

DESIGN DATA - RP 900.410 TO RP 900.557				
Traffic	Average Daily			Max.Hr.
Current 2010	Pass: 565	Trucks: 150	Total: 715	75
Forecast 2030	Pass: 625	Trucks: 165	Total: 790	80
Clear Zone Distance: 20' (4:1)		Design Speed: 45 MPH		
Minimum Sight Dist. for Stopping: 360'		Bridges:		
Sight Dist. for No Passing Zone: 700'				
Pavement Design Life: 20 (Years)		Design ESALs: 918,627 One-Way Flexible		
DESIGN DATA - RP 900.557 TO RP 900.931				
Traffic	Average Daily			Max.Hr.
Current 2010	Pass: 565	Trucks: 150	Total: 715	75
Forecast 2030	Pass: 625	Trucks: 165	Total: 790	80
Clear Zone Distance: 32' (4:1)		Design Speed: 65 MPH		
Minimum Sight Dist. for Stopping: 645'		Bridges:		
Sight Dist. for No Passing Zone: 1100'				
Pavement Design Life: 20 (Years)		Design ESALs: 918,627 One-Way Flexible		

JOB # 4 NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

Revised	6/12/14	STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
		ND	SS-3-281(104)900	18107	1	1

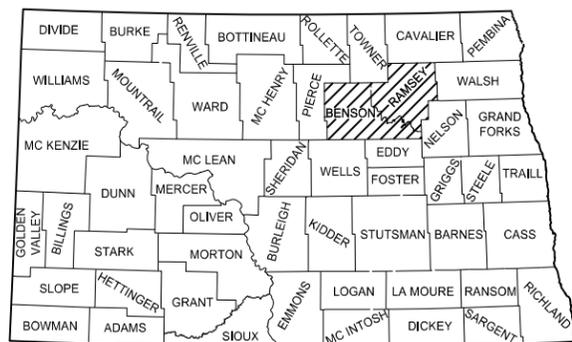
GOVERNING SPECIFICATIONS:
Standard Specifications adopted by the North Dakota Department of Transportation October 2008; Standard Drawings currently in effect; and other Contract Provisions submitted herein.

PROJECT NUMBER \ DESCRIPTION	NET MILES	GROSS MILES
SS-3-281(104)900	0.516	0.521

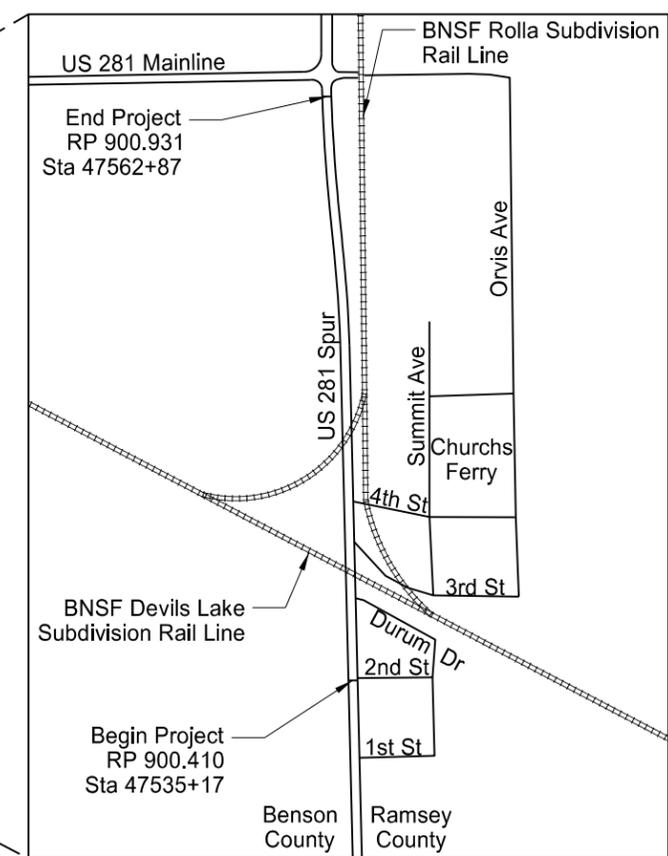
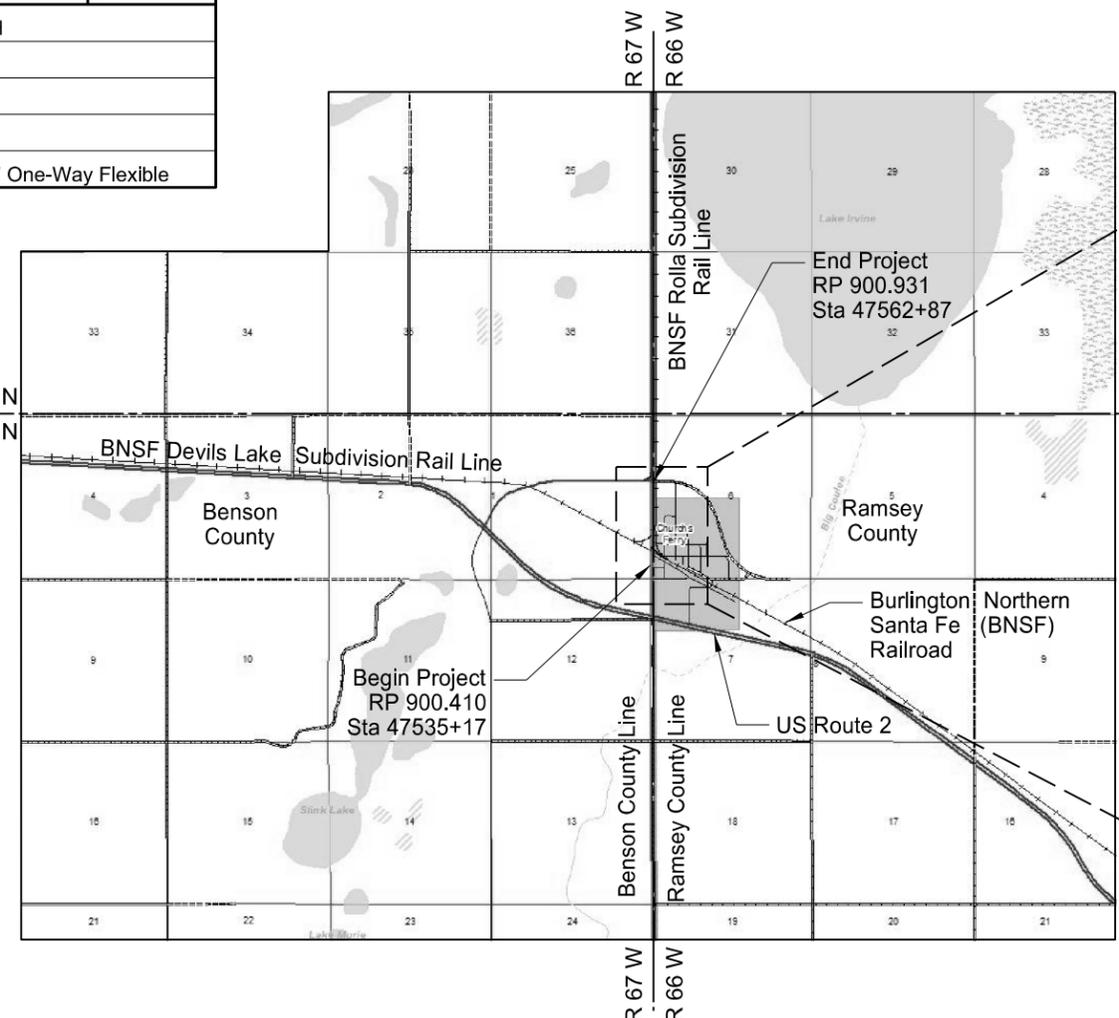
Benson & Ramsey Counties
Churchs Ferry Spur North RP 900.410 to RP 900.931
HBP Surfacing, Aggregate Base, & Incidentals

Legal Description

T-155-N R-66-W SEC 6 & 7
T-155-N R-67-W SEC 1, 2, & 12



STATE COUNTY MAP



DESIGNERS
Nancy Wills, PE
Aaron Cook, PE
Michael Leonard
Race Rolland
Samuel Traut

APPROVED DATE 4-21-2014

For Roger Weigel
OFFICE OF PROJECT DEVELOPMENT
ND DEPARTMENT OF TRANSPORTATION

I hereby certify that the attached plans were prepared by me or under my direct supervision and that I am a duly registered professional engineer under the laws of the state of ND.

APPROVED DATE 4-17-2014

Nancy E. Wills
Stantec Consulting

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D-20-10	NDDOT Utility Company Abbreviations
D-20-20 & 21	Linestyles
D-20-30, 31, & 32	Symbols
D-203-8	Standard Rural Approaches
D-704-5	Contractor Sign Detail
D-704-7 & 8	Breakaway Systems for Construction Zone Signs
D-704-10 & 11	Construction Sign Details
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D-704-19	Road Closure & Lane Closure on a Two Way Road Layouts
D-704-21	Detour & Roadway Diversion Sign Layouts
D-704-22	Construction Truck & Temporary Detour Layouts
D-704-26	Miscellaneous Sign Layouts

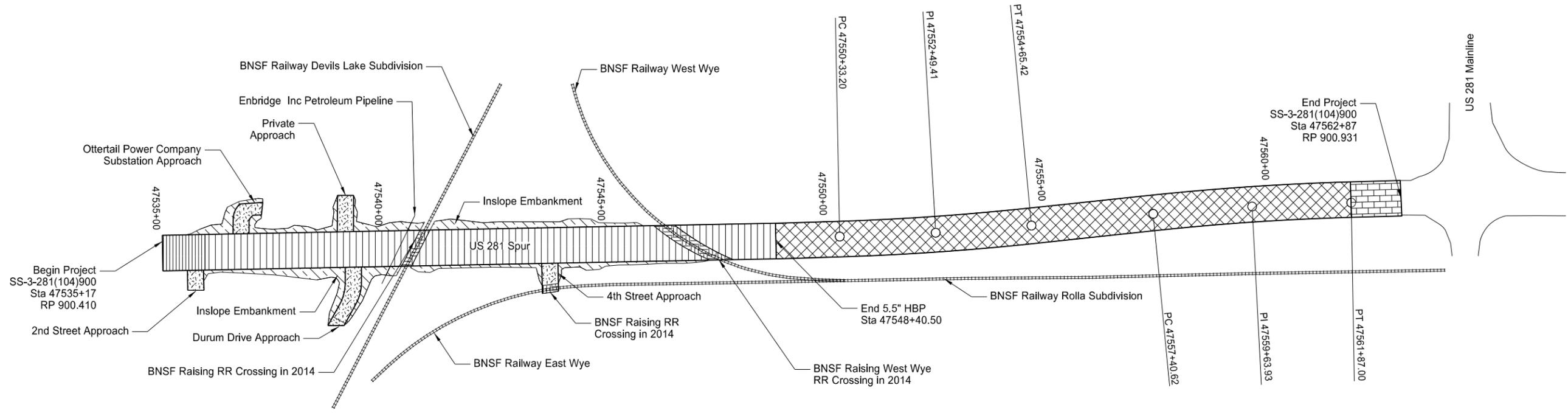
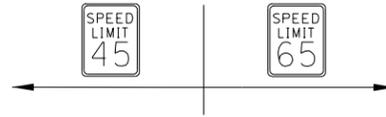
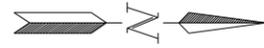
LIST OF SPECIAL PROVISIONS (SP)

SP 1010(08)	Temporary Erosion & Sediment Best Management Practices
SP 1101(08)	Split Sampling & Testing Requirements for Aggregate Base
SP 1275(08)	Weather Limitations for Hot Bituminous Mix
SP 1285(08)	Monuments & Right of Way Markers
SP 1477(08)	Permits & Environmental Considerations
SP 1478(08)	Railroad Requirements

LIST OF PERMITS

Sovereign Land Permit
404 Permit

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-3-281(104)900	4	1



Churchs Ferry Spur North (Plan View)

Drawing Not to Scale

Legend

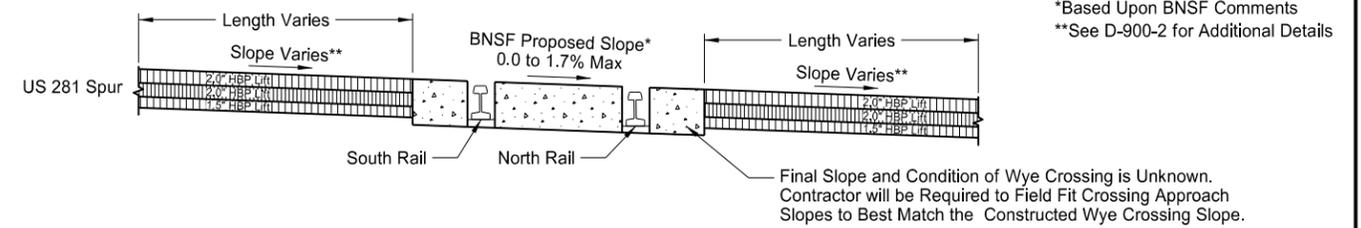
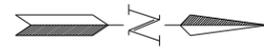
- 2.0" to 5.5" HBP Transition
- 5.5" HBP with Aggregate Base
- HBP Superelevation Correction
- Milling Transition
- Gravel Approach
- Concrete Railroad Crossing by BNSF
- Inslope Embankment
- BNSF Railway Railroad

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Scope of Work
Plan View

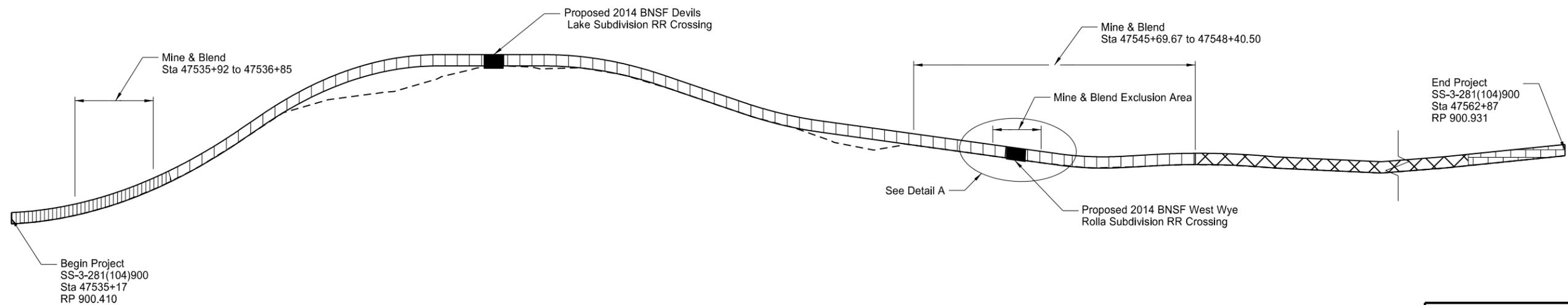
US 281 Spur
Churchs Ferry
(RP 900.410 to RP 900.931)

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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*Based Upon BNSF Comments
**See D-900-2 for Additional Details

Proposed West Wye Rolla Subdivision RR Crossing
Detail A



Churchs Ferry Spur North (Profile View)

Drawing Not to Scale

Legend

- 2.0" to 5.5" HBP Transition
- 5.5" HBP with Aggregate Base
- HBP Superelevation Correction
- Milling Transition
- Existing Ground

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Scope of Work
Profile View

US 281 Spur
Churchs Ferry
(RP 900.410 to RP 900.931)

NOTES

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-3-281(104)900	6	1

GENERAL NOTES

100-P01 PROTECTION OF EXISTING FACILITIES: The contractor shall exercise care in his construction operations to ensure that Burlington Northern Santa Fe (BNSF) Railroad Cross Arm Warning Devices are not disturbed during construction. Any damage caused by the contractor shall be repaired by the Contractor at the contractor's expense.

100-P02 WORK SCHEDULE: In order to minimize interference with traffic operations, a detailed schedule shall be agreed to prior to beginning work, between the Engineer, BNSF Railway, utility companies, and the contractor and subcontractors, if any.

102-P01 TIED PROJECTS: Project SS-3-281(119)900 – PCN 20700 is also tied to this project.

105-200 UTILITY COORDINATION: The Contractor shall arrange a Post Bid Utility Coordination Meeting with affected Utility Companies, NDDOT District Office, and the Project Engineer. This meeting shall be in addition to the preconstruction meeting. The Post Bid Utility Coordination Meeting shall be held near the project area or at the District office and shall be held no later than two weeks after the Department and the Contractor have executed the contract, as approved by the Engineer. The Contractor shall provide an agenda for the meeting, and be prepared to discuss the items on it. Items to discuss shall include, but not be limited to; plan for constructing the project, work schedule, utility adjustment/relocates needed prior to project start, utility adjustment/relocates that can be done concurrent with project, utility locates and site access. The Contractor shall publish meeting minutes and distribute the minutes to all attendees and the NDDOT Utilities Engineer within one week after the meeting.

105-P01 ENBRIDGE INC. UNDERGROUND PIPELINE UTILITY: The proposed embankment construction near 47540+35 LT will take place over an existing 16" crude oil pipeline crossing operated by Enbridge Inc.

A notice of at least seventy-two (72) hours will be given to Enbridge Inc, before NDDOT or its permitted representatives or agents commence any activity upon Enbridge's easement. Coordination shall be made through Enbridge Inc at either 701-739-1950 or 701-500-0217.

105-P02 COORDINATION OF PROJECTS: BNSF is scheduled to complete grade raises on three (3) rail crossings within the project limits prior to the commencement of work on this project. BNSF's operations have the potential to create unanticipated site conditions. Plans and quantities are based upon the Engineer's best assessment of possible future site conditions.

It is anticipated that BNSF will complete the track raises by 7/28/14. If BNSF completes their project early, the NDDOT Contractor may potentially be able to start early. This will only be allowed at the direction of the district engineer and as long as the contractor does not impede any of the remaining work items of BNSF.

After BNSF has completed their project and prior to the start of this project, the wetlands will be documented by NDDOT. The site will not be disturbed prior to wetland documentation. Wetland documentation will be the responsibility of NDDOT and not the Contractor.

There are other projects on US 281 and US Route 2 that will occur in the vicinity of this project during the 2014 construction season. The Contractor shall coordinate work efforts and traffic control devices to minimize confusion and delay to the public.

107-115 RAILROAD PROTECTIVE LIABILITY INSURANCE: This project includes work in the Burlington Northern Santa Fe (BNSF) Railway right of way, and in the vicinity of the following BNSF railroad crossings:

DOT 102597E at US 281 Spur RP 900.517 (Mainline W/Crossarms)
 DOT 102637A at US 281 Spur RP 900.633 (North Crossing)
 DOT 102636T (4th Street)

The type of work that will be performed within the railroad right of way is earthwork, aggregate base, and hot bituminous paving. Inquiries for protective liability insurance should be directed to:

Rosa Martinez
 Marsh Co.
 Texas
 214-303-8519

Information on the list of crossing numbers may be obtained from the Federal Railroad Administration website:
<http://safetydata.fra.dot.gov/Officeofsafety/>

107-P01 HAUL ROAD RESTRICTIONS: The contractor shall contact the appropriate State, County, Township, City or Political Subdivision official(s) to determine if the proposed haul road has local load restrictions or is designated as a "No Haul Route" prior to preparing a bid for this project. Paved roads off the state system will not be designated as haul roads by the NDDOT. If the contractor chooses to use a paved road off the state system for this project, the contractor shall be responsible for all costs of the inspection, maintenance, restoration, and release of the haul road. The entire haul cycle, loaded and empty, will be considered for haul routes.

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107-P02 HAUL ROAD RESTORATION: Any gravel or water needed for haul road restoration will be paid for under the NDDOT Price Schedule for Miscellaneous Items (PS-1). All gravel needed for haul road restoration will be CL-13 aggregate, accepted under Section 302 of the Standard Specifications.

200-010 SHRINKAGE: 25 percent additional volume is included for shrinkage in earth embankment.

203-P01 CONTRACTOR-FURNISHED BORROW: Borrow material required for constructing the embankment will not be obtained from within the right of way. It will be the contractor's responsibility to obtain borrow areas. Compaction requirements for embankments shall be as specified in Section 203.02 I of the Standard Specifications. Salvaged Base Course may be used to construct inslope embankment but item will be paid for under the bid item "Borrow-Excavation".

203-P02 TOPSOIL-IMPORTED: The Contractor shall supply all required topsoil for this project. Imported topsoil shall be obtained by the Contractor from a source outside of the highway right-of-way. The Contractor may salvage any available existing topsoil in lieu of imported topsoil within the project limits. The cost of stripping and salvaging any existing topsoil shall not be paid for separately, but included in the price bid for "Topsoil- Imported".

The topsoil quantity will be based off of a surface area measurement and an assumed 4 inch depth.

All topsoil will be paid for as "Topsoil-Imported" whether it is salvaged or imported. No payments shall be made on the item "Topsoil-Imported" until all work associated has been completed to the satisfaction of the Engineer.

203-P03 EXCAVATION AND FILL ELEVATIONS: All ditch grades and contours are given at the top of the topsoil.

203-P04 HAUL: No average haul has been computed for this project.

302-P01 TEMPORARY WEDGE FOR PAVEMENT DROP OFF: Where there is a 2" or greater drop off, construct a temporary wedge at locations where traffic is maintained. The temporary wedge shall be constructed using aggregate or embankment and have a cross slope of 4:1 or flatter. Include all costs for materials and constructing the temporary wedge in the price bid for "Salvaged Base Course."

302-P02 BLENDED BASE COURSE: The Contractor will mine and blend at a depth between 12 and 18 inches at the following locations:
Sta. 47535+92.00 to 47536+85.00
Sta. 47545+69.67 to 47549+39.00 (Excluding Wye At-Grade RR Crossing)

The mine and blend operations shall ensure the existing pavement is completely pulverized, leaving no slabs or slivers and as much of the existing aggregate base as possible without disturbing the existing subgrade.

302-P03 SALVAGED BASE COURSE: Only bituminous material removed from within the project limits shall be incorporated in the Salvaged Base Course. The following requirements shall be met; the bituminous material shall be between 30 and 50 percent by volume, any material added to the blend shall meet the requirements of Aggregate Base Course CL 5 and the gradation of the blended material shall be less than 1-1/2 inch. Salvaged Base Course cannot be substituted for Aggregate Base Course CL 5. The material shall be paid for as "Salvaged Base Course".

400-080 HOT BITUMINOUS PAVEMENT: The 5.5" hot bituminous pavement shall be paver laid in three (3) lifts with the top lift having a depth of approximately 2 inches.

410-P01 PAVING OPERATION: Paving operations shall be coordinated to ensure each entire lift is paved completely by the end of the same working day leaving no uneven pavement edges.

The final lift shall be paved continuously, without creation of a cold transverse joint, between the southern project limits of the tied project SS-3-281(119)900 – PCN 20700 and the northern project limits of SS-3-281(104)900 – PCN 18107.

410-P02 SUPERPAVE PROPERTIES: The following aggregate and mix design properties are required.
PG 58-28 Asphalt Cement shall be used in all hot bituminous pavements.

The Superpave FAA 43 shall conform to Section 410 of the Standard Specifications and Supplemental Specifications along with the following aggregate and mix design properties:

Test	Criteria	Reference
Coarse Aggregate Angularity	85% min	NDDOT Field Sampling/Testing Manual
Fine Aggregate Angularity	43% min	AASHTO T 304
Gyratory Effort, # Gyration	N _{ini} =7 N _{des} =75 N _{max} =115	AASHTO R 35
Voids Filled with Asphalt	65-78%	AASHTO M 323, T 166
%G _{mm} @ N _{ini}	89% max	AASHTO M 323, T 166

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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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410-P03 CONTRACTOR CORING: Immediately after the cores have been cut, the Contractor shall fill the core holes as follows:

- Remove any free standing water;
- Tack the hole as specified in Section 401;
- Place the same type of bituminous material; and
- Compact each lift with hand tamper.

If the core hole is 2 inches or greater, the Contractor shall fill the core hole with the same type of bituminous material in a minimum of two lifts.

704-P01 TRAFFIC CONTROL DEVICES: The traffic control devices list has been developed using the following layouts on the Standard Drawing for traffic control:

D-704-19 Layout Type E can be Referenced for the Southern Closure of US Hwy 281 Spur at the Intersection with US Route 2.

D-704-21 Layout Type I can be Referenced for the Northern Closure of US Hwy 281 Spur at the Intersection with US Hwy 281. This Layout also Applies to the Closure of the Minor Streets within the Project Limits.

D-704-22 and D-704-26, Layouts Type K, Type L, and Type Y for Construction Trucks Hauling Material

704-P02 MAINTAIN DRIVEWAY ACCESS: The Contractor shall be responsible for providing access to all adjacent properties during construction. Final details on location of access points and construction procedures shall be approved by the Engineer prior to the start of the work. No additional compensation will be made to the Contractor for any costs associated with this item.

704-P03 SIGN ANCHORS: The sign anchors shall be removed as part of the same operation as when the sign faces come down. The sign anchors cannot remain in the ground without a sign attached to them.

706-P01 FIELD LABORATORY TYPE C: The Type C Laboratory shall be wired for DSL Broadband internet capabilities. The internet shall have a wireless Wi-Fi router and also the capabilities of hard wiring to a computer. The cost of installation and monthly fee for the internet will be included in the cost of the laboratory.

708-P01 EROSION CONTROL: Erosion control has been provided for placement prior to stripping the topsoil or placing embankment or as indicated by the engineer. Locations are shown in the erosion control plan. An additional 200 LF of temporary 12" Fiber Rolls and 200 LF of permanent 12" Fiber Rolls have been provided to be used at the Engineer's discretion.

708-P02 SILT FENCE: In section 708.07.B.1, change the minimum weight of the steel posts from 1.3 pounds/foot to 0.95 pounds/foot. A welded metal plate near the bottom is not required.

894-100 RETROREFLECTIVE SHEETING: Provide Type IV retroreflective sheeting that meets ASTM D 4956, Type IV. Provide Type XI retroreflective sheeting that meets ASTM D 4956, Type XI.

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ENVIRONMENTAL COMMITMENTS

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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ENVIRONMENTAL COMMITMENTS (EC): The North Dakota Department of Transportation and the Federal Highway Administration have made environmental commitments to secure approval of this project. The environmental commitments are as follows:

EC-1: Unavoidable impacts to wetlands will be mitigated onsite, adjacent to the project, or at a NDDOT approved mitigation site or bank.

ACTION REQUIRED /TAKEN: 0.05 acres of permanent impacts to wetlands will require mitigation. The NDDOT proposes to mitigate these impacts at the Herda mitigation site in the Devils Lake Basin Regional Service Area.

Wetland Impact Table															
Wetland Number	Location	Cowardin Class.	Wetland Type	Wetland Size Ac.	Wetland Feature	USACE Jurisdictional Wetlands*	Wetland Impacts (acres)		USFWS Easement Impacts		Wetland Mitigation				
							Temp. Ac.	Perm. Ac.	Temp.	Perm.	Mitigation Required			Onsite Mitigation Acres	
										EO 11990	USACE	USFWS	Location; Acreage; Wetland#; Ratio		
2	Sec. 6, T155N, R66W Sec. 31, T156N, R66W Sec. 36, T156N, R67W Sec. 1, T155N, R67W	PEMCx	Basin/Ditch	433.96	Natural	Yes	0.08	0.05	0.00	0.00	Y	N	N	11990 NDDOT Herda Mitigation Site 0.05 (1:1)	0.00
15	Sec. 6, T155N, R66W	PEMCx	Ditch	10.45	Artificial	Yes	0.35	0.02	0.00	0.00	N	N	N	none	0.00
5	Sec. 1, T155N, R67W	PEMCx	Ditch	0.11	Artificial	No	0.06	0.04	0.00	0.00	N	N	N	none	0.00
4	Sec. 1, T155N, R67W	PEMCx	Ditch	0.04	Artificial	No	0.00	0.01	0.00	0.00	N	N	N	none	0.00
3	Sec. 1, T155N, R67W	PEMCx	Ditch	1.01	Artificial	No	0.06	0.04	0.00	0.00	N	N	N	none	0.00
Totals				445.57			0.55	0.16	0.00	0.00					0.00

* A wetland Jurisdictional Determination was issued by the USACE on 6/25/2012; NWO-2012-0732-BIS.

**All impacts to natural wetlands (natural/jurisdictional and natural/non-jurisdictional), regardless of size, as well as impacts greater than 0.10 acre to artificial/jurisdictional wetlands require mitigation.

***All artificial/non-jurisdictional, deep water (impacts greater than 6.6 feet), Other Waters less than 300 linear feet (determined by the USACE on a case by case), Preamble Wetlands, and temporary impacts do not require mitigation.

Summary Impact Table			
Total Permanent Impact Summary		Temporary Impacts and additional information	
Wetland Type	Total (Acres)	Wetland Type	Total (Acres/Lf)
Natural/JD	0.05	Temporary JD	0.43
Natural/Non-JD	0.00	Non-JD Temporary	0.12
Artificial/JD	0.02	Permanent JD > 0.10	0.00
Artificial /Non-JD	0.09	Permanent OW	0.00 ac/0 ft.
Total	0.16	Temporary OW	0.00

ENVIRONMENTAL COMMITMENTS

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EC-2: The project is located within the migration corridor of the endangered whooping crane, and suitable stopover habitat for the whooping crane is present. The migration periods of the whooping crane are April 1st to May 15th and September 1st to October 31st.

ACTION TAKEN/REQUIRED: If whooping cranes are observed within one mile of the project, construction work will cease until the USFWS is contacted, within 24 hours or the next business day – whichever is first (701) 250-4402, in order to evaluate the level of disturbance risk to the individuals present. Following coordination with the USFWS, construction activities would resume if it is unlikely that the bird(s) would be disturbed by the continuation of construction activities or after the bird(s) relocate to a new site beyond the disturbance area of the project. In addition, if above ground utility lines are moved, installed or raised as a result of this project, line markers (bird diverters) will be added at a ratio of 2:1 per linear foot to the relocated, installed, or raised utility lines. Refer to the Utility Conflict Plans regarding bird diverter information, and Relocation Utility Agreement.

SUMMARY OF QUANTITIES

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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SPEC	CODE	DESCRIPTION	UNIT	QUANTITY
103	100	CONTRACT BOND	L SUM	0.8
107	101	RAILWAY PROTECTION INSURANCE	L SUM	1
202	170	REMOVAL OF CULVERTS-ALL TYPES & SIZES	LF	97
203	119	TOPSOIL-IMPORTED	CY	632
203	140	BORROW-EXCAVATION	CY	3020
216	100	WATER	M GAL	53
302	100	SALVAGED BASE COURSE	TON	1157
306	300	BLENDED BASE COURSE	SY	1089
401	150	SS1H OR CSS1H EMULSIFIED ASPHALT	GAL	730
410	213	SUPERPAVE FAA 43	TON	2166
410	445	PG 58-28 ASPHALT CEMENT	TON	129
410	910	CORED SAMPLE	EA	7
411	100	MILLING PAVEMENT SURFACE	TON	24
702	100	MOBILIZATION	L SUM	0.8
704	1000	TRAFFIC CONTROL SIGNS	UNIT	581
704	1052	TYPE III BARRICADE	EA	10
704	1095	TYPE B FLASHERS	EA	4
706	300	FIELD LABORATORY-TYPE C	EA	1
708	1325	SILT FENCE SUPPORTED	LF	375
708	1332	REMOVAL SILT FENCE SUPPORTED	LF	375
708	1430	FIBER ROLLS 12IN	LF	2175
708	1431	REMOVAL FIBER ROLLS 12IN	LF	1175
708	2240	SEEDING-TYPE B-CL II	ACRE	1.5
708	2260	SEEDING-TYPE B-CL IV	ACRE	1.5
708	5500	MULCHING	ACRE	3.0
708	5650	ECB TYPE 1	SY	252
714	4106	PIPE CONDUIT 24IN-APPROACH	LF	260
714	5015	PIPE CORR STEEL .064IN 18IN	LF	16
714	5035	PIPE CORR STEEL .064IN 24IN	LF	18
714	5810	END SECT CORR STEEL .064IN 18IN	EA	2
714	5820	END SECT CORR STEEL .064IN 24IN	EA	2
720	130	IRON PIN R/W MONUMENTS	EA	4
754	110	FLAT SHEET FOR SIGNS-TYPE XI REFL SHEETING	SF	26.5
754	206	STEEL GALV POSTS-TELESCOPING PERFORATED TUBE	LF	123.2
754	592	RESET SIGN PANEL	EA	4
754	805	OBJECT MARKERS - CULVERTS	EA	4
762	103	PVMT MK PAINTED-MESSAGE	SF	532
762	1104	PVMT MK PAINTED 4IN LINE	LF	8705

BASIS OF ESTIMATE

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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**US 281 Spur - HBP Transition
2.0" to 5.5"**

47535+17.00 - 47536+92.00	
Length (Sta)	1.75

Material	Unit	Quantity
SS1H or CSS1H Emulsified Asphalt @ 0.05 Gal/SY	Gal	50.13
Superpave FAA 43 @ 2.00 Ton/CY (2.0" to 5.5" Depth)	Ton	107.25
PG 58-28 Asphalt Cement @ 5.9%	Ton	6.37

US 281 Spur - 5.5" HBP

47536+92.00 - 47548+40.50	
Gross Length (Sta)	11.49
RR Crossing Excl	-0.28
Net Length (Sta)	11.21

Material	Unit	Width (ft)	Area (sf)	Quantity Per Station
Salvaged Base Course @ 1.875 Ton/CY	Ton	See Section 11 Data Tables		
SS1H or CSS1H Emulsified Asphalt @ 0.05 Gal/SY (Avg Width 2nd & 3rd Lifts)	Gal	25.8		28.67
Superpave FAA 43 @ 2.00 Ton/CY (5.5" Depth)	Ton		11.922	88.31
PG 58-28 Asphalt Cement @ 5.9%	Ton			5.21

US 281 Spur - 2.0" Superelevation Correction

47548+40.50 - 47551+39.99	47551+39.99 - 47562+87.00
Length (Sta)	Length (Sta)
2.99	11.47

Material	Unit	Width (ft)	Quantity	Width (ft)	Quantity
SS1H or CSS1H Emulsified Asphalt @ 0.05 Gal/SY	Gal	26.0	43.18	39.0	248.55
Superpave FAA 43 @ 2.00 Ton/CY (OL 2.0" Lift)	Ton		98.10		692.67
PG 58-28 Asphalt Cement @ 5.9%	Ton		5.80		40.83

Note: Lift thickness and therefore quantity will vary during the superelevation correction, ideally a depth of 2.0" will be held over centerline with cross slope maintained to the edge of driving lane. Quantities are calculated from the typical shown in Section 30 Sheet 3.

Unit Conversions	Basis
Salvaged Base Course	1.875 Ton/CY
SS1H or CSS1H Emulsified Asphalt	0.05 Gal/SY
PG 58-28 Asphalt Cement	5.9 %
Superpave FAA 43	2.00 Ton/CY

Water

- 25 MGal/Mile for Dust Palliative
- 20 Gal/Ton for Aggregates
- 10 Gal/CY for Embankment

Object Markers - Culverts			
Station	Lt/Rt	Qty	Unit
47541+30.00	Rt	1	EA
47541+64.00	Lt	1	EA
47544+98.00	Lt & Rt	2	EA
Total:			4 EA

Iron Pin R/W Monuments				
Station	Lt/Rt	Offset	Qty	Unit
47538+19.34	Rt	44.77'	1	EA
47538+19.27	Rt	56.67'	1	EA
47540+37.30	Rt	60.40'	1	EA
47540+37.34	Rt	45.40'	1	EA
Total:			4	EA

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BASIS OF ESTIMATE

US 281 Spur - Shoulder Widening At Railroad Crossings

Material	Unit	Area (sf)	Depth (ft)	Quantity	Area (sf)	Depth (ft)	Quantity
SS1H or CSS1H Emulsified Asphalt @ 0.05 Gal/SY	Gal	1514.9		16.83	2003.1		22.26
Superpave FAA 43 @ 2.00 Ton/CY (5.5" Depth)	Ton	1514.9	0.458	51.39	2003.1	0.458	67.96
PG 58-28 Asphalt Cement @ 5.9%	Ton			3.03			4.01

US 281 Spur - Approaches

Material	Unit	Location				
		4th Street 47543+81.43	Durum Drive 47539+39.45	Private Approach 47539+21.16	2nd Street 47535+74.53	Ottertail Approach 47536+86.55
Material	Unit	Quantity	Quantity	Quantity	Quantity	Quantity
Salvaged Base Course @ 1.875 Ton/CY	Ton	25	133	50	67	8
SS1H or CSS1H Emulsified Asphalt @ 0.05 Gal/SY	Gal	9	6	6	1	6
Superpave FAA 43 @ 2.00 Ton/CY (5.5" to 3.0" Depth)	Ton	48	34	34	9	34
PG 58-28 Asphalt Cement @ 5.9%	Ton	3	2	2	1	2

PVMT MK PAINTED 4 IN LINE (CL Marking Mainline)

Location	Begin Station	End Station	Basis		Quantity (LF)
	47535+17.00	47549+30.00	Barrier Stripe	10,560 LF/mile	2826
	47549+30.00	47562+87.00	Centerline Skips	1,320 LF/mile	339
Total:					3165

PVMT MK PAINTED 4 IN LINE (Edge Lines Mainline)

Location	Begin Station	End Station	Basis		Quantity (LF)
	47535+17.00	47562+87.00	Edge Line	10,560 LF/mile	5540
Total:					5540

Railroad Crossing Messages

Begin Station	End Station	Location	PVMT MK MESSAGE (SF)
47538+50	47540+47	Rt	133
47541+17	47543+17	Lt	133
47544+89	47546+73	Rt	133
47547+12	47551+96	Lt	133
Total:			532

PVMT MK Message

Railroad message includes these items: RR, X's, (3) 24"x12' Bands

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BASIS OF ESTIMATE

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-3-281(104)900	10	3

Bituminous Core Sampling					
	Location	Start Station	End Station	Basis	Quantity
PCN 18107	5.5" HBP (3 Lifts)	47536+92	47548+41	2 Cores/Sublot/Lane/Lift 1 Sublot/2,000 LF	6 EA
	Full Depth Cores	47536+92	47548+41	1 Core/Mile	1 EA
Project Total:					7 EA

Imported Topsoil Summary SS-3-281(104)900	
Location	Topsoil (CY)
US 281 Spur Mainline (Sta. 47535+96.2-47549+39.0)	467
Private Approach (Sta. 47539+21.16)	51
Ottertail Approach (Sta. 47536+86.55)	25
Durum Drive (Sta. 47539+39.45)	79
4th Street (Sta. 47543+81.43)	10
Total:	632

Topsoil – Imported
Calculations assumed placement depth of 4”.

Earthwork Summary SS-3-281(104)900		
Location	Borrow (CY) (Not a Pay Item)	Borrow - Excavation Adjusted (CY) (Pay Item)
US 281 Spur Mainline (Sta. 47535+92.00 - 47548+40.50)	643	810
2nd Street (Sta 47535+74.53)	0	0
Ottertail Approach (Sta. 47536+86.55)	253	316
Private Approach (Sta. 47539+21.16)	248	310
Durum Drive (Sta. 47539+39.45)	1085	1356
4th Street (Sta. 47543+81.43)	183	229
Totals:	2412	3020

Blended Base Course SS-3-281(104)900			
Location	Width (FT)	Length (FT)	Area (SY)
Sta. 47535+92 to 47536+85	28	93	289
Sta. 47545+69.67 to 47548+40.50	28	257	800
Total			1089

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	End Area (SF)		Volume (CY)				
	Exca*	Fill	Exca*	Fill	Fill Adjusted	Mass Ordinate	Salvaged Base Course
47535+17.00	0	0	0	0	0	0	0
47535+18.00	0	0	0	0	0	0	0
47535+50.00	0	3	0	2	3	-3	0
47536+00.00	0	14	0	16	20	-23	1
47536+24.91	0	8	0	10	13	-36	2
47536+50.00	0	1	0	4	5	-41	2
47536+94.86	1	0	1	0	1	-41	1
47537+00.00	1	0	0	0	0	-41	0
47537+50.00	7	0	7	0	0	-34	0
47537+88.00	0	4	5	2	3	-32	0
47538+00.00	0	3	0	1	2	-34	0
47538+13.00	0	1	0	1	1	-35	0
47538+50.00	0	23	0	16	20	-55	6
47538+61.99	0	28	0	11	14	-69	6
47539+00.00	0	33	0	42	53	-122	35
47539+50.00	0	12	0	41	51	-173	82
47539+77.37	0	30	0	21	26	-199	54
47539+77.91	0	30	0	1	1	-200	1
47540+00.00	0	83	0	46	58	-258	41
47540+23.00	0	42	0	53	67	-325	38
47540+50.00	0	44	0	43	54	-379	34
47540+67.01	0	30	0	23	29	-408	19
47540+77.19	0	5	0	7	8	-416	9
47540+89.82	0	1	0	1	2	-418	7
47540+99.99	0	0	0	0	0	-418	5
47541+45.45	0	70	0	59	74	-492	39
47541+48.00	0	37	0	5	6	-498	3
47541+50.00	0	41	0	3	4	-502	2
47541+67.19	5	70	1	35	44	-545	15
47541+89.99	5	37	4	45	56	-597	10
47542+00.00	3	24	1	11	14	-610	2
47542+50.00	1	0	4	22	28	-634	4
47542+88.00	1	0	1	0	0	-633	0
47543+00.00	1	0	0	0	0	-633	0
47543+50.00	6	0	7	0	0	-626	0
47543+85.00	22	0	18	0	0	-608	0

	End Area (SF)		Volume (CY)				
	Exca*	Fill	Exca*	Fill	Fill Adjusted	Mass Ordinate	Salvaged Base Course
47544+00.00	24	0	13	0	0	-595	0
47544+50.00	4	0	26	0	0	-569	0
47544+74.21	0	0	2	0	0	-567	0
47544+97.85	0	42	0	18	23	-590	1
47545+00.00	0	41	0	3	4	-594	0
47545+50.00	1	0	1	38	47	-640	2
47545+52.04	1	0	0	0	0	-640	0
47546+00.00	8	12	8	10	13	-645	4
47546+08.17	8	7	2	3	3	-646	2
47546+21.10	7	1	4	2	2	-644	3
47546+50.00	1	0	4	1	1	-641	7
47546+52.04	1	0	0	0	0	-641	1
47546+67.23	0	0	0	0	0	-641	2
47547+00.00	0	18	0	11	13	-654	10
47547+21.10	0	21	0	15	19	-673	9
47547+40.00	0	19	0	14	18	-691	5
47547+50.00	0	11	0	5	7	-698	1
47547+60.00	0	2	0	2	3	-701	1
47547+67.23	0	0	0	0	0	-701	0
47548+00.00	0	0	0	0	0	-701	0
47548+40.50	2	0	2	0	0	-699	0
			Volume (CY)				
			Exca	Fill	Fill Adjusted	Mass Ordinate	Salvaged Base Course CY
Totals			111	643	810		466

Salvaged Base Course 466 CY * 1.875 Ton/CY = 874 Tons

Notes:

*The quantity of 111 CY of Common Excavation – Type A shall be considered incidental to the bid item “Borrow-Excavation”.

25 percent additional volume has been included for shrinkage in Borrow Excavation Quantities.

Earthwork Values

US 281 Spur
Churchs Ferry
(RP 900.410 to RP 900.931)

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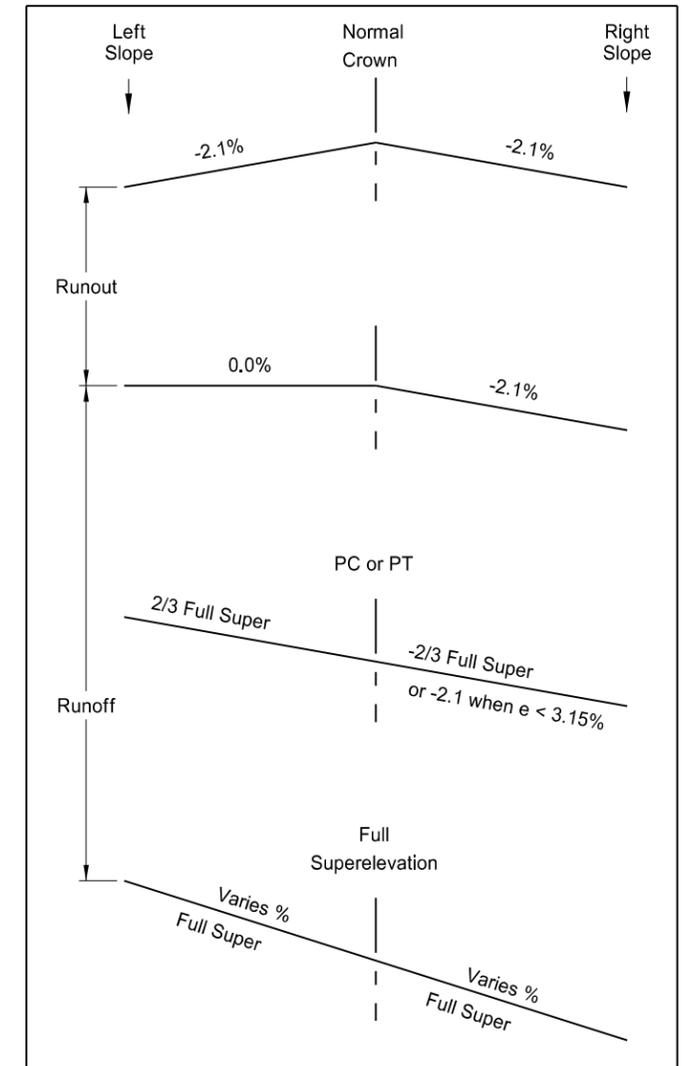
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ND	SS-3-281(104)900	20	1

P.C. Station 47550+33.20
P.I. Station 47552+49.41
Delta = 4° 19' 20" (LT)
Degree = 1° 00' 00"
Tangent = 216.21
Length = 432.22
Radius = 5729.58
External = 4.08
P.T. Station 47554+65.42

Station	Left Slope	Right Slope
47548+95.44	-2.1	-2.1
47549+66.00	-2.1	0.0
47550+33.20	-2.1	2.0
47550+66.80	-3.0	3.0
47554+31.82	-3.0	3.0
47554+65.42	-2.1	2.0
47555+32.62	-2.1	0.0
47556+03.02	-2.1	-2.1

P.C. Station 47557+40.62
P.I. Station 47559+63.93
Delta = 4° 27' 50" (RT)
Degree = 1° 00' 00"
Tangent = 223.30
Length = 446.38
Radius = 5729.58
External = 4.35
P.T. Station 47561+87.00

Station	Left Slope	Right Slope
47556+03.02	-2.1	-2.1
47556+73.42	0.0	-2.1
47557+40.62	2.0	-2.1
47557+74.22	3.0	-3.0
47561+53.40	3.0	-3.0
47561+84.00	2.1	-2.1
47562+54.20	Match Exst	Match Exst
47563+24.76	Match Exst	Match Exst

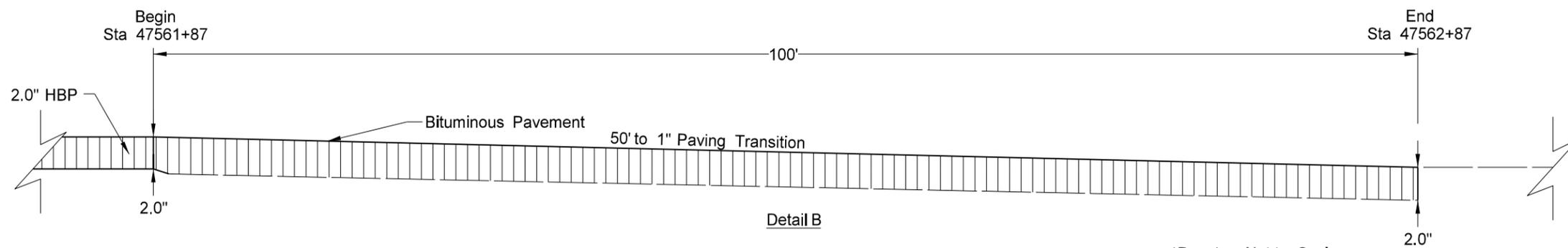
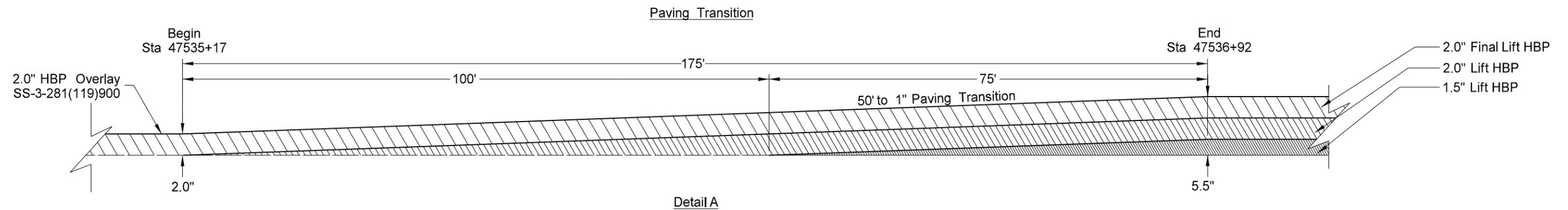
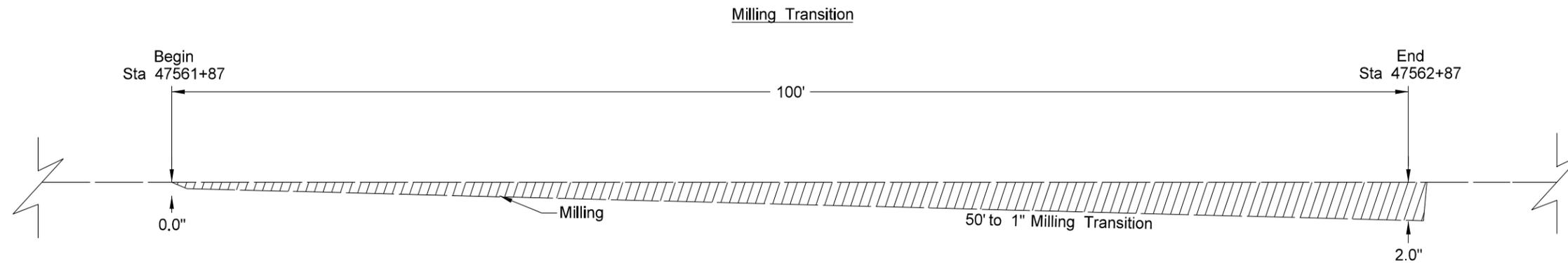


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Superelevation Table
US 281 Spur Churchs Ferry (RP 900.410 to RP 900.931)

Note: Calculations based on AASHTO method five. Design is based upon a speed of 65 mph and maximum superelevation of 6%.

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-3-281(104)900	20	2



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*Drawing Not to Scale

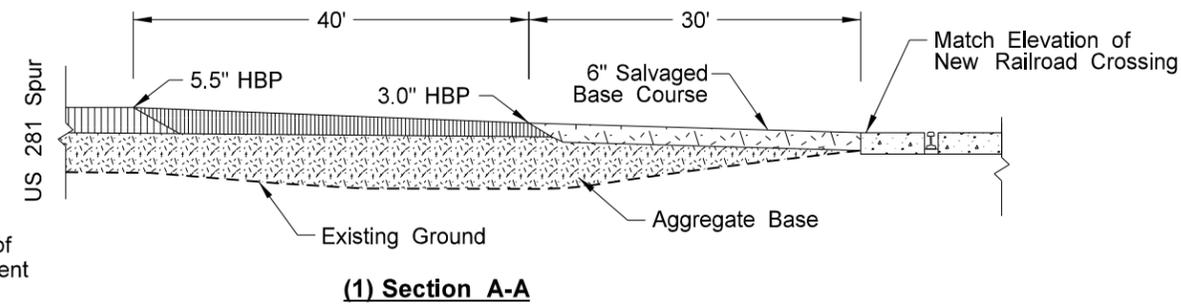
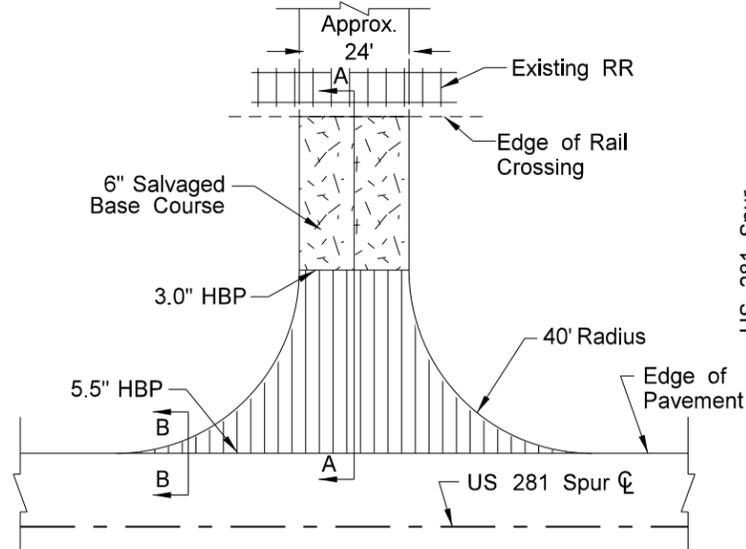
- Milling
- Pavement Transition
- 3rd Lift
- 2nd Lift
- 1st Lift

Milling & Paving Transitions

US 281 Spur
Churchs Ferry
(RP 900.410 to 900.931)

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-3-281(104)900	20	3

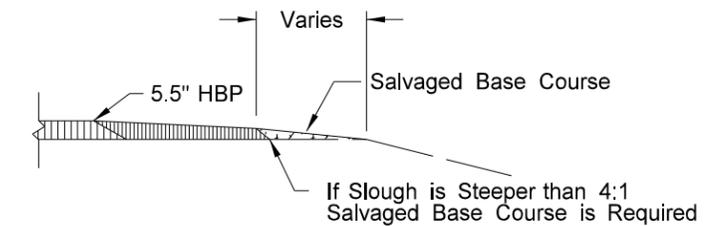
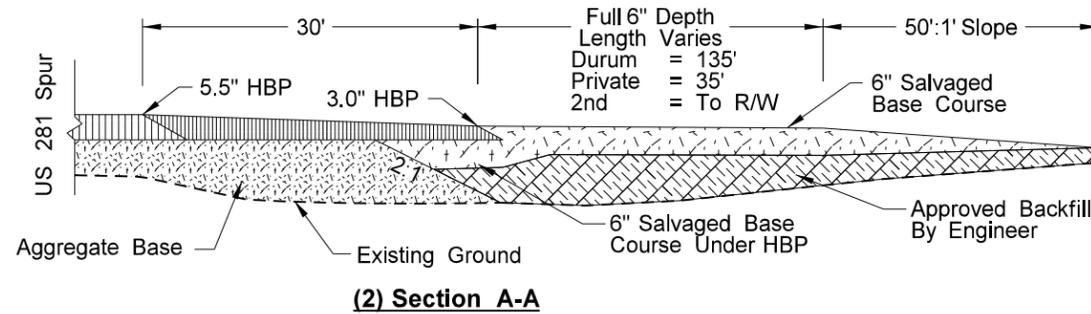
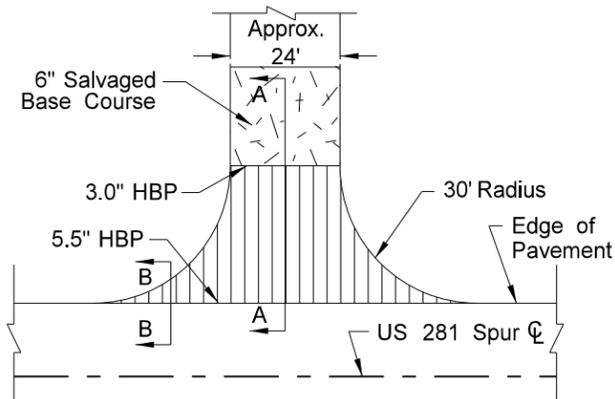
(1) 4th St



Notes:

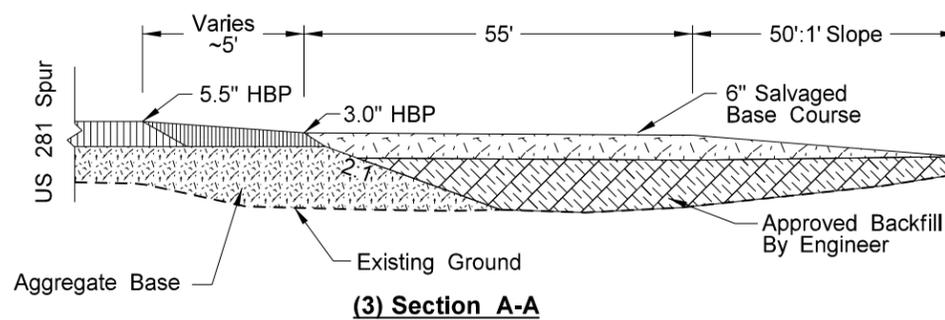
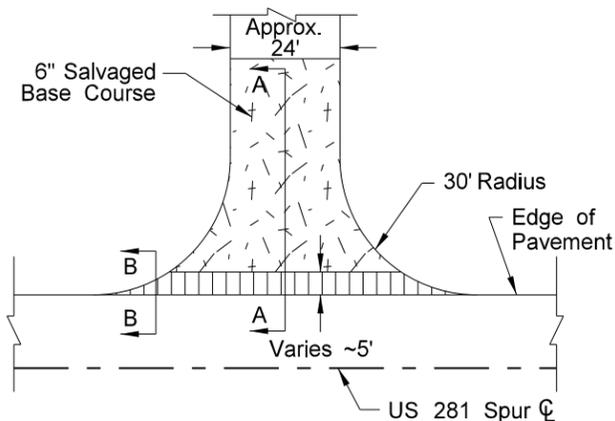
- Quantity totals have been included in the bid items of the "Estimate of Quantities" of the plans.
- Basis of Estimate Table on this sheet reflects quantities for the top 6" of Salvaged Base Course.
- Additional information and details pertaining to the construction of approaches can be found on NDDOT Standard Drawing D-203-8.
- Drawing is not to scale

(2) Durum Dr, Private Dr, & 2nd St



(1, 2, & 3) Section B-B

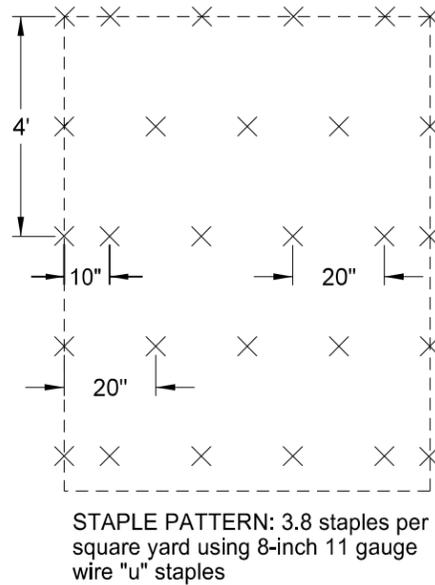
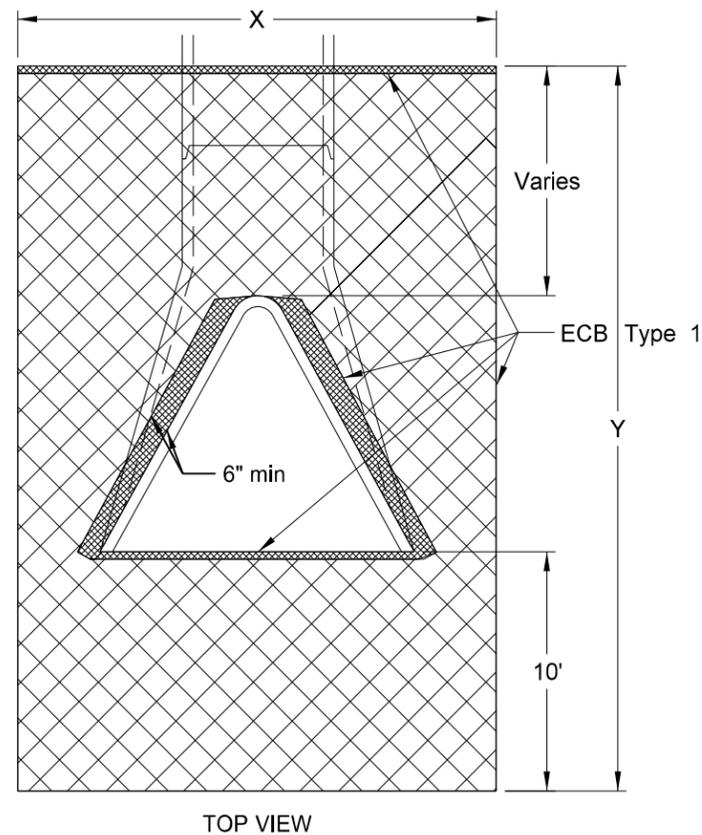
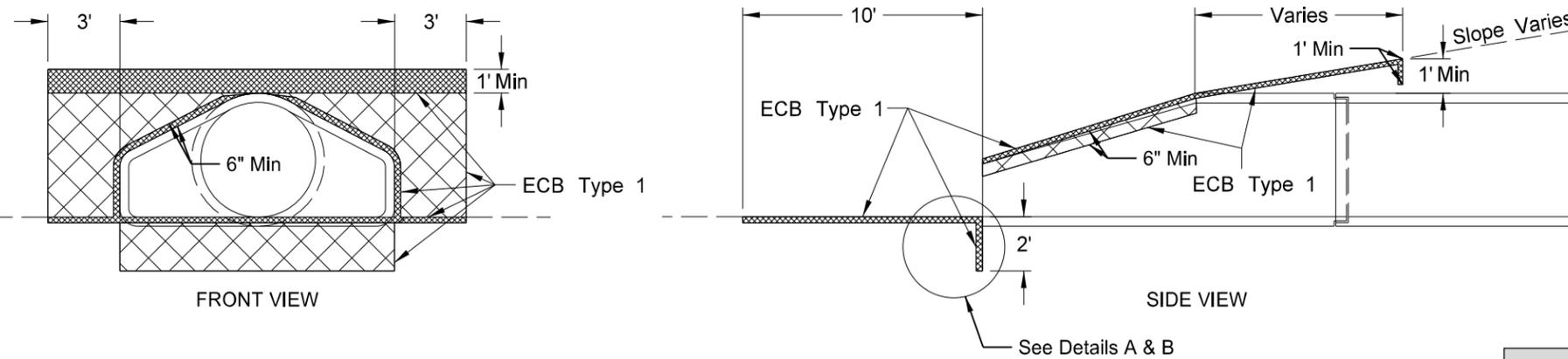
(3) Ottertail Approach



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BASIS OF ESTIMATE	ITEM	UNIT	4th St.	Durum Dr.	Private Dr.	2nd St.	Ottertail Approach	TOTALS
	Number of Locations	#	1	1	1	1	1	5
	Salvaged Base Course	TON	25	133	50	8	67	283
	SS1H or CSS1H	GAL	9	6	6	6	1	28
	Superpave FAA 43	TON	48	34	34	34	9	159
PG 58-28 Asphalt Cement	TON	3	2	2	2	1	10	

Approach Construction & Paving Details
US 281 Spur
Churchs Ferry
(RP 900.410 to 900.931)

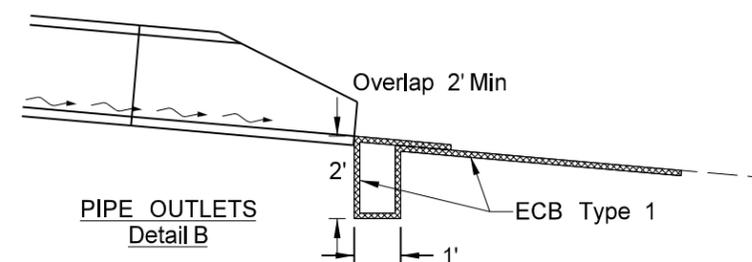
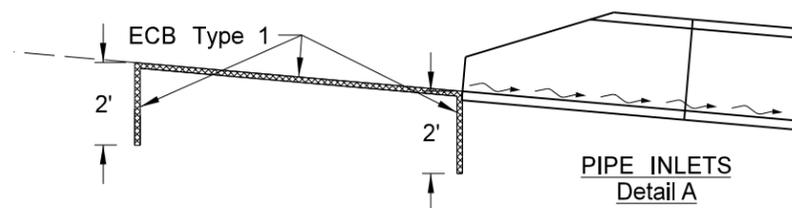


Erosion Control Blanket (ECB)				
Location of Surface Area to be Protected		Pipe Dia (Inch)	Unit Quantity (SY)	Total Quantity
Station	(Lt/Rt)			Type 1 (SY)
47536+27	Lt	24	28	28
47536+93	Lt	24	28	28
47538+66	Lt	24	28	28
47538+94	Rt	24	28	28
47539+76	Lt	24	28	28
47539+78	Rt	24	28	28
47541+30	Rt	24	23	23
47541+64	Lt	24	23	23
47544+98	Lt	18	19	19
47544+98	Rt	18	19	19
Total (SY)				252

	DIA	X	Y	Surface Area to be Protected	ECB
	In	Ft	Ft	SF	SY
Mainline Culvert	18	10.3	16.6	171.0	19
Mainline Culvert	24	11.7	17.4	203.6	23
Approach Culvert	24	11.7	21.4	250.4	28

Note: Quantity Assumptions
 4:1 Slopes for Mainline Culverts
 8:1 Slopes for Approach Culverts

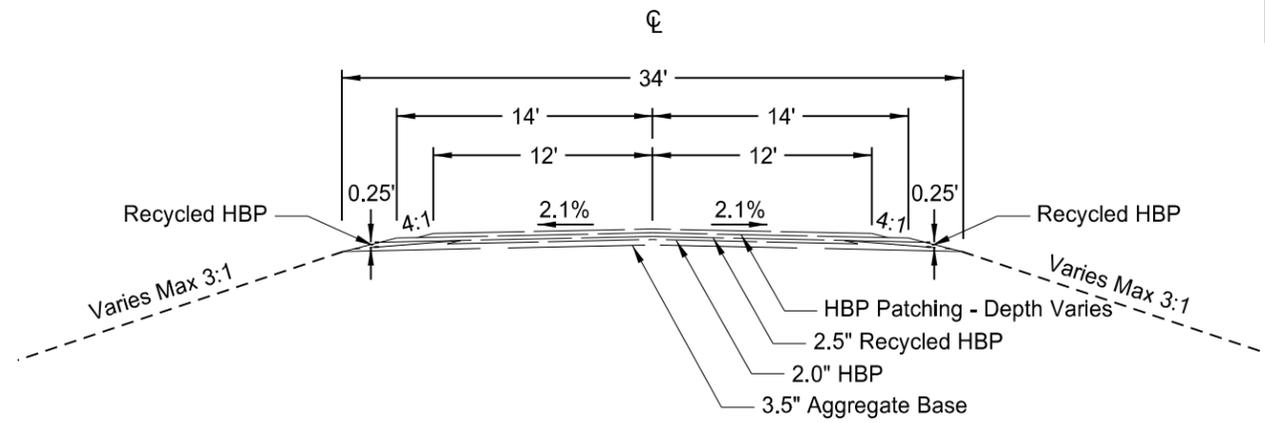
NOTE: The ECB shall be tucked a minimum of 1' into the embankment above the flared end section, a minimum of 6" into the embankment (against the flared end section) around the opening of the flared end section, and 2' into the ground at the end of the flared end section.



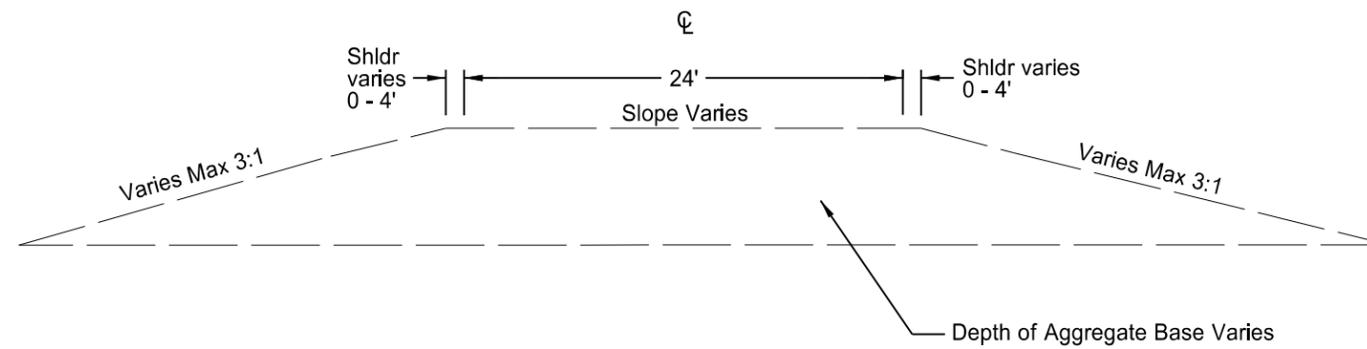
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Erosion Control at Culvert End Sections
 US 281 Spur
 Churchs Ferry
 (RP 900.410 to RP 900.931)

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-3-281(104)900	30	1

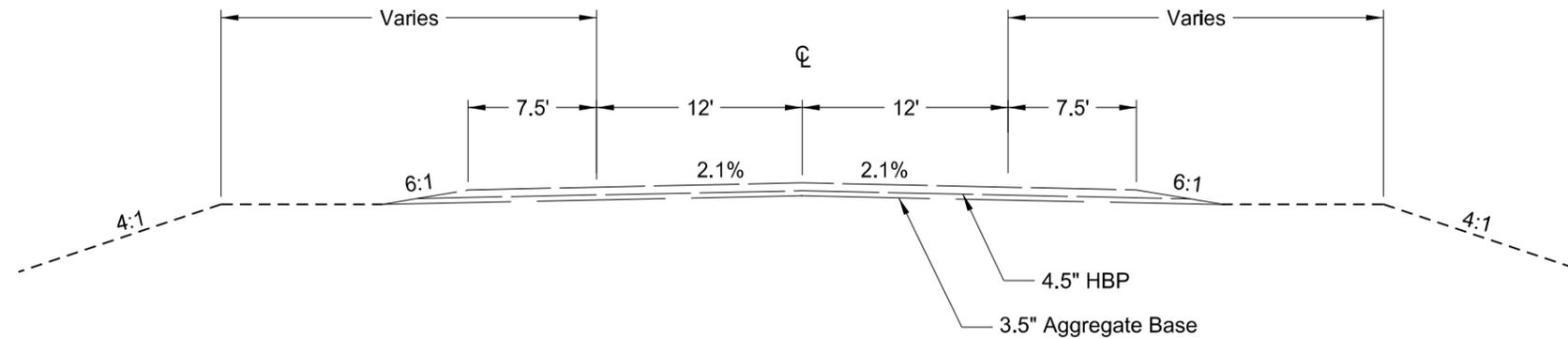


Existing Typical Section
 Sta. 47535+17.00 to Sta. 47535+96.20
 Sta. 47545+69.67 to Sta. 47551+40.00*



Existing Typical Section
 Sta. 47535+96.20 to Sta. 47545+69.67**

Notes:
 *Shoulder width varies approaching tracks
 **Existing pavement width prior to 2013 raise by BNSF was 24 ft. Existing typical was constructed by BNSF and depths shown reflect typical based on pre-construction plan, not as-built.

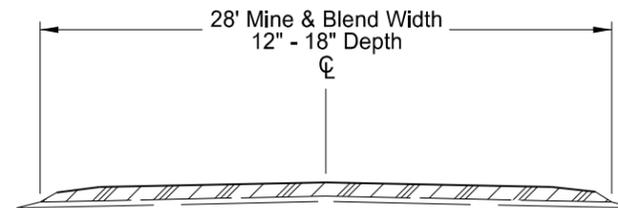
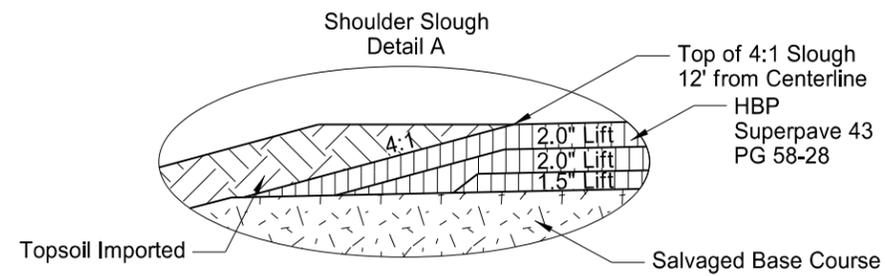


Existing Typical Section
 Sta. 47551+40.00 to Sta. 47562+87.00

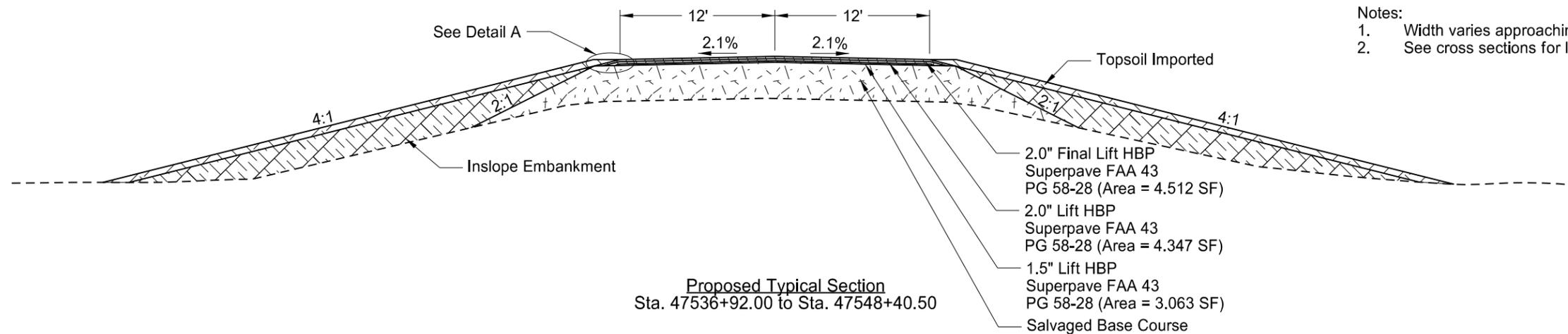
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Existing Typical Sections
 US 281 Spur
 Churchs Ferry
 (RP 900.410 to RP 900.931)

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-3-281(104)900	30	2



Proposed Mine & Blend Typical Section
 Sta. 47535+92.00 to Sta. 47536+85.00
 Sta. 47545+69.97 to Sta. 47548+40.50



Proposed Typical Section
 Sta. 47536+92.00 to Sta. 47548+40.50

- Notes:
1. Width varies approaching tracks, see section 90 for layout.
 2. See cross sections for locations of 4:1 to 3:1 slope break.

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Proposed Typical Sections
 US 281 Spur
 Churchs Ferry
 (RP 900.410 to RP 900.931)

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-3-281(104)900	30	3

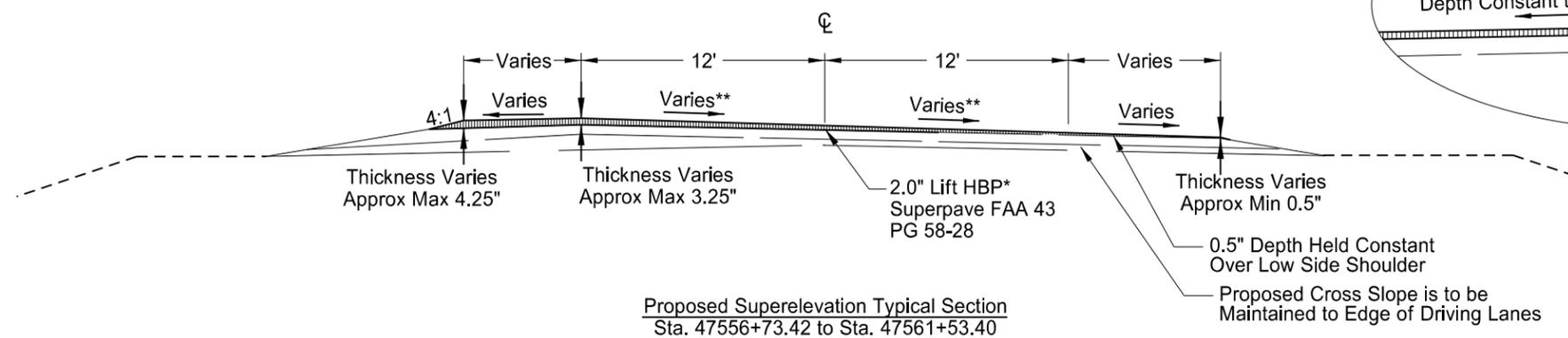
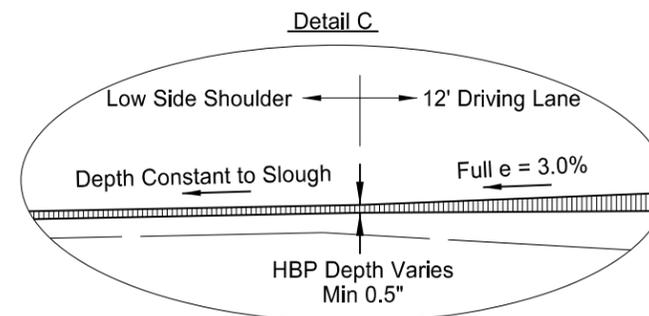
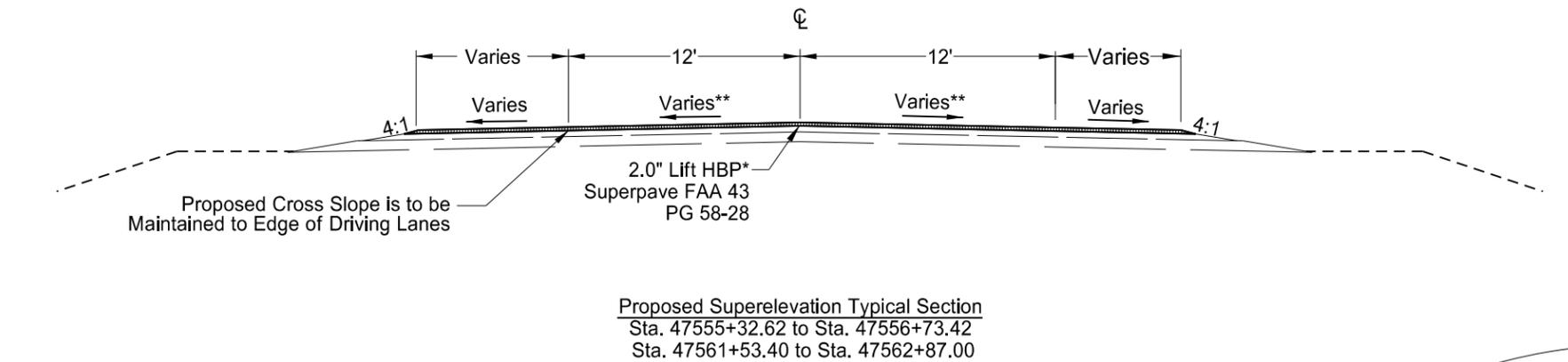
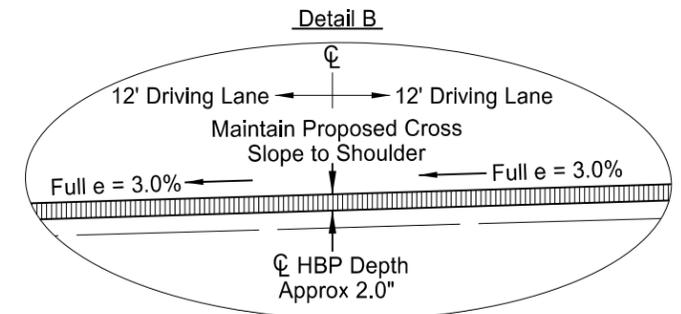
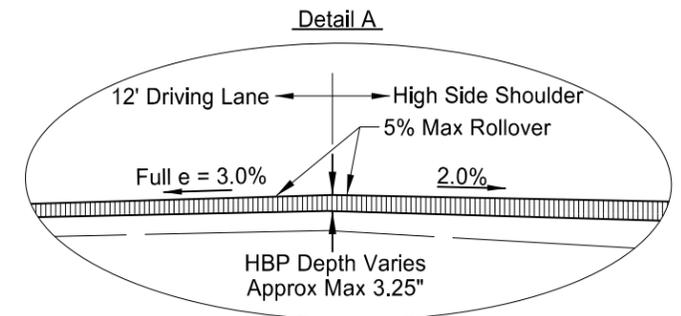
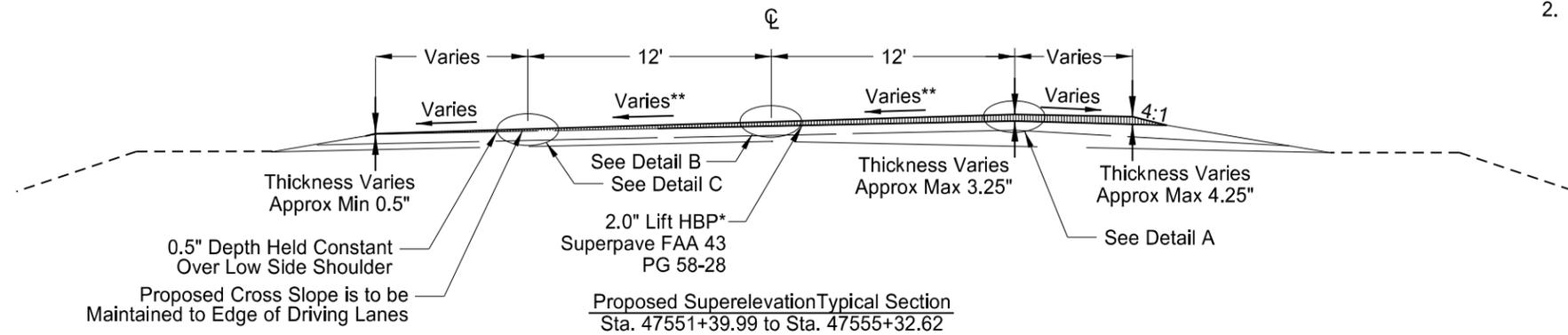
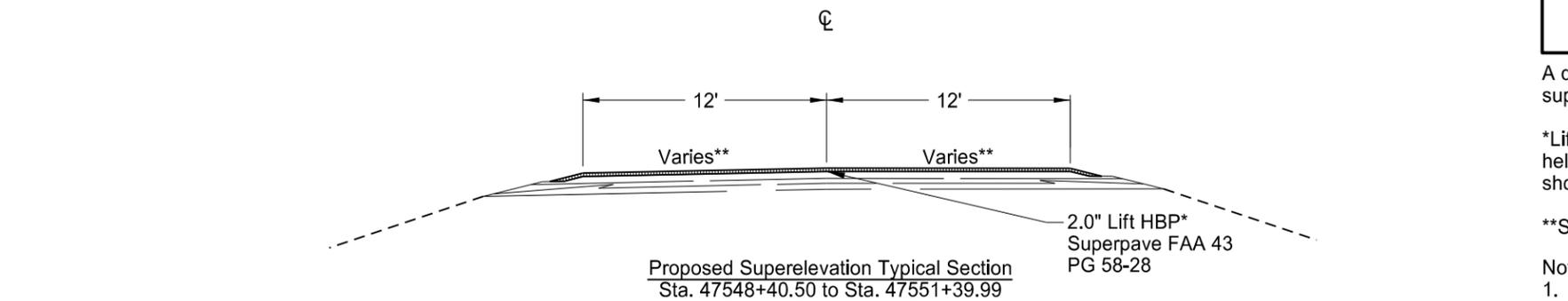
A quantity of 790 Tons of Superpave FAA 43 has been allocated for the superelevation correction.

*Lift thickness will vary during HBP Surfacing. Ideally, a depth of 2.0" will be held over centerline with the proposed cross slopes maintained to the shoulder break point.

**See Section 20 Sheet 1 for superelevation cross slopes.

Note:

- 5% maximum rollover allowed
- Existing shoulder width 7.5'.



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Superelevation Typical

US 281 Spur
Churchs Ferry
(RP 900.410 to RP 900.931)

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SS-3-281(104)900	50	1

HYDRAULIC DATA FOR SS-3-281(104)900 PCN 18107									
STATION (CI)	EXISTING PIPE	PROPOSED PIPE SIZE	DRAINAGE AREA (ACRES)	25 - YEAR DATA				100-YEAR DATA	
				DESIGN DISCHARGE (CFS)	DESIGN HEADWATER (FT)	DESIGN VELOCITY (FPS)	DESIGN STAGE (NAVD 88)	100-YEAR DISCHARGE (CFS)	100-YEAR STAGE (NAVD 88)
47541+45 (skewed)	24" CSP	Extend 24" 18 FT	1.506	5.27	1.407	4.42	1459.62	6.15	1459.75
47544+98	18" CSP	Extend 18" 16 Ft	0.883	3.39	1.261	4.18	1458.46	3.96	1458.6

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Hydraulic Data

US 281 Spur
Churchs Ferry
(RP 900.410 to RP 900.931)

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-3-281(104)900	51	1

Begin Station / Location	Begin Offset	End Station / Location	End Offset	Length	Pipe Conduit		Mainline Pipe Conduit Allowable Materials	Required Diameter	Minimum Thickness	End Sections		Applicable Backfill Detail	
					CMP Pay Size	Approach Pay Size				Begin	End		
				LF	IN	IN		IN	IN	EA	EA		
47541+30	42' Rt	47541+25	39' Rt	3	24		Pipe Corrugated Steel (2-2/3" x 1/2" Corrugation)	24	0.064	Y		D-714-28	
47541+64	50' Lt	47541+51	35' Lt	15	24		Pipe Corrugated Steel (2-2/3" x 1/2" Corrugation)	24	0.064		Y	D-714-28	
47544+98	35' Rt	47544+98	30' Rt	5	18		Pipe Corrugated Steel (2-2/3" x 1/2" Corrugation)	18	0.064	Y		D-714-28	
47544+98	36' Lt	47544+98	25' Lt	11	18		Pipe Corrugated Steel (2-2/3" x 1/2" Corrugation)	18	0.064		Y	D-714-28	
Begin Station /	Begin Offset	End Station /	End Offset	Length	Pipe Conduit		Approach Pipe Conduit Allowable Materials	Required Diameter	Minimum Thickness	End Sections		Applicable Backfill	
				LF	In	In				In	In		EA
47536+27	40' Lt	47536+93	42' Lt	66		24	Reinforced Concrete Pipe - Class III (Barrel Length = 60 LF)	24		Y (A)	Y (A)	D-203-8	
							Zinc Coated Steel (2-2/3" x 1/2" Corrugation)						0.168
							Aluminum Coated Steel (Type 2)						0.138
							High Density Polyethylene (HDPE)						
							Polymeric Coated Steel (over zinc or aluminum coated steel)						0.064
47538+66	48' Lt	47539+76	48' Lt	110		24	Reinforced Concrete Pipe - Class III (Barrel Length = 104 LF)	24		Y (A)	Y (A)	D-203-8	
							Zinc Coated Steel (2-2/3" x 1/2" Corrugation)						0.168
							Aluminum Coated Steel (Type 2)						0.138
							High Density Polyethylene (HDPE)						
							Polymeric Coated Steel (over zinc or aluminum coated steel)						0.064
47538+94	58' Rt	47539+78	58' Rt	84		24	Reinforced Concrete Pipe - Class III (Barrel Length = 78 LF)	24		Y (A)	Y (A)	D-203-8	
							Zinc Coated Steel (2-2/3" x 1/2" Corrugation)						0.168
							Aluminum Coated Steel (Type 2)						0.138
							High Density Polyethylene (HDPE)						
							Polymeric Coated Steel (over zinc or aluminum coated steel)						0.064

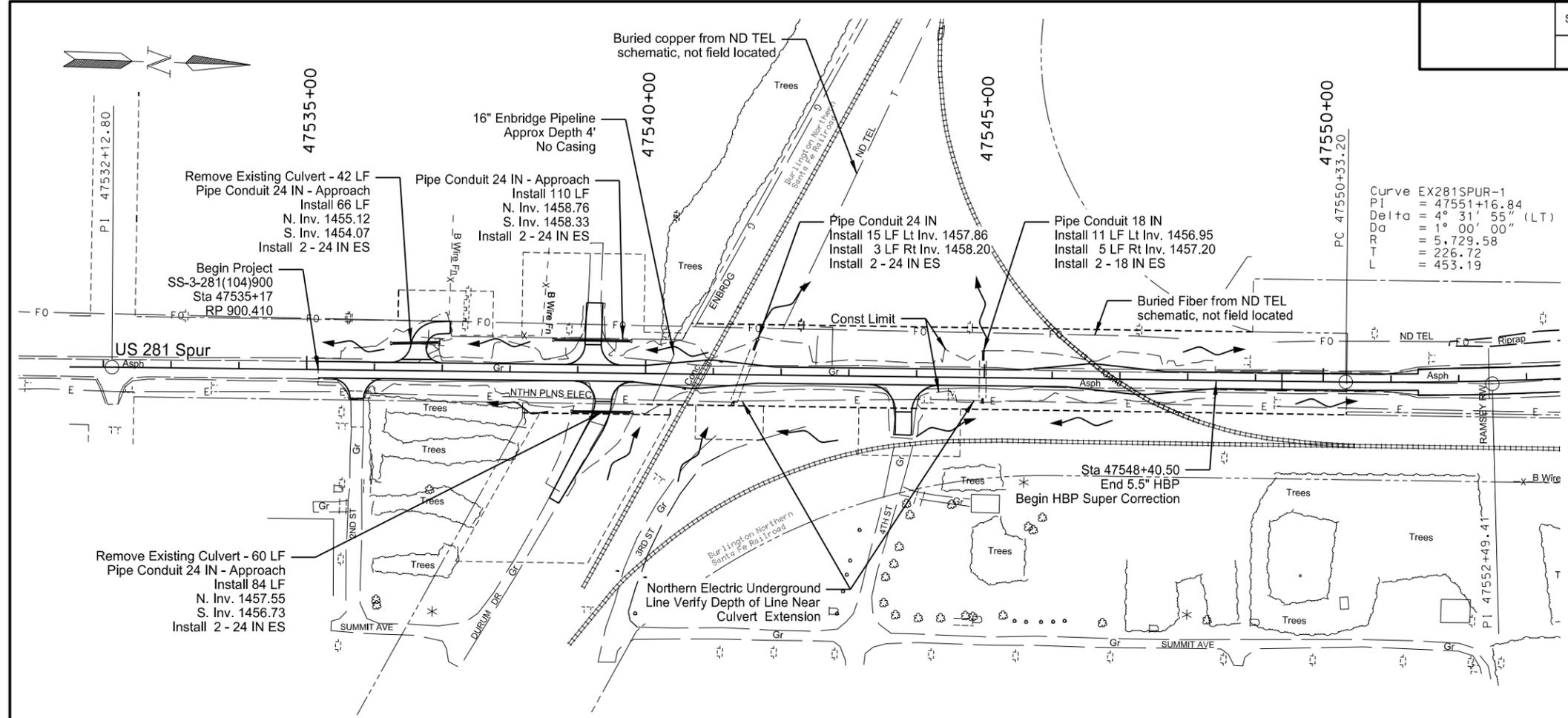
(A) Not paid for separately, but to be included in price bid for "Pipe Conduit."

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Allowable Pipe List

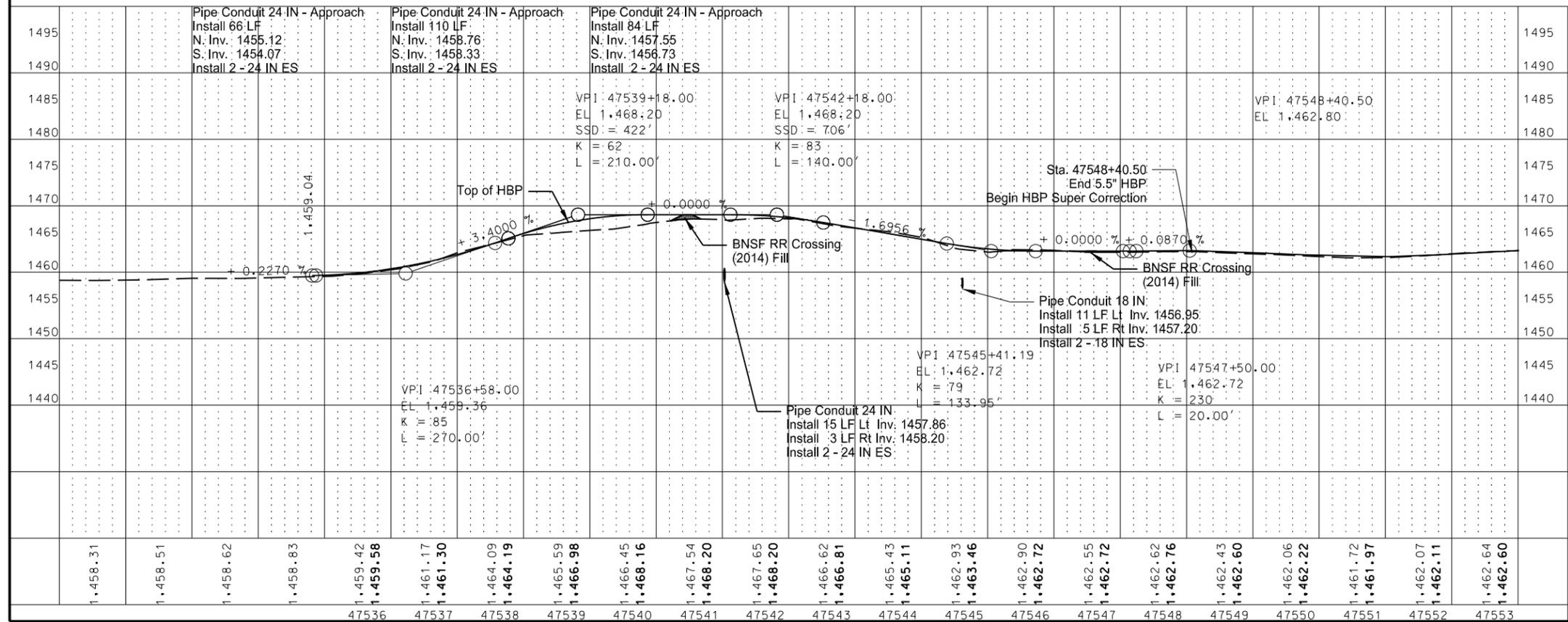
US 281 Spur
Churchs Ferry
(RP 900.410 to RP 900.931)

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-3-281(104)900	60	1



202	0170	REMOVAL OF CULVERTS - ALL TYPES & SIZES	
		Sta 47536+86; 44' Lt - 12" CSP	37 LF
		Sta 47539+50; 42' Rt - 12" CSP	60 LF
714	4106	PIPE CONDUIT 24 IN - APPROACH	
		Sta 47536+27; 40' Lt - 47536+93; 42' Lt	66 LF
		Sta 47538+66; 48' Lt - 47539+76; 48' Lt	110 LF
		Sta 47538+94; 58' Rt - 47539+78; 58' Rt	84 LF
714	5015	PIPE CORR STEEL .064 18IN	
		Sta 47544+98; 36' Lt	11 LF
		Sta 47544+98; 35' Rt	5 LF
714	5035	PIPE CORR STEEL .064 24IN	
		Sta 47541+64; 50' Lt	15 LF
		Sta 47541+30; 42' Rt	3 LF
714	5810	END SECT CORR STEEL .064IN 18IN	
		Sta 47544+98; 36' Lt	1 EA
		Sta 47544+98; 35' Rt	1 EA
714	5820	END SECT CORR STEEL .064IN 24IN	
		Sta 47541+64; 50' Lt	1 EA
		Sta 47541+30; 42' Rt	1 EA

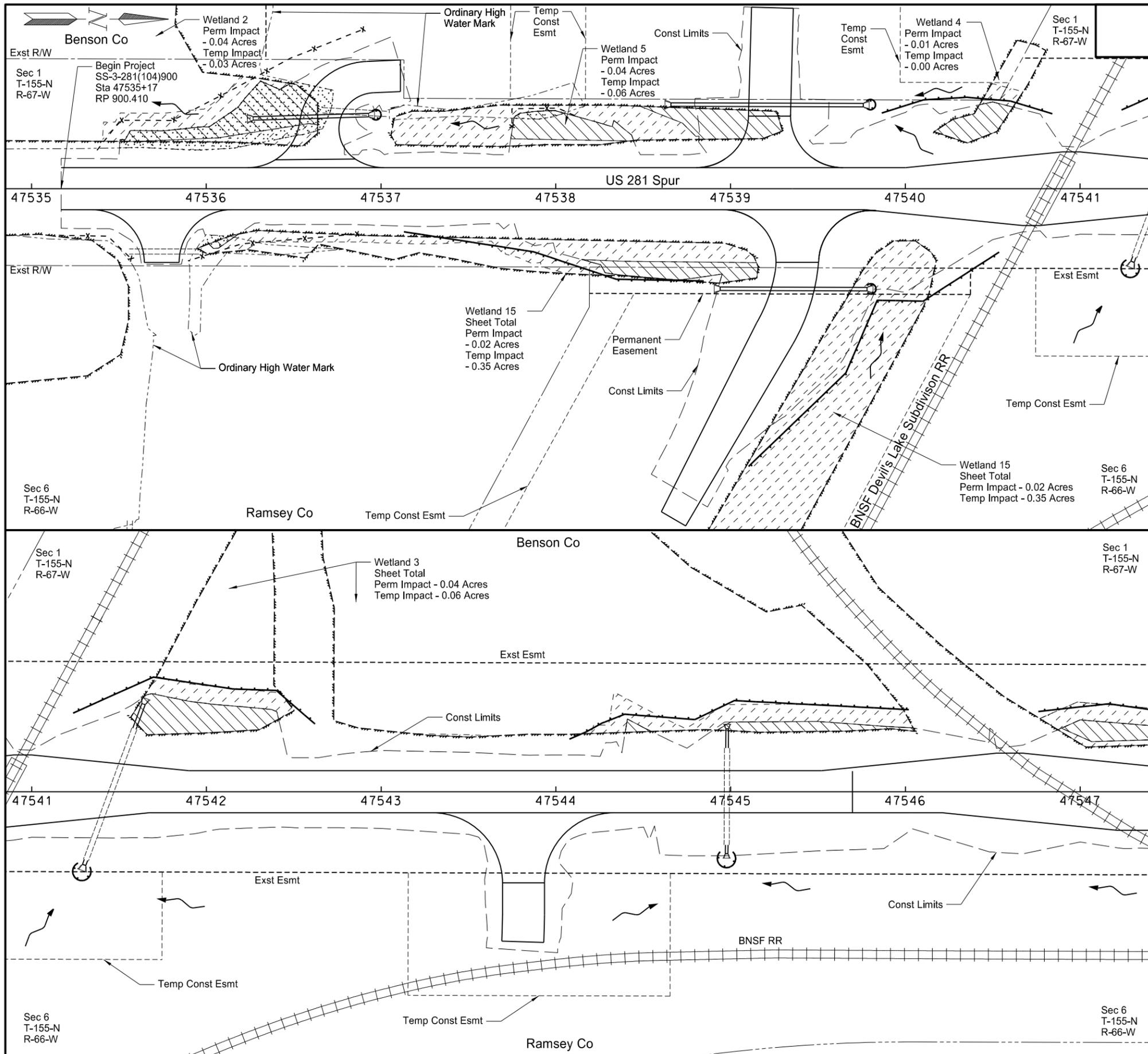
Curve EX281SPUR-1
 PI = 47551+16.84
 Delta = 4° 31' 55.84" (LT)
 Da = 1° 00' 00" (LT)
 R = 5,729.58
 T = 226.72
 L = 453.19



Note: All elevations on sheet are in NAVD 88 Datum.
 NGVD 29 = (NAVD 88) - 1.2'

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Plan & Profile
 US 281 Spur
 Churchs Ferry
 (RP 900.410 to 900.931)



STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-3-281(104)900	75	1

Temporary Erosion Control

708	1325	Silt Fence Supported		
		Sta 47535+17 Lt to 47547+00 Lt	225	LF
		Sta 47535+17 Rt to 47547+00 Rt	150	LF
708	1332	Removal Silt Fence Supported		
		Sta 47535+17 Lt to 47547+00 Lt	225	LF
		Sta 47535+17 Rt to 47547+00 Rt	150	LF
708	1430	Fiber Rolls 12 IN		
		Sta 47535+17 Lt to 47546+50 Lt	450	LF
		Sta 47535+17 Rt to 47547+00 Rt	375	LF
708	1431	Removal Fiber Rolls 12 IN		
		Sta 47535+17 Lt to 47546+50 Lt	450	LF
		Sta 47535+17 Rt to 47547+00 Rt	375	LF
708	2260	Seeding-Type B- CL IV		
		Sta 47535+17 Lt to 47547+00 Lt	0.60	ACRE
		Sta 47535+17 Rt to 47547+00 Rt	0.60	ACRE
708	5500	Mulching		
		Sta 47535+17 Lt to 47547+00 Lt	0.60	ACRE
		Sta 47535+17 Rt to 47547+00 Rt	0.60	ACRE

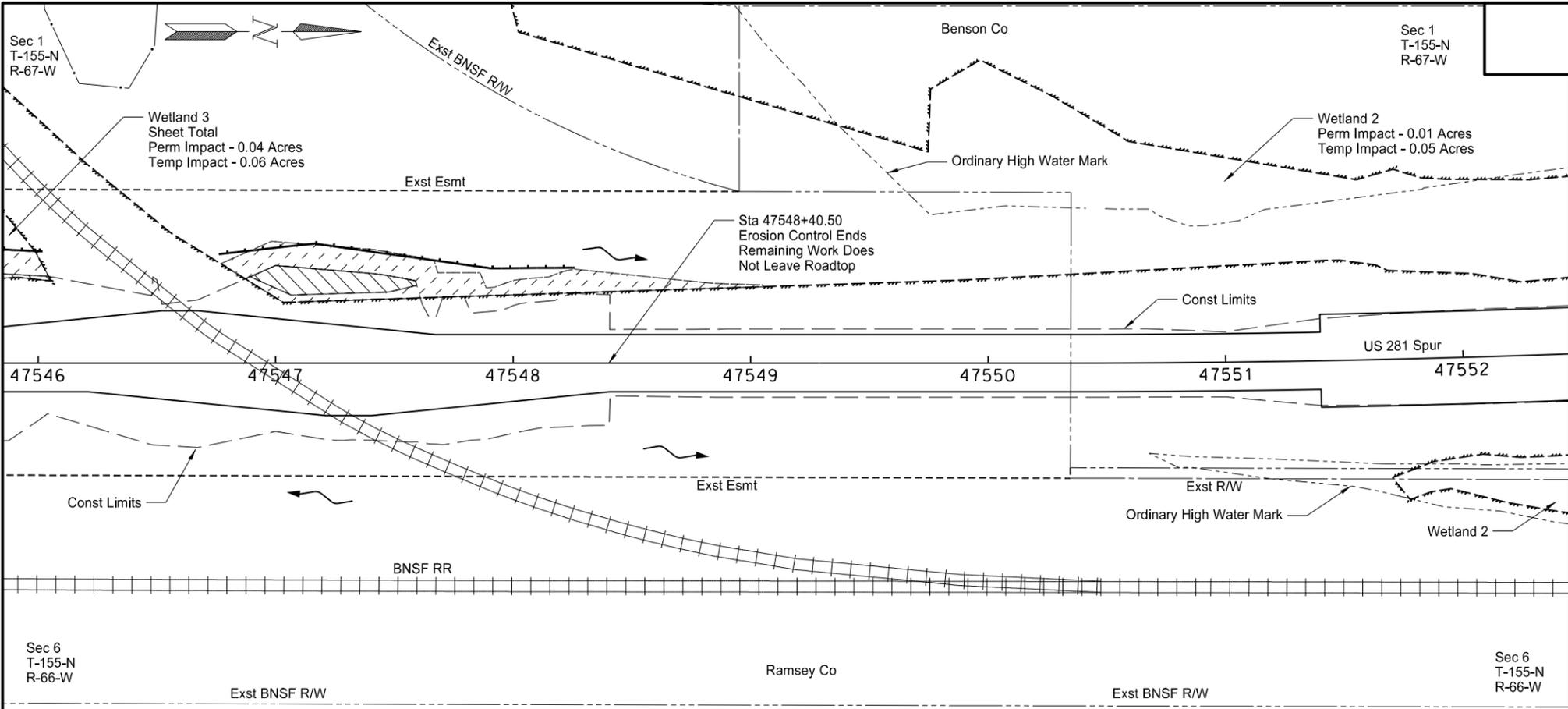
Note: Wetland location may be altered due to railroad relocations.

Legend

	Temporary Fiber Rolls 12 IN
	Temporary Silt Fence Support
	Delineated Wetland Boundary
	Permanent Wetland Impact
	Temporary Wetland Impact
	Hydraulic Flow Line
	Fill in Ordinary High Water (EI 1456 NAVD 88)

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Wetland Impacts, Temporary Erosion Control, & Seeding
US 281 Spur
Churchs Ferry
(RP 900.410 to RP 900.931)



Temporary Erosion Control

708	1430	Fiber Rolls 12 IN Sta 47546+50 Lt to 47548+40.50 Lt	150	LF
708	1431	Removal Fiber Rolls 12 IN Sta 47546+50 Lt to 47548+40.50 Lt	150	LF
708	2260	Seeding-Type B- CL IV Sta 47547+00 Lt to 47548+40.50 Lt Sta 47547+00 Rt to 47548+40.50 Rt	0.15 0.15	ACRE ACRE
708	5500	Mulching Sta 47547+00 Lt to 47548+40.50 Lt Sta 47547+00 Rt to 47548+40.50 Rt	0.15 0.15	ACRE ACRE

Note: Wetland location may be altered due to railroad relocations.

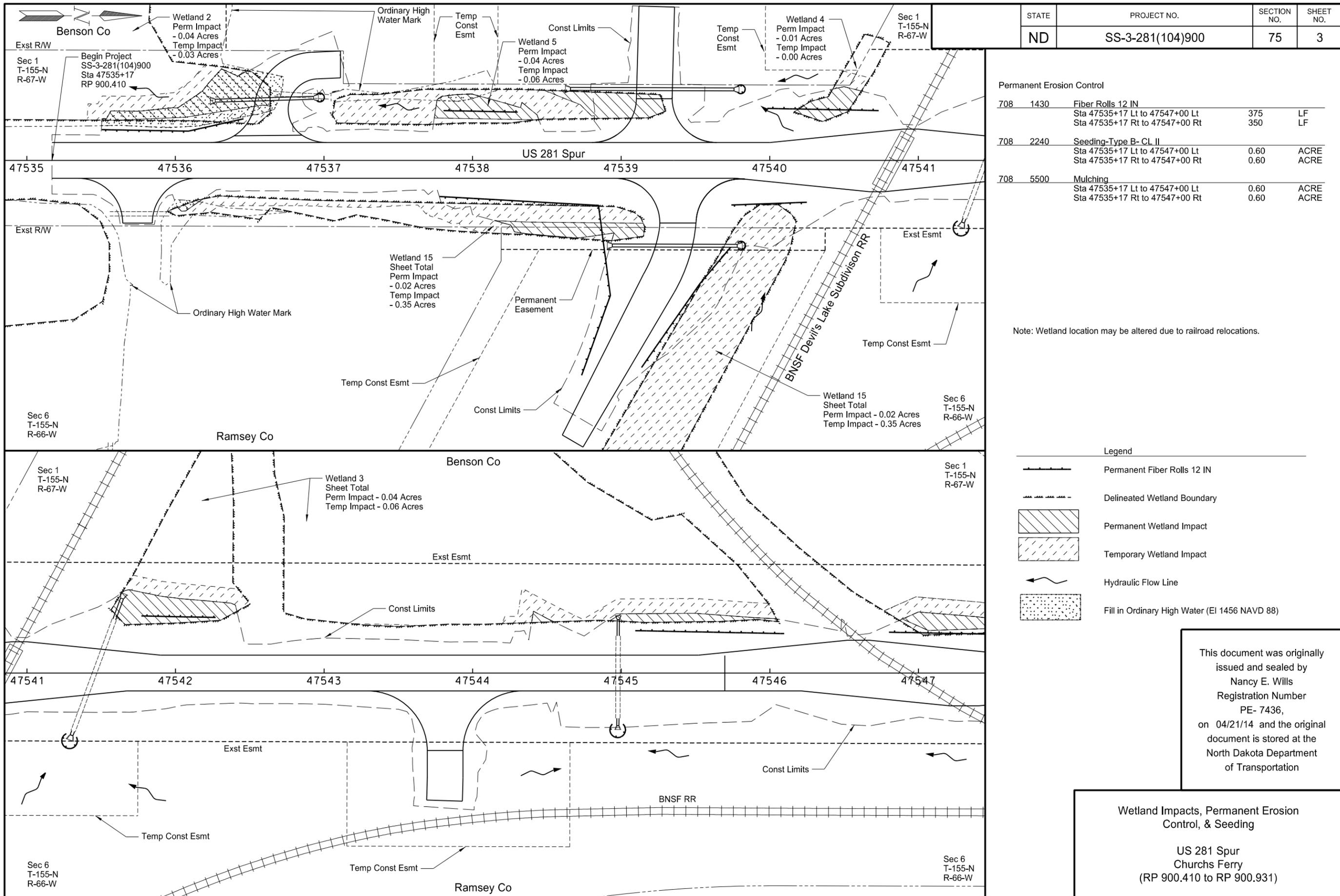
Legend

	Temporary Fiber Rolls 12 IN
	Temporary Silt Fence Support
	Delineated Wetland Boundary
	Permanent Wetland Impact
	Temporary Wetland Impact
	Hydraulic Flow Line
	Fill in Ordinary High Water (EI 1456 NAVD 88)

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Wetland Impacts, Temporary Erosion
 Control, & Seeding

US 281 Spur
 Churchs Ferry
 (RP 900.410 to RP 900.931)



STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-3-281(104)900	75	3

Permanent Erosion Control

708	1430	Fiber Rolls 12 IN		
		Sta 47535+17 Lt to 47547+00 Lt	375	LF
		Sta 47535+17 Rt to 47547+00 Rt	350	LF
708	2240	Seeding-Type B- CL II		
		Sta 47535+17 Lt to 47547+00 Lt	0.60	ACRE
		Sta 47535+17 Rt to 47547+00 Rt	0.60	ACRE
708	5500	Mulching		
		Sta 47535+17 Lt to 47547+00 Lt	0.60	ACRE
		Sta 47535+17 Rt to 47547+00 Rt	0.60	ACRE

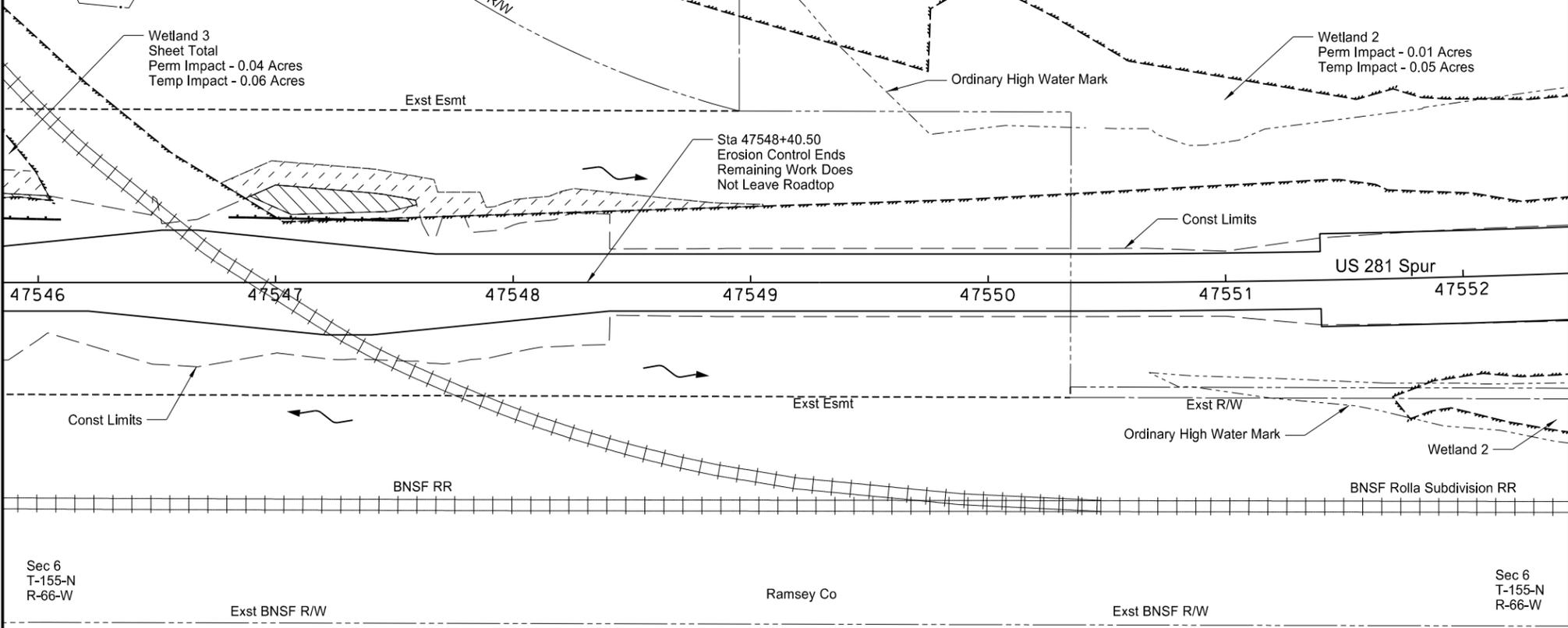
Note: Wetland location may be altered due to railroad relocations.

Legend

	Permanent Fiber Rolls 12 IN
	Delineated Wetland Boundary
	Permanent Wetland Impact
	Temporary Wetland Impact
	Hydraulic Flow Line
	Fill in Ordinary High Water (EI 1456 NAVD 88)

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Wetland Impacts, Permanent Erosion Control, & Seeding
US 281 Spur
Churchs Ferry
(RP 900.410 to RP 900.931)



Permanent Erosion Control

708	1430	Fiber Rolls 12 IN Sta 47547+00 Lt to 47548+40.50 Lt	75	LF
708	2240	Seeding-Type B- CL II Sta 47547+00 Lt to 47548+40.50 Lt Sta 47547+00 Rt to 47548+40.50 Rt	0.15 0.15	ACRE ACRE
708	5500	Mulching Sta 47535+00 Lt to 47548+40.50 Lt Sta 47535+00 Rt to 47548+40.50 Rt	0.15 0.15	ACRE ACRE

Note: Wetland location may be altered due to railroad relocations.

Legend

	Permanent Fiber Rolls 12 IN
	Delineated Wetland Boundary
	Permanent Wetland Impact
	Temporary Wetland Impact
	Hydraulic Flow Line
	Fill in Ordinary High Water (EI 1456 NAVD 88)

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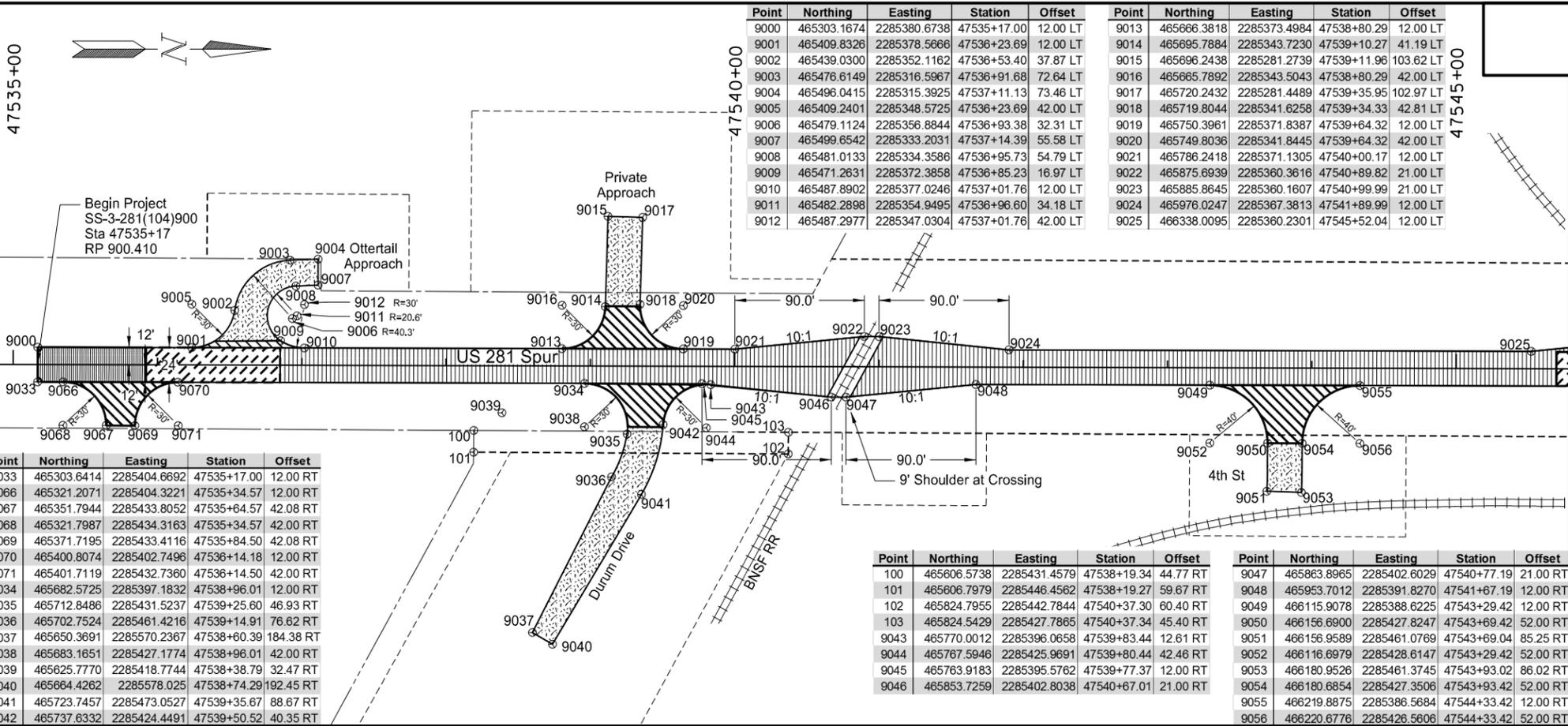
Wetland Impacts, Permanent Erosion
 Control, & Seeding

 US 281 Spur
 Churchs Ferry
 (RP 900.410 to RP 900.931)

PRELIMINARY SURVEY COORDINATE AND CURVE DATA - US Hwy 281 Spur from Jct Hwy 2 to US Hwy 281

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-3-281(104)900	81	1

HORIZONTAL ALIGNMENT				CURVE DATA		US PUBLIC LAND SURVEY DATA			SURVEY CONTROL POINTS						
PNT	STATION	NORTHING	EASTING	ARC DEFINITION		DESC. SEC-TWP-RGE	NORTHING	EASTING	PNT	NORTHING	EASTING	ELEV	STATION	OFFSET	CONTROL POINT DESCRIPTION
Alignment EX281SPUR						SW Cor Sec 1 T-155-N R-67-W	464920.47	2280125.16							
POT	47520+00.00	463786.86	2285429.68	Curve EX281SPUR_1	Curve EX281SPUR_2	E¼ Cor Sec 1 T-155-N R-67-W	467640.69	2285364.19							
PI	47532+12.80	464999.26	2285398.68	P.I. Sta 47552+49.41	P.I. Sta 47559+63.93	SE Cor Sec 2 T-156-N R-67-W	496596.51	2279583.95	Primary Control						
PC	47550+33.20	466819.30	2285362.72	Delta = 4°19'20" (LT)	Delta = 4°27'50" (RT)	NE Cor Sec 2 T-155-N R-67-W	470197.80	2280028.66	GPS 281-1	468161.24	2283450.79	1454.16	9241+25.50	36.8' Lt	3/4" Rebar w/ Alum cap stamped 'LS 4730 281-1'
PI-EX281-SPUR-1	47552+49.41	467035.47	2285358.45	Degree = 01°00'00"	Degree = 01°00'00"	NW Cor Sec 7 T-155-N R-66-W	464999.41	2285408.68							
PT	47554+65.42	467250.71	2285337.90	Tangent = 216.21	Tangent = 223.30	W¼ Cor Sec 12 T-155-N R-67-W	462269.15	2280170.77	GPS 281-3	486160.39	2284882.62	1462.74	9440+09.18	112.97' Lt	3/4" Rebar w/ Alum cap stamped 'LS 4730 281-3'
PC	47557+40.62	467524.66	2285311.74	Radius = 5729.58	Radius = 5729.58	SE Cor Sec 12 T-155-N R-67-W	459713.84	2285500.03							
PI-EX281-SPUR-2	47559+63.93	467746.96	2285290.52	Length = 432.22	Length = 446.38	SW Cor Sec 12 T-155-N R-67-W	459634.71	2280212.83	GPS 281-4	475434.66	2277252.13	1469.40	9334+15.08	7924.26' Lt	3/4" Rebar w/ Alum cap stamped 'LS 4730 281-4'
PT	47561+87.00	467970.23	2285286.66	P.C. Sta 47550+33.20	P.C. Sta 47557+40.62	E¼ Cor Sec 12 T-155-N R-67-W	462356.61	2285454.46							
POT	47563+73.59	468156.79	2285283.44	P.T. Sta 47554+65.42	P.T. Sta 47561+87.00	N¼ Cor Sec 12 T-155-N R-67-W	464959.94	2282766.92							
						S¼ Cor Sec 12 T-155-N R-67-W	459674.76	2282856.15	Secondary Control						
									RTK 201	468164.00	2286119.67	1464.50	N/A	N/A	
									RTK 202	463580.19	2285413.67	1457.49	N/A	N/A	
									RTK 206	465484.45	2285329.81	1458.80	47536+99	59' Lt	
									RTK 207	465011.58	2285435.63	1457.21	47532+24	37' Rt	
									RTK 208	466188.76	2285407.86	1461.62	47544+02	33' Lt	
									RTK 209	467076.30	2285301.53	1460.91	47552+95	42' Lt	
									RTK 210	467808.01	2285319.35	1463.18	47560+24	30' Rt	
NOTES:				Date Survey Completed 02/10/2012		<input type="checkbox"/> Assumed Coordinates <input checked="" type="checkbox"/> All coordinates on this sheet are Benson County ground coordinates. They are derived from the "North Dakota Coordinate System of 1983", NAD83(CORS96), North Zone Combination factor (cf) = 0.9998610			All coordinates and measurements on this document derived from the International Foot definition.			This document was originally issued and sealed by Nancy E. Wills, Registration Number LS-7436, on 04/17/14 and the original document is stored at the North Dakota Department of Transportation			
1. OPUS Control established by Ulteig - received from NDDOT and converted from NGVD-29 Datum back to NAVD-88 (Utieg Survey Completed 11/19/2009) 2. All elevations listed on the plans are NAVD-88 Datum 3. The station and offsets listed are based off existing US 281 and 281 Spur centerlines						<input checked="" type="checkbox"/> NAVD-88 <input type="checkbox"/> NGVD-29 <input checked="" type="checkbox"/> ENGLISH UNITS <input type="checkbox"/> METRIC UNITS									



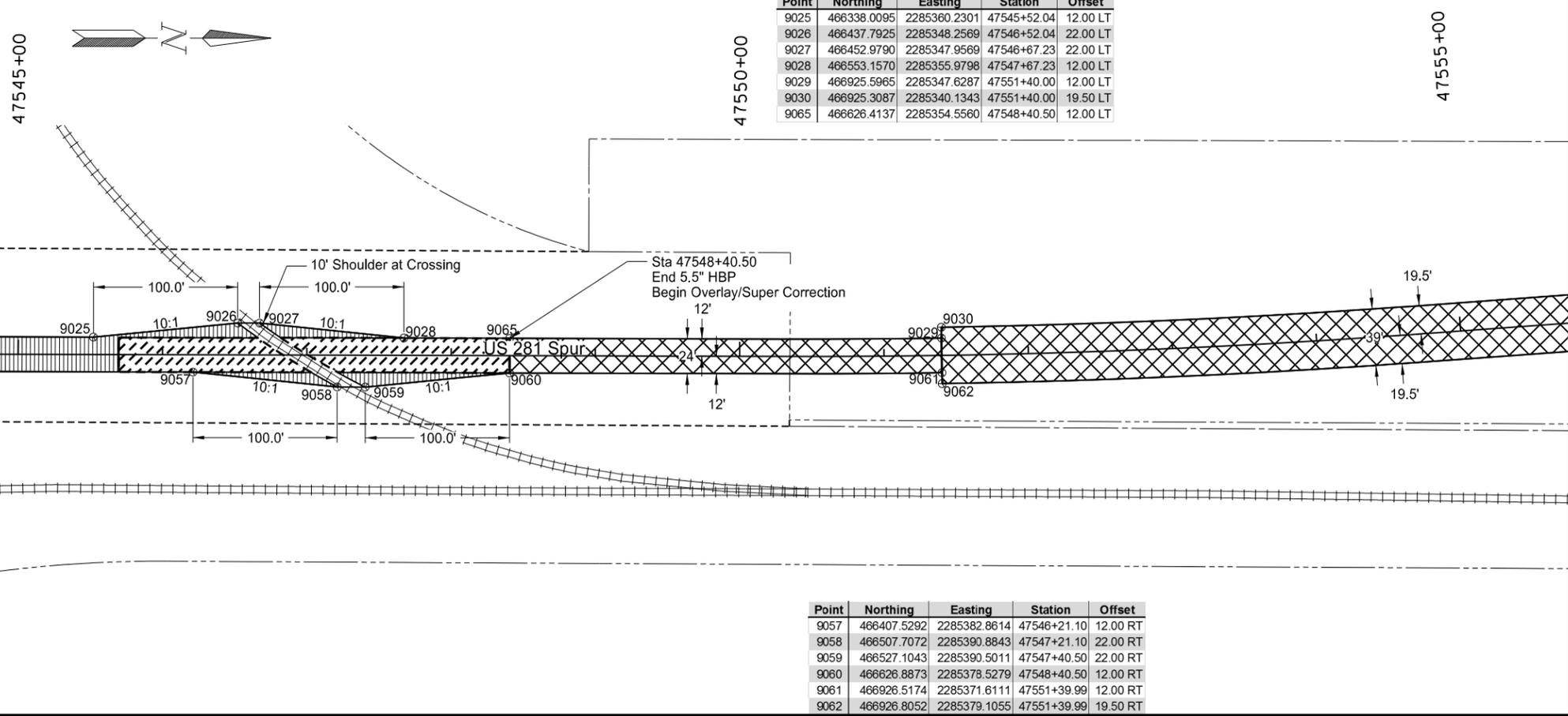
Point	Northing	Easting	Station	Offset
9033	465303.6414	2285404.6892	47535+17.00	12.00 RT
9066	465321.2071	2285404.3221	47535+34.57	12.00 RT
9067	465351.7944	2285433.8052	47535+64.57	42.08 RT
9068	465321.7987	2285434.3163	47535+34.57	42.00 RT
9069	465371.7195	2285433.4116	47535+84.50	42.08 RT
9070	465400.8074	2285402.7496	47536+14.18	12.00 RT
9071	465401.7119	2285432.7360	47536+14.50	42.00 RT
9034	465682.5725	2285397.1832	47538+96.01	12.00 RT
9035	465712.8486	2285431.5237	47539+25.60	46.93 RT
9036	465702.7524	2285461.4216	47539+14.91	76.62 RT
9037	465650.3691	2285570.2367	47538+60.39	184.38 RT
9038	465683.1651	2285427.1774	47538+96.01	42.00 RT
9039	465625.7770	2285418.7744	47538+38.79	32.47 RT
9040	465664.4262	2285578.025	47538+74.29	192.45 RT
9041	465723.7457	2285473.0527	47539+35.67	88.67 RT
9042	465737.6332	2285424.4491	47539+50.52	40.35 RT

Point	Northing	Easting	Station	Offset
9000	465303.1674	2285380.6738	47535+17.00	12.00 LT
9001	465409.8326	2285378.5666	47536+23.69	12.00 LT
9002	465439.0300	2285352.1162	47536+53.40	37.87 LT
9003	465476.6149	2285316.5967	47536+91.68	72.64 LT
9004	465496.0415	2285315.3925	47537+11.13	73.46 LT
9005	465409.2401	2285348.5725	47536+23.69	42.00 LT
9006	465479.1124	2285356.8844	47536+93.38	32.31 LT
9007	465499.6542	2285333.2031	47537+14.39	55.58 LT
9008	465481.0133	2285334.3586	47536+95.73	54.79 LT
9009	465471.2631	2285372.3858	47536+85.23	16.97 LT
9010	465487.8902	2285377.0246	47537+01.76	12.00 LT
9011	465482.2898	2285354.9495	47536+96.60	34.18 LT
9012	465487.2977	2285347.0304	47537+01.76	42.00 LT

Point	Northing	Easting	Station	Offset
9013	465666.3818	2285373.4984	47538+80.29	12.00 LT
9014	465695.7884	2285343.7230	47539+10.27	41.19 LT
9015	465696.2438	2285281.2739	47539+11.96	103.62 LT
9016	465665.7892	2285343.5043	47538+80.29	42.00 LT
9017	465720.2432	2285281.4489	47539+35.95	102.97 LT
9018	465719.8044	2285341.6258	47539+34.33	42.81 LT
9019	465750.3961	2285371.8387	47539+64.32	12.00 LT
9020	465749.8036	2285341.8445	47539+64.32	42.00 LT
9021	465786.2418	2285371.1305	47540+00.17	12.00 LT
9022	465875.6939	2285360.3616	47540+89.82	21.00 LT
9023	465885.8645	2285360.1607	47540+99.99	21.00 LT
9024	465976.0247	2285367.3813	47541+89.99	12.00 LT
9025	466338.0095	2285360.2301	47545+52.04	12.00 LT

Point	Northing	Easting	Station	Offset
100	465606.5738	2285431.4579	47538+19.34	44.77 RT
101	465606.7979	2285446.4562	47538+19.27	59.67 RT
102	465824.7955	2285442.7844	47540+37.30	60.40 RT
103	465824.5429	2285427.7865	47540+37.34	45.40 RT
9043	465770.0012	2285396.0658	47539+83.44	12.61 RT
9044	465767.5946	2285425.9691	47539+80.44	42.46 RT
9045	465763.9183	2285395.5762	47539+77.37	12.00 RT
9046	465853.7259	2285402.8038	47540+67.01	21.00 RT

Point	Northing	Easting	Station	Offset
9047	465863.8965	2285402.6029	47540+77.19	21.00 RT
9048	465953.7012	2285391.8270	47541+67.19	12.00 RT
9049	466115.9078	2285388.6225	47543+29.42	12.00 RT
9050	466156.6900	2285427.8247	47543+69.42	52.00 RT
9051	466156.9589	2285461.0769	47543+69.04	85.25 RT
9052	466116.6979	2285428.6147	47543+29.42	52.00 RT
9053	466180.9526	2285461.3745	47543+93.02	86.02 RT
9054	466180.6854	2285427.3506	47543+93.42	52.00 RT
9055	466219.8875	2285386.5684	47544+33.42	12.00 RT
9056	466220.6776	2285426.5606	47544+33.42	52.00 RT



Point	Northing	Easting	Station	Offset
9025	466338.0095	2285360.2301	47545+52.04	12.00 LT
9026	466437.7925	2285348.2569	47546+52.04	22.00 LT
9027	466452.9790	2285347.9569	47546+67.23	22.00 LT
9028	466553.1570	2285355.9798	47547+67.23	12.00 LT
9029	466925.5965	2285347.6287	47551+40.00	12.00 LT
9030	466925.3087	2285340.1343	47551+40.00	19.50 LT
9065	466626.4137	2285354.5560	47548+40.50	12.00 LT

Point	Northing	Easting	Station	Offset
9057	466407.5292	2285382.8614	47546+21.10	12.00 RT
9058	466507.7072	2285390.8843	47547+21.10	22.00 RT
9059	466527.1043	2285390.5011	47547+40.50	22.00 RT
9060	466626.8873	2285378.5279	47548+40.50	12.00 RT
9061	466926.5174	2285371.6111	47551+39.99	12.00 RT
9062	466926.8052	2285379.1055	47551+39.99	19.50 RT

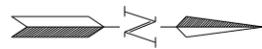
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-3-281(104)900	90	1

306	300	BLENDED BASE COURSE		
		Sta 47535+92.00 to Sta 47536+85.00	289	SY
		Sta 47545+69.67 to Sta 47548+40.50	800	SY
401	150	SS1H OR CSS1H EMULSIFIED ASPHALT		
		Sta 47535+17.00 to Sta 47551+39.99	454	GAL
410	213	SUPERPAVE FAA 43		
		Sta 47535+17.00 to Sta 47536+92.00	107	TON
		Sta 47536+92.00 to Sta 47548+40.50	1110	TON
		Sta 47548+40.50 to Sta 47551+39.99	98	TON
		Total	1315	TON
410	445	PG 58-28 ASPHALT CEMENT		
		Sta 47535+17.00 to Sta 47551+39.99	78	TON
410	910	CORED SAMPLE		
		Sta 47535+17.00 to Sta 47548+40.50	7	EA
720	130	IRON PIN R/W MONUMENTS		
		Sta 47538+19.34; 44.77' Rt	1	EA
		Sta 47538+19.27; 56.67' Rt	1	EA
		Sta 47540+37.30; 60.40' Rt	1	EA
		Sta 47540+37.34; 45.40' Rt	1	EA

- HBP Transition
- Superpave FAA 43 (5.5")
- Approach - Superpave FAA 43
- Blended Base Course Superpave FAA 43 (5.5")
- Super Correction - Superpave FAA 43
- Salvaged Base Course

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Paving Layout
US 281 Spur
Churchs Ferry
(RP 900.410 to RP 900.931)



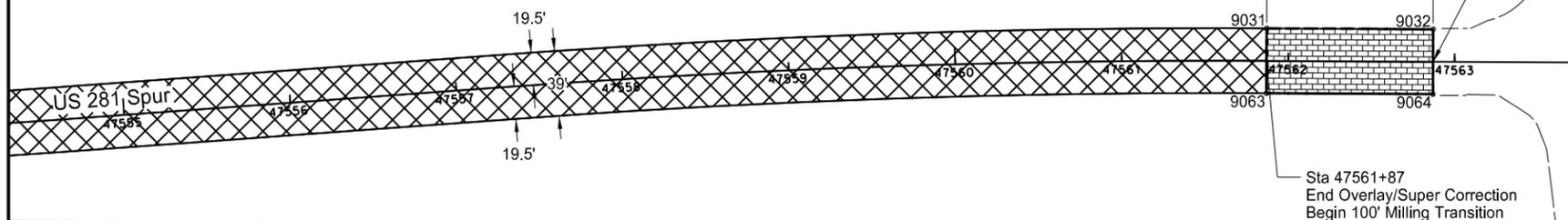
47555+00

47560+00

Point	Northing	Easting	Station	Offset
9031	467969.8916	2285267.1672	47561+87.00	19.50 LT
9032	468069.8766	2285265.4392	47562+87.00	19.50 LT
9063	467970.5655	2285306.1613	47561+87.00	19.50 RT
9064	468070.5505	2285304.4333	47562+87.00	19.50 RT

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-3-281(104)900	90	2

401	150	SS1H OR CSS1H EMULSIFIED ASPHALT		
		Sta 47551+39.99 to Sta 47562+87.00	249	GAL
410	213	SUPERPAVE FAA 43		
		Sta 47551+39.99 to Sta 47562+87.00	692	TON
410	445	PG 58-28 ASPHALT CEMENT		
		Sta 47551+39.99 to Sta 47562+87.00	41	TON
411	100	MILLING PAVEMENT SURFACE		
		Sta 47561+87.00 to Sta 47562+87.00	24	TON



End Project
SS-3-281(104)900
Sta 47562+87
RP 900.931

Sta 47561+87
End Overlay/Super Correction
Begin 100' Milling Transition

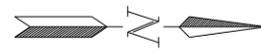
-  Super Correction - Superpave FAA 43
-  Milling Transition (2.0")

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Paving Layout

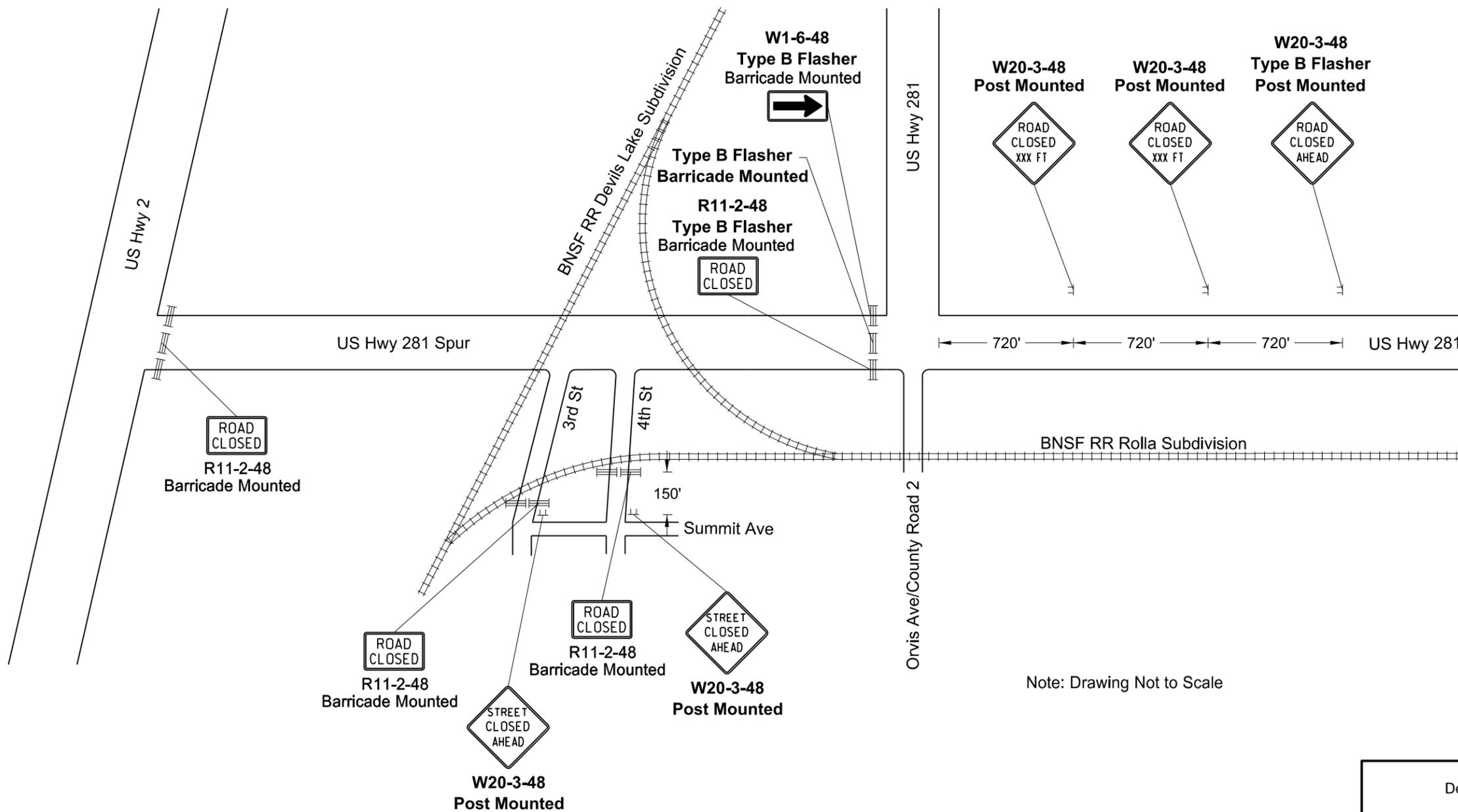
US 281 Spur
Churchs Ferry
(RP 900.410 to RP 900.931)

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-3-281(104)900	100	2



Legend

- ▬ Sign
- ▬▬ Type III Barricade



Note: Drawing Not to Scale

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Detour Traffic Control Layout

US 281 Spur
Churchs Ferry
(RP 900.410 to 900.931)

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
N.D.	SS-3-281(104)900	110	1

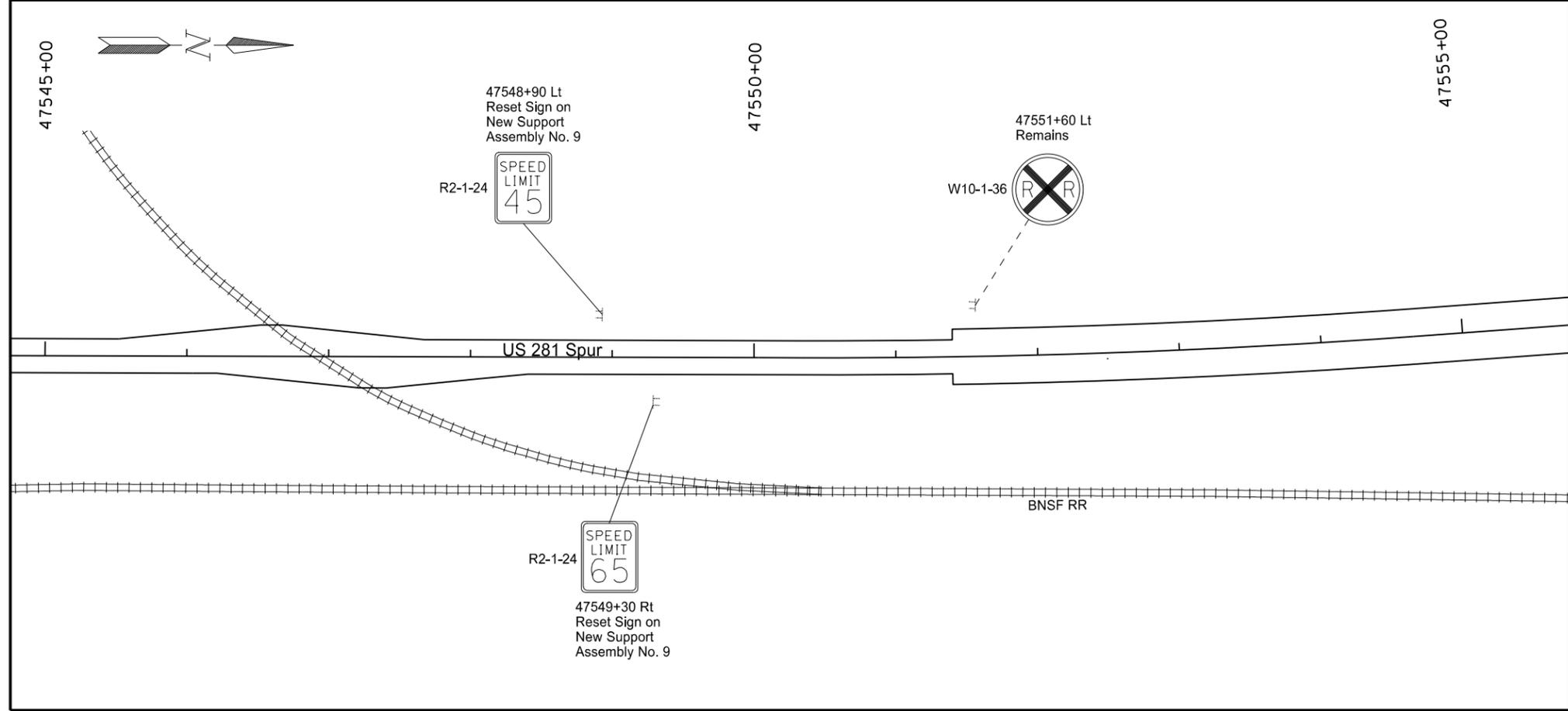
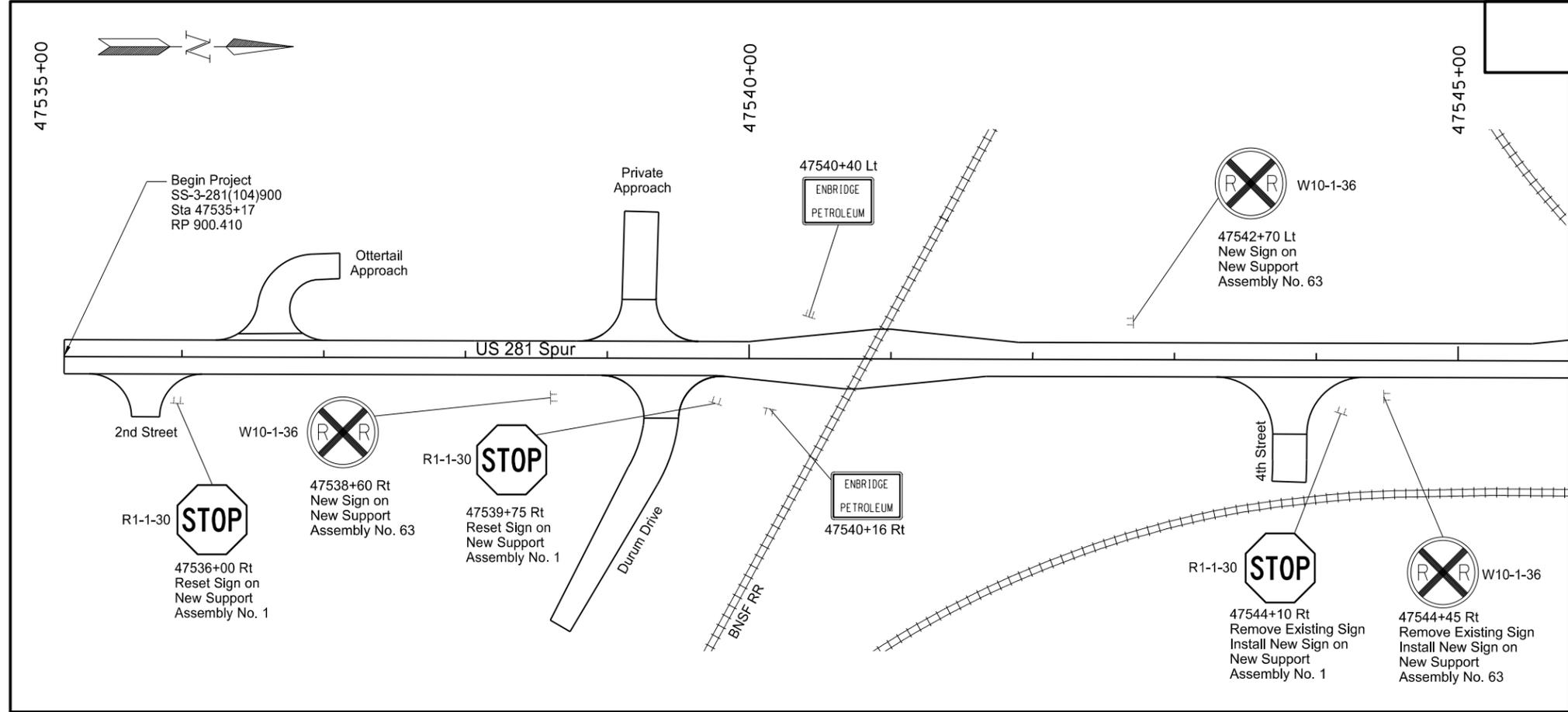
Sta/RP	Sign No.	Assembly No.	Flat Sheet For Signs		Sign Support Length				Support Size	Max Post Len	Sleeve Length				Sleeve Size	Anchor EA	Anchor LF	Anchor Size	Reset Sign Panel EA	Reset Sign Support EA	Break-Away EA	Comments
			IV SF	XI SF	1st LF	2nd LF	3rd LF	4th LF		LF	1st LF	2nd LF	3rd LF	4th LF								
US Hwy 281 Spur																						
47536+00 Rt		1			12.0				2.25 x 2.25 12 ga	13.7					1	4	2.5 x 2.5 12 ga	1			R1-1-30	
47538+60 Rt		63		7.1	12.1				2.5 x 2.5 12 ga	12.7					1	4	3 x 3 7 ga				W10-1-36	
47539+75 Rt		1			12.0				2.25 x 2.25 12 ga	13.7					1	4	2.5 x 2.5 12 ga	1			R1-1-30	
47542+70 Lt		63		7.1	12.1				2.5 x 2.5 12 ga	12.7					1	4	3 x 3 7 ga				W10-1-36	
47544+10 Rt		1		5.2	9.1				2 x 2 12 ga	10.5					1	4	2.25 x 2.25 12 ga				R1-1-30	
47544+45 Rt		63		7.1	12.1				2.5 x 2.5 12 ga	12.7					1	4	3 x 3 7 ga				W10-1-36	
47548+90 Lt		9			10.6				2 x 2 12 ga	11.5					1	4	2.25 x 2.25 12 ga				R2-1-24	
47549+30 Rt		9			11.2				2 x 2 12 ga	11.5					1	4	2.25 x 2.25 12 ga	1			R2-1-24	
Sub Total			0.0	26.5			Total	91.2							Total	32			3	0	0	
Grand Total			0.0	26.5			Total	91.2							Total	32			3	0	0	

Basis of Estimate
Sign Support Lengths
The sign support lengths have been calculated using the following vertical clearances:
Rural Roadway - 60"

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Sign Summary
Perforated Tube
US Hwy 281 Spur

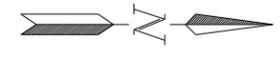
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-3-281(104)900	110	2



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Sign Layout
US 281 Spur
Churchs Ferry
(RP 900.410 to RP 900.931)

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-3-281(104)900	110	3



47555+00

47560+00

47560+37 Lt Remains



W3-5-36

US 281 Mainline

End Project
SS-3-281(104)900
Sta 47562+87
RP 900.931

US 281 Spur

BNSF RR

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Sign Layout

US 281 Spur
Churchs Ferry
(RP 900.410 to RP 900.931)

NDDOT ABBREVIATIONS

Abn	abandoned	Calc	calculate	Xsec	cross sections	Eq	equal
Abut	abutment	Cd	candela	Xing	crossing	Eq	equation
Ac	acres	CIP	cast iron pipe	Xrd	Crossroad	Evgr	evergreen
Adj	adjusted	CB	catch basin	Crn	crown	Exc	excavation
Aggr	aggregate	CRS	cationic rapid setting	CF	cubic feet	Exst	existing
Ahd	ahead	C Gd	cattle guard	M3	cubic meter	Exp	expansion
ARV	air release valve	C To C	center to center	M3/s	cubic meters per second	Expy	Expressway
Align	alignment	Cl or C	centerline	CY	cubic yard	E	external of curve
Al	alley	Cm	centimeter	Cy/mi	cubic yards per mile	Extru	extruded
Alt	alternate	Ch	chain	Culv	culvert	FOS	factor of safety
Alum	aluminum	Chnlk	chain-link	C&G	curb & gutter	F	Fahrenheit
ADA	Americans with Disabilities Act	Ch Blk	channel block	CI	curb inlet	FS	far side
A	ampere	Ch Ch	channel change	CR	curb ramp	F	farad
&	and	Chk	check	CS	curve to spiral	Fed	Federal
Appr	approach	Chsld	chiseled	C	cut	FP	feed point
Approx	approximate	Cir	circle	Dd Ld	dead load	Ft	feet/foot
ACP	asbestos cement pipe	Cl	class	Defl	deflection	Fn	fence
Asph	asphalt	Cl	clay	Defm	deformed	Fn P	fence post
AC	asphalt cement	Cl F	clay fill	Deg or D	degree	FO	fiber optic
Assmd	assumed	Cl Hvy	clay heavy	Dint	delineate	FB	field book
@	at	Cl Lm	clay loam	Dintr	delineator	FD	field drive
Atten	attenuation	Clnt	clean-out	Depr	depression	F	fill
ATR	automatic traffic recorder	Clr	clear	Desc	description	FAA	fine aggregate angularity
Ave	Avenue	Cl&gr	clearing & grubbing	Det	detail	FS	fine sand
Avg	average	Co S	coal slack	DWP	detectable warning panel	FH	fire hydrant
ADT	average daily traffic	Comb.	combination	Dtr	detour	FI	flange
Az	azimuth	Coml	commercial	Dia	diameter	FIRD	flared
Bk	back	Compr	compression	Dir	direction	FES	flared end section
BF	back face	CADD	computer aided drafting & design	Dist	distance	F Bcn	flashing beacon
Bs	backsight	Conc	concrete	DM	disturbed material	FA	flight auger sample
Balc	balcony	Cond	conductor	DB	ditch block	FL	flow line
B Wire	barbed wire	Const	construction	DG	ditch grade	Ftg	footing
Barr	barricade	Cont	continuous	Dbl	double	FM	force main
Btry	battery	CSB	continuous split barrel sample	Dn	down	Fs	foresight
Brg	bearing	Contr	contraction	Dwg	drawing	Fnd	found
BI	beehive inlet	Contr	contractor	Dr	drive	Fdn	foundation
Beg	begin	CP	control point	Drwy	driveway	Frac	fractional
BM	bench mark	Coord	coordinate	DI	drop inlet	Frwy	freeway
Bkwy	bikeway	Cor	corner	D	dry density	Frt	front
Bit	bituminous	Corr	corrected	Ea	each	FF	front face
Blk	block	CAES	corrugated aluminum end section	Esmt	easement	F Disp	fuel dispenser
Bd Ft	board feet	CAP	corrugated aluminum pipe	E	East	FFP	fuel filler pipes
BH	bore hole	CMES	corrugated metal end section	EB	Eastbound	FLS	fuel leak sensor
BS	both sides	CMP	corrugated metal pipe	Elast	elastomeric	Furn	furnished
Bot	bottom	CPVCP	corrugated poly-vinyl chloride pipe	EL	electric locker		
Blvd	Boulevard	CSES	corrugated steel end section	E Mtr	electric meter		
Bndry	boundary	CSP	corrugated steel pipe	Elec	electric/al		
BC	brass cap	C	coulomb	EDM	electronic distance meter		
Brkwy	breakaway	Co	County	Elev or El	elevation		
Br	bridge	Crse	course	Ellipt	elliptical		
Bldg	building	C Gr	course gravel	Emb	embankment		
BV	butterfly valve	CS	course sand	Emuls	emulsion/emulsified		
Byb	bypass	Ct	Court	ES	end section		
C Gdrl	cable guardrail	Xarm	cross arm	Engr	engineer		
		Xbuck	cross buck	ESS	environmental sensor station		

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
06-15-10	
REVISIONS	
DATE	CHANGE
04-20-11	Added Items
03-15-13	Added Items
11-01-13	Added Items

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NDDOT ABBREVIATIONS

Gal	gallon	J	joule	M	meter	Pen.	penetration
Galv	galvanized	Jct	junction	M/s	meters per second	Perf	perforated
Gar	garage	K	kelvin	M	mid ordinate of curve	Per.	perimeter
Gs L	gas line	Kn	kilo newton	Mi	mile	PL	pipeline
G Reg	gas line regulator	Kpa	kilo pascal	MM	mile marker	PI	place
GMV	gas main valve	Kg	kilogram	MP	mile post	P&P	plan & profile
G Mtr	gas meter	Kg/m3	kilogram per cubic meter	MI	milliliter	PL	plastic limit
GSV	gas service valve	Km	kilometer	Mm	millimeter	PI	plate
GVP	gas vent pipe	K	Kip(s)	Mm/hr	millimeters per hour	Pt	point
GV	gate valve	LS	Land Surveyor (licensed)	Min	minimum	PCC	point of compound curve
Ga	gauge	LSIT	Land Surveyor In Training	Misc	miscellaneous	PC	point of curve
Geod	geodetic	Ln	lane	Mon	monument	PI	point of intersection
GIS	Geographical Information System	Lg	large	Mnd	mound	PRC	point of reverse curvature
G	giga	Lat	latitude	Mtbl	mountable	PT	point of tangent
GPS	Global Positioning System	Lt	left	Mtd	mounted	POC	point on curve
Gov	government	L	length of curve	Mtg	mounting	POT	point on tangent
Grd	graded/grade	Lens	lenses	Mk	muck	PE	polyethylene
Gr	gravel	Lvl	level	Mun	municipal	PVC	polyvinyl chloride
Grnd	ground	LB	level book	N	nano	PCC	Portland Cement concrete
GWM	ground water monitor	Lvng	leveling	NGS	National Geodetic Survey	Lb or #	pounds
Gdrl	guardrail	Lht	light	NS	near side	PP	power pole
Gtr	gutter	LP	light pole	Neop	neoprene	Preempt	preemption
H Plg	H piling	Ltg	lighting	Ntwk	network	Prefab	prefabricated
Hdwl	headwall	Lig Co	lignite coal	N	newton	Prfmd	performed
Ha	hectare	Lig Sl	lignite slack	N	North	Prep	preparation
Ht	height	LF	linear foot	NE	North East	Press.	pressure
HI	height of instrument	Liq	liquid	NW	North West	PRV	pressure relief valve
Hel	helical	LL	liquid limit	NB	Northbound	Prestr	prestressed
H	henry	L	litre	No. or #	number	Pvt	private
Hz	hertz	Lm	loam	Obsc	obscure(d)	PD	private drive
HDPE	high density polyethylene	Loc	location	Obsn	observation	Prod.	production/produce
HM	high mast	LC	long chord	Ocpd	occupied	Prog	programmed
HP	high pressure	Long.	longitude	Ocpy	occupy	Prop.	property
HPS	high pressure sodium	Lp	loop	Off Loc	office location	Prop Ln	property line
Hwy	highway	LD	loop detector	O/s	offset	Ppsd	proposed
Hor	horizontal	Lm	lumen	OC	on center	PB	pull box
HBP	hot bituminous pavement	Lum	luminaire	C	one dimensional consolidation		
Hr	hour(s)	L Sum	lump sum	OC	organic content		
Hyd	hydrant	Lx	lux	Orig	original		
Ph	hydrogen ion content	ML	main line	O To O	out to out		
Id	identification	M Hr	man hour	OD	outside diameter		
In or "	inch	MH	manhole	OH	overhead		
Incl	inclinometer tube	Mkd	marked	PMT	pad mounted transformer		
IMH	inlet manhole	Mkr	marker	Pg	pages		
ID	inside diameter	Mkg	marking	Pntd	painted		
Inst	instrument	MA	mast arm	Pr	pair		
Intchg	interchange	Matl	material	Pnl	panel		
Intmdt	intermediate	Max	maximum	Pk	park		
Intscn	intersection	MC	meander corner	PK	Parker-Kalon nail		
Inv	invert	Meas	measure	Pa	pascal		
IM	iron monument	Mdn	median	PSD	passing sight distance		
IPn	Iron Pin	MD	median drain	Pvmt	pavement		
IP	iron Pipe	MC	medium curing	Ped	pedestal		
Jt	joint	M	mega	Ped	pedestrian		
		Mer	meridian	PPP	pedestrian pushbutton post		

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
06-15-10	
REVISIONS	
DATE	CHANGE
04-20-11	Added Items
03-15-13	Added Items
11-01-13	Added Items

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NDDOT ABBREVIATIONS

Qty	quantity	Sig	signal	Tel	telephone	WB	Westbound
Qtr	quarter	Si Cl	silt clay	Tel B	Telephone Booth	Wrng	wiring
Rad or R	radius	Si Cl Lm	silty clay loam	Tel P	telephone pole	W/	with
RR	railroad	Si Lm	silty loam	Tv	television	W/o	without
Rlwy	railway	Sgl	single	Temp	temperature	WC	witness corner
Rsd	raised	SC	slow curing	Temp	temporary	WGS	World Geodetic System
RTP	random traverse point	SS	slow setting	TBM	temporary bench mark	Z	zenith
Rge or R	range	Sm	small	T	tesla		
RC	rapid curing	S	South	T	thinwall tube sample		
Rec	record	SE	South East	T/mi	tons per mile		
Rcy	recycle	SW	South West	Ts	topsoil		
RPCC	recycled Portland cement concrete	SB	Southbound	Twp or T	township		
Ref	reference	Sp	spaces	Traf	traffic		
R Mkr	reference marker	Spcl	special	TSCB	traffic signal control box		
RM	reference monument	SP	special provisions	Tr	trail		
Refl	reflectorized	G	specific gravity	Transf	transformer		
RCB	reinforced concrete box	Spk	spike	TB	transit book		
RCES	reinforced concrete end section	SC	spiral to curve	Trans	transition		
RCP	reinforced concrete pipe	ST	spiral to tangent	TT	transmission tower		
RCPS	reinforced concrete pipe sewer	SB	split barrel sample	Trans	transverse		
Reinf	reinforcement	SH	sprinkler head	Trav	traverse		
Res	reservation	SV	sprinkler valve	TP	traverse point		
Ret	retaining	Sq	square	Trtd	treated		
Rev	reverse	SF	square feet	Trmt	treatment		
Rt	right	Km2	square kilometer	Qc	triaxial compression		
R/W	right of way	M2	square meter	TERO	tribal employment rights ordinance		
Riv	river	SY	square yard	Tpl	triple		
Rd	road	Stk	stake	TP	turning point		
Rdbd	road bed	Std	standard	Typ	typical		
Rdwy	roadway	N	standard penetration test	Qu	unconfined compressive strength		
RWIS	Roadway Weather Information System	Std Specs	Standard Specifications	Ugrnd	underground		
Rk	rock	Sta	station	USC&G	US Coast & Geodetic Survey		
Rt	route	Sta Yd	station yards	USGS	US Geologic Survey		
Salv	salvage(d)	Stm L	steam line	Util	utility		
Sd	sand	SEC	steel encased concrete	VG	valley gutter		
Sdy Cl	sandy clay	SSD	stopping sight distance	Vap	vapor		
Sdy Cl Lm	sandy clay loam	SD	storm drain	Vert	vertical		
Sdy Fl	sandy fill	St	street	VC	vertical curve		
Sdy Lm	sandy loam	SPP	structural plate pipe	VCP	vitrified clay pipe		
San	sanitary sewer line	SPPA	structural plate pipe arch	V	volt		
Sc	scoria	Str	structure	Vol	volume		
Sec	seconds	Subd	subdivision	Wkwy	walkway		
Sec	section	Sub	subgrade	W	water content		
SL	section line	Sub Prep	subgrade preparation	WGV	water gate valve		
Sep	separation	Ss	subsoil	WL	water line		
Seq	sequence	SE	superelevation	WM	water main		
Serv	service	SS	supplement specification	WMV	water main valve		
Sh	shale	Supp	supplemental	W Mtr	water meter		
Sht	sheet	Surf	surfacing	WSV	water service valve		
Shtng	sheeting	Surv	survey	WW	water well		
Shldr	shoulder	Sym	symmetrical	W	watt		
Sw	sidewalk	SI	Systems International	Wrng	wearing		
S	siemens	Tan	tangent	Wb	weber		
SD	sight distance	T	tangent (semi)	WIM	Weigh In Motion		
		TS	tangent to spiral	W	West		

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
06-15-10	
REVISIONS	
DATE	CHANGE
04-20-11	Added Items
03-15-13	Added Items
11-01-13	Added Items

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NDDOT UTILITY COMPANY AND ORGANIZATION ABBREVIATIONS

D-20-10

702COM 702 Communications
 ACCENT Accent Communications
 AGASSIZ WU Agassiz Water Users Incorporated
 AGC Associated General Contractors of America
 All PI Alliance Pipeline
 ALL SEAS WU All Seasons Water Users Association
 AMOCO PI Amoco Pipeline Company
 AMRDA HESS Amerada Hess Corporation
 AT&T AT&T Corporation
 B PAW Bear Paw Energy Incorporated
 BAKER ELEC Baker Electric
 BASIN ELEC Basin Electric Cooperative Incorporated
 BEK TEL Bek Communications Cooperative
 BELLE PL Belle Fourche Pipeline Company
 BLM Bureau of Land Management
 BNSF Burlington Northern Santa Fe Railway
 BOEING Boeing
 BRNS RWD Barnes Rural Water District
 BURK-DIV ELEC Burke-Divide Electric Cooperative
 BURL WU Burleigh Water Users
 Cable One Cable One
 CABLE SERV Cable Services
 CAP ELEC Capital Electric Cooperative Incorporat
 CASS CO ELEC Cass County Electric Cooperative
 CASS RWU Cass Rural Water Users Incorporated
 CAV ELEC Cavalier Rural Electric Cooperative
 CBLCOM Cablecom Of Fargo
 CENEX PL Cenex Pipeline
 CENT PL WATER DIST Central Pipe Line Water District
 CENT PWR ELEC Central Power Electric Cooperative
 COE Corps of Engineers
 CONS TEL Consolidated Telephone
 CONT RES Continental Resource Inc
 CPR Canadian Pacific Railway
 D O E Department Of Energy
 DAK CARR Dakota Carrier Network
 DAK CENT TEL Dakota Central Telephone
 DAK RWD Dakota Rural Water District
 DGC Dakota Gasification Company
 DICKEY R NET Dickey Rural Networks
 DICKEY RWU Dickey Rural Water Users Association
 DICKEY TEL Dickey Telephone
 DNRR Dakota Northern Railroad
 DOME PL Dome Pipeline Company
 DVELEC Dakota Valley Electric Cooperative
 DVMW Dakota, Missouri Valley & Western
 ENBRDG Enbridge Pipelines Incorporated
 ENVENTIS Enventis Telephone
 FALK MNG Falkirk Mining Company
 FHWA Federal Highway Administration
 G FKS-TRL WD Grand Forks-trail Water District
 GETTY TRD & TRAN Getty Trading & Transportation
 GLDN W ELEC Golden West Electric Cooperative
 GRGS CO TEL Griggs County Telephone

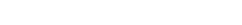
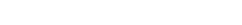
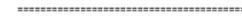
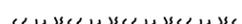
GT PLNS NAT GAS Great Plains Natural Gas Company
 HALS TEL Halstad Telephone Company
 IDEA1 Idea1
 INT-COMM TEL Inter-Community Telephone Company
 KANEB PL Kaneb Pipeline Company
 KEM ELEC Kem Electric Cooperative Incorporated
 KOCH GATH SYS Koch Gathering Systems Incorporated
 LKHD PL Lakehead Pipeline Company
 LNGDN RWU Langdon Rural Water Users Incorporated
 LWR YELL R ELEC Lower Yellowstone Rural Electric
 MCKNZ CON McKenzie Consolidated Telcom
 MCKENZ ELEC McKenzie Electric Cooperative
 MCKNZ WRD McKenzie County Water Resource District
 MCLEOD McLeod USA
 MCLN ELEC McLean Electric Cooperative
 MCLN-SHRDN R WAT McLean-Sheridan Rural Water
 MDU Montana-dakota Utilities
 MID-CONT CABLE Mid-Continent Cable
 MIDSTATE TEL Midstate Telephone Company
 MINOT CABLE Minot Cable Television
 MINOT TEL Minot Telephone Company
 MISS W W S Missouri West Water System
 MNKOTA PWR Minnkota Power
 MOR-GRAN-SOU ELEC Mor-gran-sou Electric Cooperative
 MOUNT-WILLI ELEC Mountrail-williams Electric Cooperative
 MRE LBTY TEL Moore & Liberty Telephone
 MUNICIPAL City Water And Sewer
 MUNICIPAL City Of '.....'
 N CENT ELEC North Central Electric Cooperative
 N VALL W DIST North Valley Water District
 ND PKS & REC North Dakota Parks And Recreation
 ND TEL North Dakota Telephone Company
 NDDOT North Dakota Department of Transportation
 NDSU SOIL SCI DEPT NDSU Soil Science Department
 NEMONT TEL Nemont Telephone
 NODAK R ELEC Nodak Rural Electric Cooperative
 NOON FRMS TEL Noonan Farmers Telephone Company
 NPR Northern Plains Railroad
 NSP Northern States Power
 NTH PRAIR RW Northern Prairie Rural Water Association
 NTHN BRDR PL Northern Border Pipeline
 NTHN PLNS ELEC Northern Plains Electric Cooperative Incorporated
 NTHWSTRN REF Northwestern Refinery Company
 NW COMM Northwest Communication Cooperation
 ONEOK Oneok gas
 OSHA Occupational Safety and Health Administration
 OTTR TL PWR Otter Tail Power Company
 P L E M Prairielands Energy Marketing
 POLAR COM Polar Communications
 PVT ELEC Private Electric
 QWEST Qwest Communications
 R & T W SUPPLY R & T Water Supply Association
 RAMSEY R SEW Ramsey Rural Sewer Association
 RAMSEY RW Ramsey Rural Water Association
 RAMSEY UTIL Ramsey County Rural Utilities

RED RIV TEL Red River Rural Telephone
 RESVTN TEL Reservation Telephone
 ROBRTS TEL Roberts Company Telephone
 R-RIDER ELEC Roughrider Electric Coop
 RRVW Red River Valley & Western Railroad
 RSR ELEC R.S.R. Electric Cooperative
 S E W U South East Water Users Incorporated
 SCOTT CABLE Scott Cable Television Dickinson
 SHERDN ELEC Sheridan Electric Cooperative
 SHEYN VLY ELEC Sheyenne Valley Electric Cooperative
 SKYTECH Skyland Technologies Incorporated
 SLOPE ELEC Slope Electric Cooperative Incorporated
 SOURIS RIV TELCOM Souris River Telecommunications
 ST WAT COMM State Water Commission
 STATE LN WATER State Line Water Cooperative
 STER ENG Sterling Energy
 STUT RWU Stutsman Rural Water Users
 SW PL PRJ Southwest Pipeline Project
 T M C Turtle Mountain Communications
 TCI TCI of North Dakota
 TESORO GHG PLNS PL Tesoro High Plains Pipeline
 TRI-CNTY WU Tri-County Water Users Incorporated
 TRL CO RWU Traill County Rural Water Users
 UNTD TEL United Telephone
 UPPR SOUR WUA Upper Souris Water Users Association
 US SPRINT U.S. Sprint
 USAF MSL CABLE U.S.A.F. Missile Cable
 USFWS US Fish and Wildlife Service
 USW COMM U.S. West Communications
 VRNDRY ELEC Verendrye Electric Cooperative
 W RIV TEL West River Telephone Incorporated
 WEB W. E. B. Water Development Association
 WILLI RWA Williams Rural Water Association
 WILSTN BAS PL Williston Basin Interstate Pipeline Company
 WLSH RWD Walsh Water Rural Water District
 WOLVRTN TEL Wolverton Telephone
 XLENER Xcel Energy
 YSVR Yellowstone Valley Railroad

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
6-15-10	
REVISIONS	
DATE	CHANGE
04-20-11	Added Items
03-15-13	Added Items
11-01-13	Added Items, Changed Standard Name to Include Organizations

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Line Styles

	Subgrade Reinforcement		Existing Railroad Switch		Sheet Piling
	Existing Down Guy Wire Down Guy		Overhead Sign Structure Cantilever		W-Beam w Posts
	Existing Fence		24 Inch Pipe		Existing W-Beam Guardrail with Posts
	Existing Railroad		Reinforced Concrete Pipe		Exst Wet Area-Vegetation Break
	Existing Sanitary Sewer		Signal Head with Mast Arm		Existing Wetland Delineated
	Existing Sanitary Force Main		Existing Signal Head with Mast Arm		
	Existing Storm Drain		Tie Bar at Random Spacing		
	Existing Storm Drain Force Main		3-Cable w Posts		
	Fence		Existing 3-Cable w Posts		
	Silt Fence		Site Boundary		
	Existing Field Line		Fiber Rolls		
	Exst Flow		Doweled Joint		
	Flow		Tie Bar 30 Inch 4 Foot Center to Center		
	Existing Culvert		Tie Bar 18 Inch 3 Foot Center to Center		
	Existing Curb		Existing Berm, Dike, Pit, or Earth Dam		
	Existing Valley Gutter		Existing Ditch Block		
	Existing Driveway Gutter		Depression Contours		
	Existing Curb and Gutter		Existing City Corporate Limits or Reservation Boundary		
	Existing Mountable Curb and Gutter		Gravel Pit - Borrow Area		
	Existing Double Micro Loop Detector		Existing Tree Boundary		
	Micro Loop Detector Double		Tree Row		
	Existing Overhead Sign Structure		Existing Brush or Shrub Boundary		
	Existing Micro Loop Detector		Existing Retaining Wall		
	Micro Loop Detector		Existing Planter or Wall		
	Existing Overhead Sign Structure Cantilever		Retaining Wall (Plan View)		

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
4-20-11	
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Symbols

	North Arrow (Half Scale)		Attenuation Device		Existing Railroad Battery Box		Existing Delineator Type E
	Truck Mounted Attenuator		Diamond Grade Delineator Type A		Existing Bush or Shrub		Existing EFB Misc
	Type I Barricade		Diamond Grade Delineator Type B		Existing Gas Cap or Stub		Existing Flashing Beacon
	Type II Barricade		Diamond Grade Delineator Type C		Existing Sanitary Cap or Stub		Existing Pipe Mounted Flasher
	Type III Barricade		Diamond Grade Delineator Type D		Existing Storm Drain Cap or Stub		Existing Pad Mounted Feed Point
	Catch Basin		Diamond Grade Delineator Type E		Existing Water Cap or Stub		Existing Pipe Mounted Feed Point with Pad
	Cairn or Stone Circle		Flexible Delineator		Existing Sanitary Cleanout		Existing Pole Mounted Feed Point
	Video Detection Camera		Flexible Delineator Type A		Existing Concrete Foundation		Existing Railroad Frog
	Storm Drain Cap or Stub		Flexible Delineator Type B		Existing Traffic Signal Controller		Existing Snow Gate 18
	Corrugated Metal End Section 18 Inch		Flexible Delineator Type C		Existing Pad Mounted Signal Controller		Existing Snow Gate 28
	Corrugated Metal End Section 24 Inch		Flexible Delineator Type D		Existing Sixteenth Section Corner		Existing Snow Gate 40
	Corrugated Metal End Section 30 Inch		Flexible Delineator Type E		Existing Quarter Section Corner		Existing Headwall
	Corrugated Metal End Section 36 Inch		Delineator Type A		Existing Section Corner		Existing Pedestrian Head with Number
	Corrugated Metal End Section 42 Inch		Delineator Type A Reset		Existing Railroad Crossbuck		Existing Signal Head
	Corrugated Metal End Section 48 Inch		Delineator Type B		Existing Satellite Dish		Existing Sprinkler Head
	Concrete Foundation		Delineator Type B Reset		Existing Fuel Dispensers		Existing Fire Hydrant
	Ground Connection Conductor		Delineator Type C		Existing Flexible Delineator Type A		Existing Catch Basin Drop Inlet
	Neutral Connection Conductor		Delineator Type D		Existing Flexible Delineator Type B		Existing Curb Inlet
	Phase 1 Connection Conductor		Delineator Type E		Existing Flexible Delineator Type C		Existing Manhole Inlet
	Phase 2 Connection Conductor		Delineator Drums		Existing Flexible Delineator Type D		Existing Junction Box
	Traffic Cone		Spot Elevation		Existing Flexible Delineator Type E		
	Signal Controller		Existing Access Control Arrow		Existing Delineator Type A		
	Pad Mounted Signal Controller		Existing Artifact		Existing Delineator Type B		
	Alignment Data Point		Existing Flashing Beacon		Existing Delineator Type C		
	Emergency Vehicle Detector		Existing Benchmark		Existing Delineator Type D		

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
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Symbols

D-20-31

 Existing Light Standard	 Existing Manhole with Valve Water	 Existing Telephone Pole	 Existing Undefined Manhole
 Existing High Mast Light Standard 10 Luminaire	 Existing Water Manhole	 Existing Wood Pole	 Existing Undefined Pull Box
 Existing High Mast Light Standard 3 Luminaire	 Existing Mile Post Type A	 Existing Post	 Existing Undefined Pedestal
 Existing High Mast Light Standard 4 Luminaire	 Existing Mile Post Type B	 Existing Pedestrian Push Button Post	 Existing Undefined Valve
 Existing High Mast Light Standard 5 Luminaire	 Existing Mile Post Type C	 Existing Control Point CP	 Existing Undefined Pipe Vent
 Existing High Mast Light Standard 6 Luminaire	 Existing Reference Marker	 Existing Control Point GPS-RTK	 Existing Gas Valve
 Existing High Mast Light Standard 7 Luminaire	 Existing RW Marker	 Existing Control Point TRI	 Existing Water Valve
 Existing High Mast Light Standard 8 Luminaire	 Existing Utility Marker	 Existing Reference Marker Point NGS	 Existing Fuel Pipe Vent
 Existing High Mast Light Standard 9 Luminaire	 Existing Monument Found	 Existing Pull Box	 Existing Gas Pipe Vent
 Existing Overhead Sign Structure Load Center	 Existing Monument set	 Existing Intelligent Transportation Pull Box	 Existing Sanitary Pipe Vent
 Existing Luminaire	 Existing RW Property Monument Found	 Existing Water Pump	 Existing Storm Drain Pipe Vent
 Existing Light Standard Luminaire	 Existing RW Property Monument set	 Existing Slotted Reinforced Concrete Pipe	 Existing Water Pipe Vent
 Existing Federal Mailbox	 Existing Object Marker Type I	 Existing RR Profile Spot	 Existing Weather Station
 Existing Private Mailbox	 Existing Object Marker Type II	 Existing Fuel Leak Sensors	 Existing Ground Water Well Bore Hole
 Existing Meander Section Corner	 Existing Object Marker Type III	 Existing Highway Sign	 Existing Windmill or Tower
 Existing Meter	 Existing Electrical Pedestal	 Existing Miscellaneous Spot	 Existing Witness Corner
 Existing Electrical Manhole	 Existing Telephone Pedestal	 Existing Lighting Standard Pole	 Flashing Beacon
 Existing Gas Manhole	 Existing Fiber Optic Telephone Pedestal	 Existing Traffic Signal Standard	 Flagger
 Existing Sanitary Manhole	 Existing TV Pedestal	 Existing Transformer	 Pipe Mounted Flasher
 Existing Sanitary Force Main Manhole	 Existing Fiber Optic TV Pedestal	 Existing Large Evergreen Tree	 Sanitary Force Main with Valve
 Existing Sanitary Manhole with Valve	 Existing Fuel Filler Pipes	 Existing Small Evergreen Tree	
 Existing Storm Drain Manhole	 Existing Traverse PI Aerial Panel	 Existing Large Tree	
 Existing Force Main Storm Drain Manhole	 Existing Pole	 Existing Small Tree	
 Existing Force Main Storm Drain Manhole with Valve	 Existing Power Pole	 Existing Tree Trunk	
 Existing Telephone Manhole	 Existing Power Pole with Transformer	 Existing Pad Mounted Traffic Signal Control Box	

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Symbols

D-20-32

 Pad Mounted Feed Point  Pipe Mounted Feed Point with Pad  Pole Mounted Feed Point  Headwall  Double Headwall with Vegetation Barrier  Single Headwall with Vegetation Barrier  Pole Mounted Head  Sprinkler Head  Fire Hydrant  Inlet Type 1  Inlet Type 2  Double Inlet Type 2  Inlet Gate Type 2  Junction Box  High Mast Light Standard 10 Luminaire  High Mast Light Standard 3 Luminaire  High Mast Light Standard 4 Luminaire  High Mast Light Standard 5 Luminaire  High Mast Light Standard 6 Luminaire  High Mast Light Standard 7 Luminaire  High Mast Light Standard 8 Luminaire  High Mast Light Standard 9 Luminaire  Relocate Light Standard  Overhead Sign Structure Load Center  Light Standard 100 Watt High Pressure Sodium Vapor Luminaire	 Light Standard 1000 Watt High Pressure Sodium Vapor Luminaire  Light Standard 150 Watt High Pressure Sodium Vapor Luminaire  Light Standard 175 Watt High Pressure Sodium Vapor Luminaire  Light Standard 200 Watt High Pressure Sodium Vapor Luminaire  Light Standard 250 Watt High Pressure Sodium Vapor Luminaire  Light Standard 310 Watt High Pressure Sodium Vapor Luminaire  Light Standard 35 Watt High Pressure Sodium Vapor Luminaire  Light Standard 400 Watt High Pressure Sodium Vapor Luminaire  Light Standard 50 Watt High Pressure Sodium Vapor Luminaire  Light Standard 70 Watt High Pressure Sodium Vapor Luminaire  Light Standard 700 Watt High Pressure Sodium Vapor Luminaire  Manhole  Manhole 48 Inch  Sanitary Force Main Manhole  Sanitary Sewer Manhole  Storm Drain Manhole  Storm Drain Manhole with Inlet  Reset Mile Post  Mile Post Type A  Mile Post Type B  Mile Post Type C  Right of Way Marker  Tubular Marker  Concrete Monument to Be Set  RW Property Monument to Be Set	 Object Marker Type I  Object Marker Type II  Object Marker Type III  Caution Mode Arrow Panel  Back to Back Vertical Panel Sign  Double Direction Arrow Panel  Left Directional Arrow Panel  Right Directional Arrow Panel  Sequencing Arrow Panel  Truck Mounted Arrow Panel  Power Pole  Wood Pole  Pedestrian Push Button Post  Property Corner  Pull Box  Intelligent Transportation Pull Box  Sanitary Pump  Storm Drain Pump  Reinforced Pavement  Reinforced Concrete End Section 15 Inch  Reinforced Concrete End Section 18 Inch  Reinforced Concrete End Section 24 Inch  Reinforced Concrete End Section 30 Inch  Reinforced Concrete End Section 36 Inch  Reinforced Concrete End Section 42 Inch	 Reinforced Concrete End Section 48 Inch  Reinforced Concrete End Section 54 Inch  Reset Right of Way Marker  Reset USGS Marker  Right of Way Markers  Riser 30 Inch  Continuous Split Barrel Sample  Flight Auger Sample  Split Barrel Sample  Thinwall Tube Sample  Highway Sign  SNOW GATE 18 FT  SNOW GATE 28 FT  SNOW GATE 40 FT  Standard Penetration Test  Transformer  Inclinometer Tube  Underdrain Cleanout  Excavation Unit  Water Valve
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4-20-11	
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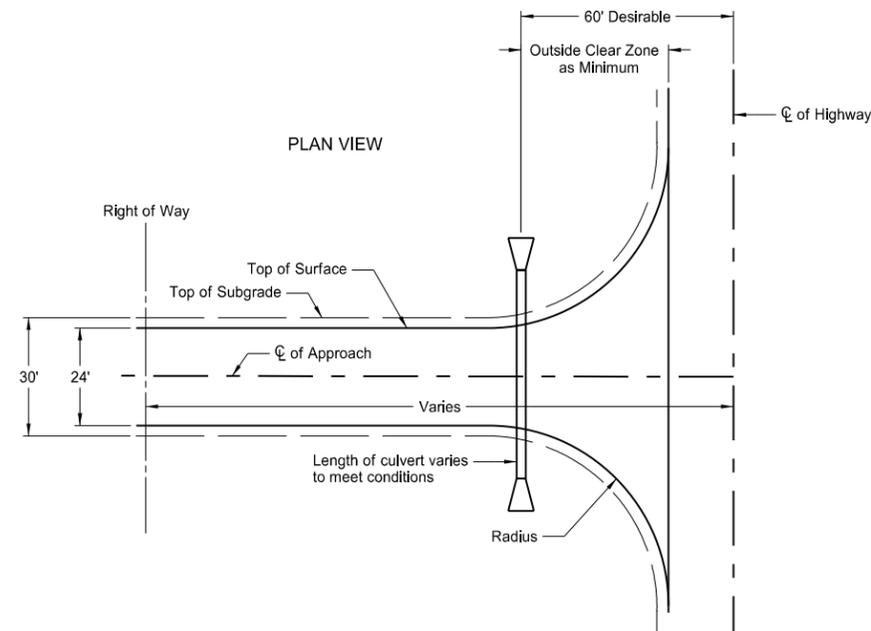
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STANDARD RURAL APPROACHES

D-203-8

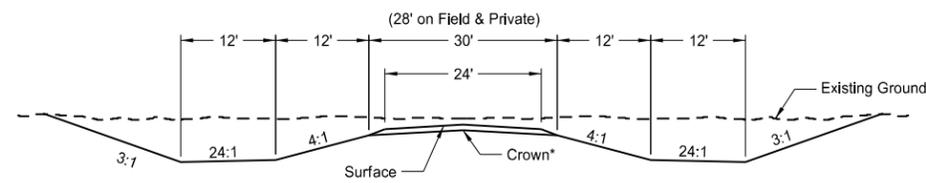
NOTES:

1. Max breakover between approach storage platform and highway shall not exceed 5%.
2. The approach slope shall be measured outside the area of mainline inslope influence.



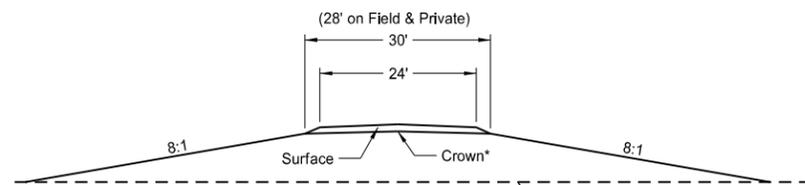
CRITERIA FOR RURAL APPROACH TYPES

	Field Drives	Private Drives	Low Volume Public Roads
Radius	R=24 ft	R=30 ft	R=40 ft
Maximum Grade	10%	7%	7%
Storage Platform	20 ft	24 ft	30 ft
Vertical Curve Length	10 ft	10 ft	Varies (Min. 20 mph)

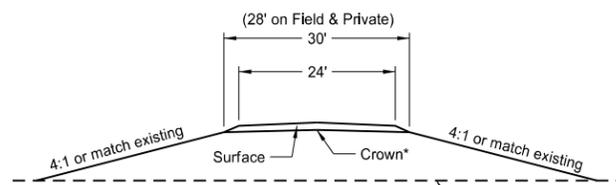


SECTION A-A

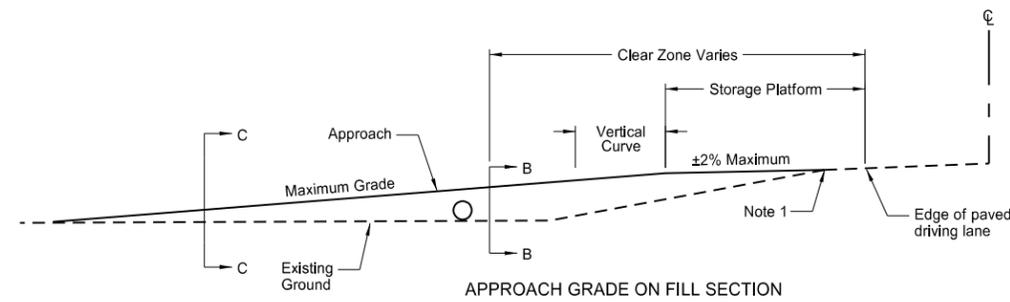
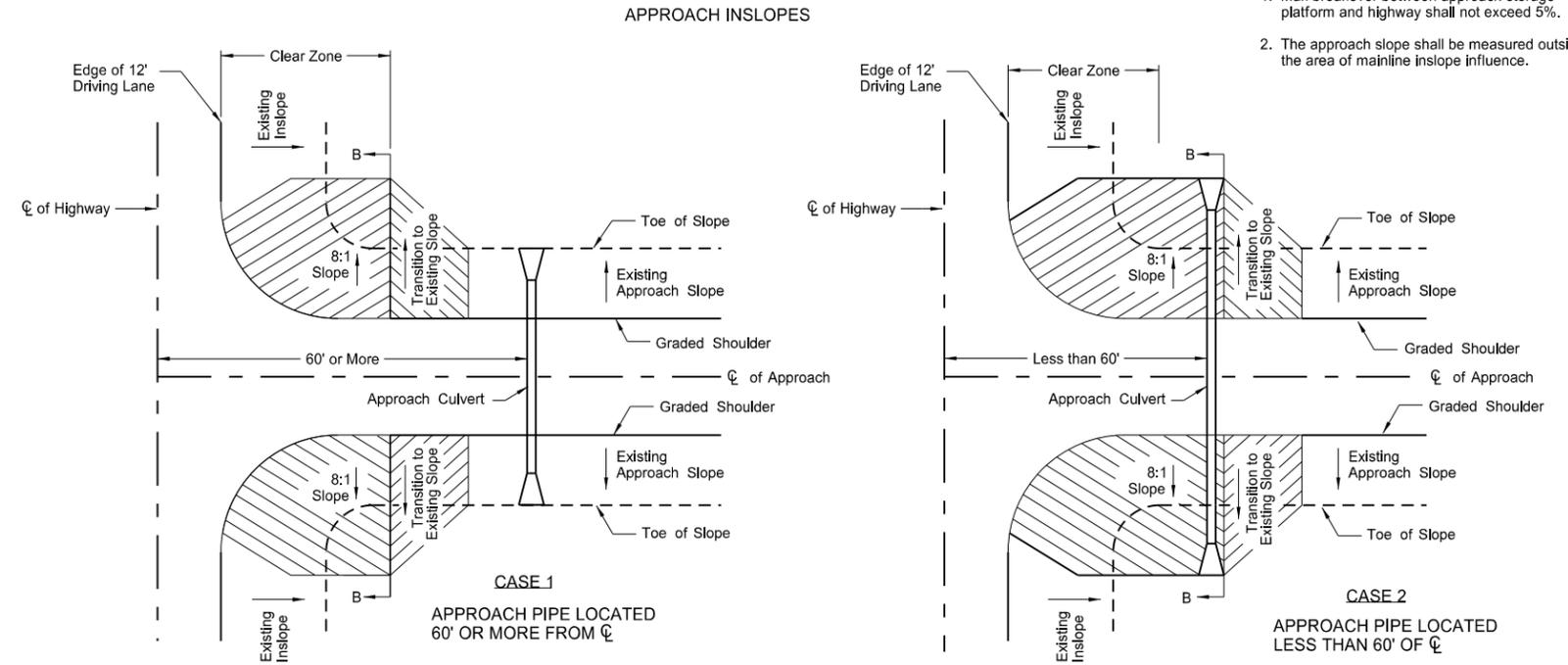
*2.1% crown for paved surface
*3.0% crown for gravel surface



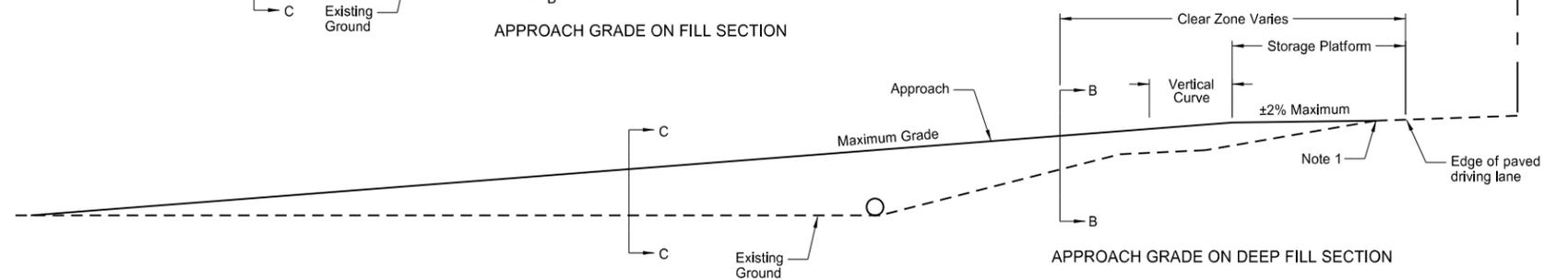
SECTION B-B



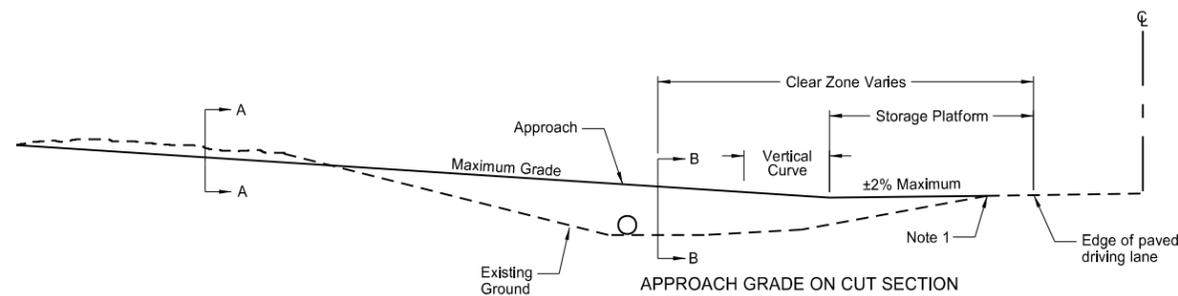
SECTION C-C



APPROACH GRADE ON FILL SECTION



APPROACH GRADE ON DEEP FILL SECTION



APPROACH GRADE ON CUT SECTION

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
2-25-14	
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DATE	CHANGE

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CONSTRUCTION SIGN DETAIL

D-704-5

SIGN NUMBER	G20-10-108	STATION(S):		AREA: 36.0 Sq.Ft.
WIDTH x HEIGHT	9'-0" x 4'-0"			
BORDER WIDTH	1.25" (Inset 0.75")			
CORNER RADIUS	3"			
MOUNTING	Ground			
BACKGROUND	TYPE: 3A Reflective COLOR: Fluorescent Orange			
LEGEND/BORDER	TYPE: Non-Refl COLOR: Black			
SYMBOL	X Y WID HT ANGLE	Dimensions are in inches.tenths Letter locations are panel edge to lower left corner		
	42.1 6.2 24 4 0			

LETTER POSITION (X)															LENGTH	SIZE	SERIES		
C	O	N	S	T	R	U	C	T	E	D	B	Y			69.7	6	D 2000		
19.2	24.5	30	35.1	39.7	44.3	49.4	54.8	59.7	64.3	69	73.1	79.1	83.7						
Y	O	U	R		C	O	M	P	A	N	Y		N	A	M	E	91.5	6	D 2000
8.3	14.2	19.8	25.3	29.4	35.4	40.7	46.2	52.4	56.8	62.8	67.8	72.9	78.9	83.9	89.9	96			
Y	O	U	R		T	O	W	N				N	D				64.6	6	D 2000
21.7	27.6	33.2	38.7	42.8	48.8	53.3	58.4	64.6	69.6	70.7	76.7	82.2							

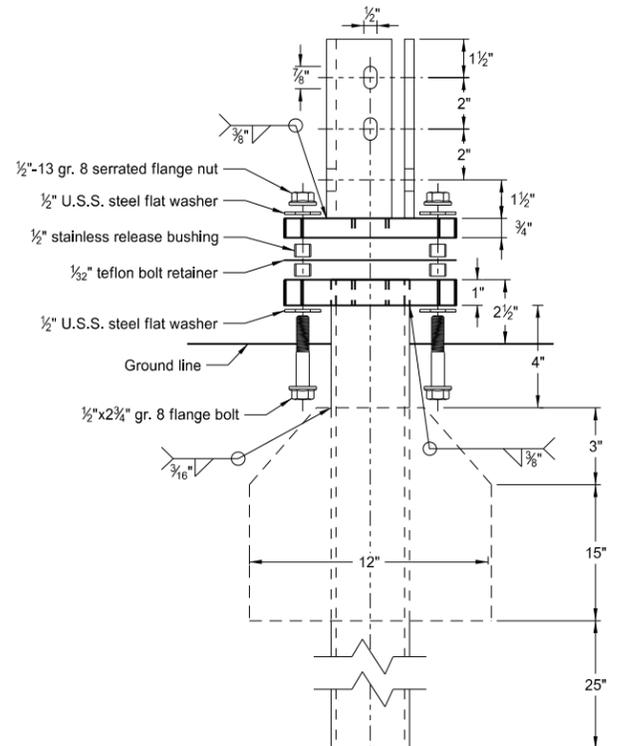
Notes:

1. Sign shall be placed a distance of 1/2A following the End Road Work (G20-2a-48) sign. There shall be a maximum of 2 signs per project.
2. Sign shall be post mounted.
3. Sign required on rural projects with a 30 day or longer duration and it is not required on seal coat projects or other short duration projects.
4. Sign shall not be placed in urban areas or within city limits.

Advance Warning Sign Spacing (A)			
Road Type	Distance between signs min. (ft)		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 to 40 mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway and Freeway (55 mph to 60 mph)	850	1350	2200
Rural Expressway and Freeway (70 mph to 75 mph)	1000	1500	2640
Interstate/4-Lane Divided (Maintenance and Surveying)	750	1000	1500

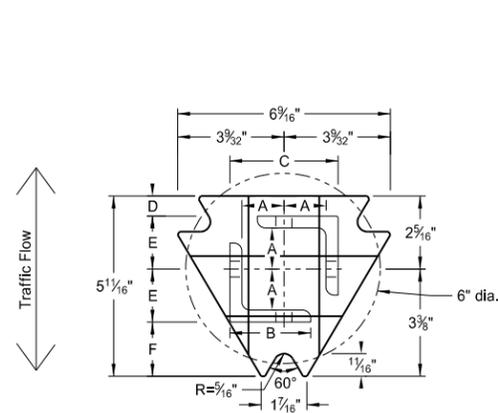
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-22-12	
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DATE	CHANGE

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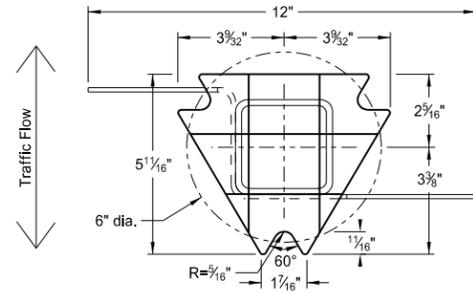


Multi-Directional Slip Base Assembly

Perforated Tube



Top Post Receiver
Plate - ASTM A572 grade 50
Angle Receiver - 2 1/2 x 2 1/2 x 3/8 ASTM A36 structural angle



Bottom Soil Stub
Tube - 3"x3"x7 gauge ASTM A500 grade B tube
Stabilizing Wing - 7 gauge H.R.P.O. ASTM A1011
Plate - ASTM A572 grade 50

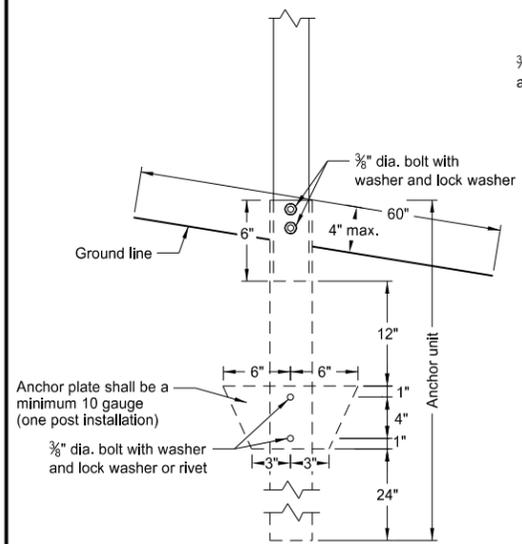
Notes:

1. Slip base bolts shall be torqued as specified by the manufacturer.
2. Anchor shall have a yield strength of 43.9 KSI and tensile strength of 59.3 KSI.
3. The 4" vertical clearance is required for the anchor or breakaway base. The 4"x60" measurement shall be made above and below post location and also back and ahead of the post.
4. When used in concrete sidewalk, anchor shall be same except without the wings.
5. Four post signs shall have over 7' between the first and the fourth posts.

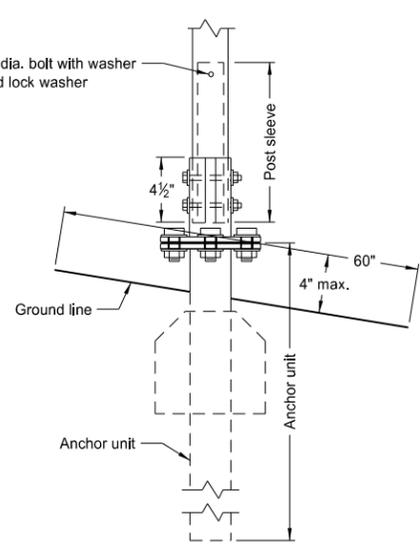
Telescoping Perforated Tube						
Number of Posts	Post Size in.	Wall Thickness Gauge	Sleeve Size in.	Wall Thickness Gauge	Slip Base	Anchor Size without Slip Base in.
1	2	12			No	2 1/4
1	2 1/4	12			No	2 1/2
1	2 1/2	12			(A)	3
1	2 1/2	10			Yes	
1	2 1/4	12	2	12	Yes	
1	2 1/2	12	2 1/4	12	Yes	
2	2	12			No	2 1/4
2	2 1/4	12			No	2 1/2
2	2 1/2	12			Yes	
2	2 1/2	12			Yes	
2	2 1/4	10	2	12	Yes	
2	2 1/2	12	2 1/4	12	Yes	
3 & 4	2 1/2	12			Yes	
3 & 4	2 1/2	10			Yes	
3 & 4	2 1/2	12	2 1/4	12	Yes	
3 & 4	2 1/4	12	2	12	Yes	
3 & 4	2 1/2	10	2 3/16	10	Yes	

Properties of Telescoping Perforated Tube						
Tube Size in.	Wall Thickness in.	U.S. Standard Gauge	Weight per Foot lbs.	Moment of Inertia in. ⁴	Cross Sec. Area in. ²	Section Modulus in. ³
1 1/2 x 1 1/2	0.105	12	1.702	0.129	0.380	0.172
2 x 2	0.105	12	2.416	0.372	0.590	0.372
2 1/4 x 2 1/4	0.105	12	2.773	0.561	0.695	0.499
2 3/16 x 2 3/16	0.135	10	3.432	0.605	0.841	0.590
2 1/2 x 2 1/2	0.105	12	3.141	0.804	0.803	0.643
2 1/2 x 2 1/2	0.135	10	4.006	0.979	1.010	0.785

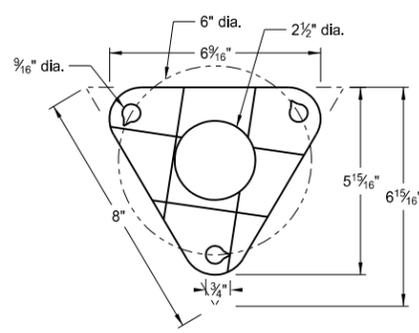
Top Post Receiver Data Table						
Square Post Sizes (B)	A	B	C	D	E	F
2 3/16"x10 ga.	1 9/64"	2 1/2"	3 1/32"	2 5/32"	1 33/64"	1 1/8"
2 1/2"x10 ga.	1 9/32"	2 1/2"	3 5/16"	5/8"	1 21/32"	1 3/4"



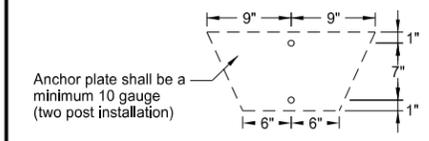
Anchor Unit and Post Assembly



Multi-Directional Slip Base Anchor Unit and Post Sleeve Assembly



Bolt Retainer for Base Connection
Bolt Retainer - 1/32" Reprocessed Teflon



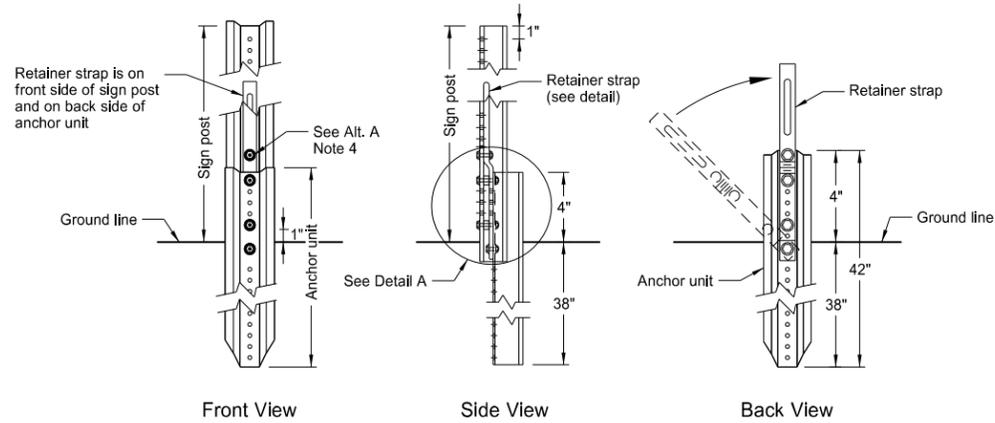
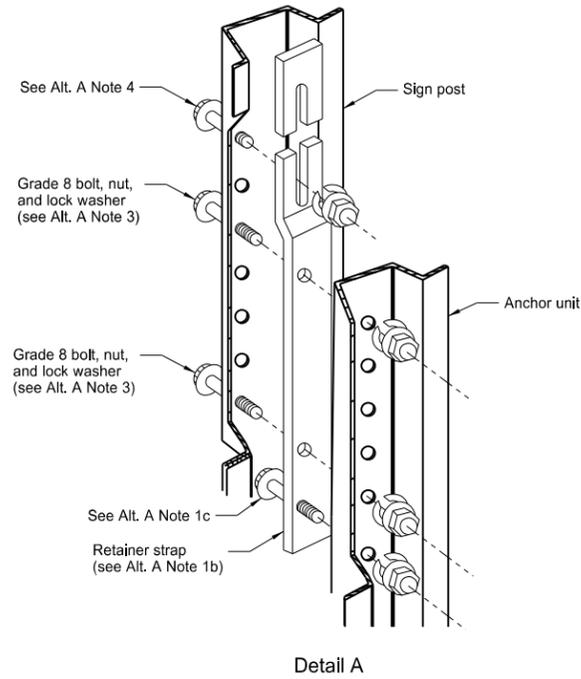
Anchor plate shall be a minimum 10 gauge (two post installation)

- (A) The breakaway base is required when the support is placed in weak soils. The Engineer shall determine if the soils are weak.
(B) The 2 3/16"x10 ga. may be inserted into 2 1/2"x10 ga. for additional wind load.

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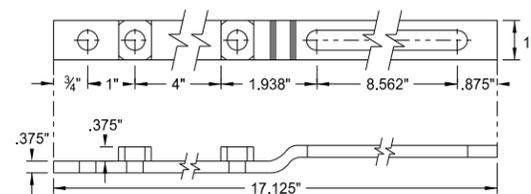
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U-Channel Post

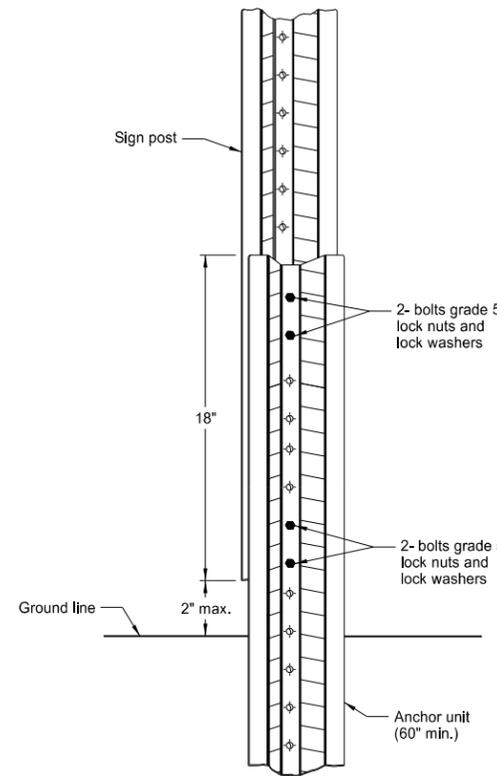


Breakaway U-Channel Detail Alternate A

A maximum of 2 posts shall be installed within 7'.

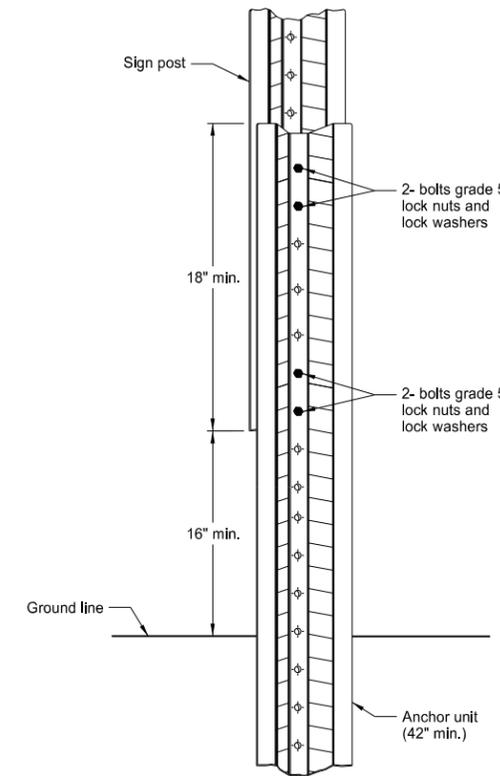


Retainer Strap Detail



Breakaway U-Channel Splice Detail Alternate B (2.5 and 3 lb/ft)

A maximum of 3 posts shall be installed within 7'.



Breakaway U-Channel Splice Detail Alternate C (2.5 and 3 lb/ft)

A maximum of 3 posts shall be installed within 7'.

Alternate A Steps of Installation:

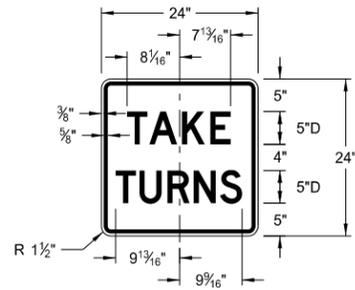
- Drive anchor unit to within 12" of ground level.
 - Proper assembly established by lining up the bottom hole of retainer strap with the 6th hole from the top of the anchor unit.
 - Assemble strap to back of anchor unit using 5/16"x2" bolt, lock washer and nut.
 - Rotate strap 90° to left.
- Drive anchor unit to 4" above ground.
 - Rotate strap to vertical position.
- Place 5/16"x2" bolt, lock washer and nut in bottom of sign post to facilitate alignment of sign post with proper hole in anchor unit.
 - Alternately tighten two connector bolts.
- Complete assembly by tightening 5/16"x2" bolt (this fastens sign post to retainer strap).
- The base post, strap and sign post shall be properly nested. Proper nesting occurs when all flat surfaces of the base post, strap, and sign post at the bolts have full contact across the entire width.

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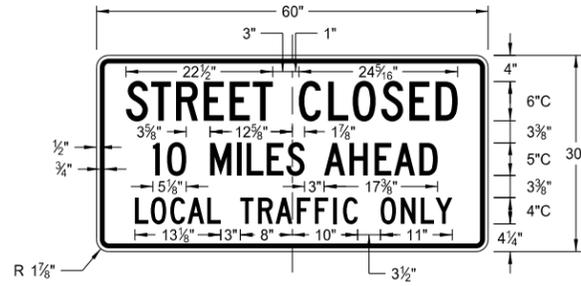
CONSTRUCTION SIGN DETAILS
REGULATORY SIGNS

D-704-10



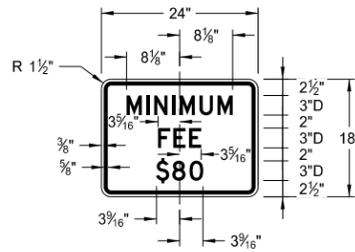
R1-50-24

Legend: black (non-refl)
Background: white



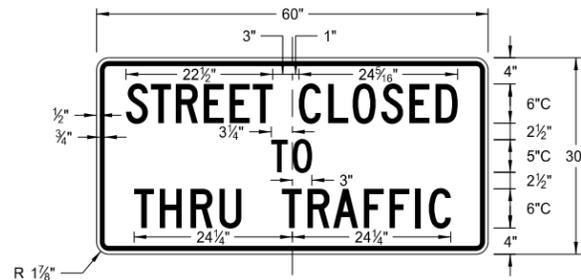
R11-3c-60

Legend: black (non-refl)
Background: white



R2-1a-24

Legend: black (non-refl)
Background: white



R11-4a-60

Legend: black (non-refl)
Background: white



R11-2a-48

Legend: black (non-refl)
Background: white

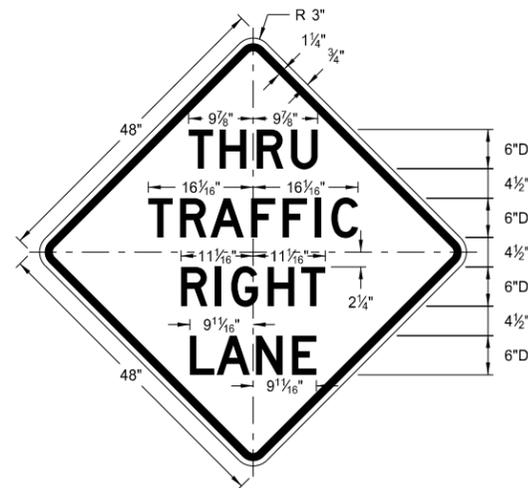
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8-13-13	
REVISIONS	
DATE	CHANGE

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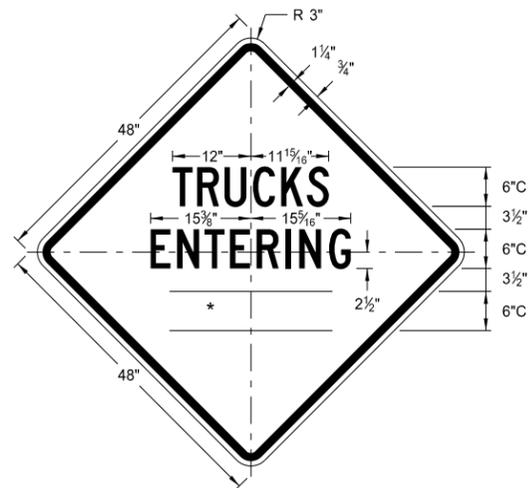
CONSTRUCTION SIGN DETAILS
WARNING SIGNS

WORD	LETTER SPACING
AHEAD	Standard
200 FT	Standard
350 FT	Standard
500 FT	Standard
1000 FT	Reduce 40%
1500 FT	Reduce 40%
½ MILE	Reduce 50%
1 MILE	Standard

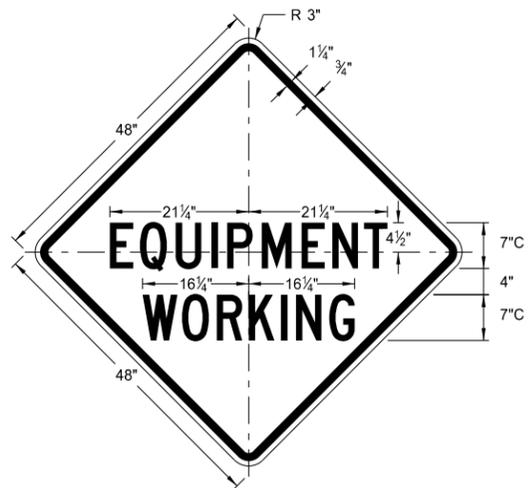
* DISTANCE MESSAGES



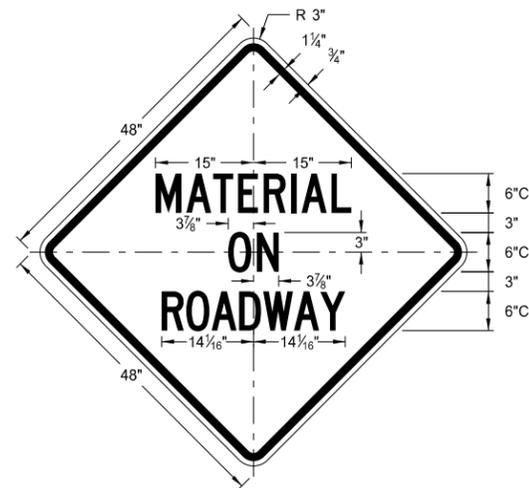
W5-8-48
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Background: orange



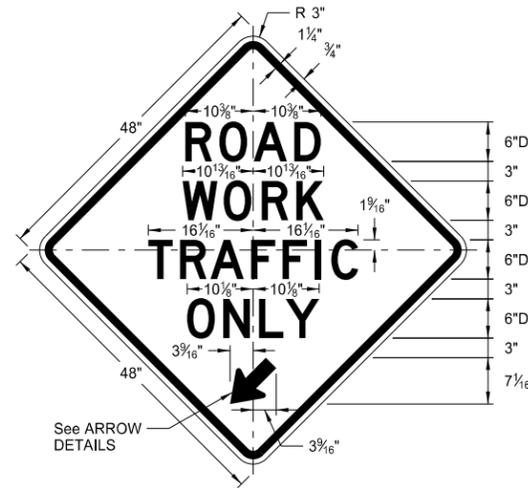
W8-54-48
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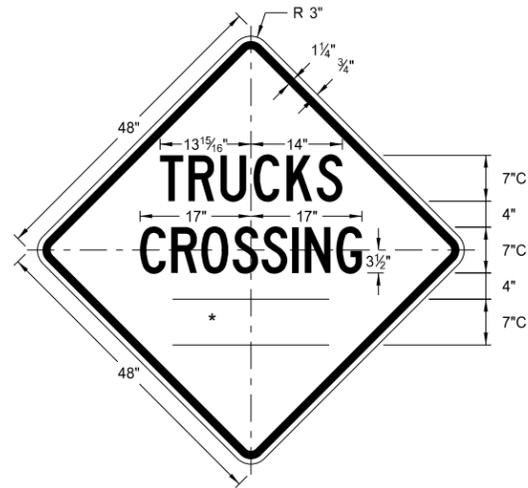
W20-51-48
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Background: orange



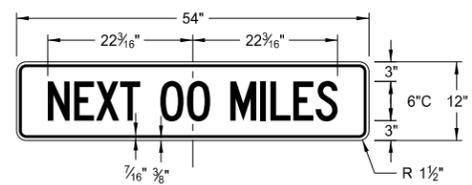
W21-51-48
Legend: black (non-refl)
Background: orange



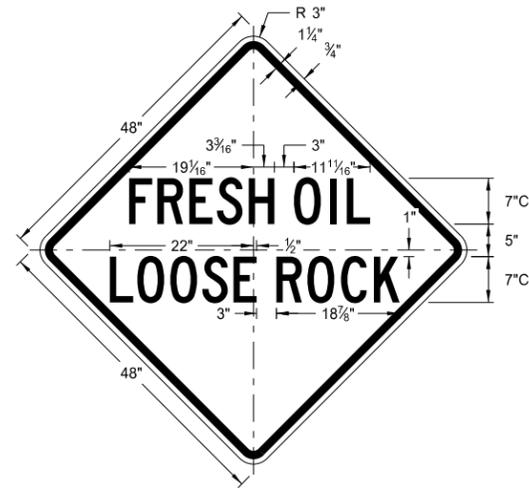
W5-9-48
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Background: orange



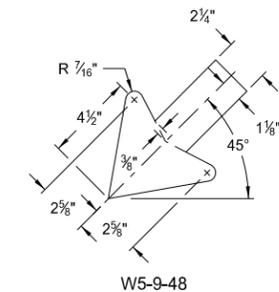
W8-55-48
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Background: orange



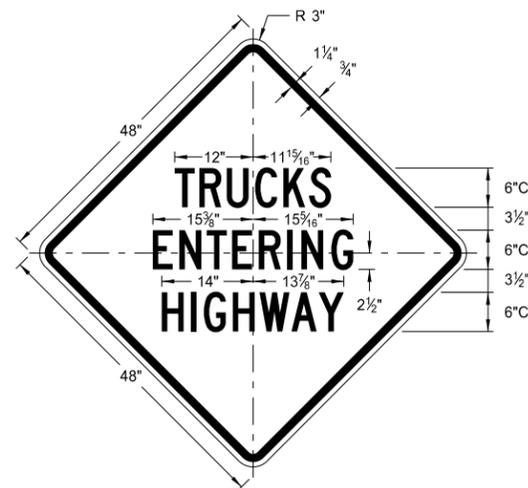
W20-52-54
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Background: orange



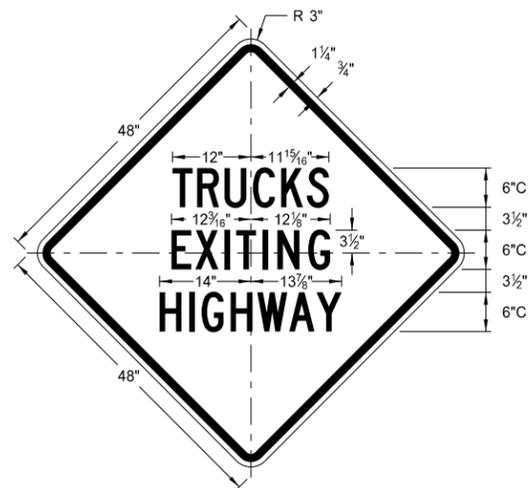
W22-8-48
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Background: orange



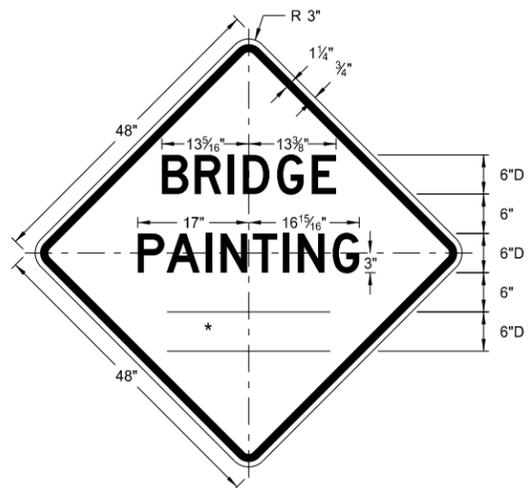
W5-9-48
ARROW DETAILS



W8-53-48
Legend: black (non-refl)
Background: orange



W8-56-48
Legend: black (non-refl)
Background: orange

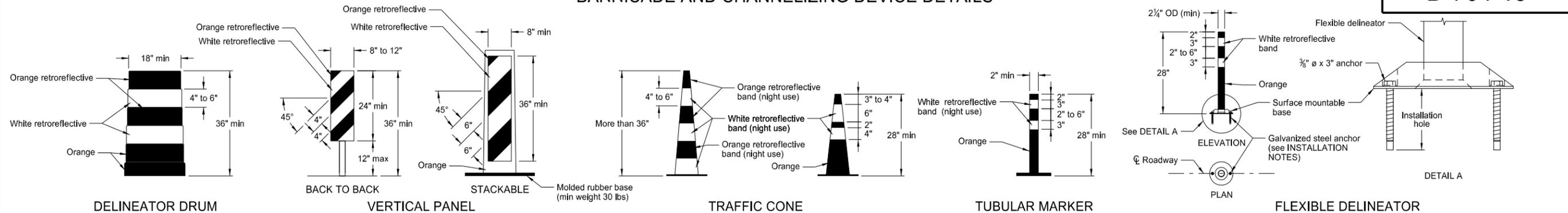


W21-50-48
Legend: black (non-refl)
Background: orange

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
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BARRICADE AND CHANNELIZING DEVICE DETAILS



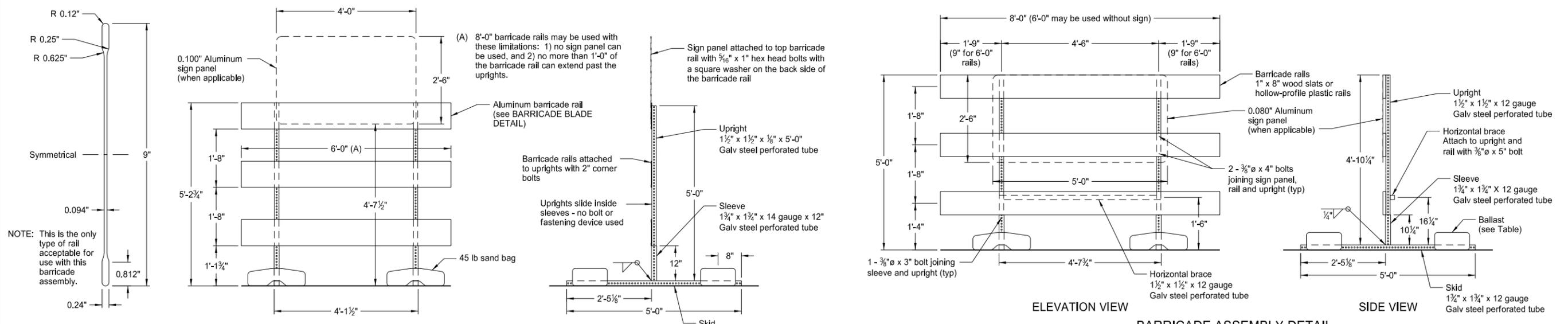
- INSTALLATION NOTES:**
1. Drill installation holes to diameter and depth as required by manufacturer's specifications.
 2. For removal, remove anchors and fill installation hole with an epoxy designed to bond to pavement surface.
 3. In lieu of bolted down base, the contractor may use an 8" x 8" butyl pad or hot melt butyl. Butyl shall be removed as close as possible to pavement surface.

The markings on drums shall be horizontal, circumferential, alternating orange and white retroreflective stripes 4" to 6" wide. Each drum shall have a minimum of two orange and two white stripes with the top stripe being orange. Any nonretroreflective spaces between the horizontal orange and white stripes shall not exceed 3" wide. Stripes shall not be placed on ribs or indentations in the drum. Drums shall have closed tops that will not allow collection of construction debris or other debris. Ballast shall not be placed on the top of a drum.

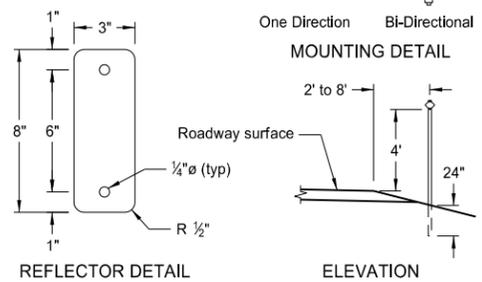
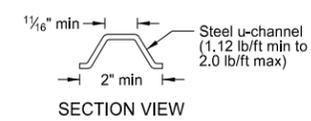
Markings for vertical panels shall be alternating orange and white retroreflective stripes, sloping downward in the direction vehicular traffic is to pass. Retroreflective sheeting shall be placed on both sides of panel and shall have a minimum of 270 square inches of retroreflective area facing vehicular traffic. Where the height of the retroreflective material on the vertical panel is 36 inches or more, a stripe width of 6 inches shall be used.

Retroreflectization of cones more than 36" in height shall be provided by alternating orange and white retroreflective stripes. Each cone shall have a minimum of two orange and two white stripes with the top stripe being orange. Any nonretroreflective space between the orange and white stripes shall not exceed 3" wide.

Retroreflectization of tubular markers more than 42" in height shall be provided by alternating four 4" to 6" wide orange and white stripes with the top stripe being orange.



NOTE: Markings for barricades shall be alternating orange and white retroreflective stripes, sloping downward in the direction traffic is to pass. Retroreflective sheeting shall be placed on both sides of the rails and shall have a minimum of 270 square inches of visible retroreflective area facing vehicular traffic. When the barricade length is less than 36", the rail stripe width shall be 4".



MINIMUM BALLAST
 (For each side of barricade support)

Without Sign	4 - 25 lb sandbags
With Sign	6 - 25 lb sandbags

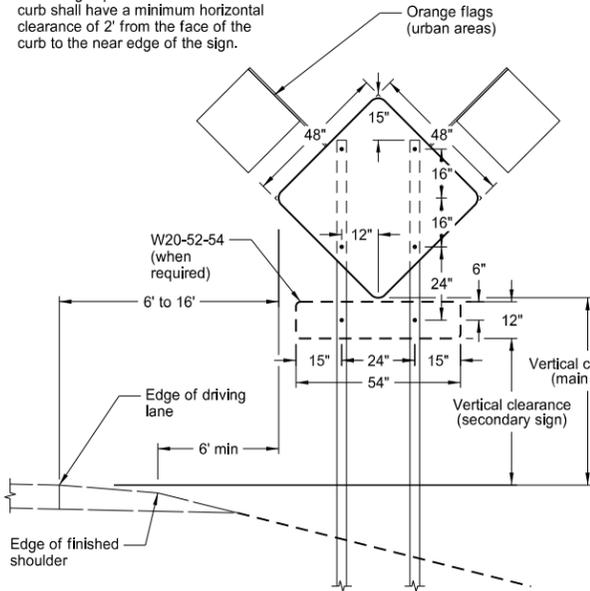
Note: The number of sandbags are based on a wind speed of 55 MPH. The sandbags are assumed to be placed at or near the ends of the skids.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE

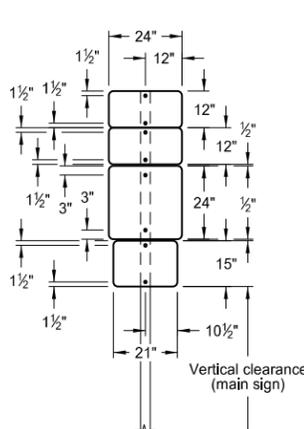
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CONSTRUCTION SIGN PUNCHING AND MOUNTING DETAILS

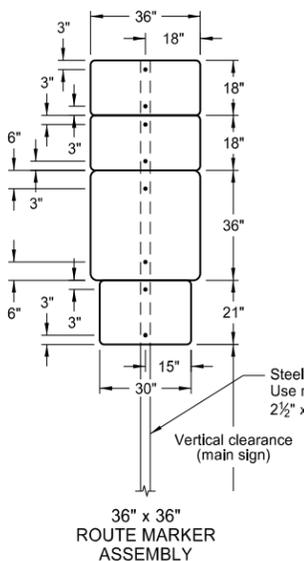
Note: Signs placed in sections with curb shall have a minimum horizontal clearance of 2' from the face of the curb to the near edge of the sign.



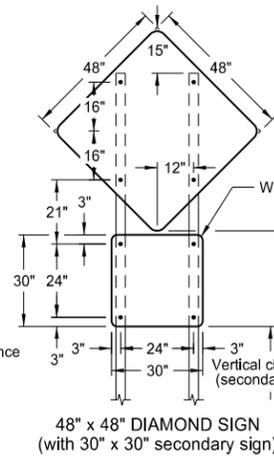
TYPICAL SECTION (48" x 48" diamond warning sign shown)



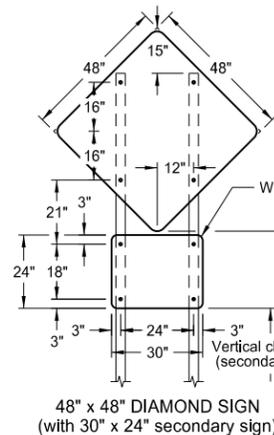
24" x 24" ROUTE MARKER ASSEMBLY



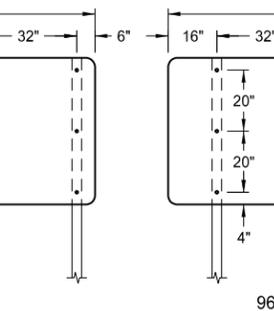
36" x 36" ROUTE MARKER ASSEMBLY



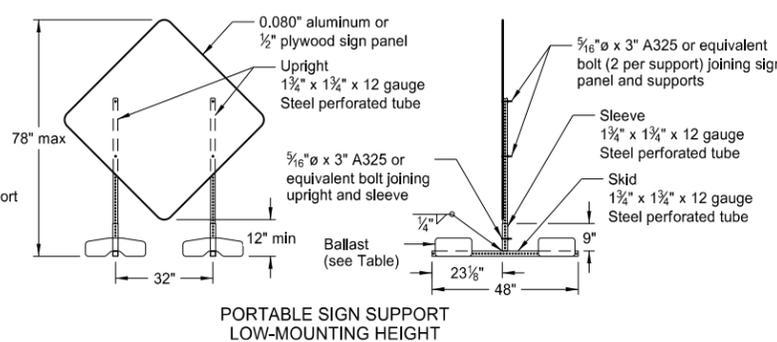
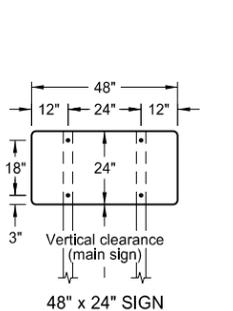
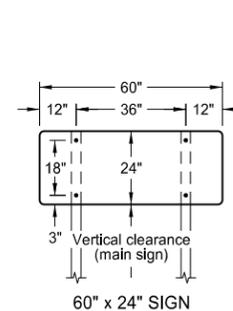
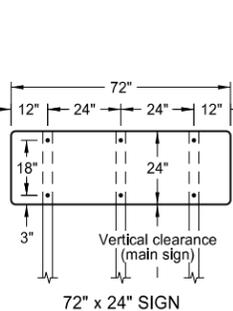
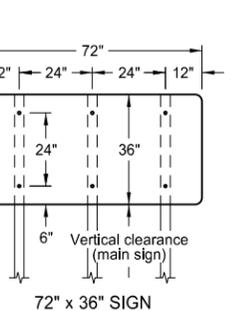
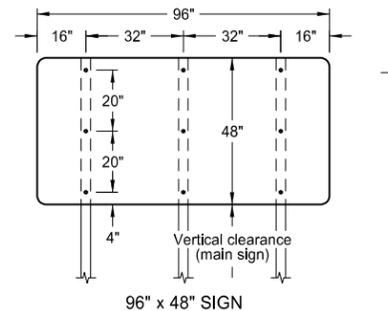
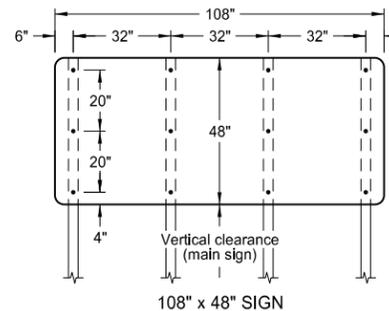
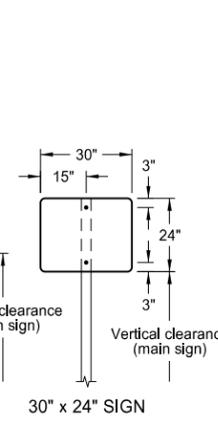
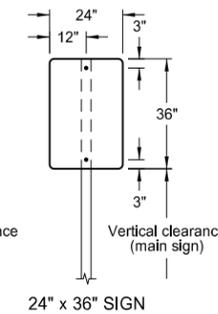
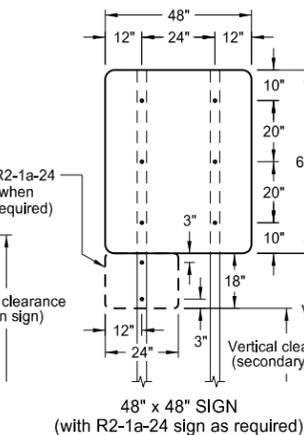
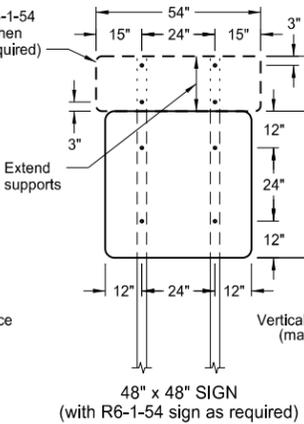
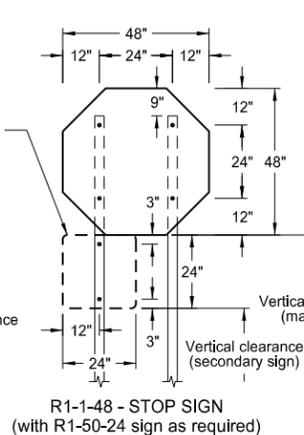
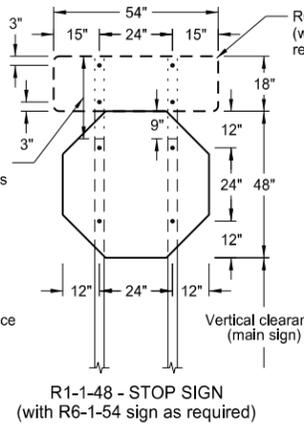
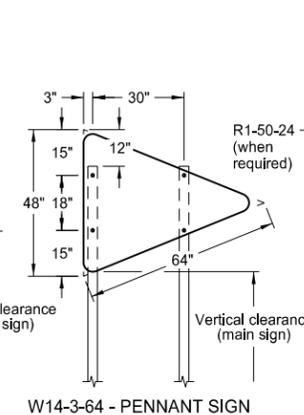
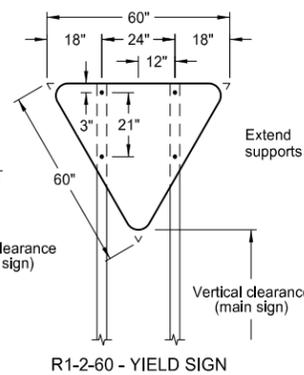
48" x 48" DIAMOND SIGN (with 30" x 30" secondary sign)



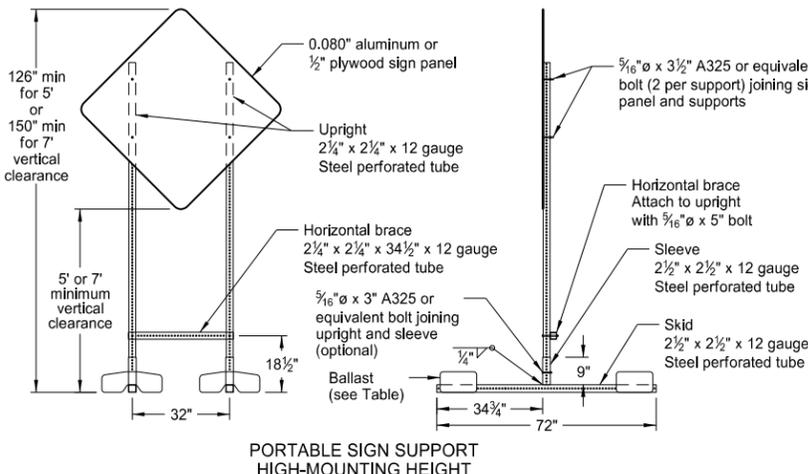
18" x 18" DIAMOND SIGN



48" x 48" DIAMOND SIGN (with 30" x 24" secondary sign)



PORTABLE SIGN SUPPORT LOW-MOUNTING HEIGHT



PORTABLE SIGN SUPPORT HIGH-MOUNTING HEIGHT

- NOTES:
- Sign Supports: Supports shall be galvanized or painted. Minimum post sizes are 2.5 lb/ft u-channel or 2" x 2" x 12 gauge steel perforated tube, except where noted. When installing signs on u-channel, the minimum post size for assemblies containing a secondary sign is 3.0 lb/ft. Post sizes are based on a wind speed of 55 MPH.
Signs over 50 square feet should be installed on 2 1/2" x 2 1/2" perforated tube supports as a minimum.
Guy wires shall not be attached to sign supports. Wind beams may be attached to u-posts behind the sign panels.
 - Sign Panels: Provide sign panels made of 0.100" aluminum, 1/2" plywood, or other approved material, except where noted. All holes to be punched round for 3/8" bolts.
 - Alternate Messages: The signs that have alternate messages may have these alternate messages placed on a reflectorized plate (without a border) and installed and removed as required. (i.e. "Left" and "Right" message on a lane closure sign)
 - Route Marker Auxiliary Signs: Provide route marker auxiliary signs, such as the cardinal direction and directional arrows, with a background and legend that match the route marker they are used with:
Interstate - white legend on blue background
Interstate Business Loop - white legend on green background
US and State - black legend on white background
County - yellow legend on blue background
 - Vertical Clearance: Install signs with a vertical clearance of 5'-0" (see TYPICAL SECTION.) In areas where parking or pedestrian movements are likely or the view of the sign may be obstructed, install signs with a vertical clearance of 7'-0" from the top of the curb or from the near edge of the driving lane in absence of a curb.
The vertical clearance to secondary signs is 1'-0" less than the vertical clearance as stated above.
Large signs having an area exceeding 50 square feet shall have a minimum clearance of 7'-0" from the ground at the post.
 - Portable Signs: Provide portable signs that meet the vertical clearance as stated above. Use portable signs when it is necessary to place signs within the pavement surface.
When portable signs are used for 5 days or less, low-mounting height (minimum 12" vertical clearance) sign supports may be used as long as the view of the sign is not obstructed. Time delays caused by unforeseen circumstances, such as equipment breakdown, rain, subgrade failures, etc., will not accrue towards the 5 day period. The R9-8 through R9-11a series, W1-5 through W1-8 series, M4-10, and E5-1 may be used for longer than 5 days.
Signs mounted to the portable sign supports shown in the LOW-MOUNTING HEIGHT and HIGH-MOUNTING HEIGHT Details shall have a maximum surface area of 16 square feet.

MINIMUM BALLAST (For each side of sign support base)

Sign Panel Mounting Height (ft)	Number of 25 lb sandbags for 4' x 4' sign panel
1'	6
5'	8
7'	10

Note: The number of sandbags are based on a wind speed of 55 MPH. The sandbags are assumed to be placed at or near the ends of the skids.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-4-13	
REVISIONS	
DATE	CHANGE
11-14-13	Revised Note 6.

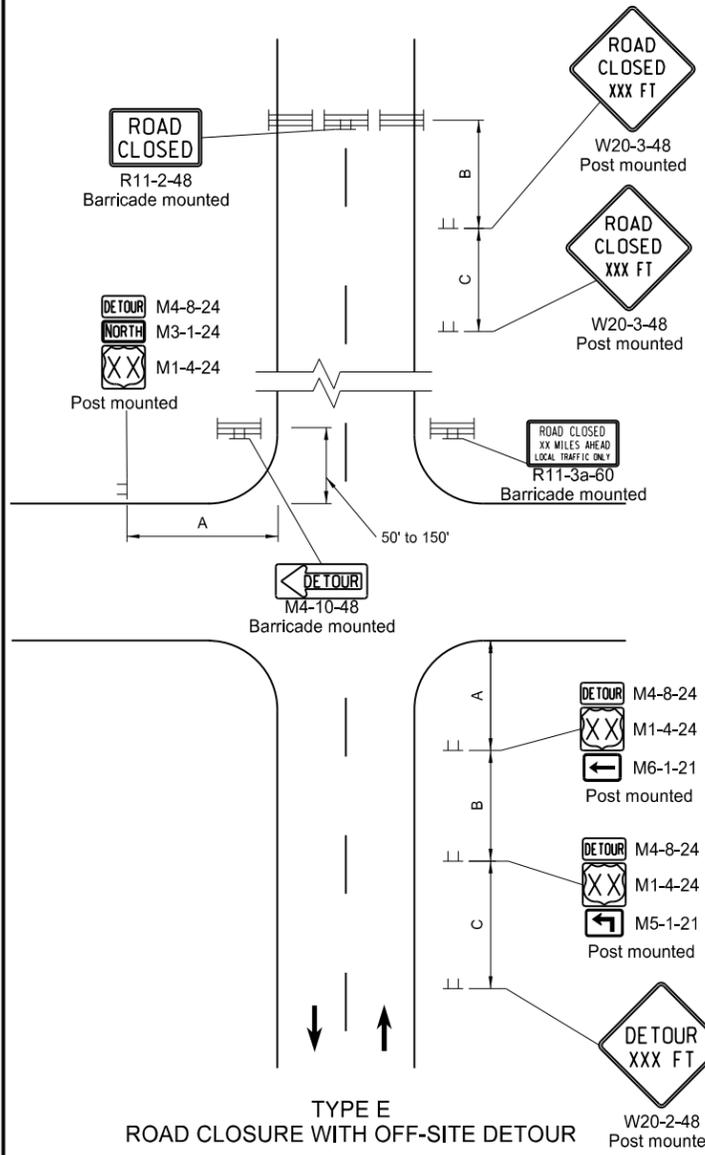
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ROAD CLOSURE AND LANE CLOSURE ON A TWO WAY ROAD LAYOUTS

D-704-19

Notes

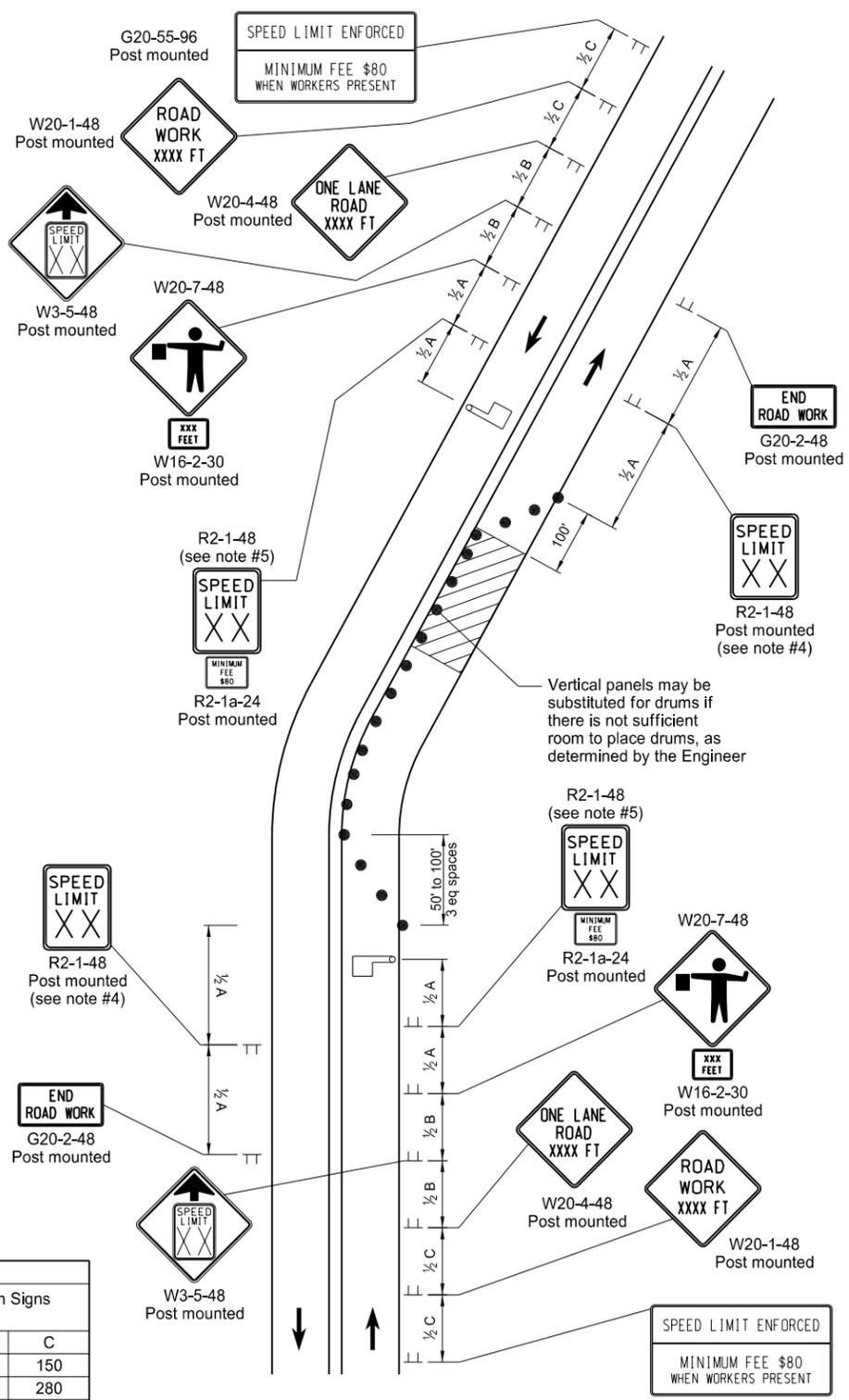
- Variables
 - S = Numerical value of speed limit or 85th percentile.
 - W = The width of taper
 - L = Minimum length of taper, or S x W for freeways, expressways, and all other roads with speeds of 45 mph or greater, or W x S²/60 for urban, residential, and other streets with speeds of 40 mph or less.
- Barricades placed on roadway shall be on a moveable assembly. Signs placed on the roadway shall be placed on skid mounted assemblies.
- Delineator drums used for tapering traffic shall be placed at 3 equal spaces. Delineator drums for tangents shall be spaced at 2 times dimension "S".
- The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
- The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 mph below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 mph. In this case, the speed limit reduction shall not exceed 30 MPH. Where speed limits are to be reduced more than 30 MPH, a second speed limit sign shall be installed with the desired speed reduction but shall not exceed 30 MPH. The second speed limit sign shall be placed at 1/2 B.
- When warning signs are used in urban areas and the signs are not portable, flags shall be installed. The flags shall be 24 inches square, mounted perpendicular to the edges of the diamond sign, and at such a distance above the edge so that when the flag is limp it will not touch the sign. Rural areas will not require flags.
- Existing speed limit signs within a reduced speed zone shall be covered.
- Where necessary, safe speed to be determined by the Engineer.
- The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Specifications.
- G20-55-96 or R2-1a-24 sign are not required when a pilot car operation is used, if this standard is part of other traffic control layouts, or the work is less than 15 days.
- When highway-rail grade crossings exist either within or in the vicinity of the roadway work activities:
 - Extra care shall be taken to minimize the probability of conditions being created, either by lane restrictions, flagging or other operations, where vehicles might be stopped within the highway-rail grade crossing (considered as being 15 feet on either side of the closest and farthest rail.)
 - A "Do Not Stop on Tracks" sign (R8-8-24) should be placed near the cross buck in each direction while the lane closure is in the vicinity of the tracks.
 - A buffer space between the work zone and the lane closure transition should be extended upstream of the highway-rail grade crossing so a queue created by the flagging operation will not extend across the highway-rail grade crossing.
 - If the queuing of vehicles across active rail tracks cannot be avoided, a flagger shall be provided at the highway-rail grade crossing to prevent vehicles from stopping within the highway-rail grade crossing, even if automatic warning devices are in place.



**TYPE E
ROAD CLOSURE WITH OFF-SITE DETOUR**

Used where a road is closed beyond a detour point. Signing shown for one direction only. Sign not shown on detour shall be shown in plans and installed and maintained by the contractor.

Road Type	ADVANCE WARNING SIGN SPACING		
	Distance Between Signs Min. (ft)		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 to 40mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway and Freeway (55 mph to 60 mph)	850	1350	2200
Rural Expressway and Freeway (70 mph to 75 mph)	1000	1500	2640
Interstate/4-Lane Divided (Maintenance and Surveying)	750	1000	1500



**TYPE F
LANE CLOSURE ON A TWO WAY ROAD USING FLAGGERS**

Two lane highway with one lane closed. Flagger is at a point where it is visible to approaching traffic.

KEY

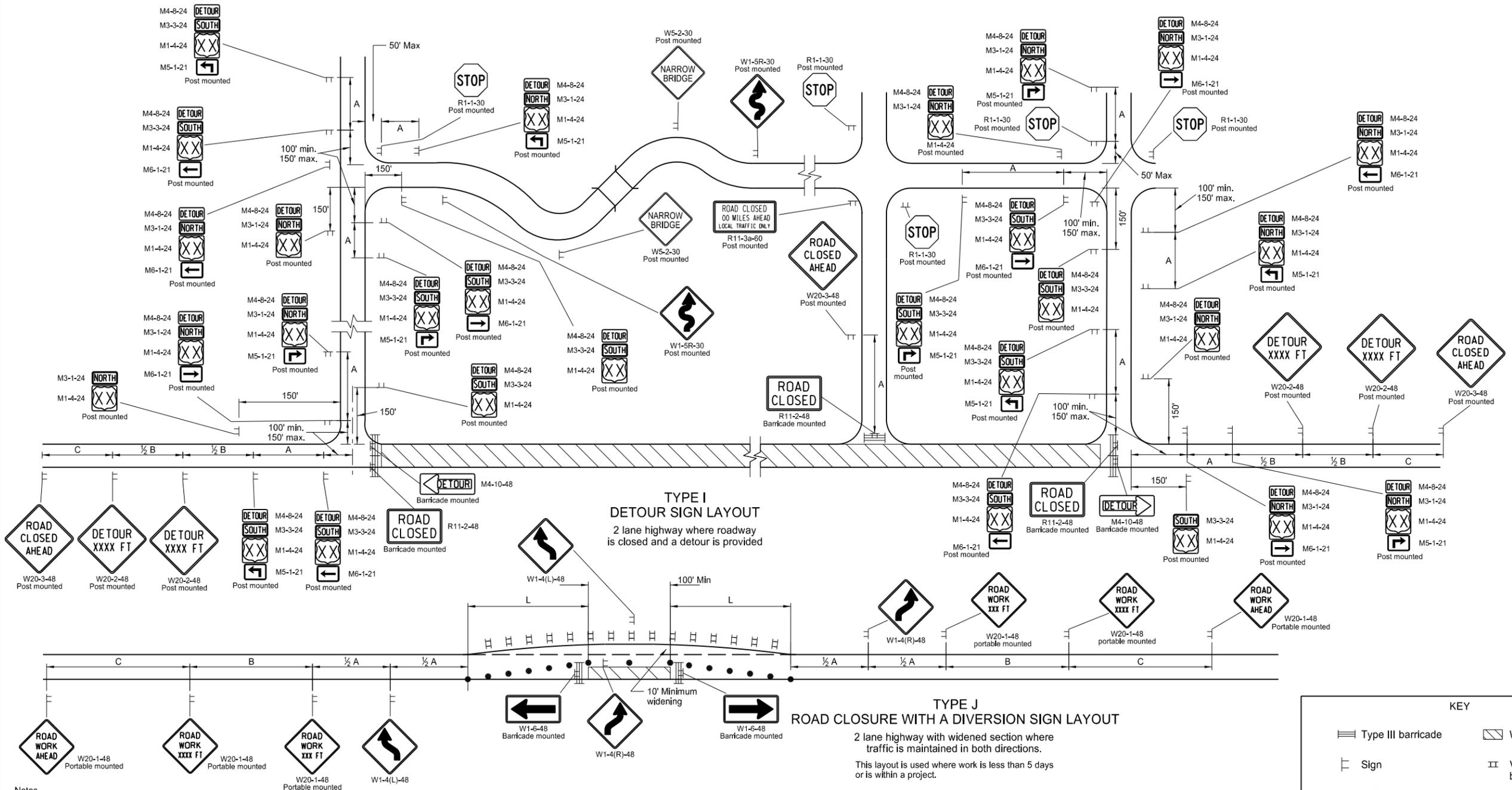
- Delineator Drum
- ▬ Sign
- ▬ Type III Barricade
- ▨ Work/Hazard Area
- ☞ Flagger

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
3-13-14	Revised Sign Cell "ROAD WORK XXX FT"

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Roger Weigel
 Registration Number
 PE-2930,
 on 03/13/14 and the original document is stored at the
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DETOUR AND ROADWAY DIVERSION SIGN LAYOUTS

D-704-21



- Notes**
- Variables
S=Numerical value of speed limit or 85th percentile. W=The width of taper.
L=Minimum length of taper, or $S \times W$ for freeways, expressways, and all other roads with speeds of 45 mph or greater, or $W \times S^2 / 60$ for urban, residential, and other streets with speeds of 40 mph or less.
 - Barricades placed on roadway shall be on a moveable assembly. Signs placed on roadway shall be placed on skid mounted assemblies.
 - Delineator drums and vertical panels used for tapering traffic shall be spaced at dimension "S". Delineator drums, tubular markers and vertical panels used for tangents shall be spaced at 2 times "S". The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 mph below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 MPH. In this case, the speed limit reduction shall not exceed 30 MPH. Where speed limits are to be reduced more than 30 MPH, a second speed limit sign shall be installed with the desired speed reduction but shall not exceed 30 MPH. The second speed limit sign shall be placed at $\frac{1}{2}$ B.
 - When warning signs are used in urban areas and the signs are not portable, flags shall be installed. The flags shall be 24 inches square, mounted perpendicular to the edges of the diamond sign, and at such a distance above the edge so that when the flag is limp it will not touch the sign. Rural areas will not require flags.
 - Existing speed limit signs within a reduced speed zone shall be covered.
 - Obliterated or covered pavement marking shall be paid for as Obliteration of Pavement Marking. The covering shall be approved by the engineer.
 - The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Specifications.

- A W24-1-48 sign may be used in place of the double reverse curve signs if the tangent between tapers is less than 60'.

KEY

	Type III barricade		Work area
	Sign		Vertical panels back to back
	Delineator drum		

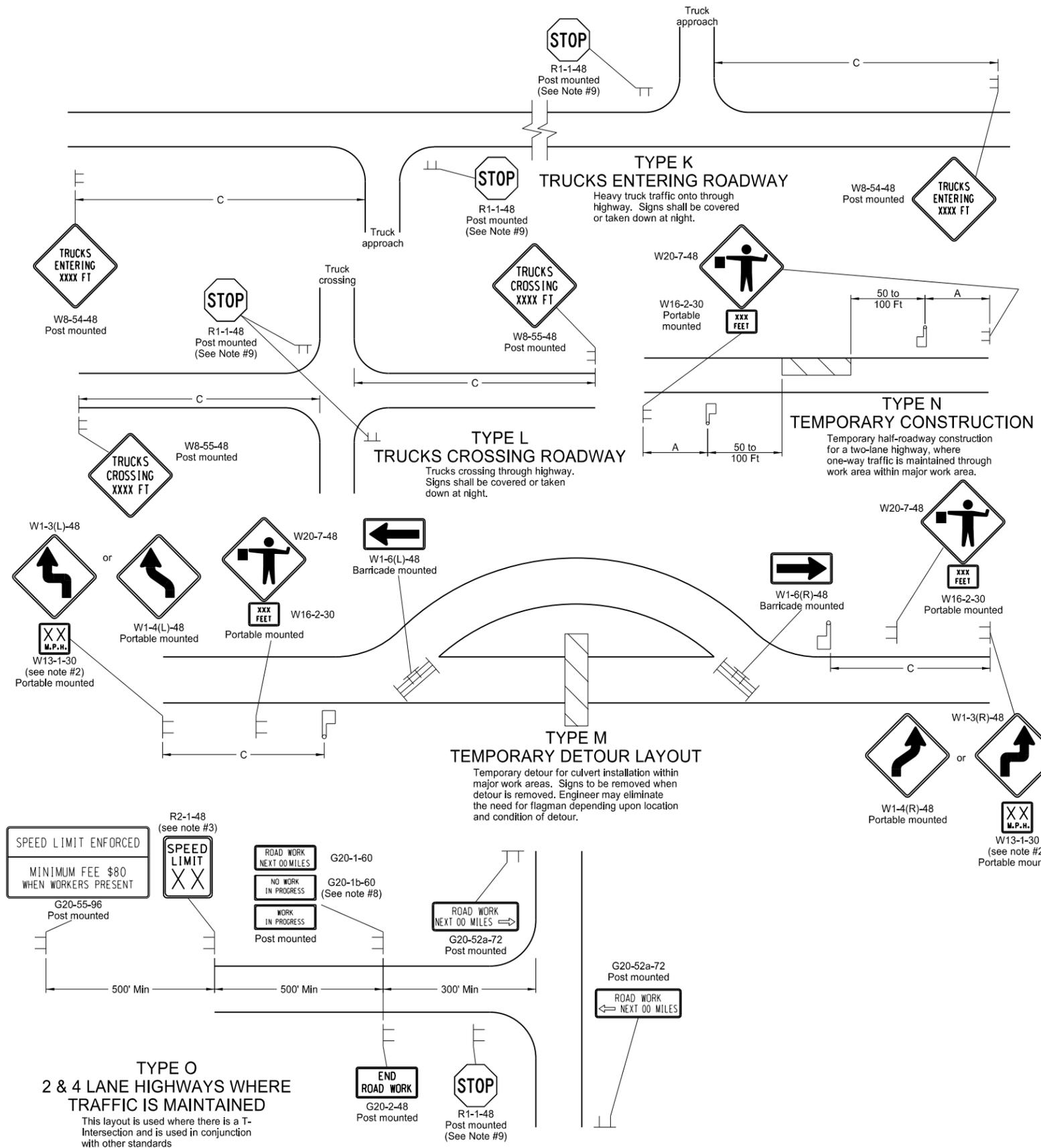
ADVANCE WARNING SIGN SPACING			
Road Type	Distance Between Signs Min. (ft)		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 to 40 mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway and Freeway (55 mph to 60 mph)	850	1350	2200
Rural Expressway and Freeway (70 mph to 75 mph)	1000	1500	2640
Interstate/4-Lane Divided (Maintenance and Surveying)	750	1000	1500

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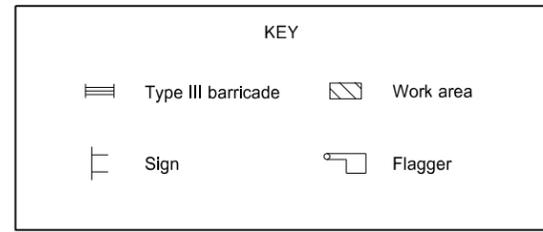
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CONSTRUCTION TRUCK AND TEMPORARY DETOUR LAYOUTS

D-704-22



- Notes
1. Barricades placed on roadway shall be on a moveable assembly. Signs placed on the roadway shall be placed on skid mounted assemblies. Where necessary, safe speed to be determined by the Engineer.
 2. The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 mph below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 mph. In this case, the speed limit reduction shall not exceed 30 MPH. Where speed limits are to be reduced more than 30 MPH, a second speed limit sign shall be installed with the desired speed reduction but shall not exceed 30 MPH. The second speed limit sign shall be placed at 1/2 B.
 3. When warning signs are used in urban areas and the signs are not portable, flags shall be installed. The flags shall be 24 inches square, mounted perpendicular to the edges of the diamond sign, and at such a distance above the edge so that when the flag is limp it will not touch the sign. Rural areas will not require flags.
 4. Existing speed limit signs within a reduced speed zone shall be covered. Obliterated or covered pavement marking shall be paid for as Obliteration of Pavement Marking. The covering shall be approved by the engineer.
 5. The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Specifications.
 6. The contractor shall install the G20-1b-60 sign when work is suspended for winter.
 7. If existing stop sign is in place, a 48" stop sign is not required.
 8. G20-55-96 sign is not required if this standard is part of other traffic control layouts with this sign or the work is less than 15 days.



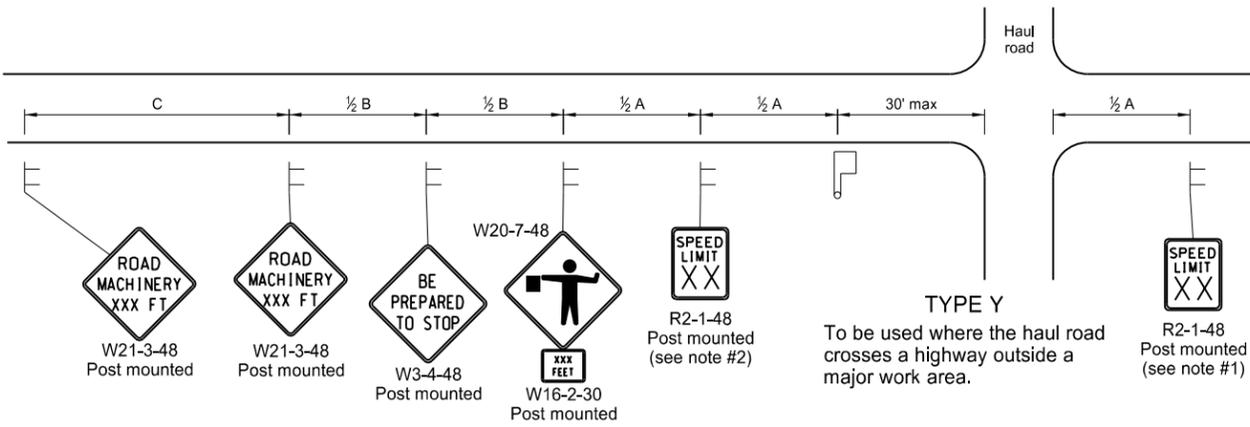
Road Type	ADVANCE WARNING SIGN SPACING		
	Distance Between Signs Min. (ft)		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 to 40mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway and Freeway (55 mph to 60 mph)	850	1350	2200
Rural Expressway and Freeway (70 mph to 75 mph)	1000	1500	2640
Interstate/4-Lane Divided (Maintenance and Surveying)	750	1000	1500

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION 9-27-13	
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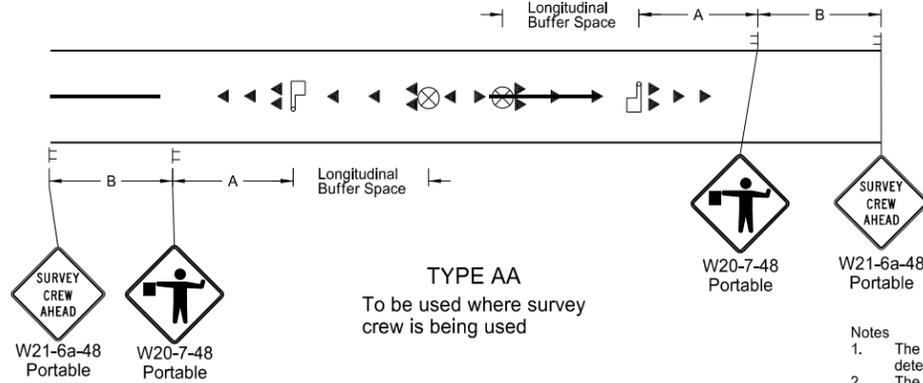
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MISCELLANEOUS SIGN LAYOUTS

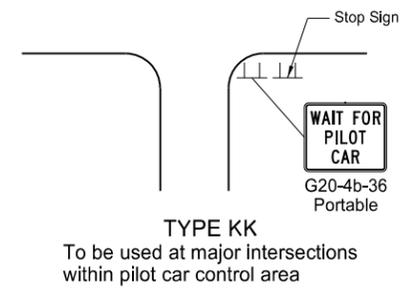
D-704-26



TYPE Y
To be used where the haul road crosses a highway outside a major work area.

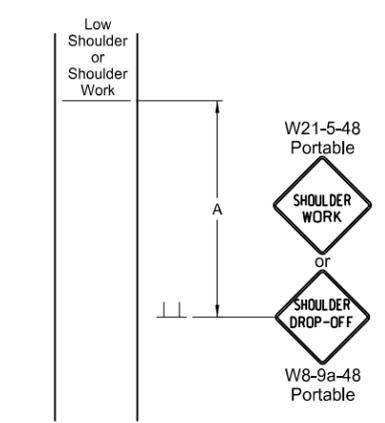


TYPE AA
To be used where survey crew is being used

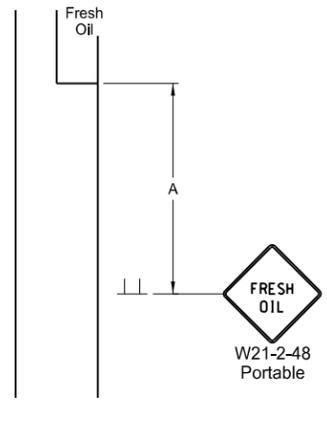


TYPE KK
To be used at major intersections within pilot car control area

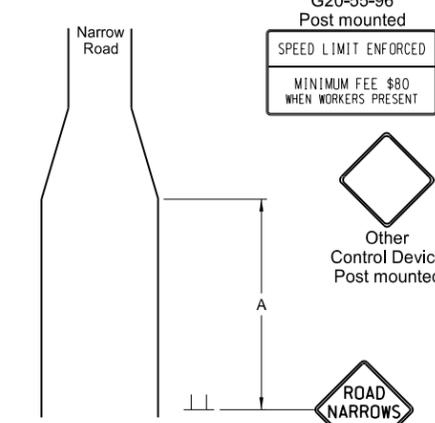
- Notes
1. The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
 2. The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 mph below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 mph. In this case, the speed limit reduction shall not exceed 30 MPH. Where speed limits are to be reduced more than 30 MPH, a second speed limit sign shall be installed with the desired speed reduction but shall not exceed 30 MPH. The second speed limit sign shall be placed at 1/2 B.
 3. When warning signs are used in urban areas and the signs are not portable, flags shall be installed. The flags shall be 24 inches square, mounted perpendicular to the edges of the diamond sign, and at such a distance above the edge so that when the flag is limp it will not touch the sign. Rural areas will not require flags.
 4. Existing speed limit signs within a reduced speed zone shall be covered.
 5. The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Specifications.
 6. G20-55-96 signs are not required if this standard is part of other traffic control layouts, or the work is less than 15 days.
 7. When a pilot car operation is used, place a G20-4b-36 "Wait For Pilot Car" sign at major intersections within pilot car control area.



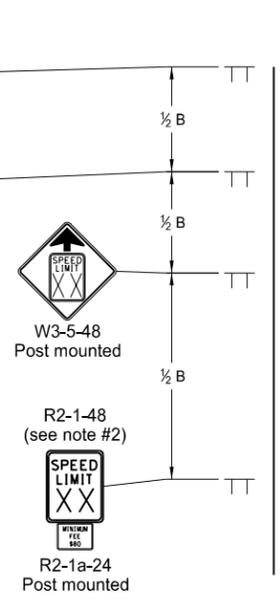
TYPE BB
To be used within a major work area where the sign conditions exist



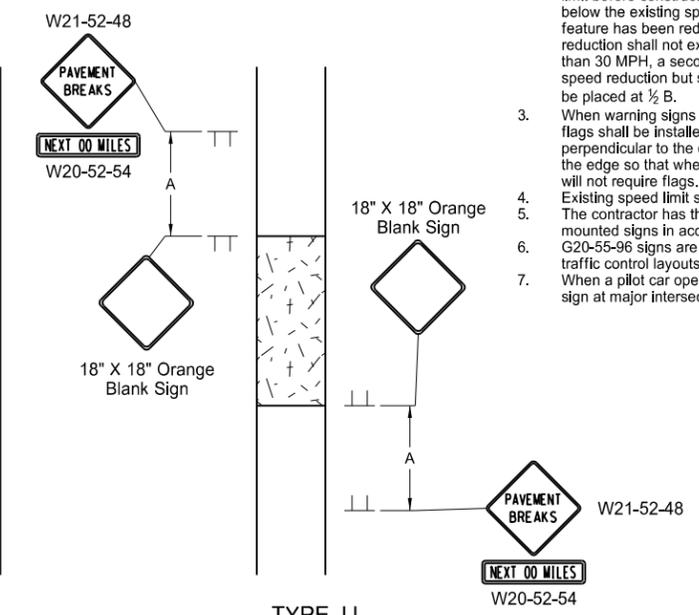
TYPE CC
To be used where the sign conditions exist



TYPE DD
To be used where the sign conditions exist



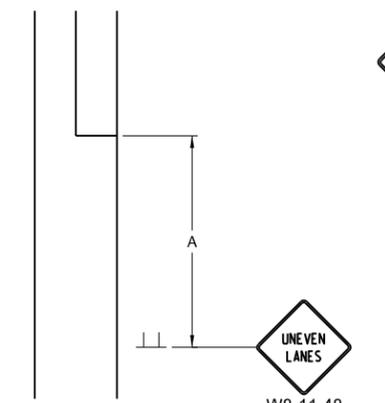
TYPE Z
To be used where speed zone is needed



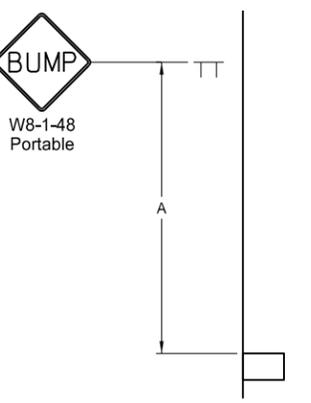
TYPE JJ
To be used where there is a break in the pavement. These signs may be skid mounted or post mounted and shall be installed when conditions exist and removed when not applicable.

Longitudinal Buffer Space	
*Speed (mph)	Length Min (feet)
20	115
25	155
30	200
35	250
40	305
45	360
50	425
55	495
60	570
65	645
70	730
75	820

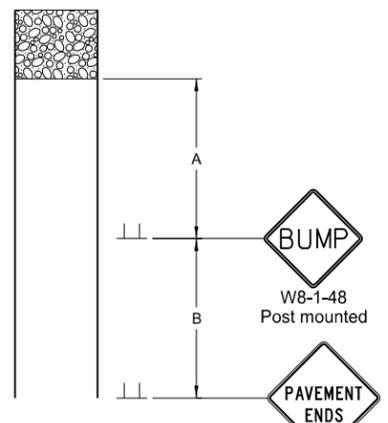
* Posted speed, off-peak 85th percentile speed prior to work starting, or the anticipated operating speed in mph.



TYPE GG
To be used where a difference of elevation between lanes exist



TYPE EE
To be used where the sign conditions exist



TYPE FF
To be used where the sign conditions exist

ADVANCE WARNING SIGN SPACING			
Road Type	Distance Between Signs Min. (ft)		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 to 40 mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway and Freeway (55 mph to 60 mph)	850	1350	2200
Rural Expressway and Freeway (70 mph to 75 mph)	1000	1500	2640
Interstate/4-Lane Divided (Maintenance and Surveying)	750	1000	1500

KEY

Sign (represented by a vertical line with a horizontal bar)

Flagger (represented by a square with a diagonal line)

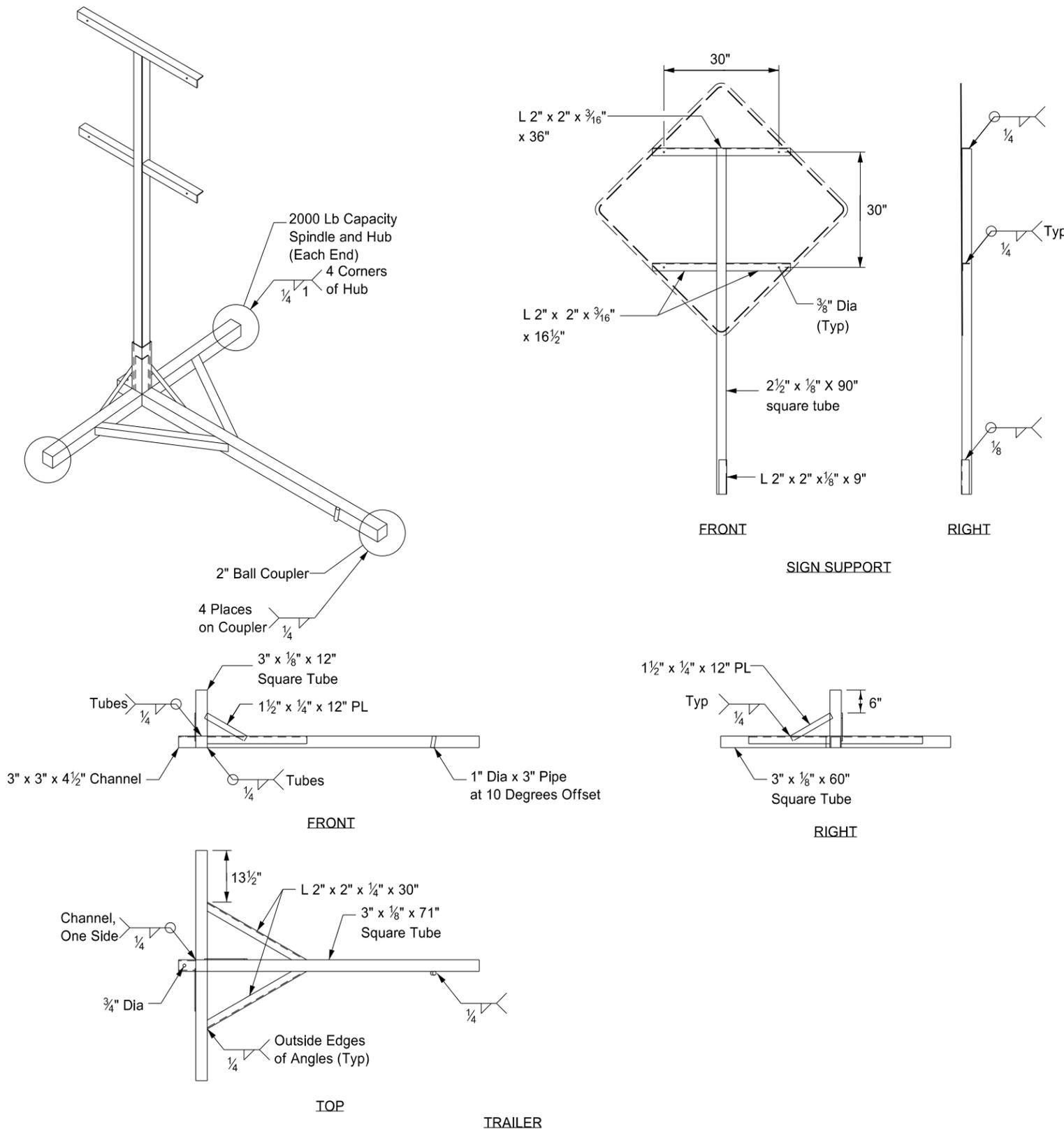
Cones (represented by a triangle)

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PORTABLE SIGN SUPPORT ASSEMBLY

D-704-50



Notes:

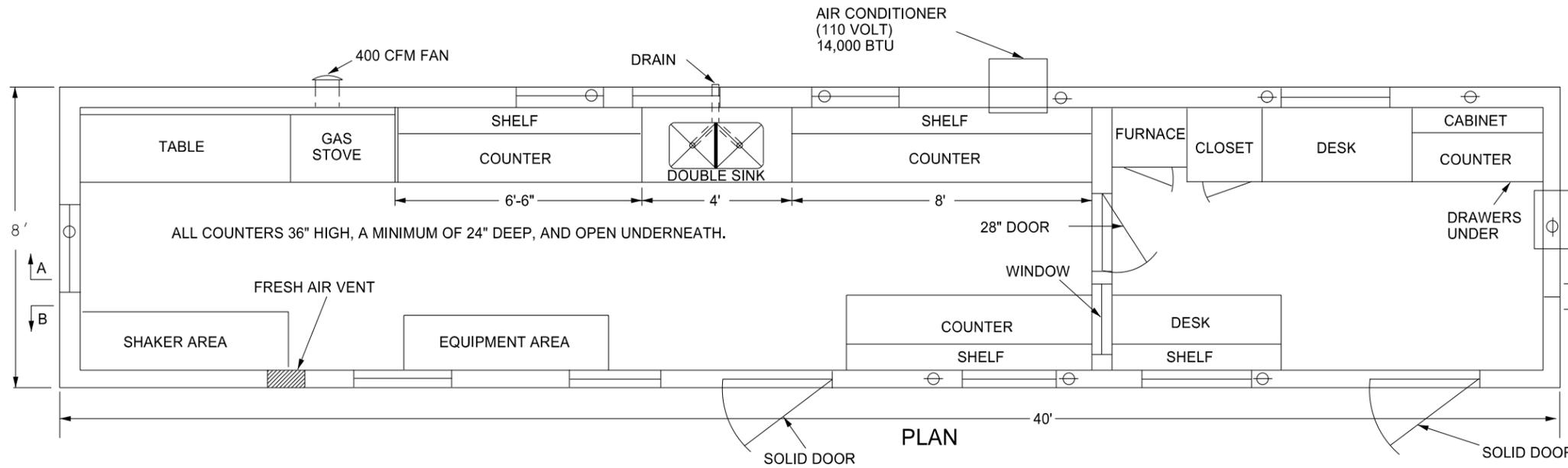
- ① The maximum weight of the assembly is 250 pounds.
- ② Use a 14" wheel and tire.
- ③ Automotive and equipment axle assemblies may not be used for trailer-mounted sign supports.
- ④ Other NCHRP 350 crash tested assemblies are acceptable.

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FIELD LABORATORY

D-706-1



AIR CONDITIONER (110 VOLT) 8,000 BTU

NOTES:
There shall be a minimum of six exterior ventilated casement or double hung windows. The minimum total area of opening shall be 34 square feet. The number, size, and location of windows may be adjusted to fit conditions. Suggested locations are shown on drawing.

The sink shall be double compartment stainless steel. Each compartment shall be a minimum of 16"x14"x10" deep. The sink shall be drained to an outside waste line. A trap is not required. Water service lines shall be copper or plastic having a diameter of 1/2 inch.

The lab shall be equipped with an exhaust fan capable of removing inside air at a rate of 400 CFM.

The fresh air vent shall be hinged to open or close manually.

24" x 48" table shall be provided capable of holding a 200 lb. masonry saw. The table shall have a minimum clearance of 36" overhead.

The water supply tank shall have a capacity of 500 gallons.

Steps shall be provided for each of two entrance doors. Steps for each area shall be made of, or covered with, a material providing for a non-slip surface. They shall be heavy duty steps that are capable of withstanding heavy loadings and extensive use.

The pressure tank on the pump shall be 20 gallon capacity.

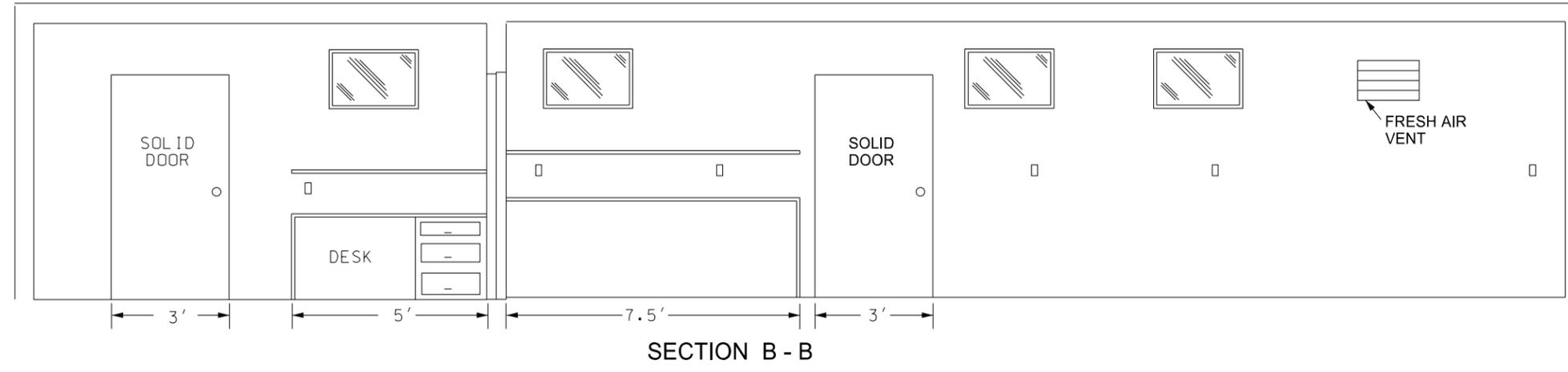
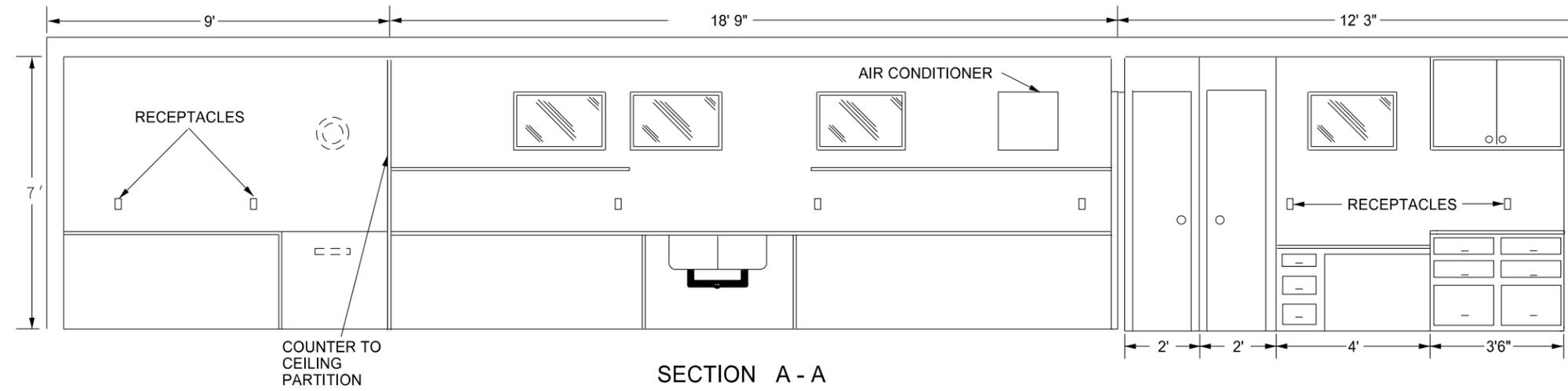
Locks, latches, and hinges for main doors shall be heavy duty type to withstand the intense use in service.

The wall between the office and the work area shall be properly insulated to prevent the transmission of heat & noise.

The floor beneath the marshal area shall be heavily reinforced.

The lab shall be equipped with steel cable tie downs and ground anchors at each corner of the lab.

Electrical service entrance shall be wired for 100 amps, and have separate circuits for air conditioners. Convenience outlets shall have a minimum spacing of four feet in counter areas.

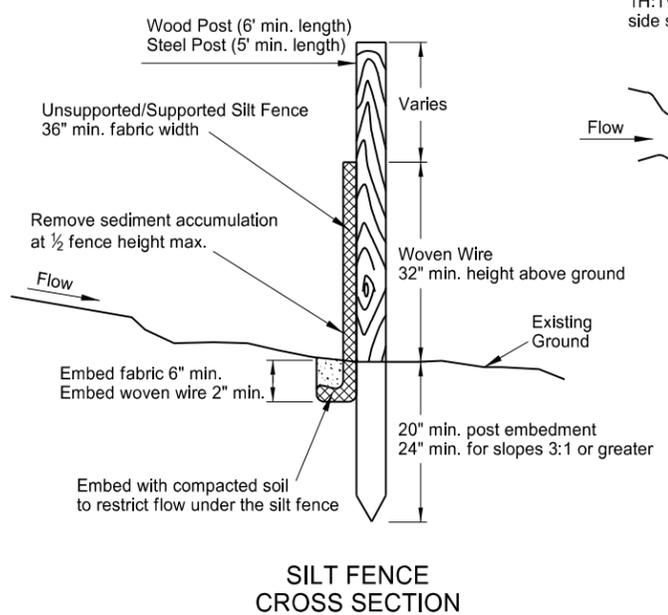
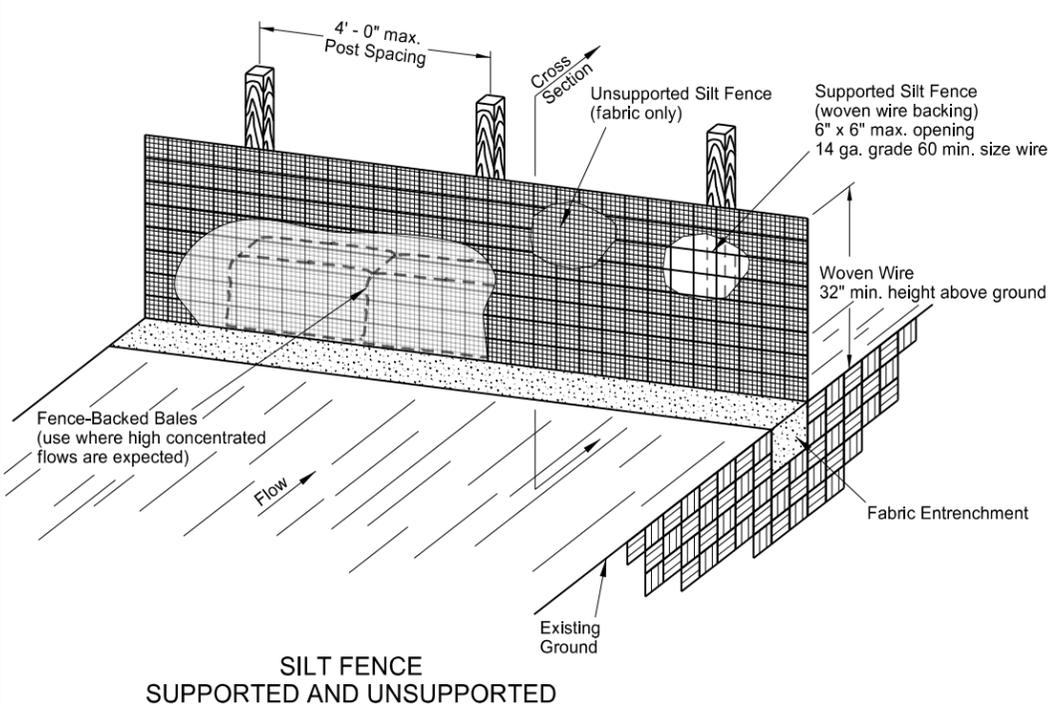
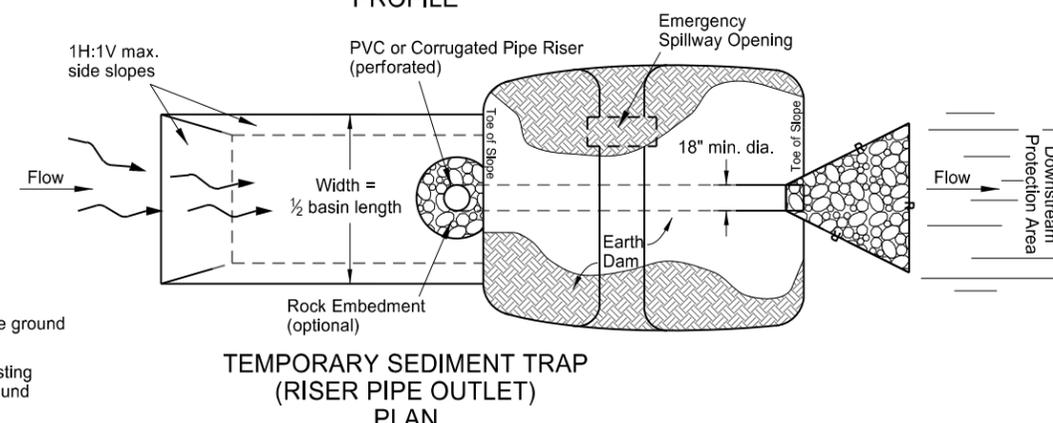
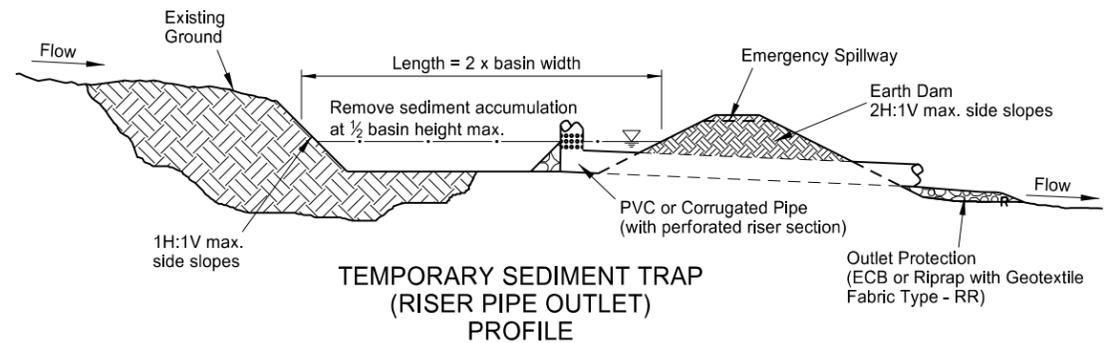
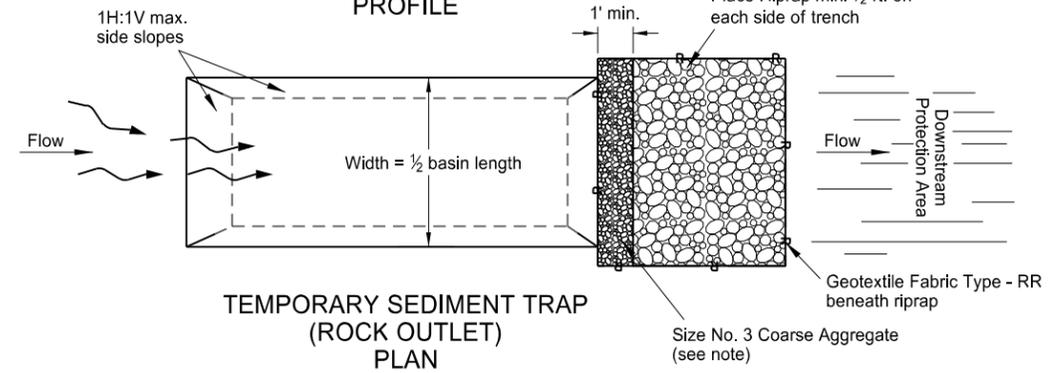
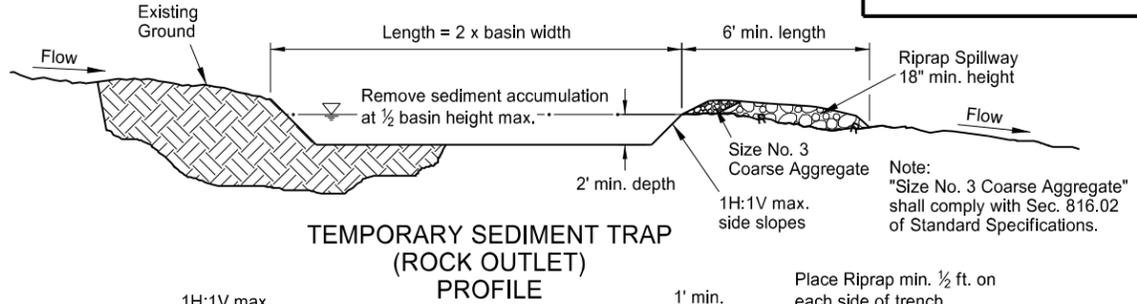
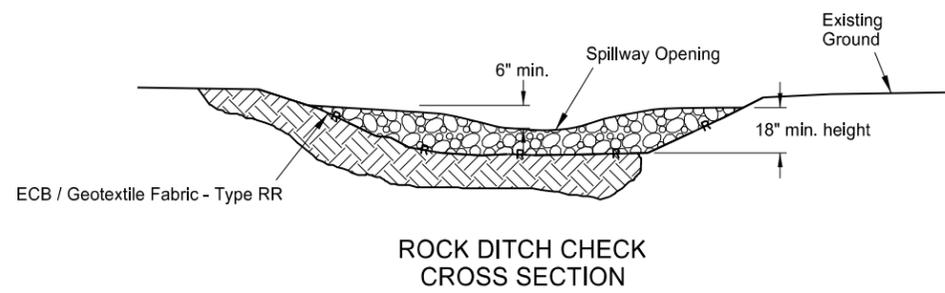
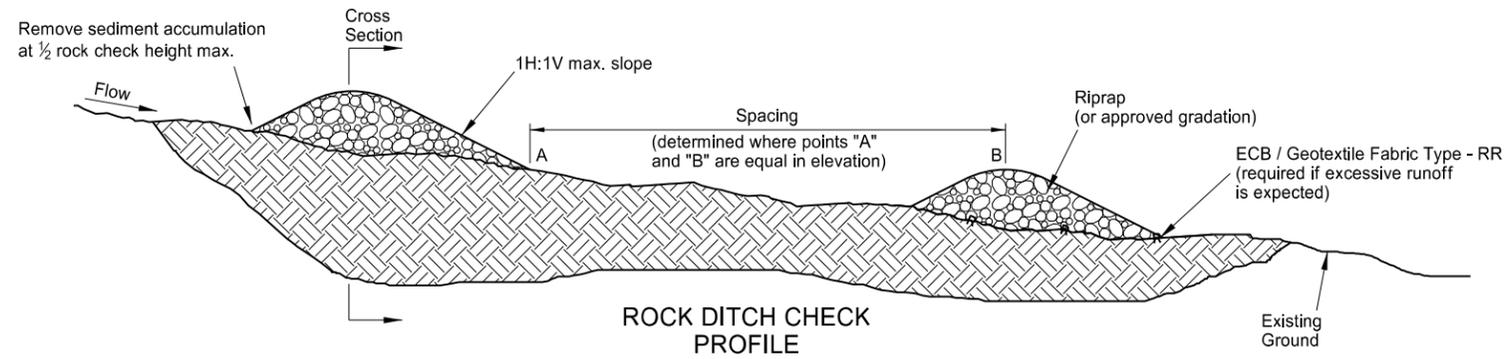


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EROSION AND SILTATION CONTROLS

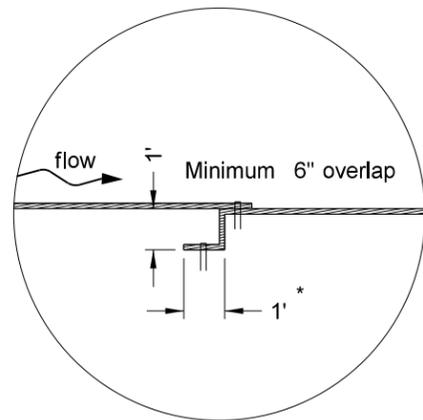
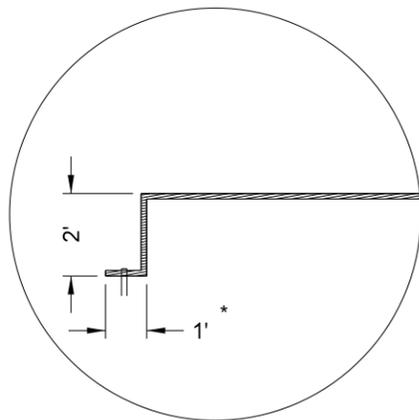
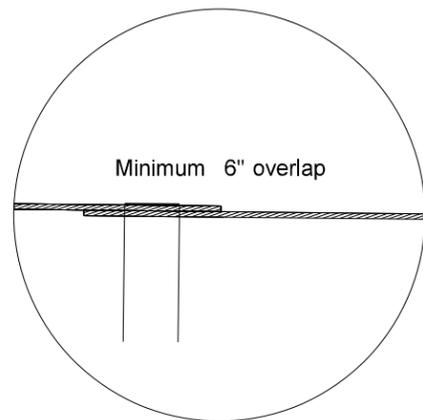
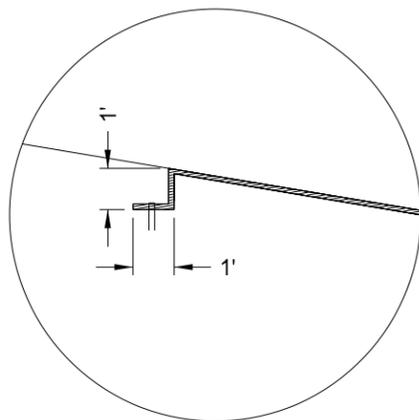
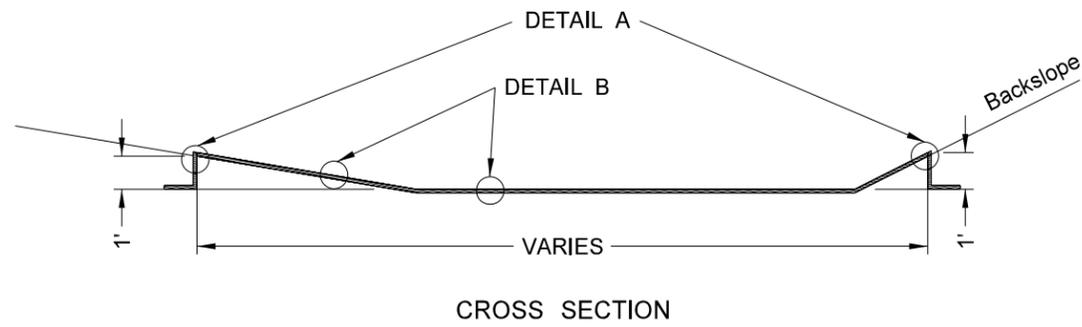
D-708-2



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10-03-13	
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DATE	CHANGE

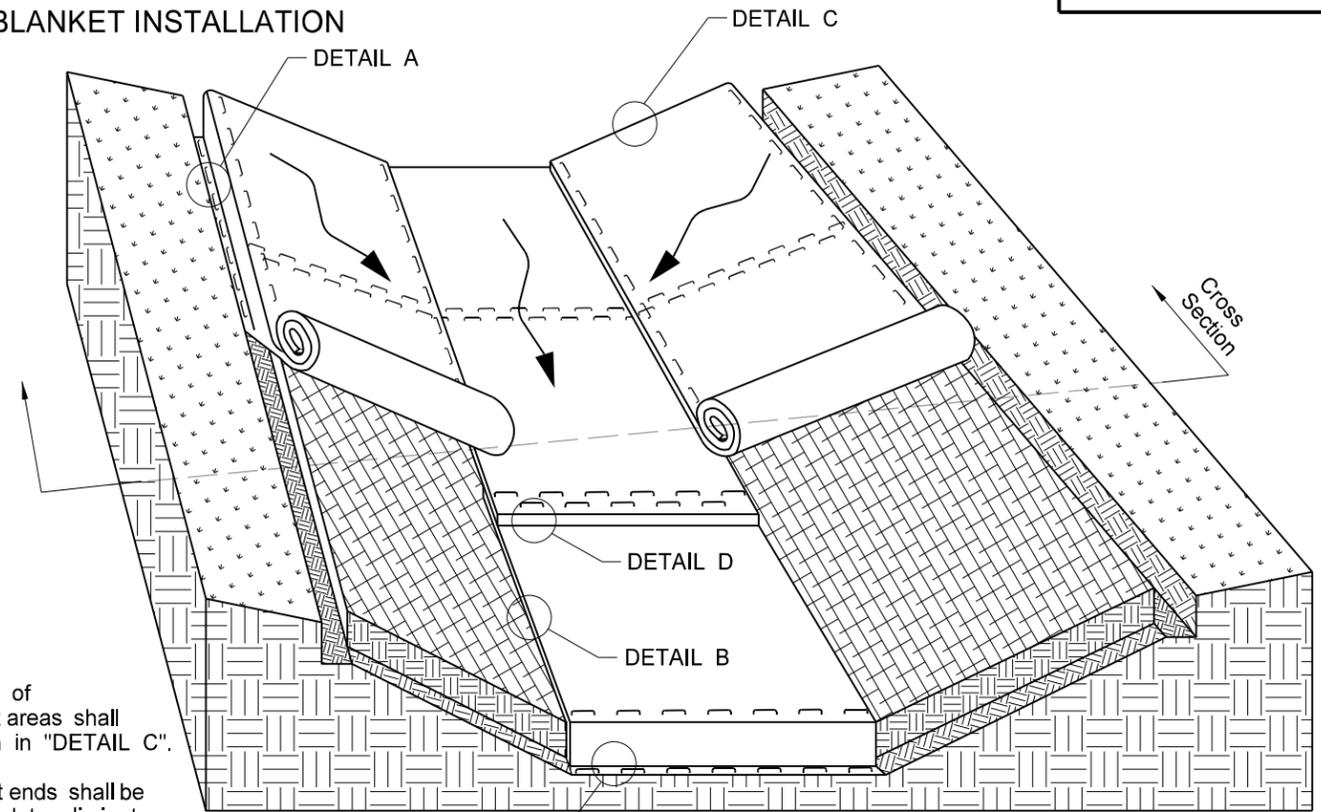
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EROSION AND SILTATION CONTROL
EROSION CONTROL BLANKET INSTALLATION



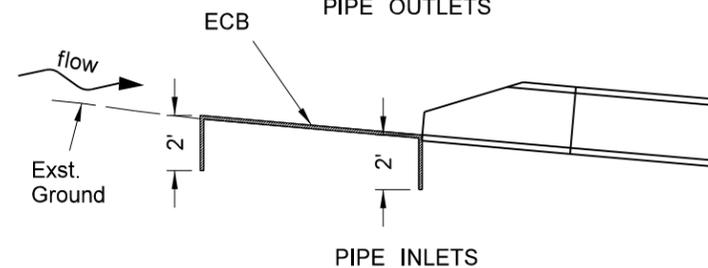
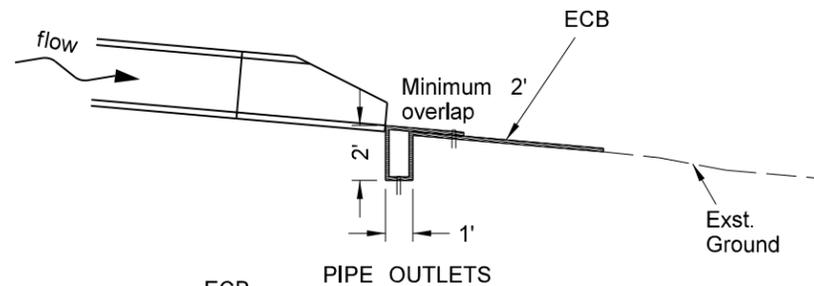
* This tie may be placed ahead or back.

DETAILS
CHANNEL OR SLOPE INSTALLATION



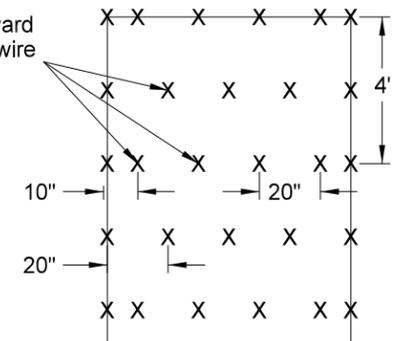
Notes:
Beginning and ending of erosion control blanket areas shall be installed as shown in "DETAIL C".

Erosion control blanket ends shall be entrenched and stapled to eliminate undermining on side slopes.



INSTALLATION AT PIPE ENDS

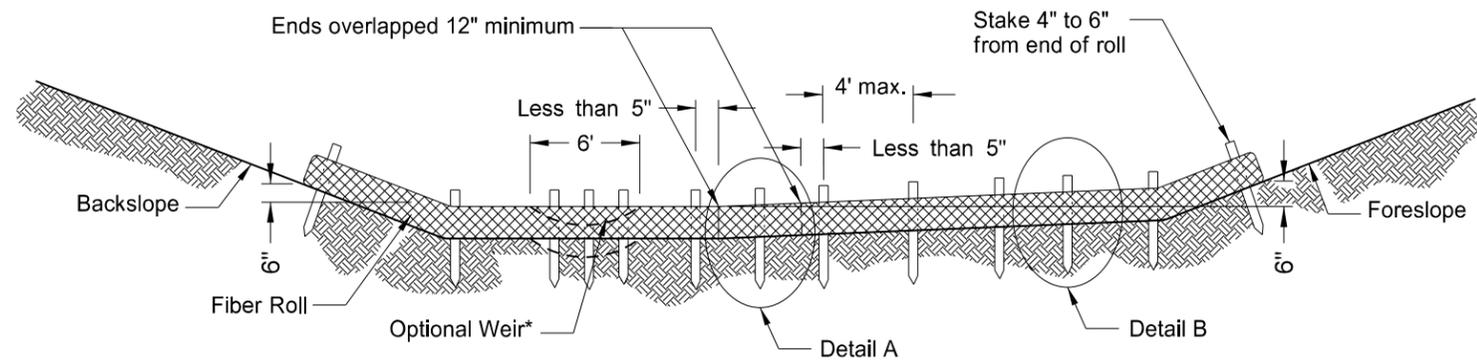
3.8 staples per square yard using 8-inch 11 gauge wire "u" staples.



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10-03-13	
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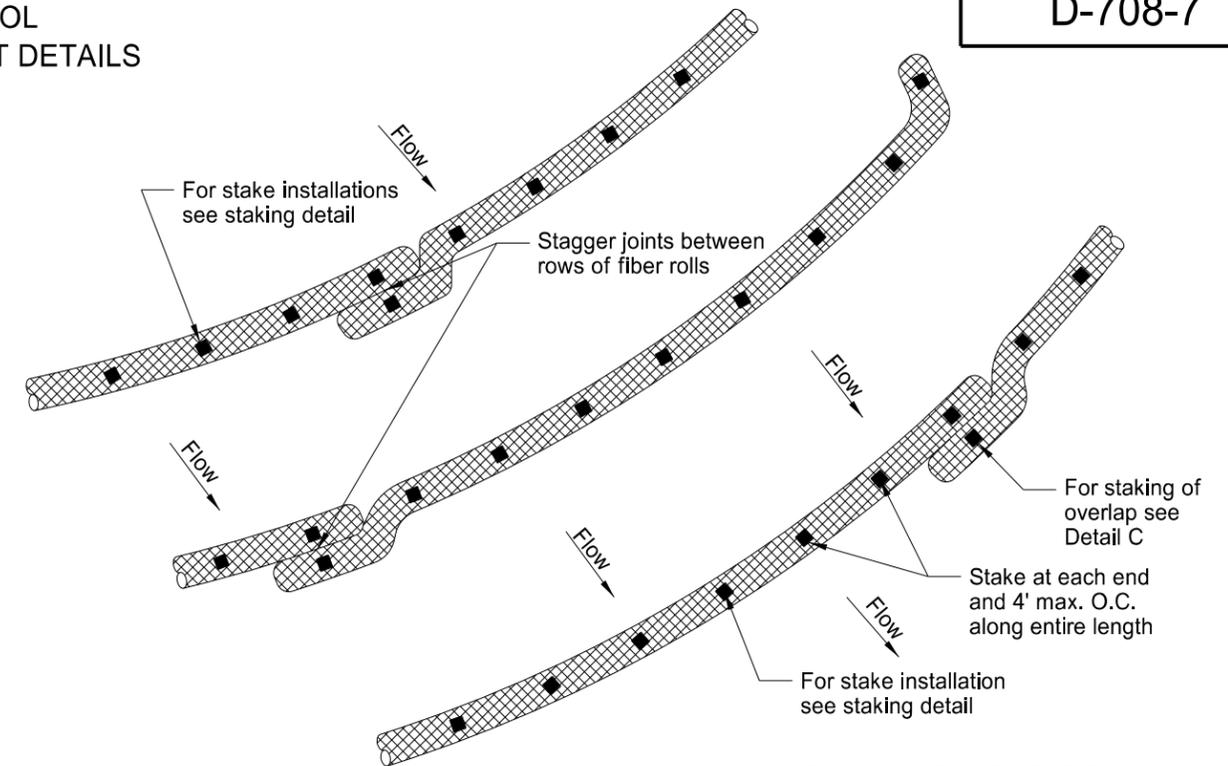
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EROSION CONTROL
FIBER ROLL PLACEMENT DETAILS

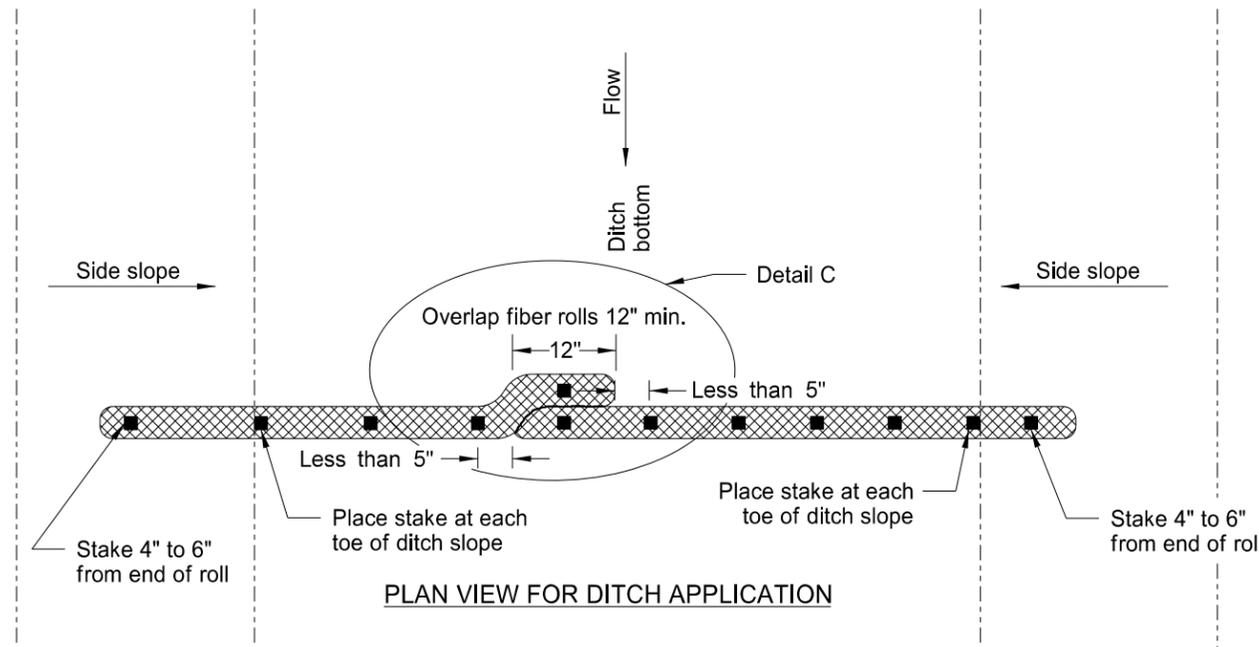


*Optional Weir. Use in flat areas, such as the Red River Valley, where there is potential for water to back up on adjacent property. Lower fiber roll enough to prevent water from backing up on adjacent property. Do not use 20-inch fiber rolls in flat areas where there is potential for water to back up on adjacent property.

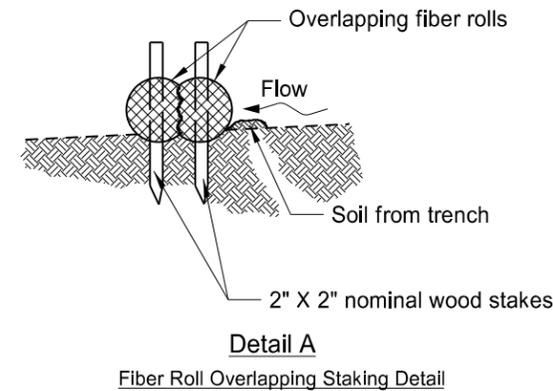
12 OR 20 INCH FIBER ROLL - DITCH BOTTOM



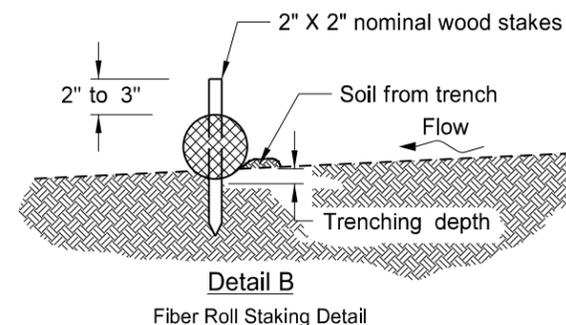
PLAN VIEW FOR SLOPE APPLICATION



PLAN VIEW FOR DITCH APPLICATION



Detail A
Fiber Roll Overlapping Staking Detail



Detail B
Fiber Roll Staking Detail

FIBER ROLL DIAMETER	NOMINAL STAKE SIZE	MINIMUM STAKE LENGTH	MINIMUM TRENCH DEPTH	MAXIMUM TRENCH DEPTH
6"	2" x 2"	18"	2"	2"
12"	2" x 2"	24"	2"	3"
20"	2" x 2"	36"	3"	5"

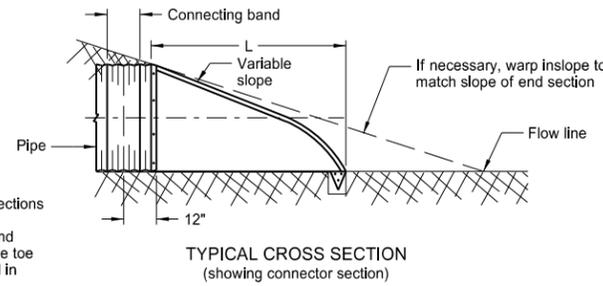
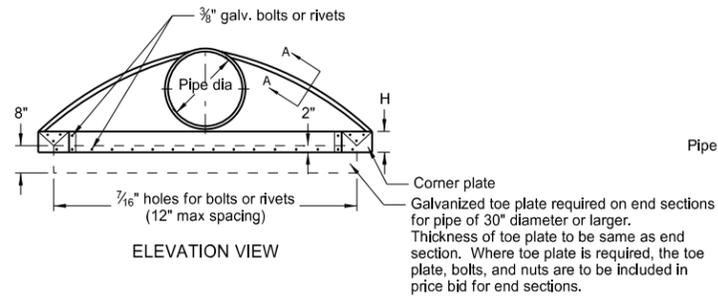
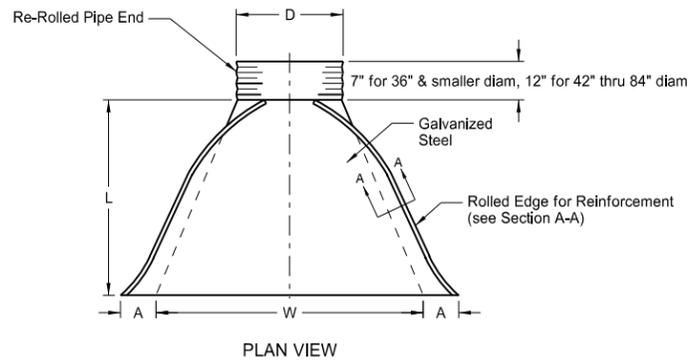
NOTE: Runoff must not be allowed to run under or around roll.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-18-10	
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DATE	CHANGE
06-10-13	Added plan view for ditch and slope application, Added table with values for stake and trench dimensions.
10-04-13	Revised fiber roll overlap detail.

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ROUND CORRUGATED STEEL PIPE CULVERTS AND END SECTIONS

D-714-4



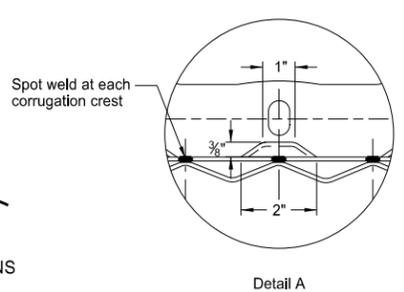
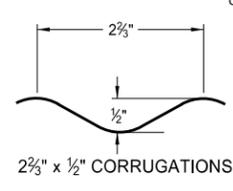
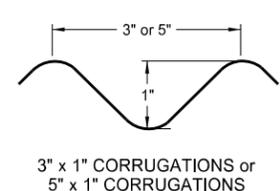
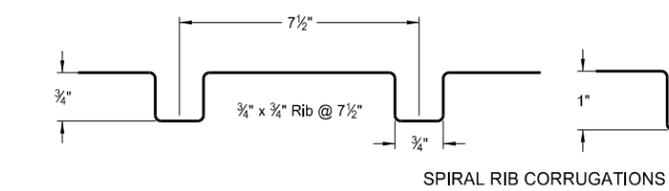
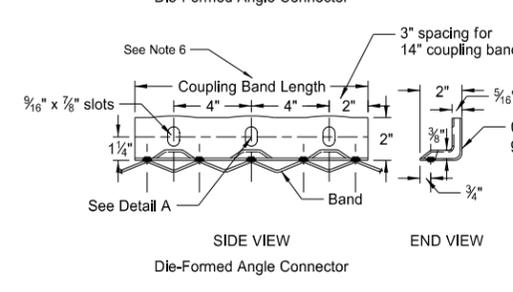
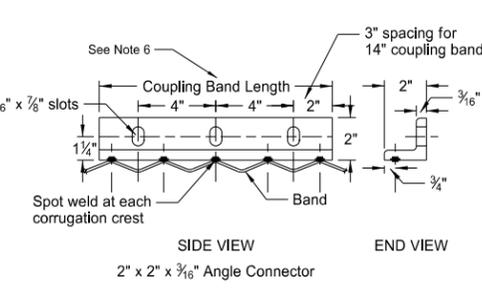
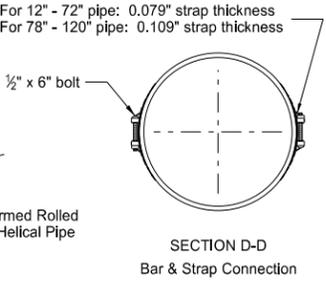
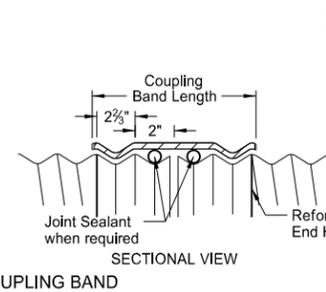
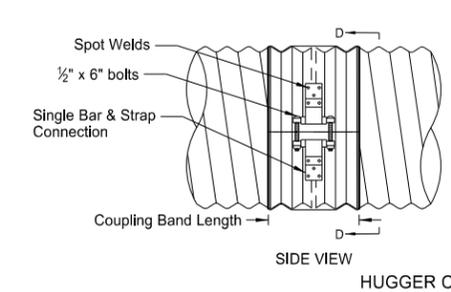
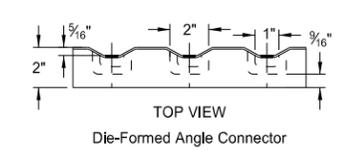
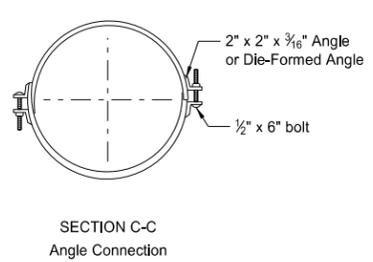
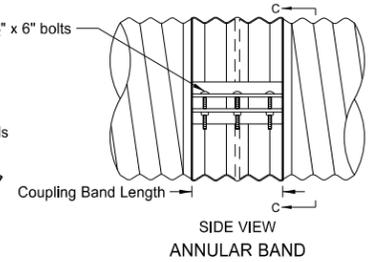
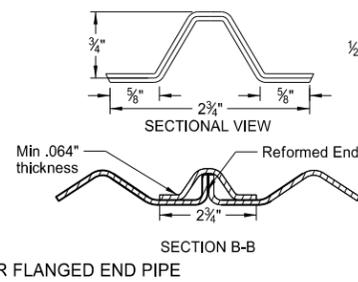
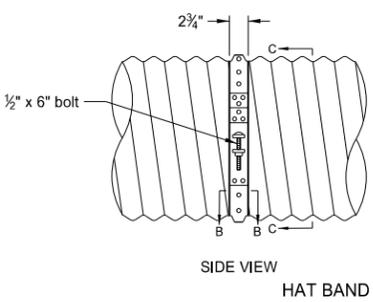
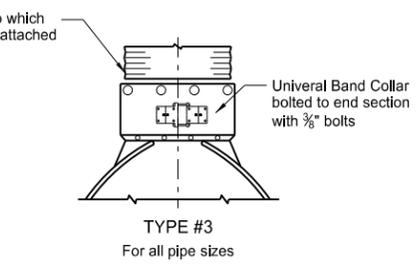
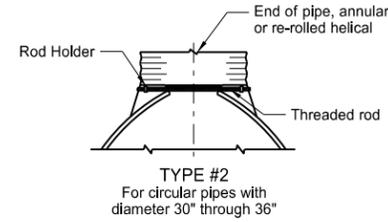
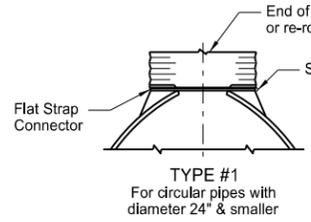
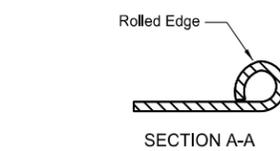
PIPE DIA. IN	GALV. THICK.	END SECTION DIMENSIONS					APPROX. SLOPE	BODY PIECE
		A IN	B IN	H IN	L IN	W IN		
15	0.064	7	8	6	26	30	2 1/2:1	1
18	0.064	8	10	6	31	36	2 1/2:1	1
24	0.064	10	13	6	41	48	2 1/2:1	1
30	0.079	12	16	8	51	60	2 1/2:1	1 or 2
36	0.079	14	19	9	60	72	2 1/2:1	2
42	0.109	16	22	11	69	84	2 1/2:1	2
48	0.109	18	27	12	78	90	2 1/2:1	2
54	0.109	18	30	12	84	102	2:1	2
* 60	0.109	18	33	12	87	114	1 1/2:1	3
* 66	0.109	18	36	12	87	120	1 1/2:1	3
* 72	0.109	18	39	12	87	126	1 1/3 :1	3
* 78	0.109	18	42	12	87	132	1 1/2:1	3
* 84	0.109	18	45	12	87	138	1 1/6 :1	3

- These sizes have 0.109" sides and 0.138" center panels.
 - Pipe diameter is equal to dimension "D" of end section.
- Manufacturers tolerances of above dimensions will be allowed.
- Splices to be the lap riveted type.

COUPLING BAND DIMENSIONS				
COUPLING TYPE	CORRUGATION PITCH x DEPTH	PIPE SIZE	COUPLING BAND LENGTH	MIN. BAND THICKNESS
Hat Band	2 3/8" x 1/2"	12" - 48"	2 3/4"	.064"
Annular Band	2 3/8" x 1/2"	12" - 72"	12"	.052"
		78" - 84"	12"	.079"
Hugger Band	2 5/8" x 1/2" Rerolled End	12" - 72"	10 1/2"	.052"
		78" - 84"	10 1/2"	.079"
	3" x 1" Rerolled End	48" - 120"	10 1/2"	.052"
	5" x 1" Rerolled End	48" - 120"	12"	.064"

Multiple panel bodies shall have lap seams which are to be tightly joined with 3/8" dia. galv. bolts or rivets. Nuts to be torqued to 25 foot-lbs ±.

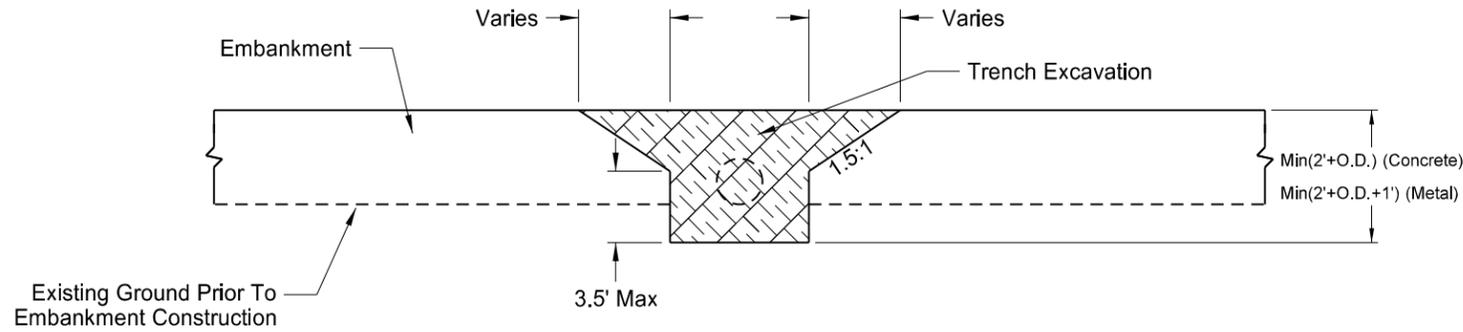
- NOTES:
1. Pipes and connecting bands shall conform to applicable sections of NDDOT Standard Specifications and to AASHTO M-36.
 2. Top edge of all end sections to have rolled edges for reinforcement (see Section A-A). The reinforced edges are to be supplemented with 2" x 2" x 1/4" galv. angle for 60" through 72" dia. and 2 1/2" x 2 1/2" x 1/4" galv. angle for 78" and 84" dia.. Angles to be attached by galv. 3/8" dia. bolts and nuts. Angles are to extend from pipe to the corner wing bend.
 3. Elongated pipes shall be factory preformed so that the vertical diameter shall be 5% greater and the horizontal diameter 5% less than a circular pipe.
 4. Coupling bands shall be two-piece for pipes larger than 36" as shown in Section C-C & D-D details. For pipes 36" and smaller, a one-piece band is acceptable.
 5. 1/2" x 8" bolts may be used as a substitute for the 1/2" x 6" bolts shown in the details.
 6. Coupling bands wider than 14" may be used if a minimum of four 1/2" bolts with maximum spacing of 5 1/2" are used for the connection.
 7. Length of spot welds shall be minimum 1/2".



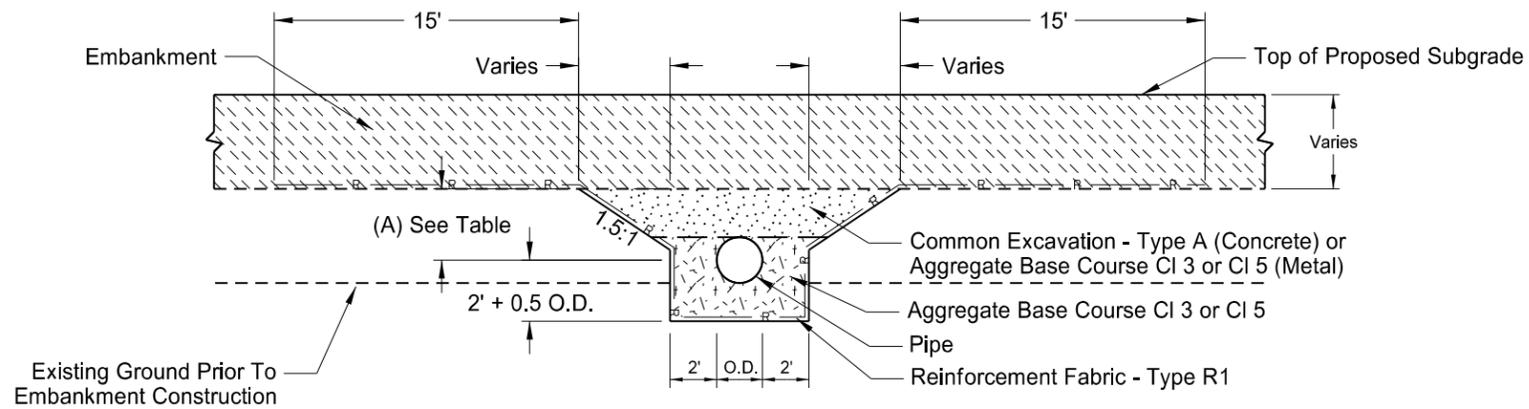
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
08-06-13	
REVISIONS	
DATE	CHANGE
01-07-14	End Section Plan View
02-27-14	3" x 1" Corrugation Detail

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TRANSVERSE MAINLINE PIPE EXCAVATION AND INSTALLATION DETAIL FOR PIPES INSTALLED IN NEW EMBANKMENT AREAS



EXCAVATION DETAIL



INSTALLATION DETAIL

Pay Items

- 1) Pipe*
- 2) Reinforcement Fabric - Type R1

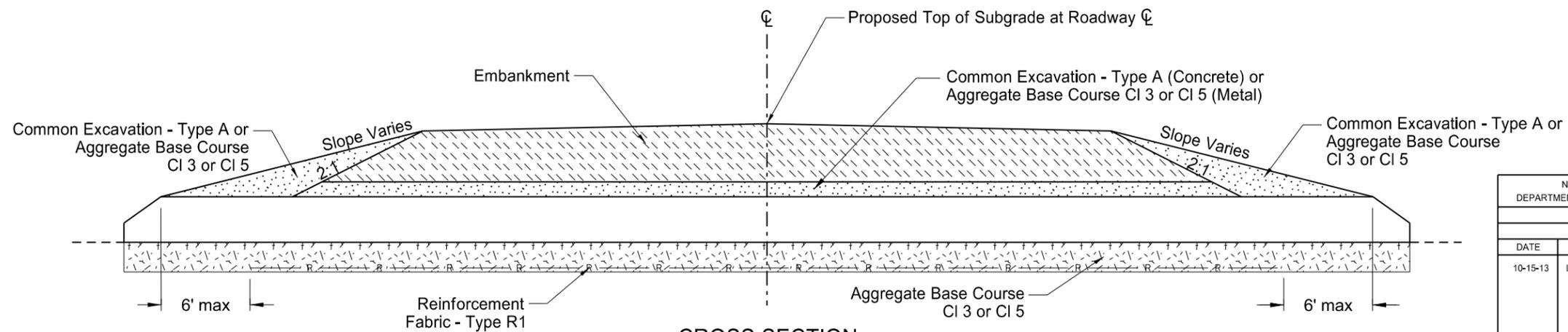
*Included in Pipe Pay Item

- 1) Pipe
- 2) Trench excavation
- 3) Aggregate base course CI 3 or CI 5
- 4) Common Excavation - Type A

NOTES:

- 1) This drawing applies to new/extended mainline and paved intersection roadway pipes only (including ramps). It does not include pipes in approaches

Backfill Dimensions	
Pipe Materials	Dimension (A)
Concrete	0.5 O.D.
Metal	0.5 O.D. + 1 foot



CROSS SECTION

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
7-26-13	
REVISIONS	
DATE	CHANGE
10-15-13	Label Formatting

This document was originally issued and sealed by
 Ron Horner,
 Registration Number
 PE-2087,
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STANDARD MONUMENTS AND RIGHT OF WAY MARKERS

NOTES:

The construction and installation of Alignment Monuments, Iron Pin Reference Monuments, Iron Pin R/W Monuments, and Right of Way Markers (witness posts) shall conform to Section 720 of the Standard Specifications.

ALIGNMENT MONUMENTS:

Iron Pin or Precast Concrete Alignment Monuments with aluminum caps will be placed on the centerline alignment PI's, section corners, quarter corners, section line crossings, quarter line crossings, and at curve points (PC's, PT's, TS's, and ST's) on the centerline.

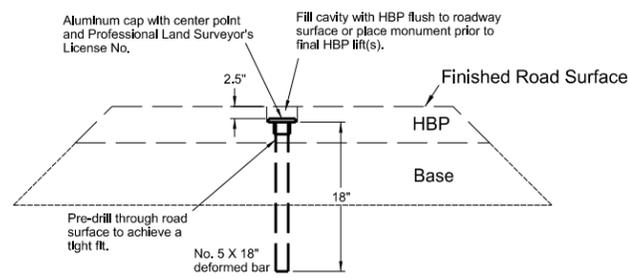
IRON PIN R/W MONUMENT:

Iron pins with aluminum caps (No. 5 X 18") will be placed at breaks on the Right of Way line, and at curve points (PC's, PT's, TS's and ST's) on the Right of Way line.

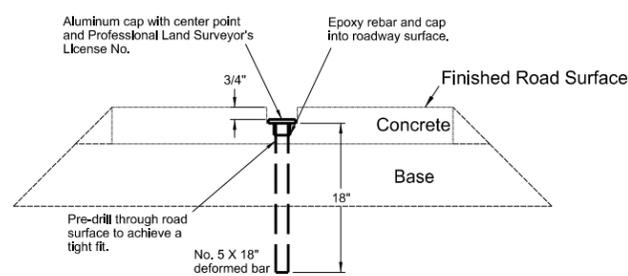
IRON PIN REFERENCE MONUMENT:

Iron Pins without aluminum caps (No. 5 X 18") will be placed as reference monuments on the Right of Way line at section corners, quarter corners, section line crossings, and quarter line crossings.

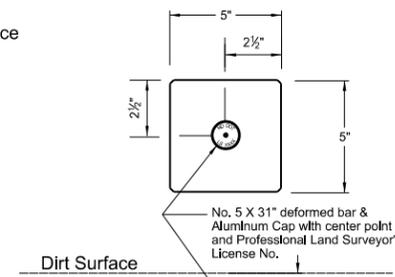
ALIGNMENT MONUMENT DETAILS



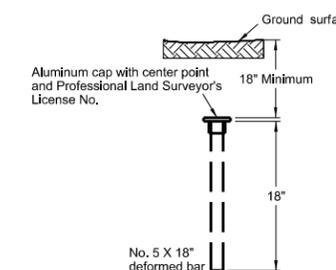
IRON PIN
(Within Finished Roadway Surface)



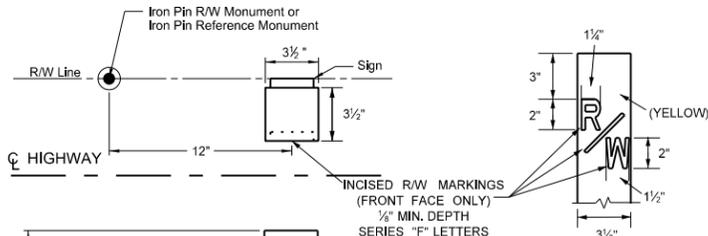
IRON PIN
(Within Finished Roadway Surface)



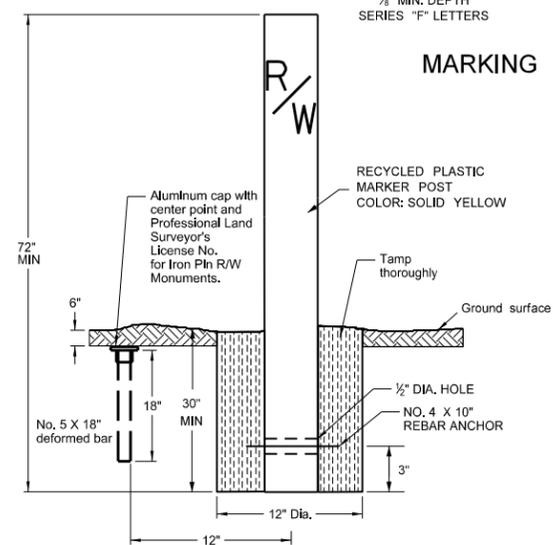
PRECAST CONCRETE
(Outside Finished Roadway Surface)
(Inside R/W Limits)



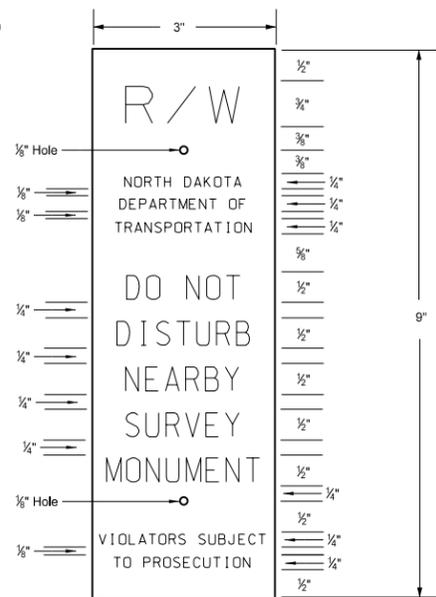
IRON PIN
(Outside Finished Roadway Surface)
(Outside R/W Limits)



MARKING DETAIL



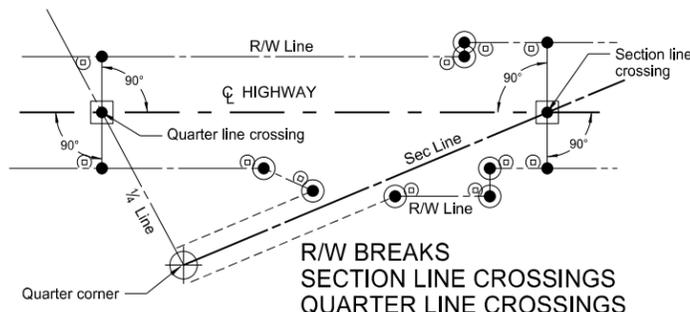
RECYCLED PLASTIC
RIGHT OF WAY MARKER
(WITNESS POST) DETAILS
&
IRON PIN REFERENCE AND R/W
MONUMENT DETAILS



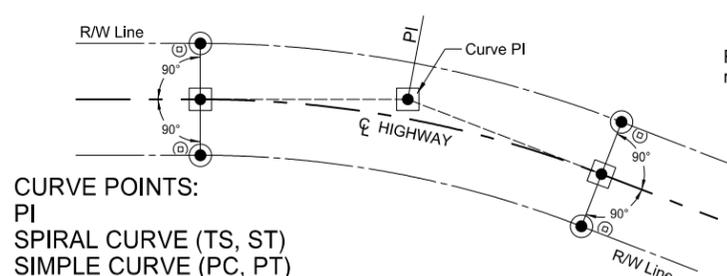
SIGN DETAIL

Black letters on orange high intensity background sheeting meeting ASTM D-4956 Type III or higher on 80 gauge 5052-H38 aluminum. Silk screen graphics. One color print. Sign shall be attached by drilling two holes in the face of the post (side facing the private owner, away from the Department of Transportation right of way). Put inserts into the holes and mount the sign with #4 vandal proof screws. Sign shall be installed 2" from top of post.

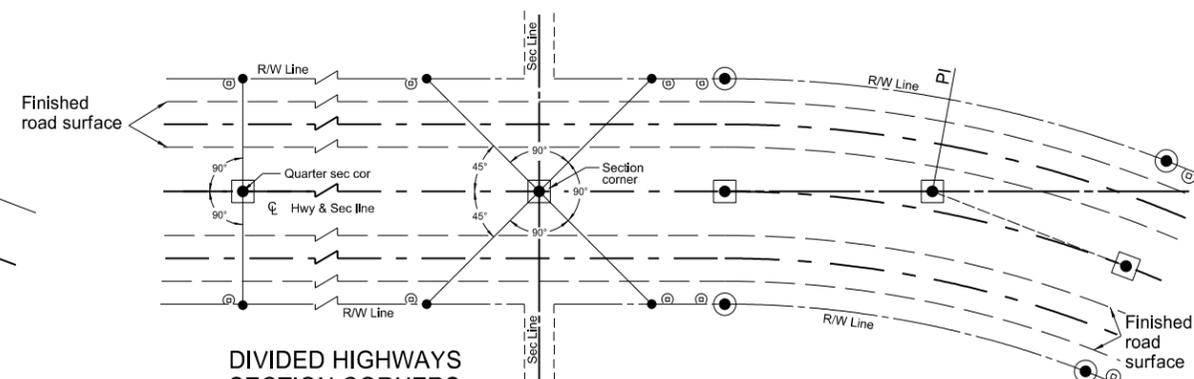
VARIOUS MONUMENT AND MARKER PLACEMENTS



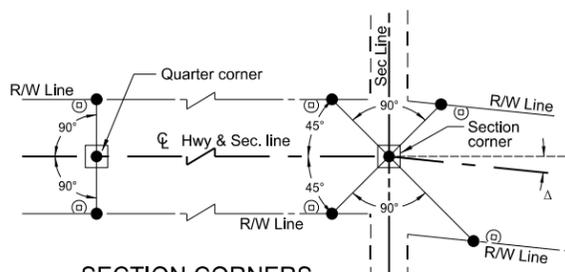
R/W BREAKS
SECTION LINE CROSSINGS
QUARTER LINE CROSSINGS



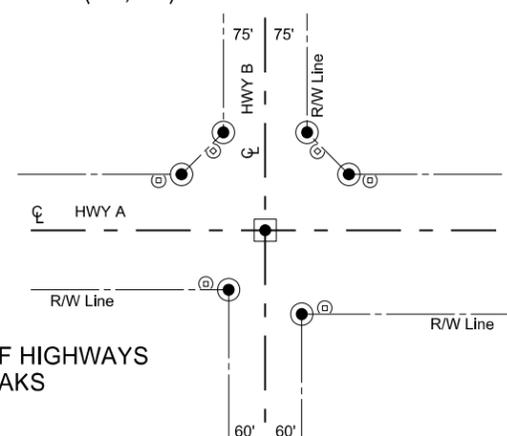
CURVE POINTS:
PI
SPIRAL CURVE (TS, ST)
SIMPLE CURVE (PC, PT)



DIVIDED HIGHWAYS
SECTION CORNERS
QUARTER CORNERS



SECTION CORNERS
QUARTER CORNERS



INTERSECTION OF HIGHWAYS
FLARED R/W BREAKS

LEGEND

- Iron Pin Reference Monument
- ⊙ R/W Marker (witness post)
- Alignment Monument
- Iron Pin R/W Monument

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-2013	
REVISIONS	
DATE	CHANGE
11/12/13	Note for SIGN DETAIL modified to meet ASTM D-4956 Type III or higher on 80 gauge 5052-H38

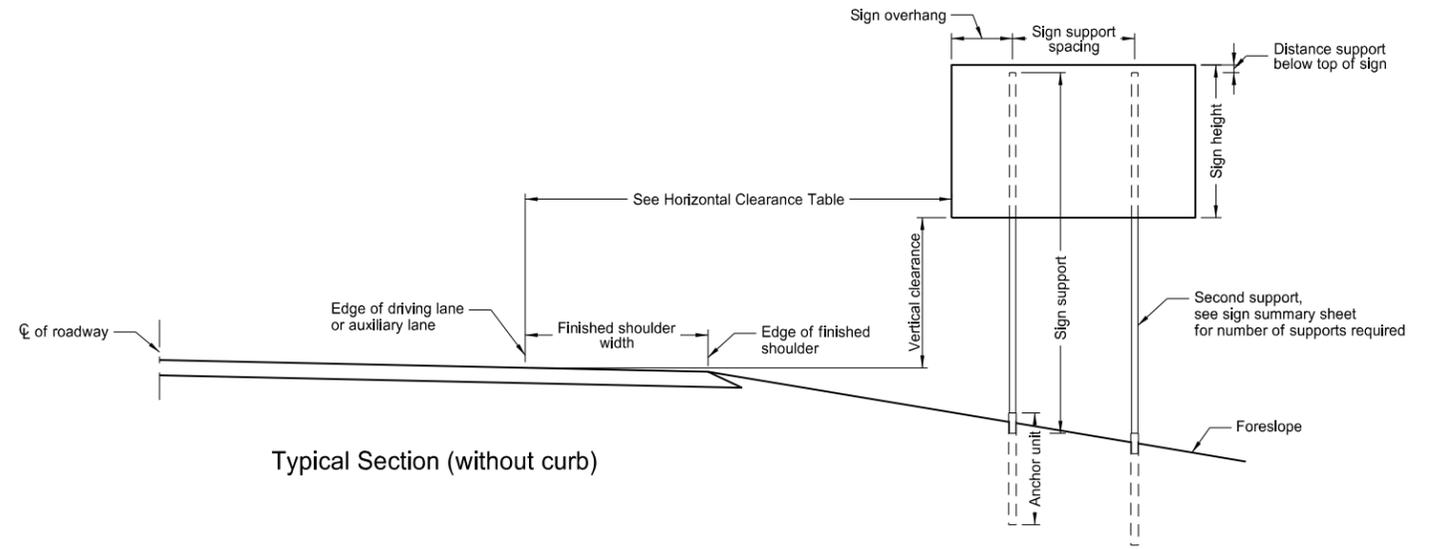
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on 11/12/13 and the original document is stored at the
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PERFORATED TUBE ASSEMBLY DETAILS

D-754-23

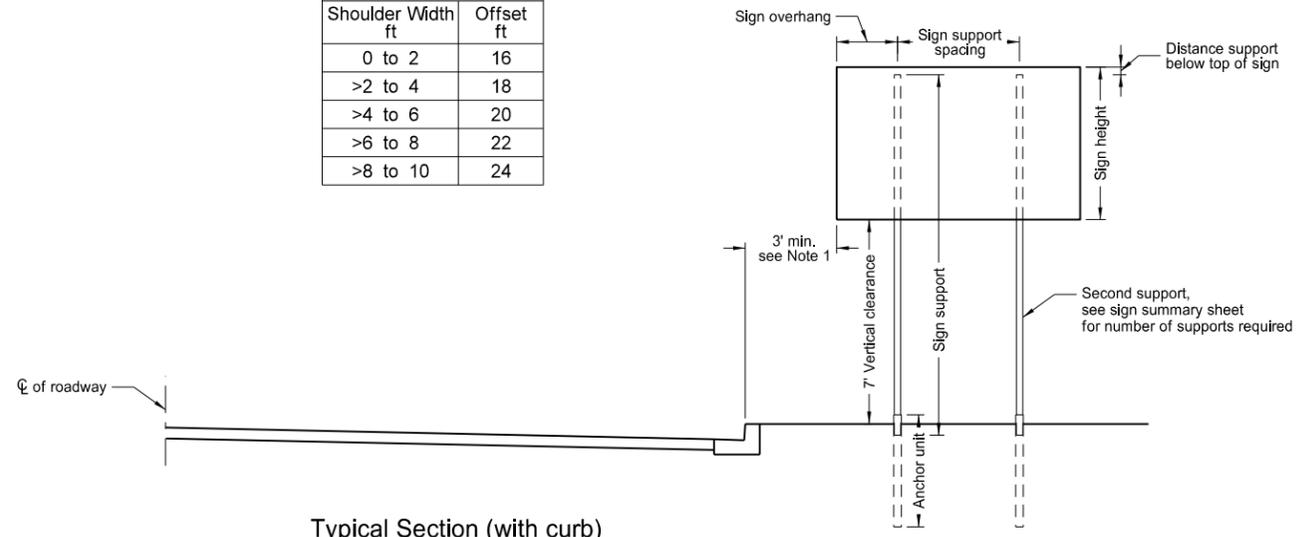
Notes:

1. Curbed Roadways: The clearance from the face of the curb should be 3' except where right of way or sidewalk width is limited, a minimum clearance of 2' shall be provided. The horizontal clearance may need to be increased to maintain a minimum sidewalk clear width of 4' from the sign support, not including any attached curb.
 2. Minimum vertical clearance: Signs installed at the side of the road in rural districts shall be at least 5' measured from the bottom of the sign to the edge of the driving lane or auxiliary lane. Where parking or pedestrian movements occur, the clearance to the bottom of the sign shall be at least 7'.
- Directional signs on expressways shall be installed with a minimum height of 7'. If the secondary sign is mounted below another sign, the major sign shall be installed at least 8' and the secondary sign shall be installed at least 5' above the edge of the driving lane.
- All route signs, warning signs, and regulatory signs on expressways shall be at least 7' above the edge of the driving lane.
- Adopt-a-highway signs installed on Freeways shall be at least 7' above the edge of the driving lane.
- The vertical clearance shall have a maximum height of 6" above the vertical clearance specified above.
3. Offset signs: Where signs are placed at least 30 feet or more from the edge of the traveled way, the height to the bottom of such sign shall be 5' above the edge of the driving lane.

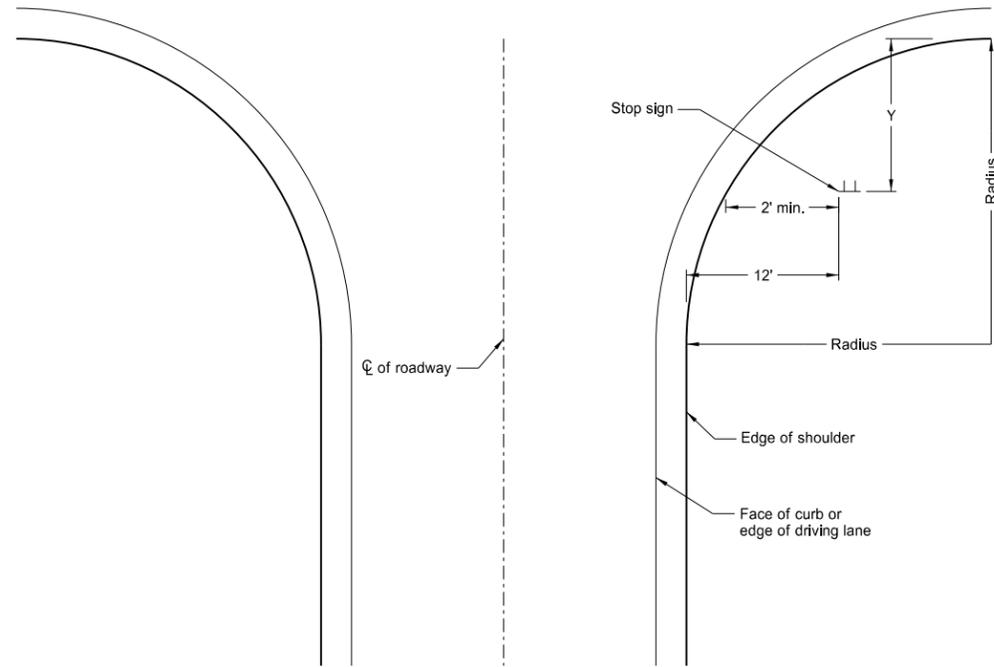


Typical Section (without curb)

Horizontal Clearance Table	
Shoulder Width ft	Offset ft
0 to 2	16
>2 to 4	18
>4 to 6	20
>6 to 8	22
>8 to 10	24



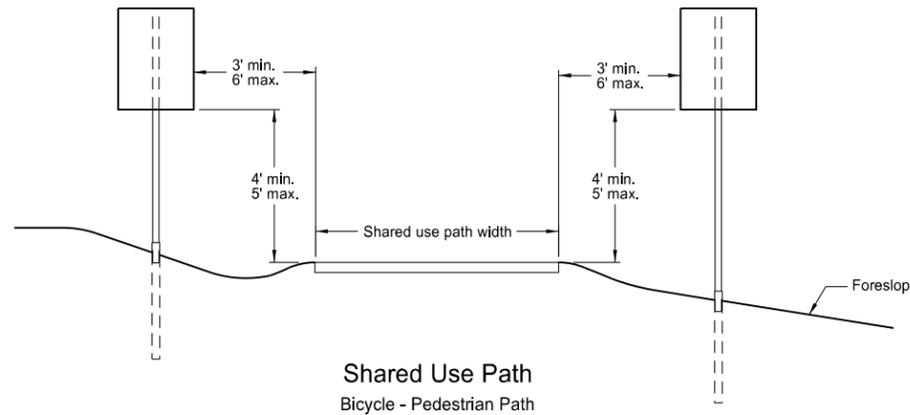
Typical Section (with curb)
Residential or Business District



Stop Sign Location
Wide Throat Intersection

This layout is to be used for the placement of "Stop" signs.

Radius ft.	Y-max. ft.	Y-min. ft.
40	50	15
45	50	18
50	50	21
55	50	25
60	50	28
65	50	32
70	50	35
75	50	39
80	50	43



Shared Use Path
Bicycle - Pedestrian Path

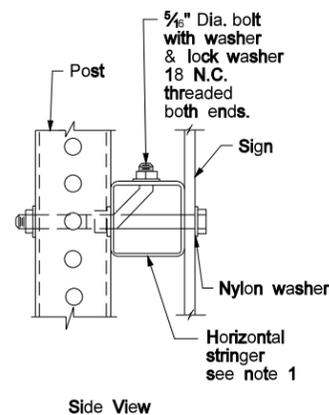
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE

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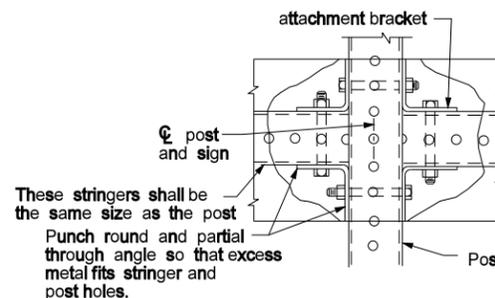
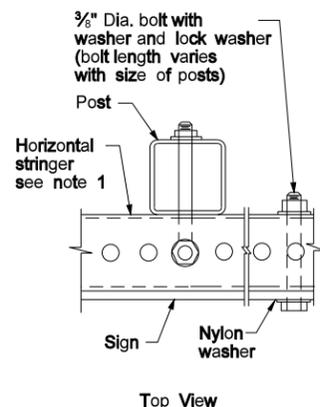
Mounting Details Perforated Tube

Note:

- Horizontal stringers - In lieu of perforated tubes, the contractor may substitute z bar stringers. The z bar stringers shall be 1 1/2" x 3/16" thick, 1.08 lbs./ft aluminum or 3.16 lbs./ft steel.
- Metal washers used on sign face shall have a minimum outside diameter of 5/8" ± 1/16" and 10 gauge thickness.
- No Parking Signs: All no parking signs with directional arrows shall be placed at a 30 to 45 degree angle with the line of traffic flow. No parking signs required at the above angles may have the support turned to the correct angle. If the no parking sign is placed with another sign that has to be placed at a 90 degree angle with the line of traffic flow, the detailed angle strap should be used to mount the no parking sign. Flat washers and lock washers shall be used with all nylon washers. Material used for the attachment strap shall be included in the price bid for "Flat sheet for signs."
- In lieu of using the bent bolt to attach the post to the stringer, the contractor may choose to punch the sign backing and place the bolt through the sign, the stringer and the post.
- 4" vertical clearance of anchor or breakaway base. The 4" x 60" measurement shall be made above and below post location and also back and ahead of post.

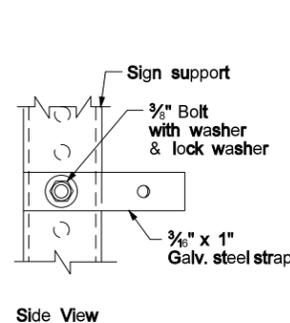


STRINGER MOUNTING
(WITH STRINGER IN FRONT OF POST)

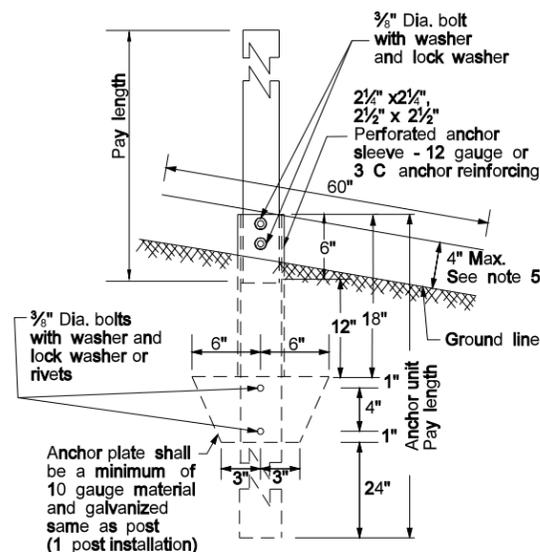
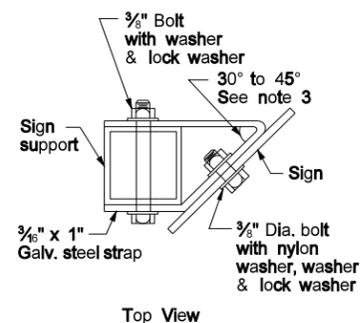


STREET NAME SIGNS
AND ONE WAY SIGNS
SINGLE POST ASSEMBLY
ONE STRINGER OR
BACK TO BACK MOUNTING

These stringers shall be the same size as the post. Punch round and partial through angle so that excess metal fits stringer and post holes.



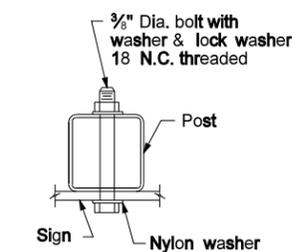
STRAP DETAIL



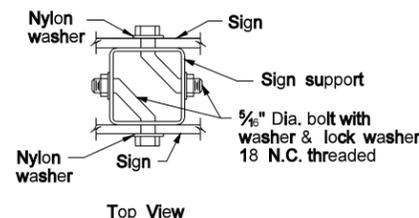
ANCHOR UNIT AND
POST ASSEMBLY

Number of Posts	Telescoping Perforated Tube						
	Post Size In.	Wall Thickness Gauge	Sleeve Size In.	Wall Thickness Gauge	Slip Base	Anchor Size Without Slip Base In.	Anchor Wall Thickness Gauge
1	2	12			No	2 1/4	12
1	2 1/2	12			No	2 1/2	12
1	2 1/2	12			(B)	3(C)	7
1	2 1/2	10			Yes		7
1	2 1/4	12	2 1/2(D)	12	Yes		7
1	2 1/2	12	2 1/4	12	Yes		7
2	2 1/2	10			Yes		7
2	2 1/4	12	2 1/2(D)	12	Yes		7
2	2 1/2	12	2 1/4	12	Yes		7
3 & 4	2 1/2	12			Yes		7
3 & 4	2 1/2	10			Yes		7
3 & 4	2 1/2	12	2 1/4	12	Yes		7
3 & 4	2 1/4	12	2 1/2(D)	12	Yes		7
3 & 4	2 1/2	10	2 3/8	10	Yes		7

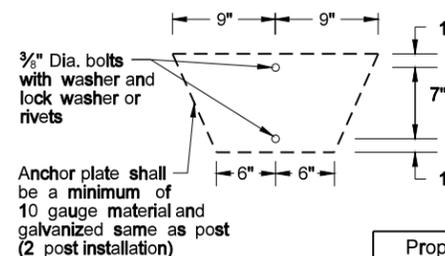
(B) - The 2 1/2", 12 gauge posts do not need breakaway bases when placed in standard soils, but require a shim as specified by the manufacturer. The breakaway base is required when the support is placed in weak soils. The Engineer shall determine if the soils are weak. Weak soils are classified as boggy, wet, or loose soil areas.
(C) - 3" anchor unit
(D) - 2 1/2" x 12 ga. x 18" minimum length external sleeve required.



BOLT MOUNTING



BACK TO BACK
MOUNTING



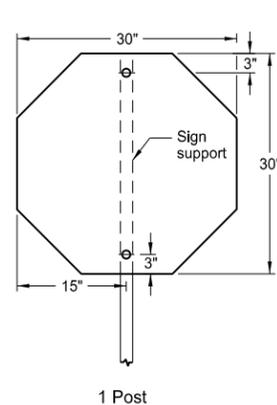
Properties of Telescoping Perforated Tubes						
Tube Size In.	Wall Thickness In.	U.S. Standard Gauge	Weight Per Foot Lbs.	Moment of Inertia In. ⁴	Gross Sect. area In. ²	Section Modulus In. ³
1 1/2 x 1 1/2	0.105	12	1.702	0.129	0.380	0.172
2 x 2	0.105	12	2.416	0.372	0.590	0.372
2 1/4 x 2 1/4	0.105	12	2.773	0.561	0.695	0.499
2 3/8 x 2 3/8	0.135	10	3.432	0.605	0.841	0.590
2 1/2 x 2 1/2	0.105	12	3.141	0.804	0.803	0.643
2 1/2 x 2 1/2	0.135	10	4.006	0.979	1.010	0.783

The 2 1/4" size 10 gauge is shown as 2.19" size on the plans.
The 2 1/2" size is shown as 2.51" size on the plans.

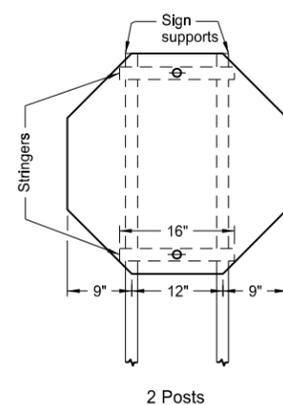
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-6-09	
REVISIONS	
DATE	CHANGE

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SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS REGULATORY, WARNING AND GUIDE SIGNS

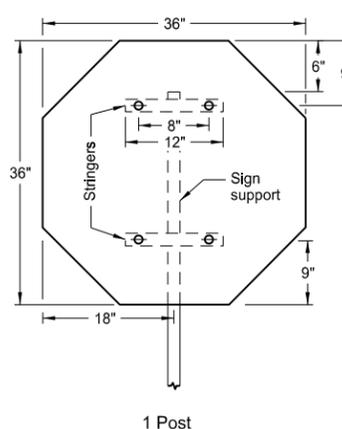


1 Post

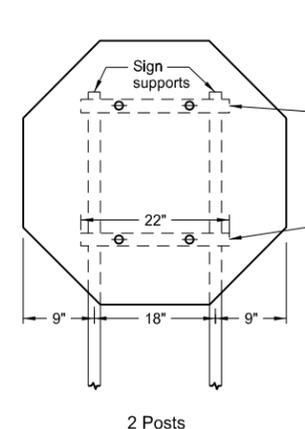


2 Posts

Assembly No. 1

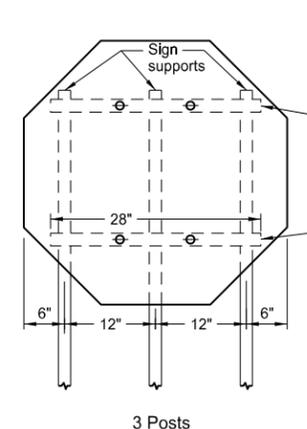


1 Post



2 Posts

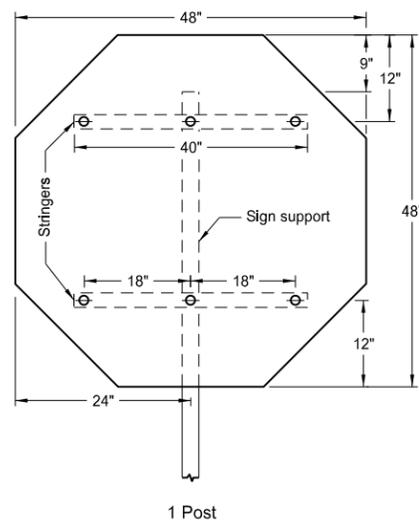
Assembly No. 2



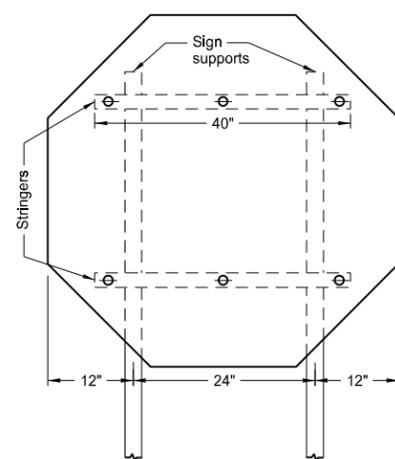
3 Posts

Notes:

1. See Standard D-754-25 for mounting details.
2. The minimum sign backing material thickness shall be 0.100 inch.
3. Perforated square tube stringer shall be 1½" x 1½".
4. All holes shall be punched round for ⅜" bolt.

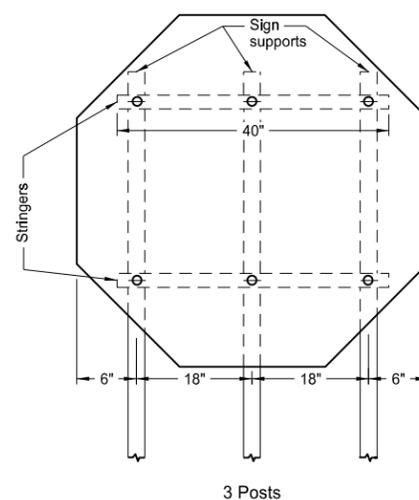


1 Post

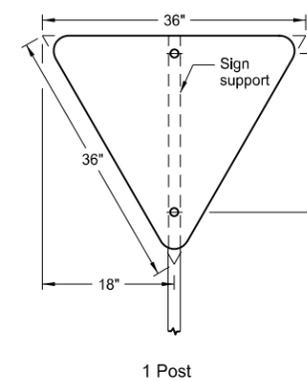


2 Posts

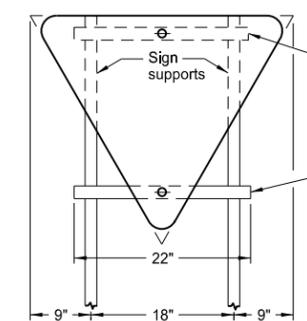
Assembly No. 3



3 Posts

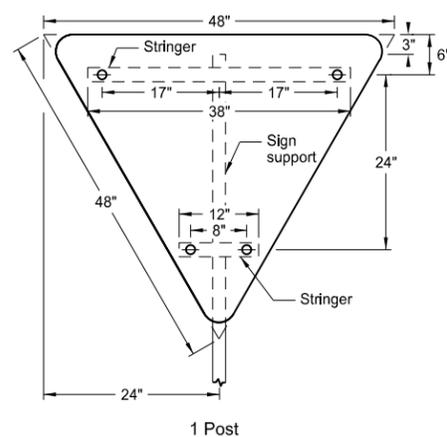


1 Post

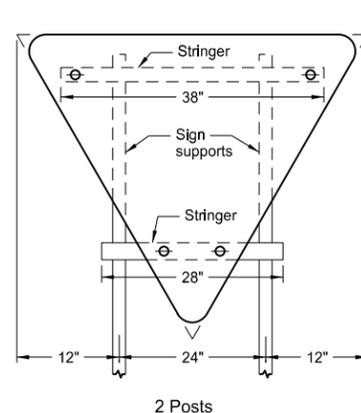


2 Posts

Assembly No. 4

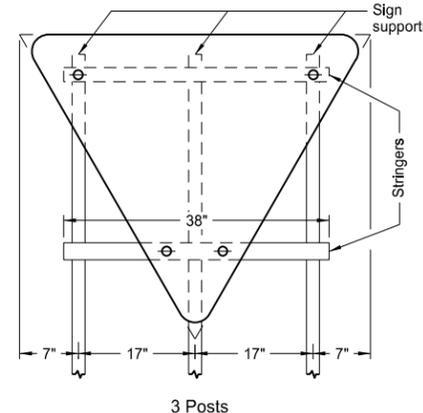


1 Post



2 Posts

Assembly No. 5

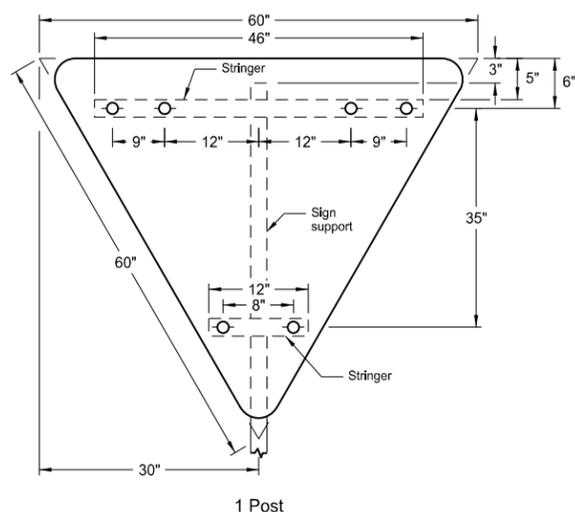


3 Posts

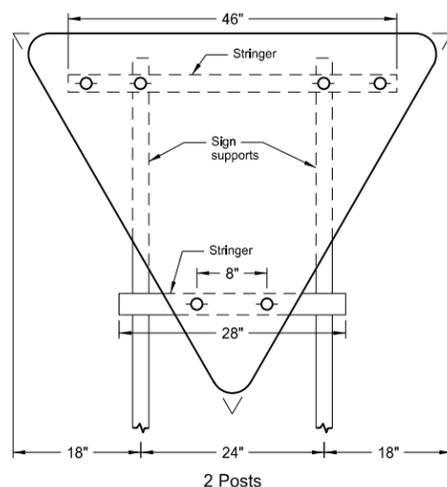
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE

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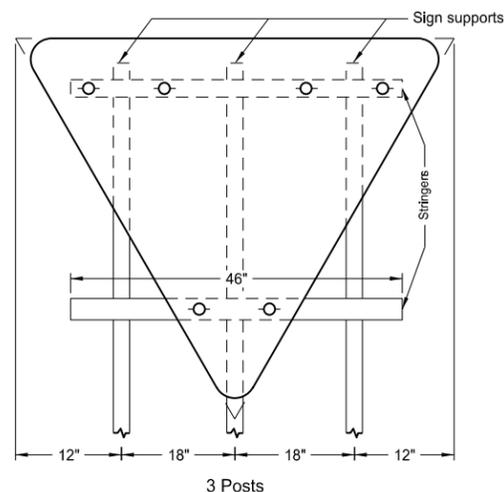
SIGN PUNCHING, STRINGER AND SUPPORT LOCATION
DETAILS REGULATORY, WARNING AND GUIDE SIGNS



1 Post



2 Posts

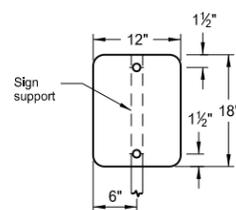


3 Posts

Assembly No. 6

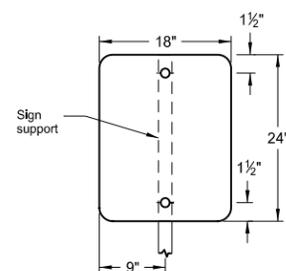
Notes:

1. See Standard D-754-25 for mounting details.
2. The minimum sign backing material thickness shall be 0.100 inch.
3. Perforated square tube stringer shall be 1½" x 1½".
4. All holes shall be punched round for ⅜" bolt.



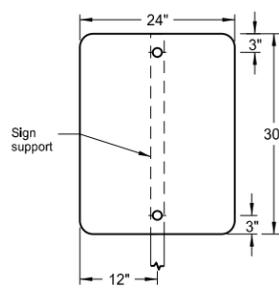
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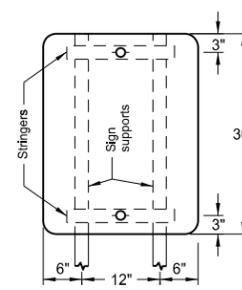
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Assembly No. 8

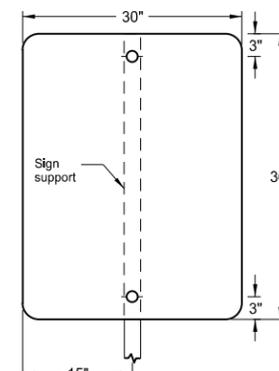


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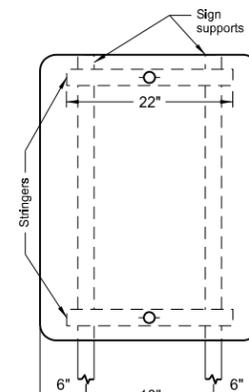
Assembly No. 9



2 Posts

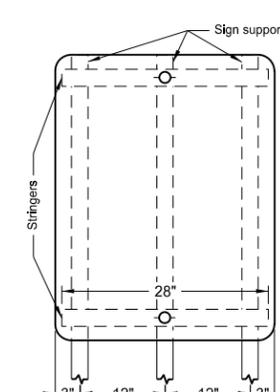


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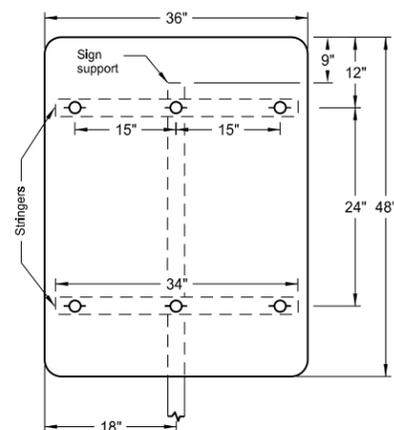


2 Posts

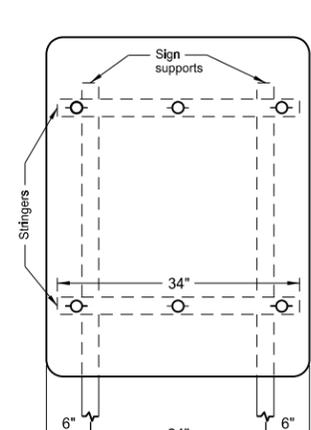
Assembly No. 10



3 Posts

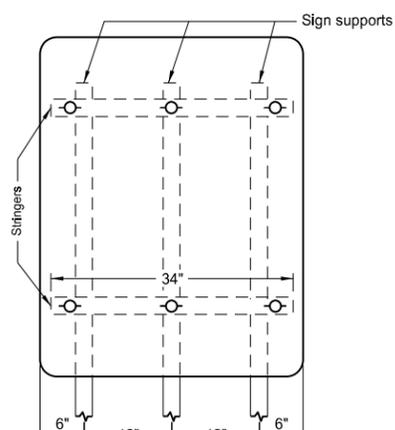


1 Post



2 Posts

Assembly No. 11



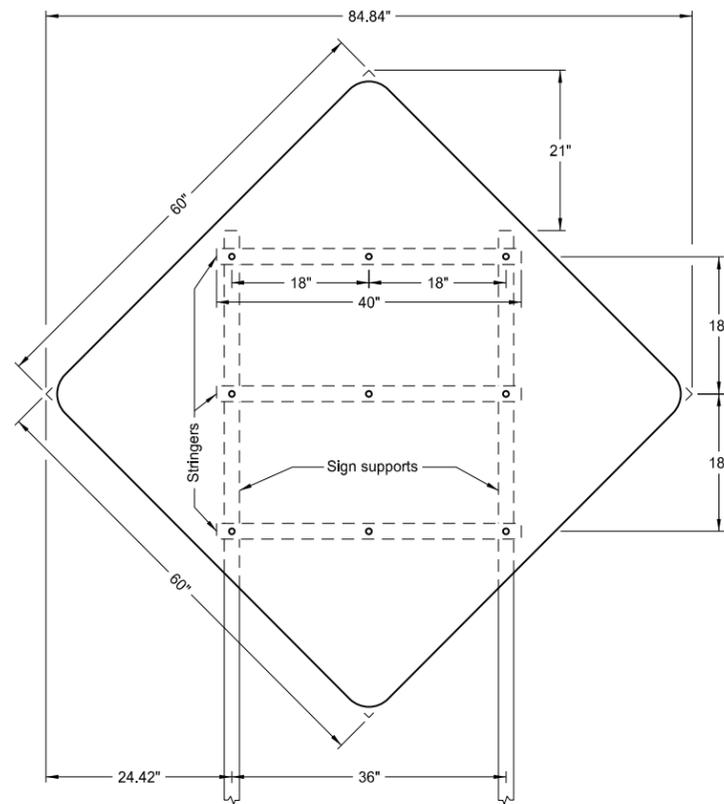
3 Posts

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE

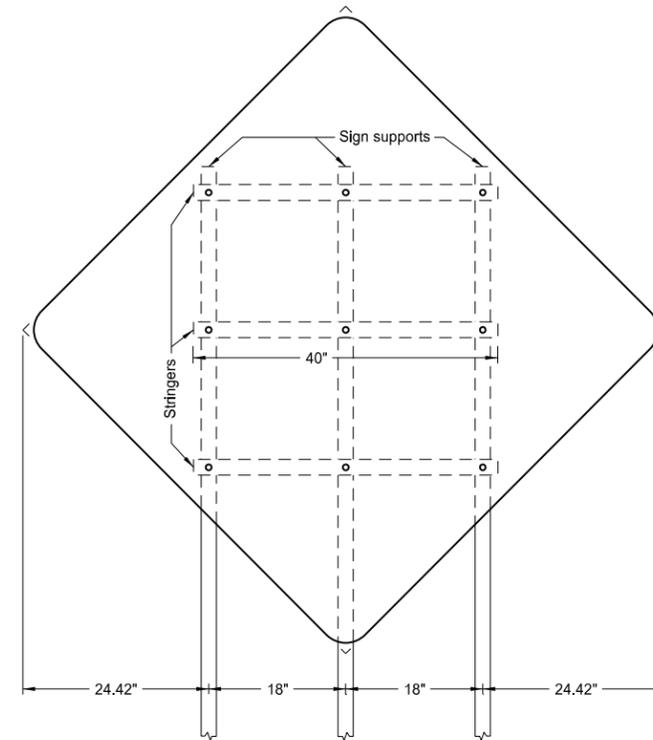
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**SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS
REGULATORY, WARNING AND GUIDE SIGNS**

D-754-40



2 Posts

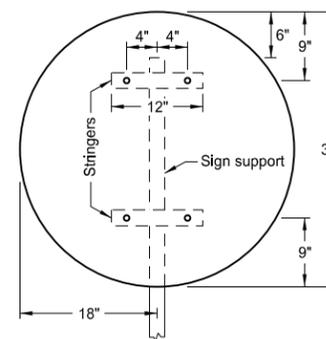


3 Posts

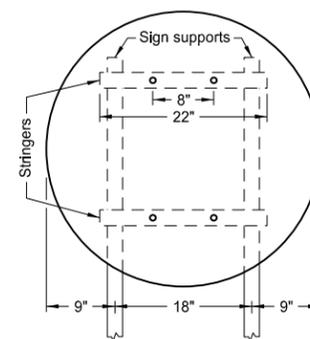
ASSEMBLY NO. 62

Notes:

1. The minimum sign backing material thickness shall be 0.100 inch.
2. Perforated square tube stringer shall be 1½"x1½".
3. All holes shall be punched round for ⅜" bolt.



1 Post



2 Posts

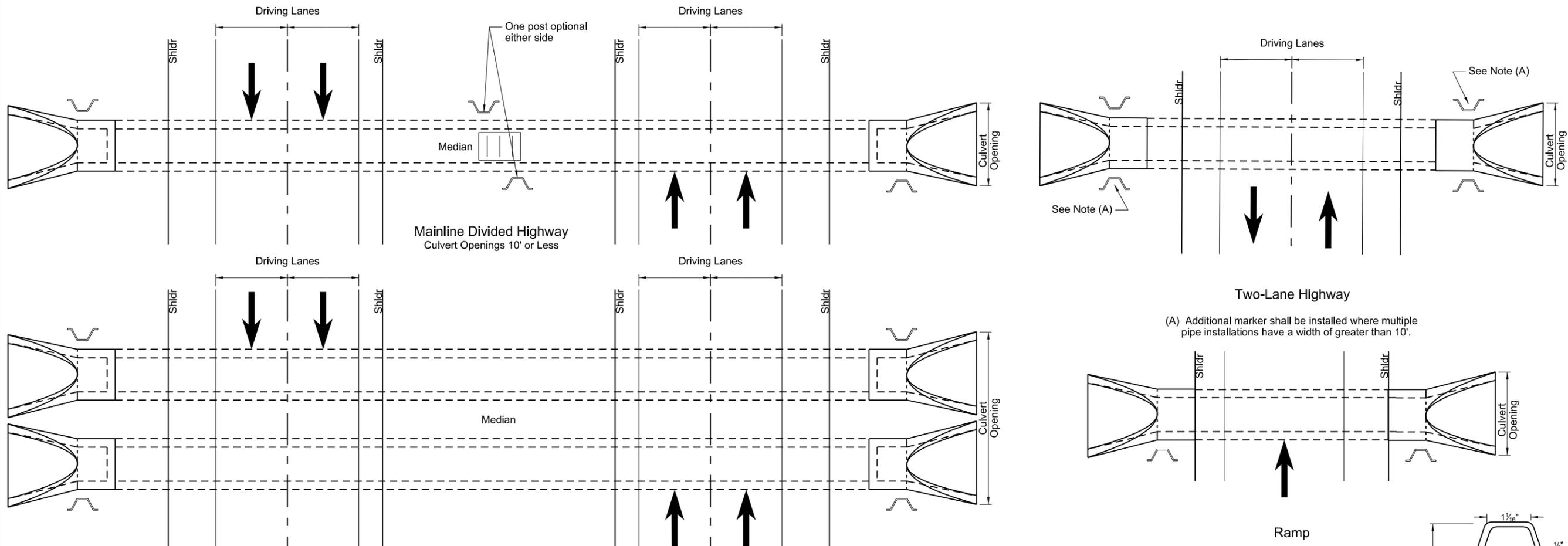
ASSEMBLY NO. 63

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-22-12	
REVISIONS	
DATE	CHANGE

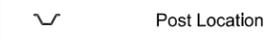
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OBJECT MARKERS - CULVERTS

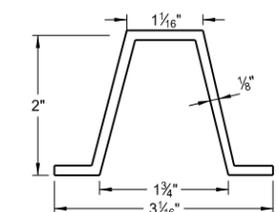
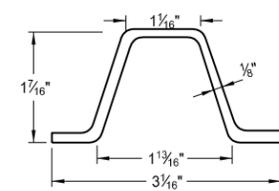
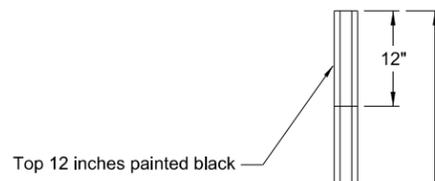
D-754-83



(A) Additional marker shall be installed where multiple pipe installations have a width of greater than 10'.

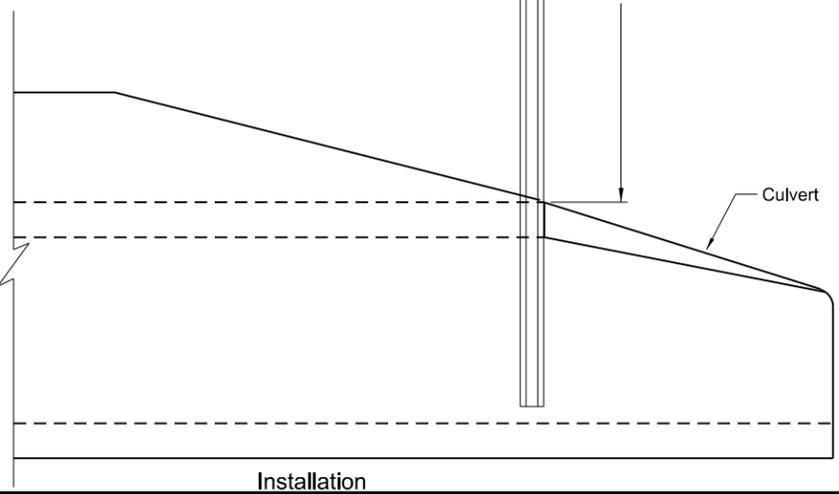


Mainline Divided Highway Culvert Openings Greater than 10' Multiple Installations



Notes:

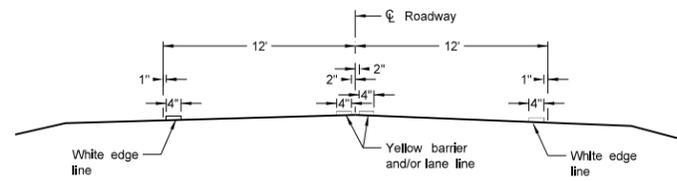
- Installation:** Construction requirements shall meet 754.03E.2. Each end of culverts crossing the roadway within the right-of-way shall be marked with a post as shown. Posts are to be installed in front of the culvert in the direction of travel along the side of the culvert and one foot from the culvert opening unless shown otherwise on the plans.
- Posts:** Posts shall conform to section 894.06A of the Standard Specifications with the exception that the post may or may not have holes drilled.
- Basis of Payment:** The quantity will be measured by the number of object markers each installed. All costs for furnishing and installing the markers shall be included in the price bid for the item "Object Markers - Culverts".



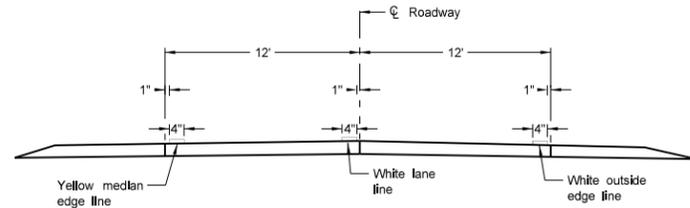
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-05-13	
REVISIONS	
DATE	CHANGE

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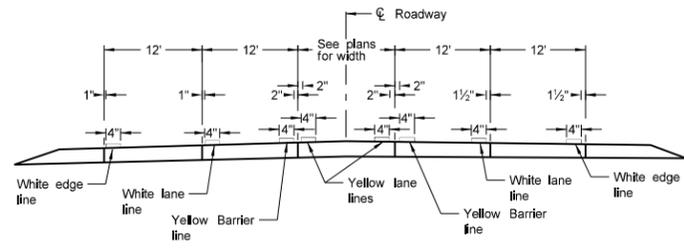
PAVEMENT MARKING



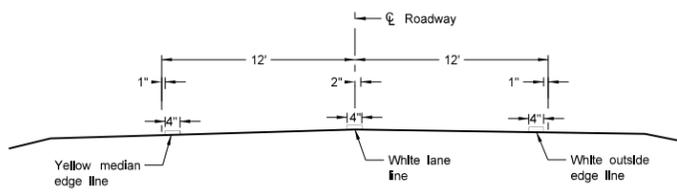
Two Lane Two Way
RURAL ROADWAY



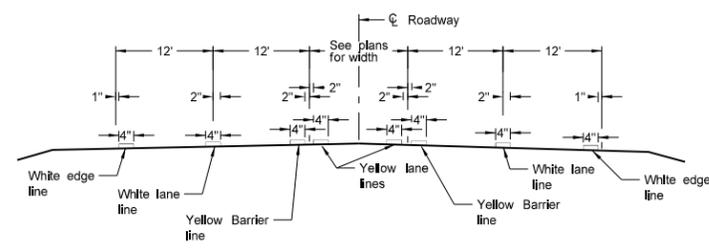
Two Lane Roadway
INTERSTATE HIGHWAY
Concrete Section



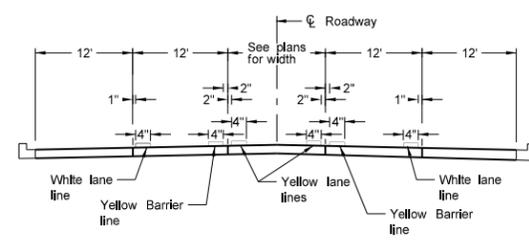
RURAL FIVE LANE ROADWAY
Concrete Section



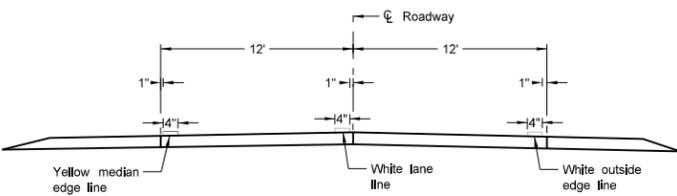
Two Lane Divided
Rural Roadway
PRIMARY HIGHWAY
Asphalt Section



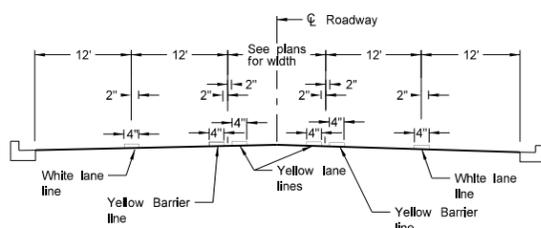
RURAL FIVE LANE ROADWAY
Asphalt Section



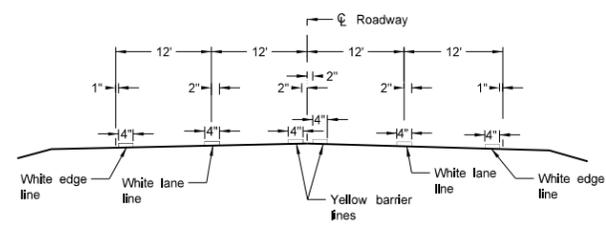
URBAN FIVE LANE SECTION
Concrete Section



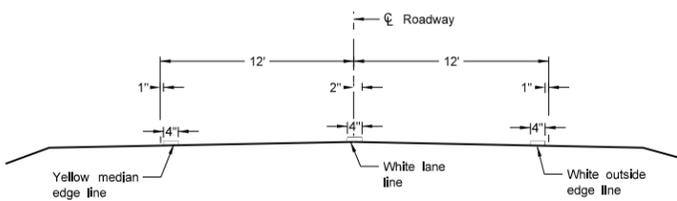
Two Lane Roadway
PRIMARY HIGHWAY
Concrete Section



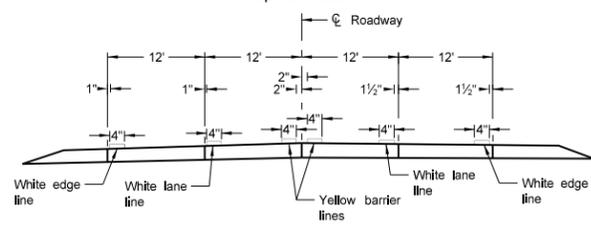
URBAN FIVE LANE SECTION
Asphalt Section



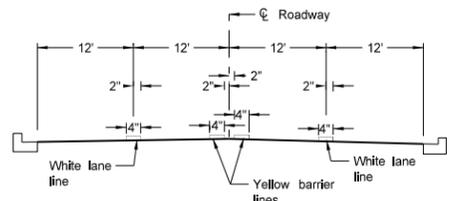
RURAL FOUR LANE ROADWAY
Asphalt Section



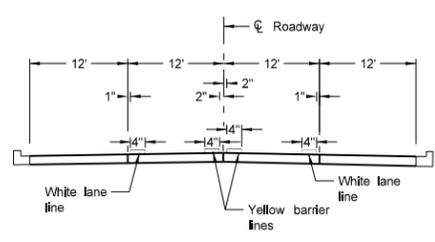
Two Lane Roadway
INTERSTATE HIGHWAY
Asphalt Section



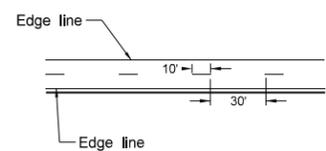
RURAL FOUR LANE ROADWAY
Concrete Section



URBAN FOUR LANE SECTION
Asphalt Section



URBAN FOUR LANE SECTION
Concrete Section



CENTERLINE PAVEMENT MARKING SKIP SPACING DETAIL

NOTES:
1. Edge lines shall be continued through private drives and field drives and broken for intersections.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
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DATE	CHANGE

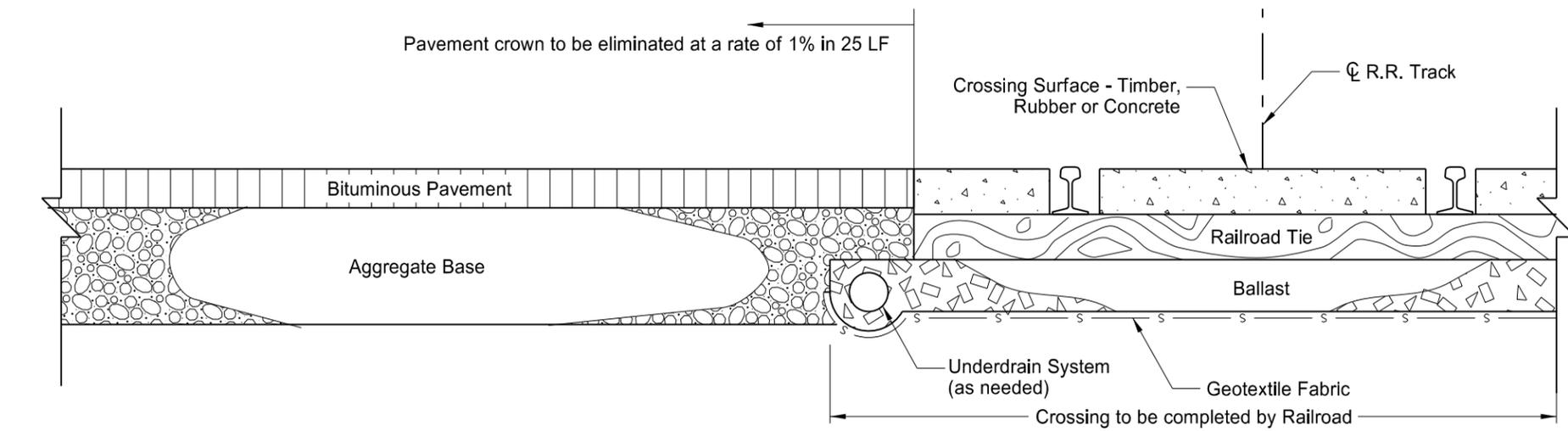
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Pavement Details at Railroad Crossing

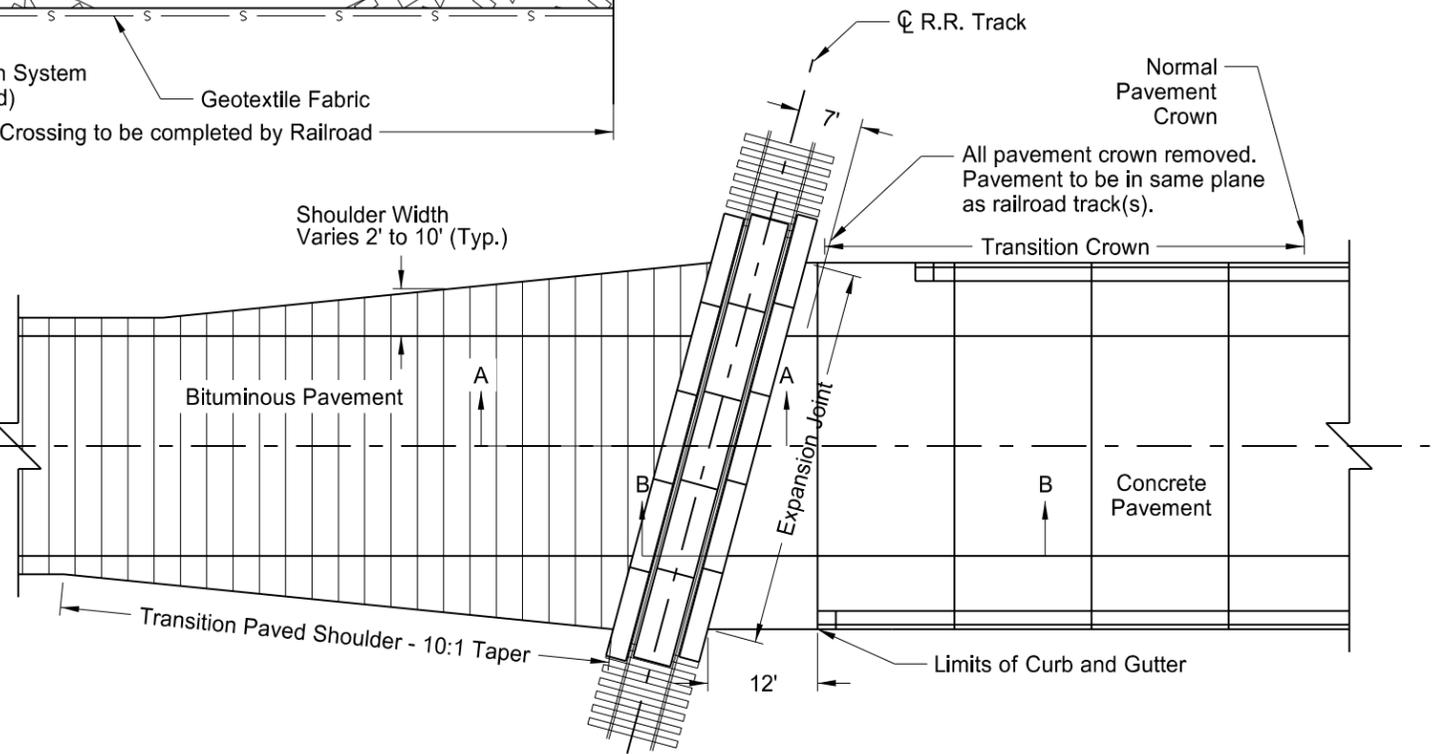
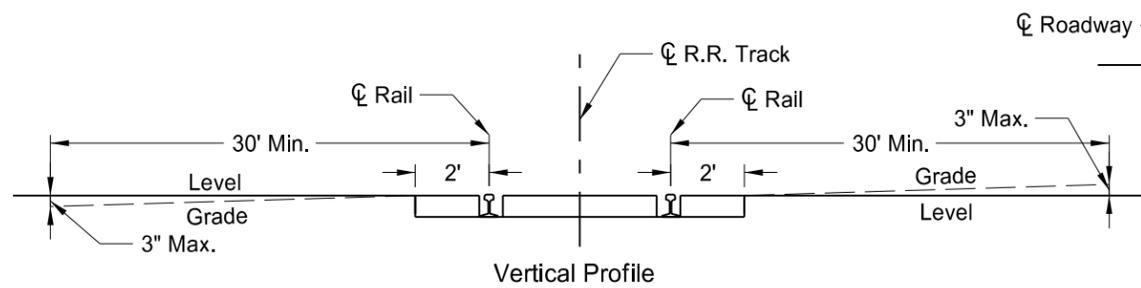
D-900-2

Notes:

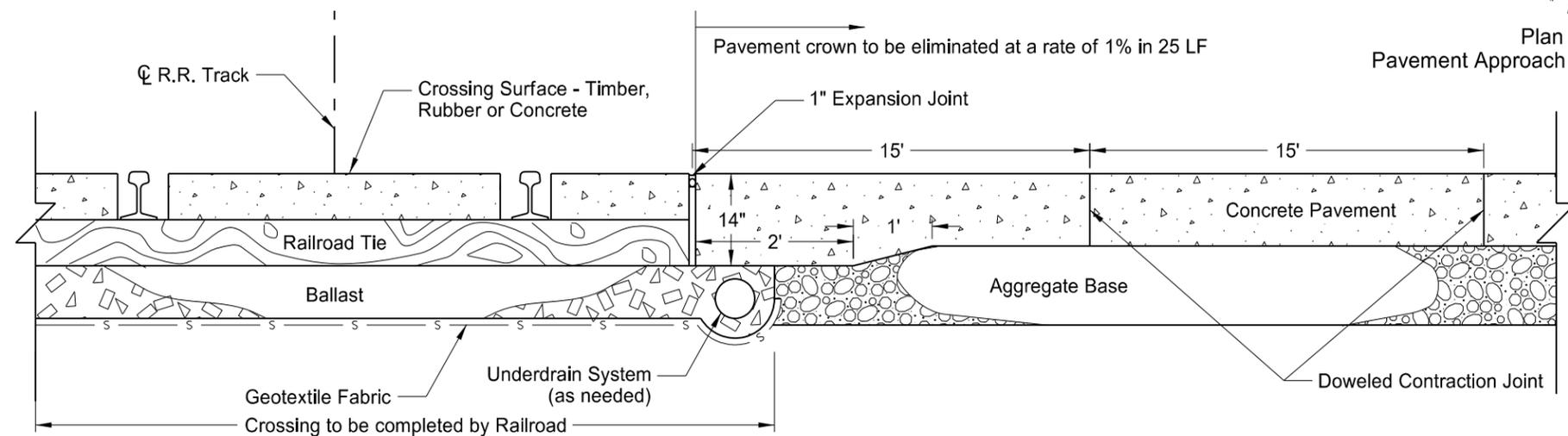
1. See typical section on plans for thickness of aggregate base, pavements and finished shoulder widths.
2. Basis of Estimate: The preformed expansion joint and additional concrete slab thickness shall be included in the price bid for concrete pavement pay items.



Section A - A
Bituminous Pavement Approach



Plan View
Pavement Approach at Railroad Crossing



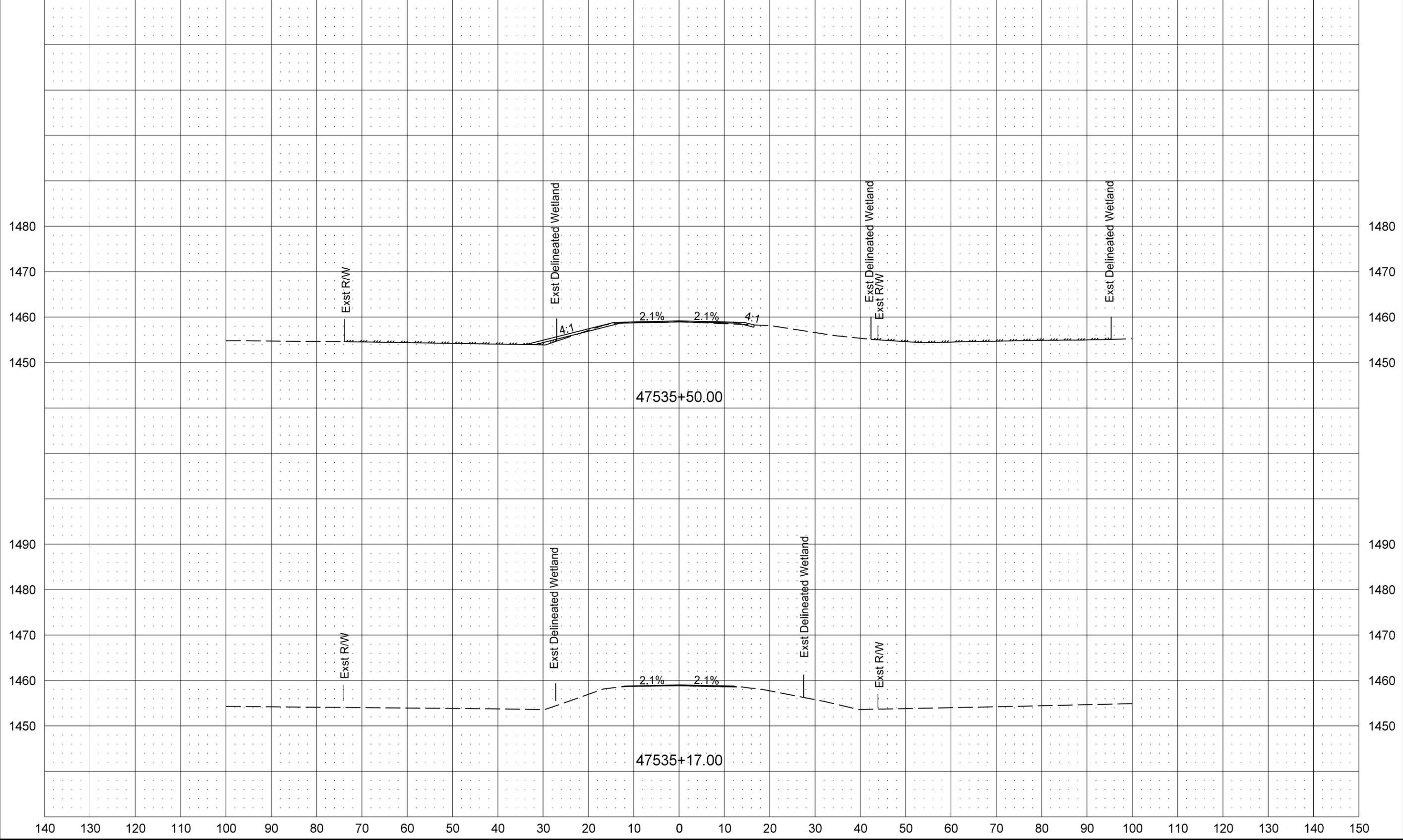
Section B - B
Concrete Pavement Approach and Joint Treatment

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-1-13	
REVISIONS	
DATE	CHANGE

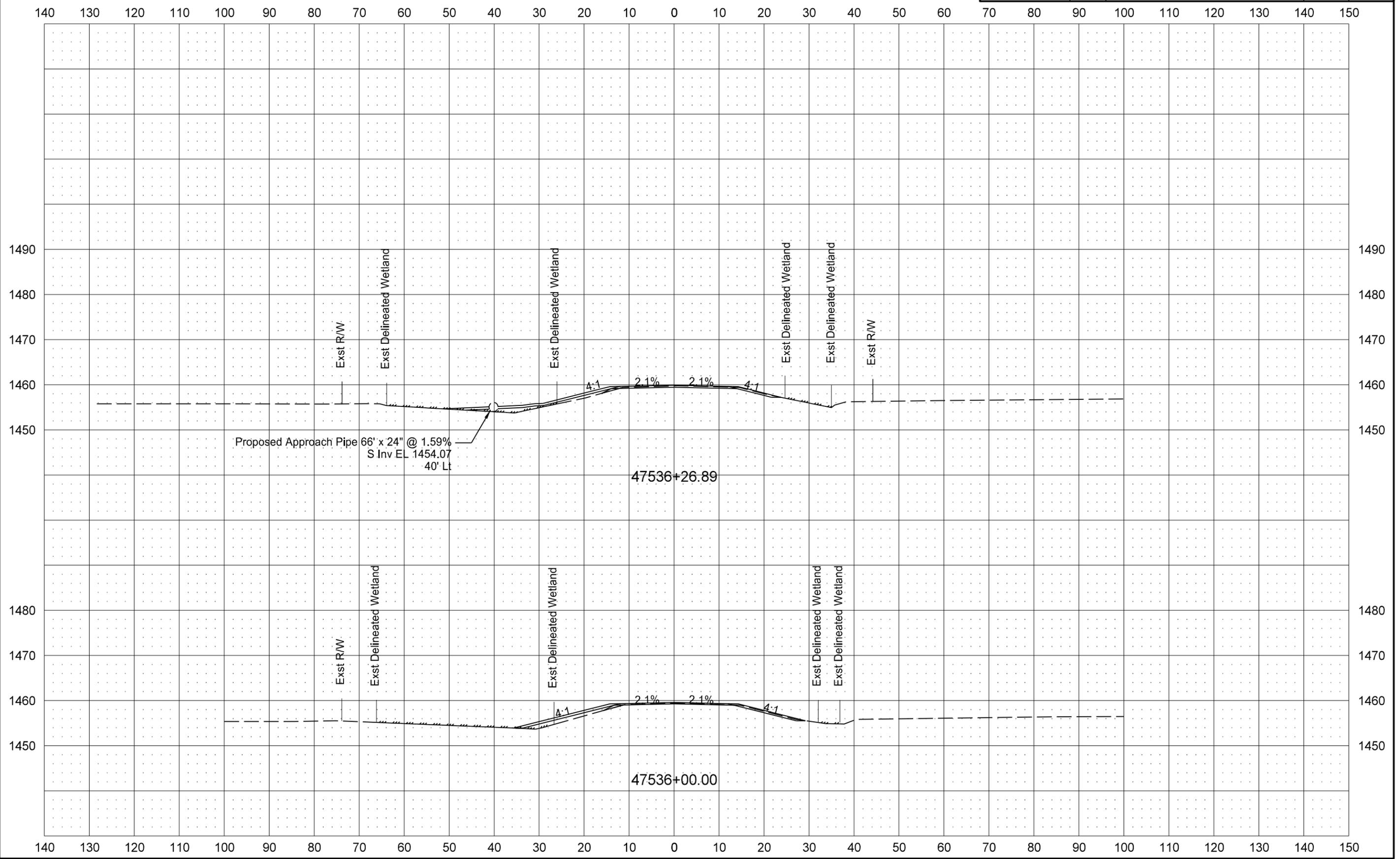
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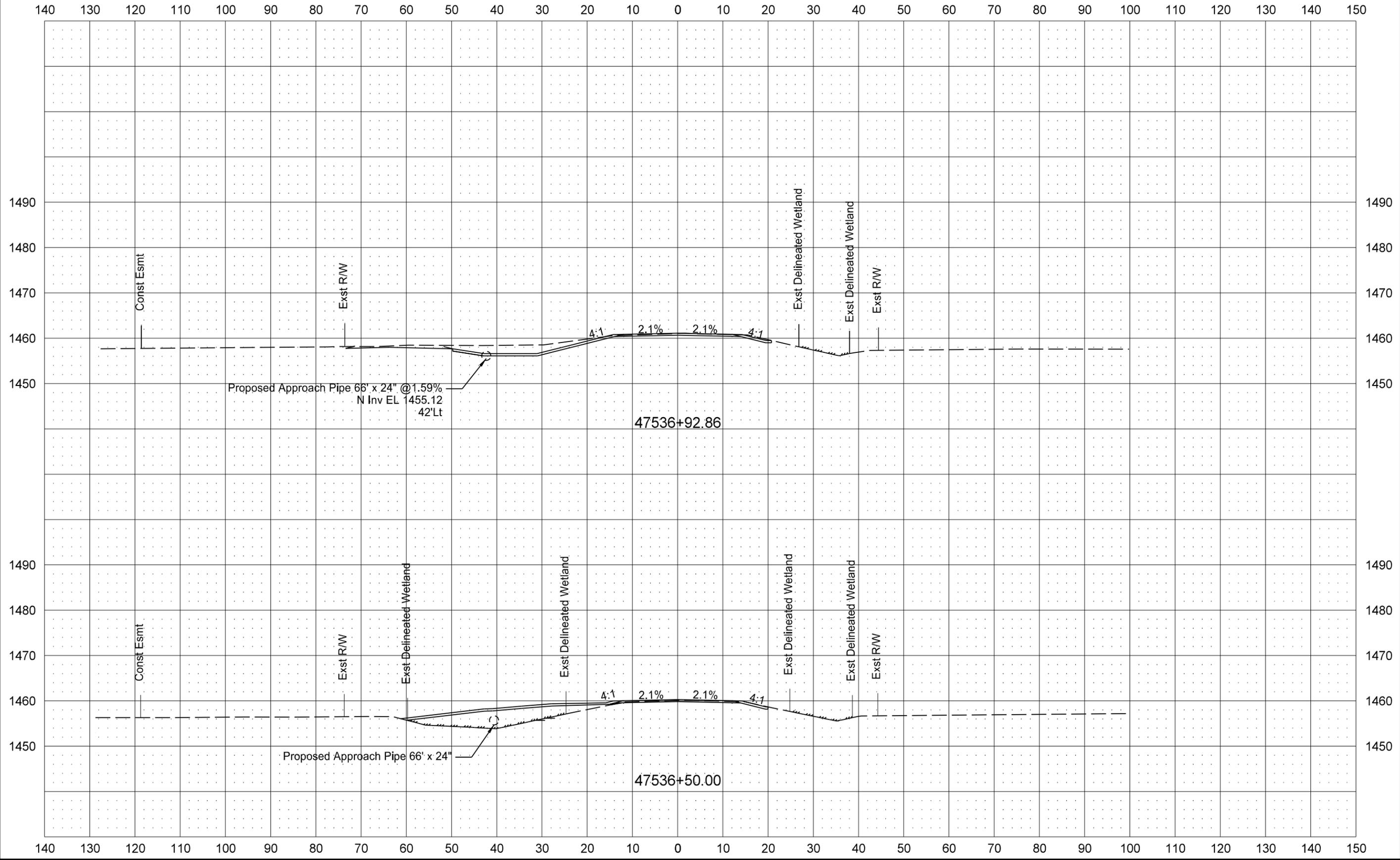
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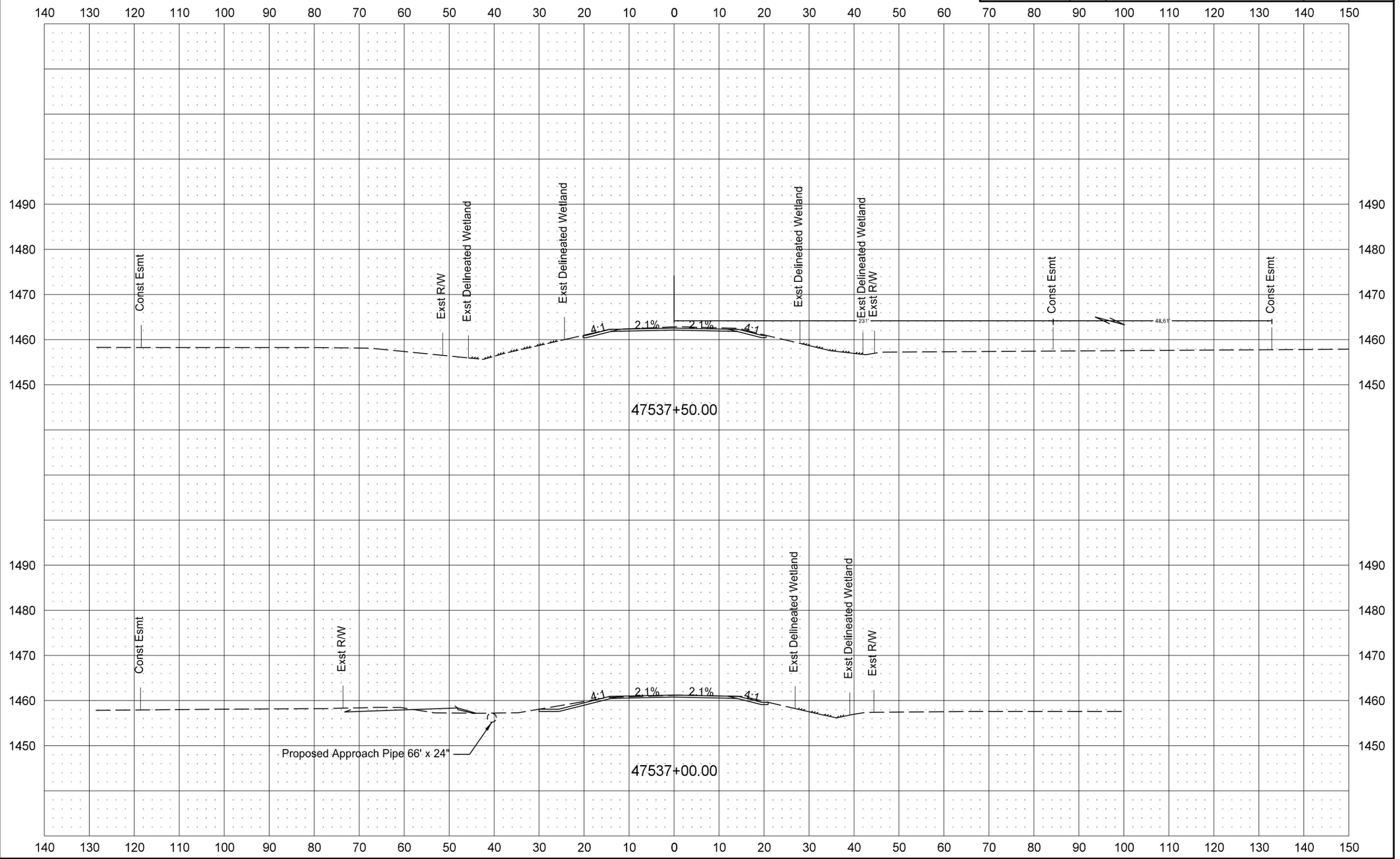


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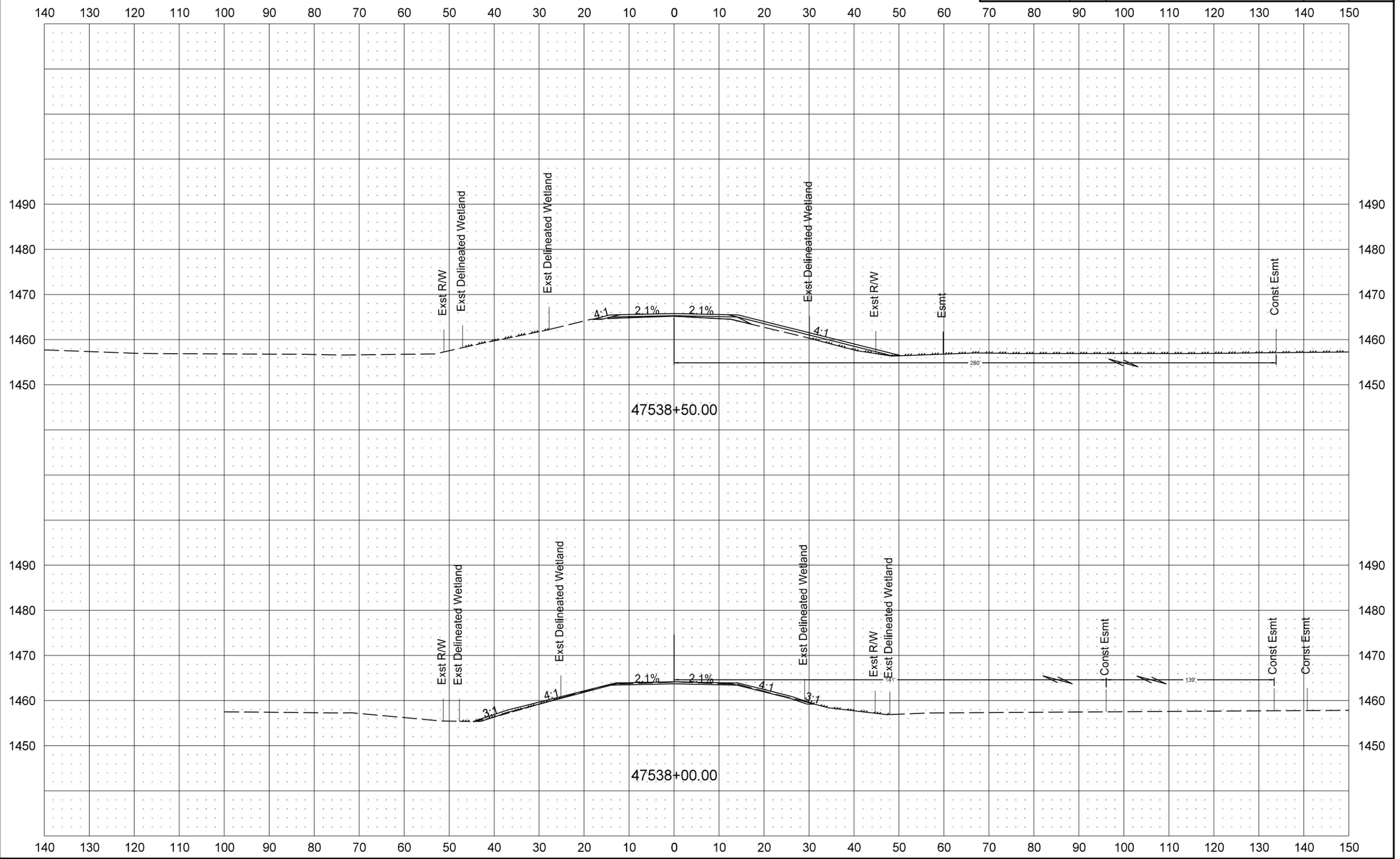




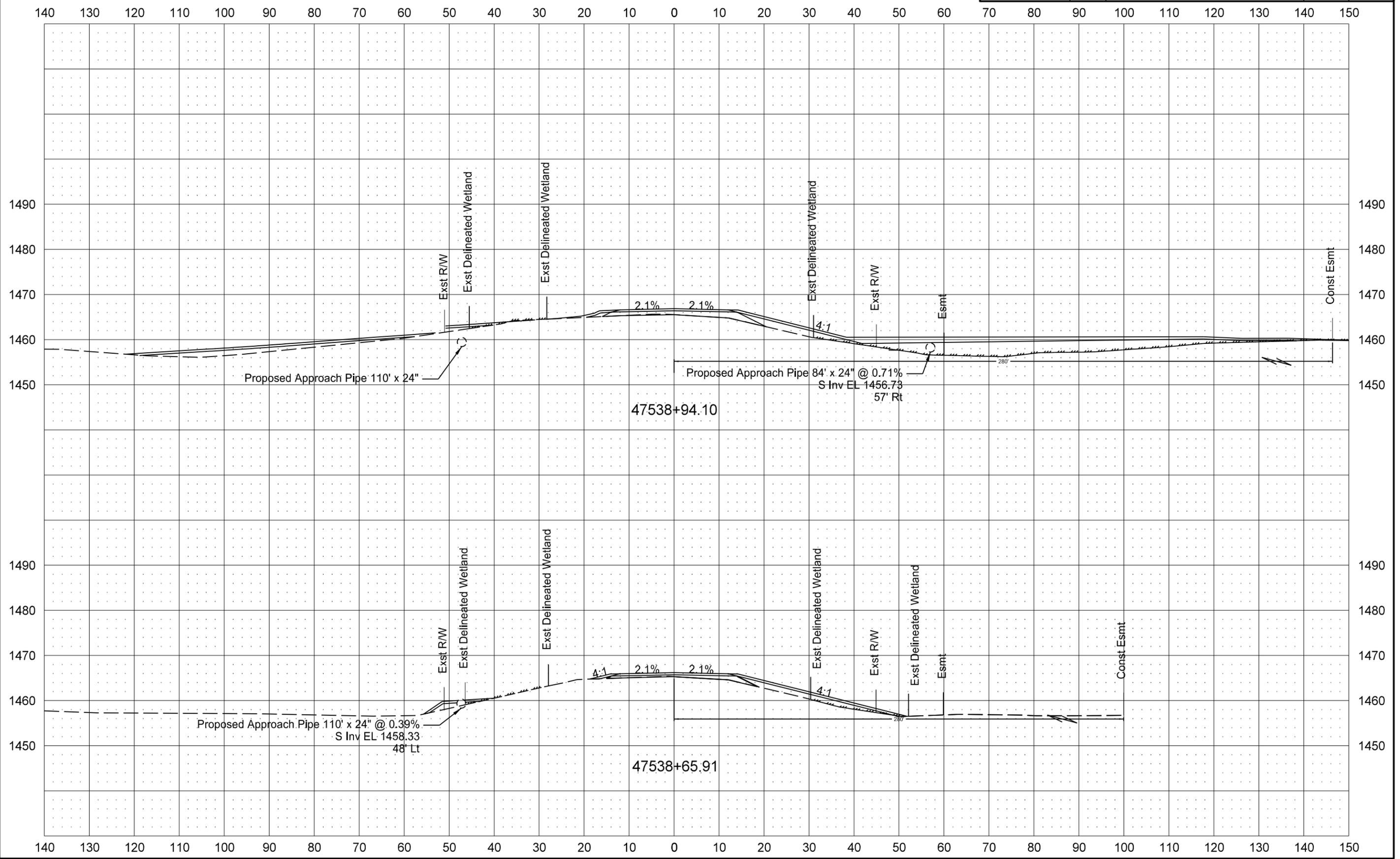
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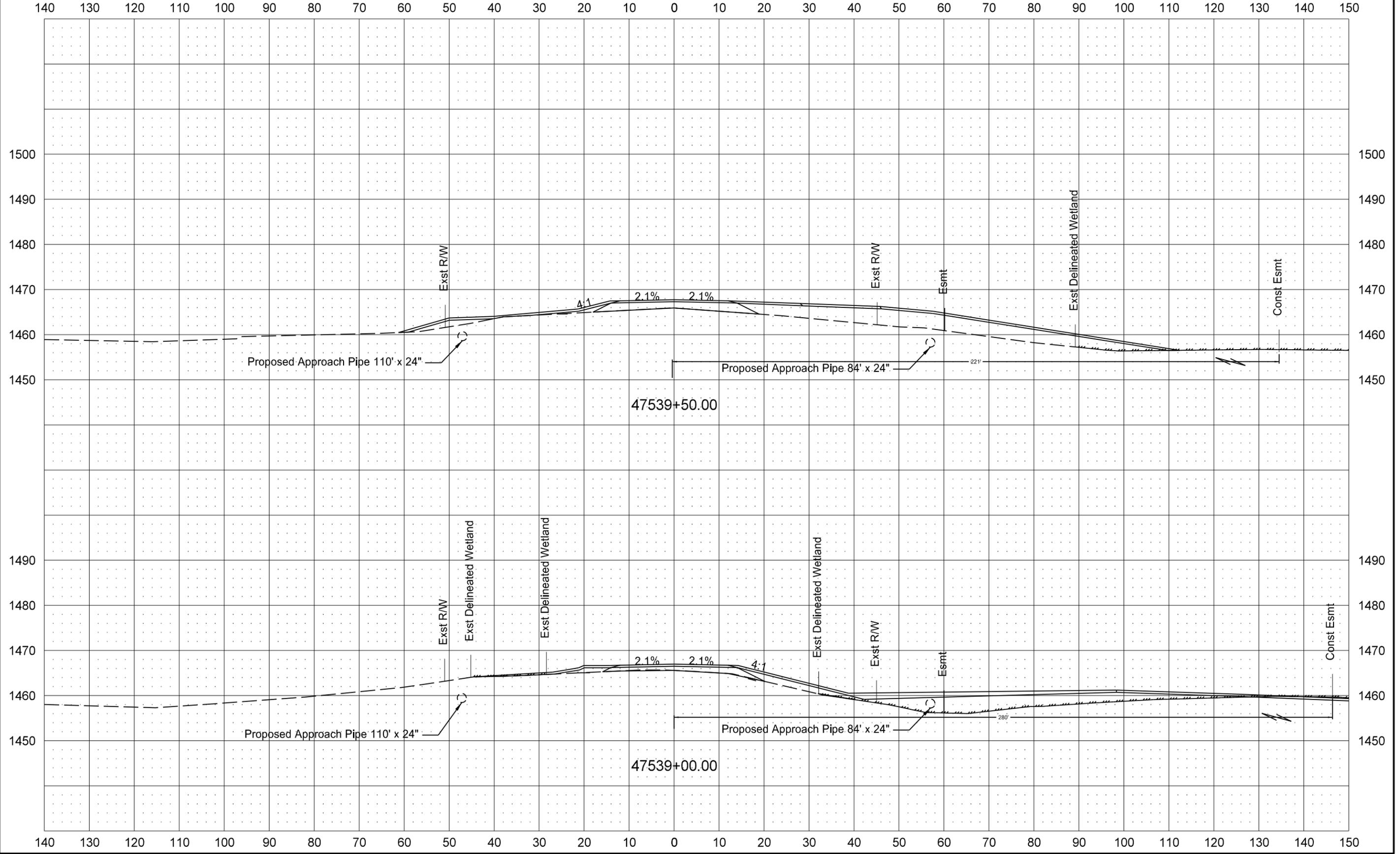
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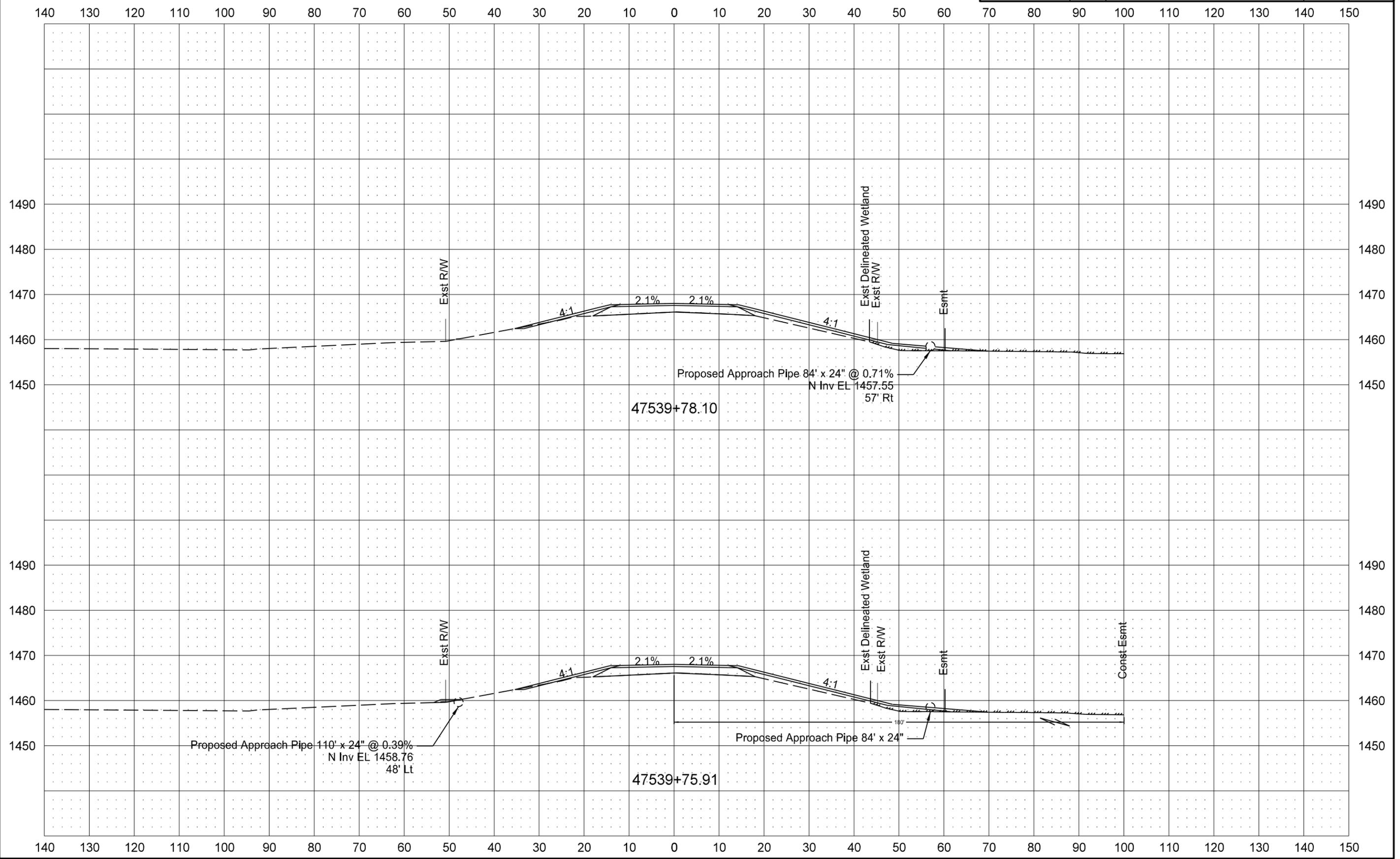
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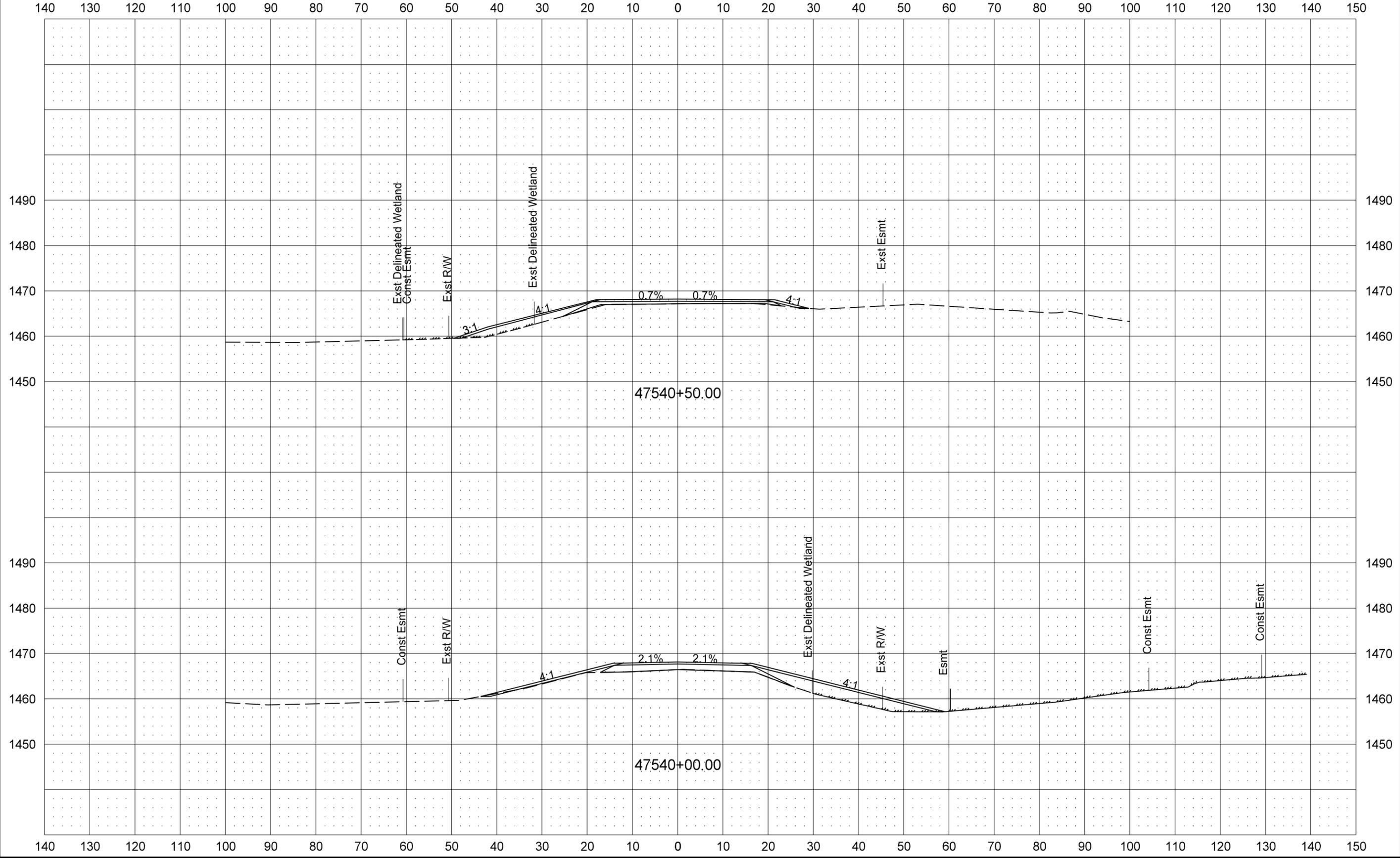
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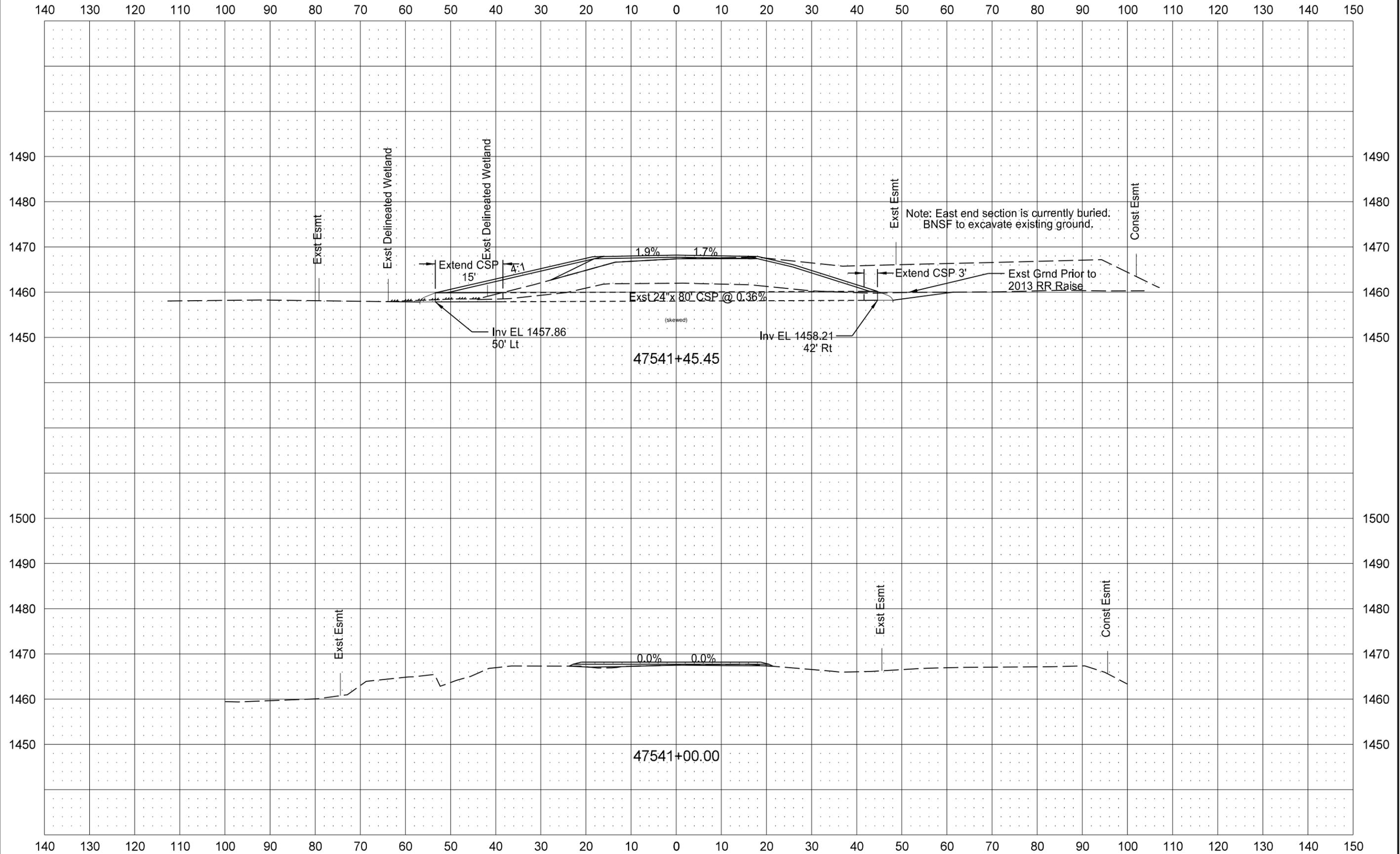
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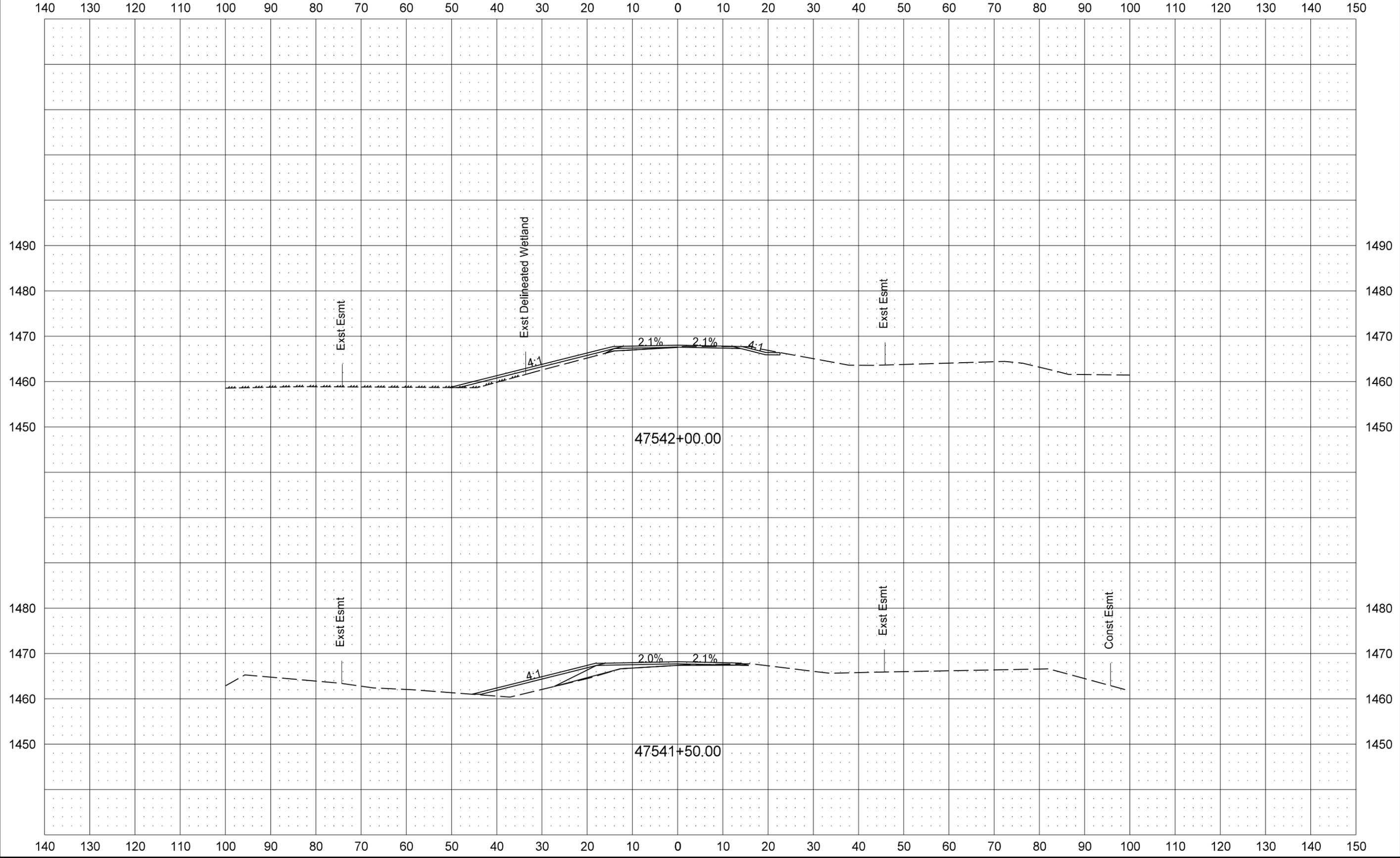


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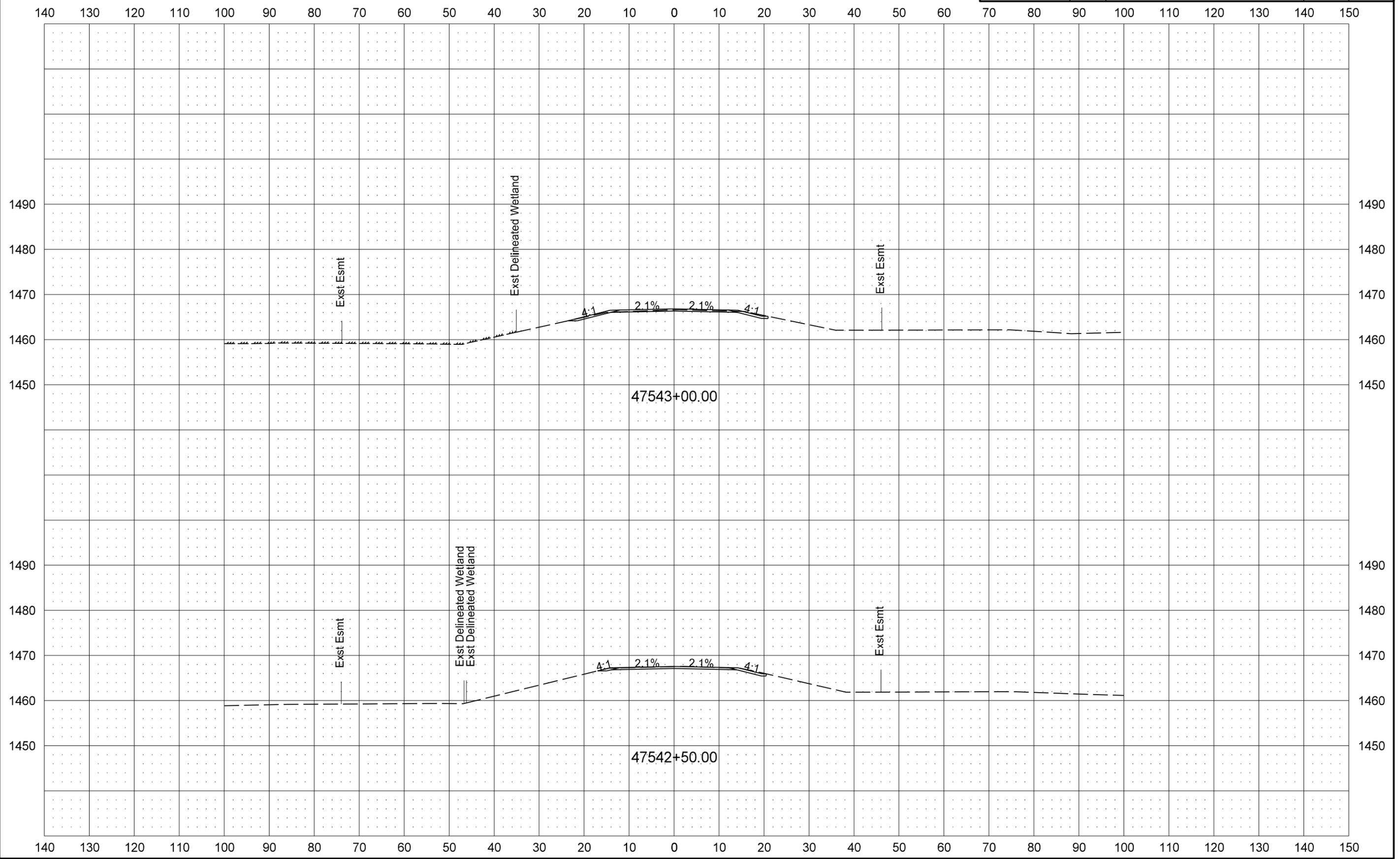


US HWY 281 Spur

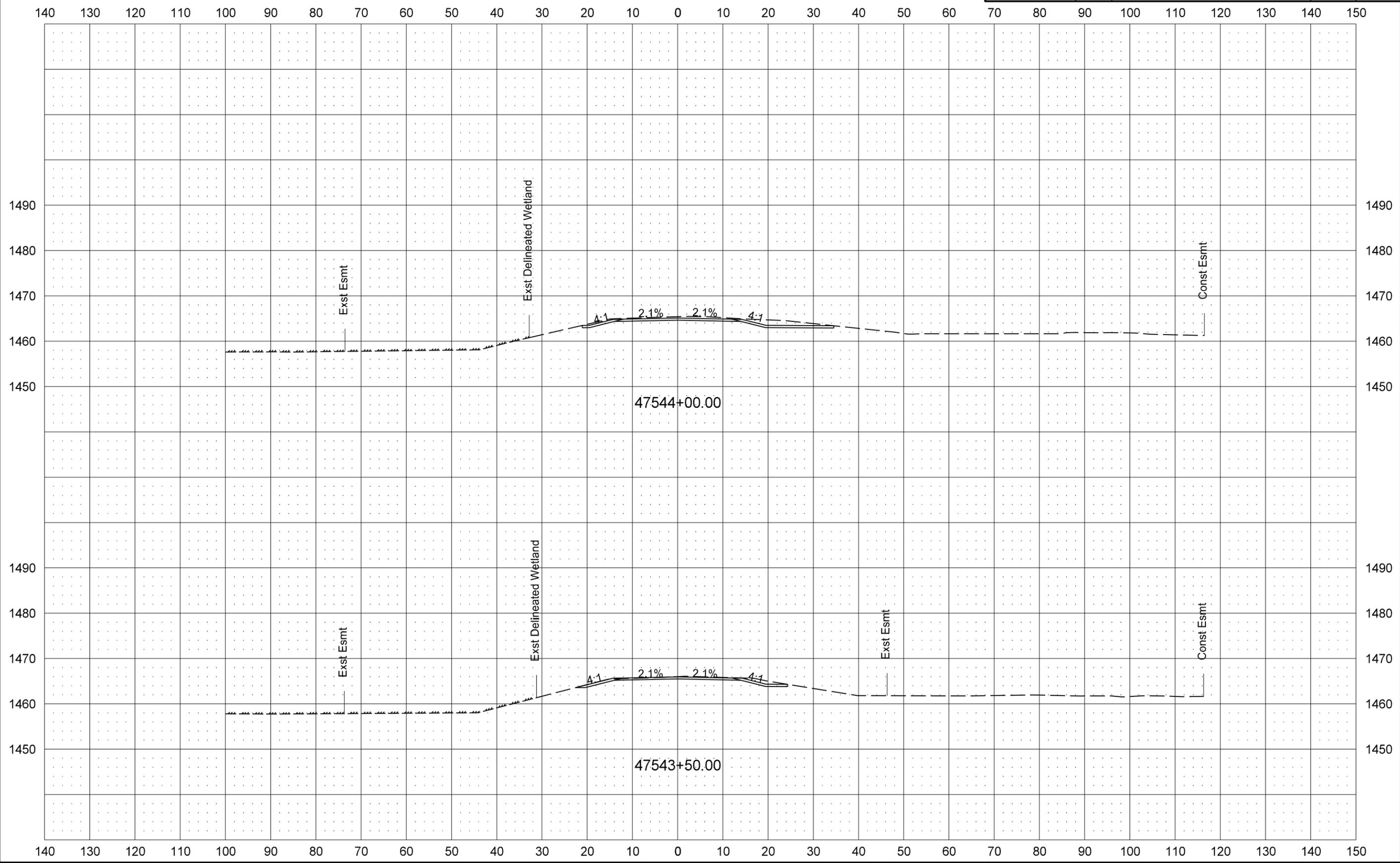
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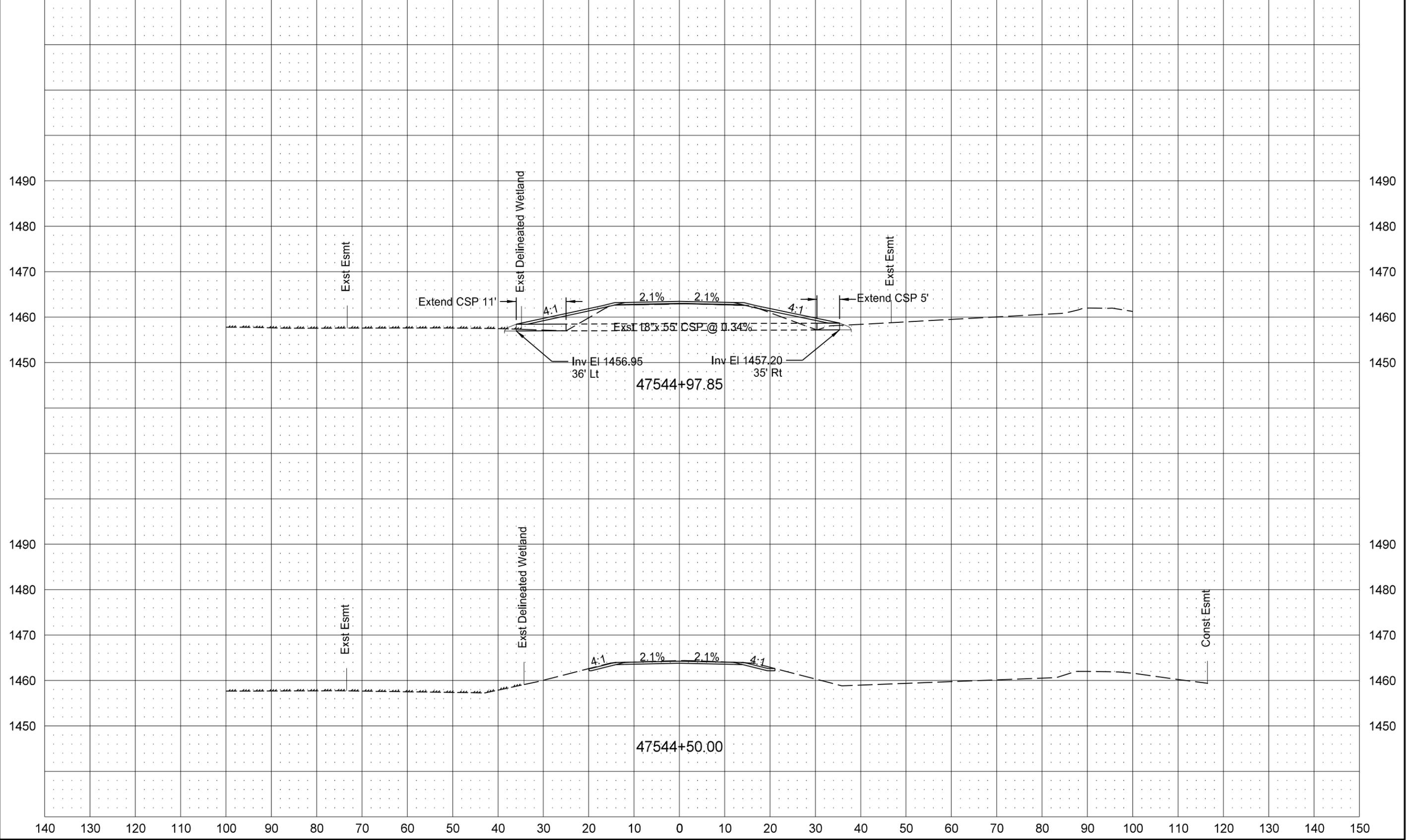


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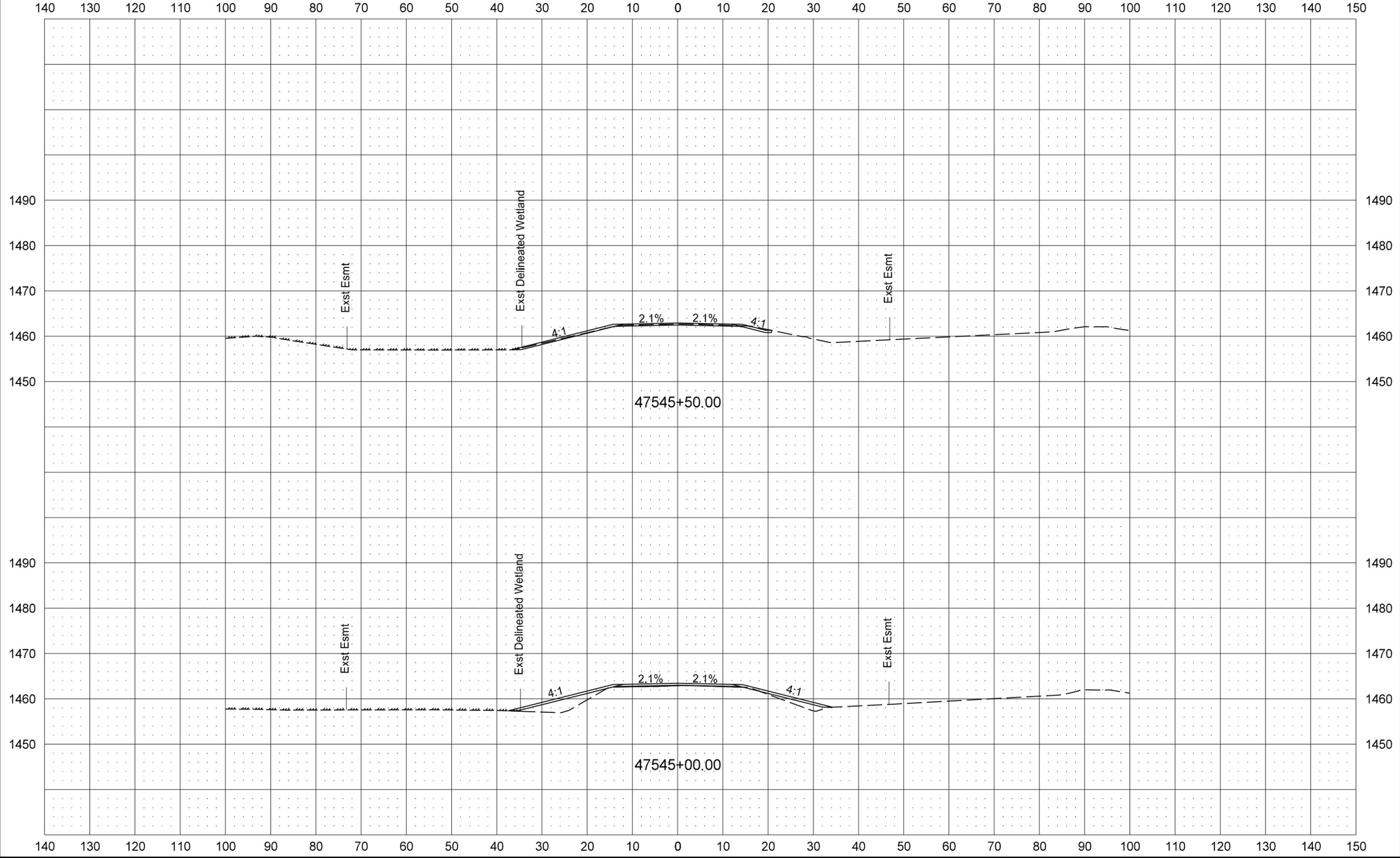
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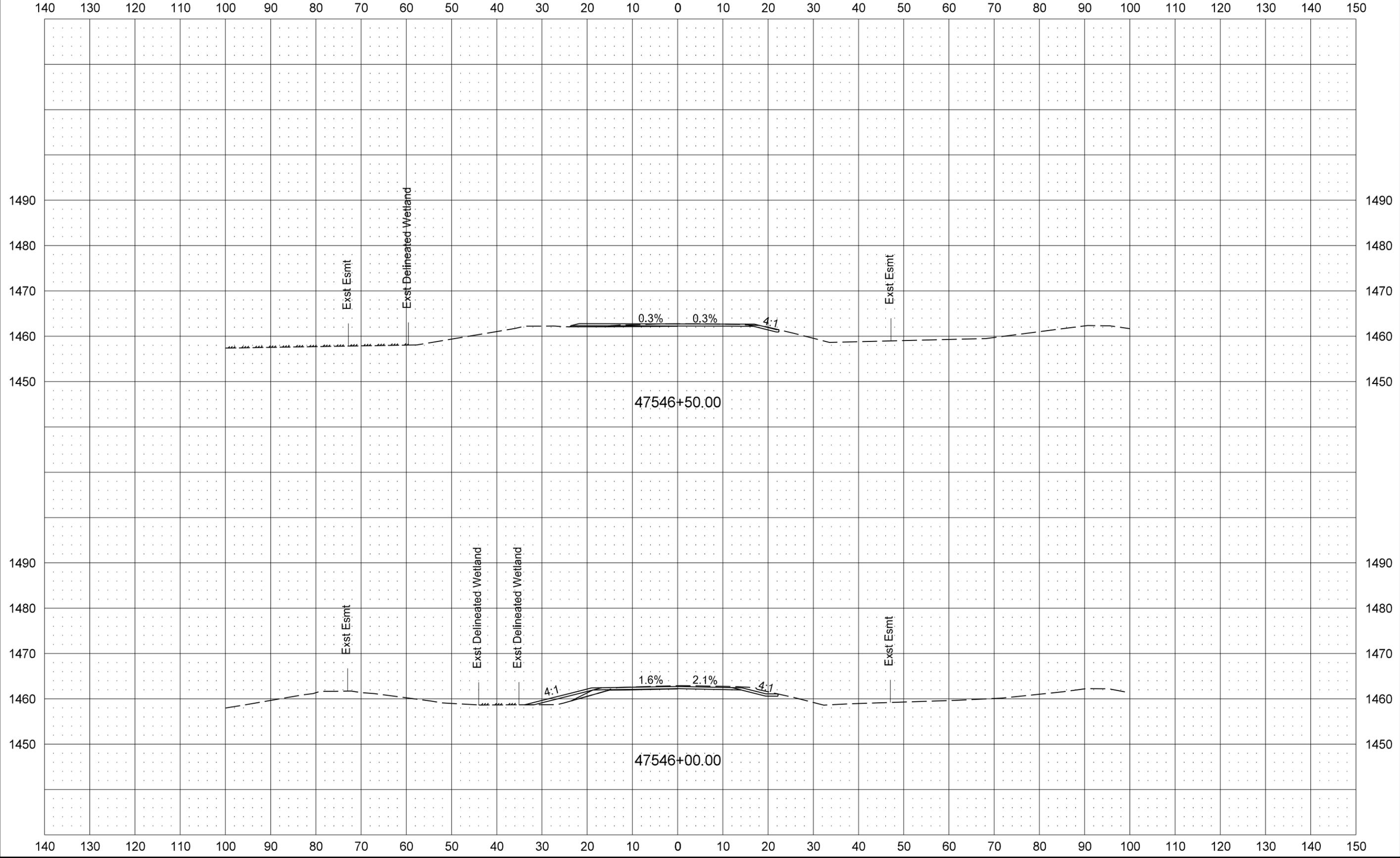
US HWY 281 Spur

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US HWY 281 Spur

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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US HWY 281 Spur

STATE

PROJECT NO.

SECTION NO.

SHEET NO.

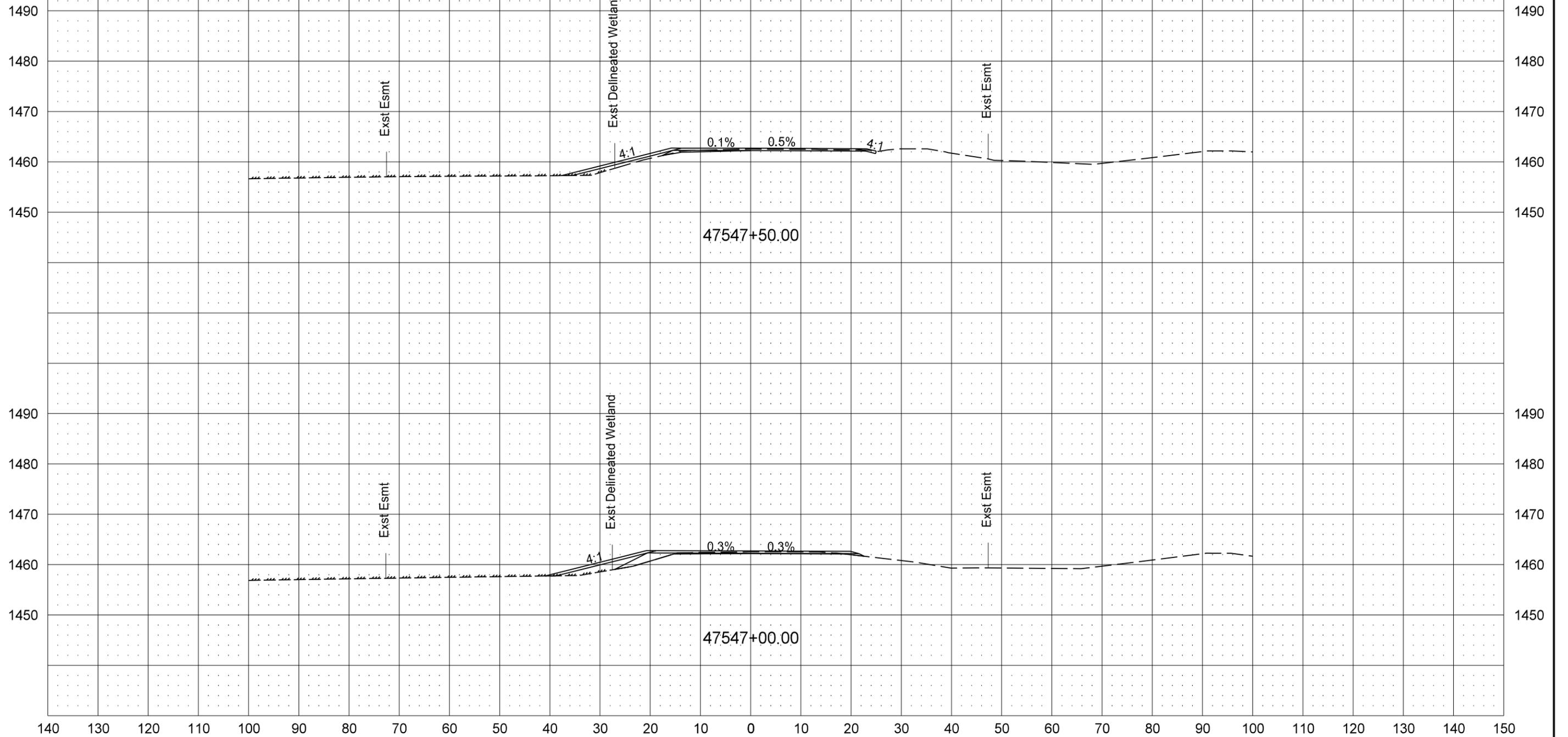
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SS-3-281(104)900

200

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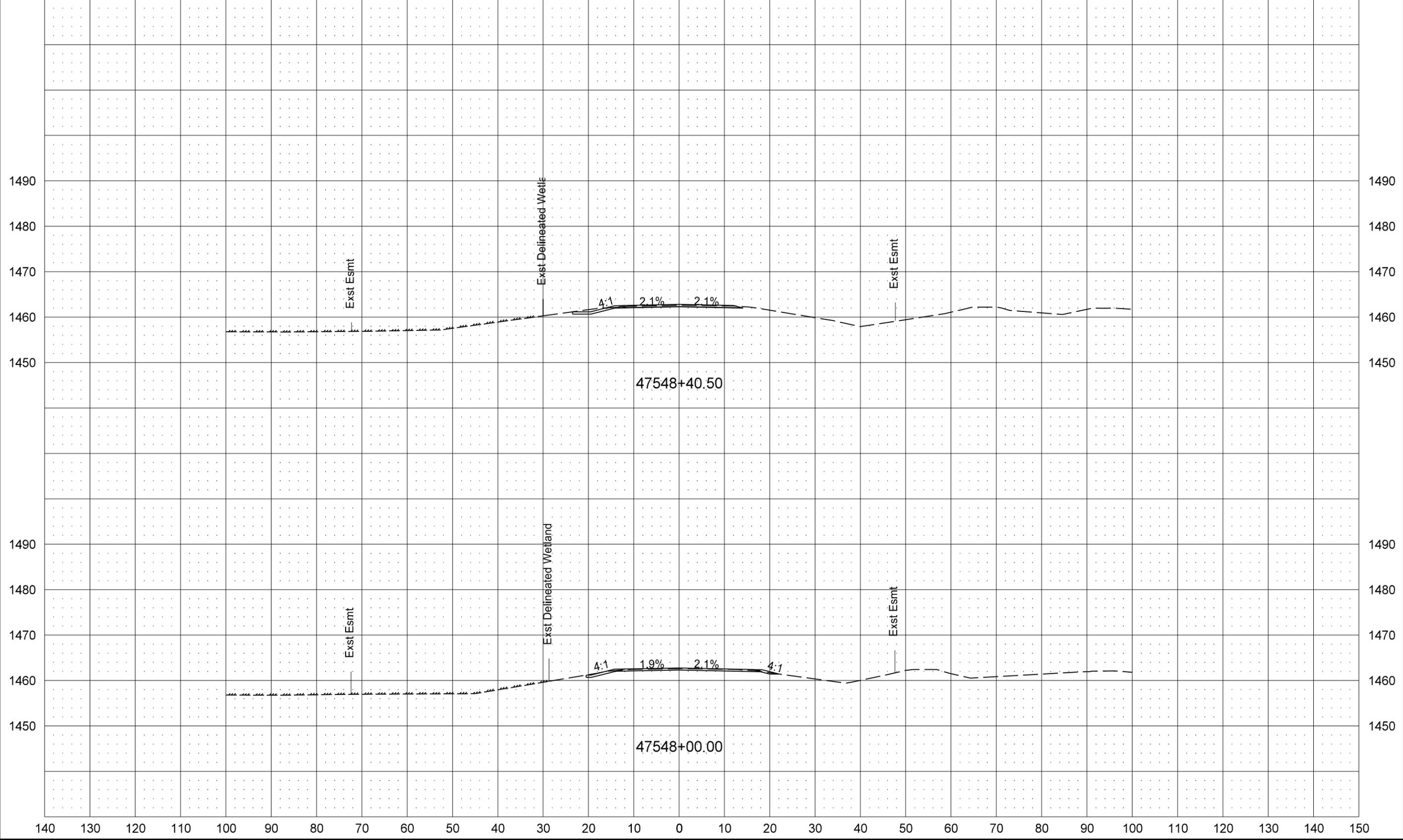
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US HWY 281 Spur

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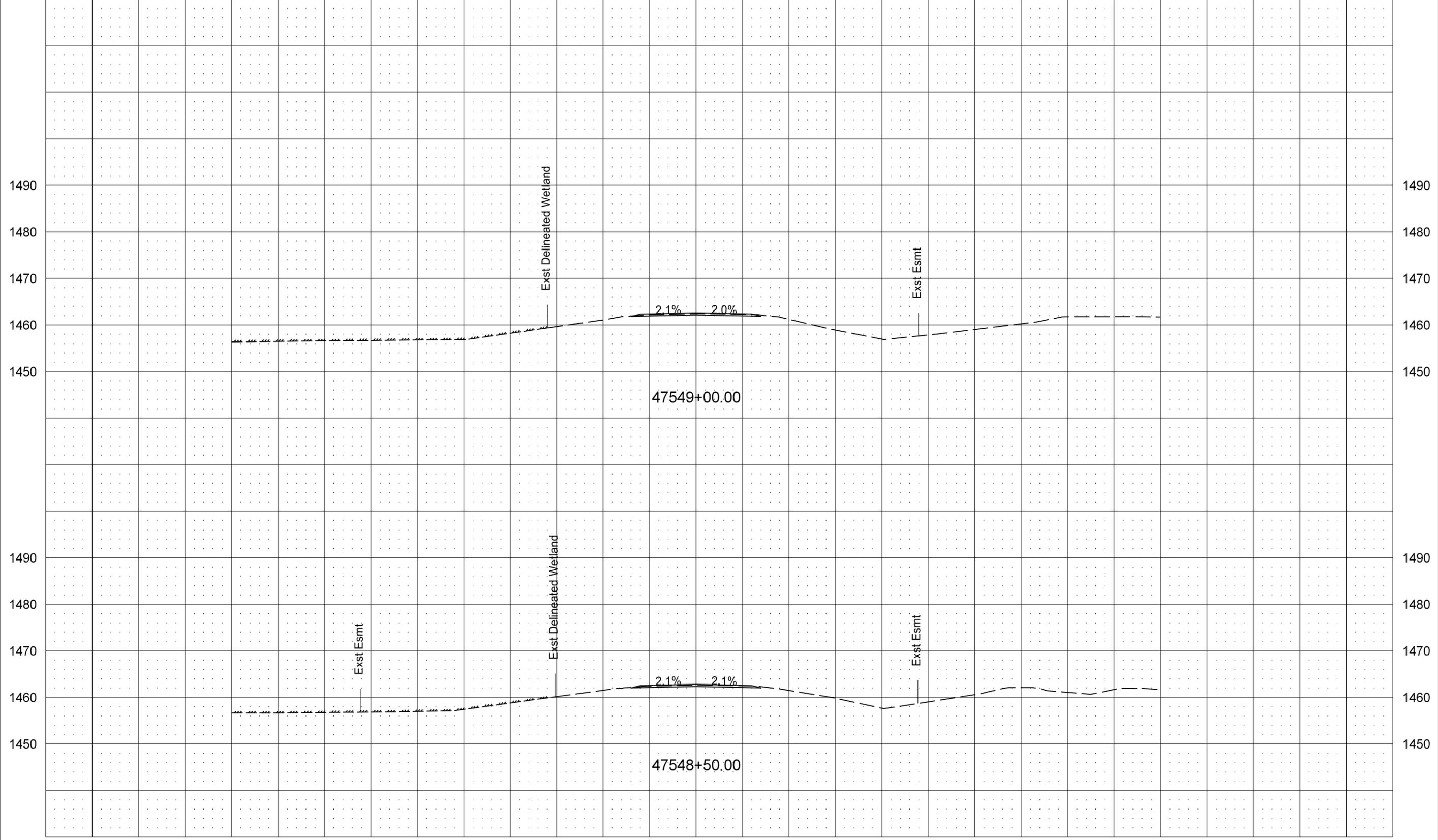
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US HWY 281 Spur

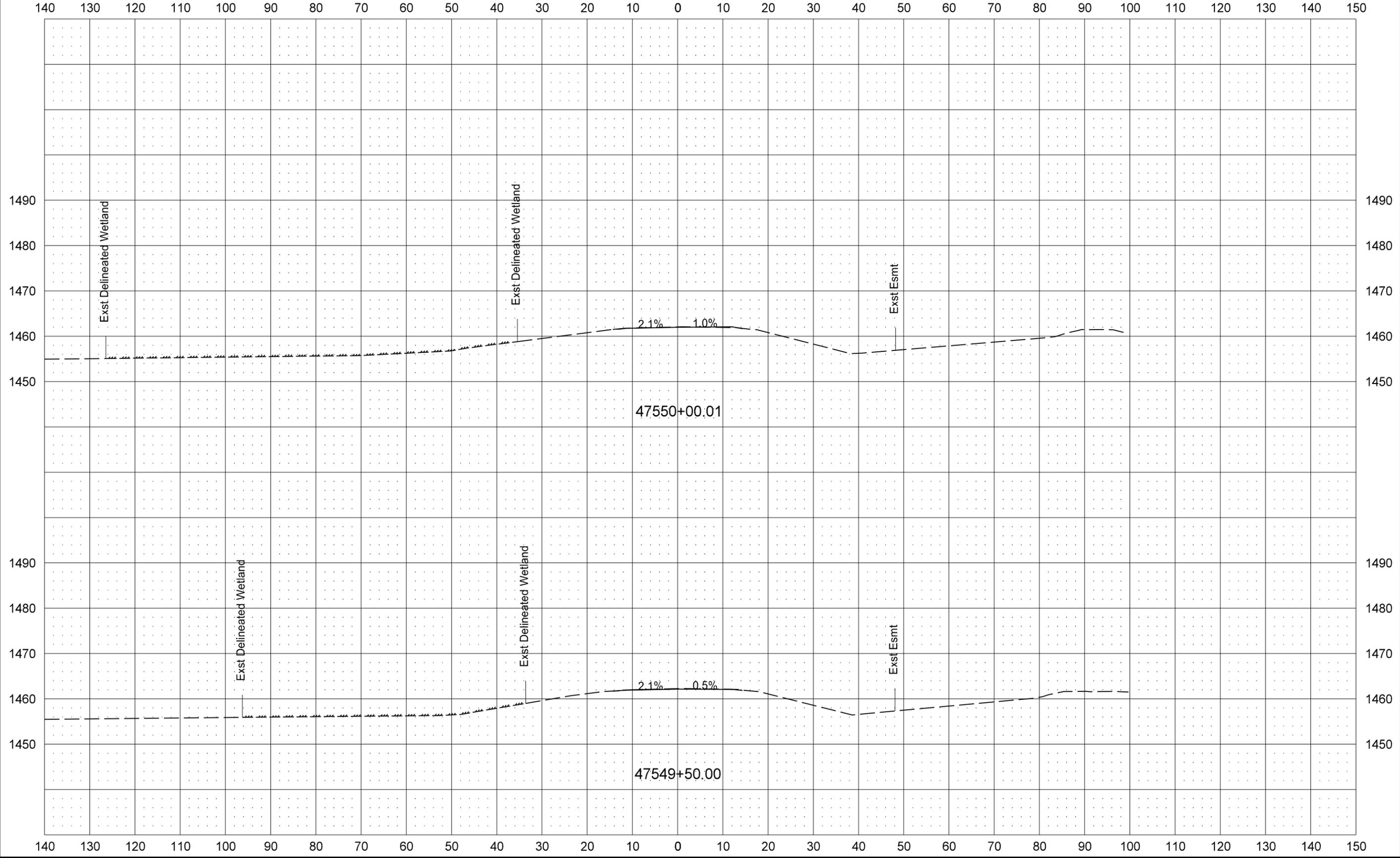
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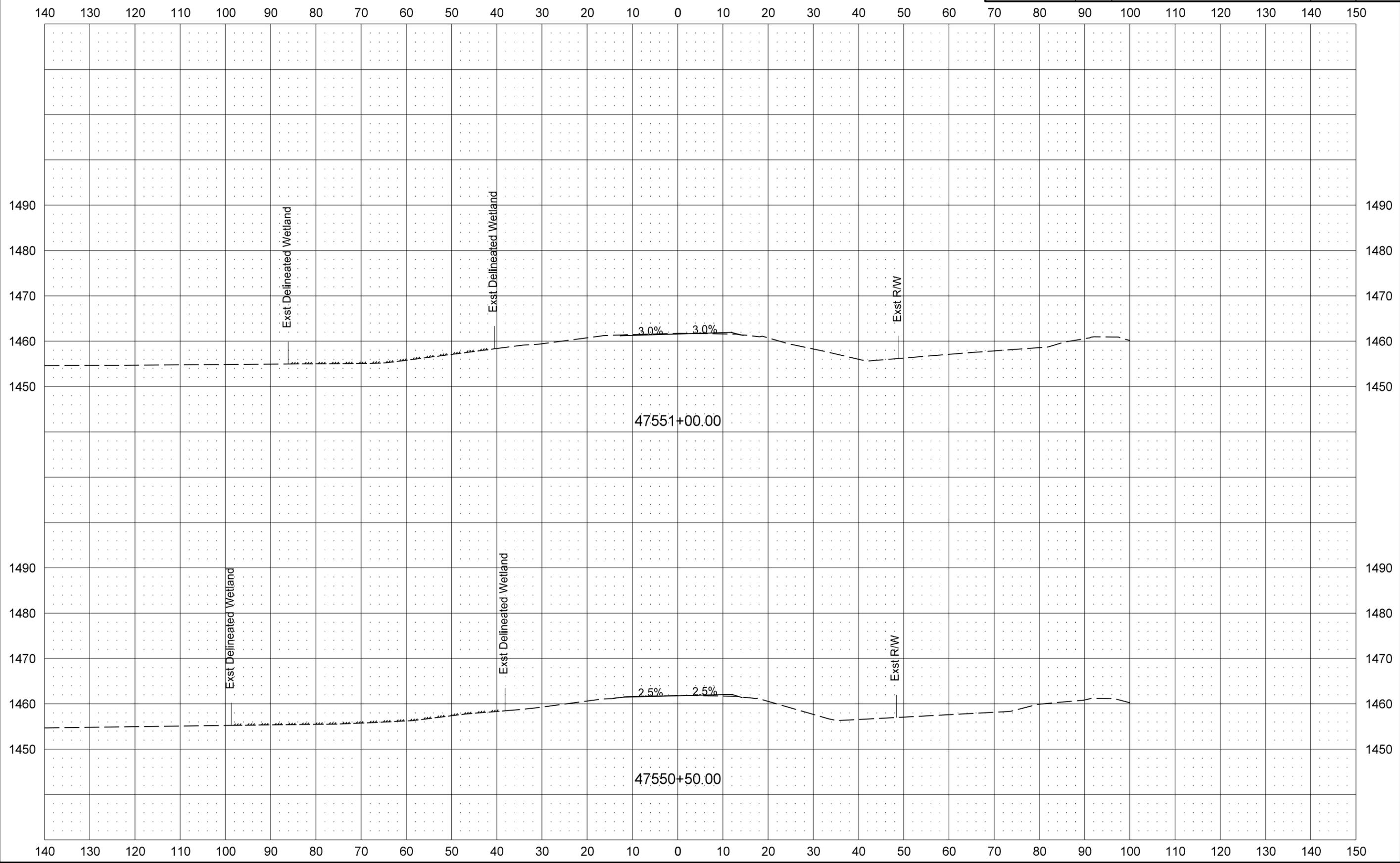


US HWY 281 Spur

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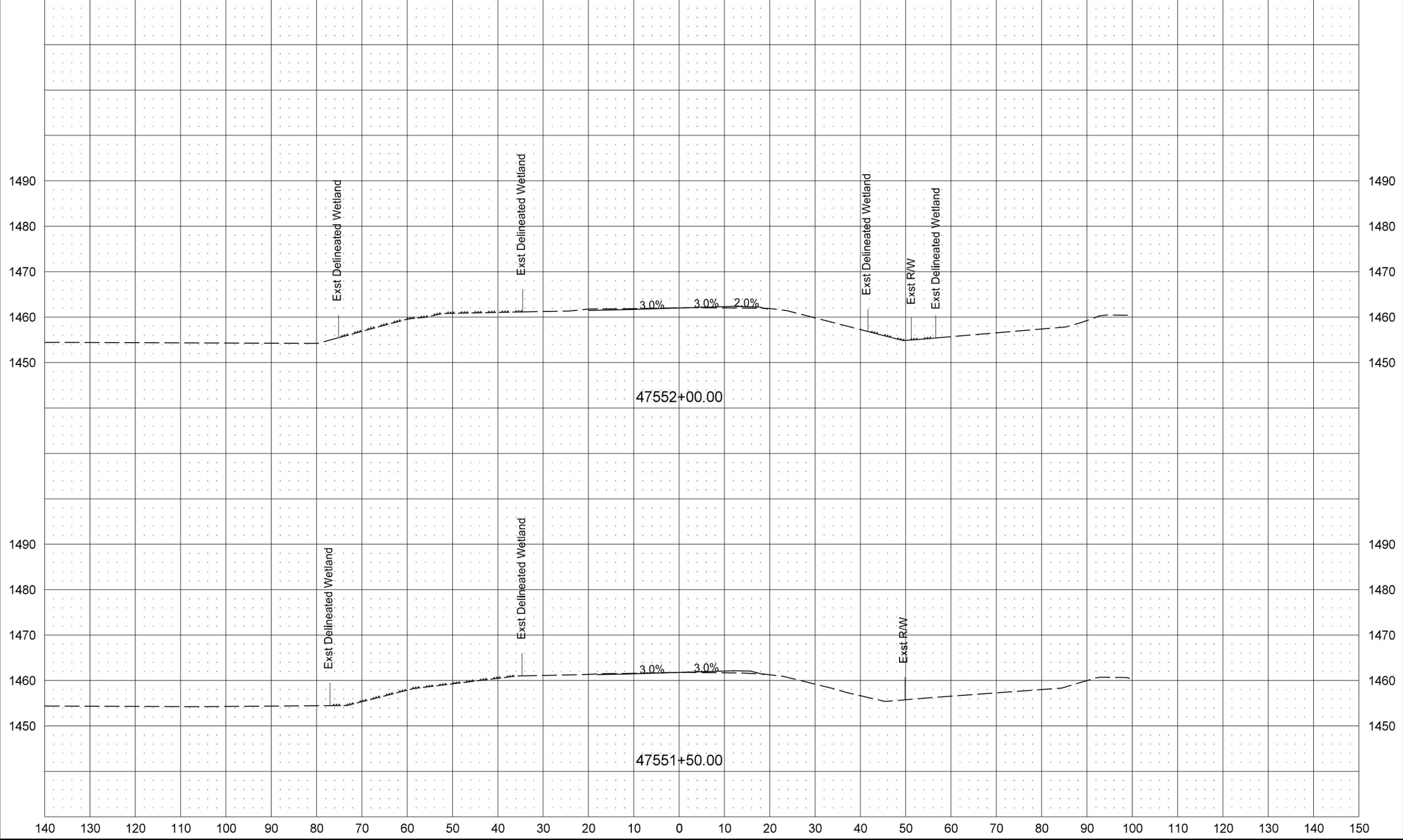


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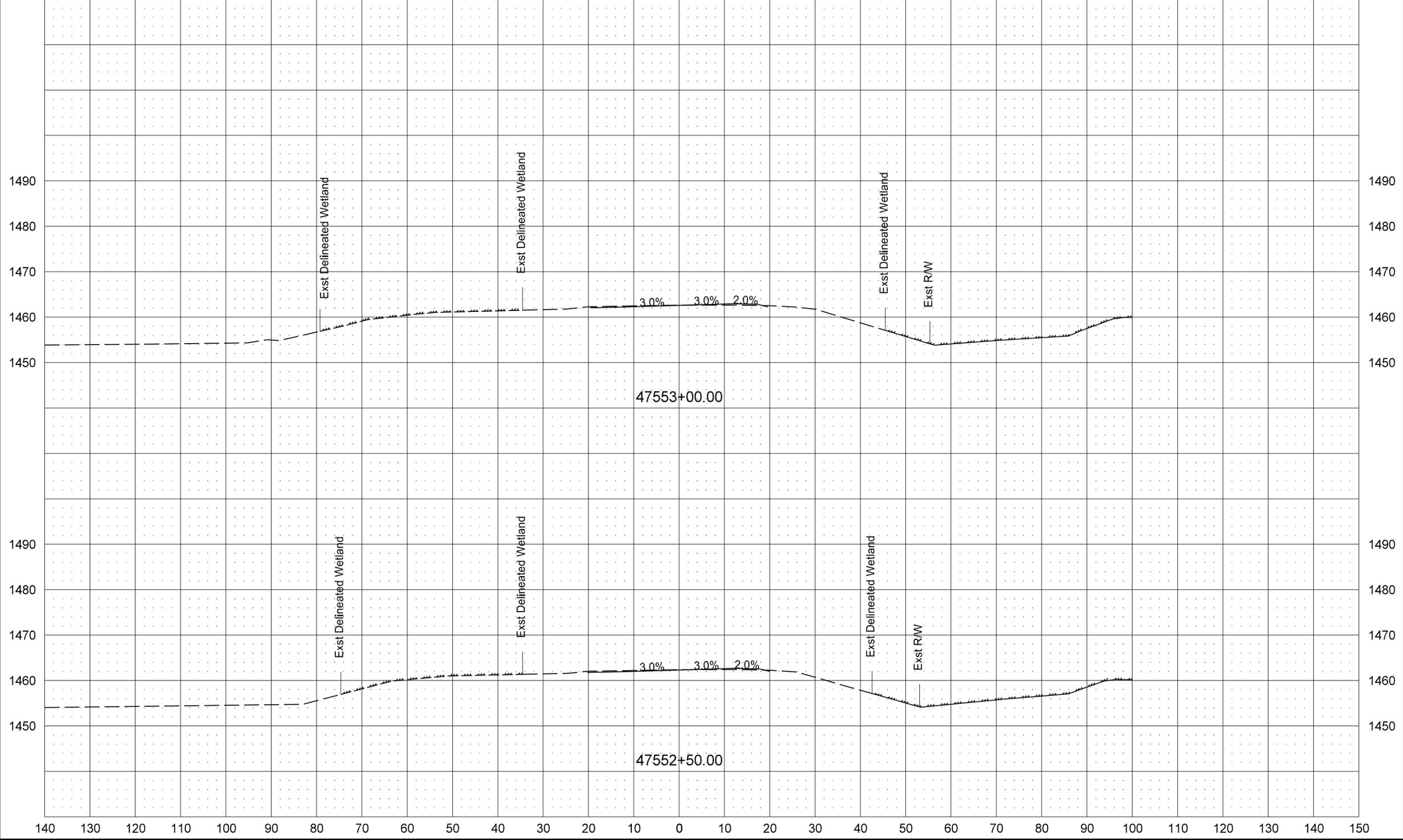
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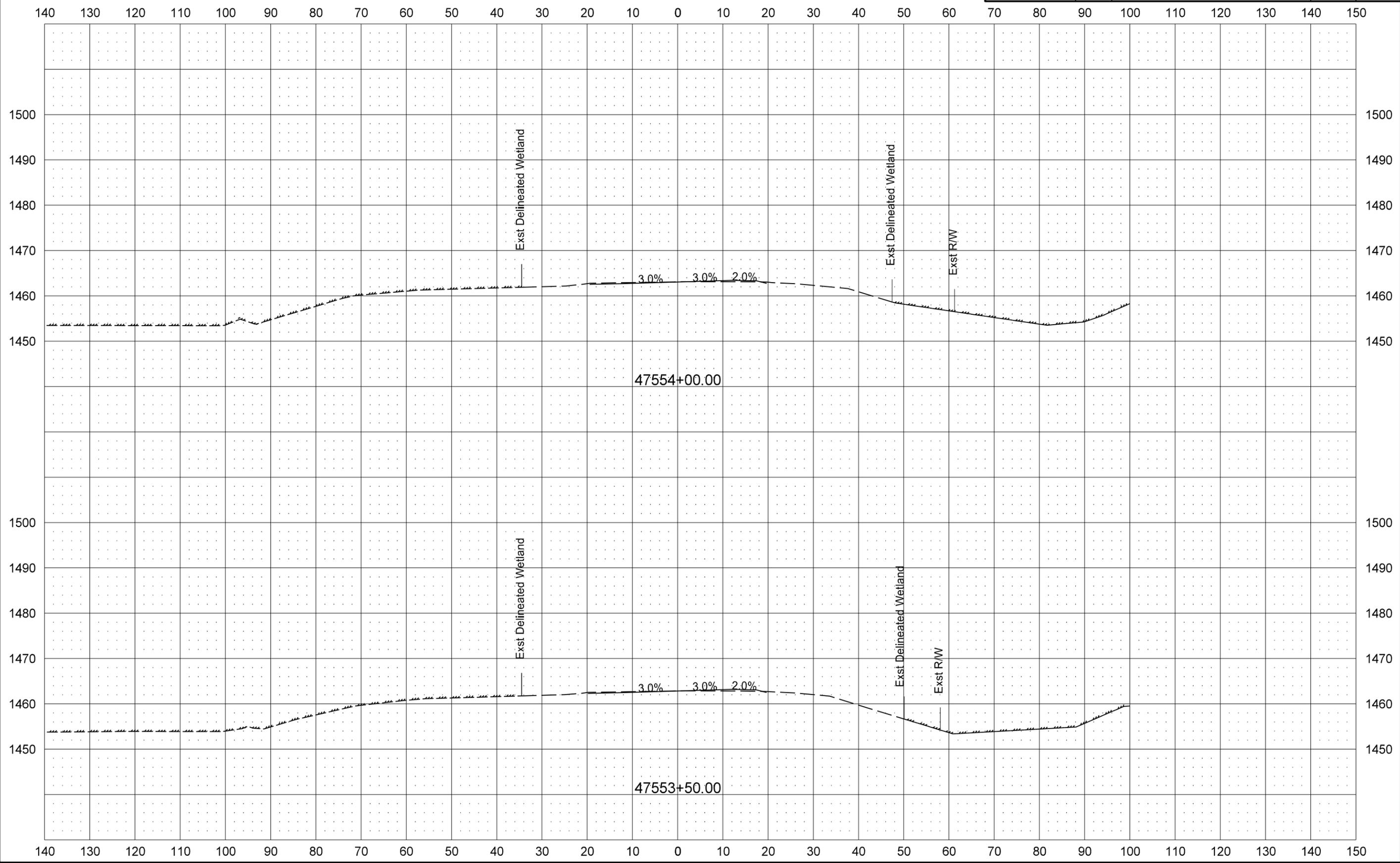
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-3-281(104)900	200	23

140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150



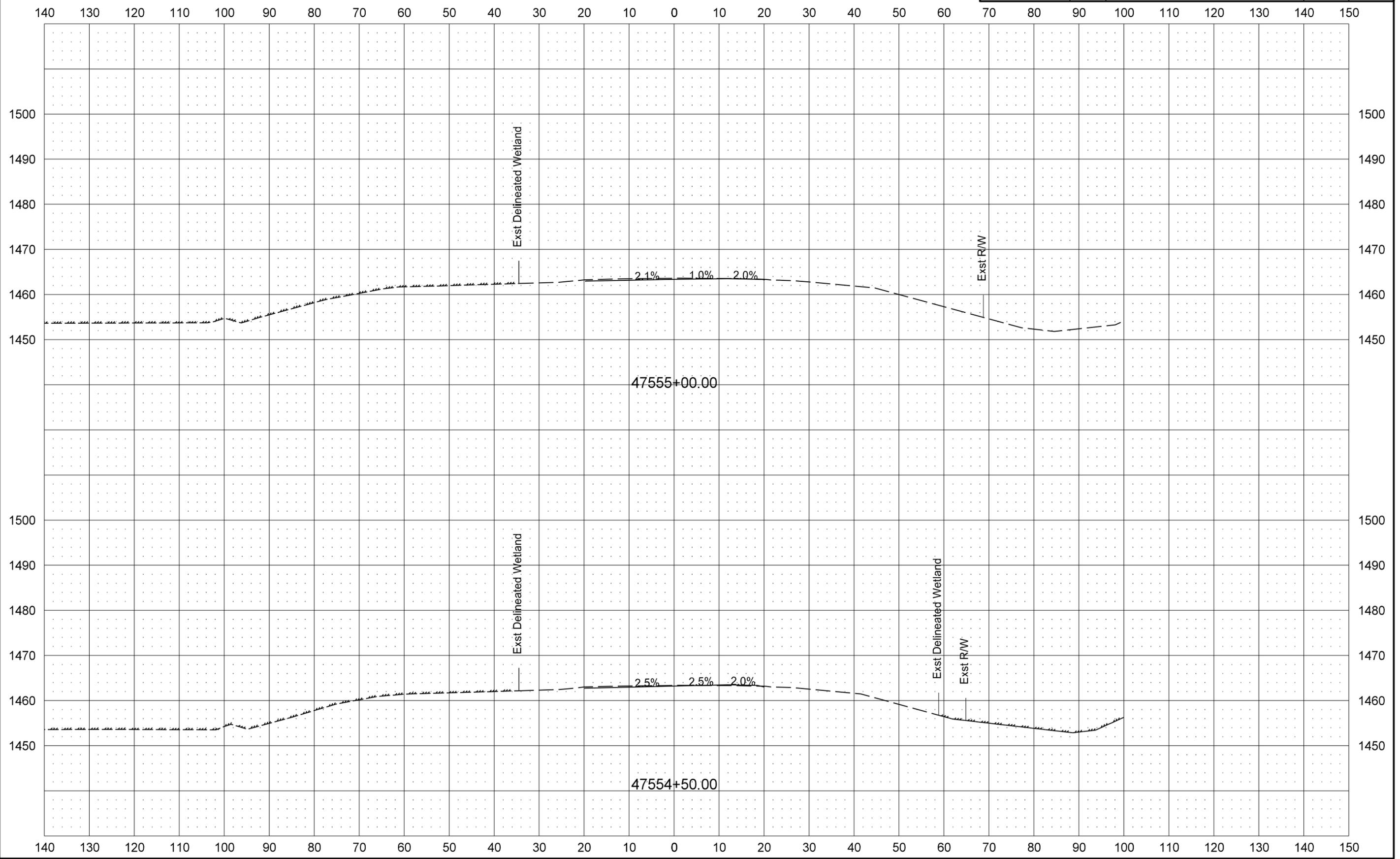
US HWY 281 Spur

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-3-281(104)900	200	24



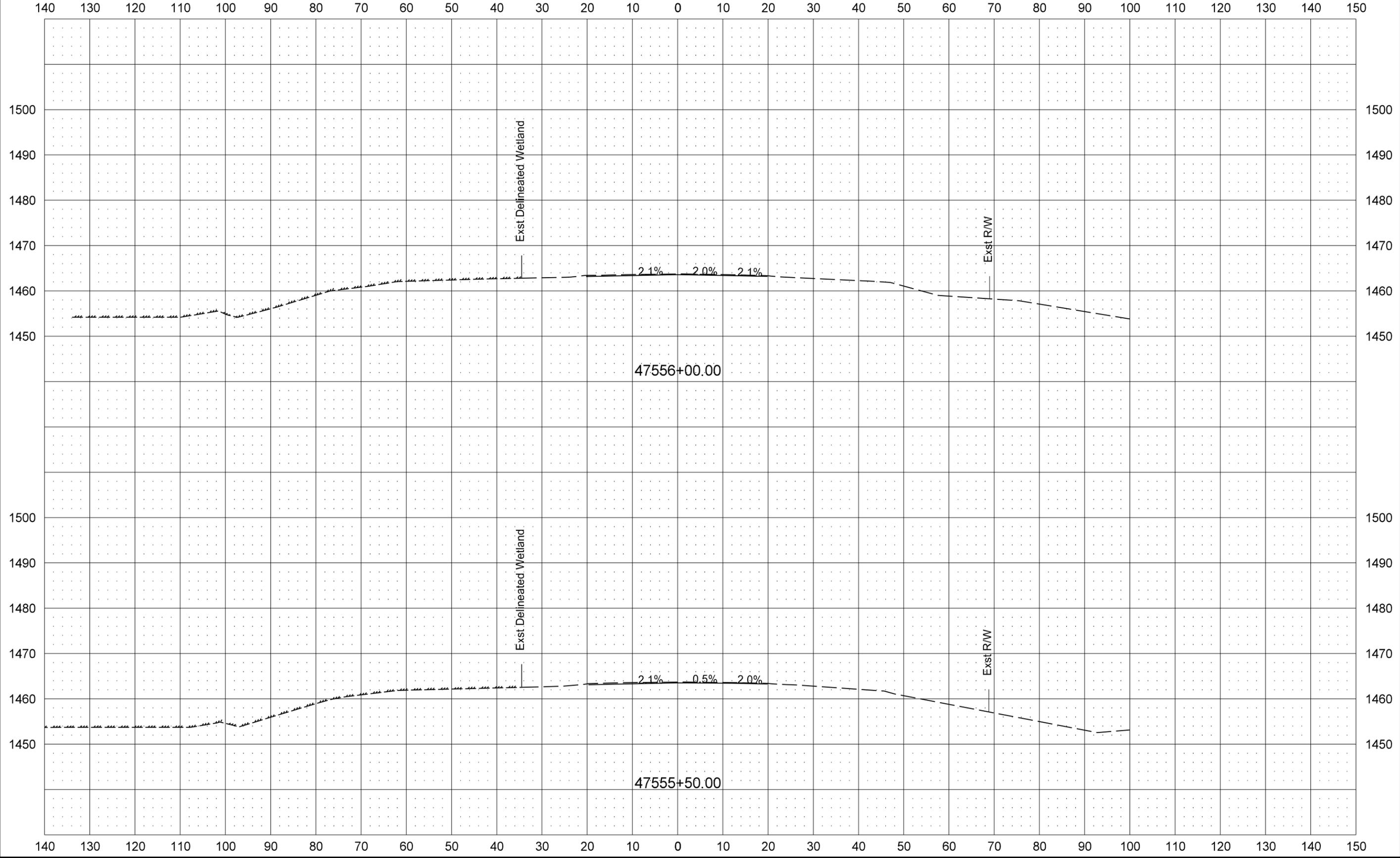
US HWY 281 Spur

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-3-281(104)900	200	25



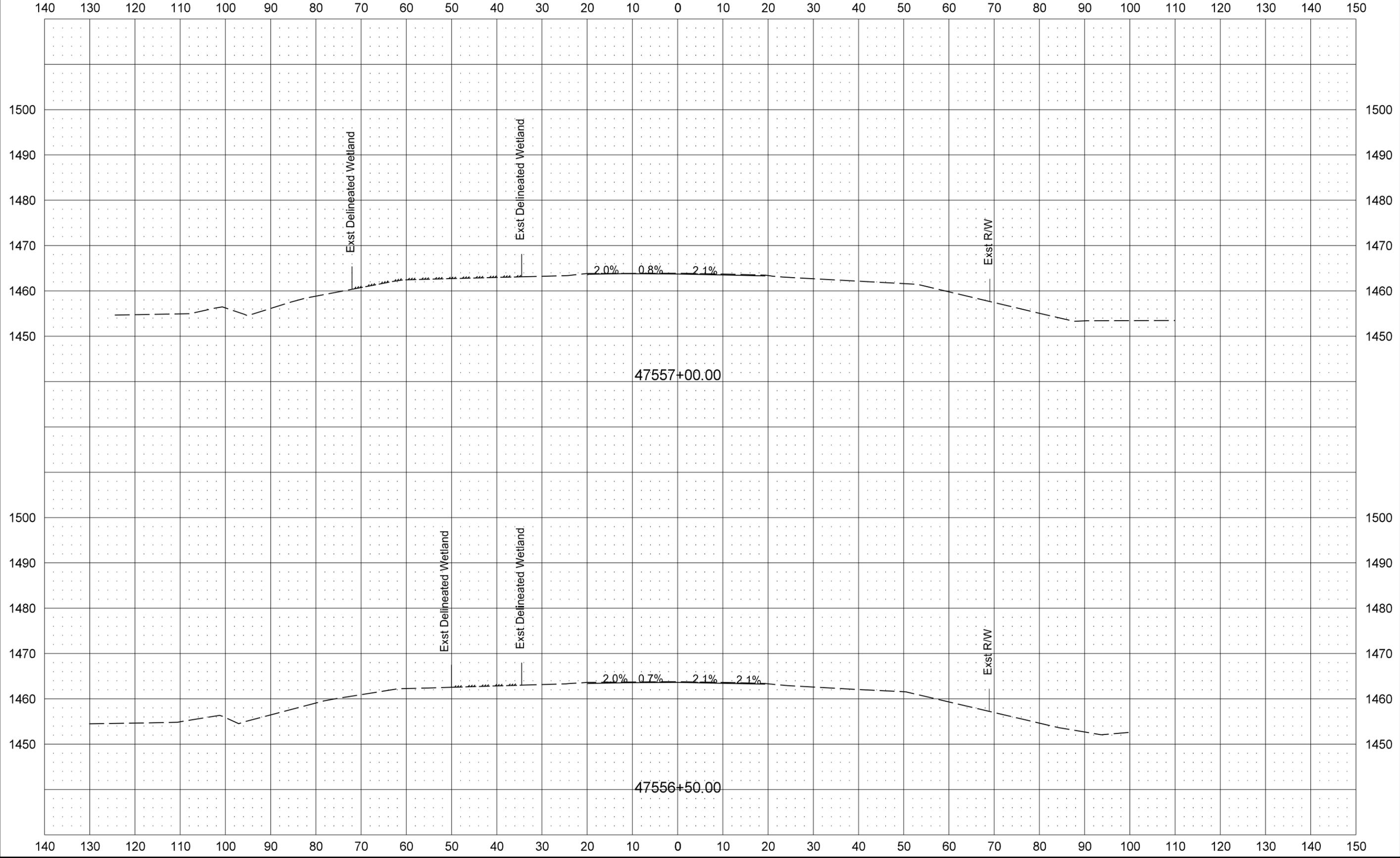
US HWY 281 Spur

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SS-3-281(104)900	200	26



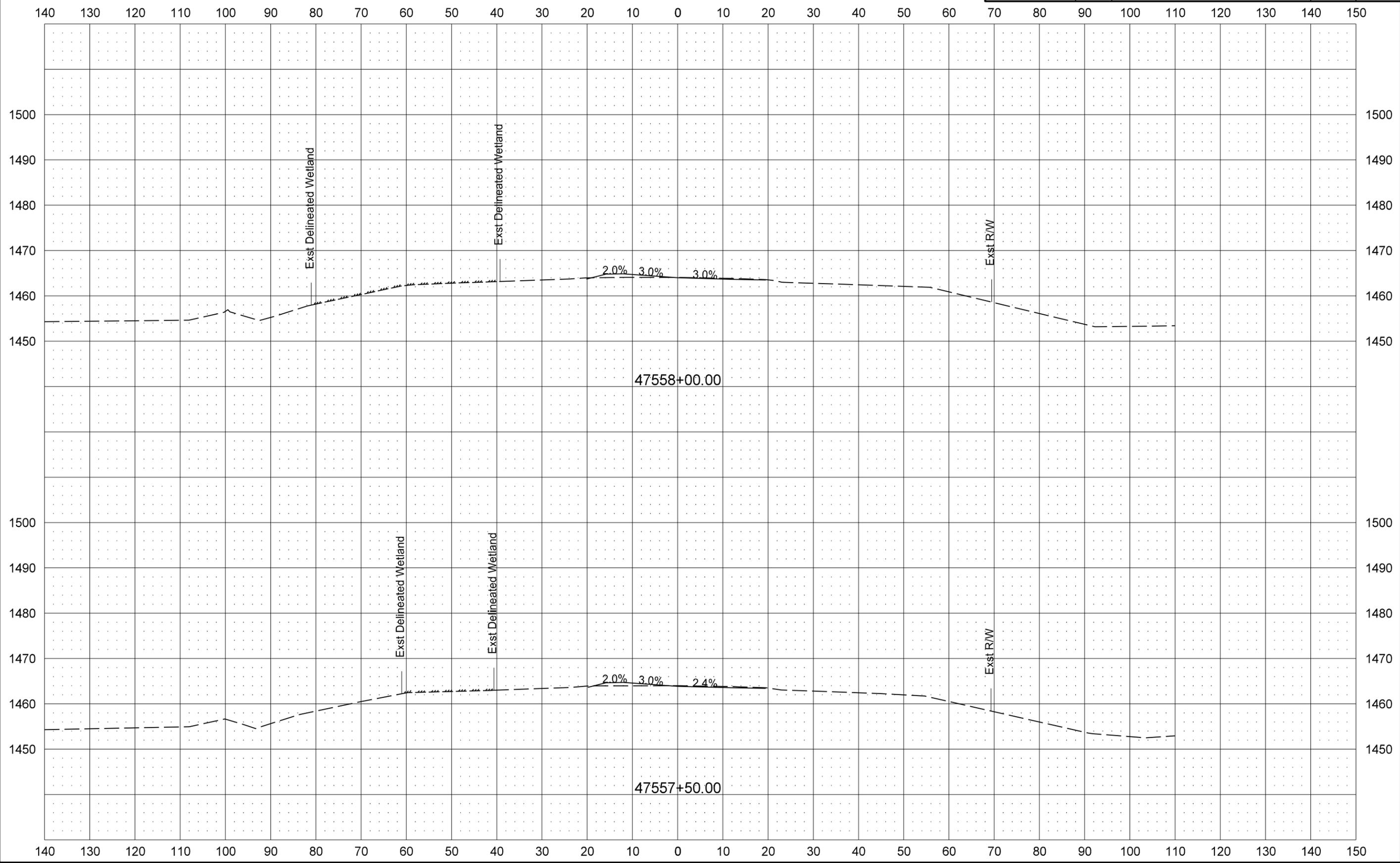
US HWY 281 Spur

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-3-281(104)900	200	27



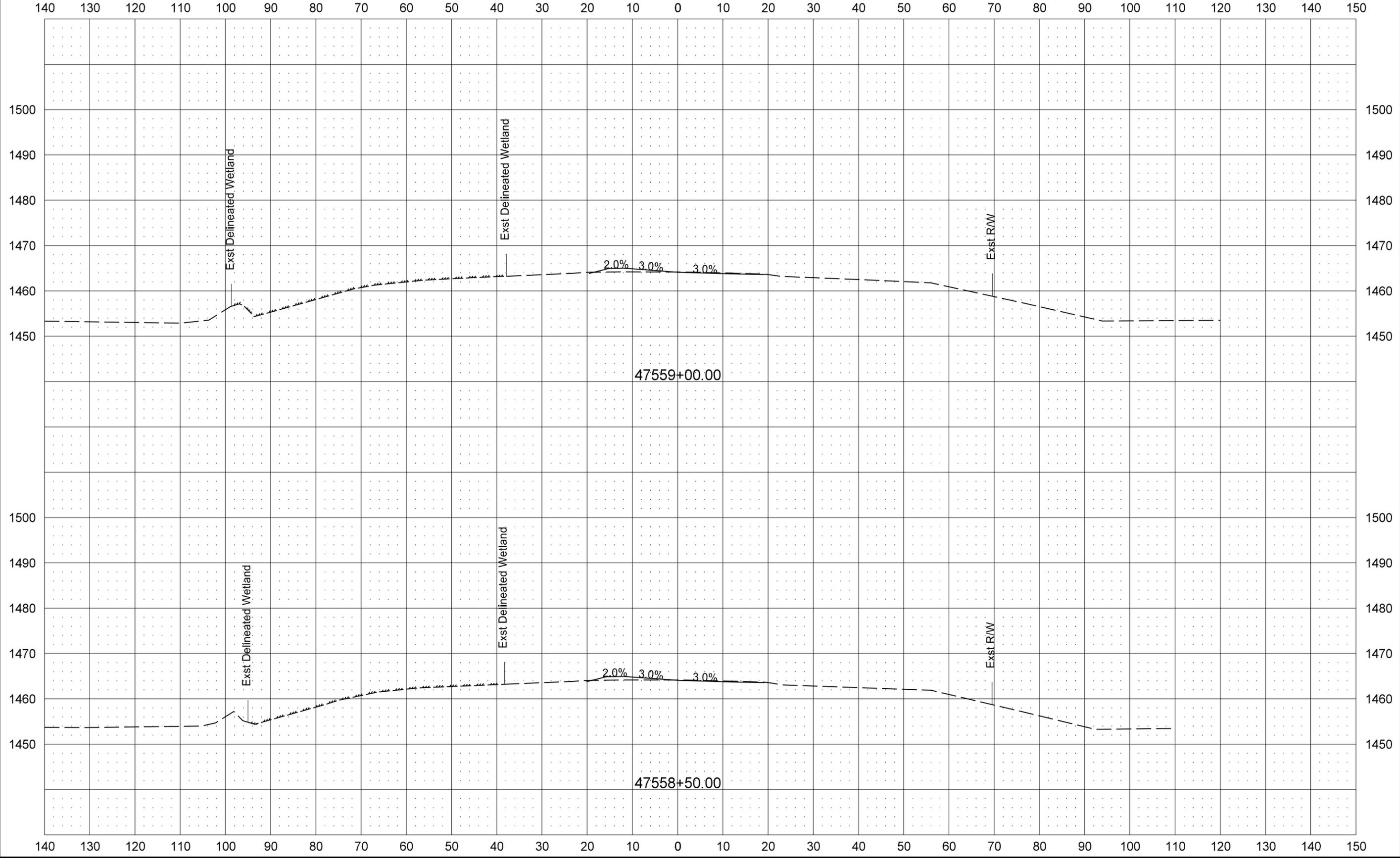
US HWY 281 Spur

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-3-281(104)900	200	28



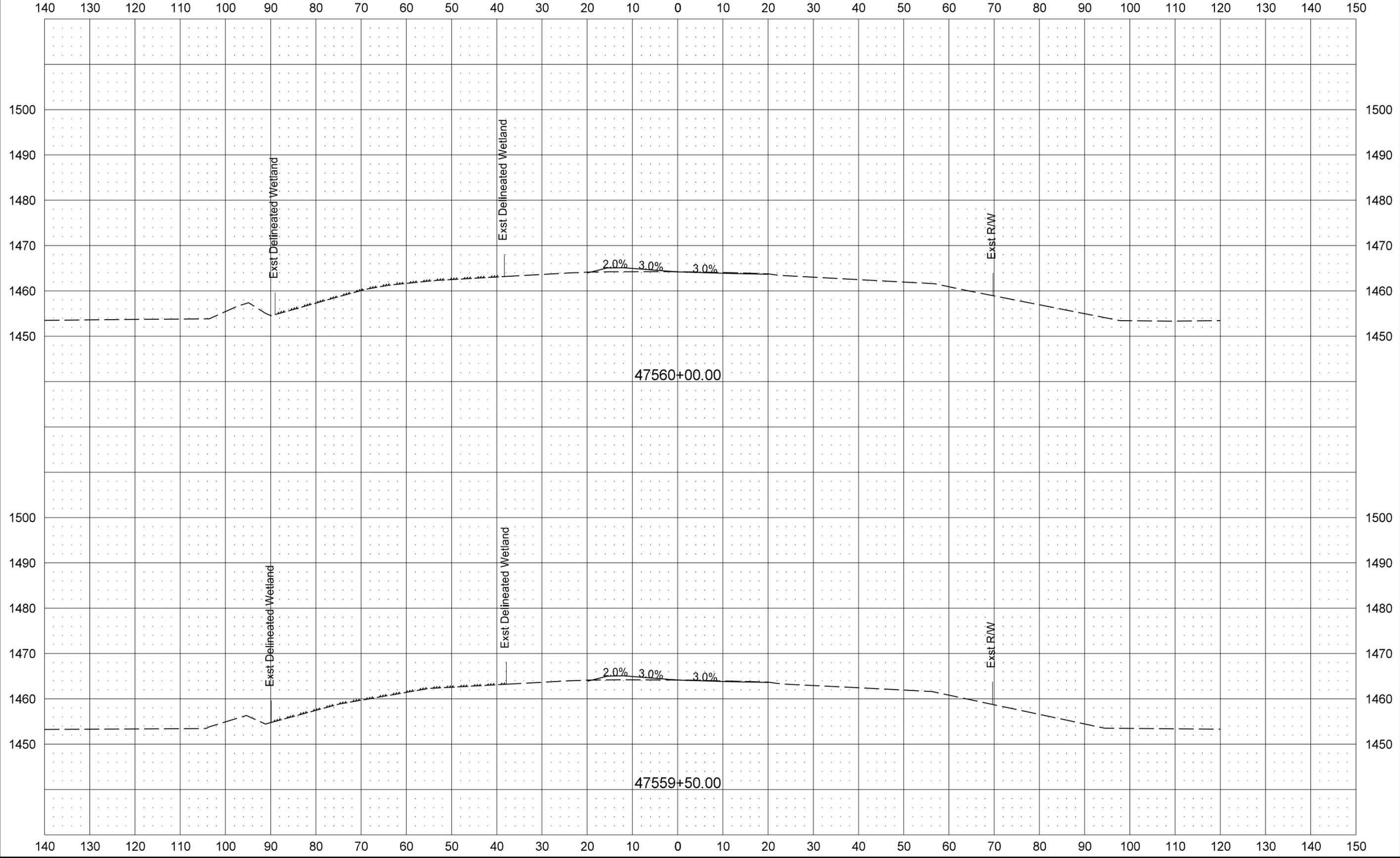
US HWY 281 Spur

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-3-281(104)900	200	29



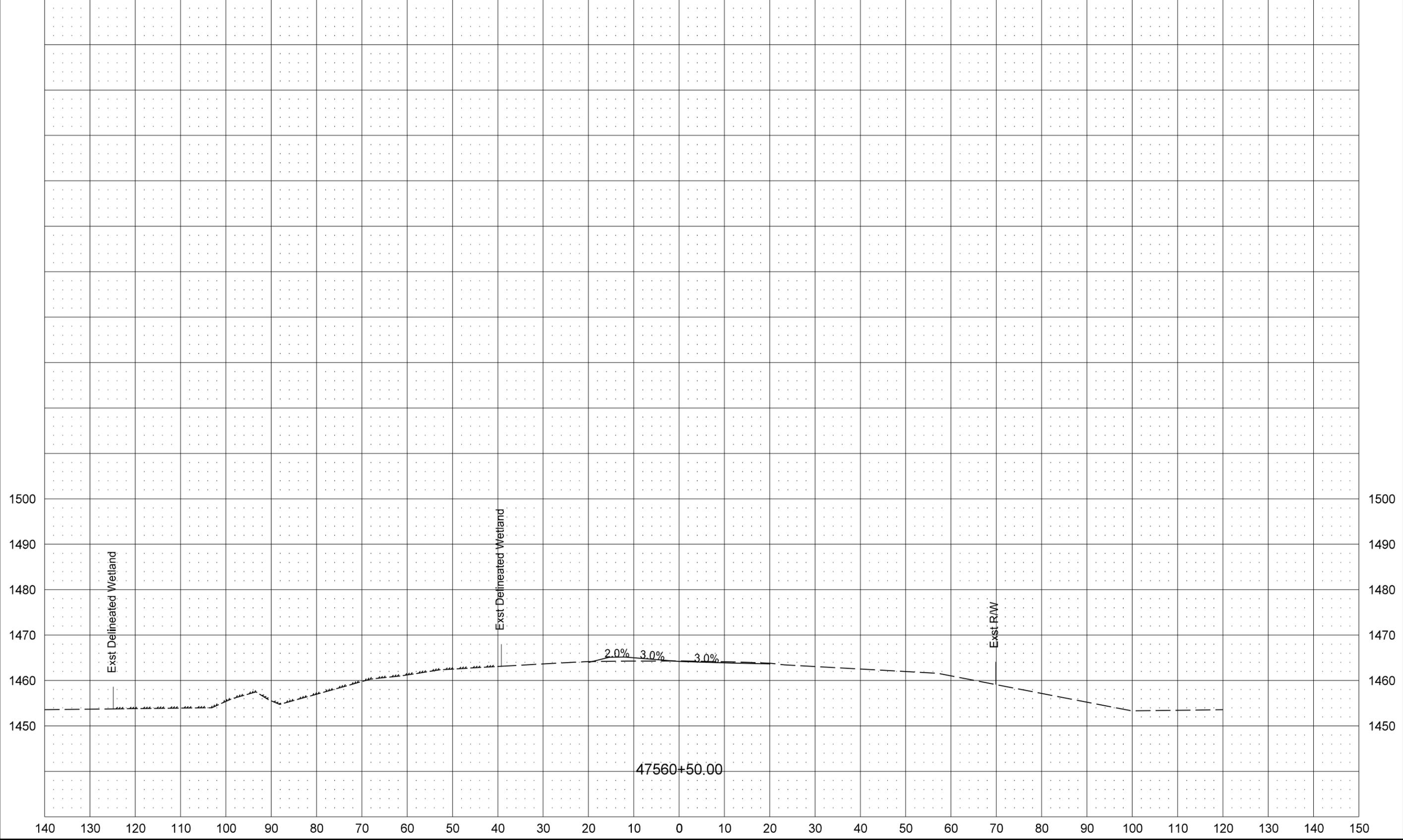
US HWY 281 Spur

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-3-281(104)900	200	30



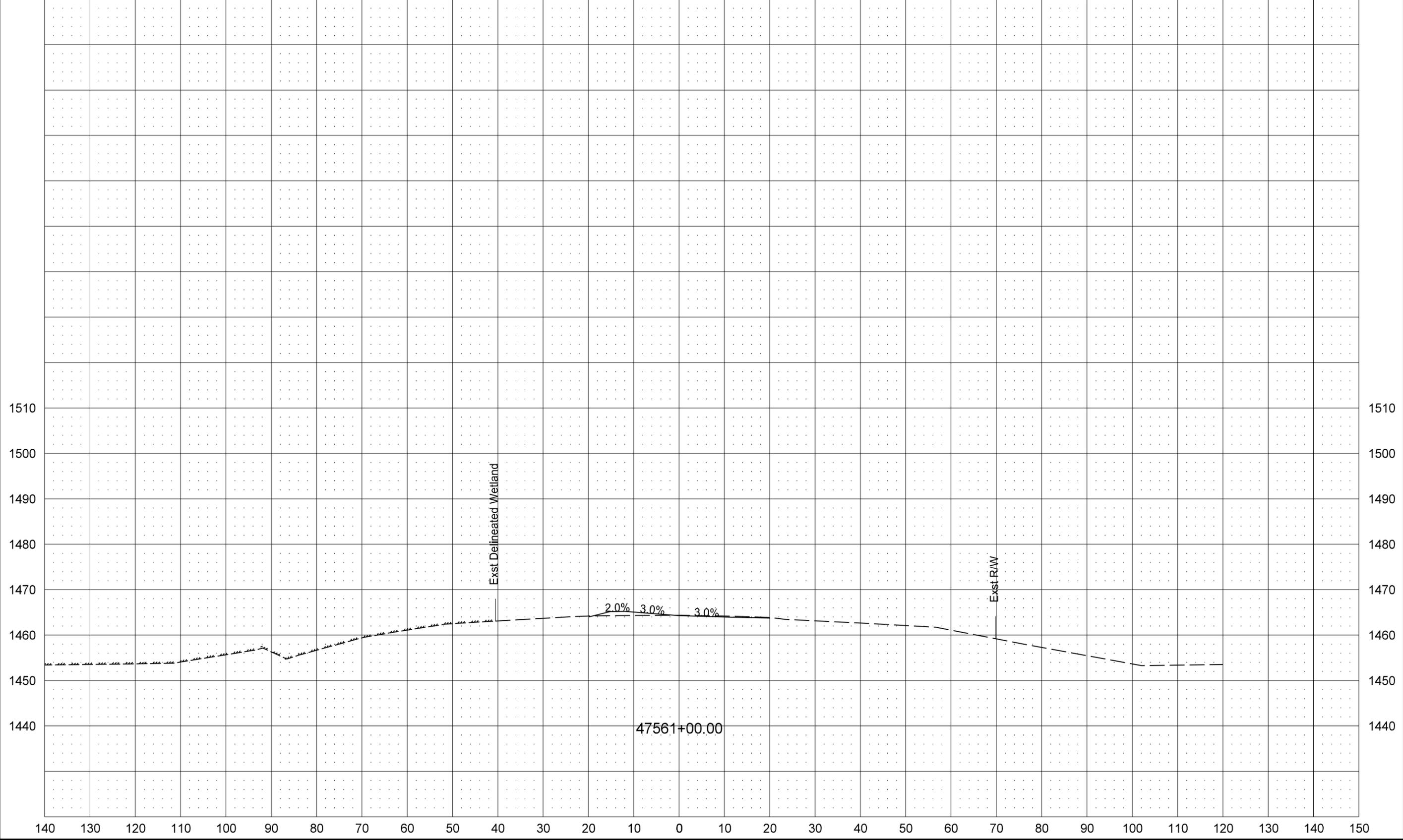
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-3-281(104)900	200	31

140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150



STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-3-281(104)900	200	32

140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150



US HWY 281 Spur

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-3-281(104)900	200	33

