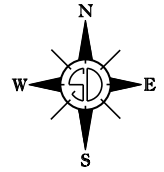


STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	1806-351	1	17



**STATE OF SOUTH DAKOTA**  
**DEPARTMENT OF TRANSPORTATION**  

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**PLANS FOR PROPOSED**  
**PROJECT 1806-351**  
**SD HIGHWAY 1806**  
**STANLEY COUNTY**  
  
**UNDER DRAINS**

PCN 12U0

INDEX OF SHEETS

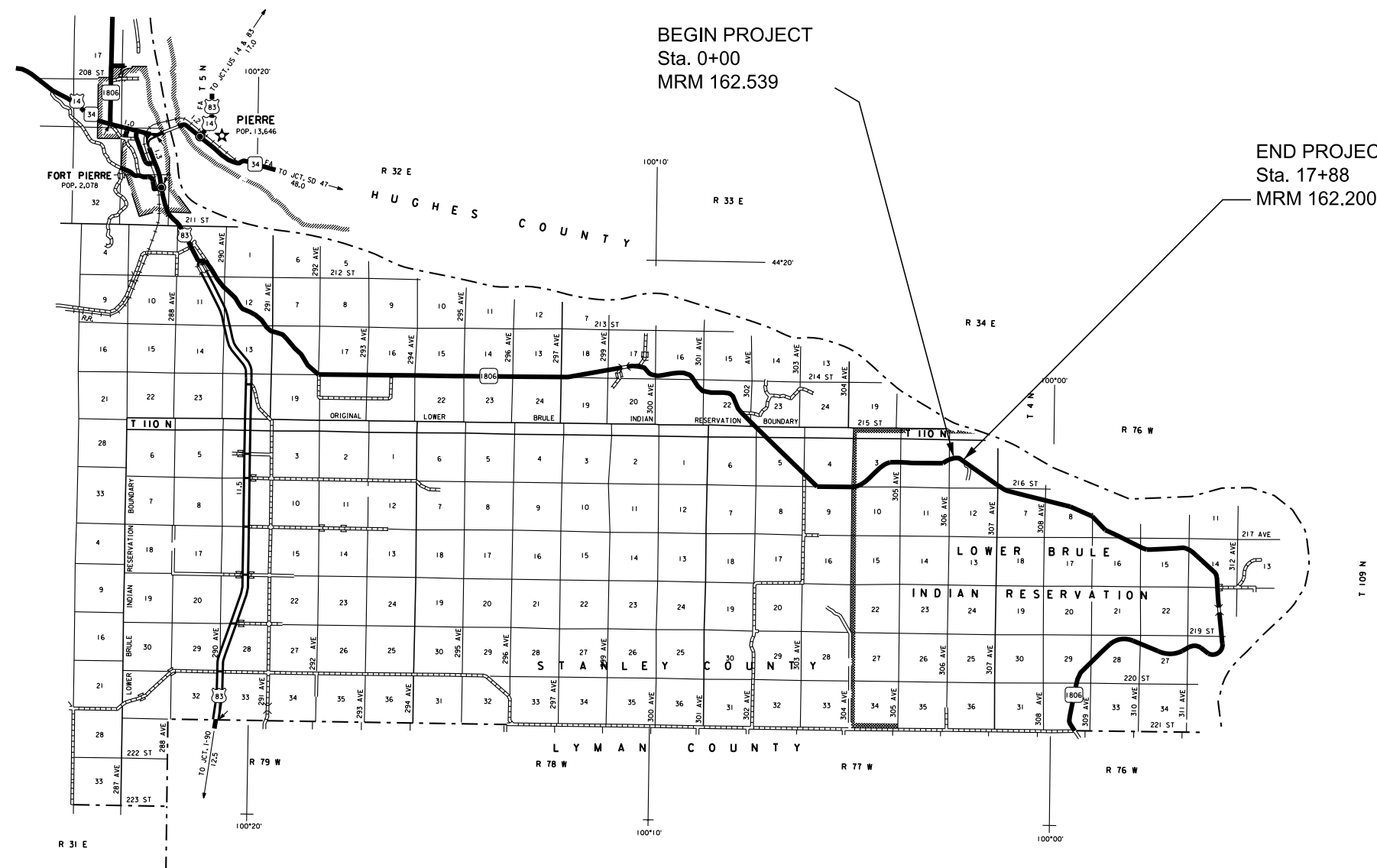
SHEET 1	TITLE SHEET
SHEET 2&3	ESTIMATE OF QUANTITIES, PLAN NOTES & SIGN TABULATION
SHEET 4	FIXED LOCATION SIGNS
SHEET 5	UNDER DRAIN LOCATIONS
SHEET 6-13	X-SECTIONS
SHEET 14	TYPICAL UNDERDRAIN INSATLLATION DETAIL
SHEET 15-17	STANDARD PLATES

PROJECT

DESIGN DESIGNATION

ADT (2011)	245
ADT (2021)	283
DHV	39
D	50%
T DHV	3.6%
T ADT	8.0%
V	65 MPH

**STORM WATER PERMIT**  
(None Required)



## SD HIGHWAY 1806

GROSS LENGTH	1788.0 FEET	0.339 MILES
LENGTH OF EXCEPTIONS	0.00 FEET	0.000 MILES
NET LENGTH	1788.0 FEET	0.339 MILES

ESTIMATE OF QUANTITIES

Bid Item Number	Item	Quantity	Unit
009E0010	Mobilization	Lump Sum	LS
230E0100	Remove and Replace Topsoil	Lump Sum	LS
634E0100	Traffic Control	422	Unit
634E0120	Traffic Control, Miscellaneous	Lump Sum	LS
680E0240	4" Corrugated Polyethylene Drainage Tubing	80	Ft
680E0440	4" Slotted Corrugated Polyethylene Drainage Tubing	4,210	Ft
680E2000	Concrete Headwall for Underdrain	2	Each
680E2010	Precast Concrete Headwall for Drain	2	Each
680E2500	Porous Backfill	1,567.0	Ton
734E0010	Erosion Control	Lump Sum	LS

SPECIFICATIONS

Construction Specifications: South Dakota Standard Specifications for Roads and Bridges, 2004 Edition and Required Provisions, Supplemental Specifications and/or Special Provisions as included in the Proposal.

SEQUENCE OF OPERATIONS

The Contractor shall submit his or her proposed sequence of operations for the Engineer's approval at least one week prior to the preconstruction meeting. All work shall be inside the State of SD Right of Way.

UTILITIES

The Contractor shall contact the involved utility companies through South Dakota One Call (1-800-781-7474) prior to starting work. It shall be the responsibility of the Contractor to coordinate work with the utility owners to avoid damage to existing facilities.

HISTORICAL PRESERVATION OFFICE CLEARANCES

To obtain State Historical Preservation Office (SHPO) clearance, a cultural resources survey may need to be conducted by a qualified archaeologist. In lieu of a cultural resources survey, the Contractor could request a records search from Jim Donohue, State Archaeological Research Center (SARC). Provide SARC with the following: a topographical map or aerial view on which the site is clearly outlined, site dimensions, project number, and PCN. If applicable, provide evidence that the site has been previously disturbed by farming, mining, or construction activities with a landowner statement that no artifacts have been found on the site. The Contractor shall arrange and pay for the cultural resource survey and/or records search.

If any earth disturbing activities occur within the current geographical or historic boundaries of any South Dakota reservation, the Contractor shall obtain Tribal Historical Preservation Office (THPO) clearance. If no THPO exists, the required SHPO clearance shall suffice, with documentation of Tribal contact efforts provided to SHPO.

To facilitate SHPO or THPO responses, the Contractor should submit a records search or cultural resources survey report to the DOT Environmental Engineer, 700 East Broadway Avenue, Pierre, SD 57501-2586 (605-773-3268). Allow 30 days from the date this information is submitted to the Environmental Engineer for SHPO/THPO approval. The Contractor is responsible for obtaining all required permits and clearances for staging areas, borrow sites, waste disposal sites, and all material processing sites. The Contractor shall provide the required permits and clearances to the Engineer at the preconstruction meeting.

WASTE DISPOSAL SITE

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

Construction/demolition debris may not be disposed of within the State ROW.

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

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

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

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

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

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

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

EDGE DRAINS

Edge drain system shall be installed at edge of roadway on shoulder from Station 1+00, 15' Lt & Rt. to Station 14+00, 15', Lt & Rt. The edge drains shall consist of 4 inch Slotted Corrugated Polyethylene Drainage Tubing placed in a 2 foot wide by 3 foot deep trench backfilled with 3 feet of Porous Backfill. The edge drain shall daylight at an Outlet Headwall (See Sht. 17) located at Station 14+00, 25' Lt. and Rt. or as directed by the Engineer.

EDGE DRAINS(CONT'D)

The depth of the edge drain trench may be adjusted to provide for positive drainage as directed by the Engineer.

The estimated quantities for the edge drain system are as follows:

4" Slotted Corrugated Polyethylene Tubing	2600	Ft
4" Corrugated Polyethylene Tubing	40	Ft
Porous Backfill	960	Ton
Concrete Headwall for Edge drain (See Standard Plates 680.03)	2	Each

UNDER DRAINS

A underdrain system shall be installed at the toe of the inslope from Station 1+00, 46' Lt. to Station 14+00, 65' Lt. and from Station 1+00 , 45' Rt., to Station 4+50, 55' Rt. The underdrain shall consist of 4 inch Slotted Corrugated Polyethylene Drainage Tubing placed in a 2 foot wide by 3 foot deep trench backfilled with 3 feet of Porous Backfill. The underdrain shall daylight at an Outlet Headwall (See Sht. 16) located at Station 14+00, 55' Lt. and Station 4+50 55' Rt. or as directed by the Engineer. The depth of the underdrain trench may be adjusted to provide for positive drainage as directed by the Engineer.

The estimated quantities for the underdrain system are as follows:

4" Slotted Corrugated Polyethylene Tubing	1610	Ft
4" Corrugated Polyethylene Tubing	40	Ft
Porous Backfill	607	Ton
Concrete Headwall for Under drain (See Standard Plates 680.01)	2	Each

Each drain trench shall be graded to maintain a minimum of .01ft/ft or 1% drop from beginning to outlet. The Outlet Headwall shall be placed to blend in with the surrounding topography with the outlet tubing placed above the bottom of the drainage so as to permit proper flow from the outlet.

Care must be taken to ensure that the drain and outlet tubing is not damaged during construction. Sufficient cover material is to be placed over the drains before heavy equipment is allowed to work over them.

The drain locations and elevations given are based on the best information available at the time of the Geotechnical Engineering Review. Actual field conditions may require that adjustments be made by the Project Engineer during construction to provide for sufficient drainage.

The excavation required to install the drains shall be incidental to the contract unit price per foot for the corresponding "Polyethylene Tubing" bid items.

REMOVING, STOCKPILING, AND REPLACING TOPSOIL

The Contractor will be required to remove and salvage 4 inches of the existing topsoil throughout the anticipated disturbed areas. The topsoil removal shall be done prior to work commencing throughout the areas.

The Contractor shall stockpile the material at a site approved by the Engineer, and/or windrow the material near the disturbed areas to control potential sediment runoff as determined by the Engineer.

All topsoil removal, stockpiling, salvaging, windrowing, and replacement shall be done as according to the plans and/or as directed by the Engineer.

REMOVING, STOCKPILING, AND REPLACING TOPSOIL(CONT'D)

The replacement of topsoil shall be spread evenly throughout all disturbed areas upon completion of the work. Any clumps larger than 3 inches shall be broken up prior to seeding the areas.

For information purpose only there is estimated to be approximately 140.0 Cubic Yards of top soil to be removed, stockpiled, and replaced on project.

Measurement of topsoil quantities will not be made, and all cost associated with removing, salvaging, stockpiling, windrowing, and replacing topsoil shall be incidental to the contract lump sum price for "Remove and Replace Topsoil".

EROSION CONTROL

The areas disturbed as a result of work on this project shall be restored and/or reshaped to the satisfaction of the Engineer. All disturbed areas shall be seeded and mulched. Disturbed areas anticipated on the project are areas above the under drain installations.

All permanent seed shall be planted in the topsoil at a depth of ¼" to ½". Hand seeding devices approved by the Engineer will be allowed. All seed broadcast must be raked or dragged in (incorporated) within the top ¼" to ½" of topsoil when possible. This requirement may be waived by the Engineer during construction when raking or dragging is deemed not feasible by conventional methods.

Type F Permanent Seed Mixture shall consist of the following:

Grass Species	Variety	Pure Live Seed (PLS) (Pounds/Acre)
Western Wheatgrass	Flintlock, Rodan, Rosana	7
Green Needlegrass	Lodorn	4
Sideoats Grama	Butte, Killdeer, Pierre, Trailway	3
Blue Grama	Bad River, Willis	2
Oats or Spring Wheat: April through July; Winter Wheat: August through November		10
Total:		26

It is estimated that 0.5 acres will be disturbed throughout the under drain areas.

The Contractor will reshape the ditch section from STA 1+00 Rt. to STA 5+00 Rt. after under drain installation and prior to seeding and mulching, to restore ditch to original typical section. This work will be incidental to the contract lump sum price for "Erosion Control".

It is estimated that 0.3 acres will be disturbed throughout the ditch shaping section from STA 1+00 Rt. to STA 5+00 Rt.

Application fertilizer will not be required on this project.

Mulching (Grass, Hay or Straw) Bales with noxious weed contamination will be rejected and the Contractor will be required to remove the contaminated bales from the project.

EROSION CONTROL(CONT'D)

All costs associated with furnishing and placing the seed and mulch, including labor, equipment and incidentals shall incidental to the contract lump sum price for "Erosion Control".

GENERAL MAINTENANCE OF TRAFFIC

Storage of vehicles and equipment shall be outside the clear zone and as near as possible to the right-of-way line. Contractor's employees should mobilize at a location off the right-of-way and arrive at the work sites in a minimum number of vehicles necessary to perform the work.

Indiscriminate driving and parking of vehicles within the right-of-way will not be permitted. Any damage to the vegetation, surfacing, embankment, delineators and existing signs resulting from such indiscriminate use shall be repaired and/or restored by the Contractor, at no expense to the State, and to the satisfaction of the Engineer.

The Contractor shall provide documentation that all breakaway sign supports comply with FHWA NCHRP Report 350 or MASH crash-worthy requirements. The Contractor shall provide installation details at the preconstruction meeting for all breakaway sign support assemblies.

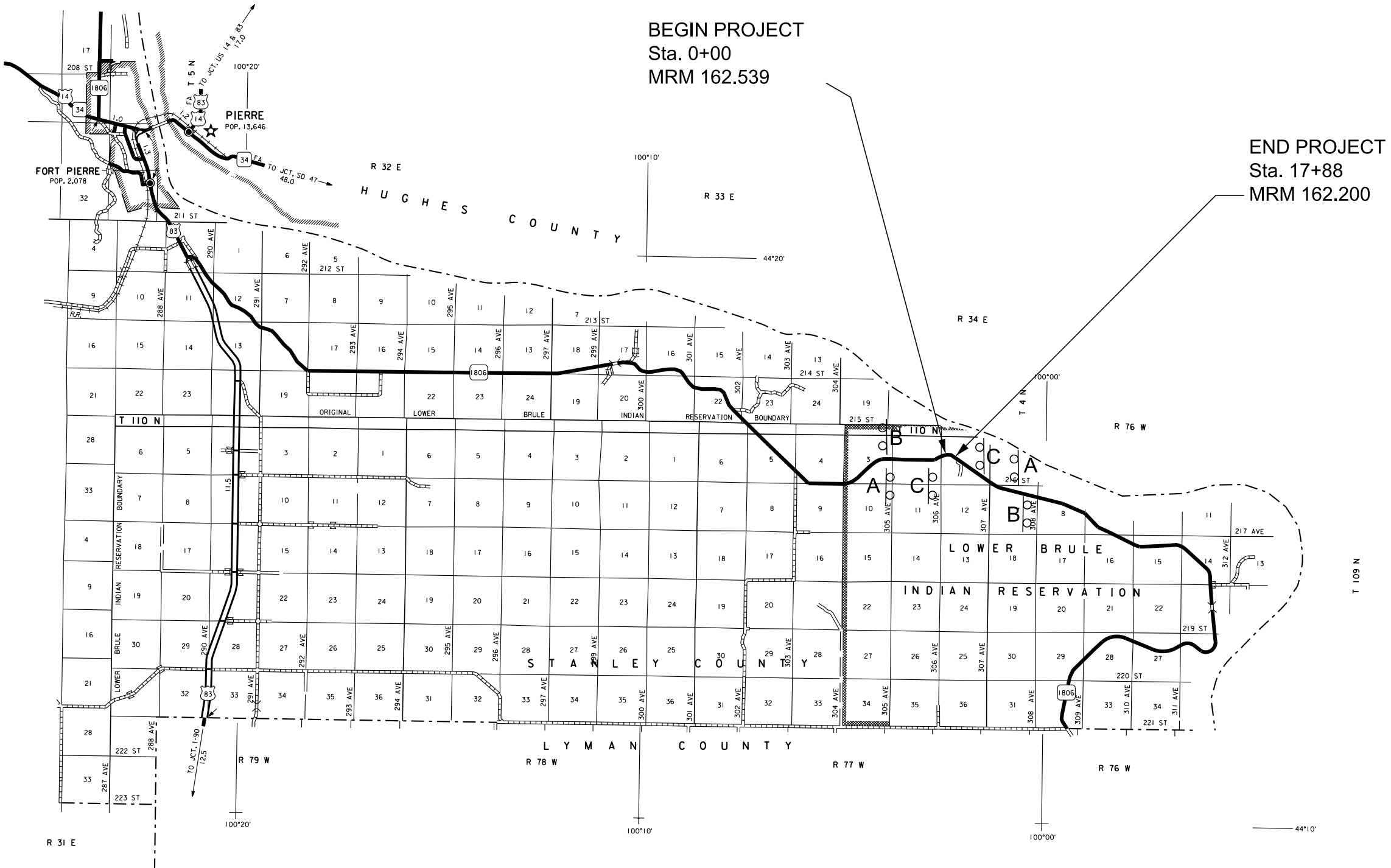
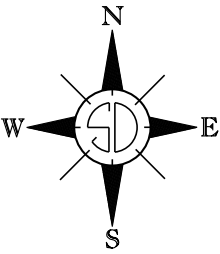
The bottom of signs on portable or temporary supports shall not be less than seven feet above the pavement in urban areas and one foot above the pavement in rural areas. Portable sign supports may be used as long as the duration is 3 days or less. If the duration is more than 3 days the signs shall meet the minimum mounting heights of 5 feet for rural areas and 7 feet for urban areas.

Any existing Sign(s) in the work limits shall be removed and reset as needed to accommodate the under drain installations. Cost for remove/reset existing signs shall be incidental to the contract lump sum price for "Traffic Control, Misc.".

ITEMIZED LIST FOR TRAFFIC CONTROL

SIGN CODE	SIGN SIZE	DESCRIPTION	NUMBER REQUIRED	UNITS PER SIGN	UNITS
G20-1	48" x 24"	ROAD WORK NEXT ## MILES	2	24	48
G20-2	36" x 18"	END ROAD WORK	2	17	34
W20-1	48" x 48"	ROAD WORK #### FT. OR AHEAD	4	34	136
W20-4	48" x 48"	ONE LANE ROAD #### FT. OR AHEAD	2	34	68
W20-7a	48" x 48"	FLAGGER	2	34	68
W21-5	48" x 48"	SHOULDER WORK	2	34	68
TOTAL UNITS					422

FIXED LOCATION SIGNS



END PROJECT  
Sta. 17+88  
MRM 162.200

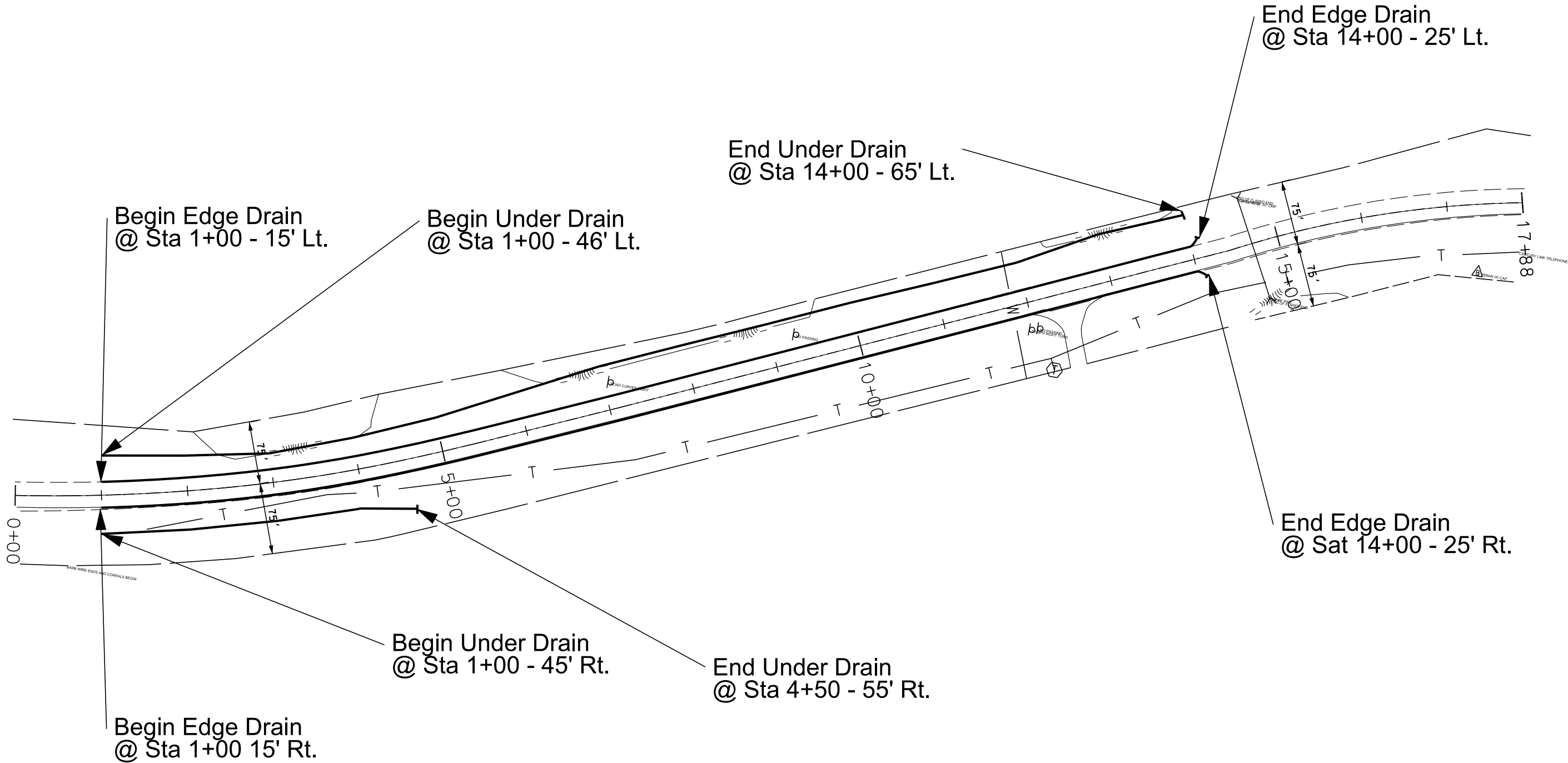
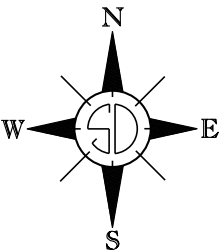
A —

B —

C —

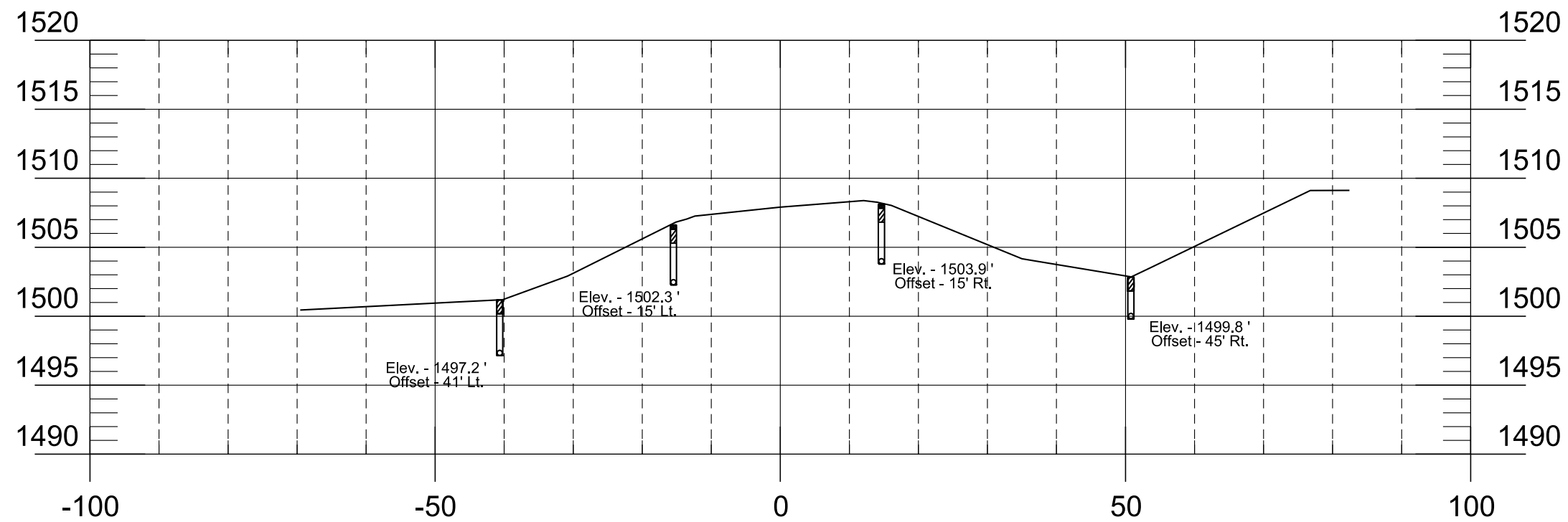
NOTES:  
- Sign locations will be verified in the field by the Engineer prior to installation.

UNDER DRAIN LOCATIONS

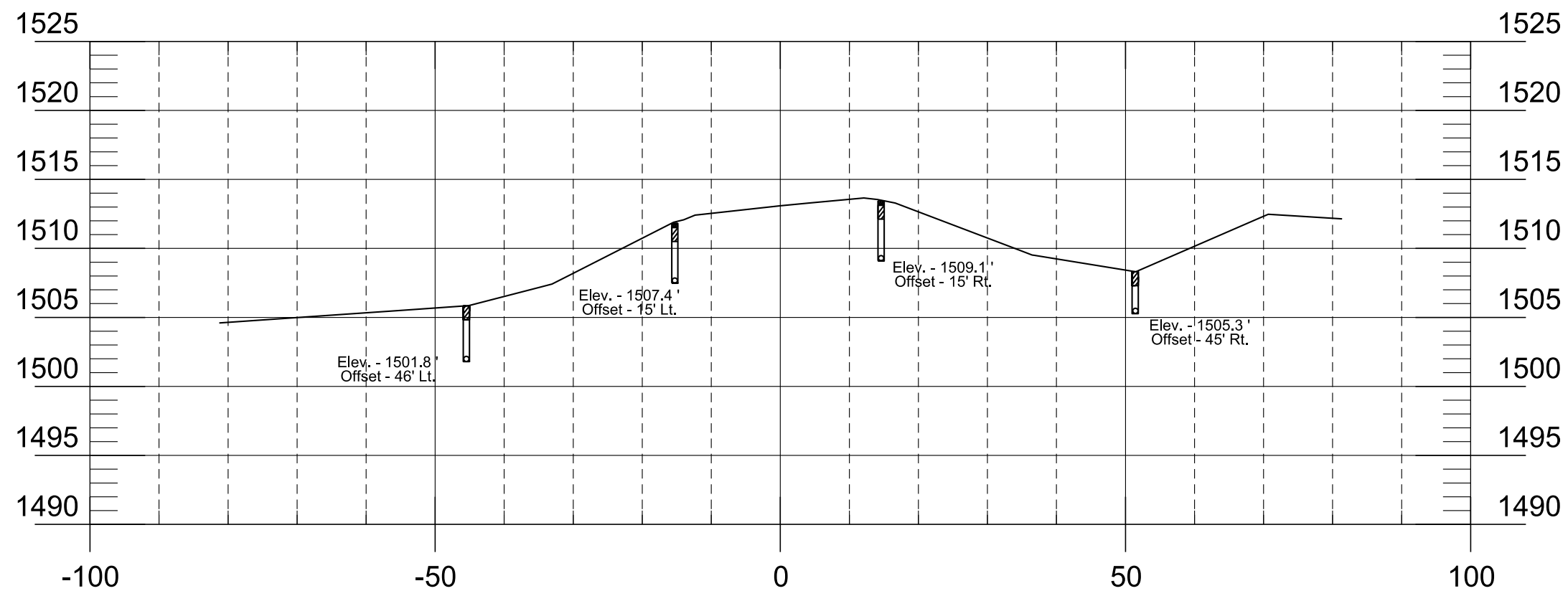




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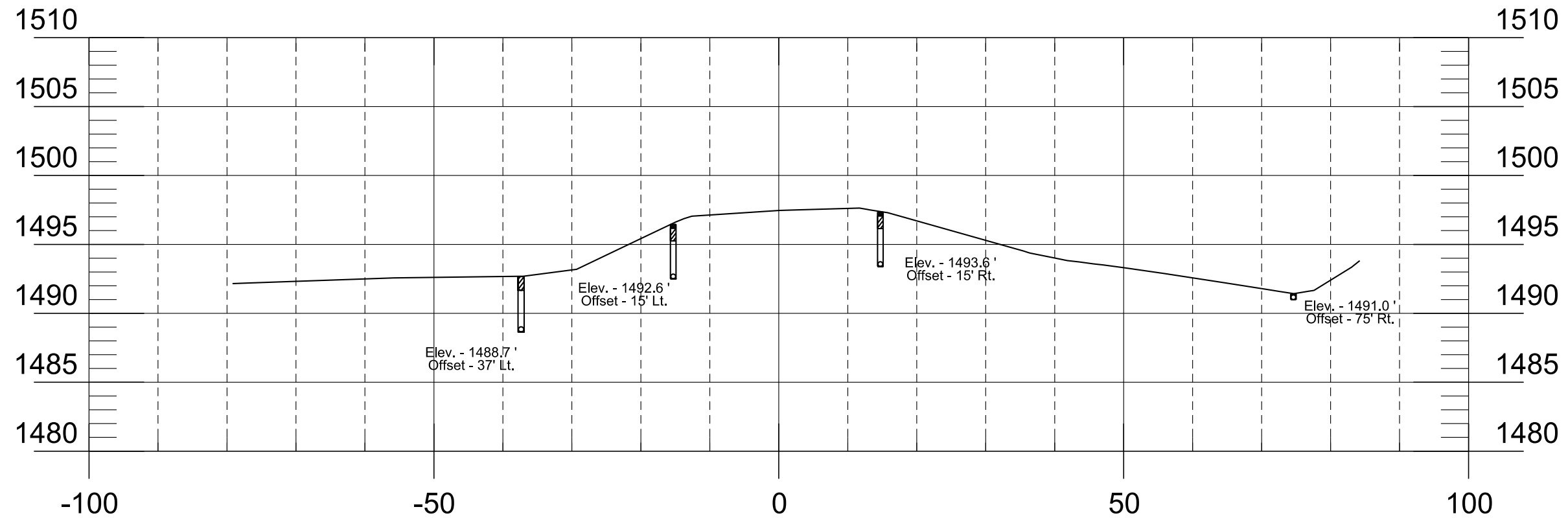


2+00

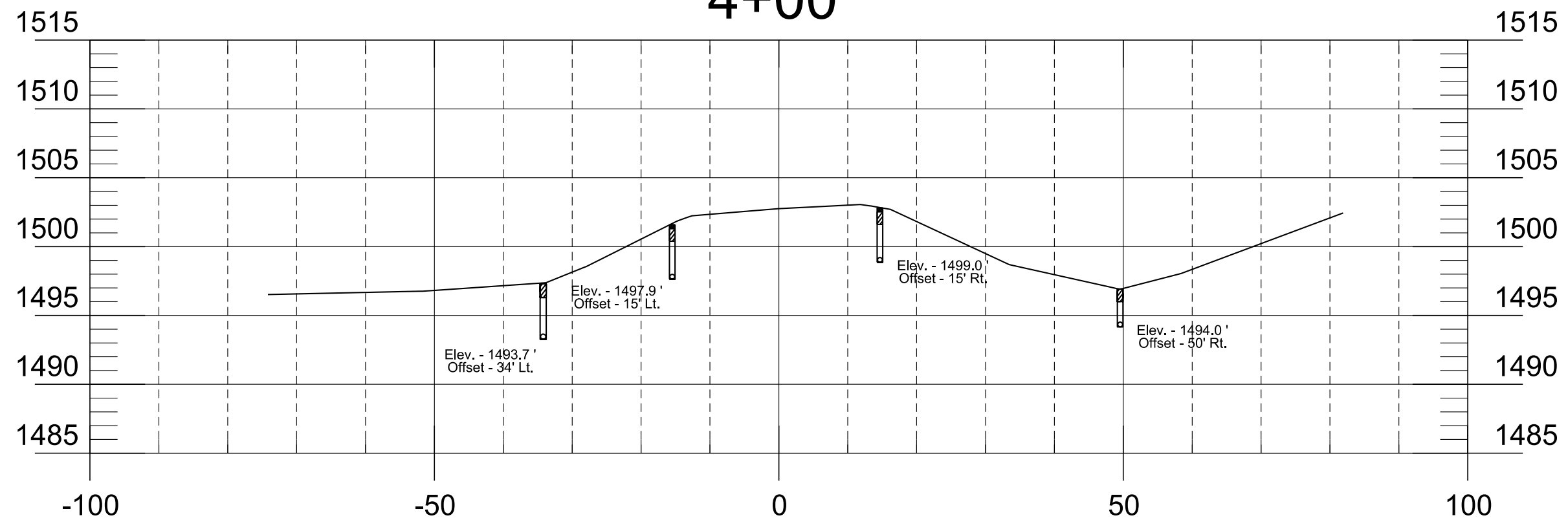


1+00

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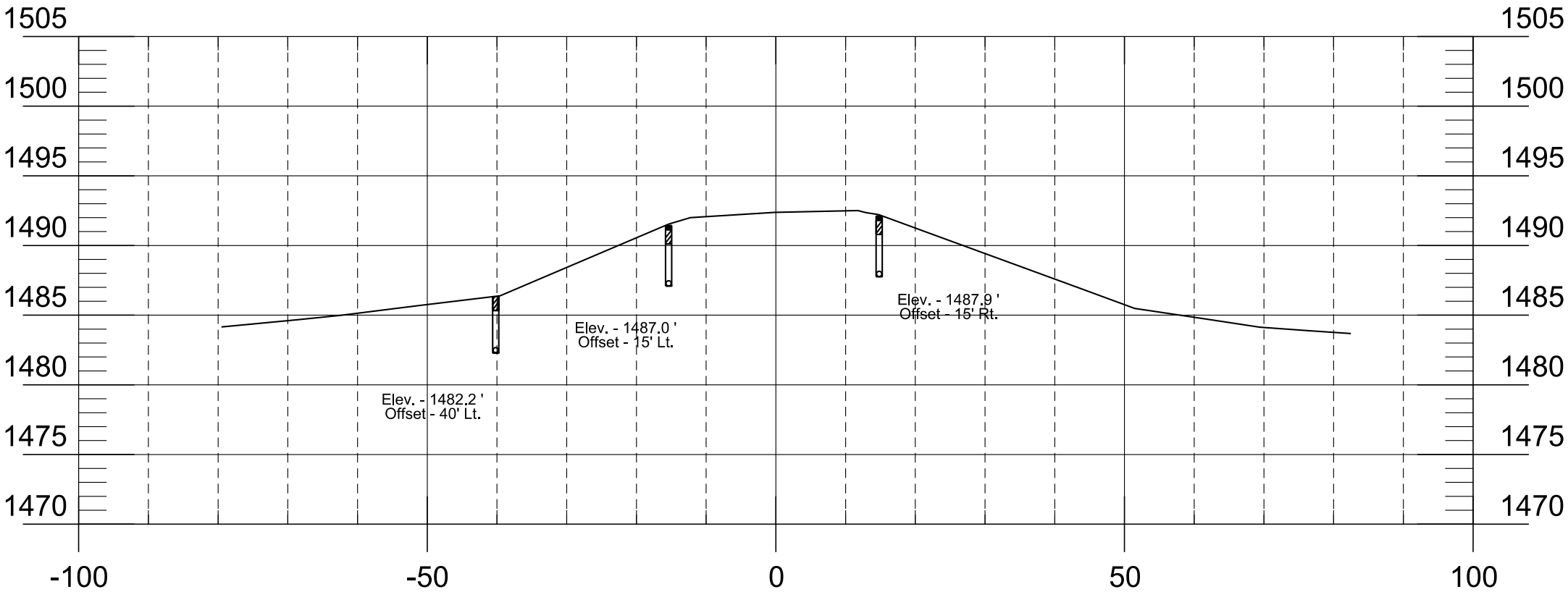


4+00

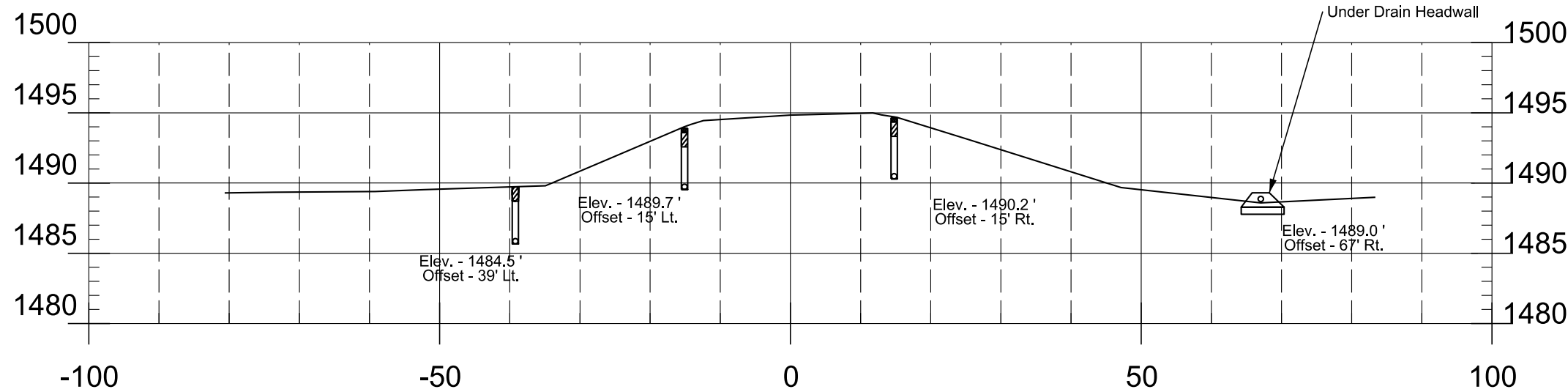


3+00

X SECTIONS



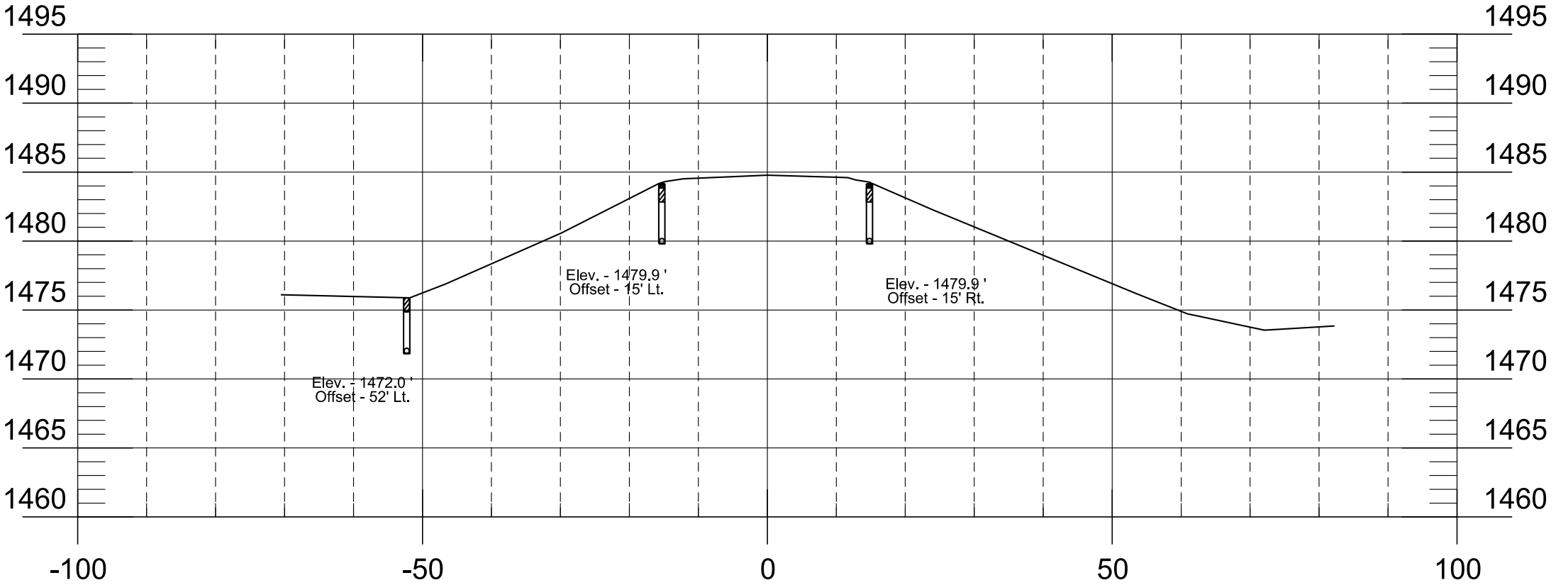
5+00



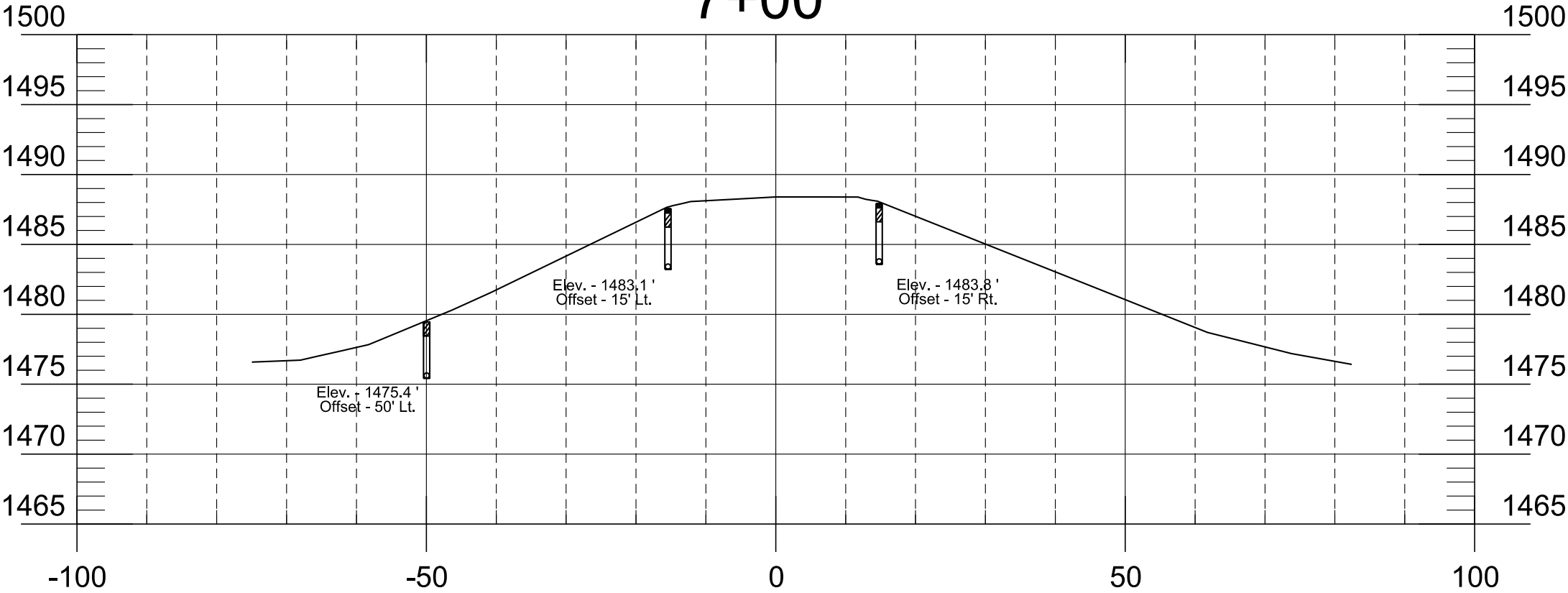
4+50



X SECTIONS

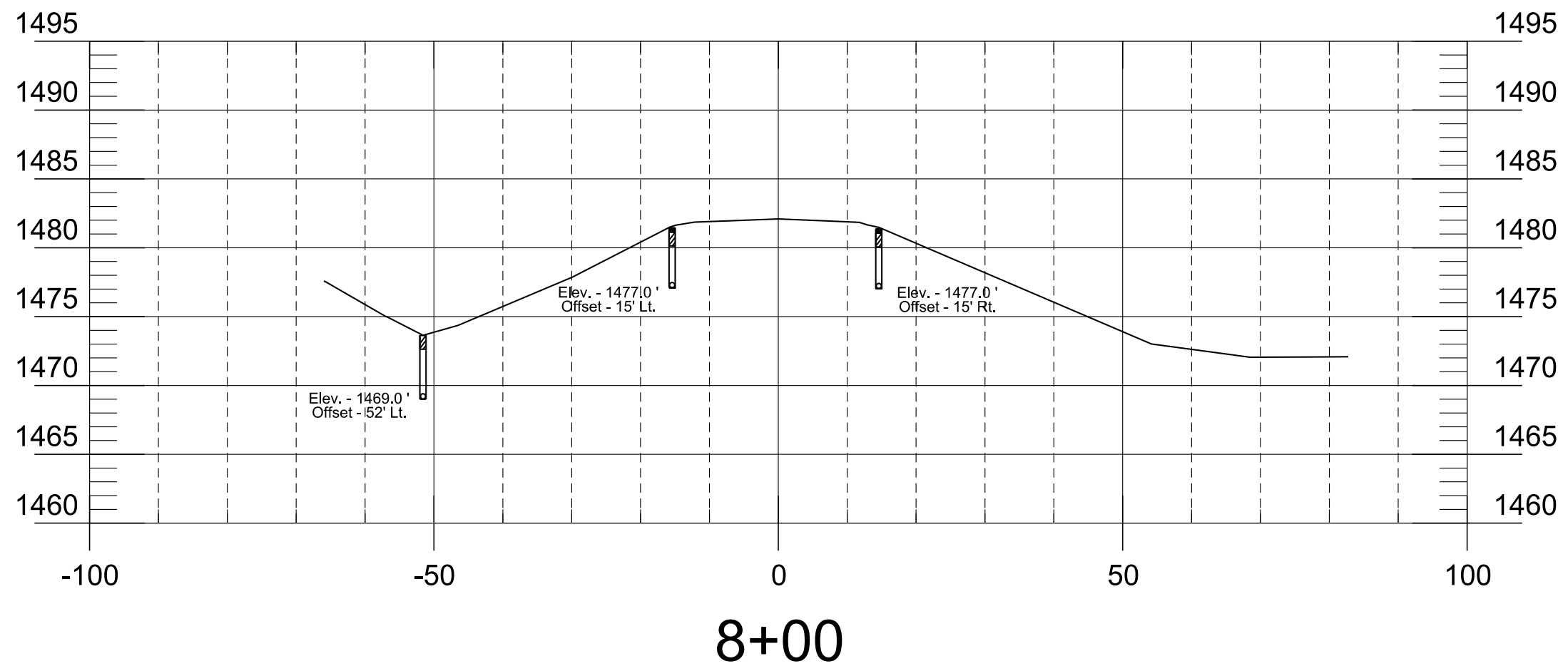
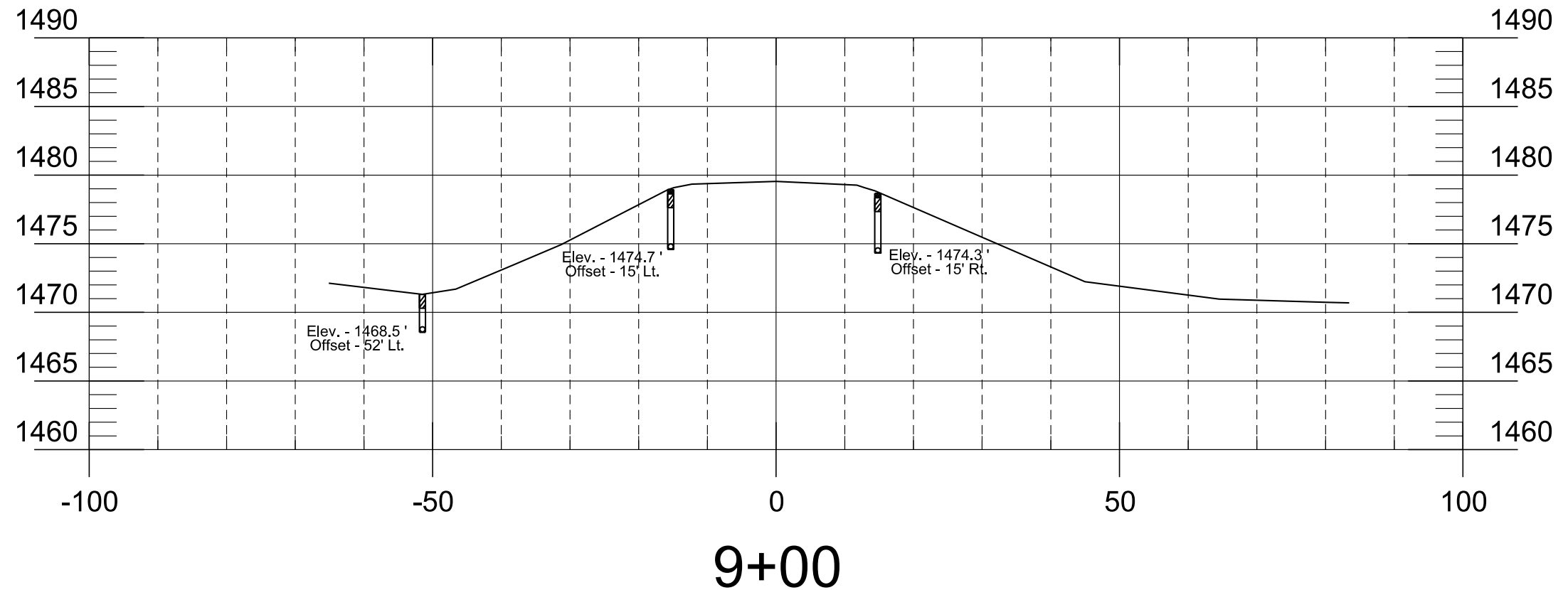


7+00

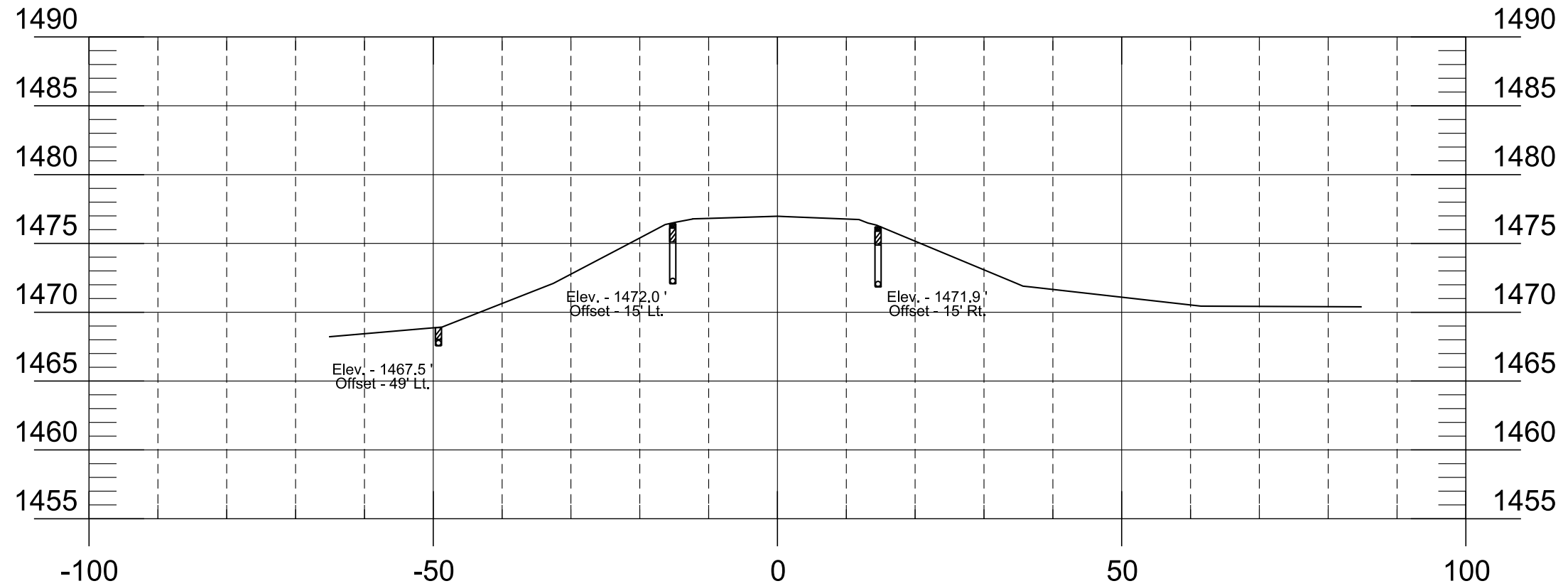


6+00

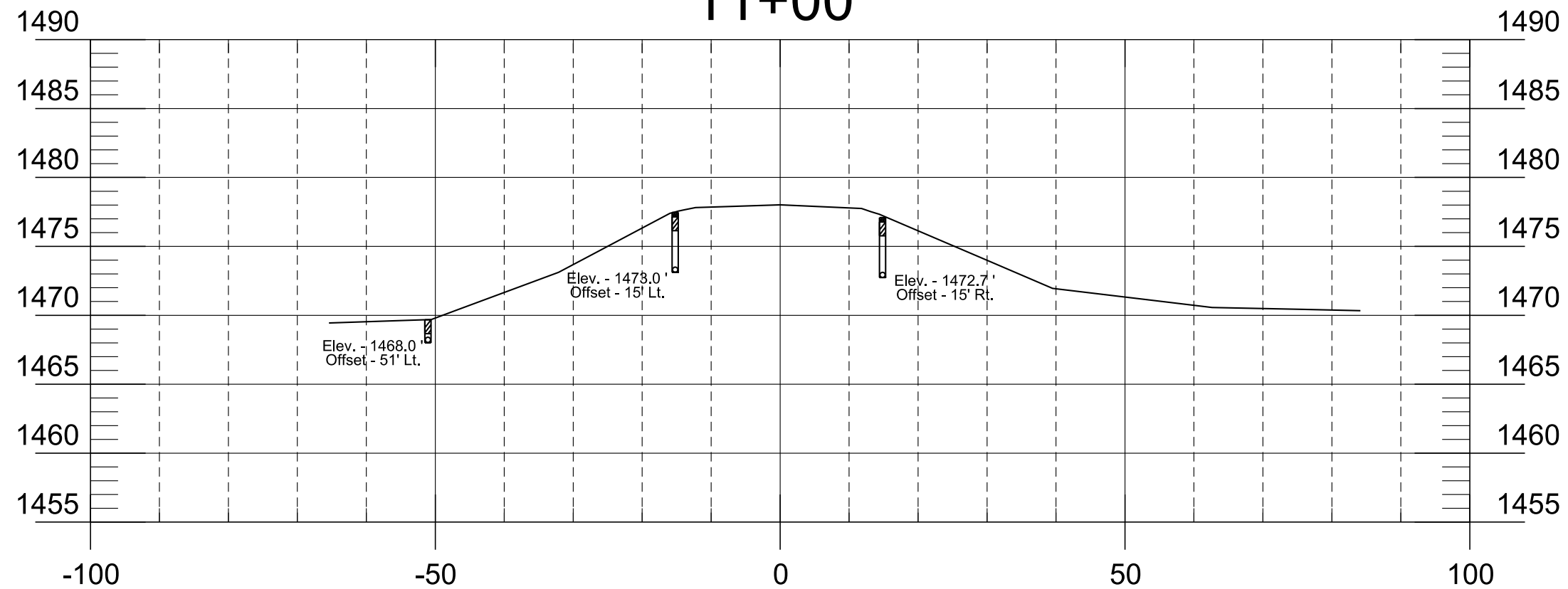
# X SECTIONS



# X SECTIONS

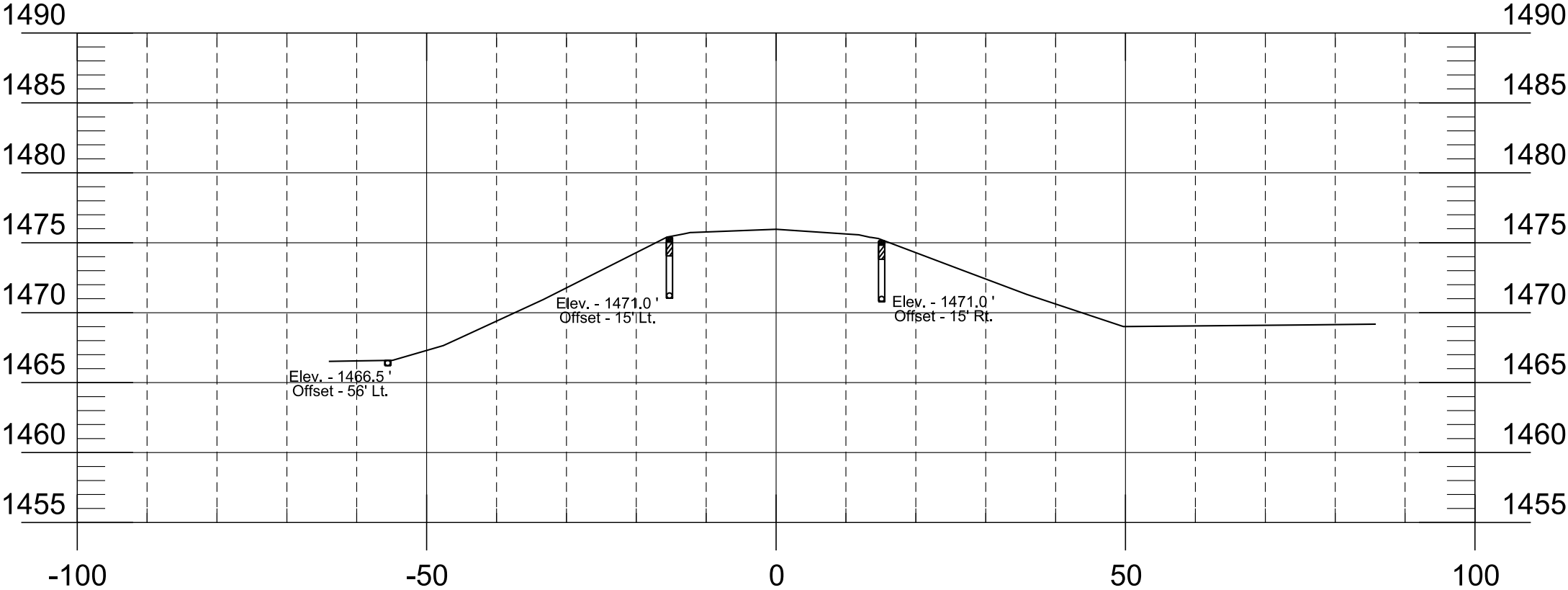


11+00

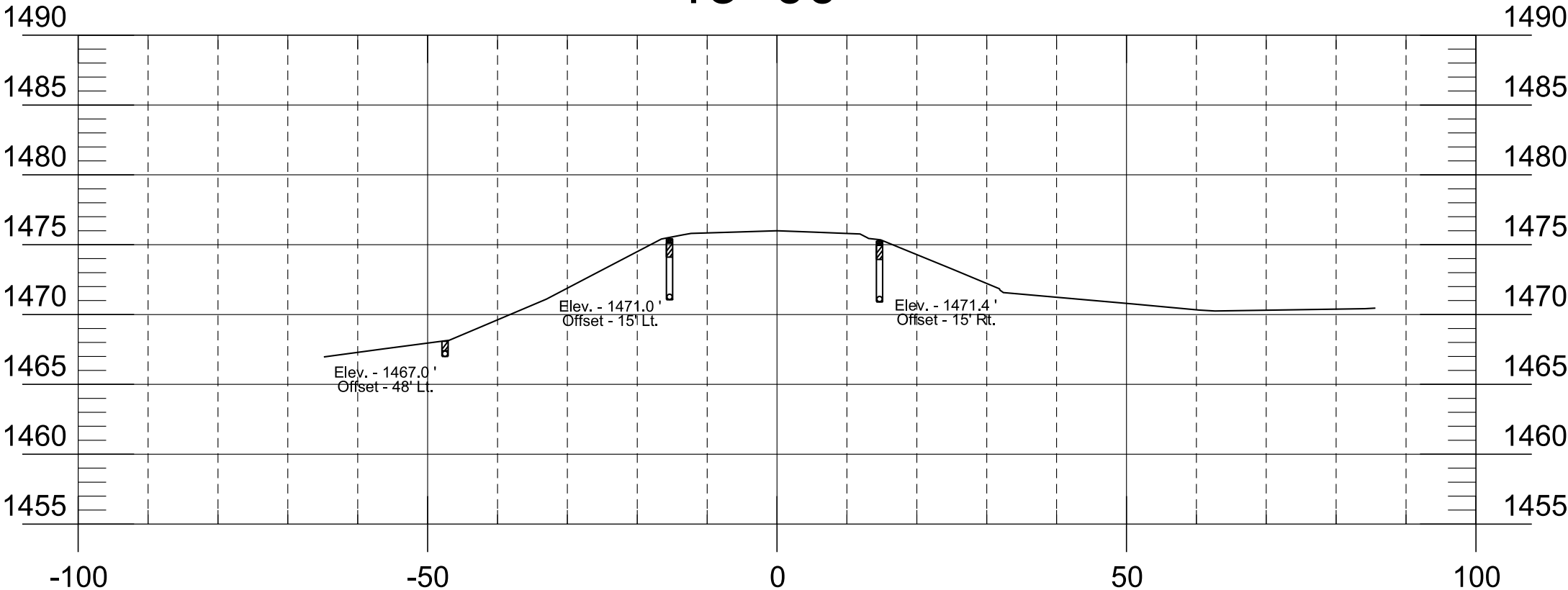


10+00

X SECTIONS

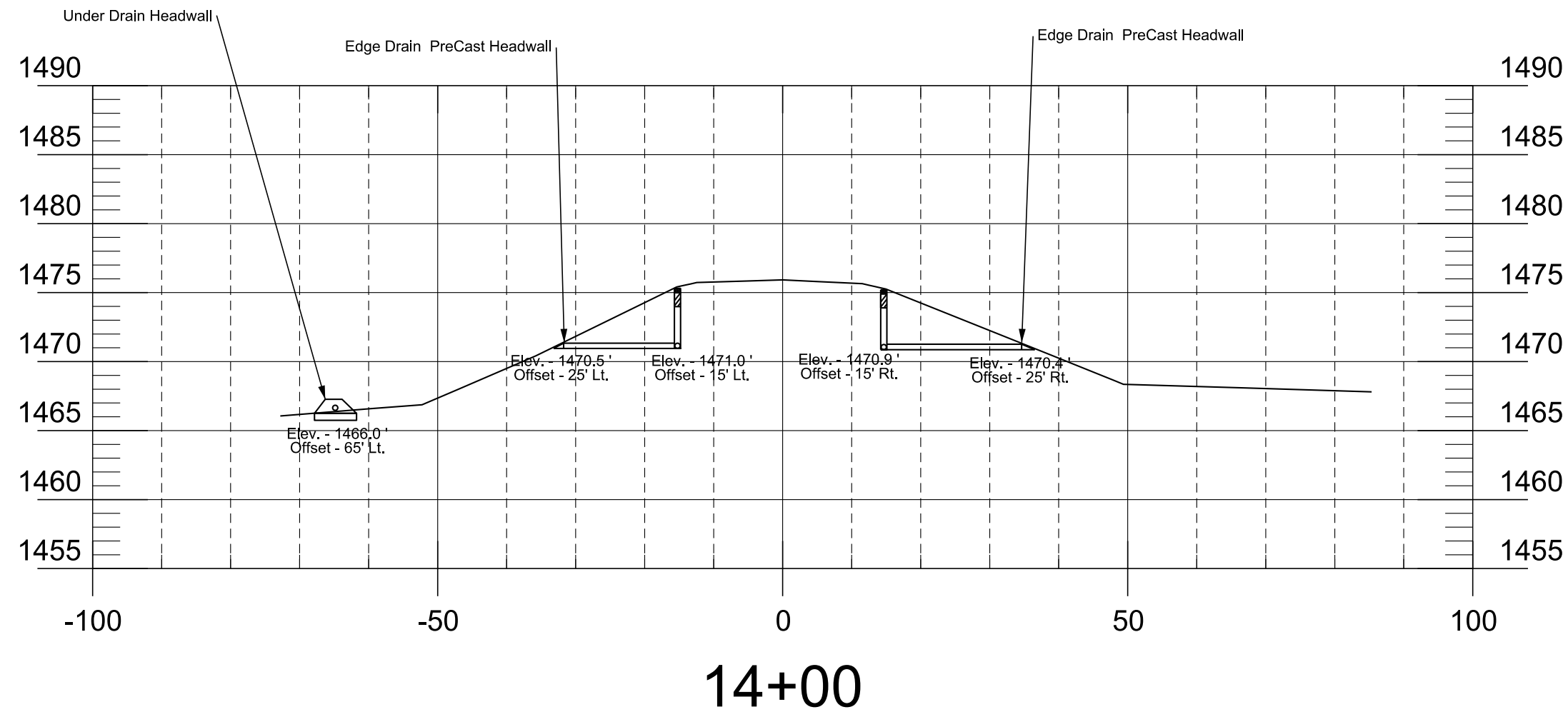


13+00

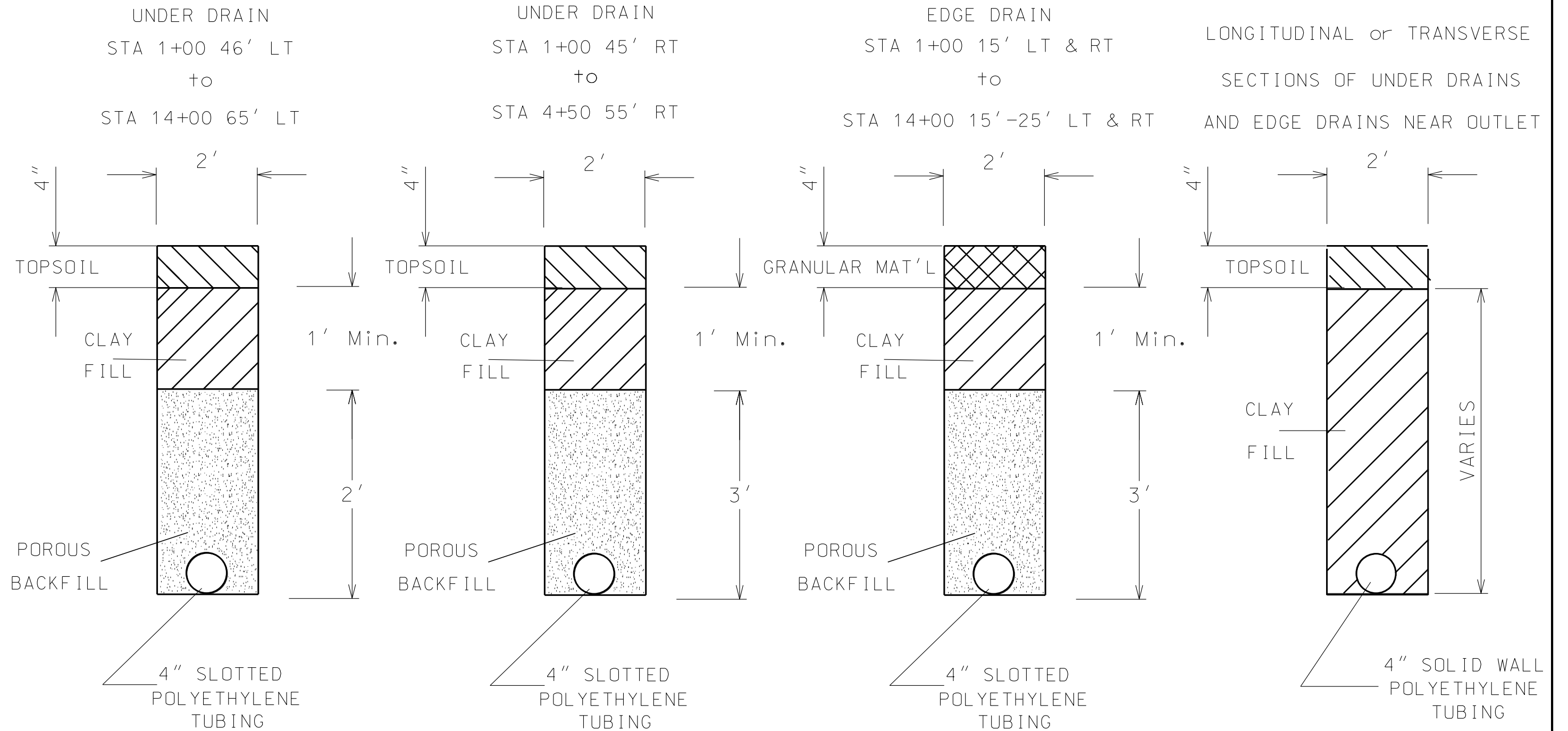


12+00

X SECTIONS



# TYPICAL UNDERDRAIN INSTALLATION



UNDERDRAINS SHALL BE CONSTRUCTED IN  
ACCORDANCE WITH SECTION 680, STANDARD  
SPECIFICATONS FOR ROADS AND BRIDGES 2004 EDITION

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

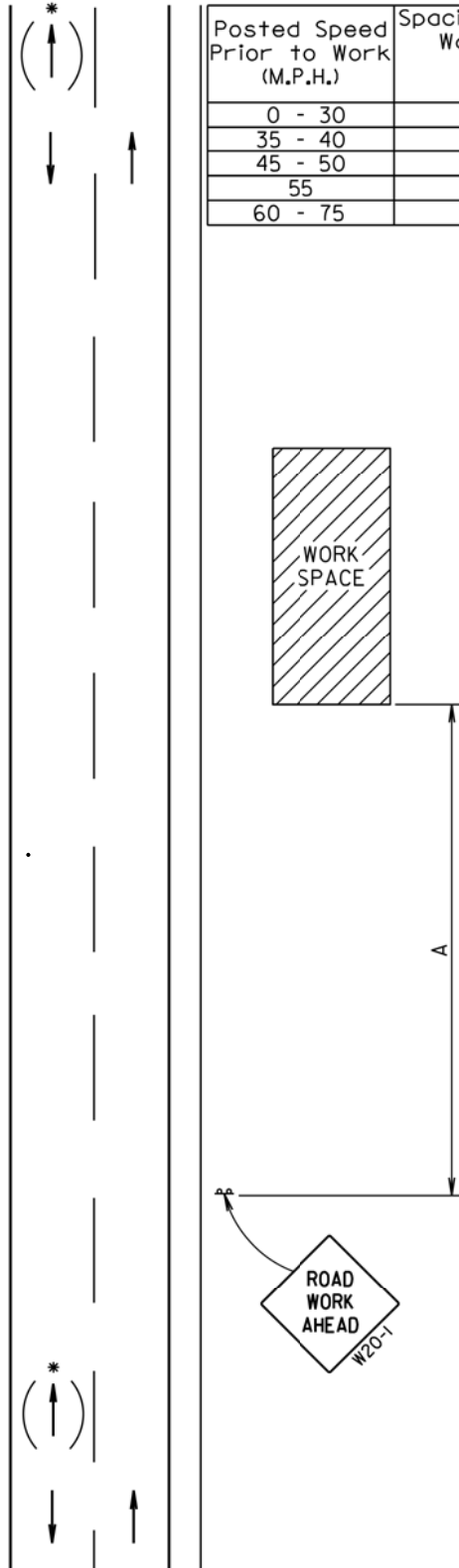
The signs illustrated shall be used where there are distracting situations; such as: vehicles parked on shoulder, vehicles accessing the work site via the highway, and equipment traveling on or crossing the roadway to perform work operations.

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

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

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

Posted Speed Prior to Work (M.P.H.)	Spacing of Advance Warning Signs (Feet) (A)
0 - 30	200
35 - 40	350
45 - 50	500
55	750
60 - 75	1000



July 1, 2005

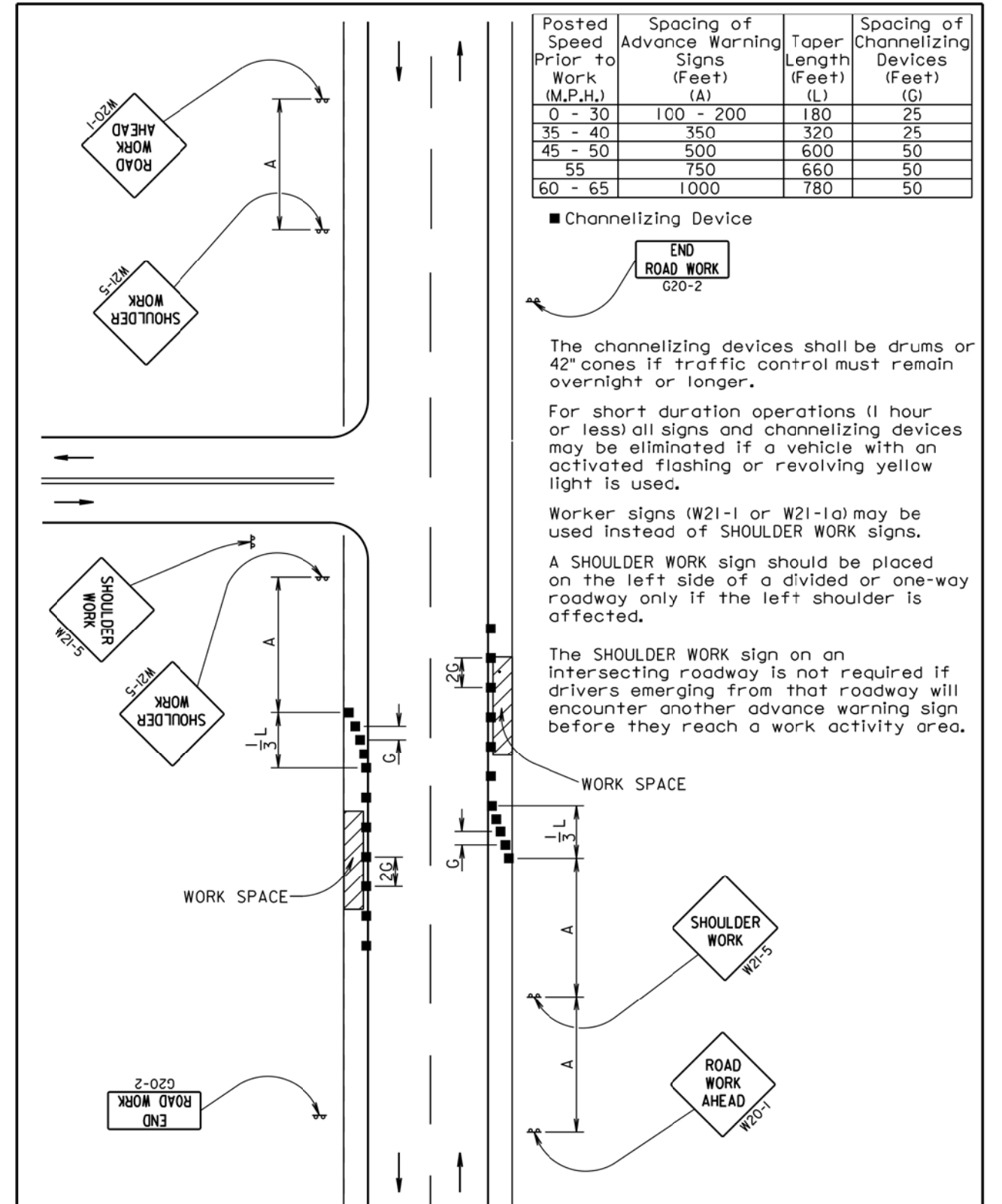
**Published Date: 1st Qtr. 2013**

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## GUIDES FOR TRAFFIC CONTROL DEVICES WORK BEYOND THE SHOULDER

PLATE NUMBER  
634.01

Sheet 1 of 1



February 14, 2011

**Published Date: 1st Qtr. 2013**

SDDOT

## GUIDES FOR TRAFFIC CONTROL DEVICES WORK ON SHOULDERS

PLATE NUMBER  
634.03

Sheet 1 of 1



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

- Flagger
- Channelizing Device

For low-volume traffic situations with short work zones on straight roadways where the flagger is visible to road users approaching from both directions, a single flagger may be used.

The ROAD WORK AHEAD and the END ROAD WORK signs may be omitted for short duration operations (1 hour or less).

For tack and/or flush seal operations, when flaggers are not being used, the FRESH OIL sign (W21-2) shall be displayed in advance of the liquid asphalt areas.

Flashing warning lights and/or flags may be used to call attention to the advance warning signs.

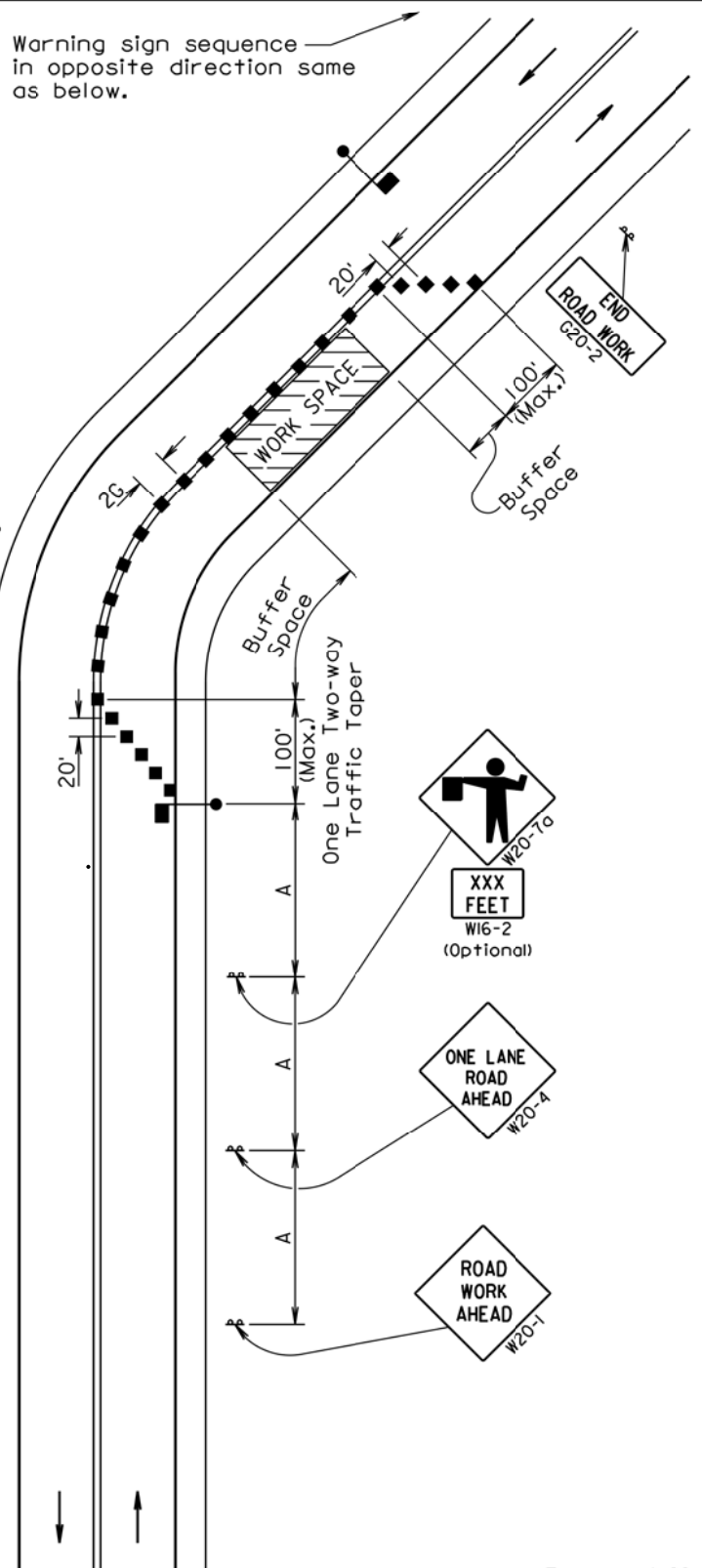
The channelizing devices shall be drums or 42" cones.

Channelizing devices are not required along the centerline adjacent to work area when pilot cars are utilized for escorting traffic through the work area.

Channelizing devices and flaggers shall be used at intersecting roads to control intersecting road traffic as required.

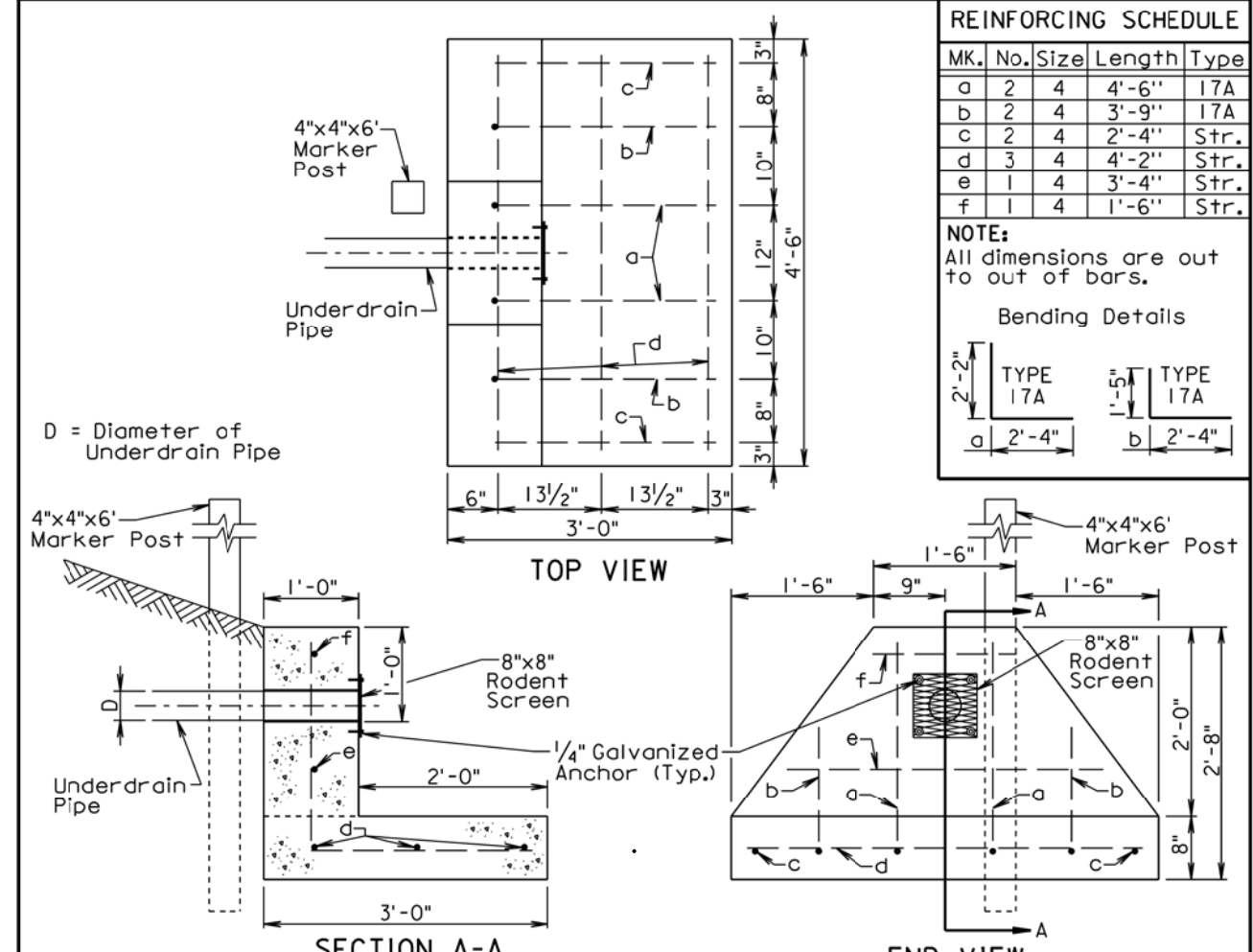
The buffer space should be extended so that the two-way traffic taper is placed before a horizontal or vertical curve to provide adequate sight distance for the flagger and queue of stopped vehicles.

Warning sign sequence in opposite direction same as below.



February 14, 2011

Published Date: 1st Qtr. 2013	S D D O T	GUIDES FOR TRAFFIC CONTROL DEVICES LANE CLOSURE WITH FLAGGER PROVIDED	PLATE NUMBER 634.23
			Sheet 1 of 1



MK.	No.	Size	Length	Type
a	2	4	4'-6"	17A
b	2	4	3'-9"	17A
c	2	4	2'-4"	Str.
d	3	4	4'-2"	Str.
e	1	4	3'-4"	Str.
f	1	4	1'-6"	Str.

NOTE:  
All dimensions are out to out of bars.

Bending Details

TYPE	17A	17A
a	2'-4"	2'-4"
b	2'-4"	2'-4"

#### GENERAL NOTES:

The concrete shall be Class M6. The concrete shall conform to the requirements of section 462 of the Standard Specifications except the minimum curing time shall be 72 hours. It is estimated that 0.55 cubic yards of concrete is required for each unit.

Four cast-in-place or drilled-in 1/4" galvanized anchors shall be placed in the headwall. Each galvanized anchor shall be placed approximately 1" from the outside corner of the rodent screen. It is preferred that the anchor location be centered at an opening in the rodent screen.

All reinforcing steel shall conform to ASTM A615 Grade 60. It is estimated that 25.7 pounds of reinforcing steel is required for each unit.

The underdrain pipe shall be placed in the concrete headwall with the pipe end flush with the concrete surface adjacent to the rodent screen.

The 8"x8" rodent screen shall be galvanized 13 Ga. steel with a diamond shaped flattened mesh pattern. The size shall be 1/2". The size refers to the measurement across the smallest diamond shaped opening measured from the centers of the wires. The rodent screen shall be centered about the hole in the headwall and fastened to the headwall with the appropriate bolts or nuts with washers.

A 4"x4"x6" marker post shall be placed at the approximate location as depicted in the above drawings for each concrete headwall. The marker post shall project 3'± above the ground line. The marker post shall be cedar or treated with a wood preservative and shall be painted with two coats of white paint.

All costs for furnishing and installing the concrete headwall including equipment, labor, and materials including concrete, reinforcing steel, rodent screen, anchors, and marker post shall be incidental to the contract unit price per each for "Concrete Headwall for Underdrain".

March 28, 2001

Published Date: 1st Qtr. 2013	S D D O T	CONCRETE HEADWALL FOR UNDERDRAIN	PLATE NUMBER 680.01
			Sheet 1 of 1

STATE OF SOUTH DAKOTA	PROJECT		SHEET	TOTAL SHEETS
	1806-351		17	17

Plotting Date: 03/04/2013

