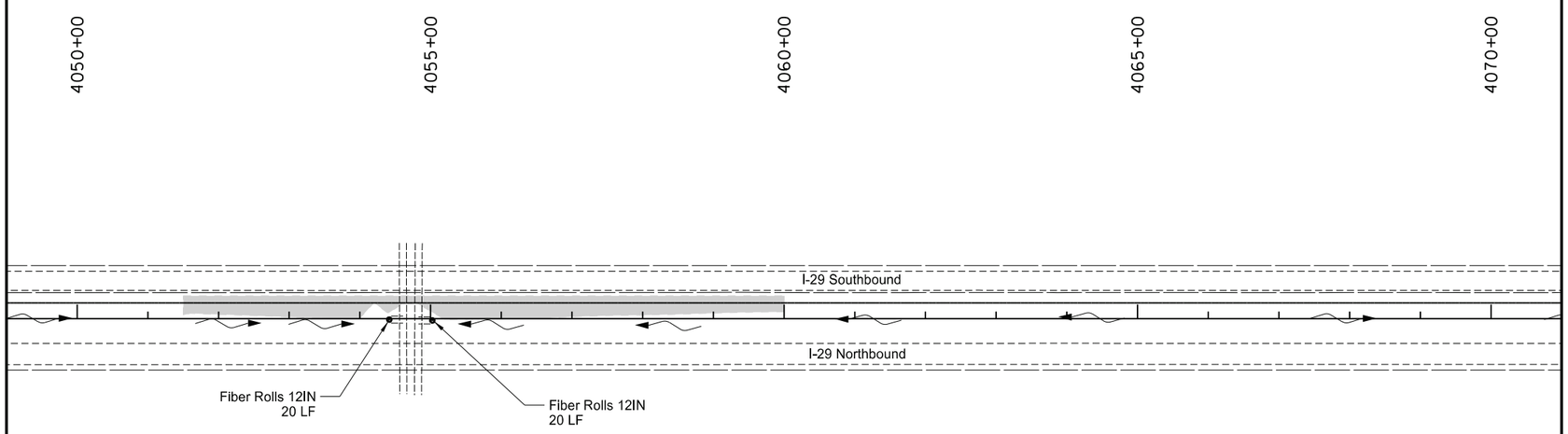


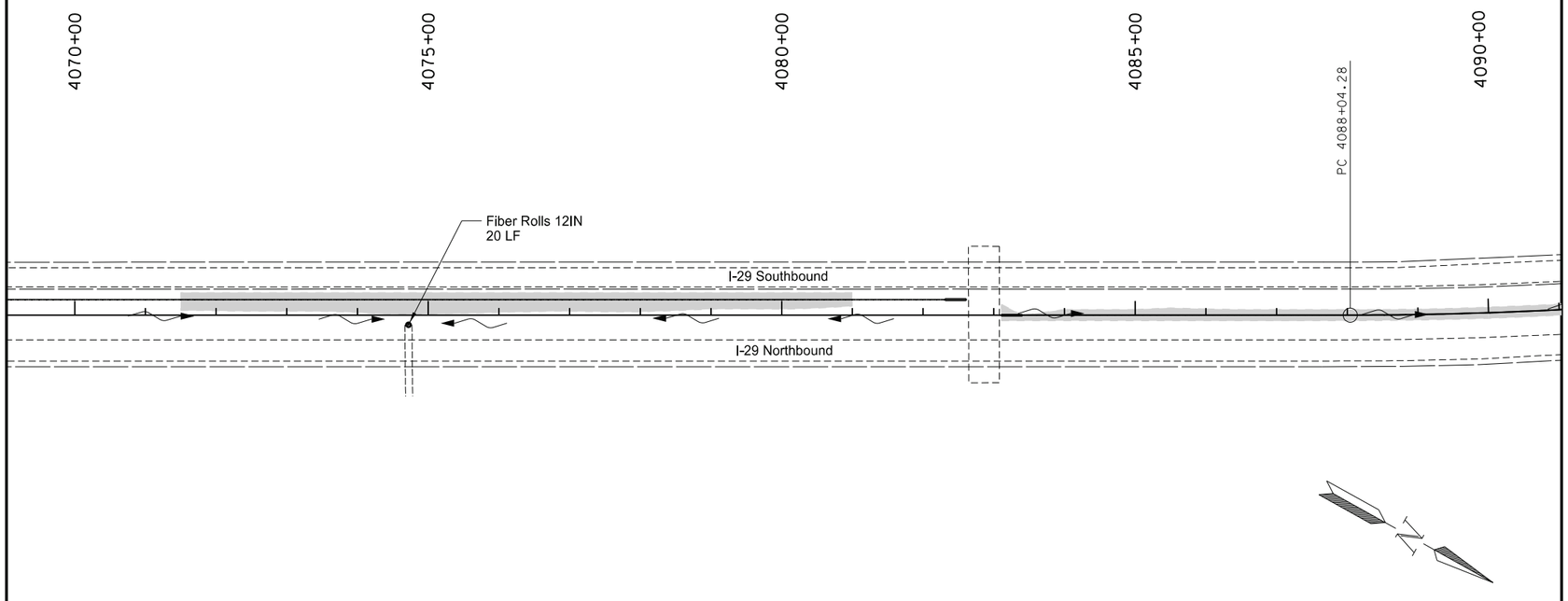
High Tension Cable Guardrail

Permanent Erosion Control

I-29 - Cass Co 20 to Argusville Interchange

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-X-8-029(200)069	77	6



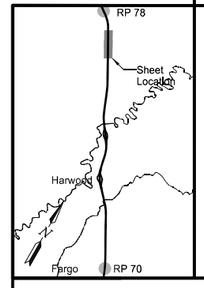


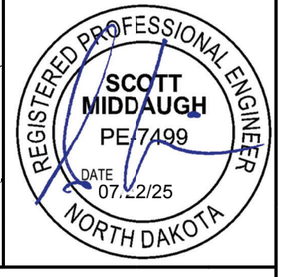
SPEC	CODE	BID ITEM	QTY	UNIT
251	0200	SEEDING CLASS II		
		Sta 4051+50 to Sta 4060+00	0.53	ACRE
		Sta 4071+50 to Sta 4081+00	0.58	ACRE
		Sta 4083+11 to Sta 4090+00	0.25	ACRE
253	0101	STRAW MULCH		
		Sta 4051+50 to Sta 4060+00	0.53	ACRE
		Sta 4071+50 to Sta 4081+00	0.58	ACRE
		Sta 4083+11 to Sta 4090+00	0.25	ACRE
261	0112	FIBER ROLLS 12IN		
		Sta 4054+42 CL Pipe	20	LF
		Sta 4055+02 CL Pipe	20	LF
		Sta 4074+72 NB CL Pipe	20	LF

LEGEND

Seeding Class II & Straw Mulch

Fiber Rolls



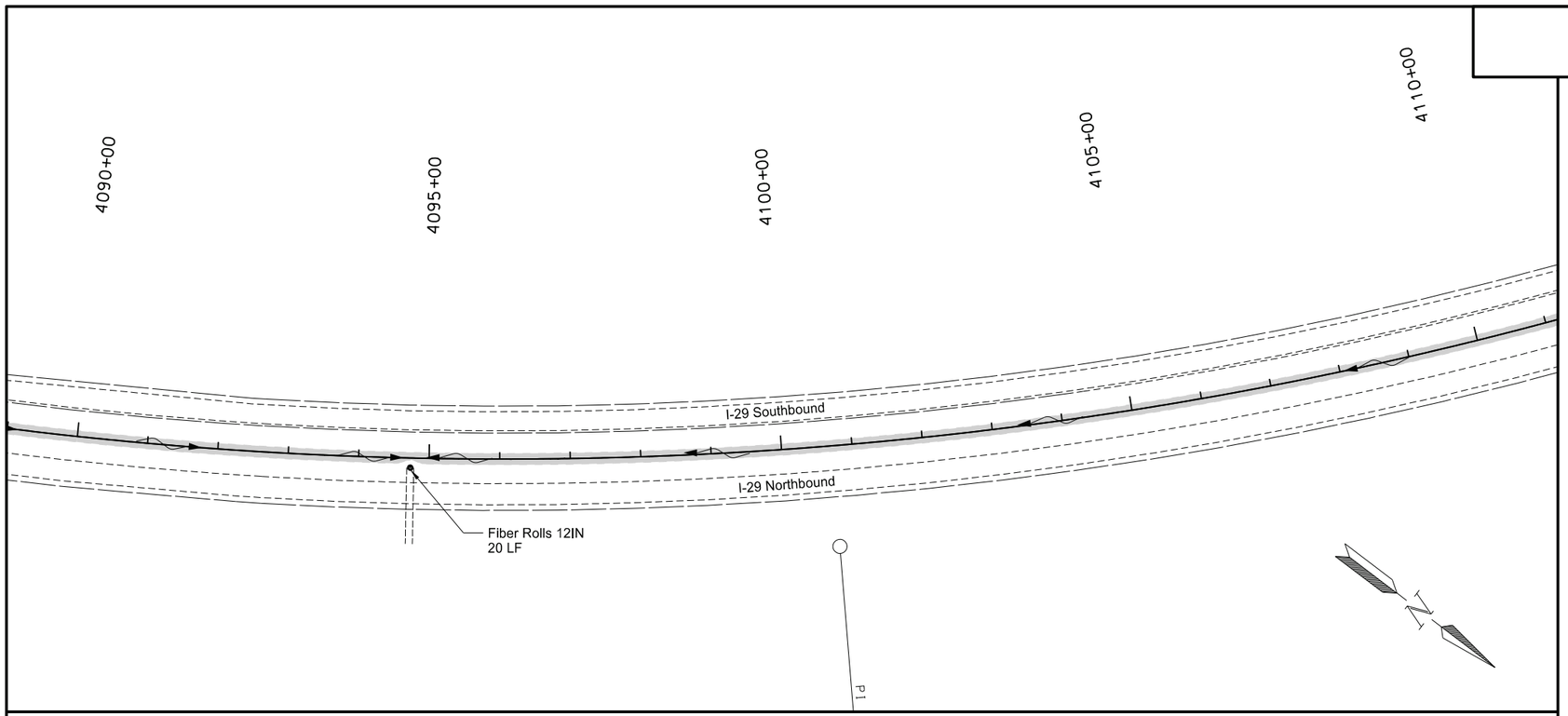


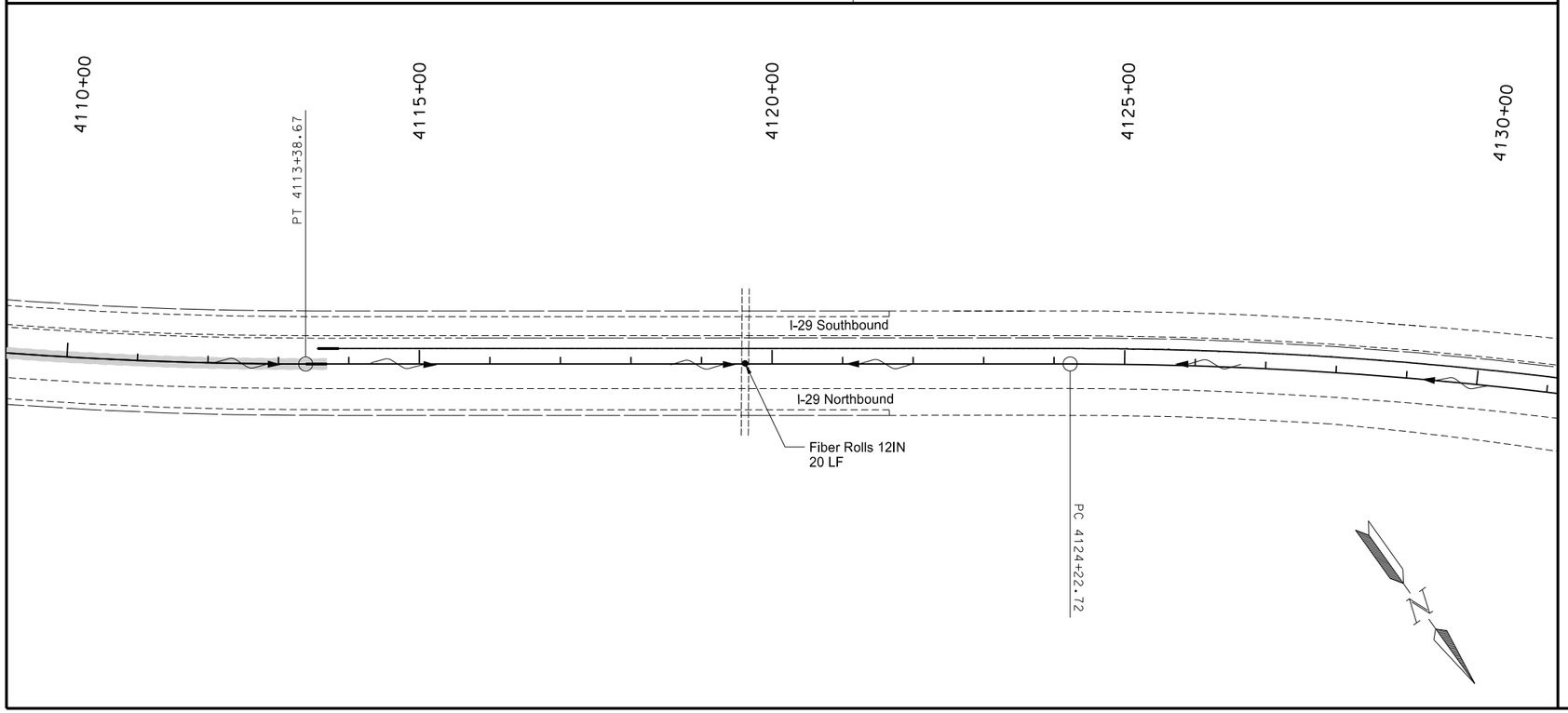
High Tension Cable Guardrail

Permanent Erosion Control

I-29 - Cass Co 20 to Argusville Interchange

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-X-8-029(200)069	77	7



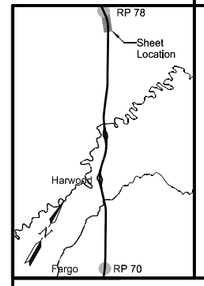


SPEC	CODE	BID ITEM	QTY	UNIT
251	0200	SEEDING CLASS II		
		Sta 4090+00 to Sta 4113+69	0.87	ACRE
253	0101	STRAW MULCH		
		Sta 5693+00 to Sta 5710+00	0.87	ACRE
261	0112	FIBER ROLLS 12IN		
		Sta 4094+74 NB CL Pipe	20	LF
		Sta 4119+62 CL Catch Basin	20	LF

LEGEND

Seeding Class II & Straw Mulch

Fiber Rolls





High Tension Cable Guardrail

Permanent Erosion Control

I-29 - Cass Co 20 to Argusville Interchange

PRELIMINARY SURVEY COORDINATE AND CURVE DATA - I-29 - MILE 69.4 TO CASS/TRAILL COUNTY LINE

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-X-8-029(200)069	81	1

HORIZONTAL ALIGNMENT

PNT	STATION	NORTHING	EASTING

CURVE DATA

ARC DEFINITION

REFERENCE MARKERS

I-29 (CHAIN OCL29_CASS)

R MKR #	NORTHING	EASTING	STATION	OFFSET
70	486,492.51	2,878,863.42	3696+36	74' Lt
70	486,552.95	2,878,999.84	3696+38	75' Rt
71	491,115.67	2,876,352.43	3749+07	83' Lt
71	491,197.58	2,876,495.82	3749+09	82' Rt
72	495,599.55	2,873,627.48	3801+87	84' Lt
72	495,711.39	2,873,749.51	3801+87	82' Rt
73	499,758.04	2,870,365.50	3854+72	102' Lt
73	499,812.04	2,870,554.50	3854+55	94' Rt
74	504,644.67	2,868,625.02	3907+41	117' Lt
74	504,761.85	2,868,785.69	3907+42	81' Rt
75	509,152.07	2,865,844.80	3960+38	92' Lt
75	509,205.36	2,866,010.26	3960+24	82' Rt
76	513,924.66	2,863,662.58	4013+03	83' Lt
76	514,004.09	2,863,806.48	4013+02	81' Rt
77	518,540.82	2,861,094.53	4065+85	83' Lt
77	518,623.12	2,861,237.55	4065+87	82' Rt
78	522,632.29	2,857,939.93	4118+62	84' Lt
78	522,768.22	2,858,034.19	4118+65	82' Rt
79	526,952.64	2,855,099.06	4171+40	84' Lt
79	526,973.56	2,855,263.01	4171+40	82' Rt
80	532,244.02	2,854,859.48	4224+30	83' Lt
80	532,243.10	2,855,023.86	4224+23	81' Rt
81	537,311.73	2,853,544.05	4277+01	84' Lt
81	537,359.00	2,853,701.90	4277+00	81' Rt
82	542,176.13	2,851,617.18	4329+78	83' Lt
82	542,255.73	2,851,760.71	4329+76	81' Rt
83	547,233.55	2,850,305.75	4382+59	84' Lt
83	547,241.71	2,850,470.57	4382+59	81' Rt
84	552,315.32	2,849,037.35	4435+35	83' Lt
84	552,363.72	2,849,194.45	4435+36	81' Rt

SURVEY CONTROL POINTS

PNT	NORTHING	EASTING	ELEV	STATION	OFFSET
MONUMENT DESCRIPTION					
Secondary Control (Station/Offset from Chain OCL29_CASS)					
RTK 1	503,968.89	2,869,673.45	888.51	3896+34	400' Rt
NGS Brass Disk in Concrete Stamped Harwood NW Base 1954					
RTK 2	524,646.62	2,856,389.78	896.14	4144+47	319' Rt
#5 Rebar w/ Red Plastic Cap					
RTK 3	561,282.50	2,846,092.43	900.39	4530+14	371' Rt
#5 Rebar w/ Red Plastic Cap					

NOTES: Sheet 1 of 2
Primary control from Trimble Now VRS. Static sessions performed with OPUS solutions used for a check on VRS control.

Date Survey Completed 10/02/2020

☐ Assumed Coordinates

☒ All coordinates on this sheet are Cass County ground coordinates.
They are derived from the NAD83(2011) reference frame; North Dakota South Zone
Combination Factor (cf) = 0.9998875

All coordinates and measurements on this document derived from the International Foot definition.

INITIALIZING BENCH MARK
Trimble Now (MIDSTATES) VRS

☒ NAVD-88
☐ _____

☐ GEOID12B ☐ _____
☒ GEOID18

REGISTERED PROFESSIONAL ENGINEER & LAND SURVEYOR
CARL P. OLSON
PE-4687
LS-4687
DATE 07/22/25
NORTH DAKOTA

PRELIMINARY SURVEY COORDINATE AND CURVE DATA - I-29 - MILE 69.4 TO CASS/TRAILL COUNTY LINE

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-X-8-029(200)069	81	2

HORIZONTAL ALIGNMENT

PNT	STATION	NORTHING	EASTING

CURVE DATA

ARC DEFINITION	

REFERENCE MARKERS

R MKR #	NORTHING	EASTING	STATION	OFFSET
85	557,363.81	2,847,502.33	4488+18	83' Lt
85	557,424.49	2,847,655.21	4488+19	81' Rt
86	562,206.75	2,845,405.98	4541+02	83' Lt
86	562,225.18	2,845,569.91	4540+97	81' Rt
87	567,357.57	2,844,516.38	4593+73	84' Lt
87	567,409.66	2,844,672.60	4593+78	81' Rt
88	572,309.43	2,842,687.19	4646+66	82' Lt
88	572,366.00	2,842,841.81	4646+59	82' Rt
89	577,305.05	2,841,024.70	4699+42	85' Lt
89	577,311.40	2,841,193.94	4699+41	85' Rt
90	582,429.11	2,839,983.68	4752+22	84' Lt
90	582,476.13	2,840,144.22	4752+21	83' Rt
91	587,398.78	2,838,297.77	4805+04	84' Lt
91	587,483.22	2,838,442.30	4805+00	84' Rt
92	591,941.16	2,835,612.23	4857+83	86' Lt
92	592,002.75	2,835,769.74	4857+80	83' Rt

SURVEY CONTROL POINTS

PNT	NORTHING	EASTING	ELEV	STATION	OFFSET	MONUMENT DESCRIPTION

NOTES: Sheet 2 of 2
Primary control from Trimble Now VRS. Static sessions performed with OPUS solutions used for a check on VRS control.

Date Survey Completed 10/02/2020

☐ Assumed Coordinates

☒ All coordinates on this sheet are Cass County ground coordinates.
They are derived from the NAD83(2011) reference frame; North Dakota South Zone Combination Factor (cf) = 0.9998875

All coordinates and measurements on this document derived from the International Foot definition.

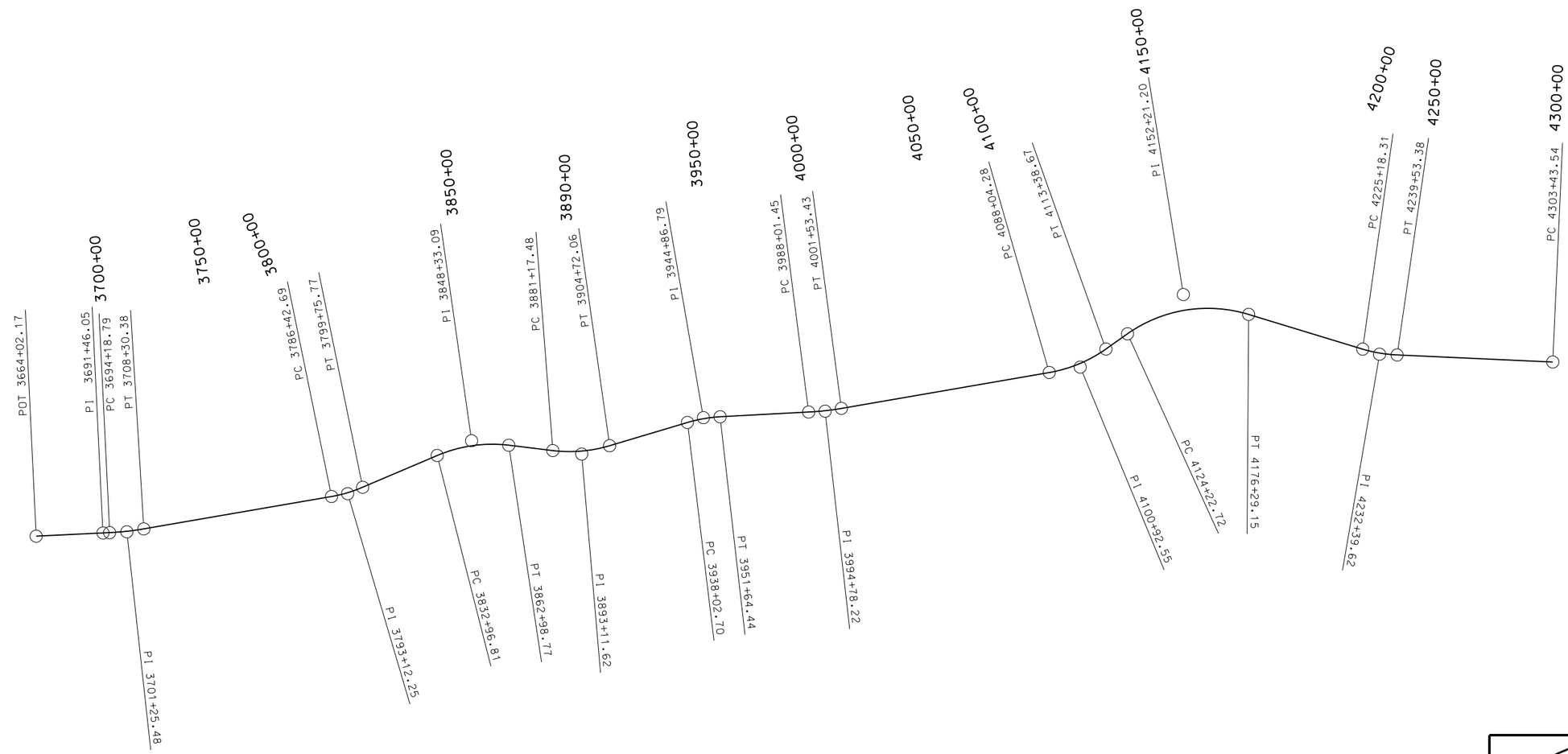
INITIALIZING BENCH MARK
Trimble Now (MIDSTATES) VRS

☒ NAVD-88
☐ _____

☐ GEOID12B ☐ _____
☒ GEOID18

REGISTERED PROFESSIONAL ENGINEER & LAND SURVEYOR
CARL P. OLSON
PE-4687
LS-4687
DATE 07/22/25
NORTH DAKOTA

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HEN-X-8-029(200)069	82	1



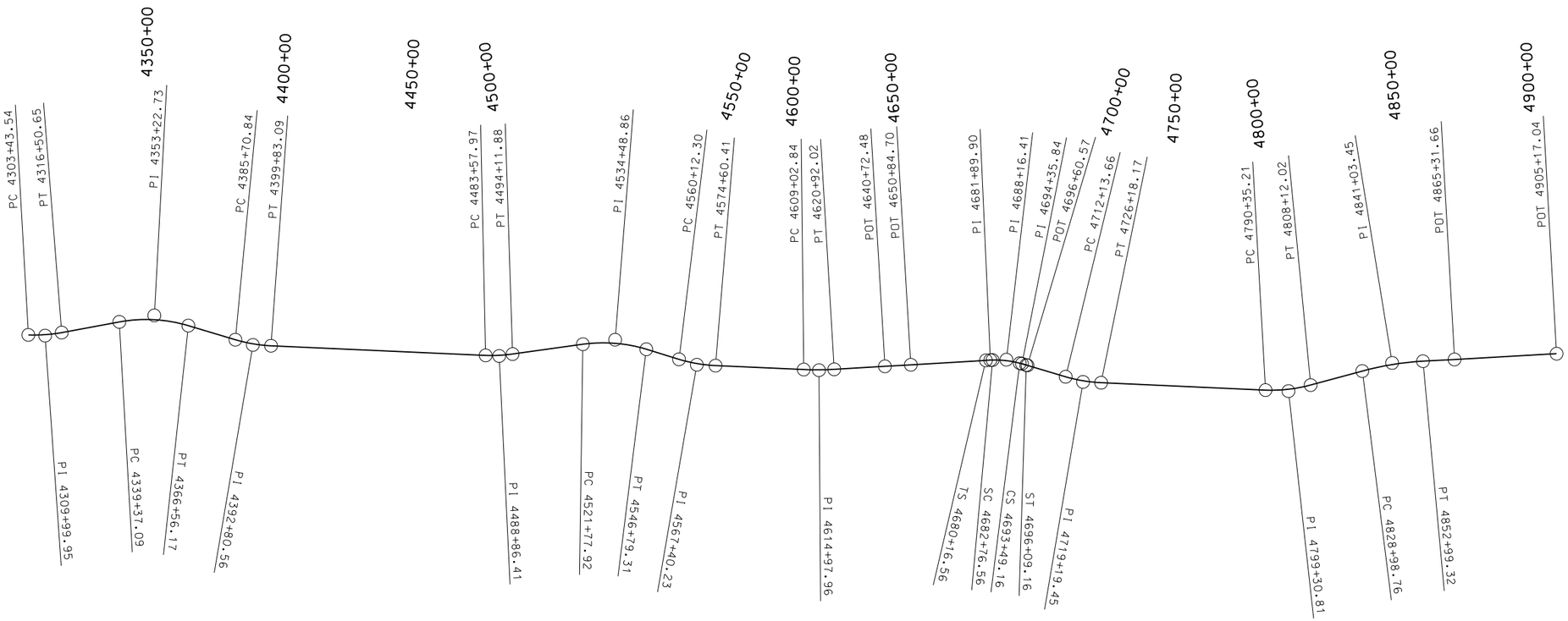
REGISTERED PROFESSIONAL ENGINEER
SCOTT MIDDAUGH
PE-7499
DATE 07/22/25
NORTH DAKOTA

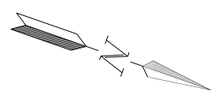
High Tension Cable Guardrail

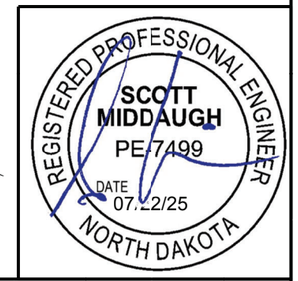
Survey Data Layouts
Chain OCL29_CASS

I-29 - Cass Co 20 to Argusville Interchange

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HEN-X-8-029(200)069	82	2







High Tension Cable Guardrail

Survey Data Layouts
Chain OCL29_CASS

I-29 - Cass Co 20 to Argusville Interchange

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HEN-X-8-029(200)069	82	3

Beginning chain OCL29 CASS description
Feature: Alignment 1 L
==========

Point 279 N 483,524.3640 E 2,880,146.8740 Sta 3664+02.17

Course from 279 to 280 N 22° 01' 42.26" W Dist 2,743.8783

Point 280 N 486,067.9337 E 2,879,117.7379 Sta 3691+46.05

Course from 280 to PC OCL29 CASS 5 N 22° 01' 41.90" W Dist 272.7355

Curve Data
———
Curve OCL29 CASS 5
P.I. Station 3701+25.48 N 486,975.8611 E 2,878,750.3896
Delta = 7° 03' 28.63" (LT)
Degree = 0° 29' 59.99"
Tangent = 706.6913
Length = 1,411.5948
Radius = 11,459.1900
External = 21.7702
Long Chord = 1,410.7025
Mid. Ord. = 21.7290
P.C. Station 3694+18.79 N 486,320.7592 E 2,879,015.4445
P.T. Station 3708+30.38 N 487,593.4307 E 2,878,406.8487
C.C. N 482,022.8228 E 2,868,392.7904
Back = N 22° 01' 41.90" W
Ahead = N 29° 05' 10.53" W
Chord Bear = N 25° 33' 26.21" W

Course from PT OCL29 CASS 5 to PC OCL29 CASS 8 N 29° 05' 10.53" W Dist 7,812.3110

Curve Data
———
Curve OCL29 CASS 8
P.I. Station 3793+12.25 N 495,005.6438 E 2,874,283.5920
Delta = 13° 19' 50.68" (LT)
Degree = 1° 00' 00.00"
Tangent = 669.5607
Length = 1,333.0751
Radius = 5,729.5800
External = 38.9899
Long Chord = 1,330.0703
Mid. Ord. = 38.7264
P.C. Station 3786+42.69 N 494,420.5221 E 2,874,609.0828
P.T. Station 3799+75.77 N 495,499.9504 E 2,873,831.9589
C.C. N 491,635.2255 E 2,869,602.0667
Back = N 29° 05' 10.53" W
Ahead = N 42° 25' 01.21" W
Chord Bear = N 35° 45' 05.87" W

Course from PT OCL29 CASS 8 to PC OCL29 CASS 11 N 42° 25' 01.21" W Dist 3,321.0385

Curve Data
———
Curve OCL29 CASS 11
P.I. Station 3848+33.09 N 499,085.8969 E 2,870,555.5877
Delta = 30° 01' 10.64" (RT)
Degree = 1° 00' 00.00"
Tangent = 1,536.2880
Length = 3,001.9634
Radius = 5,729.5800
External = 202.3900
Long Chord = 2,967.7443
Mid. Ord. = 195.4847
P.C. Station 3832+96.81 N 497,951.7244 E 2,871,591.8470
P.T. Station 3862+98.77 N 500,586.3619 E 2,870,225.7610
C.C. N 501,816.4493 E 2,875,821.7392
Back = N 42° 25' 01.21" W
Ahead = N 12° 23' 50.57" W
Chord Bear = N 27° 24' 25.89" W

Course from PT OCL29 CASS 11 to PC OCL29 CASS 14 N 12° 23' 50.57" W Dist 1,818.7086

Curve Data
———
Curve OCL29 CASS 14
P.I. Station 3893+11.62 N 503,528.9608 E 2,869,578.9297
Delta = 23° 32' 44.89" (LT)
Degree = 1° 00' 00.00"
Tangent = 1,194.1437
Length = 2,354.5810
Radius = 5,729.5800
External = 123.1173
Long Chord = 2,338.0474
Mid. Ord. = 120.5274
P.C. Station 3881+17.48 N 502,362.6620 E 2,869,835.3012
P.T. Station 3904+72.06 N 504,495.7389 E 2,868,877.9880
C.C. N 501,132.5746 E 2,864,239.3230
Back = N 12° 23' 50.57" W
Ahead = N 35° 56' 35.46" W
Chord Bear = N 24° 10' 13.01" W

Course from PT OCL29 CASS 14 to PC OCL29 CASS 17 N 35° 56' 35.46" W Dist 3,330.6372

Curve Data
———
Curve OCL29 CASS 17
P.I. Station 3944+86.79 N 507,746.0658 E 2,866,521.4084
Delta = 13° 37' 02.91" (RT)
Degree = 1° 00' 00.00"
Tangent = 684.0973
Length = 1,361.7481
Radius = 5,729.5800
External = 40.6952
Long Chord = 1,358.5453
Mid. Ord. = 40.4082
P.C. Station 3938+02.70 N 507,192.2210 E 2,866,922.9616
P.T. Station 3951+64.44 N 508,378.8828 E 2,866,261.5395
C.C. N 510,555.3853 E 2,871,561.6266
Back = N 35° 56' 35.46" W
Ahead = N 22° 19' 32.54" W
Chord Bear = N 29° 08' 04.00" W

Course from PT OCL29 CASS 17 to PC OCL29 CASS 20 N 22° 19' 32.54" W Dist 3,637.0045

Curve Data
———
Curve OCL29 CASS 20
P.I. Station 3994+78.22 N 512,369.2981 E 2,864,622.8590
Delta = 6° 45' 35.53" (LT)
Degree = 0° 29' 59.99"
Tangent = 676.7743
Length = 1,351.9781
Radius = 11,459.1900
External = 19.9676
Long Chord = 1,351.1941
Mid. Ord. = 19.9329
P.C. Statlon 3988+01.45 N 511,743.2552 E 2,864,879.9461
P.T. Station 4001+53.43 N 512,960.7275 E 2,864,293.8686
C.C. N 507,390.2387 E 2,854,279.7441
Back = N 22° 19' 32.54" W
Ahead = N 29° 05' 08.08" W
Chord Bear = N 25° 42' 20.31" W

Course from PT OCL29 CASS 20 to PC OCL29 CASS 23 N 29° 05' 08.08" W Dist 8,650.8540

Curve Data
———
Curve OCL29 CASS 23
P.I. Station 4100+92.55 N 521,646.4750 E 2,859,462.3071
Delta = 25° 20' 38.11" (LT)
Degree = 1° 00' 00.00"
Tangent = 1,288.2705
Length = 2,534.3928
Radius = 5,729.5800
External = 143.0453
Long Chord = 2,513.7816
Mid. Ord. = 139.5610
P.C. Station 4088+04.28 N 520,520.6623 E 2,860,088.5552
P.T. Station 4113+38.67 N 522,395.8675 E 2,858,414.4275
C.C. N 517,735.4252 E 2,855,081.5061
Back = N 29° 05' 08.08" W
Ahead = N 54° 25' 46.18" W
Chord Bear = N 41° 45' 27.13" W

Course from PT OCL29 CASS 23 to PC OCL29 CASS 26 N 54° 25' 46.18" W Dist 1,084.0493

Curve Data
———
Curve OCL29 CASS 26
P.I. Station 4152+21.20 N 524,654.3511 E 2,855,256.3774
Delta = 52° 03' 51.22" (RT)
Degree = 1° 00' 00.00"
Tangent = 2,798.4793
Length = 5,206.4246
Radius = 5,729.5800
External = 646.9060
Long Chord = 5,029.1371
Mid. Ord. = 581.2762
P.C. Station 4124+22.72 N 523,026.4636 E 2,857,532.6614
P.T. Station 4176+29.15 N 527,450.4462 E 2,855,140.8842
C.C. N 527,686.9059 E 2,860,865.5828
Back = N 54° 25' 46.18" W
Ahead = N 2° 21' 54.96" W
Chord Bear = N 28° 23' 50.57" W

Course from PT OCL29 CASS 26 to PC OCL29 CASS 29 N 2° 21' 54.96" W Dist 4,889.1662

Curve Data
———
Curve OCL29 CASS 29
P.I. Station 4232+39.62 N 533,056.1383 E 2,854,909.3401
Delta = 14° 21' 02.22" (LT)
Degree = 1° 00' 00.00"
Tangent = 721.3058
Length = 1,435.0622
Radius = 5,729.5800
External = 45.2247
Long Chord = 1,431.3140
Mid. Ord. = 44.8705
P.C. Station 4225+18.31 N 532,335.4469 E 2,854,939.1084
P.T. Station 4239+53.38 N 533,746.9637 E 2,854,701.8737
C.C. N 532,098.9872 E 2,849,214.4098
Back = N 2° 21' 54.96" W
Ahead = N 16° 42' 57.18" W
Chord Bear = N 9° 32' 26.07" W

Course from PT OCL29 CASS 29 to PC OCL29 CASS 32 N 16° 42' 57.18" W Dist 6,390.1618

Curve Data
———
Curve OCL29 CASS 32
P.I. Station 4309+99.95 N 540,495.7644 E 2,852,675.0969
Delta = 13° 04' 16.14" (LT)
Degree = 1° 00' 00.00"
Tangent = 656.4071
Length = 1,307.1155
Radius = 5,729.5800
External = 37.4779
Long Chord = 1,304.2828
Mid. Ord. = 37.2344
P.C. Station 4303+43.54 N 539,867.0952 E 2,852,863.8967
P.T. Station 4316+50.65 N 541,065.4456 E 2,852,349.0086
C.C. N 538,219.1187 E 2,847,376.4328
Back = N 16° 42' 57.18" W
Ahead = N 29° 47' 13.33" W
Chord Bear = N 23° 15' 05.25" W

Course from PT OCL29 CASS 32 to PC OCL29 CASS 35 N 29° 47' 13.33" W Dist 2,286.4358

Curve Data
———
Curve OCL29 CASS 35
P.I. Station 4353+22.73 N 544,252.3603 E 2,850,524.8028
Delta = 27° 11' 26.69" (RT)
Degree = 1° 00' 00.00"
Tangent = 1,385.6415
Length = 2,719.0756
Radius = 5,729.5800
External = 165.1710
Long Chord = 2,693.6316
Mid. Ord. = 160.5429
P.C. Station 4339+37.09 N 543,049.7927 E 2,851,213.1585
P.T. Station 4366+56.17 N 545,636.5795 E 2,850,462.0357
C.C. N 545,896.1196 E 2,856,185.7343
Back = N 29° 47' 13.33" W
Ahead = N 2° 35' 46.64" W
Chord Bear = N 16° 11' 29.98" W

Course from PT OCL29 CASS 35 to PC OCL29 CASS 38 N 2° 35' 46.64" W Dist 1,914.6716

Curve Data
———
Curve OCL29 CASS 38
P.I. Station 4392+80.56 N 548,258.2823 E 2,850,343.1550
Delta = 14° 07' 21.21" (LT)
Degree = 1° 00' 00.00"
Tangent = 709.7251
Length = 1,412.2563
Radius = 5,729.5800
External = 43.7896
Long Chord = 1,408.6840
Mid. Ord. = 43.4575
P.C. Station 4385+70.84 N 547,549.2857 E 2,850,375.3043
P.T. Station 4399+83.09 N 548,938.0058 E 2,850,138.9844
C.C. N 547,289.7456 E 2,844,651.6057
Back = N 2° 35' 46.64" W
Ahead = N 16° 43' 07.85" W
Chord Bear = N 9° 39' 27.24" W



High Tension Cable Guardrail

Survey Data Layouts
Chain OCL29_CASS

I-29 - Cass Co 20 to Argusville Interchange

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-X-8-029(200)069	82	4

Course from PT OCL29 CASS 38 to PC OCL29 CASS 41 N 16° 43' 07.85" W Dist 8,374.8720

Curve Data

Curve OCL29 CASS 41
P.I. Station 4488+86.41 N 557,464.9623 E 2,847,577.7172
Delta = 10° 32' 20.78" (LT)
Degree = 1° 00' 00.00"
Tangent = 528.4464
Length = 1,053.9111
Radius = 5,729.5800
External = 24.3180
Long Chord = 1,052.4259
Mid. Ord. = 24.2153
P.C. Station 4483+57.97 N 556,958.8545 E 2,847,729.7383
P.T. Station 4494+11.88 N 557,934.7266 E 2,847,335.6902
C.C. N 555,310.5943 E 2,842,242.3596
Back = N 16° 43' 07.85" W
Ahead = N 27° 15' 28.63" W
Chord Bear = N 21° 59' 18.24" W

Course from PT OCL29 CASS 41 to PC OCL29 CASS 44 N 27° 15' 28.63" W Dist 2,766.0411

Curve Data

Curve OCL29 CASS 44
P.I. Station 4534+48.86 N 561,523.4198 E 2,845,486.7614
Delta = 25° 00' 49.94" (RT)
Degree = 1° 00' 00.00"
Tangent = 1,270.9450
Length = 2,501.3881
Radius = 5,729.5800
External = 139.2690
Long Chord = 2,481.5705
Mid. Ord. = 135.9641
P.C. Station 4521+77.92 N 560,393.6087 E 2,846,068.8508
P.T. Station 4546+79.31 N 562,793.3901 E 2,845,436.9955
C.C. N 563,017.7410 E 2,851,162.1814
Back = N 27° 15' 28.63" W
Ahead = N 2° 14' 38.69" W
Chord Bear = N 14° 45' 03.66" W

Course from PT OCL29 CASS 44 to PC OCL29 CASS 47 N 2° 14' 38.69" W Dist 1,332.9943

Curve Data

Curve OCL29 CASS 47
P.I. Station 4567+40.23 N 564,852.7363 E 2,845,356.2966
Delta = 14° 28' 51.82" (LT)
Degree = 1° 00' 00.00"
Tangent = 727.9324
Length = 1,448.1066
Radius = 5,729.5800
External = 46.0561
Long Chord = 1,444.2554
Mid. Ord. = 45.6889
P.C. Station 4560+12.30 N 564,125.3621 E 2,845,384.8000
P.T. Station 4574+60.41 N 565,549.8744 E 2,845,146.8116
C.C. N 563,901.0113 E 2,839,659.6141
Back = N 2° 14' 38.69" W
Ahead = N 16° 43' 30.51" W
Chord Bear = N 9° 29' 04.60" W

Course from PT OCL29 CASS 47 to PC OCL29 CASS 50 N 16° 43' 30.51" W Dist 3,442.4301

Curve Data

Curve OCL29 CASS 50
P.I. Station 4614+97.96 N 569,416.6282 E 2,843,984.8801
Delta = 5° 56' 45.29" (LT)
Degree = 0° 29' 59.99"
Tangent = 595.1273
Length = 1,189.1862
Radius = 11,459.1900
External = 15.4434
Long Chord = 1,188.6527
Mid. Ord. = 15.4226
P.C. Station 4609+02.84 N 568,846.6770 E 2,844,156.1463
P.T. Station 4620+92.02 N 569,965.7718 E 2,843,755.4943
C.C. N 565,548.9421 E 2,833,181.7224
Back = N 16° 43' 30.51" W
Ahead = N 22° 40' 15.80" W
Chord Bear = N 19° 41' 53.16" W

Course from PT OCL29 CASS 50 to 281 N 22° 40' 15.80" W Dist 1,980.4615

Point 281 N 571,793.2088 E 2,842,992.1453 Sta 4640+72.48

Course from 281 to 282 N 22° 40' 15.80" W Dist 1,012.2175

Point 282 N 572,727.2152 E 2,842,601.9962 Sta 4650+84.70

Course from 282 to TS OCL29 CASS 57 N 22° 40' 15.80" W Dist 2,931.8556

Spiral OCL29 CASS 57 Type 1 Spiral Element

Angle 1° 57' 00.00" (RT) P 0.7374 BK N 22° 40' 15.80" W
LS 260.0000 K 129.9950 AH N 20° 43' 15.80" W
R 3,819.7186 LT 173.3439 CB N 22° 01' 15.83" W
YS 2.9494 ST 86.6762 Defl 0° 38' 59.98"
XS 259.9699 LC 259.9866 Deg 1° 30' 00.00"

Spiral Coordinates

Point	North	East	Station
TS	575,432.5349	2,841,471.9419	4680+16.56
PI	575,592.4850	2,841,405.1282	4681+89.90
SC	575,673.5545	2,841,374.4606	4682+76.56
CC	577,025.0420	2,844,947.0971	

Curve Data

Curve OCL29 CASS 58
P.I. Station 4688+16.41 N 576,178.4871 E 2,841,183.4503
Delta = 16° 05' 20.56" (RT)
Degree = 1° 30' 00.00"
Tangent = 539.8535
Length = 1,072.6029
Radius = 3,819.7186
External = 37.9610
Long Chord = 1,069.0824
Mid. Ord. = 37.5875
P.C. Station 4682+76.56 N 575,673.5545 E 2,841,374.4606
P.T. Station 4693+49.16 N 576,716.5775 E 2,841,139.8540
C.C. N 577,025.0420 E 2,844,947.0971
Back = N 20° 43' 15.80" W
Ahead = N 4° 37' 55.24" W
Chord Bear = N 12° 40' 35.52" W

Spiral OCL29 CASS 59 Type 2 Spiral Element

Angle 1° 57' 00.00" (RT) P 0.7374 BK N 4° 37' 55.24" W
LS 260.0000 K 129.9950 AH N 2° 40' 55.24" W
R 3,819.7186 LT 173.3439 CB N 3° 19' 55.22" W
YS 2.9494 ST 86.6762 Defl 0° 38' 59.98"
XS 259.9699 LC 259.9866 Deg 1° 30' 00.00"

Spiral Coordinates

Point	North	East	Station
CS	576,716.5775	2,841,139.8540	4693+49.16
PI	576,802.9706	2,841,132.8544	4694+35.84
ST	576,976.1246	2,841,124.7431	4696+09.16
CC	577,025.0420	2,844,947.0971	

Course from ST OCL29 CASS 59 to 283 N 2° 40' 55.24" W Dist 51.4069

Point 283 N 577,027.4751 E 2,841,122.3377 Sta 4696+60.57

Course from 283 to PC OCL29 CASS 64 N 2° 40' 55.24" W Dist 1,553.0950

Curve Data

Curve OCL29 CASS 64
P.I. Station 4719+19.45 N 579,283.8865 E 2,841,016.6380
Delta = 14° 02' 41.58" (LT)
Degree = 0° 59' 59.95"
Tangent = 705.7907
Length = 1,404.5059
Radius = 5,729.6500
External = 43.3067
Long Chord = 1,400.9921
Mid. Ord. = 42.9819
P.C. Station 4712+13.66 N 578,578.8689 E 2,841,049.6639
P.T. Station 4726+18.17 N 579,959.8134 E 2,840,813.5043
C.C. N 578,310.7623 E 2,835,326.2901
Back = N 2° 40' 55.24" W
Ahead = N 16° 43' 36.82" W
Chord Bear = N 9° 42' 16.03" W

Course from PT OCL29 CASS 64 to PC OCL29 CASS 67 N 16° 43' 36.82" W Dist 6,417.0446

Curve Data

Curve OCL29 CASS 67
P.I. Station 4799+30.81 N 586,963.0358 E 2,838,708.8532
Delta = 17° 46' 04.36" (LT)
Degree = 0° 59' 59.95"
Tangent = 895.5939
Length = 1,776.8102
Radius = 5,729.6500
External = 69.5721
Long Chord = 1,769.6992
Mid. Ord. = 68.7375
P.C. Station 4790+35.21 N 586,105.3368 E 2,838,966.6141
P.T. Station 4808+12.02 N 587,701.1644 E 2,838,201.6505
C.C. N 584,456.2857 E 2,833,479.3999
Back = N 16° 43' 36.82" W
Ahead = N 34° 29' 41.18" W
Chord Bear = N 25° 36' 39.00" W

Course from PT OCL29 CASS 67 to PC OCL29 CASS 70 N 34° 29' 41.18" W Dist 2,086.7335

Curve Data

Curve OCL29 CASS 70
P.I. Station 4841+03.45 N 590,413.8850 E 2,836,337.6136
Delta = 12° 00' 10.09" (RT)
Degree = 0° 29' 59,99"
Tangent = 1,204.6927
Length = 2,400.5676
Radius = 11,459.1900
External = 63.1500
Long Chord = 2,396.1805
Mid. Ord. = 62.8039
P.C. Station 4828+98.76 N 589,421.0040 E 2,837,019.8686
P.T. Station 4852+99.32 N 591,526.9406 E 2,835,876.7536
C.C. N 595,910.6992 E 2,846,464.2791
Back = N 34° 29' 41.18" W
Ahead = N 22° 29' 31.10" W
Chord Bear = N 28° 29' 36.14" W

Course from PT OCL29 CASS 70 to 284 N 22° 29' 31.10" W Dist 1,232.3401

Point 284 N 592,665.5405 E 2,835,405.3170 Sta 4865+31.66

Course from 284 to 285 N 22° 29' 31.10" W Dist 3,985.3757

Point 285 N 596,347.7612 E 2,833,880.6957 Sta 4905+17.04

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Ending chain OCL29 CASS description

REGISTERED PROFESSIONAL ENGINEER
SCOTT MIDDAUGH
PE-7499
DATE 07/22/25
NORTH DAKOTA

High Tension Cable Guardrail

Survey Data Layouts
Chain OCL29_CASS

I-29 - Cass Co 20 to Argusville Interchange

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-X-029(200)069	100	1

SIGN NUMBER	SIGN SIZE	DESCRIPTION	AMOUNT REQUIRED	UNITS PER AMOUNT	UNITS SUB TOTAL
E5-1-48	48"x48"	EXIT GORE		35	
G20-1-60	60"x24"	ROAD WORK NEXT __ MILES		28	
G20-1b-60	60"x24"	NO WORK IN PROGRESS (Sign and installation only)		18	
G20-2-48	**48"x24"**	**END ROAD WORK**	**8**	**26**	**208**
G20-4-36	36"x18"	PILOT CAR FOLLOW ME (Mounted to back of pilot car)		18	
G20-4b-36	36"x30"	WAIT FOR PILOT CAR		18	
G20-50a-72	72"x36"	ROAD WORK NEXT __ MILES RT & LT ARROWS		43	
G20-52a-72	72"x24"	ROAD WORK NEXT __ MILES RT or LT ARROW		36	
G20-55-96	96"x48"	SPEED LIMIT ENFORCED - MINIMUM FEE $80 WHEN WORKERS PRESENT		59	
G20-55-96	**96"x48"**	**SPEED LIMIT ENFORCED - MINIMUM FEE $150 WHEN WORKERS PRESENT**	**4**	**59**	**236**
M1-1-36	36"x36"	INTERSTATE ROUTE MARKER (Post and installation only)		11	
M1-4-24	24"x24"	U.S. ROUTE MARKER (Post and installation only)		10	
M1-5-24	24"x24"	STATE ROUTE MARKER (Post and installation only)		10	
M3-1-24	24"x12"	NORTH (Mounted on route marker post)		7	
M3-2-24	24"x12"	EAST (Mounted on route marker post)		7	
M3-3-24	24"x12"	SOUTH (Mounted on route marker post)		7	
M3-4-24	24"x12"	WEST (Mounted on route marker post)		7	
M4-8-24	24"x12"	DETOUR (Mounted on route marker post)		7	
M4-9-30	30"x24"	DETOUR ARROW RIGHT or LEFT/AHD AND RT or LT		15	
M4-10-48	48"x18"	DETOUR (INSIDE ARROW) RIGHT or LEFT (Mounted on barricade)		7	
M5-1-21	21"x15"	ADVANCE TURN ARROW RT or LT(Mounted on route marker post)		7	
M5-1-30	30"x21"	ADVANCE TURN ARROW RT or LT(Mounted on route marker post)		9	
M6-1-21	21"x15"	DIRECTIONAL ARROW RT or LT (Mounted on route marker post)		7	
M6-1-30	30"x21"	DIRECTIONAL ARROW RT or LT (Mounted on route marker post)		9	
M6-3-21	21"x15"	DIRECTIONAL ARROW UP (Mounted on route marker post)		7	
R1-1-48	48"x48"	STOP		32	
R1-2-60	60"x60"	YIELD		29	
R2-1-36	**36"x48"**	**SPEED LIMIT __ (Portable only)**	**12**	**30**	**360**
R2-1-48	**48"x60"**	**SPEED LIMIT __**	**8**	**39**	**312**
R2-1aP-24	24"x18"	MINIMUM FEE $80 (Mounted on Speed Limit post)		10	
R2-1aP-24	**24"x18"**	**MINIMUM FEE $150 (Mounted on Speed Limit post)**	**12**	**10**	**120**
R3-2-48	48"x48"	NO LEFT TURN		35	
R4-1-48	48"x60"	DO NOT PASS		39	
R4-7-48	48"x60"	KEEP RIGHT		39	
R5-1-48	48"x48"	DO NOT ENTER		35	
R6-1-54	54"x18"	ONE WAY RIGHT or LEFT (Mounted on STOP or DO NOT ENTER post)		14	
R7-1-12	12"x18"	NO PARKING ANY TIME		11	
R10-6-24	24"x36"	STOP HERE ON RED		16	
R11-2-48	48"x30"	ROAD CLOSED (Mounted on barricade)		12	
R11-2a-48	48"x30"	STREET CLOSED (Mounted on barricade)		12	
R11-3a-60	60"x30"	ROAD CLOSED __ MILES AHEAD LOCAL TRAFFIC ONLY (Mtd on barricade)		15	
R11-3c-60	60"x30"	STREET CLOSED __ MILES AHEAD LOCAL TRAFFIC ONLY (Mtd on barricade)		15	
R11-4a-60	60"x30"	STREET CLOSED TO THRU TRAFFIC (Mounted on barricade)		15	
W1-3-48	48"x48"	REVERSE TURN RIGHT or LEFT		35	
W1-4-48	48"x48"	REVERSE CURVE RIGHT or LEFT		35	
W1-4b-48	48"x48"	TWO LANE REVERSE CURVE RIGHT or LEFT		35	
W1-6-48	48"x24"	ONE DIRECTION LARGE ARROW		26	
W3-1-48	48"x48"	STOP AHEAD		35	
W3-3-48	48"x48"	SIGNAL AHEAD		35	
W3-4-48	48"x48"	BE PREPARED TO STOP		35	
W3-5-48	**48"x48"**	**SPEED REDUCTION AHEAD**	**8**	**35**	**280**
W4-2-48	**48"x48"**	**LANE ENDS RIGHT or LEFT**	**4**	**35**	**140**
W5-1-48	48"x48"	ROAD NARROWS		35	
W5-8-48	48"x48"	THRU TRAFFIC RIGHT LANE		35	
W5-9-48	48"x48"	ROAD WORK TRAFFIC ONLY DOWN & LT or RT ARROW		35	
W6-3-48	48"x48"	TWO WAY TRAFFIC		35	
W8-1-48	48"x48"	BUMP		35	
W8-3-48	48"x48"	PAVEMENT ENDS		35	
W8-7-48	48"x48"	LOOSE GRAVEL		35	
W8-11-48	48"x48"	UNEVEN LANES		35	
W8-12-48	48"x48"	NO CENTER LINE		35	
W8-17-48	48"x48"	SHOULDER DROP-OFF SYMBOL		35	
W8-53-48	48"x48"	TRUCKS ENTERING HIGHWAY		35	
W8-54-48	48"x48"	TRUCKS ENTERING AHEAD or __ FT or _ MILE		35	
W8-55-48	48"x48"	TRUCKS CROSSING AHEAD or __ FT or _ MILE		35	
W8-56-48	48"x48"	TRUCKS EXITING HIGHWAY		35	
W9-3a-48	48"x48"	CENTER LANE CLOSED SYMBOL		35	
W13-1P-30	30"x30"	__ MPH ADVISORY SPEED PLAQUE (Mounted on warning sign post)		14	
W14-3-64	64"x48"	NO PASSING ZONE		28	
W16-2P-30	30"x24"	__ FEET PLAQUE (Mounted on warning sign post)		10	
W20-1-48	**48"x48"**	**ROAD WORK AHEAD or _FT or _ MILE**	**8**	**35**	**280**
W20-2-48	48"x48"	DETOUR AHEAD or __FT or _MILE		35	
W20-3-48	48"x48"	ROAD or STREET CLOSED AHEAD or __ FT or _ MILE		35	
W20-4-48	48"x48"	ONE LANE ROAD AHEAD or __ FT or _ MILE		35	
W20-5-48	**48"x48"**	**RIGHT or CENTER or LEFT LANE CLOSED AHEAD or __ FT or _ MILE**	**4**	**35**	**140**
W20-7-48	**48"x48"**	**FLAGGER**	**2**	**35**	**70**
W20-8-18	**18"x18"**	**STOP - SLOW PADDLE Back to Back**	**2**	**5**	**10**
W20-52P-54	54"x12"	NEXT __ MILES (Mounted on warning sign post)		12	
W21-1-48	48"x48"	WORKERS		35	
W21-2-48	48"x48"	FRESH OIL		35	
W21-3-48	48"x48"	ROAD MACHINERY AHEAD or __ FT or _ MILE		35	
W21-5-48	48"x48"	SHOULDER WORK		35	

SIGN NUMBER	SIGN SIZE	DESCRIPTION	AMOUNT REQUIRED	UNITS PER AMOUNT	UNITS SUB TOTAL
W21-5a-48	**48"x48"**	**RIGHT or LEFT SHOULDER CLOSED**	**4**	**35**	**140**
W21-5b-48	**48"x48"**	**RIGHT or LEFT SHOULDER CLOSED AHEAD or __ FT or _ MILE**	**4**	**35**	**140**
W21-6-48	48"x48"	SURVEY CREW		35	
W21-50-48	48"x48"	BRIDGE PAINTING AHEAD or __ FT		35	
W21-51-48	48"x48"	MATERIAL ON ROADWAY		35	
W21-52-48	48"x48"	PAVEMENT BREAKS		35	
W21-53-48	48"x48"	RUMBLE STRIPS AHEAD		35	
W22-8-48	48"x48"	FRESH OIL LOOSE ROCK		35	
W24-1-48	48"x48"	DOUBLE REVERSE CURVE		35	

SPECIAL SIGNS

SPEC & CODE

704-1000	**TRAFFIC CONTROL SIGNS**	**TOTAL UNITS**	**2436**

SPEC & CODE	DESCRIPTION	UNIT	QUANTITY
704-0100	**FLAGGING**	**MHR**	**275**
704-1048	PORTABLE RUMBLE STRIPS	EACH	
704-1050	TYPE I BARRICADES	EACH	
704-1052	**TYPE III BARRICADES**	**EACH**	**2**
704-1060	**DELINEATOR DRUMS**	**EACH**	**78**
704-1065	TRAFFIC CONES	EACH	
704-1067	**TUBULAR MARKERS**	**EACH**	**225**
704-1070	DELINEATOR	EACH	
704-1072	FLEXIBLE DELINEATORS	EACH	
704-1080	STACKABLE VERTICAL PANELS	EACH	
704-1081	VERTICAL PANELS - BACK TO BACK	EACH	
704-1085	SEQUENCING ARROW PANEL - TYPE A	EACH	
704-1086	SEQUENCING ARROW PANEL - TYPE B	EACH	
704-1087	**SEQUENCING ARROW PANEL - TYPE C**	**EACH**	**2**
704-1500	OBLITERATION OF PVMT MK	SF	
704-3501	PORTABLE PRECAST CONCRETE MED BARRIER	LF	
704-3510	PRECAST CONCRETE MED BARRIER - STATE FURNISHED	EACH	
762-0200	RAISED PAVEMENT MARKERS	EACH	
762-0420	SHORT TERM 4IN LINE - TYPE R	LF	
762-0430	SHORT TERM 4IN LINE - TYPE NR	LF	

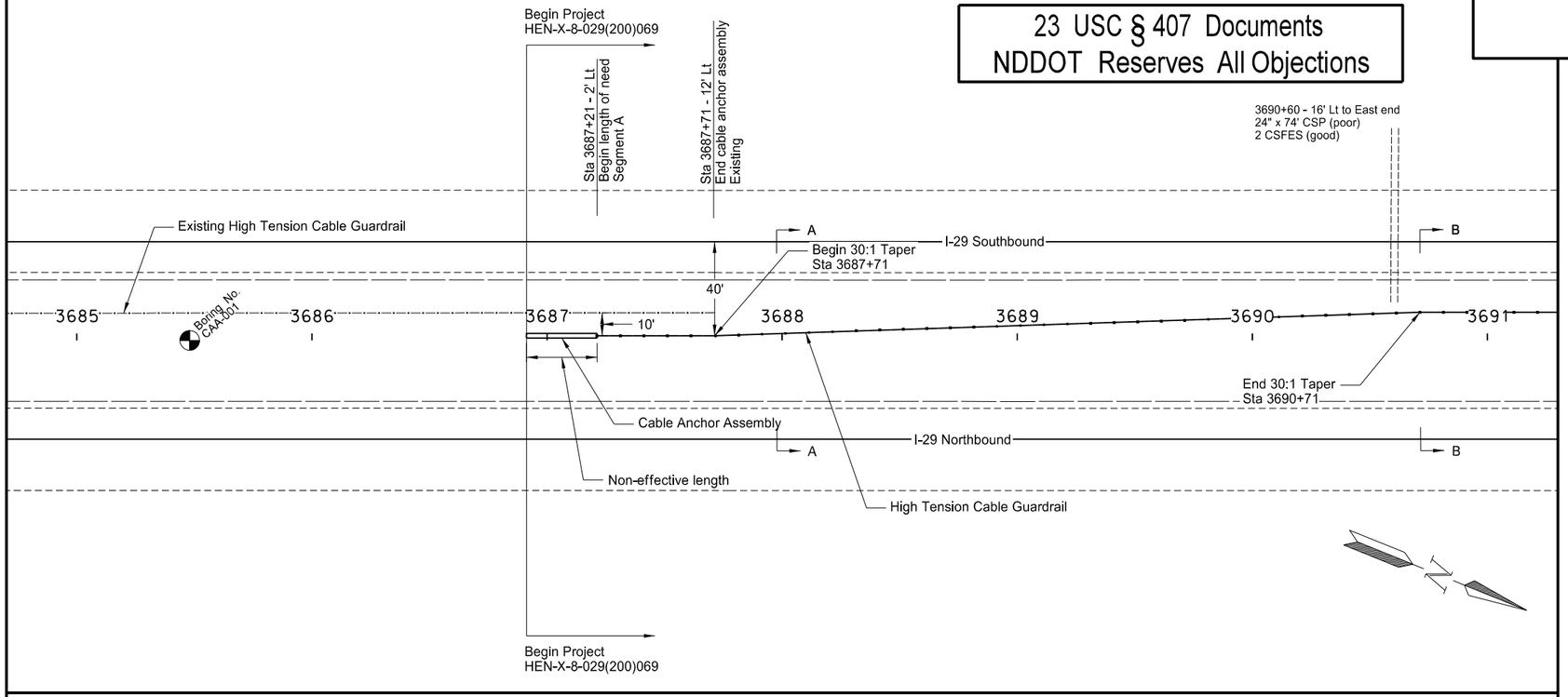
NOTE:
If additional signs are required, units will be calculated using the formula from Section III-18.06 of the Design Manual.
http://www.dot.nd.gov/

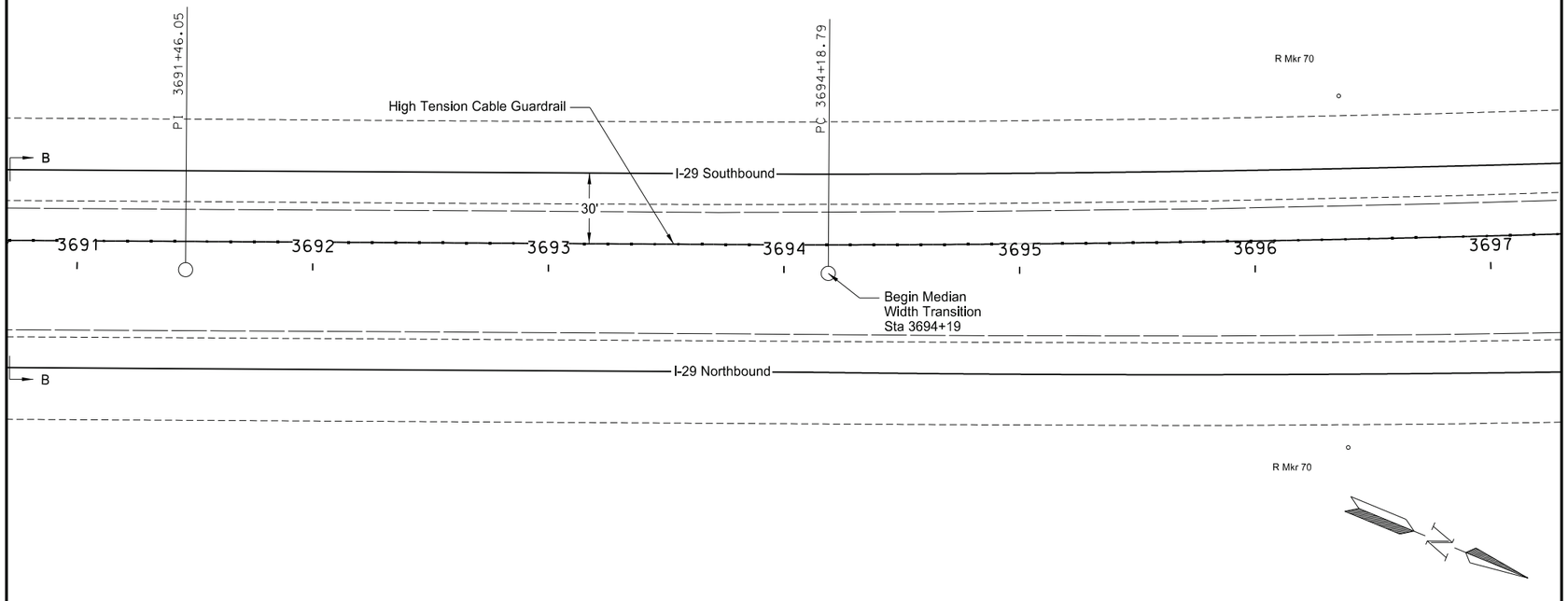
REGISTERED PROFESSIONAL ENGINEER
SCOTT MIDDAUGH
PE-7499
DATE 07/22/25
NORTH DAKOTA

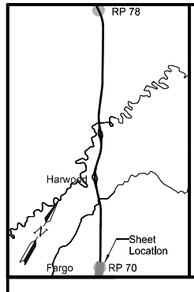
Traffic Control Devices List

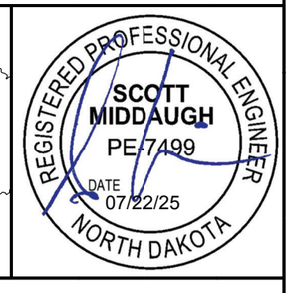
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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23 USC § 407 Documents
NDDOT Reserves All Objections









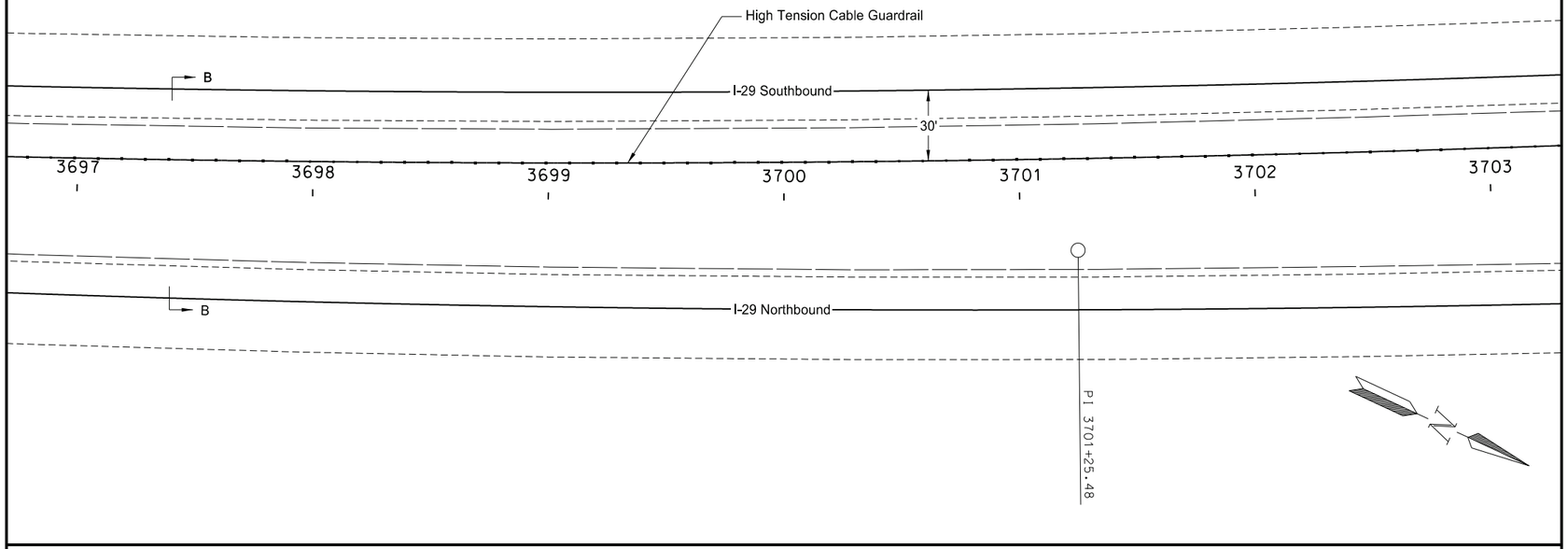
High Tension Cable Guardrail Layout

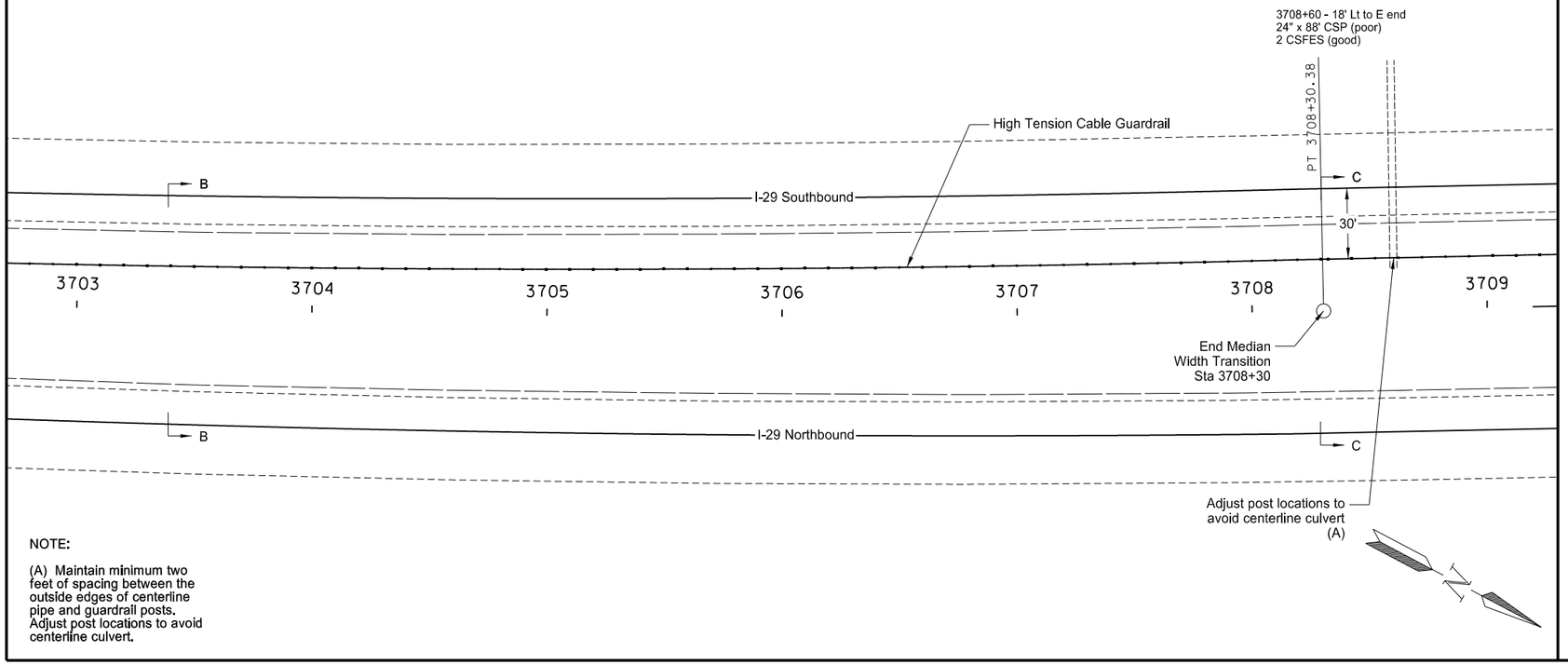
Segment A - Sta 3687+21 to 3697+00

I-29 - Cass Co 20 to Argusville Interchange

23 USC § 407 Documents
NDDOT Reserves All Objections

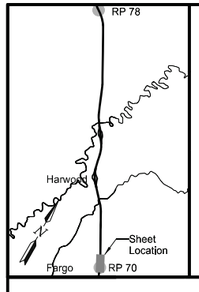
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-X-8-029(200)069	130	2

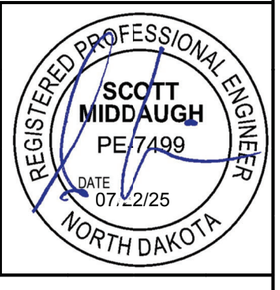




NOTE:

(A) Maintain minimum two feet of spacing between the outside edges of centerline pipe and guardrail posts. Adjust post locations to avoid centerline culvert.





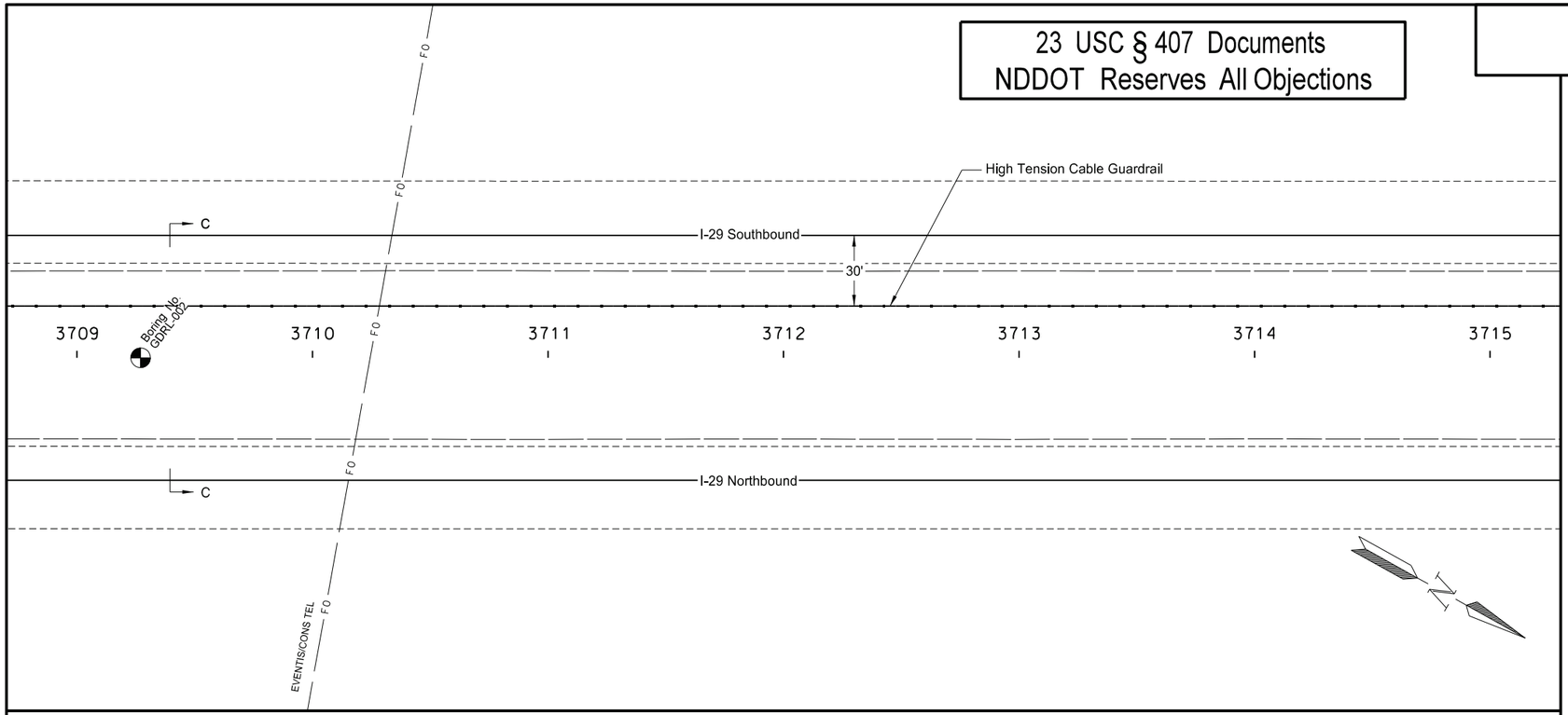
High Tension Cable Guardrail Layout

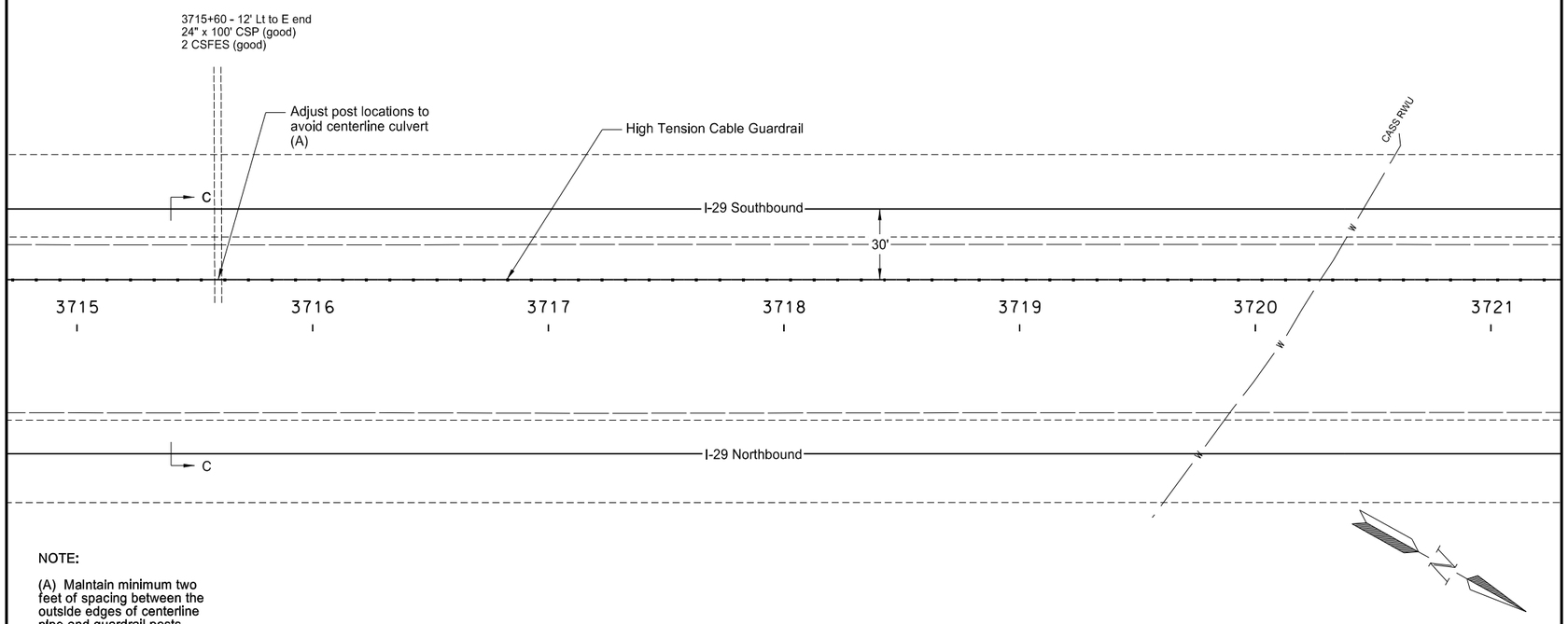
Segment A - Sta 3697+00 to 3709+00

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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-X-8-029(200)069	130	3

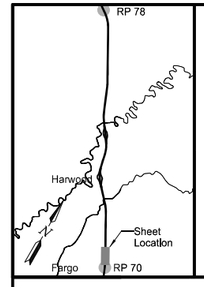
23 USC § 407 Documents
NDDOT Reserves All Objections





NOTE:

(A) Maintain minimum two feet of spacing between the outside edges of centerline pipe and guardrail posts. Adjust post locations to avoid centerline culvert.



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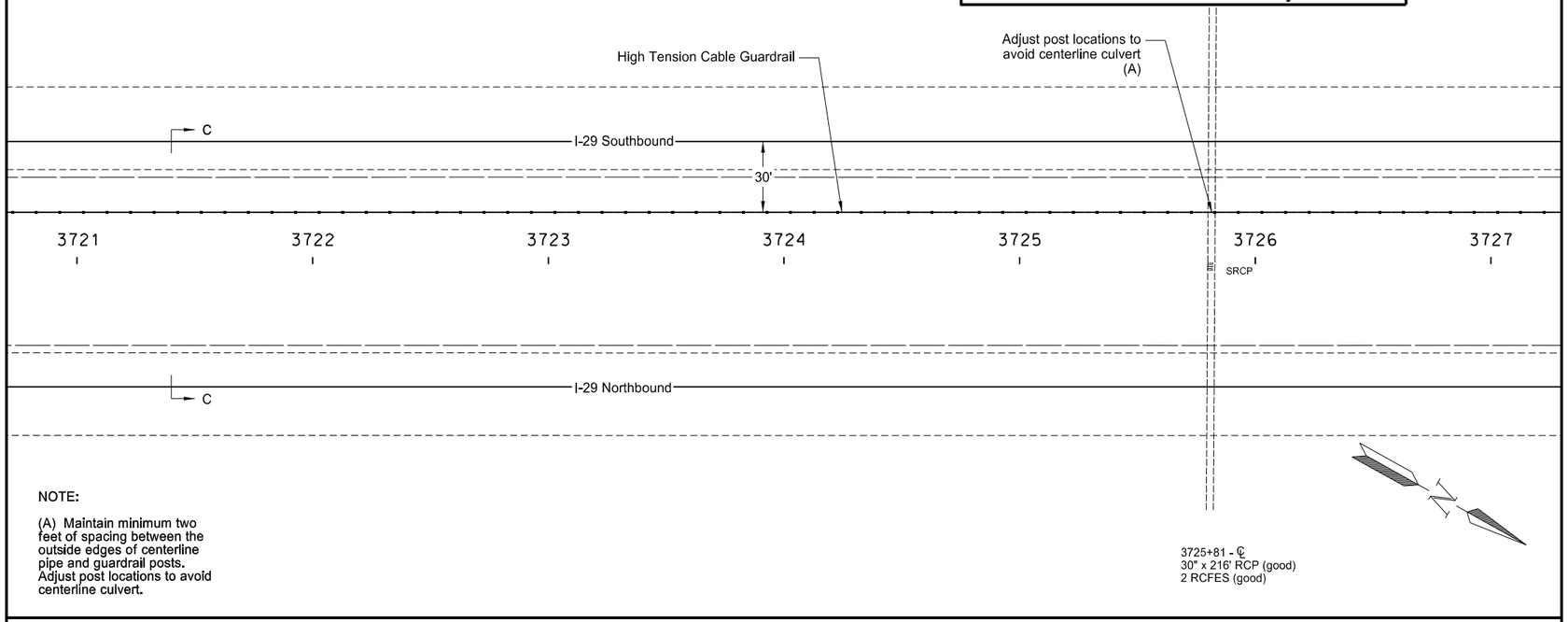
High Tension Cable Guardrail Layout

Segment A - Sta 3709+00 to 3721+00

I-29 - Cass Co 20 to Argusville Interchange

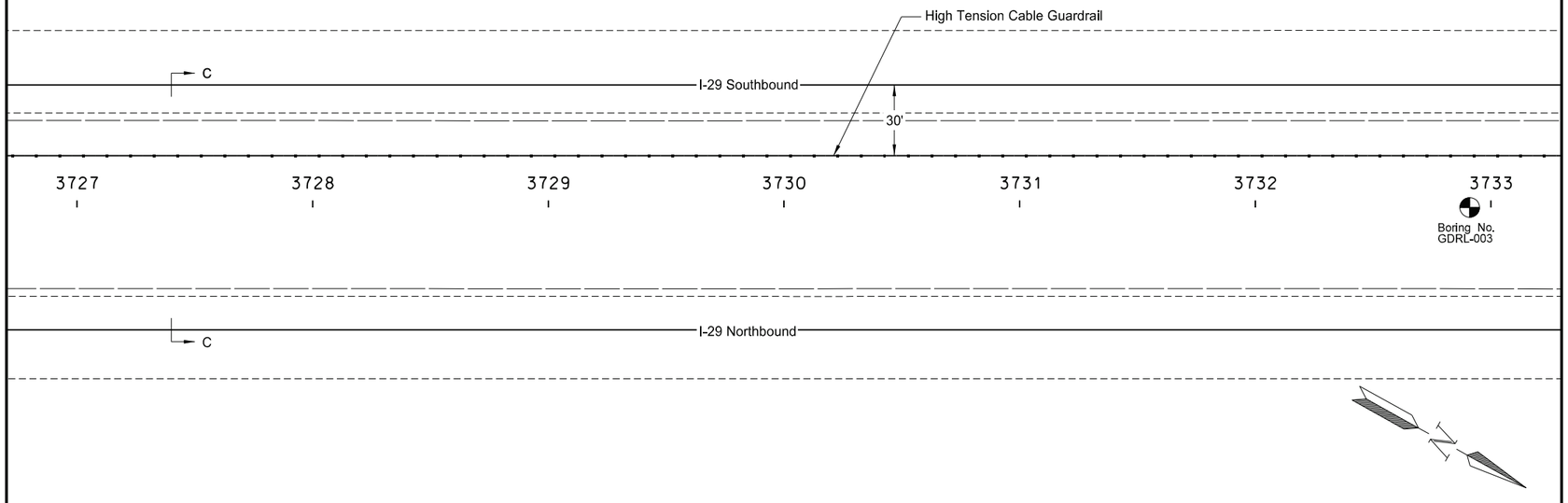
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-X-8-029(200)069	130	4

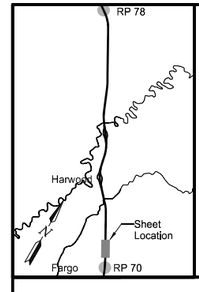
23 USC § 407 Documents
NDDOT Reserves All Objections



NOTE:

(A) Maintain minimum two feet of spacing between the outside edges of centerline pipe and guardrail posts. Adjust post locations to avoid centerline culvert.





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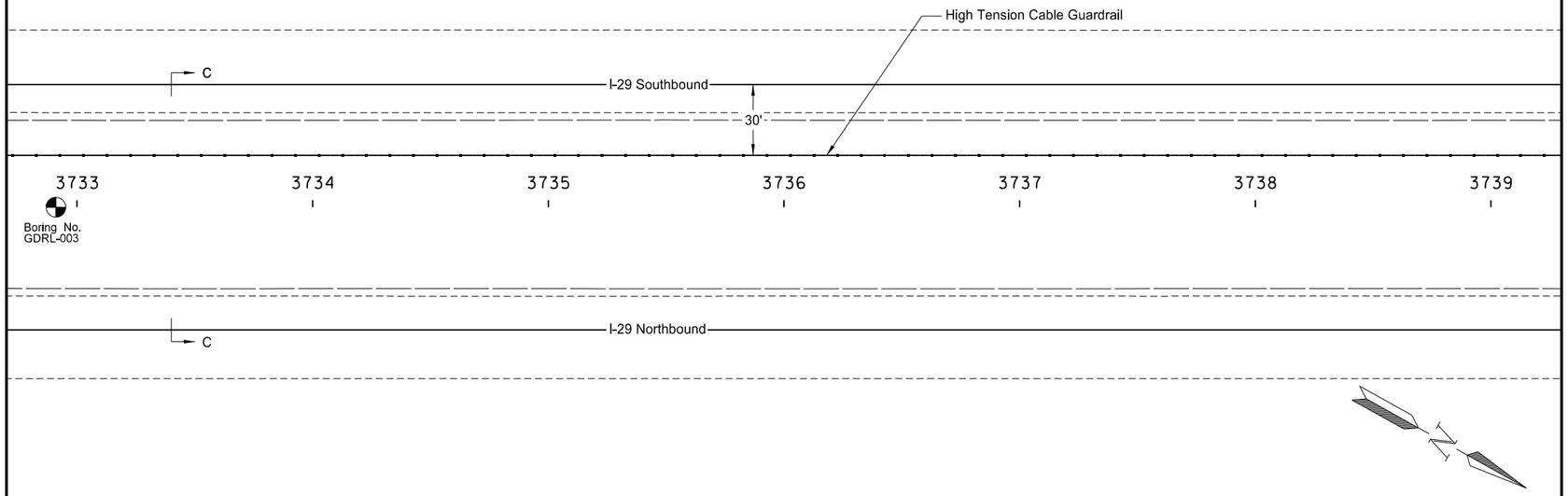
High Tension Cable Guardrail Layout

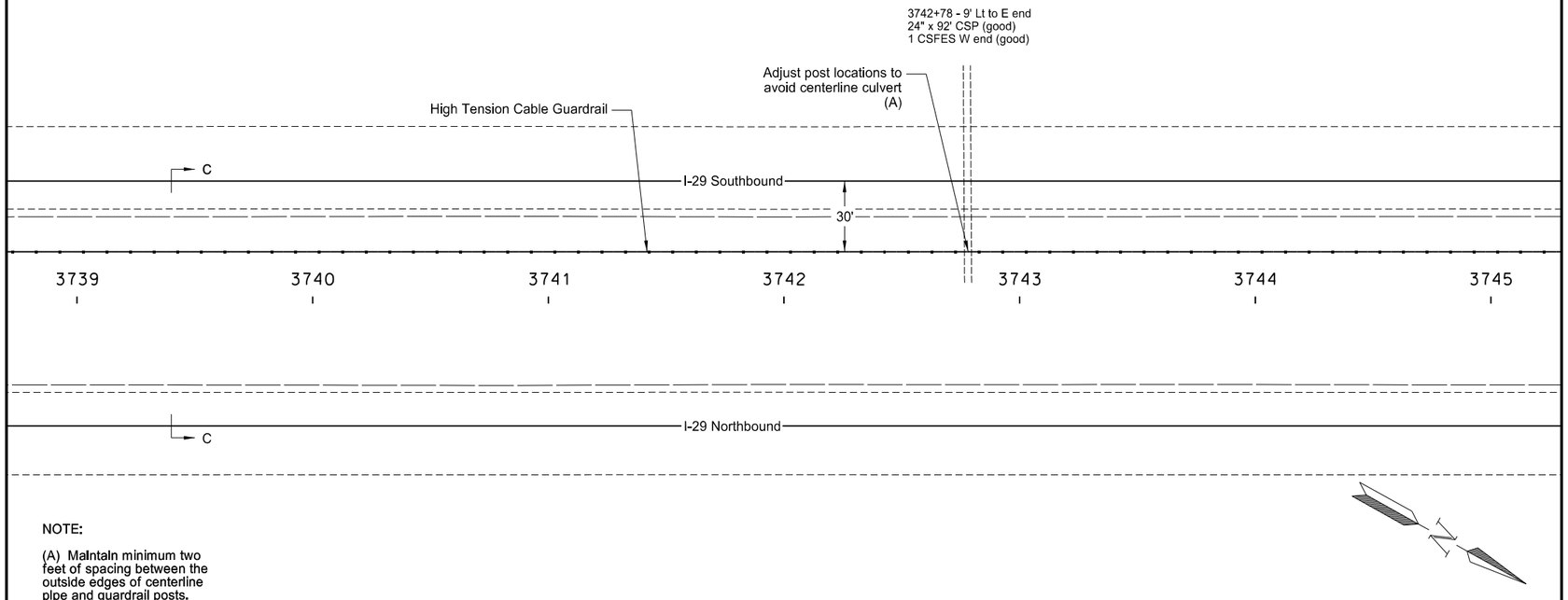
Segment A - Sta 3721+00 to 3733+00

I-29 - Cass Co 20 to Argusville Interchange

23 USC § 407 Documents
NDDOT Reserves All Objections

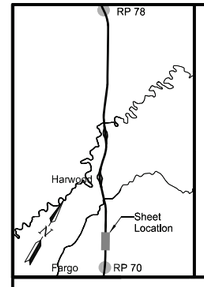
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-X-8-029(200)069	130	5





NOTE:

(A) Maintain minimum two feet of spacing between the outside edges of centerline pipe and guardrail posts. Adjust post locations to avoid centerline culvert.



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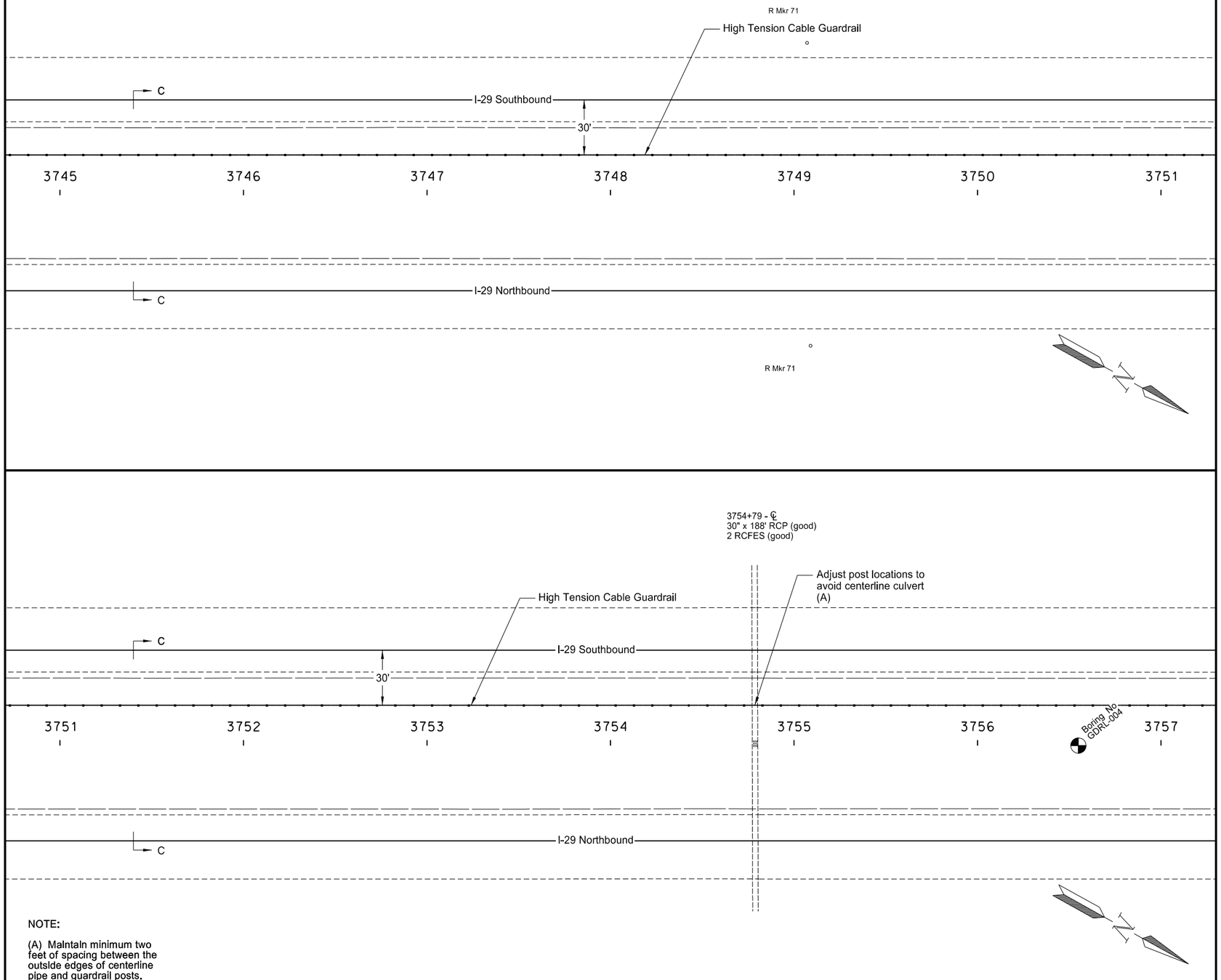
High Tension Cable Guardrail Layout

Segment A - Sta 3733+00 to 3745+00

I-29 - Cass Co 20 to Argusville Interchange

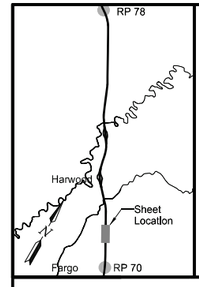
23 USC § 407 Documents
NDDOT Reserves All Objections

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-X-8-029(200)069	130	6



NOTE:

(A) Maintain minimum two feet of spacing between the outside edges of centerline pipe and guardrail posts. Adjust post locations to avoid centerline culvert.





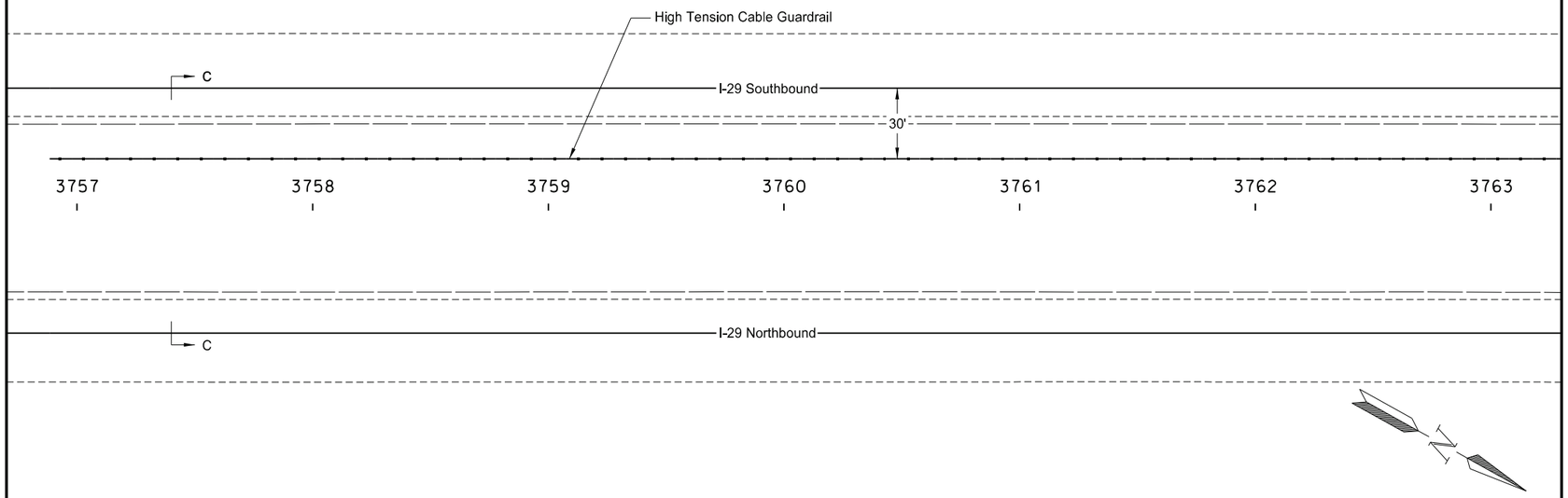
High Tension Cable Guardrail Layout

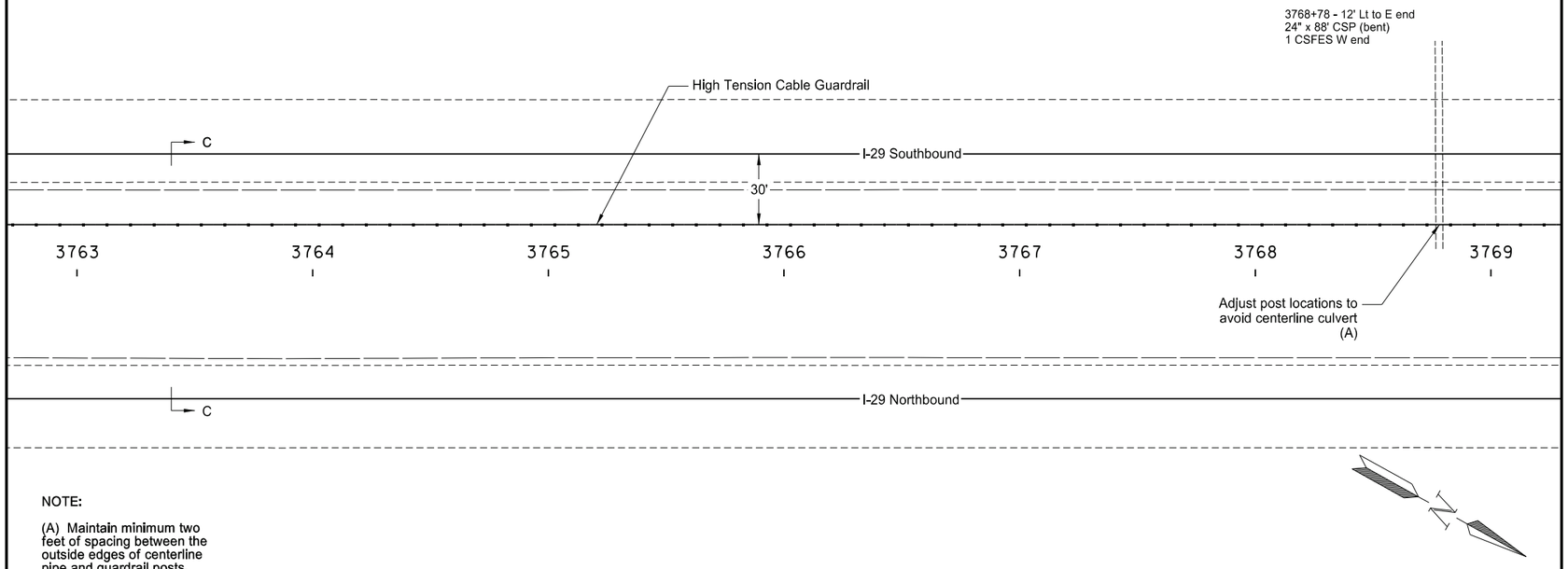
Segment A - Sta 3745+00 to 3757+00

I-29 - Cass Co 20 to Argusville Interchange

23 USC § 407 Documents
NDDOT Reserves All Objections

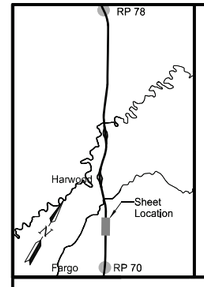
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-X-8-029(200)069	130	7





NOTE:

(A) Maintain minimum two feet of spacing between the outside edges of centerline pipe and guardrail posts. Adjust post locations to avoid centerline culvert.





High Tension Cable Guardrail Layout

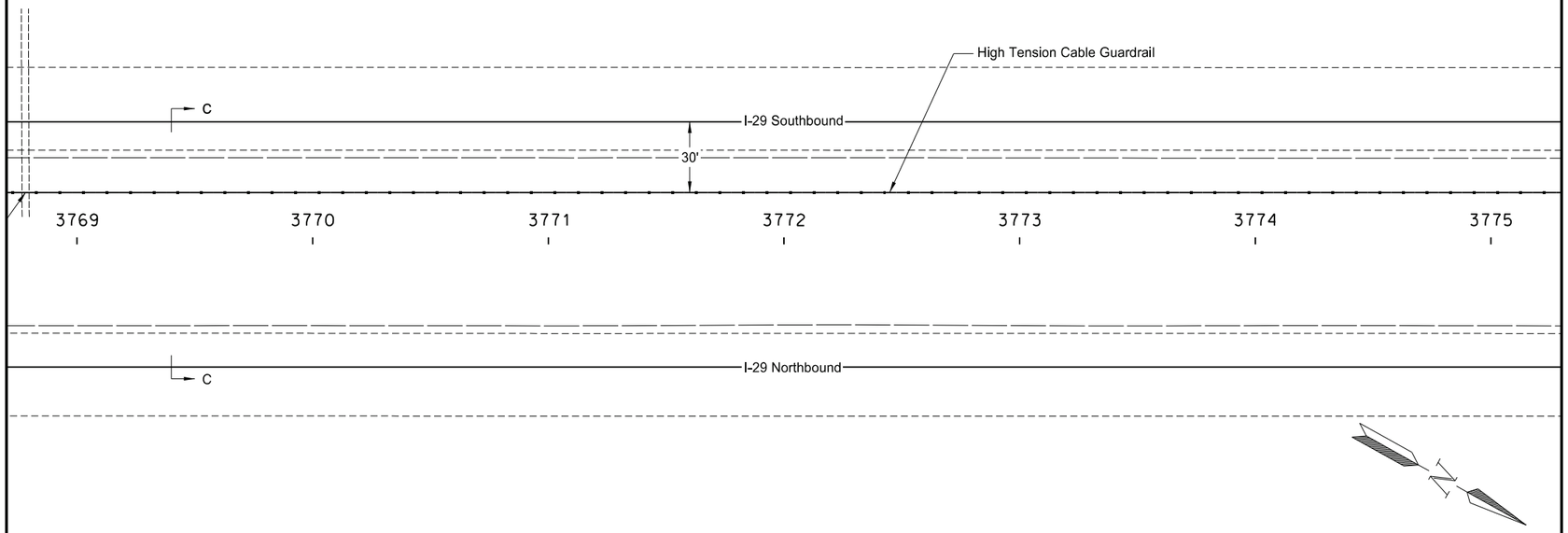
Segment A - Sta 3757+00 to 3769+00

I-29 - Cass Co 20 to Argusville Interchange

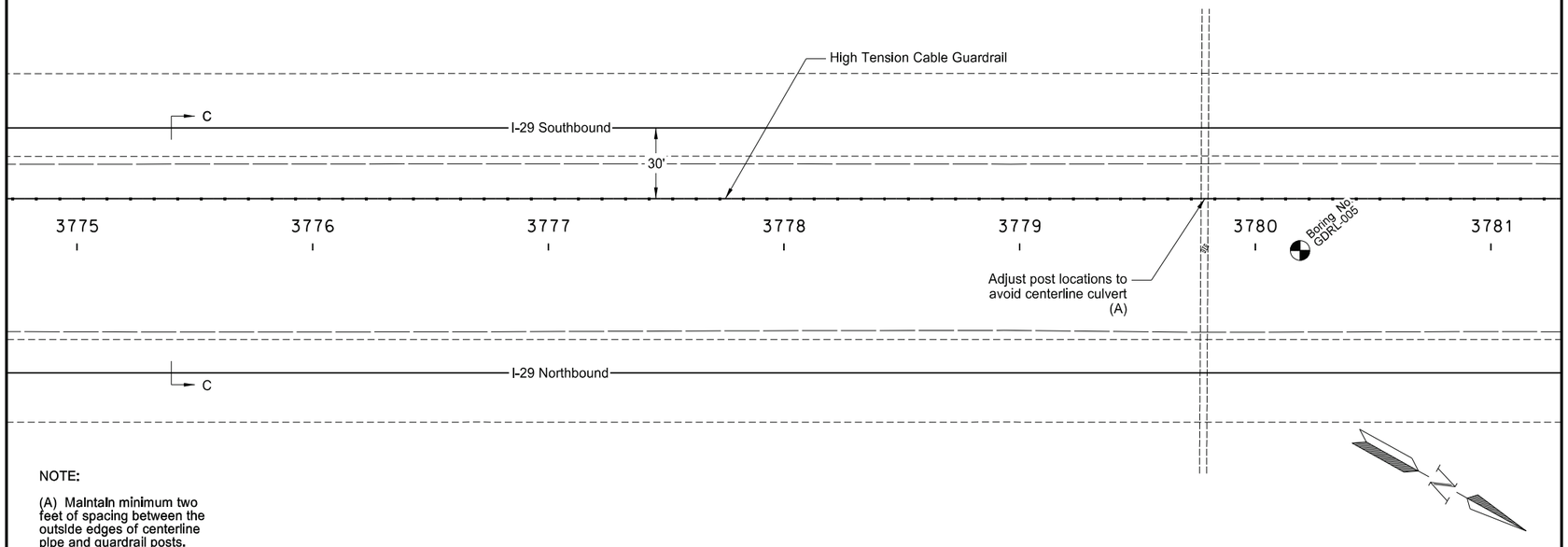
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-X-8-029(200)069	130	8

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3768+78 - 12' Lt to E end
24" x 88' CSP (bent)
1 CSFES W end

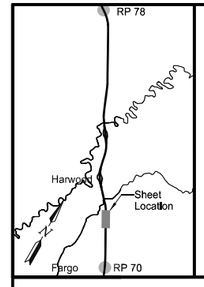


3779+78 - ℄
30" x 196' RCP (good)
2 RCFES (good)



NOTE:

(A) Maintain minimum two feet of spacing between the outside edges of centerline pipe and guardrail posts. Adjust post locations to avoid centerline culvert.





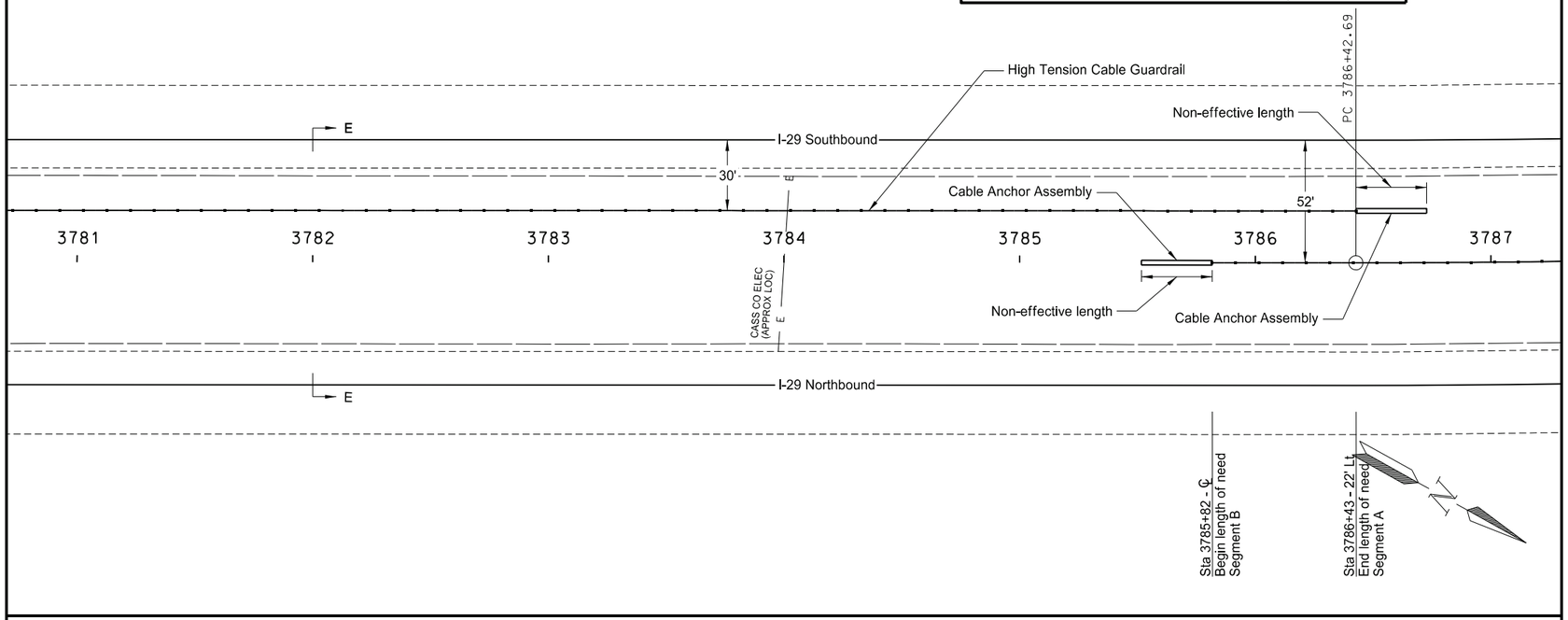
High Tension Cable Guardrail Layout

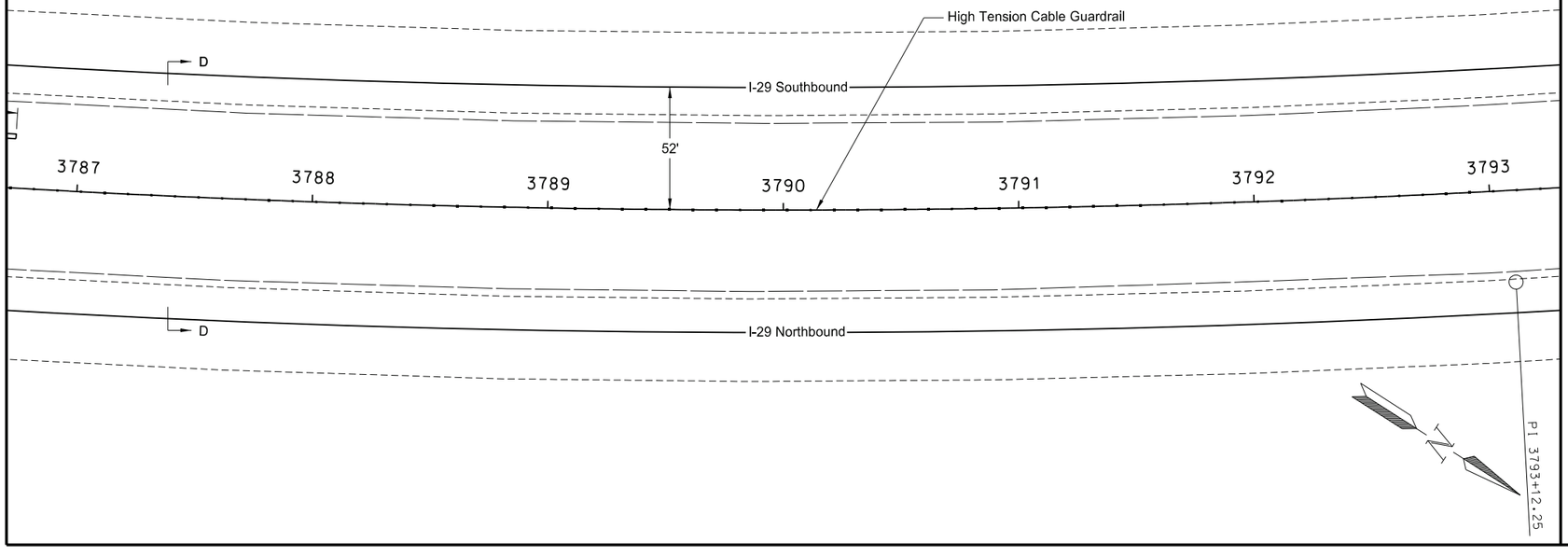
Segment A - Sta 3769+00 to 3781+00

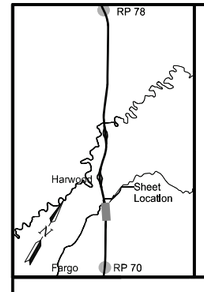
I-29 - Cass Co 20 to Argusville Interchange

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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High Tension Cable Guardrail Layout

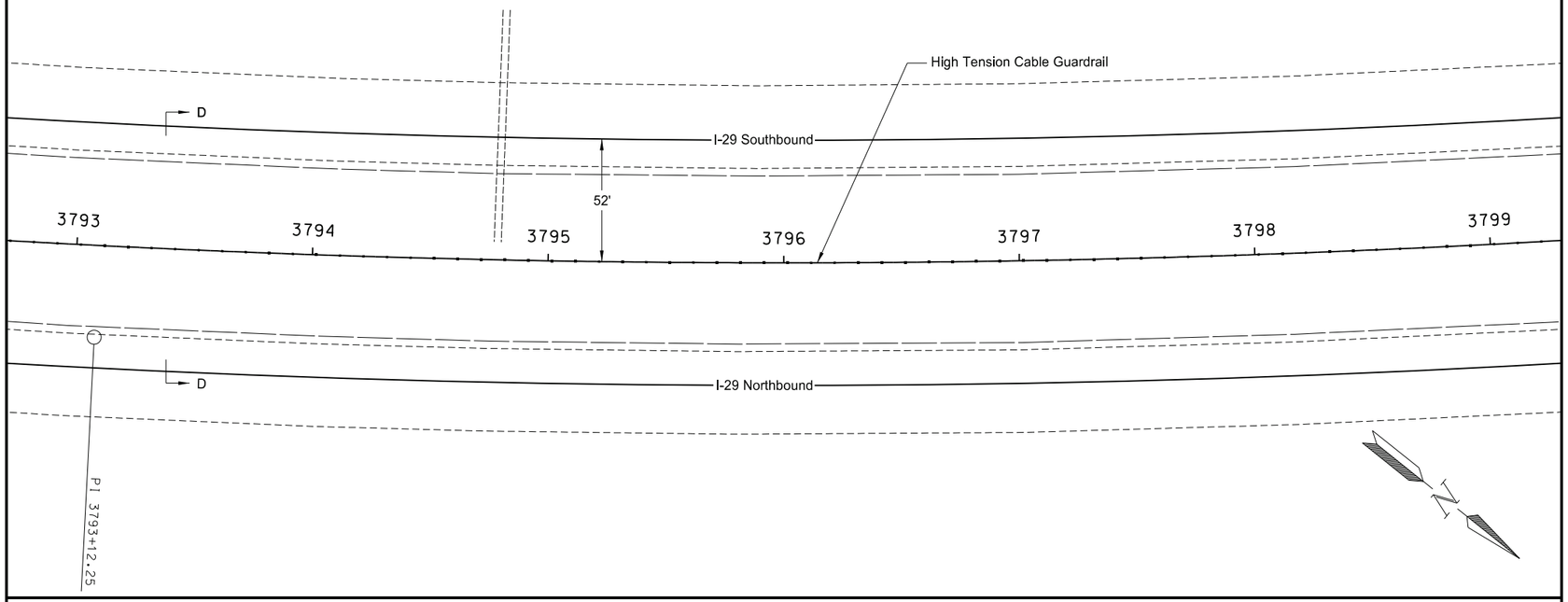
Segment A - Sta 3781+00 to 3786+43
Segment B - Sta 3785+82 to 3793+00

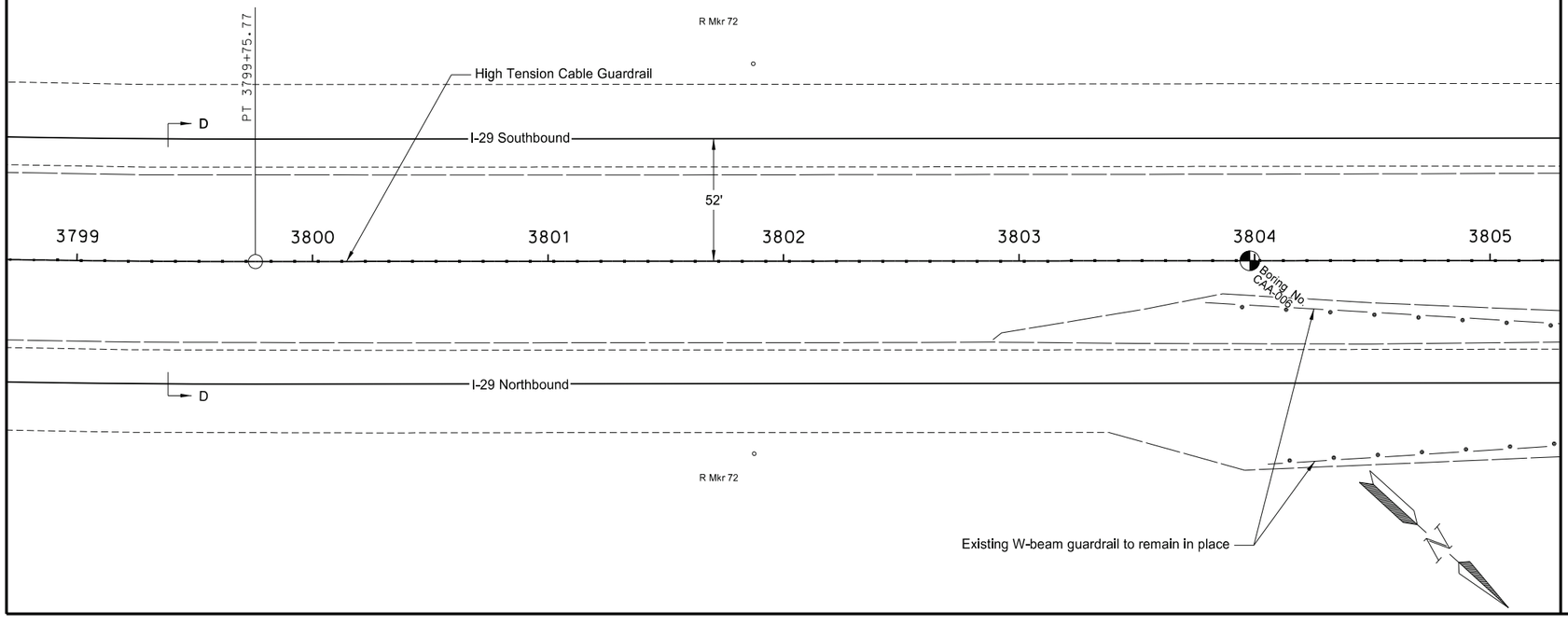
I-29 - Cass Co 20 to Argusville Interchange

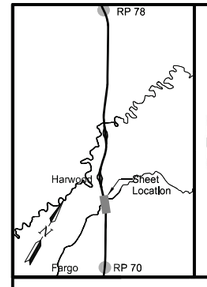
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-X-8-029(200)069	130	10

23 USC § 407 Documents
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3794+78 - 9' LT to E end
24" X 98' CSP (good)
2 CSFES (good)







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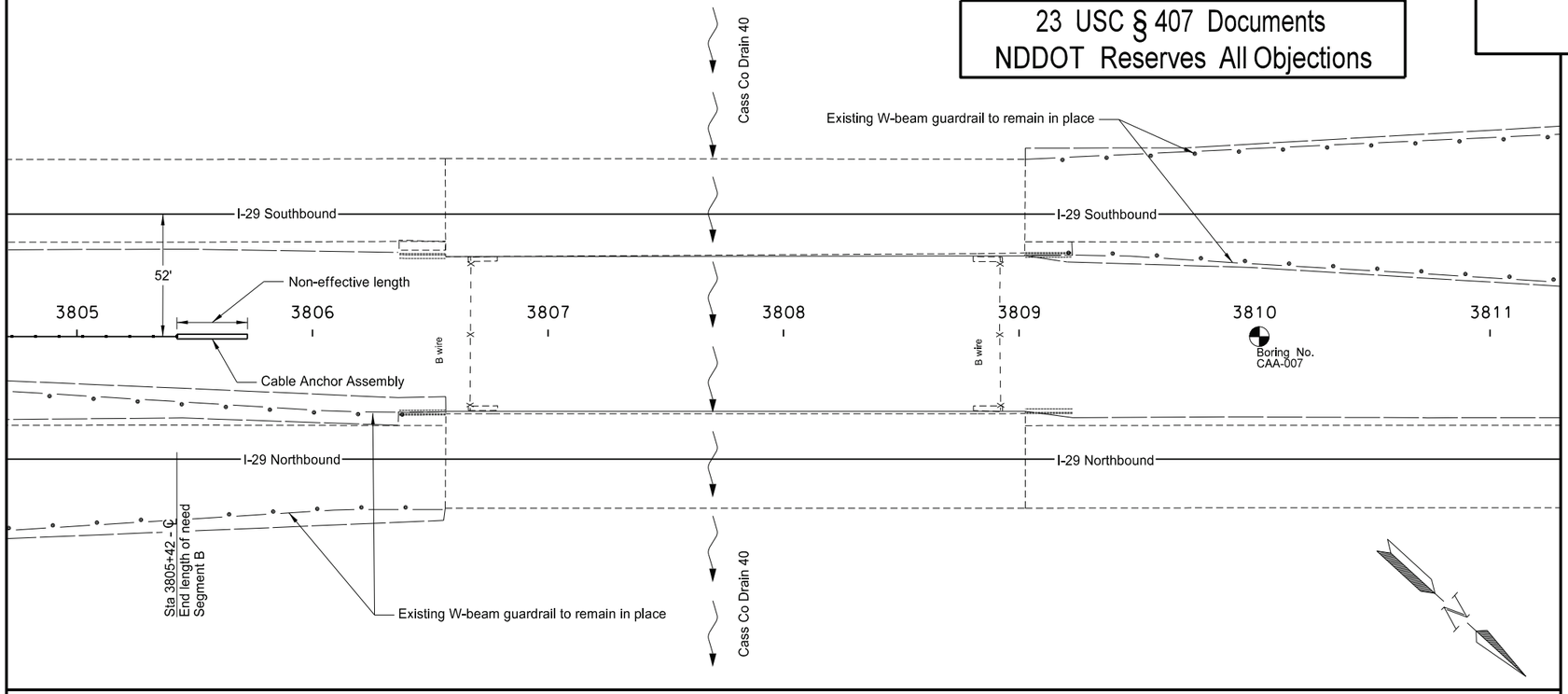
High Tension Cable Guardrail Layout

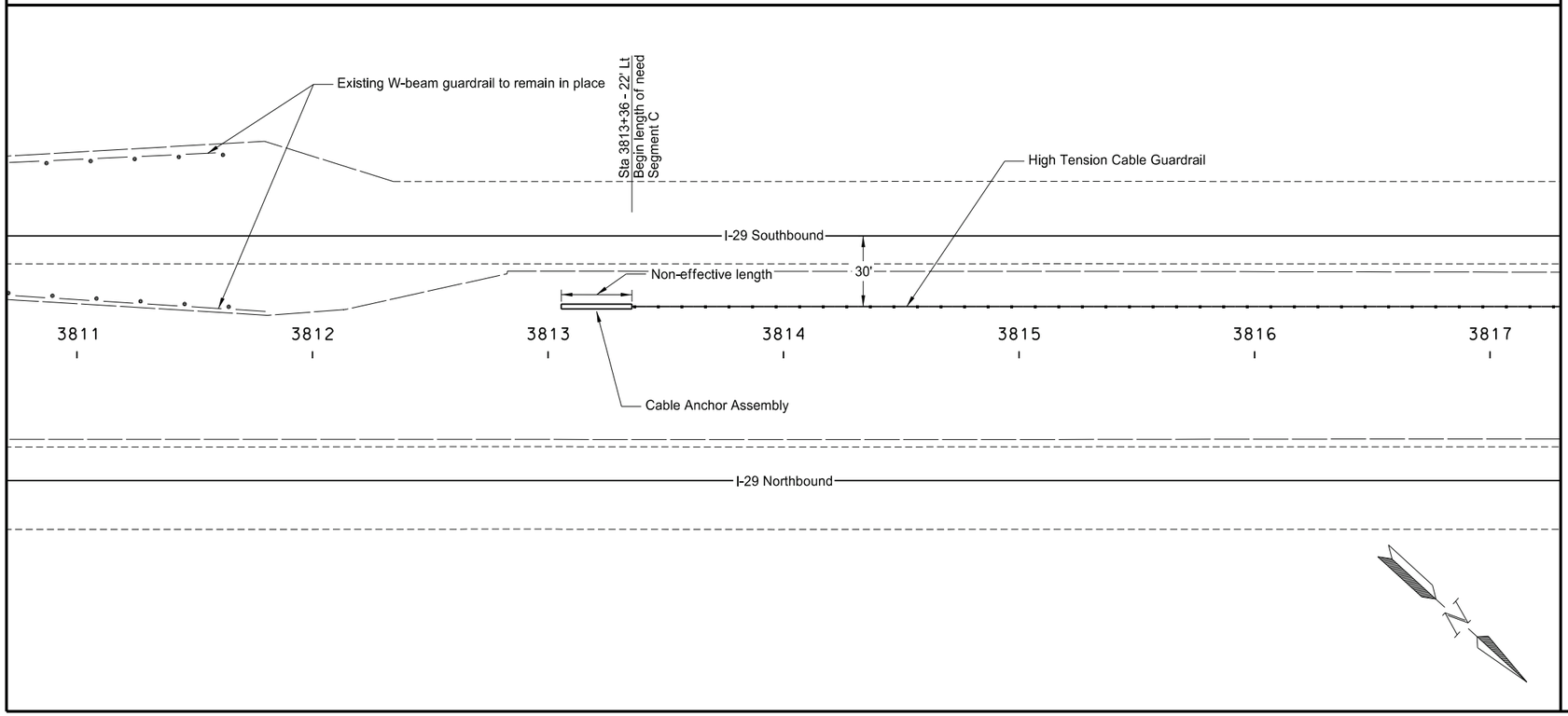
Segment B - Sta 3793+00 to 3805+00

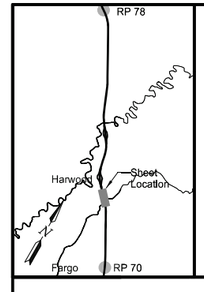
I-29 - Cass Co 20 to Argusville Interchange

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ND	HEN-X-8-029(200)069	130	11







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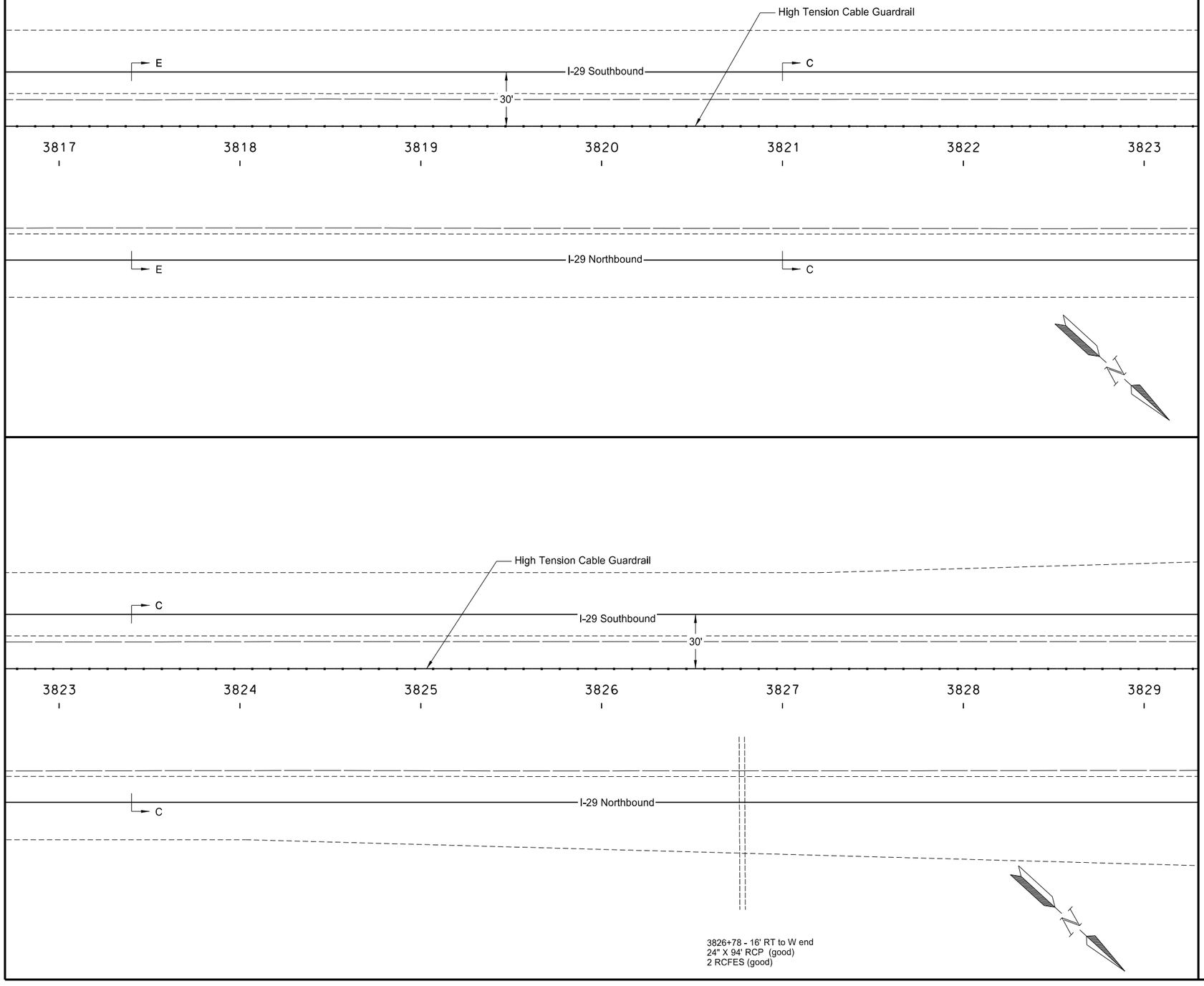
High Tension Cable Guardrail Layout

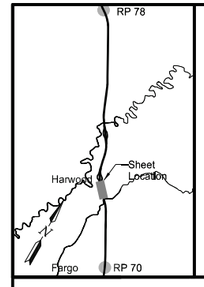
Segment B - Sta 3805+00 to 3805+42
Segment C - Sta 3813+36 to 3817+00

I-29 - Cass Co 20 to Argusville Interchange

23 USC § 407 Documents
NDDOT Reserves All Objections

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-X-8-029(200)069	130	12





REGISTERED PROFESSIONAL ENGINEER
SCOTT MIDDAUGH
PE-7499
DATE 07/22/25
NORTH DAKOTA

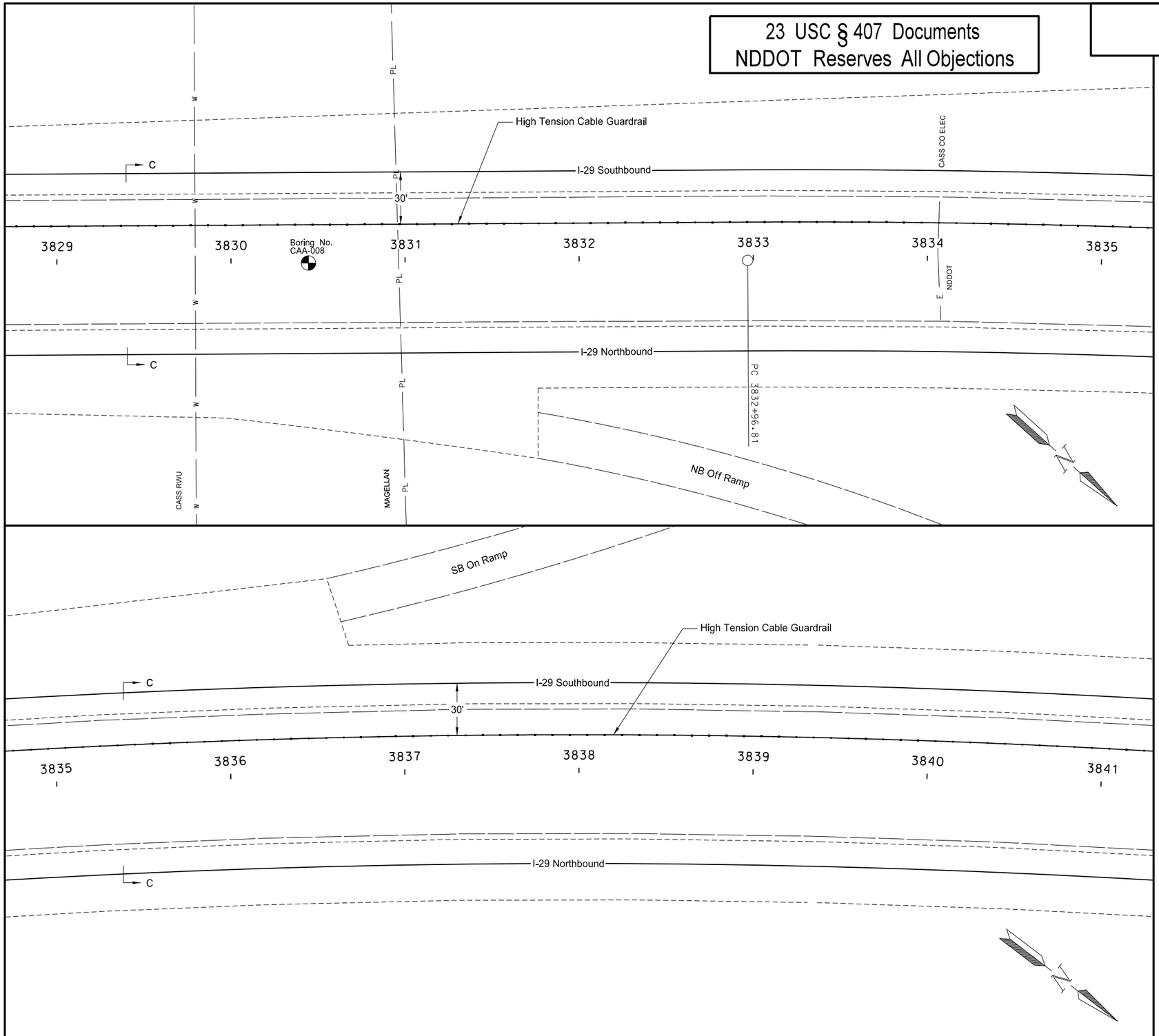
High Tension Cable Guardrail Layout

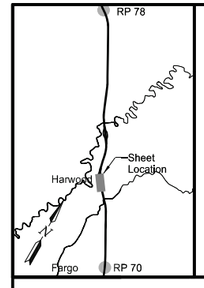
Segment C - Sta 3817+00 to 3829+00

I-29 - Cass Co 20 to Argusville Interchange

23 USC § 407 Documents
NDDOT Reserves All Objections

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-X-8-029(200)069	130	13





REGISTERED PROFESSIONAL ENGINEER
SCOTT MIDDAUGH
PE-7499
DATE 07/22/25
NORTH DAKOTA

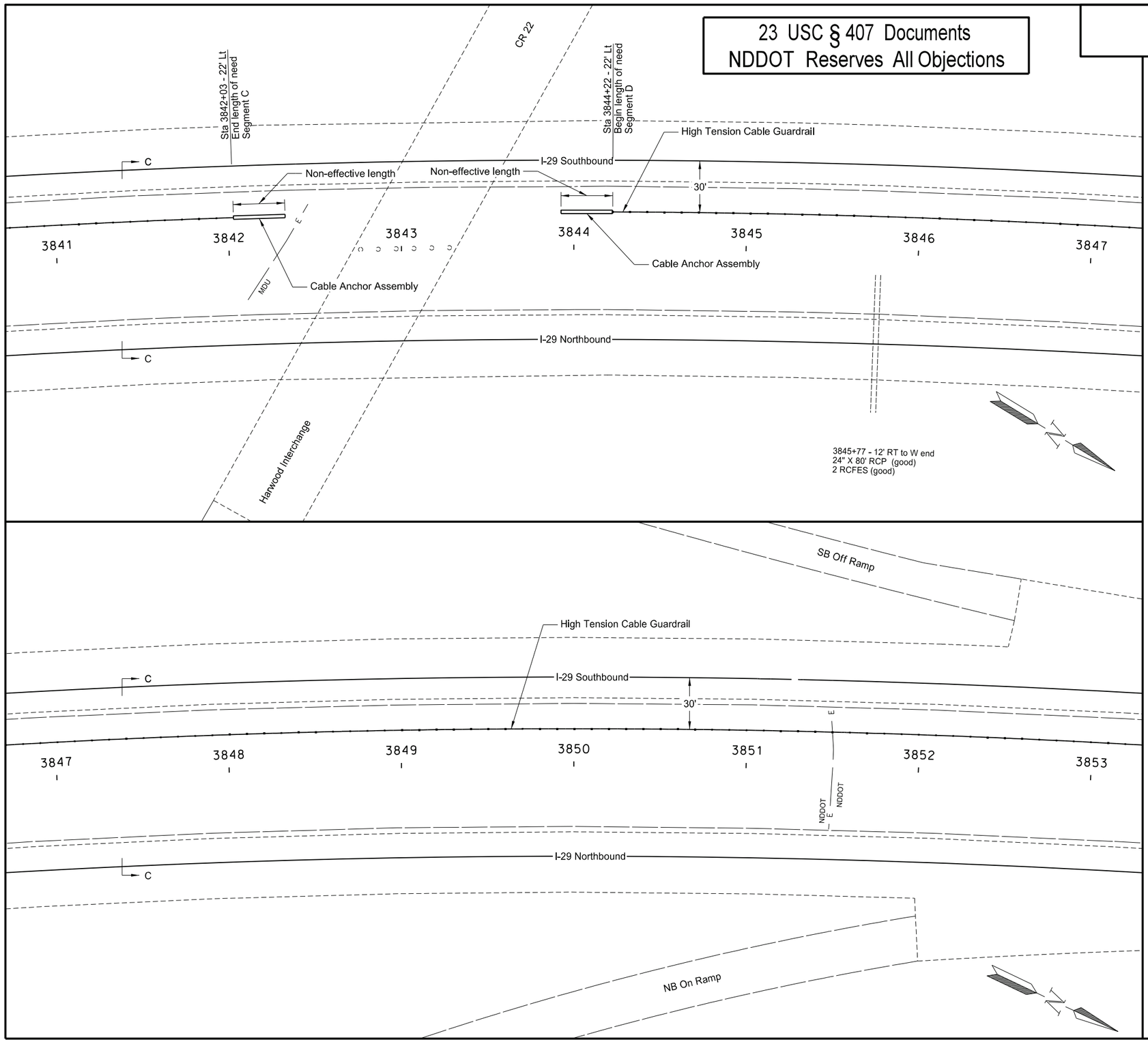
High Tension Cable Guardrail Layout

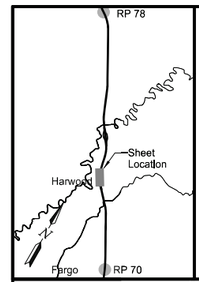
Segment C - Sta 3829+00 to 3841+00

I-29 - Cass Co 20 to Argusville Interchange

23 USC § 407 Documents
NDDOT Reserves All Objections

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-X-8-029(200)069	130	14





REGISTERED PROFESSIONAL ENGINEER
SCOTT MIDDAUGH
PE-7499
DATE 07/22/25
NORTH DAKOTA

High Tension Cable Guardrail Layout

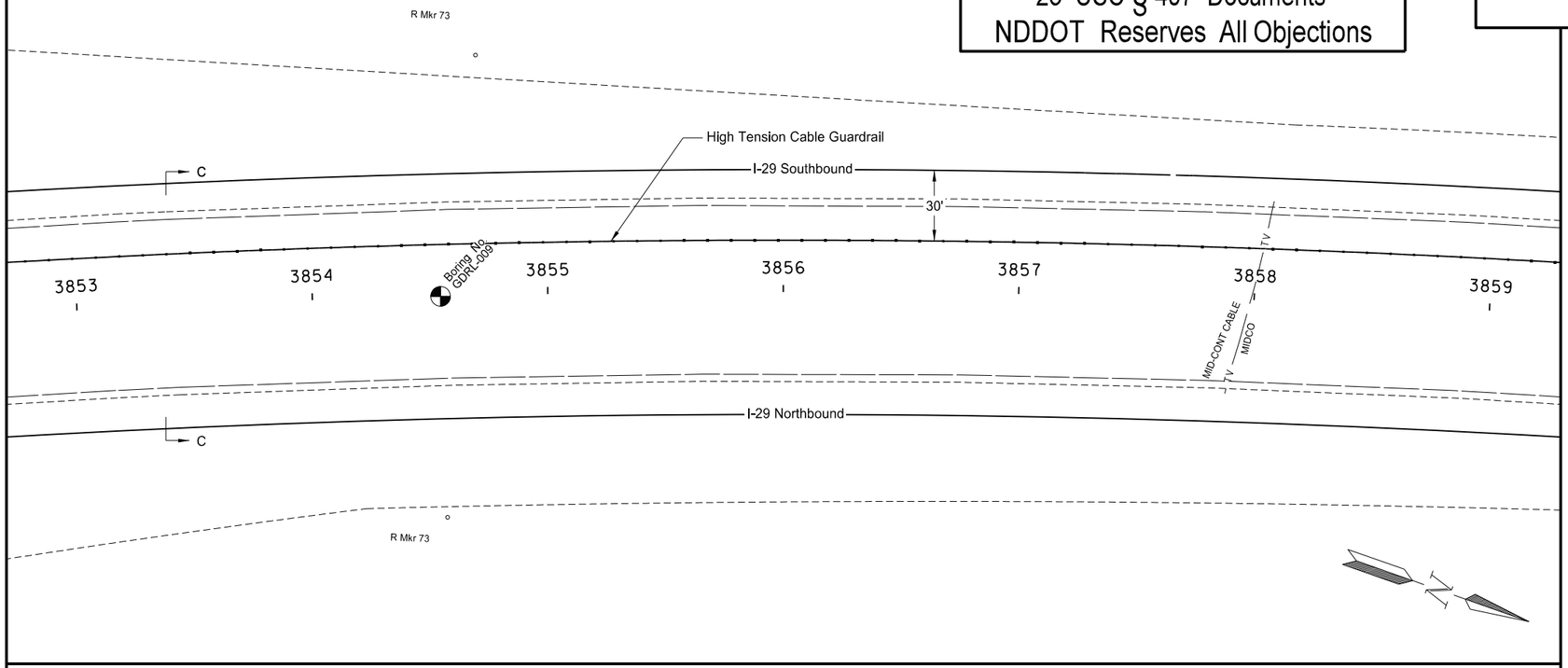
Segment C - Sta 3841+00 to 3842+03
Segment D - Sta 3844+22 to 3853+00

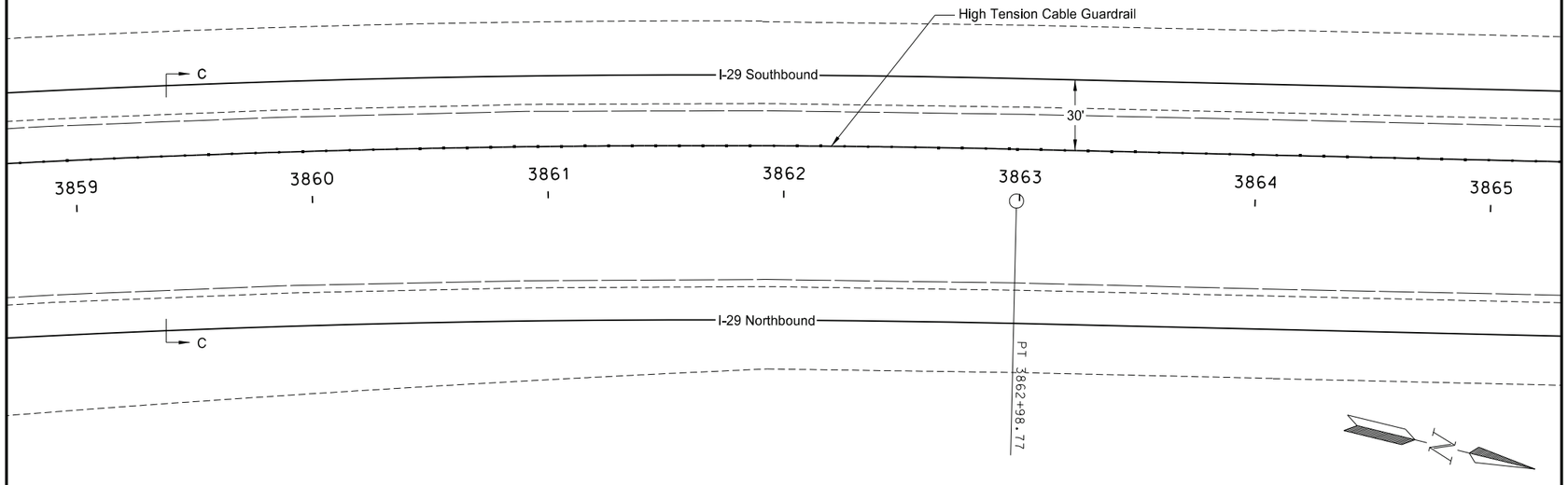
I-29 - Cass Co 20 to Argusville Interchange

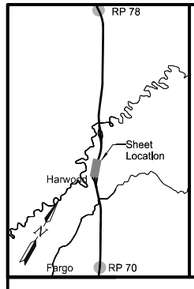
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23 USC § 407 Documents
NDDOT Reserves All Objections

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-X-8-029(200)069	130	15







REGISTERED PROFESSIONAL ENGINEER
SCOTT MIDDAUGH
PE-7499
DATE 07/22/25
NORTH DAKOTA

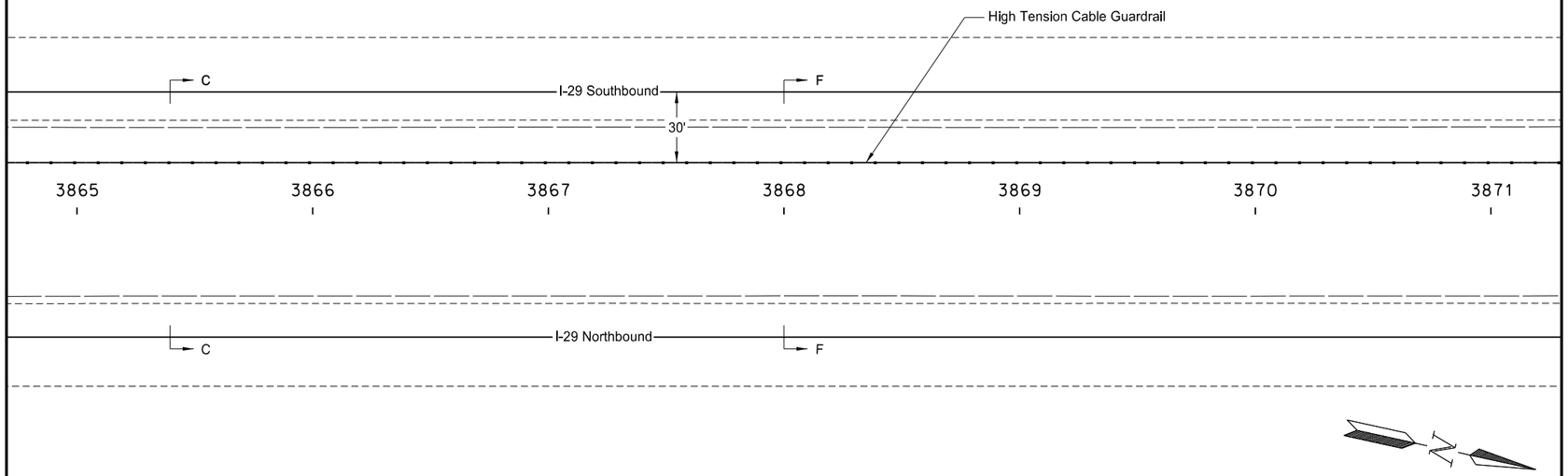
High Tension Cable Guardrail Layout

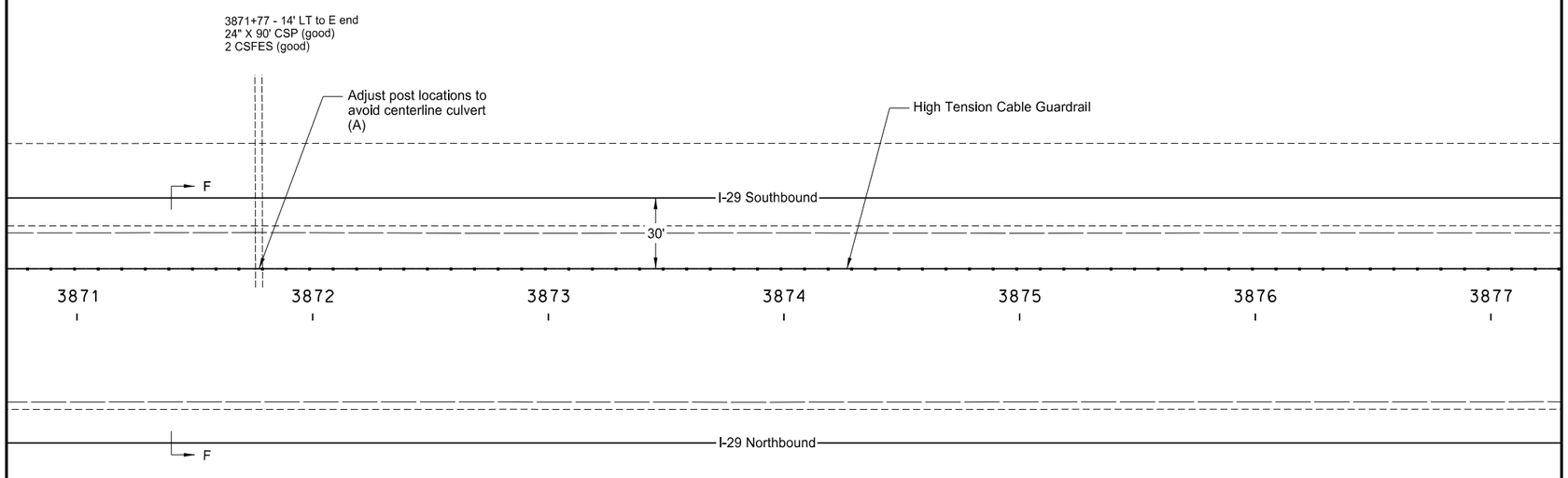
Segment D - Sta 3853+00 to 3865+00

I-29 - Cass Co 20 to Argusville Interchange

23 USC § 407 Documents
NDDOT Reserves All Objections

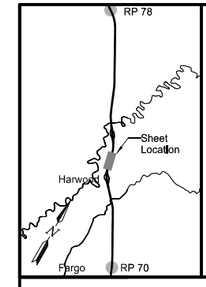
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-X-8-029(200)069	130	16

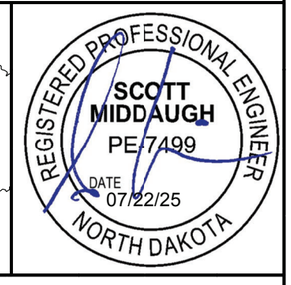




NOTE:

(A) Maintain minimum two feet of spacing between the outside edges of centerline pipe and guardrail posts. Adjust post locations to avoid centerline culvert.





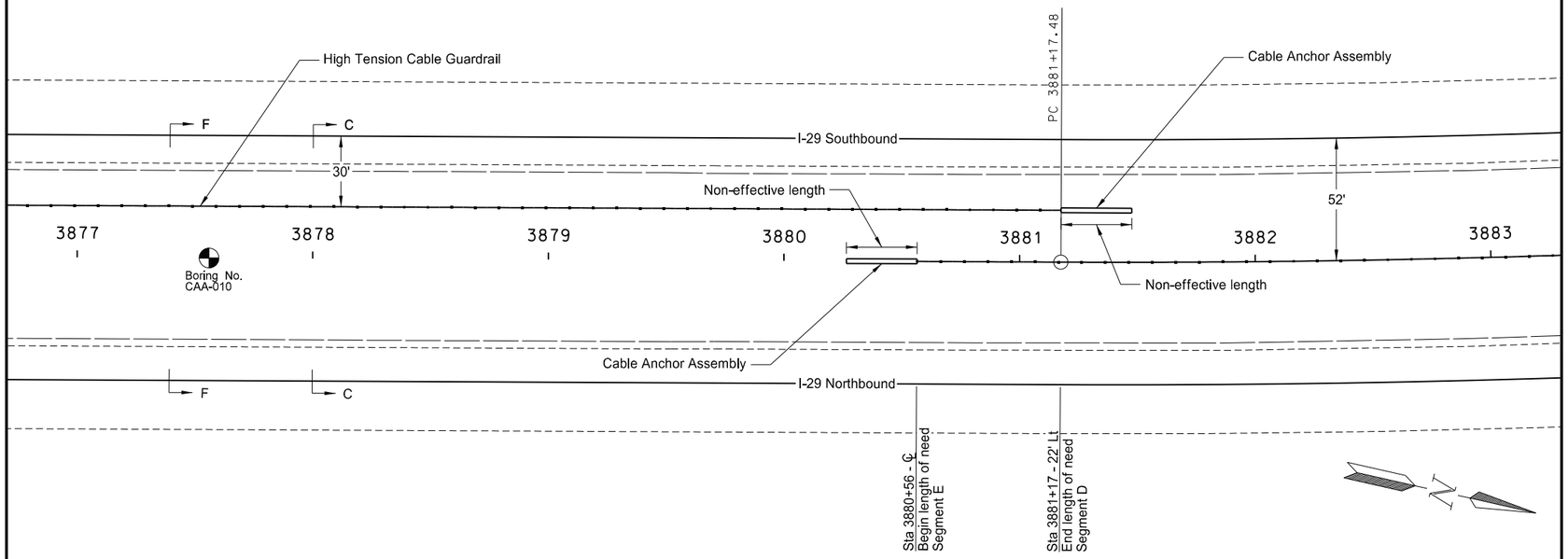
High Tension Cable Guardrail Layout

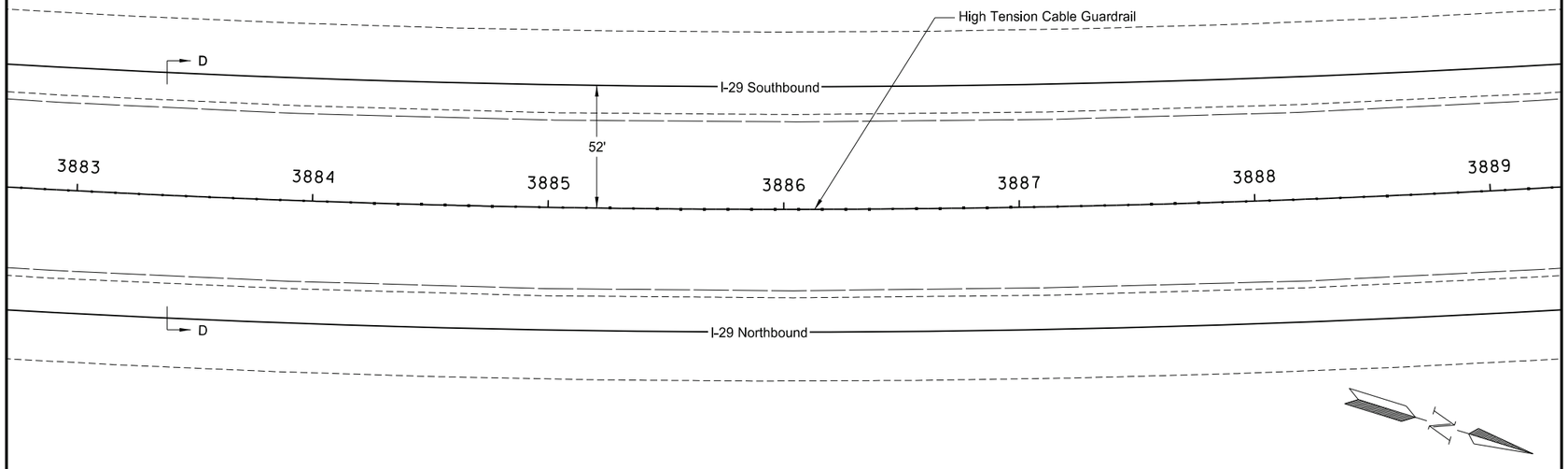
Segment D - Sta 3865+00 to 3877+00

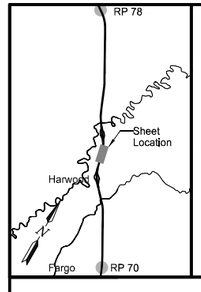
I-29 - Cass Co 20 to Argusville Interchange

23 USC § 407 Documents
NDDOT Reserves All Objections

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-X-8-029(200)069	130	17







REGISTERED PROFESSIONAL ENGINEER
SCOTT MIDDAUGH
PE-7499
DATE 07/22/25
NORTH DAKOTA

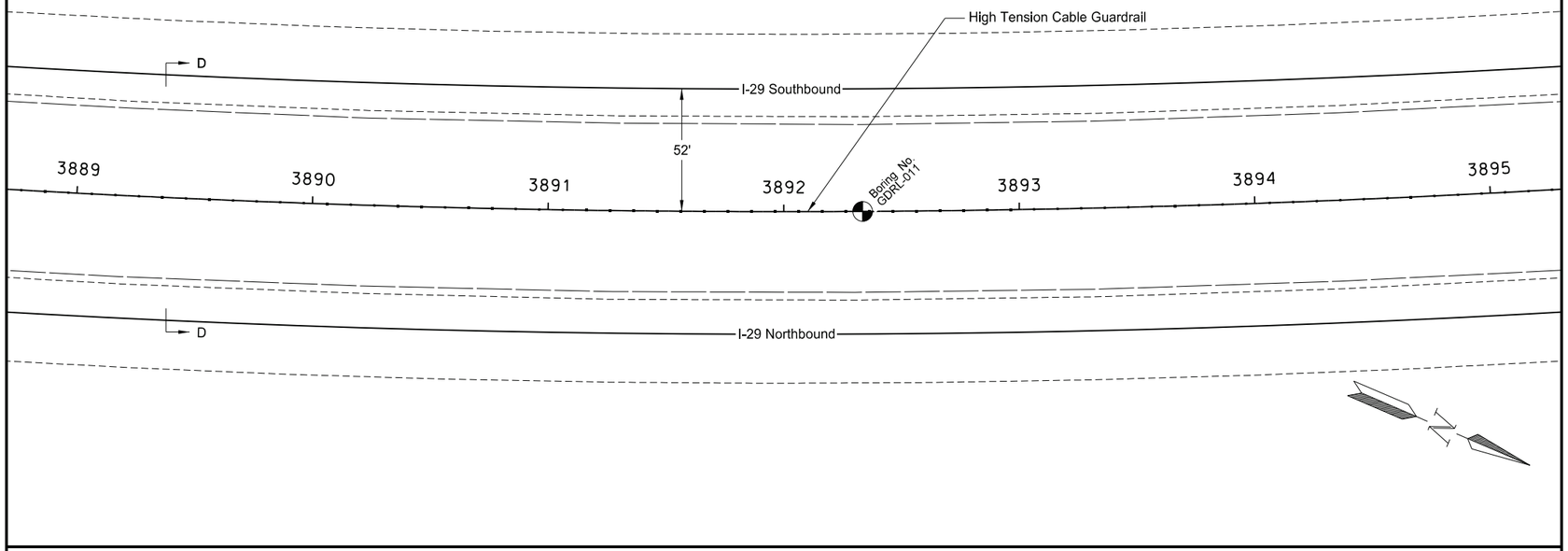
High Tension Cable Guardrail Layout

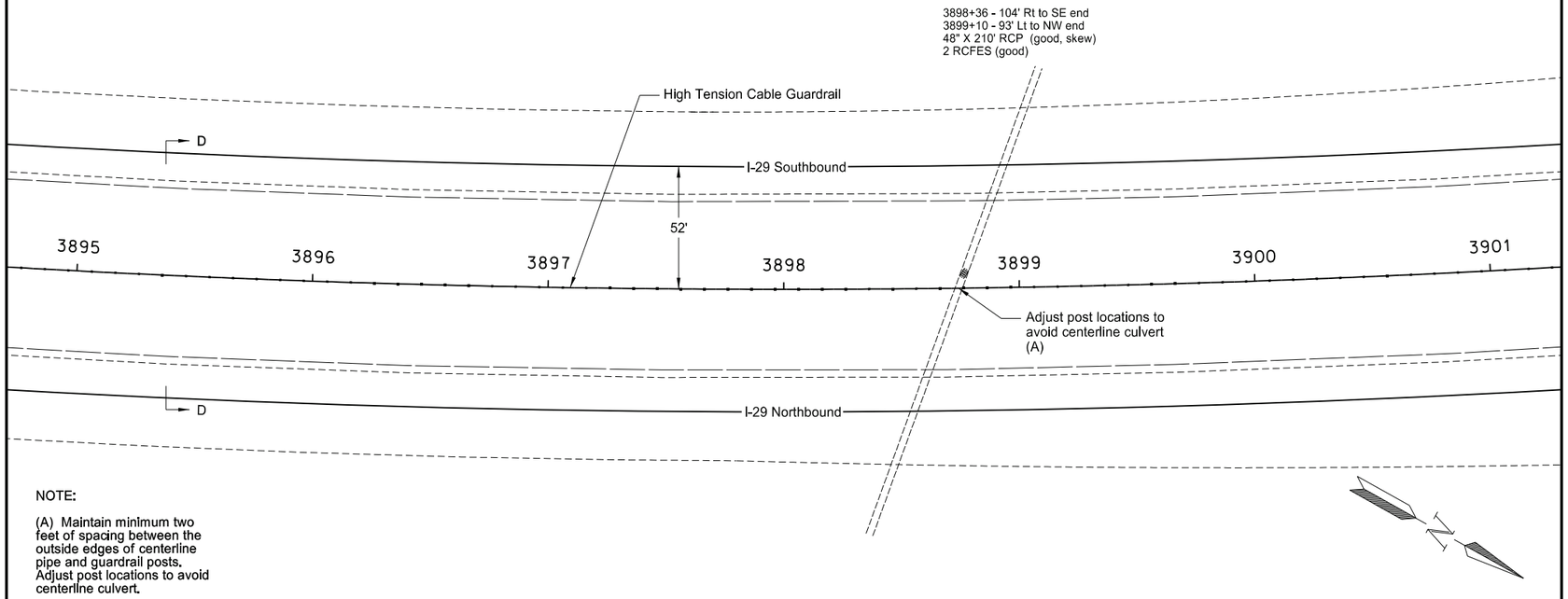
Segment D - Sta 3877+00 to 3881+17
Segment E - Sta 3880+56 to 3889+00

I-29 - Cass Co 20 to Argusville Interchange

23 USC § 407 Documents
NDDOT Reserves All Objections

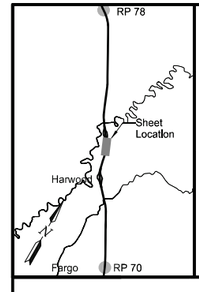
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-X-8-029(200)069	130	18





NOTE:

(A) Maintain minimum two feet of spacing between the outside edges of centerline pipe and guardrail posts. Adjust post locations to avoid centerline culvert.



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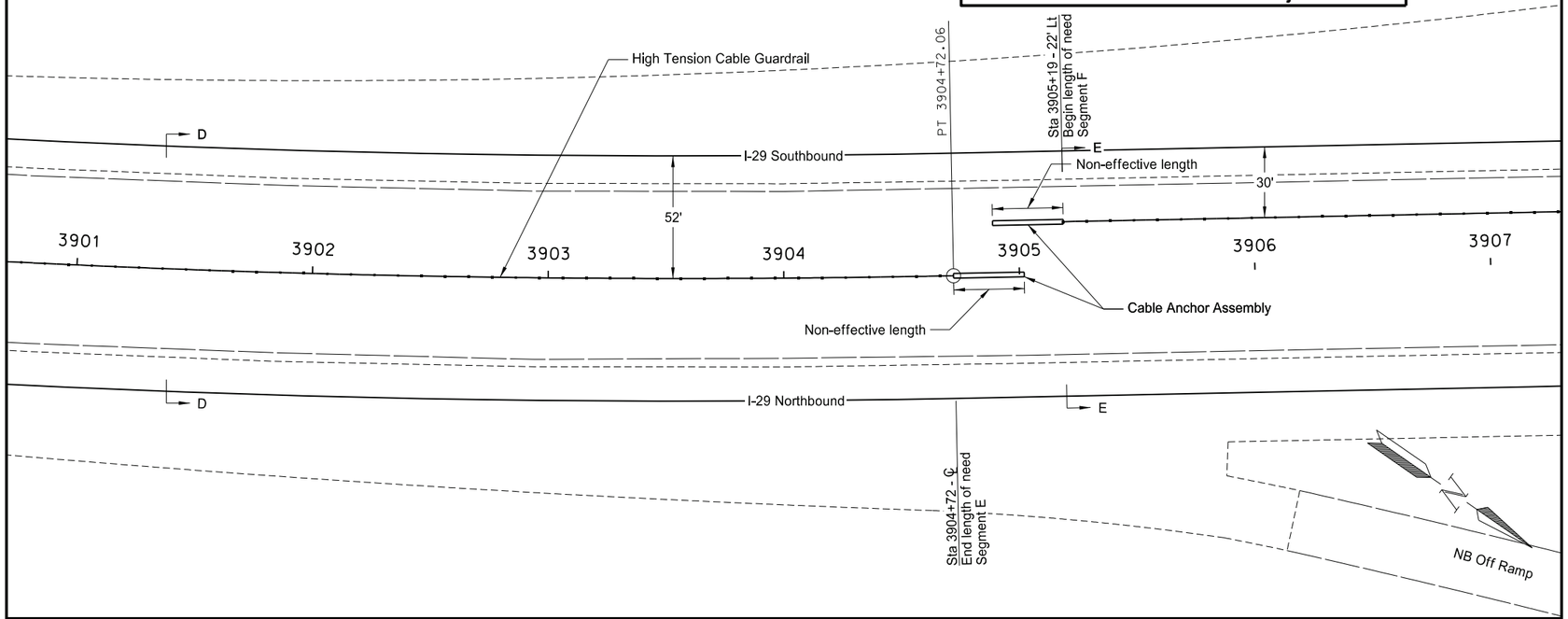
High Tension Cable Guardrail Layout

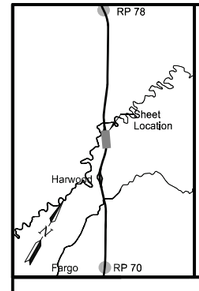
Segment E - Sta 3889+00 to 3901+00

I-29 - Cass Co 20 to Argusville Interchange

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HEN-X-8-029(200)069	130	19

23 USC § 407 Documents
NDDOT Reserves All Objections





REGISTERED PROFESSIONAL ENGINEER
SCOTT MIDDAUGH
PE-7499
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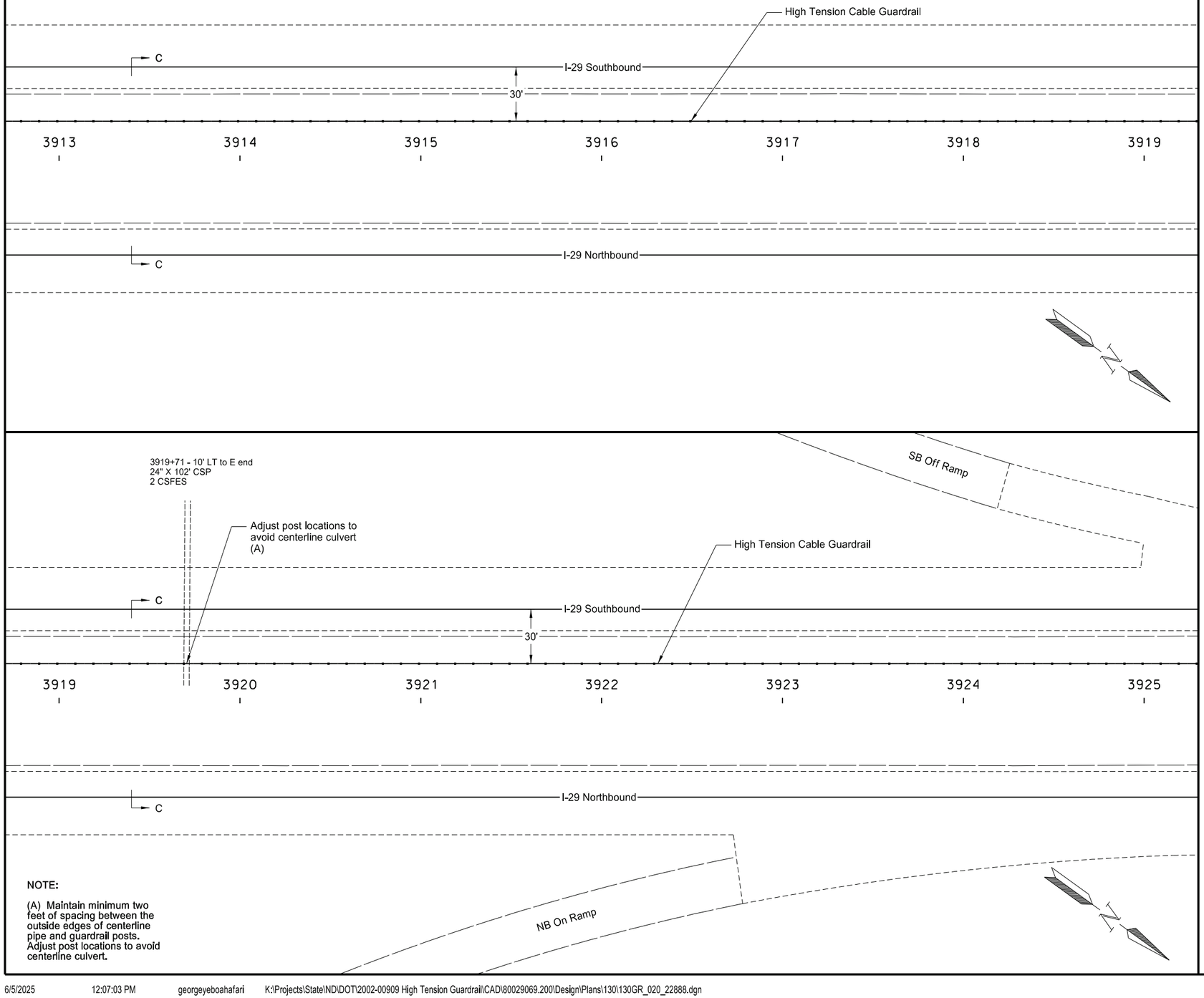
High Tension Cable Guardrail Layout

Segment E - Sta 3901+00 to 3904+72
Segment F - Sta 3905+19 to 3913+00

I-29 - Cass Co 20 to Argusville Interchange

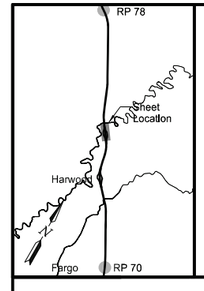
23 USC § 407 Documents
NDDOT Reserves All Objections

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-X-8-029(200)069	130	20



NOTE:

(A) Maintain minimum two feet of spacing between the outside edges of centerline pipe and guardrail posts. Adjust post locations to avoid centerline culvert.



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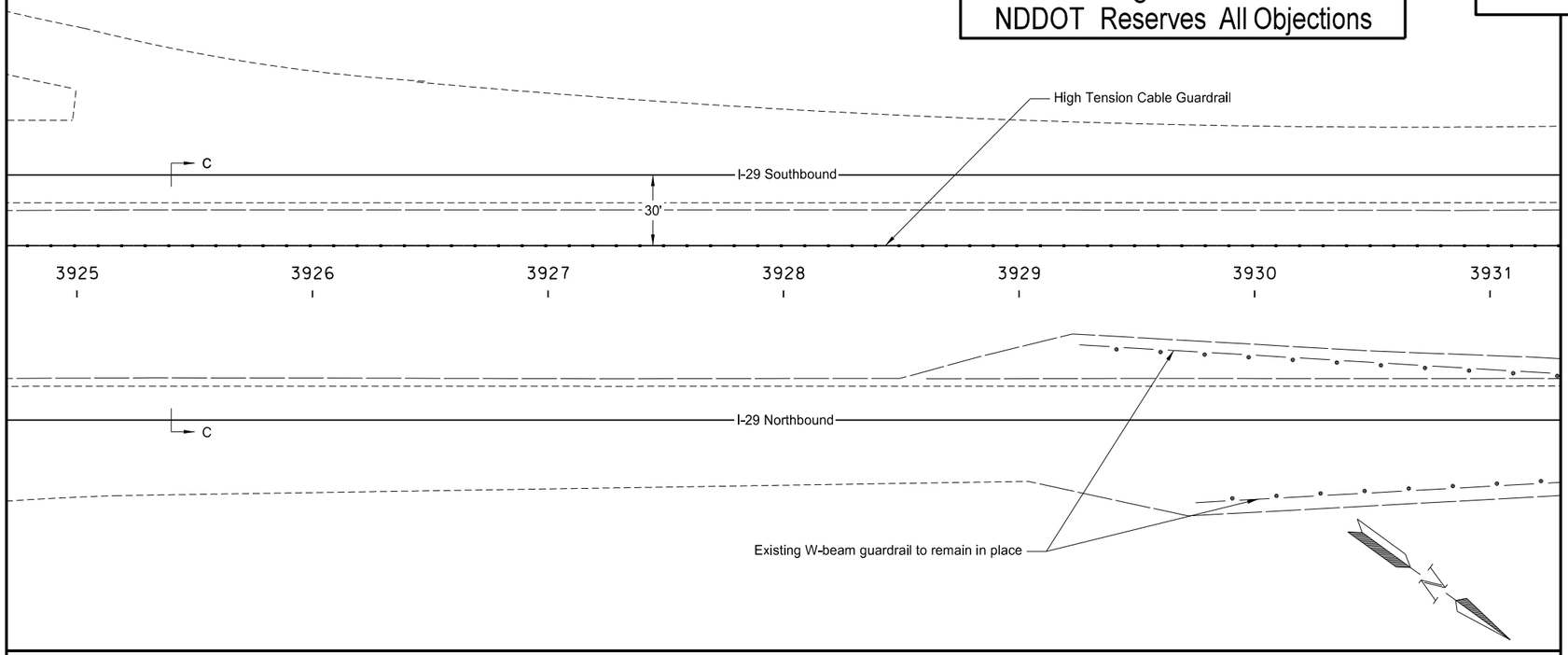
High Tension Cable Guardrail Layout

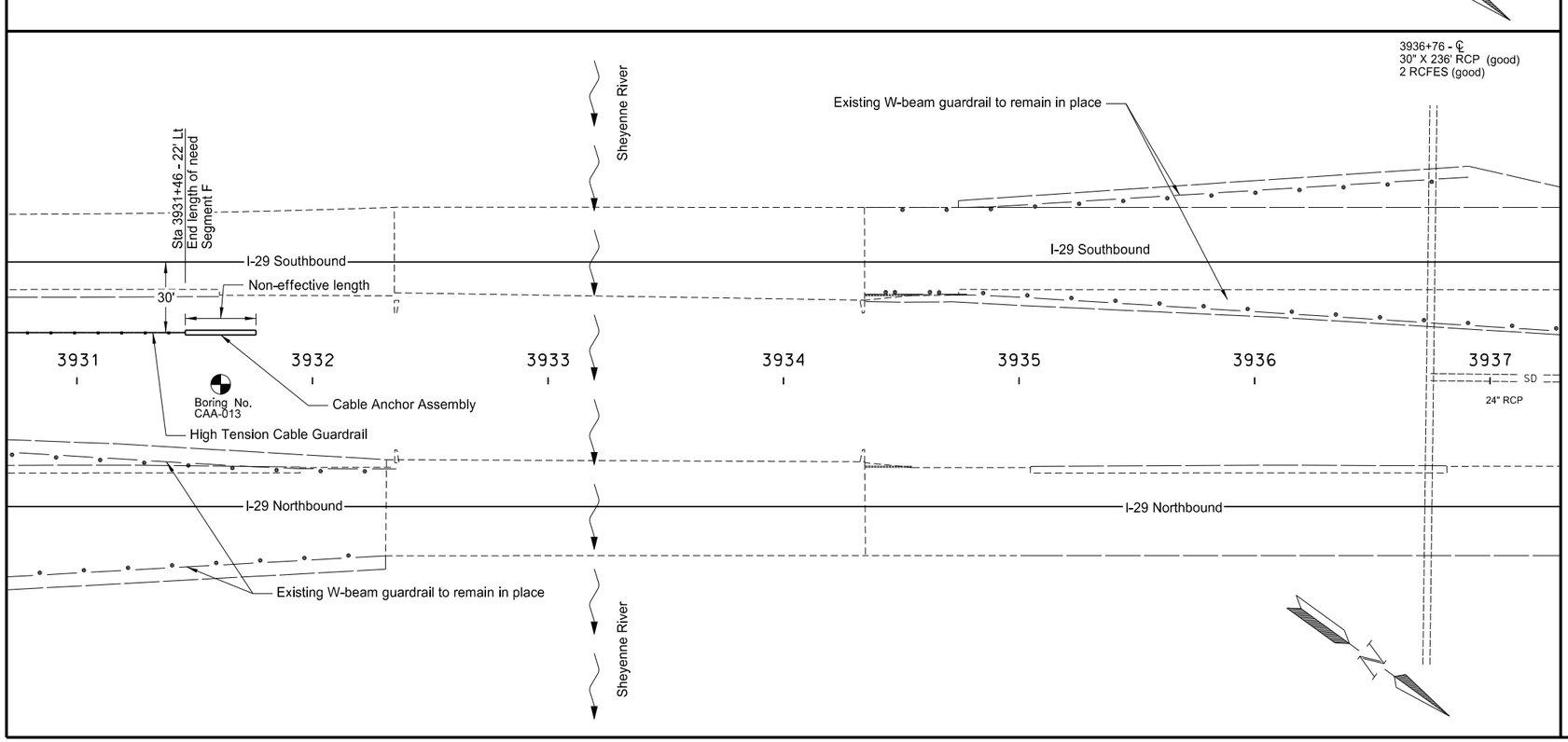
Segment F - Sta 3913+00 to 3925+00

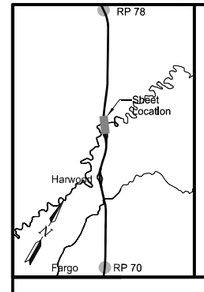
I-29 - Cass Co 20 to Argusville Interchange

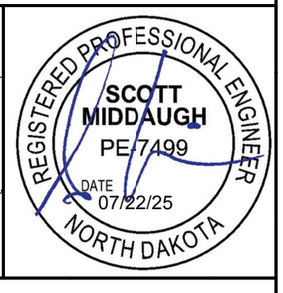
23 USC § 407 Documents
NDDOT Reserves All Objections

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-X-8-029(200)069	130	21









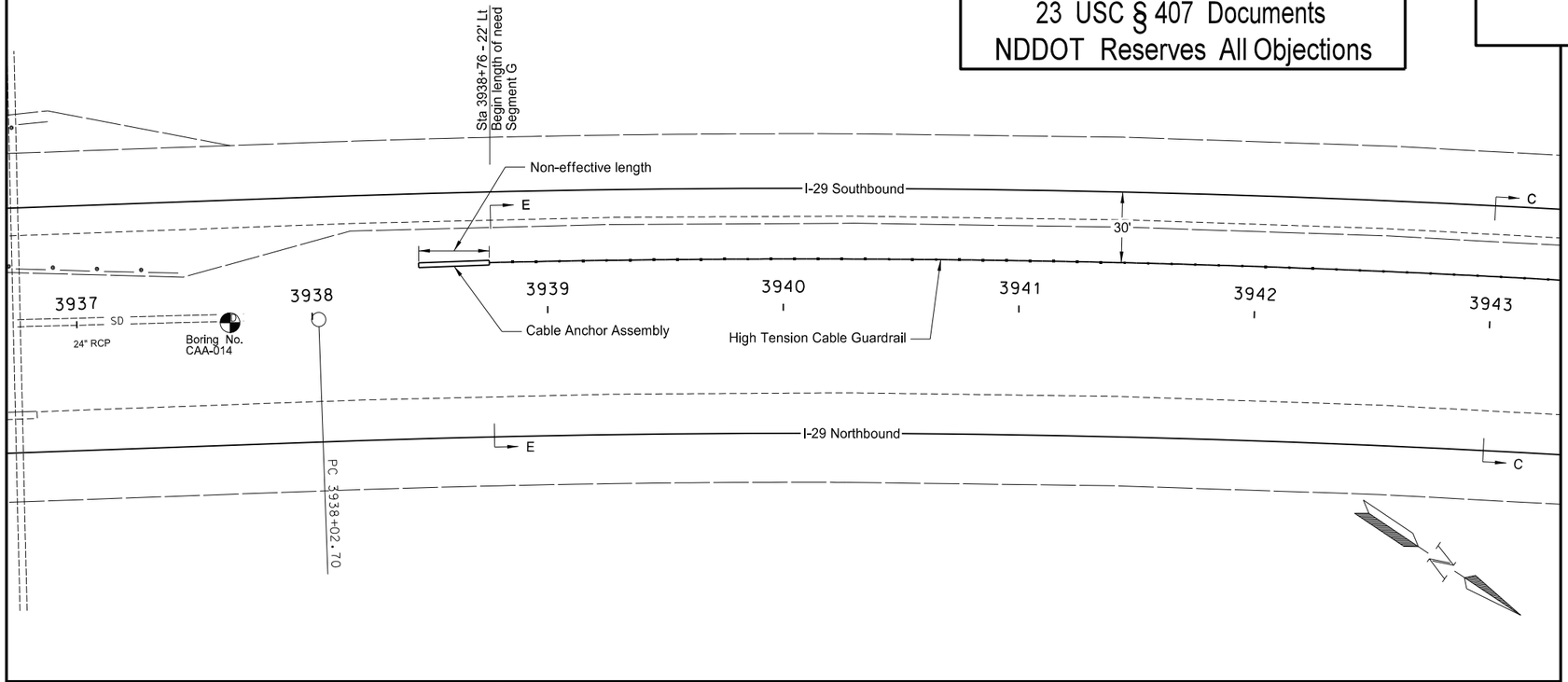
High Tension Cable Guardrail Layout

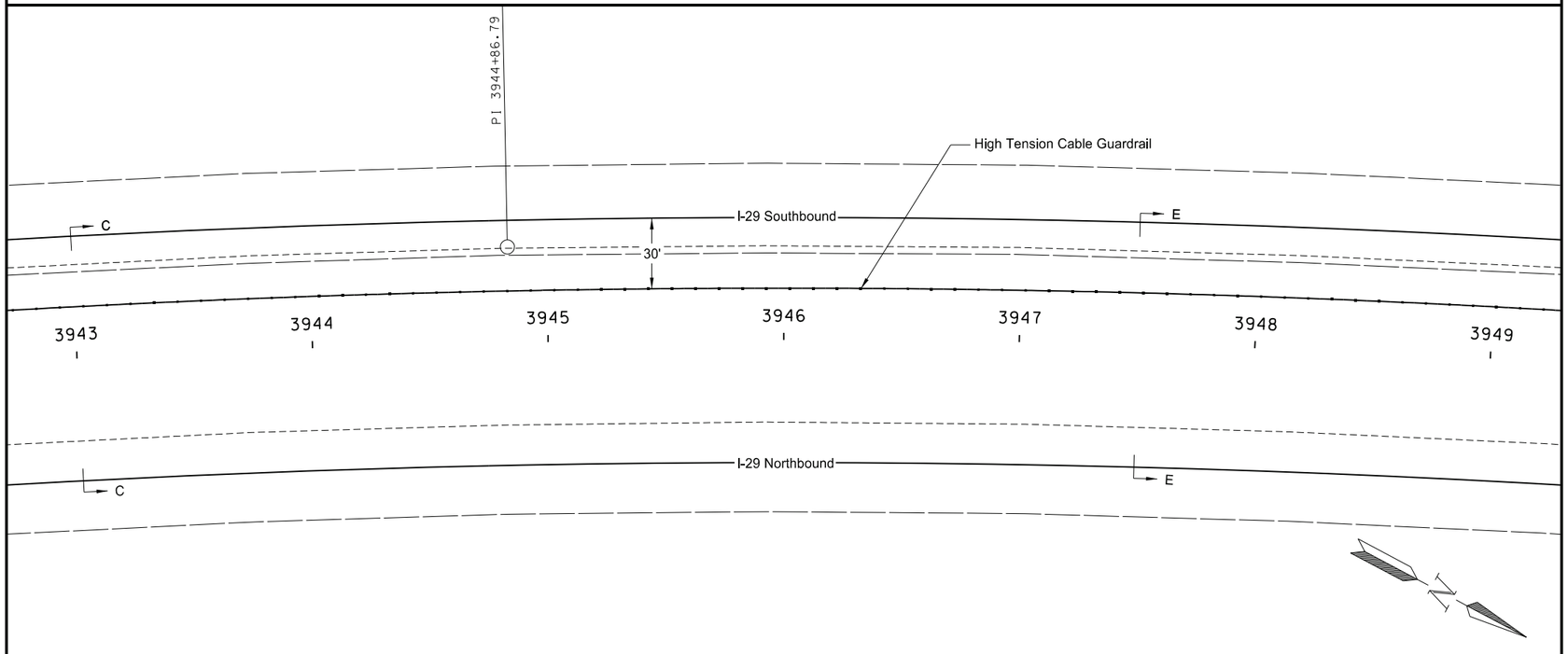
Segment F - Sta 3925+00 to 3931+46

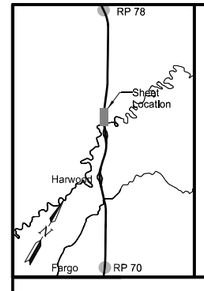
I-29 - Cass Co 20 to Argusville Interchange

23 USC § 407 Documents
NDDOT Reserves All Objections

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-X-8-029(200)069	130	22









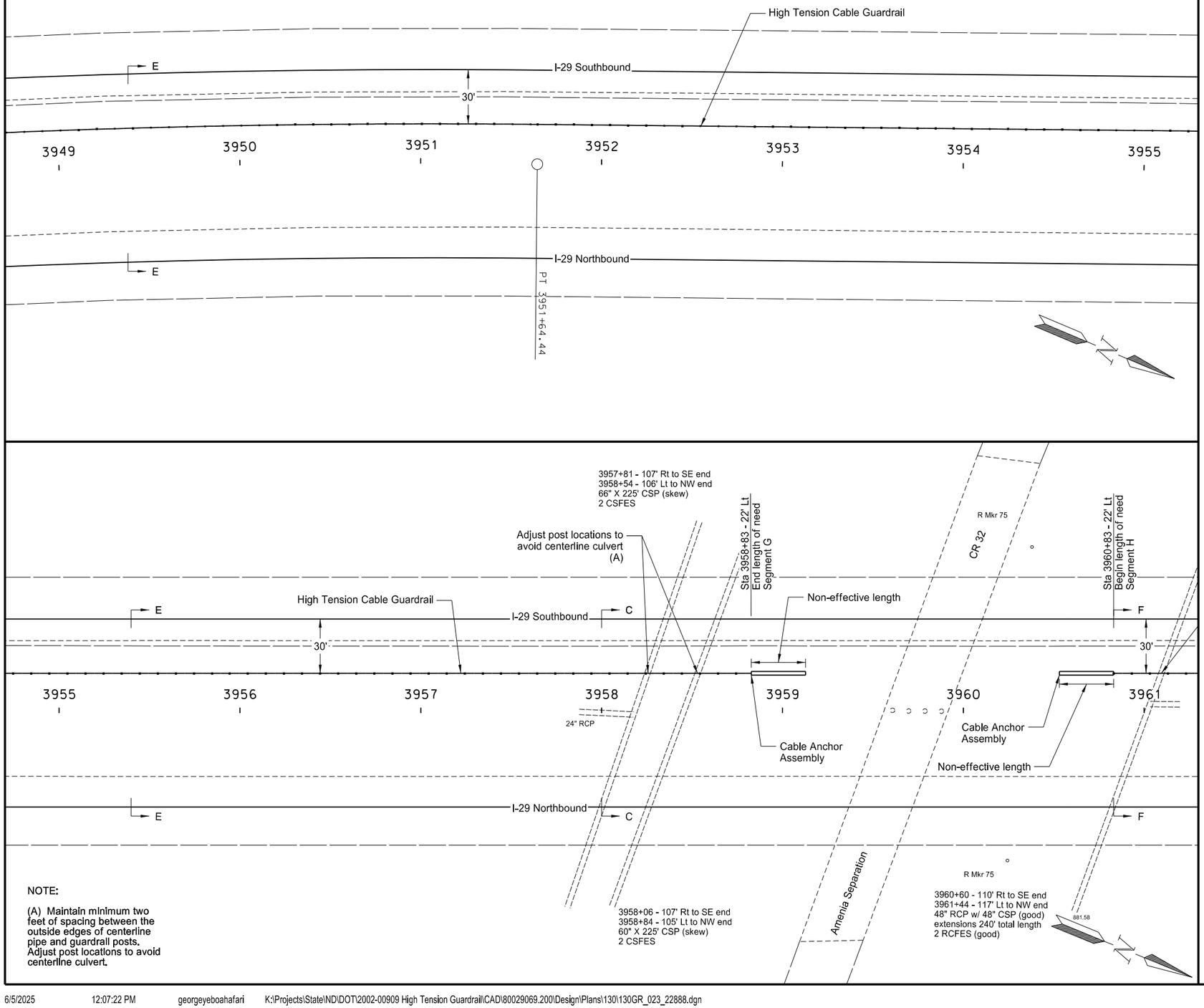
High Tension Cable Guardrail Layout

Segment G - Sta 3938+76 to 3949+00

I-29 - Cass Co 20 to Argusville Interchange

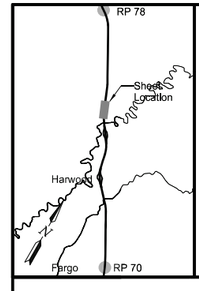
23 USC § 407 Documents
NDDOT Reserves All Objections

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-X-8-029(200)069	130	23



NOTE:

(A) Maintain minimum two feet of spacing between the outside edges of centerline pipe and guardrail posts. Adjust post locations to avoid centerline culvert.





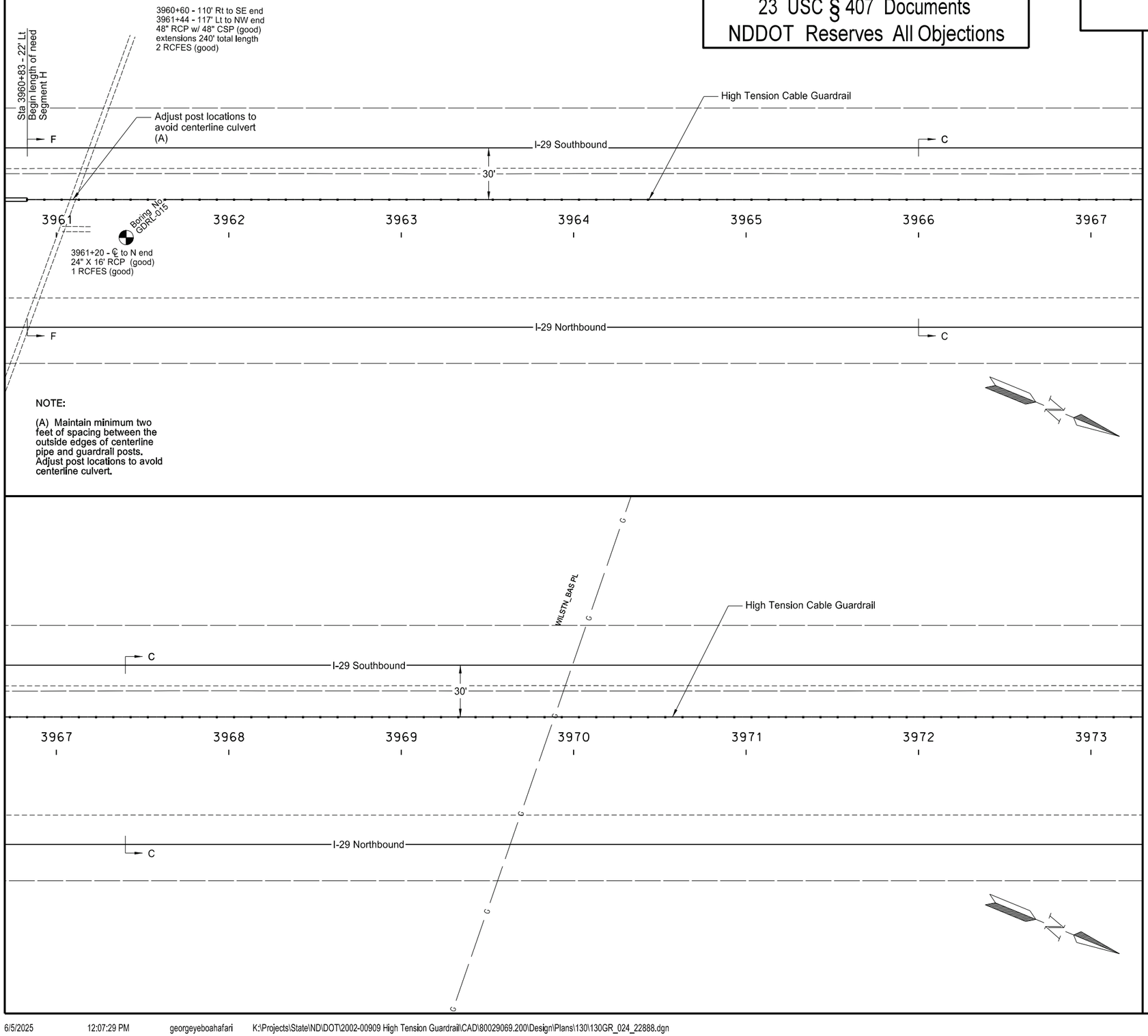
High Tension Cable Guardrail Layout

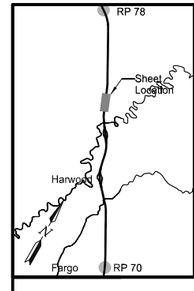
Segment G - Sta 3949+00 to 3958+83
Segment H - Sta 3960+83 to 3961+00

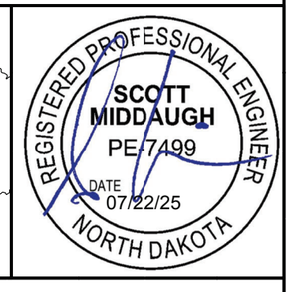
I-29 - Cass Co 20 to Argusville Interchange

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-X-8-029(200)069	130	24

23 USC § 407 Documents
NDDOT Reserves All Objections







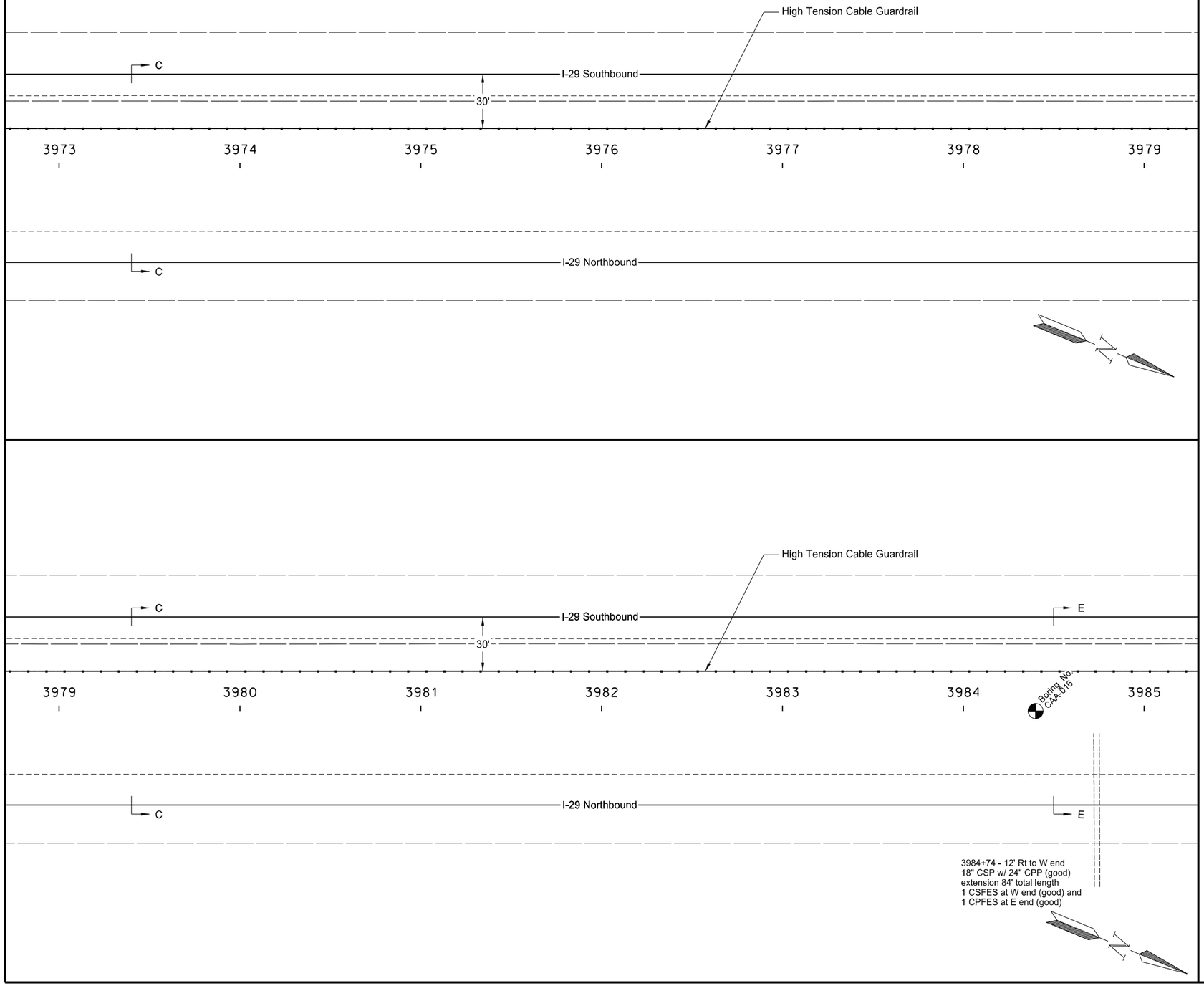
High Tension Cable Guardrail Layout

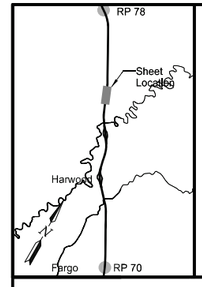
Segment H - Sta 3961+00 to 3973+00

I-29 - Cass Co 20 to Argusville Interchange

23 USC § 407 Documents
NDDOT Reserves All Objections

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-X-8-029(200)069	130	25







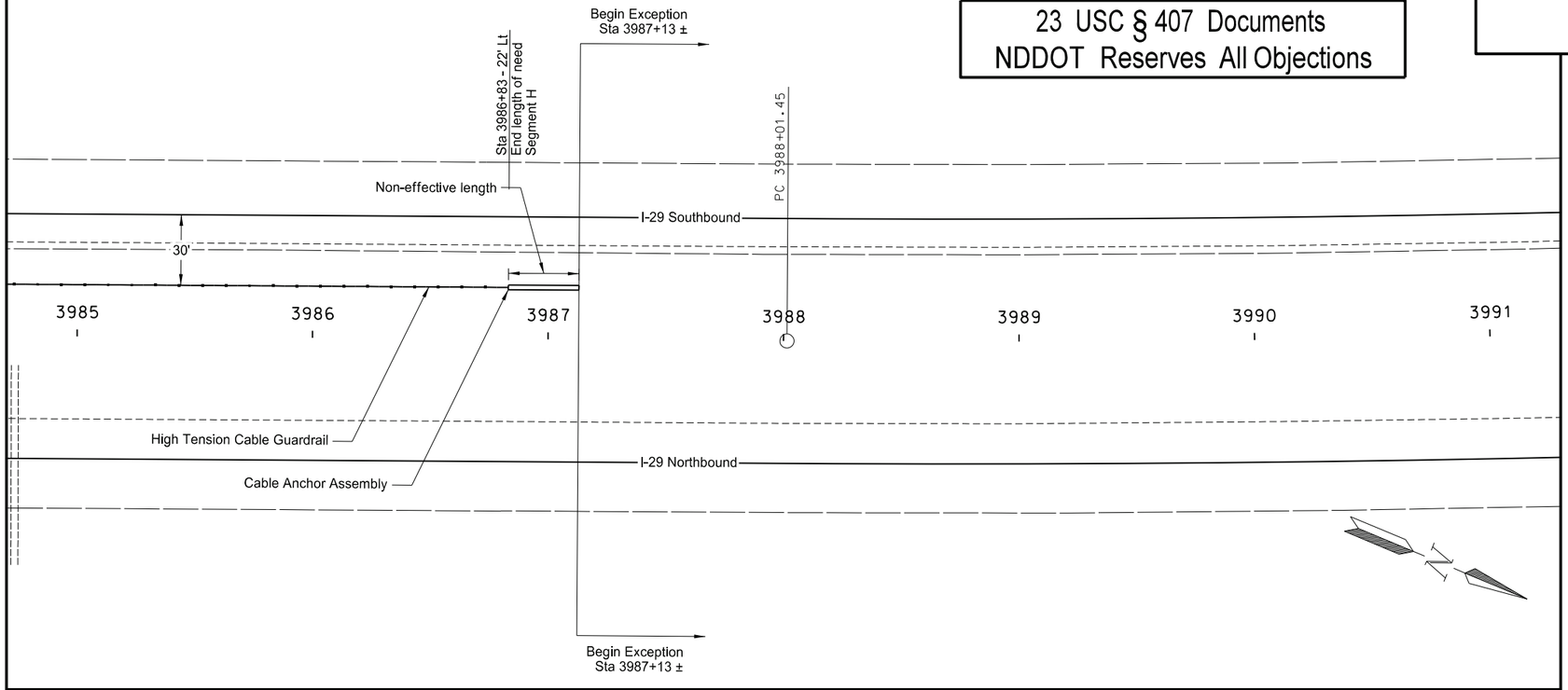
High Tension Cable Guardrail Layout

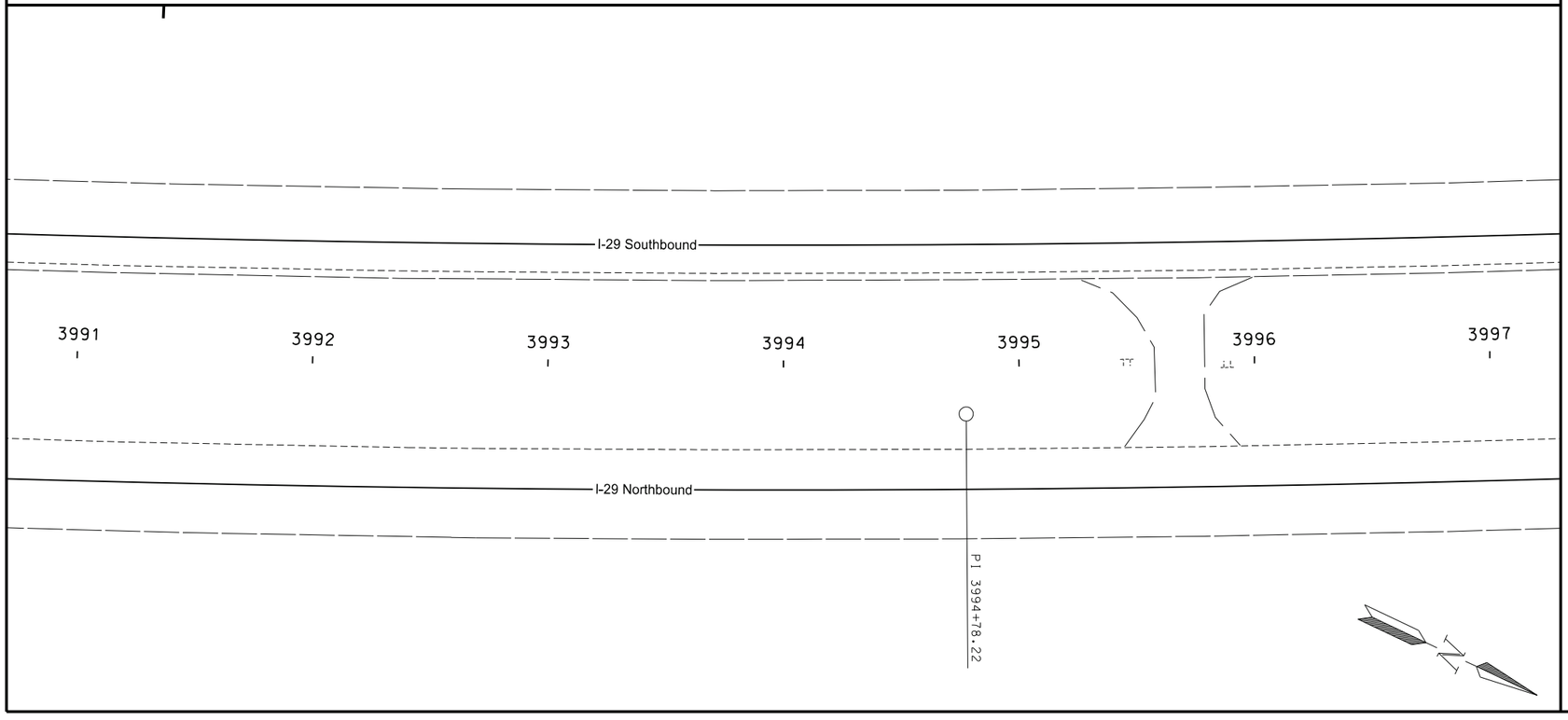
Segment H - Sta 3973+00 to 3985+00

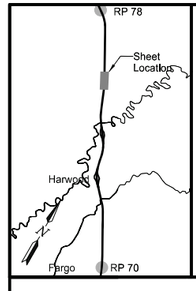
I-29 - Cass Co 20 to Argusville Interchange

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-X-8-029(200)069	130	26

23 USC § 407 Documents
NDDOT Reserves All Objections







REGISTERED PROFESSIONAL ENGINEER
SCOTT MIDDAUGH
PE-7499
DATE 07/22/25
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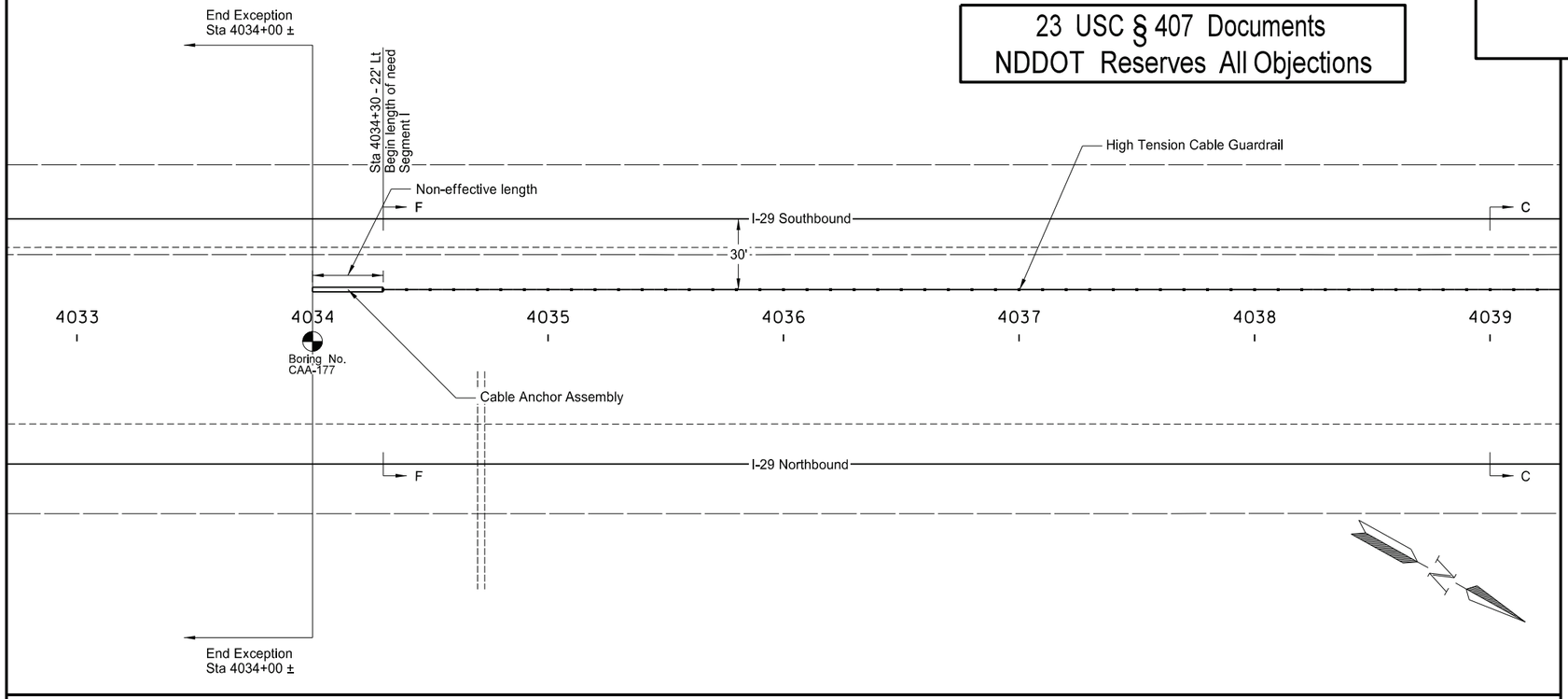
High Tension Cable Guardrail Layout

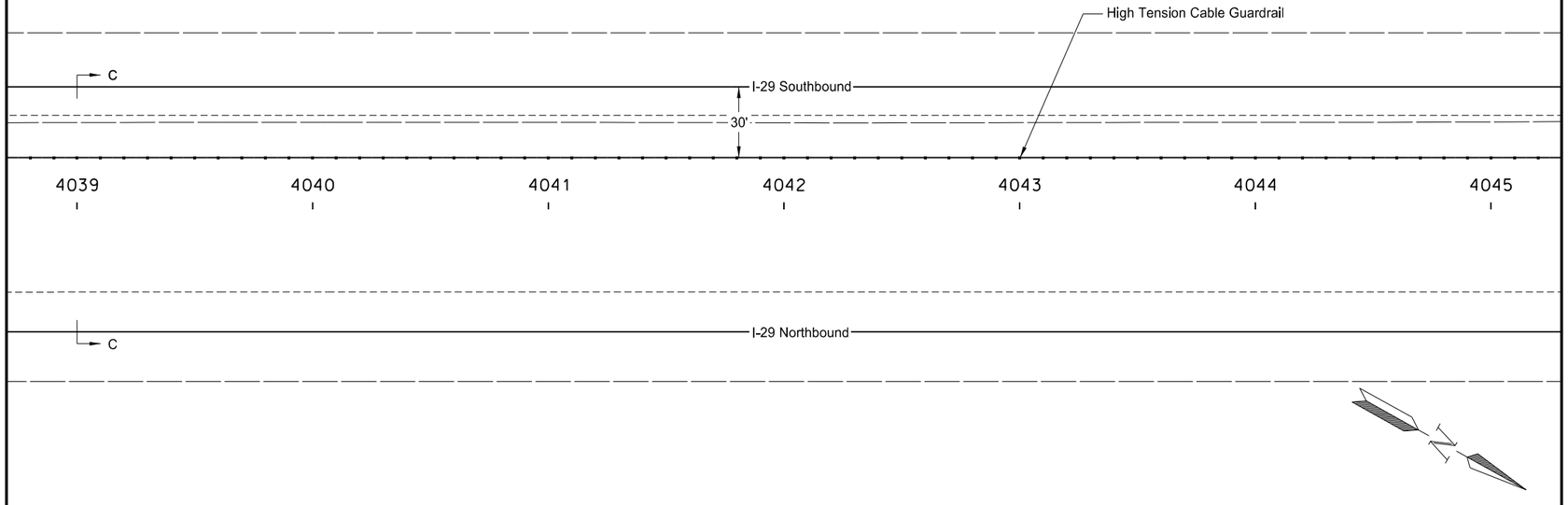
Segment H - Sta 3985+00 to 3986+83

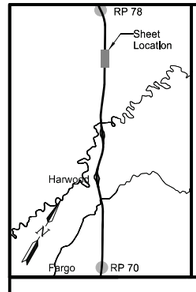
I-29 - Cass Co 20 to Argusville Interchange

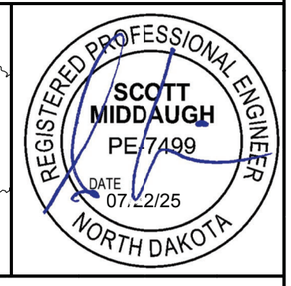
23 USC § 407 Documents
NDDOT Reserves All Objections

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-X-8-029(200)069	130	27









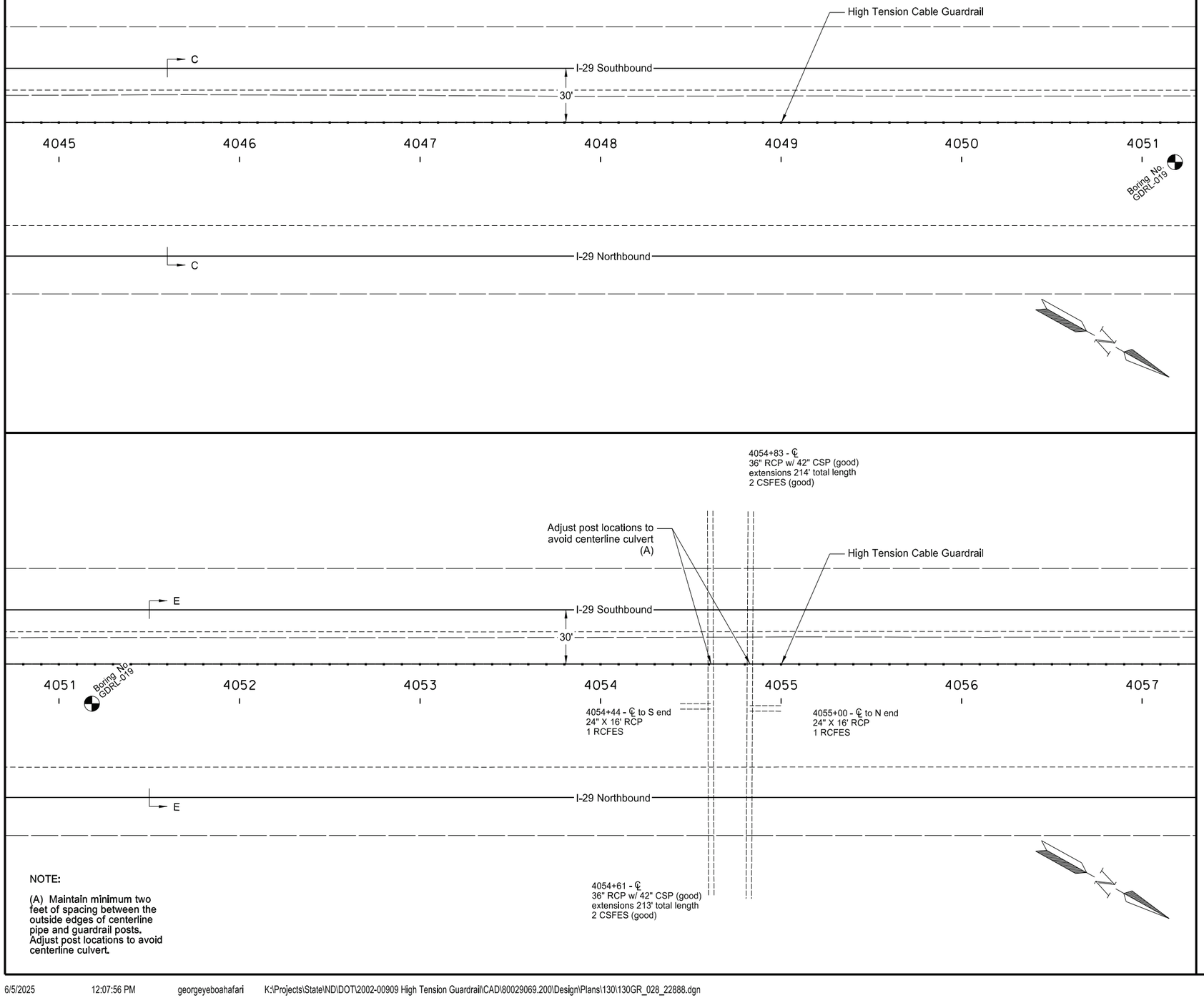
High Tension Cable Guardrail Layout

Segment I - Sta 4034+30 to 4045+00

I-29 - Cass Co 20 to Argusville Interchange

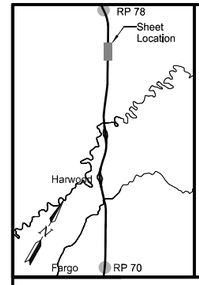
23 USC § 407 Documents
NDDOT Reserves All Objections

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-X-8-029(200)069	130	28



NOTE:

(A) Maintain minimum two feet of spacing between the outside edges of centerline pipe and guardrail posts. Adjust post locations to avoid centerline culvert.





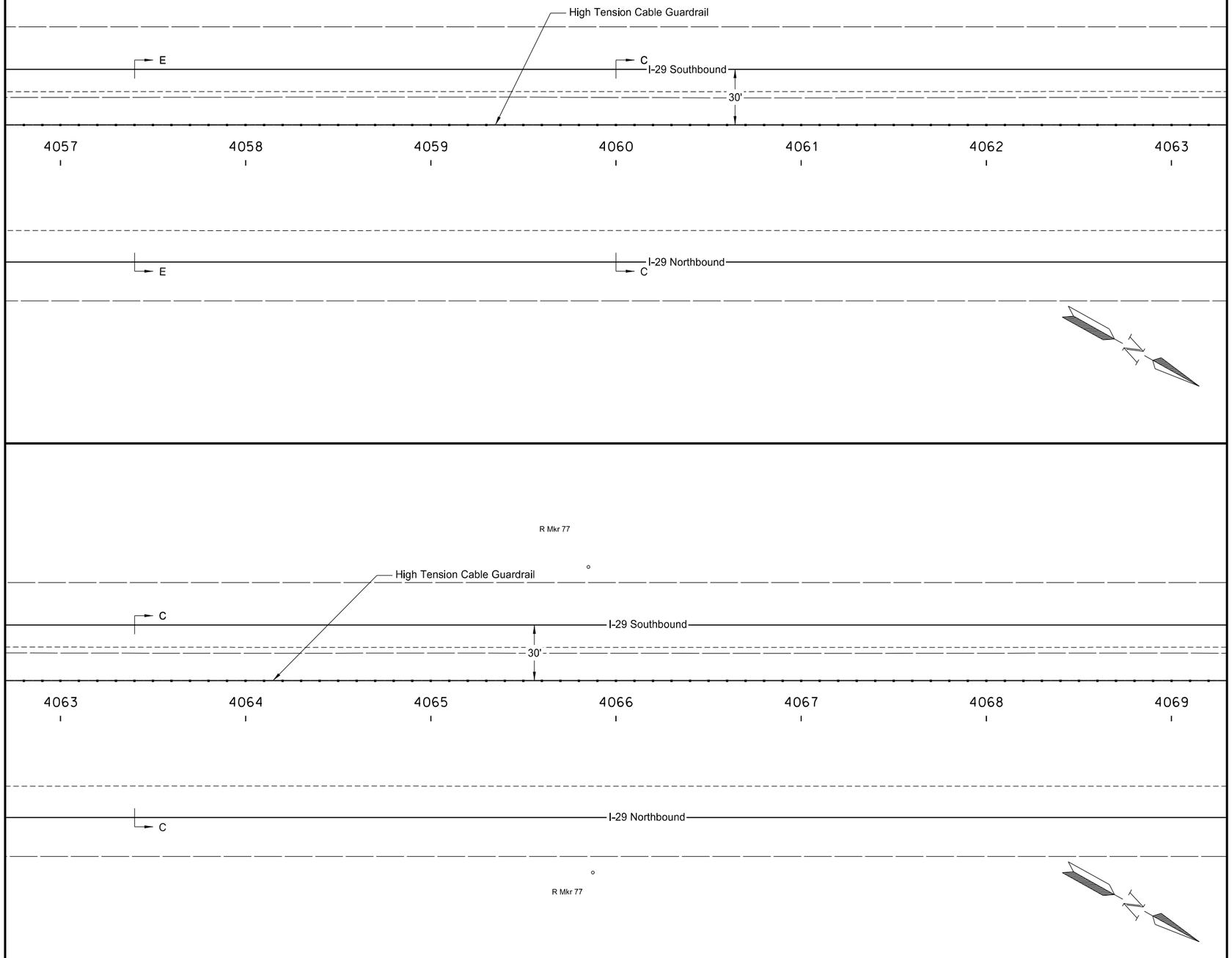
High Tension Cable Guardrail Layout

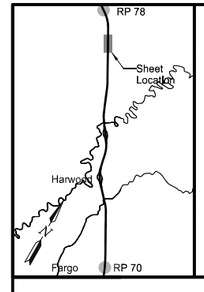
Segment I - Sta 4045+45 to 4057+00

I-29 - Cass Co 20 to Argusville Interchange

23 USC § 407 Documents
NDDOT Reserves All Objections

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-X-8-029(200)069	130	29







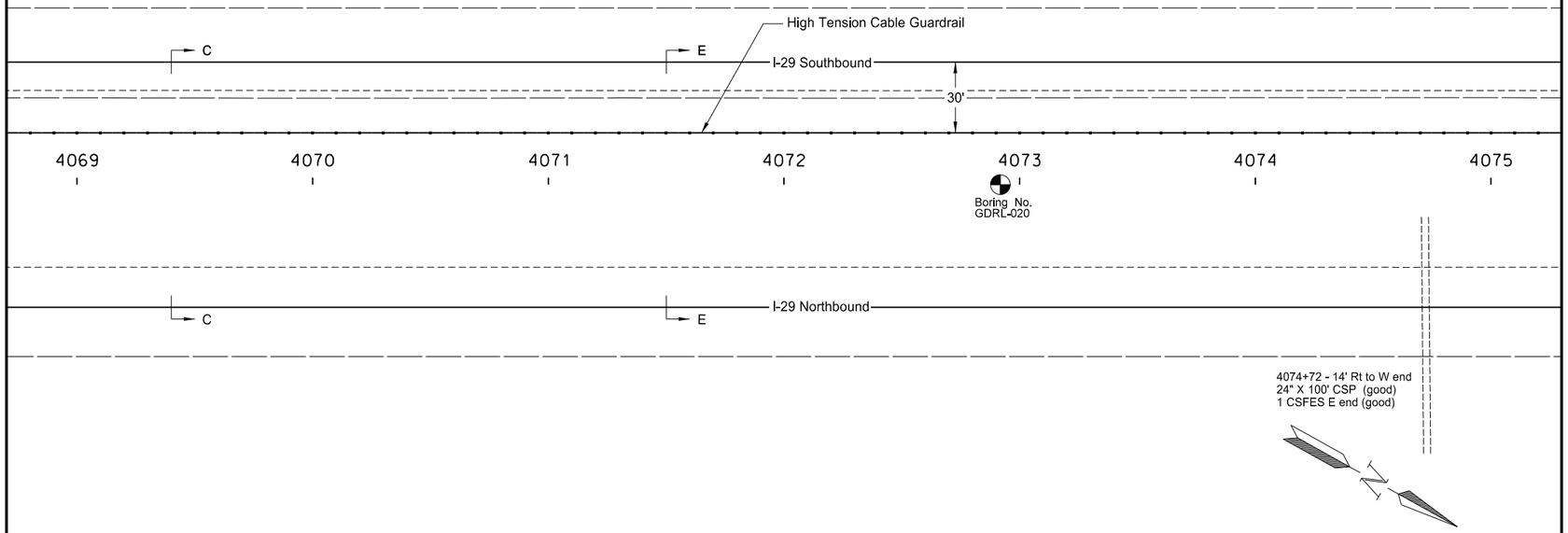
High Tension Cable Guardrail Layout

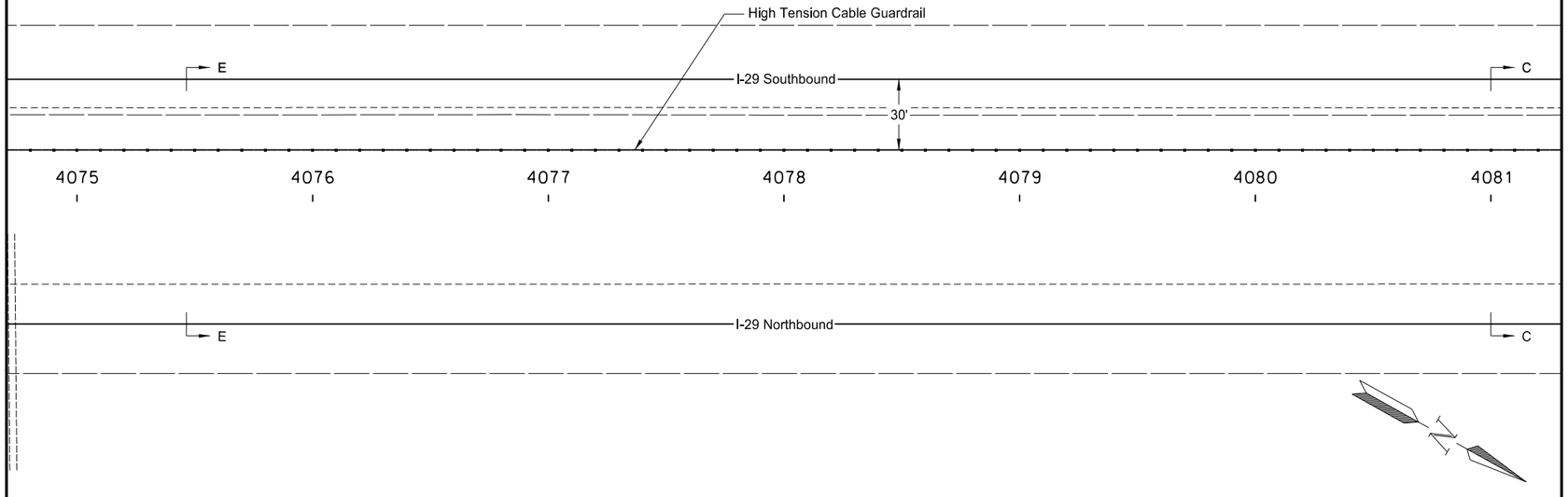
Segment I - Sta 4057+00 to 4069+00

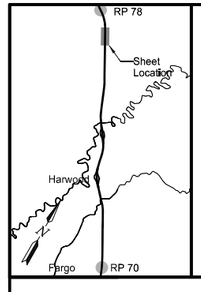
I-29 - Cass Co 20 to Argusville Interchange

23 USC § 407 Documents
NDDOT Reserves All Objections

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-X-8-029(200)069	130	30









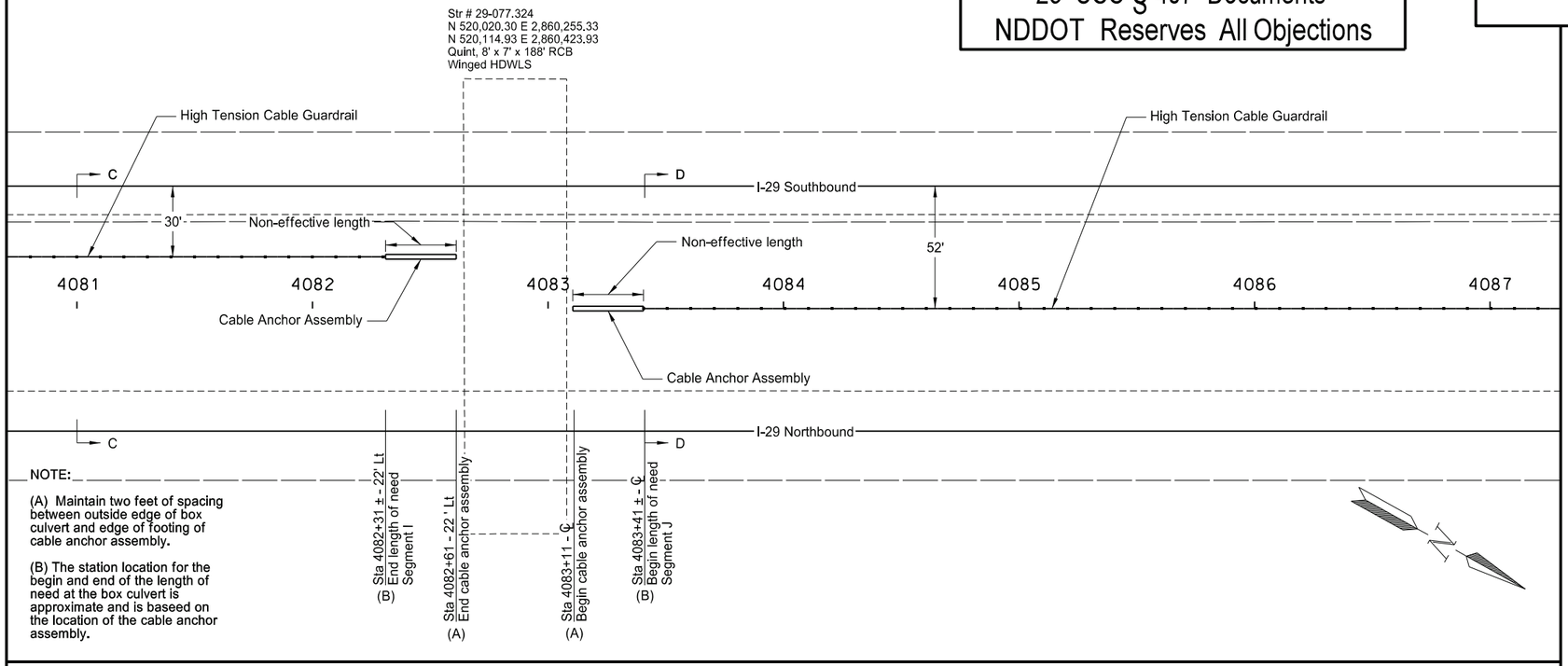
High Tension Cable Guardrail Layout

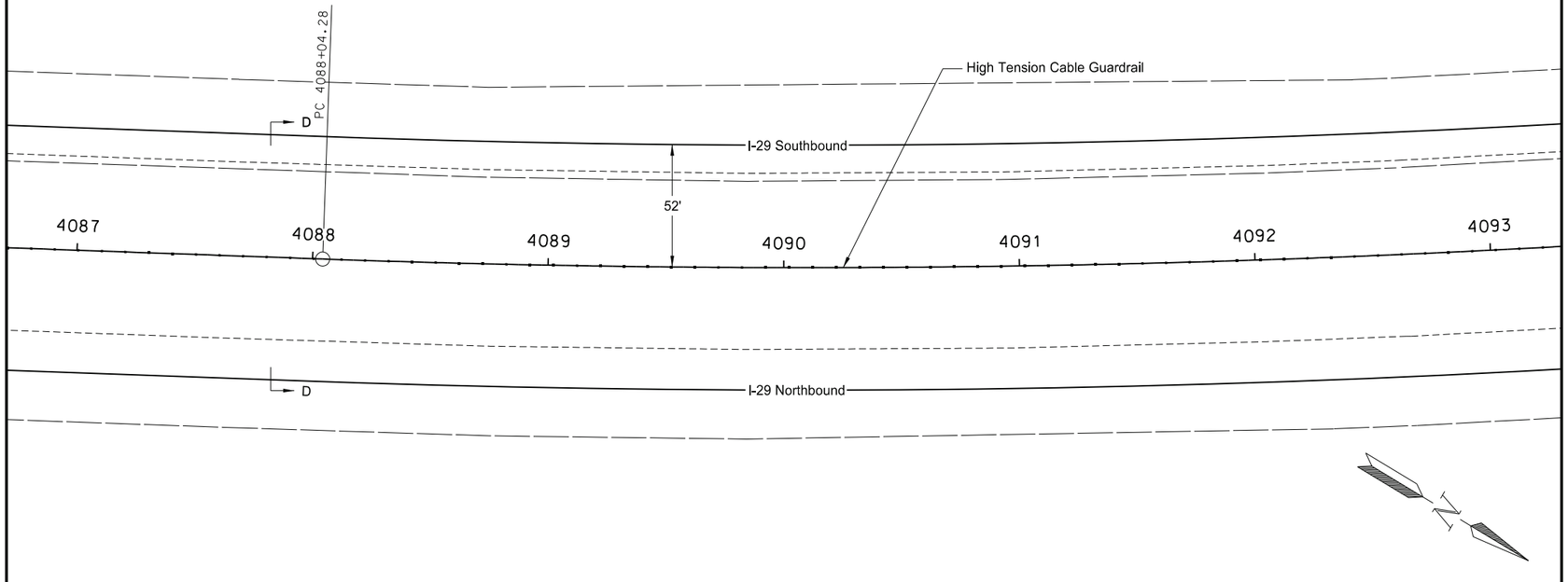
Segment I - Sta 4069+00 to 4081+00

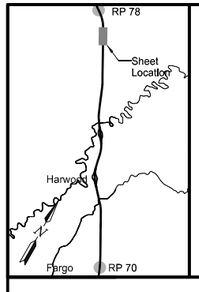
I-29 - Cass Co 20 to Argusville Interchange

23 USC § 407 Documents
NDDOT Reserves All Objections

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-X-8-029(200)069	130	31









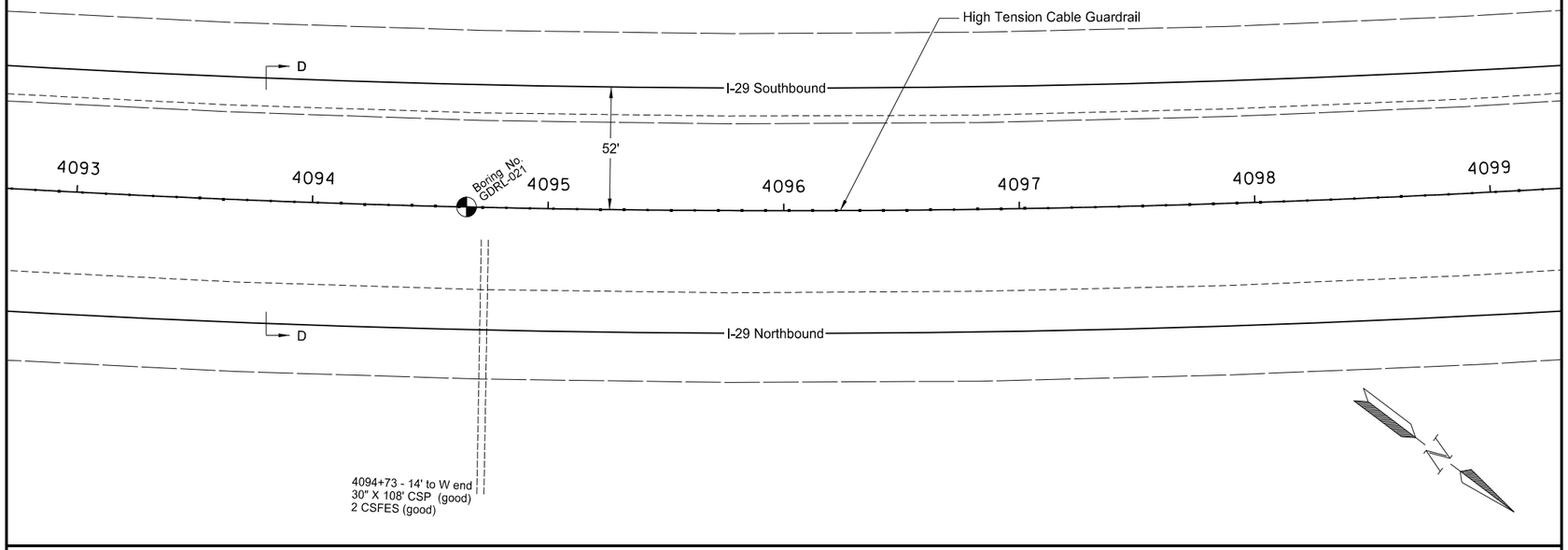
High Tension Cable Guardrail Layout

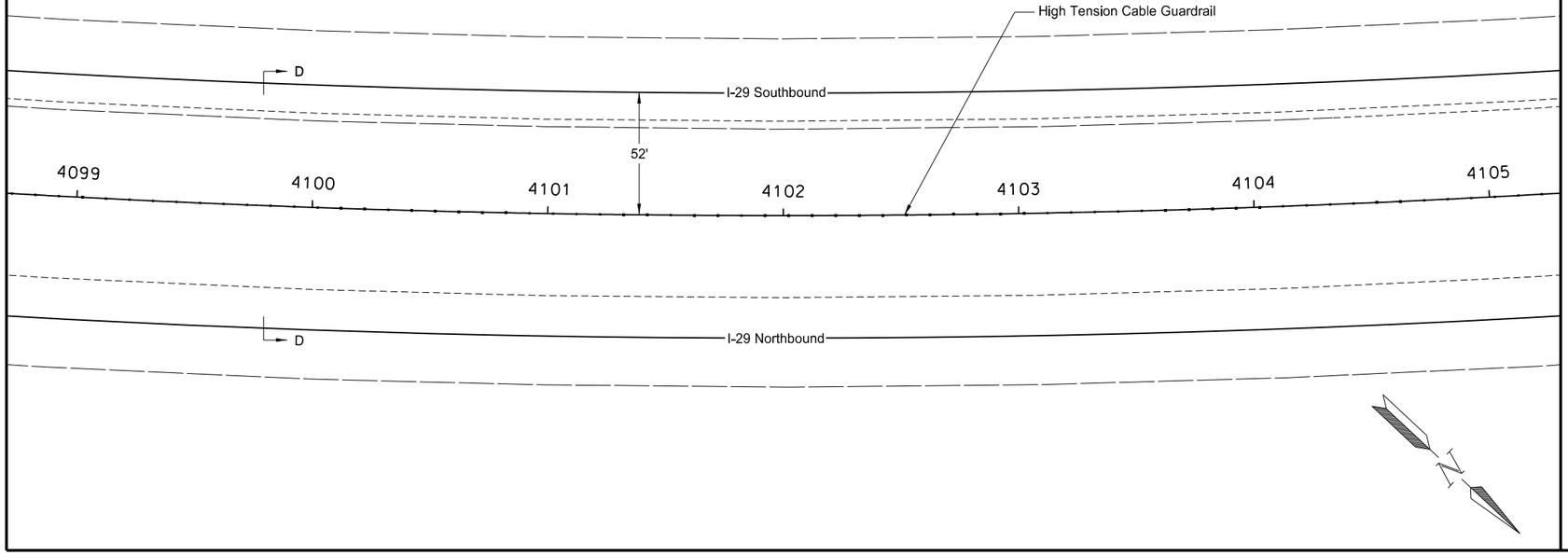
Segment I - Sta 4081+00 to 4082+31 ±
Segment J - Sta 4083+41 ± to 4093+00

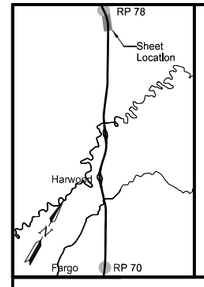
I-29 - Cass Co 20 to Argusville Interchange

23 USC § 407 Documents
NDDOT Reserves All Objections

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-X-8-029(200)069	130	32







REGISTERED PROFESSIONAL ENGINEER
SCOTT MIDDAUGH
PE-7499
DATE 07/22/25
NORTH DAKOTA

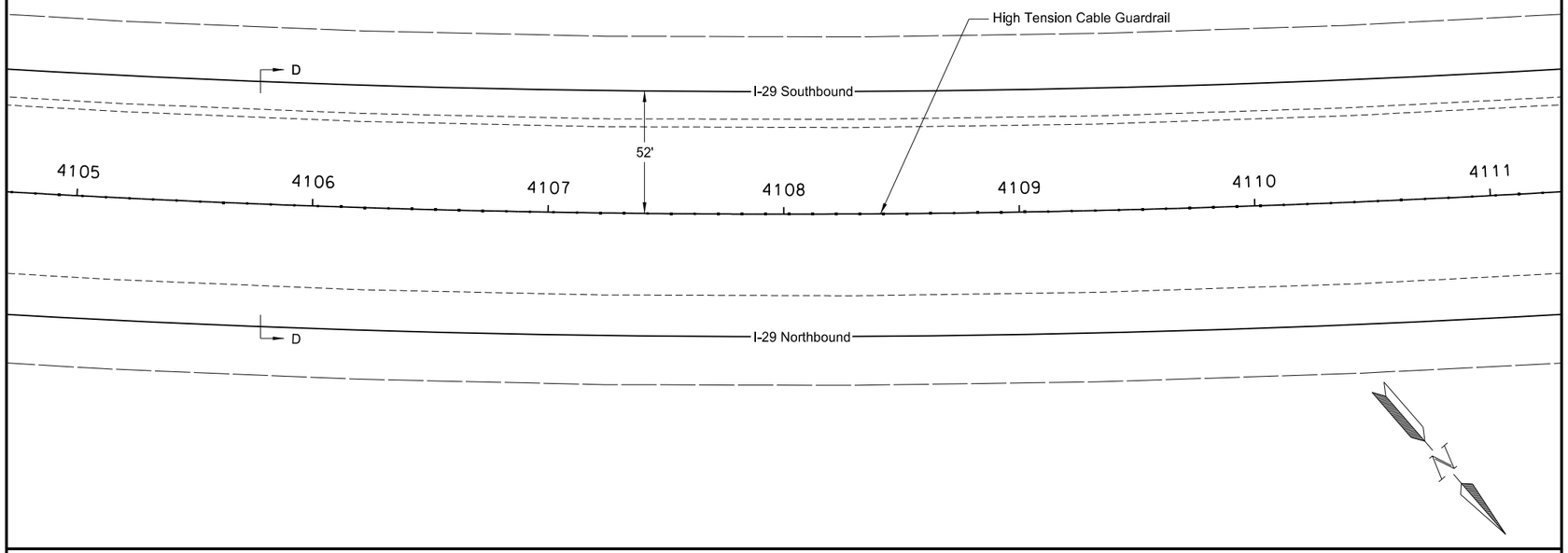
High Tension Cable Guardrail Layout

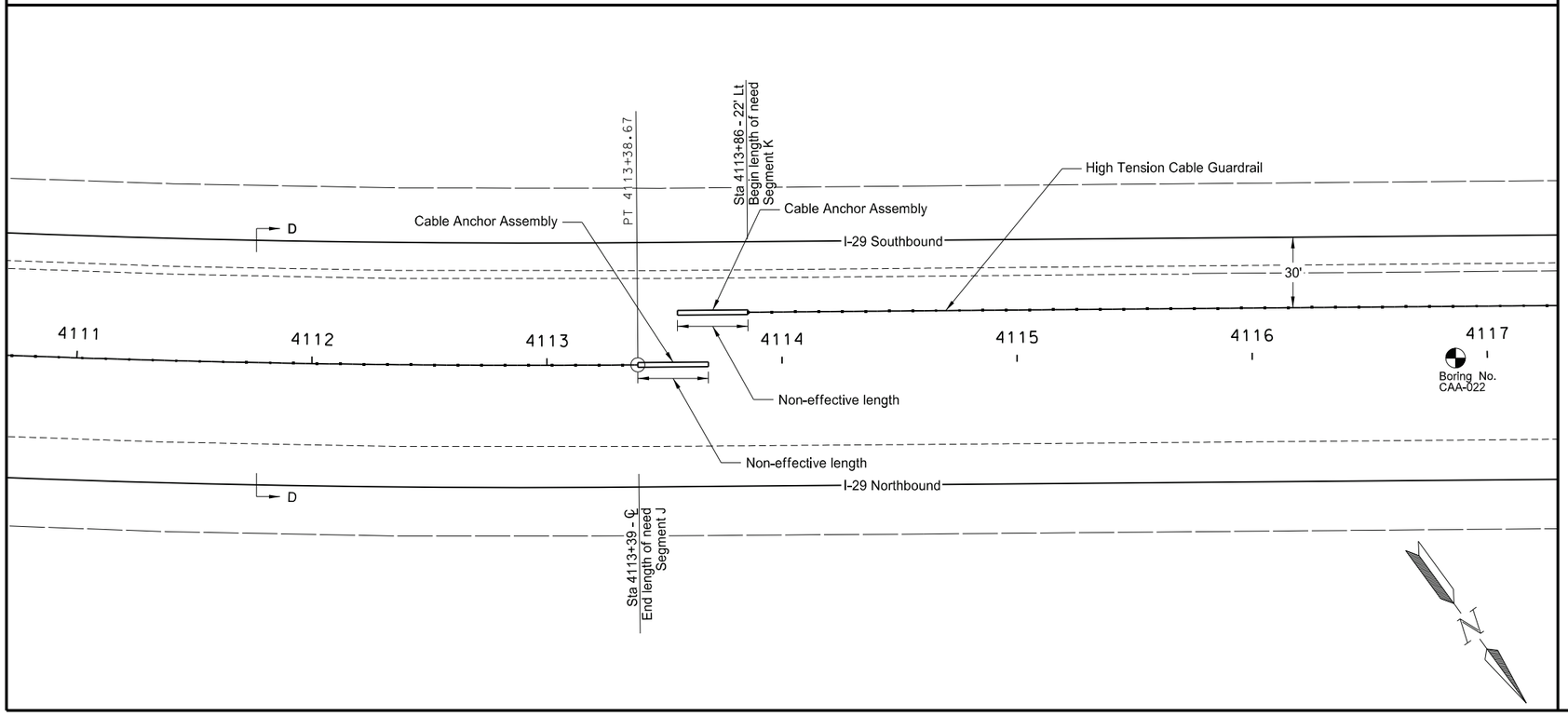
Segment J - Sta 4093+00 to 4105+00

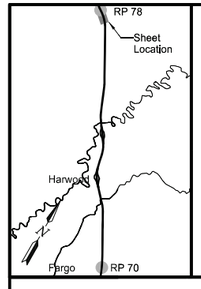
I-29 - Cass Co 20 to Argusville Interchange

23 USC § 407 Documents
NDDOT Reserves All Objections

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-X-8-029(200)069	130	33







REGISTERED PROFESSIONAL ENGINEER
SCOTT MIDDAUGH
PE-7499
DATE 07/22/25
NORTH DAKOTA

High Tension Cable Guardrail Layout

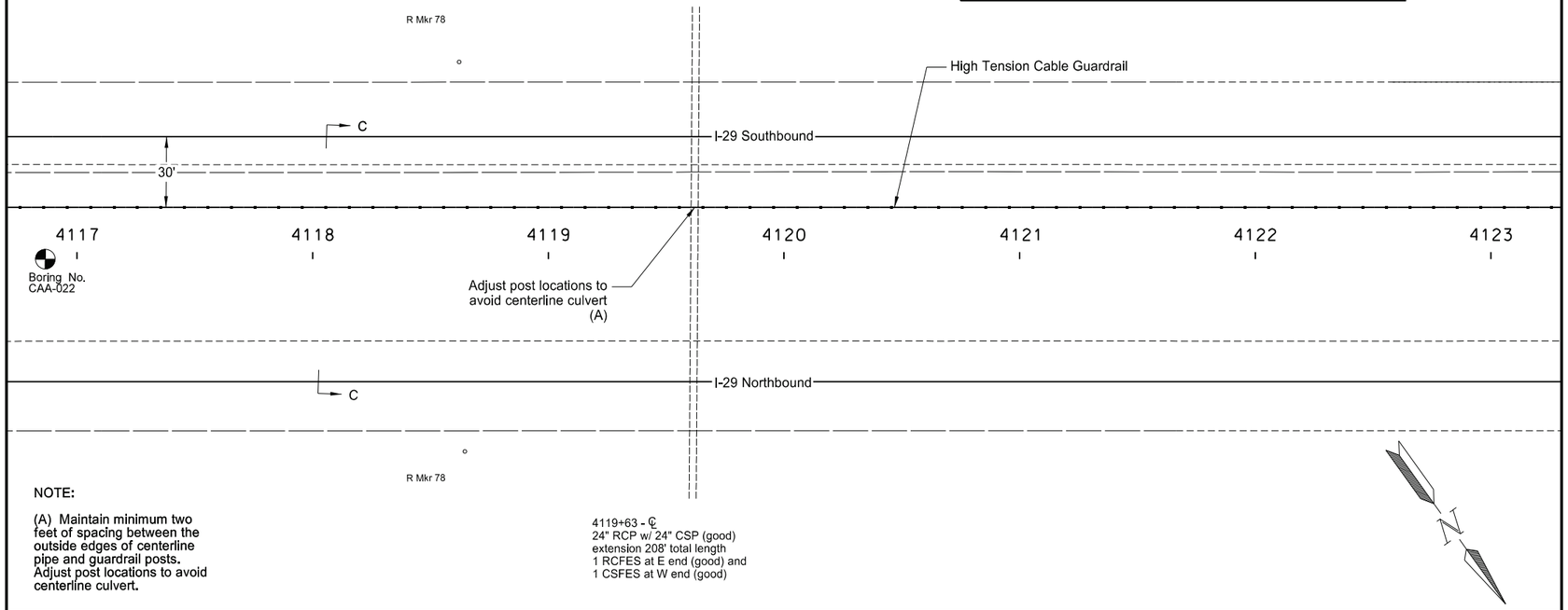
Segment J - Sta 4105+00 to 4113+39
Segment K - Sta 4113+86 to 4117+00

I-29 - Cass Co 20 to Argusville Interchange

6/5/2025 12:08:30 PM georgeyeboahafari K:\Projects\State\ND\DOT\2002-00909 High Tension Guardrail\CAD\80029069.200\Design\Plans\130\130GR_033_22888.dgn

23 USC § 407 Documents
NDDOT Reserves All Objections

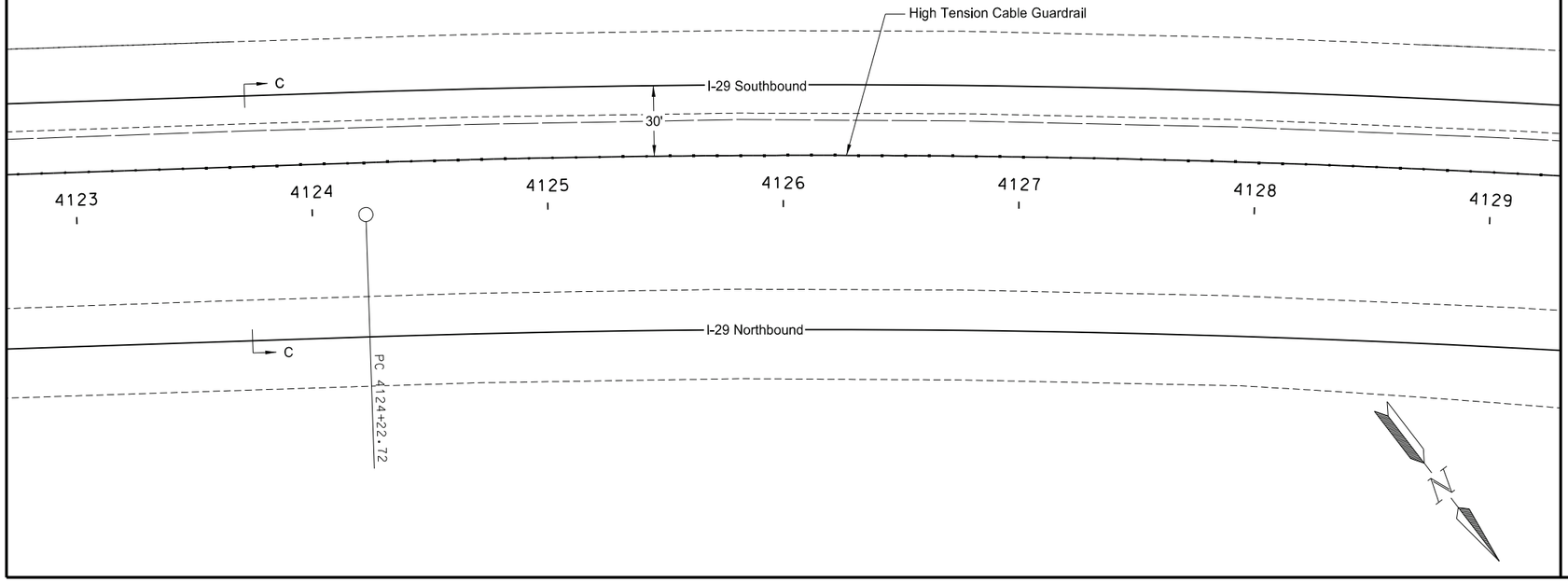
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-X-8-029(200)069	130	34

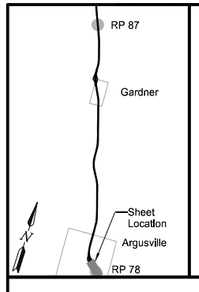


NOTE:

(A) Maintain minimum two feet of spacing between the outside edges of centerline pipe and guardrail posts. Adjust post locations to avoid centerline culvert.

4119+63 - ℄
24" RCP w/ 24" CSP (good)
extension 208' total length
1 RCFES at E end (good) and
1 CSFES at W end (good)





REGISTERED PROFESSIONAL ENGINEER
SCOTT MIDDAUGH
PE-7499
DATE 07/22/25
NORTH DAKOTA

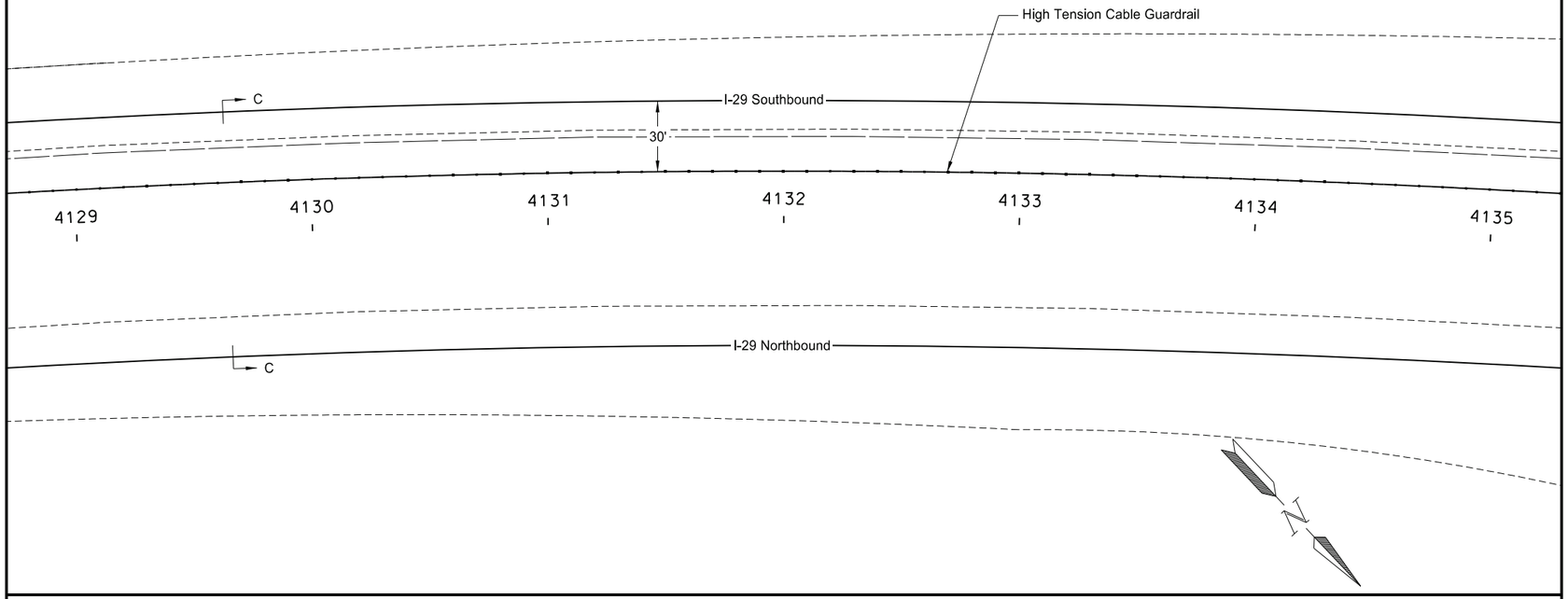
High Tension Cable Guardrail Layout

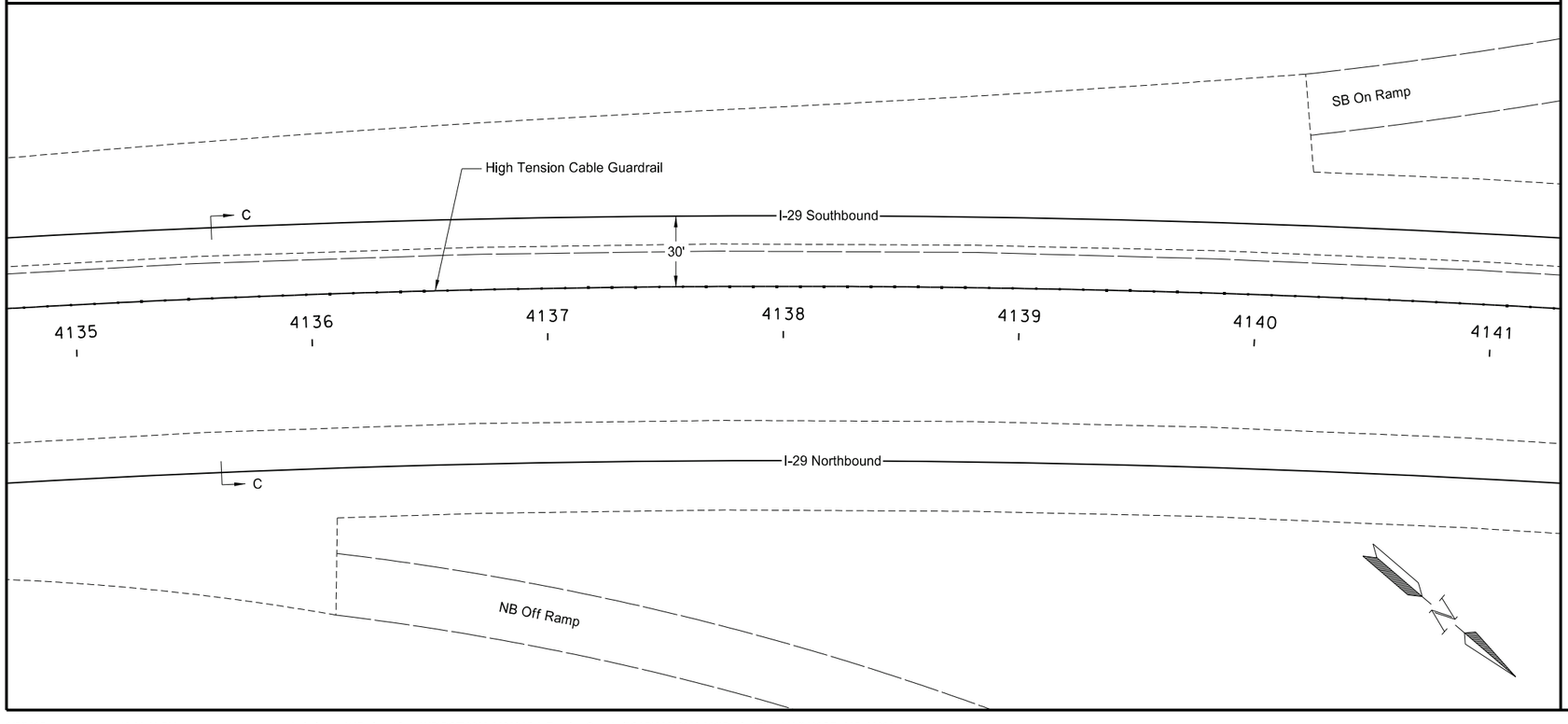
Segment J - Sta 4117+00 to 4129+00

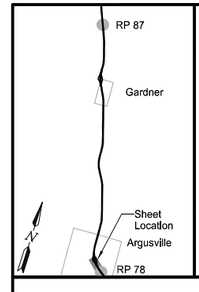
I-29 - Cass Co 20 to Argusville Interchange

23 USC § 407 Documents
NDDOT Reserves All Objections

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-X-8-029(200)069	130	35







REGISTERED PROFESSIONAL ENGINEER
SCOTT MIDDAUGH
PE-7499
DATE 07/22/25
NORTH DAKOTA

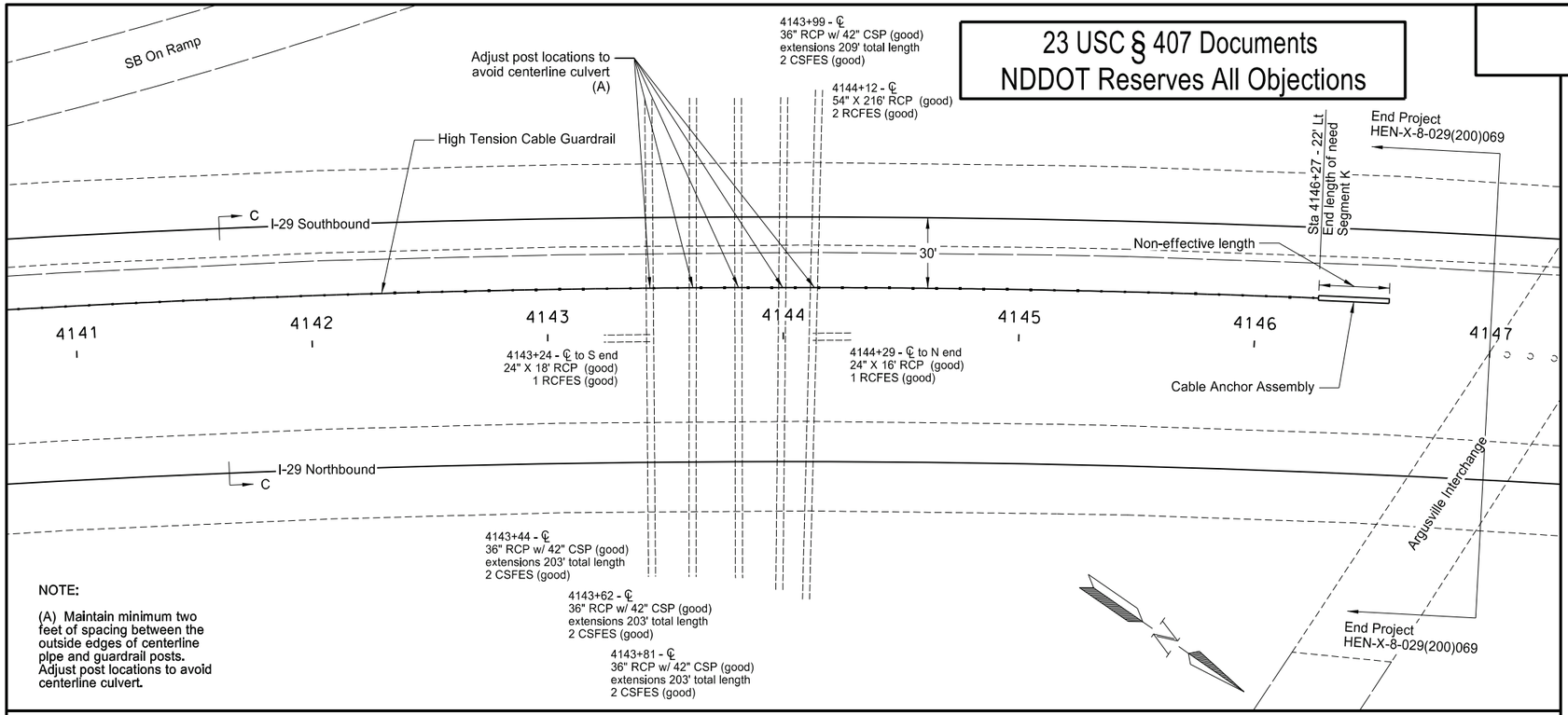
High Tension Cable Guardrail Layout

Segment J - Sta 4129+00 to 4141+00

I-29 - Cass Co 20 to Argusville Interchange

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-X-8-029(200)069	130	36

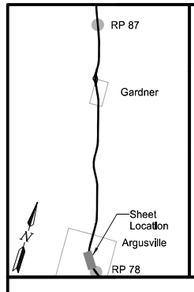
23 USC § 407 Documents
NDDOT Reserves All Objections



NOTE:

(A) Maintain minimum two feet of spacing between the outside edges of centerline pipe and guardrail posts. Adjust post locations to avoid centerline culvert.

Bottom View Intentionally Left Blank





High Tension Cable Guardrail Layout

Segment J - Sta 4141+00 to 4146+27

I-29 - Cass Co 20 to Argusville Interchange