Concurrence Point 4B
Hydraulic Design Review

TIP Project No. U-5811
WBS 44384.1.1

SR 1002 (Aviation Parkway) Widening
From NC 54 to I-40
Wake County

September 2026

Purpose of Today's Meeting:
The purpose of this meeting is to review the preliminary drainage design layout (CP 4B).

Table of Contents

1. Introduction and Project Overview 2
1.1 Proposed Action 2
1.2 Meeting Purpose 2
1.3 Project History since May 2026 Merger Meeting 2
2. Anticipated Schedule 2
3. Merger Concurrence Point 4B – Hydraulic Design Review 3
3.1 Redline Drainage Design 3
3.2 Culvert Sizing Report 4
3.3 Erosion Control Plans 4
3.4 Floodpool Permitting 5

Figures

- Vicinity Map

Appendices

- Appendix A – Merger History
- Appendix B – Type III Categorical Exclusion
- Appendix C – Redline Drainage Plans
- Appendix D – Drainage Cross Sections
- Appendix E – Culvert Sizing Reports
- Appendix F – Erosion Control Plans
- Appendix G – Grading and Revegetation Plans

1. Introduction and Project Overview

1.1 Proposed Action

NCDOT is proposing to widen Aviation Parkway (S.R. 1002) approximately 2.5 miles from NC 54 (Chapel Hill Road) to I-40 in Morrisville, Wake County (Division 5). The project would upgrade Aviation Parkway from a two-lane undivided roadway to a four-lane median-divided roadway. The project is located in Morrisville, Cary, and unincorporated areas of Wake County (Please see Figure 1: Vicinity Map.)

A quadrant loop intersection is proposed at the intersection of Aviation Parkway and NC 54, and NC 54 will shift slightly eastward to increase the separation between the roadway and the existing North Carolina Railroad (NCRR) train tracks. This design improves capacity through the intersection. U-turn bulbs will be constructed to allow drivers to change direction at designated points.

A 5-foot-wide sidewalk would be constructed along the northern side of Aviation Parkway, ending just before the Lake Crabtree causeway, and a 10-foot-wide multi-use path would be constructed along the southern side of Aviation Parkway that continues across the causeway. Marked pedestrian crossings would be added across Aviation Parkway at NC 54, the new quadrant loop east of NC 54, International Drive, and Dominion Drive.

The culvert under the Lake Crabtree causeway will be replaced with a new culvert to the west. Other culverts and drainage structures will be extended or replaced as required to accommodate anticipated stormwater flows in the 2050 design year. The Lake Crabtree causeway will be closed for approximately 6 months during construction; however, access to all properties along the corridor will be maintained through detour routes, primarily utilizing McCrimmon Parkway, Airport Boulevard, and I-40.

1.2 Meeting Purpose

The purpose of today's meeting is to review the preliminary drainage design layout with the Merger Team (Concurrence Point 4B) prior to the creation of permit drawings and submittal of the Section 404/401 Permit application. At today's meeting, NCDOT will:

1. Review the proposed hydraulic design, drainage structures, and associated resource considerations.
2. Obtain any other new information from the Merger Team that could affect decision-making and permitting considerations.

1.3 Project History since May 2026 CP 4A Merger Meeting

- NEPA Type III Categorical Exclusion signed May 14, 2026
- Reduced Conflict Intersection at McCrimmon Parkway and Southport Drive eliminated from Project Design
- Proposed left turn lane south of the International Drive/Aviation Parkway intersection eliminated after further coordination with the Wake County site development team
- CP 4A Merger concurrence form signed July 21, 2026 (See Appendix A for Merger History)
- Field Inspection conducted August 27, 2026

2. Anticipated Schedule

The following schedule is anticipated:

- **CP 4B Merger Meeting – September 2026**
- Right of Way Plans – November 2026
- CP 4C Merger Meeting – October 2026
- Right of Way Acquisition – November 2026 through November 2028

- Permit Acquisition – December 2026 through August 2027
- Utility Relocations – October 2027 through April 2029
- Let Date – July 2029

3. Merger Concurrence Point 4B – Hydraulic Design Review

3.1 Redline Drainage Design

Redline drainage plans (dated 8/10/26) are included in **Appendix C** and the cross sections are in **Appendix D.** Stream Information for all hydraulic crossings along the project corridor are depicted in **Table 1.**

Table 1: Stream Information for Major Drainage Structures

Site #	Stream ID #	Name	Stream Classification	Intermittent / Perennial	Channel Width	FEMA
1	SB	Morrisville Tributary	C; NSW	Perennial	Varies from 5-8 ft	Yes
1A	SB	Morrisville Tributary	C; NSW	Perennial	Varies from 8-17 ft	Yes
2	SD	Unnamed Tributary to Crabtree Creek	C; NSW	Perennial	Varies from 2-8 ft	No
4	SP	Unnamed Tributary to Crabtree Creek	C; NSW	Perennial	Varies from 6-13 ft	No
5	Lake Crabtree	Stirrup Iron Creek	B; NSW	Perennial	N/A	Yes

C – Aquatic life, secondary recreation, fresh water; B – All Class C uses in addition to primary recreation, fresh water
NSW – Nutrient Sensitive Waters

The redline drainage plans include improvements to the project's major drainage systems, including culvert replacements, and new cross pipe systems intended to convey flows beneath the roadway while maintaining existing drainage patterns. In addition to the culvert improvements themselves, the plans incorporate associated channel modifications, inlet and outlet treatments, headwalls, and endwalls designed to improve drainage function and reduce erosion at stream and drainage crossings.

The proposed system includes drainage pipes, grated inlets, catch basins, manholes, junction boxes, and associated conveyance structures that work together to manage runoff from the roadway, sidewalk/multi-use path, and median included in the project design. The drainage design includes modifications to roadside ditches where necessary to accommodate the proposed roadway improvements and offsite drainage.

The plans also identify areas requiring coordination with existing utilities and existing drainage infrastructure to facilitate construction and tie-ins to the surrounding drainage network. Water and Sanitary Sewer relocation plans are being designed as a part of this project. The design team is also coordinating with private utility owners to relocate all conflicting utilities.

Streams, wetlands, floodplains, and other environmental resources located within or adjacent to the project corridor are included to support environmental review and permitting coordination. Locations where proposed drainage improvements intersect or occur near jurisdictional resources are documented to evaluate potential effects associated with the project.

Preliminary drainage calculations have been developed and are being refined to reflect the final approved redline drainage design. Updated calculations will be included with subsequent permitting and CP 4C submittals.

3.2 Culvert Sizing Report

The U-5811 Project includes the proposed replacement of five Major Drainage Structures, previously presented as part of the February 2025 CP 2A Discussion. As project design and coordination efforts have continued, it was determined that all structures, with exception for the Lake Crabtree Causeway culvert, should be designed as welded steel pipes with portions being installed trenchlessly via jack and bore installation at select crossings. Welded steel pipes simplify the construction phasing and create less impacts to traffic during construction. Changes to the proposed structures are listed in **Table 2.**

Table 2: Major Drainage Structures Comparison

Site #	Stream ID #	Existing Structure	2025 CP 2A Proposed Structure	2026 CP 4B Proposed Structure
1	SB	3-60" RCP OAL = 60'	2 @ 8'x8' RCBC w/ 2' sill (buried 1') OAL = 160'	1 @ 96" Welded Steel Pipe (Buried 1.0') & 2 @ 78" WSP w/1.5' Sills w/ CIP Concrete Headwall and Endwall; OAL = 152'
1A	SB	1-8'x6' RCBC OAL = 39'	2 @ 10'x7' RCBC (buried 1') w/ 2' sill in one barrel* OAL = 67'	2 @ 108" Welded Steel Pipe (Buried 1.0') w/1.5' Sill Floodbench Barrel w/ CIP Concrete Headwall and Endwall; OAL = 100'
2	SD	1-48" RCP OAL = 48'	2 @ 72" RCPs (buried 1') OAL = 144'	2 @ 60" Welded Steel (Buried 1.0') w/ Sills/Baffles (1.0' Main Barrel & 1.5' Floodbench Barrel) at Inlet, Outlet, and 23' Spacing throughout w/ CIP Concrete Headwall and Endwall; OAL = 134'
4	SP	2-72" RCP OAL =65'	2 @ 8'x7' RCBC (buried 1') OAL = 166'	1 @ 132" Welded Steel Pipe (WSP) w/ CIP Concrete Headwall and Endwall and 1.0' Sills/Baffles at Inlet, Outlet, and 23' Spacing throughout Culvert; OAL = 140'
5	Lake Crabtree	1 @ 15' x 14' RCBC OAL = 79'	1 @ 16'x14' RCBC, OAL = 119'	2 @ 9' X 14' RCBC w/ 6" Beveled Headwall; Anticipated Length = 107'

RCP – Reinforced Concrete Pipe; RCBC – Reinforced Concrete Box Culvert; OAL – Overall Length

Further information regarding the proposed drainage structures are detailed in the Culvert Sizing Reports (CSRs) (dated 8/5/26) in **Appendix E.**

3.3 Erosion Control Plans

The Erosion Control Plans (dated 8/10/26) are included in **Appendix F**. The Erosion Control plans include the following additional construction elements related to drainage:

- Construction phasing for work adjacent to streams and drainage features, including temporary diversions, pump-around operations, and staged culvert/drainage structure installation.

- Extensive use of temporary erosion and sediment control measures, including sediment basins, skimmer basins, silt fence, sediment check structures, temporary slope drains, and stilling basins.
- Requirements for rapid stabilization of disturbed areas through seeding, matting, and other temporary groundcover measures to reduce sediment transport during construction.
- Installation of riprap, geotextile, and channel protection measures at ditch, outfall, and stream crossing locations to control erosion and improve drainage stability.
- Detailed procedures for isolating work areas from flowing water and managing runoff during construction to minimize impacts to aquatic resources.

Other elements detailed in the erosion control plans for water quality and resource protection include the following:

- Emphasis on sediment retention and treatment before discharge through the use of skimmer basins, infiltration features, sediment traps, and stilling basins.
- Stream and surface water protection measures, including temporary diversions, controlled discharge locations, and turbidity management during in-stream work.
- Stabilization requirements with accelerated timelines in environmentally sensitive areas to reduce the duration of exposed soils and potential sediment loading to downstream waters.
- Permanent channel, bank, and outfall protection features that provide long-term erosion resistance and reduce maintenance needs after construction.
- Reforestation and revegetation measures using native species to restore vegetative cover, improve long-term soil stability, and support habitat recovery. Additional details are included in the Grading and Revegetation Plans (see **Appendix G**).
- Compliance with NCDEQ/NCDOT erosion and sediment control requirements and incorporation of controls intended to protect downstream water quality during and after construction.

3.4 Floodpool Permitting

Wake County and NRCS have an existing agreement to maintain the Crabtree Creek Watershed floodpool, which includes areas within Lake Crabtree and surrounding areas. Fill within the floodpool is anticipated as a result of project, located within the stream crossing near Evans Road (Site 4) and Lake Crabtree (Site 5).

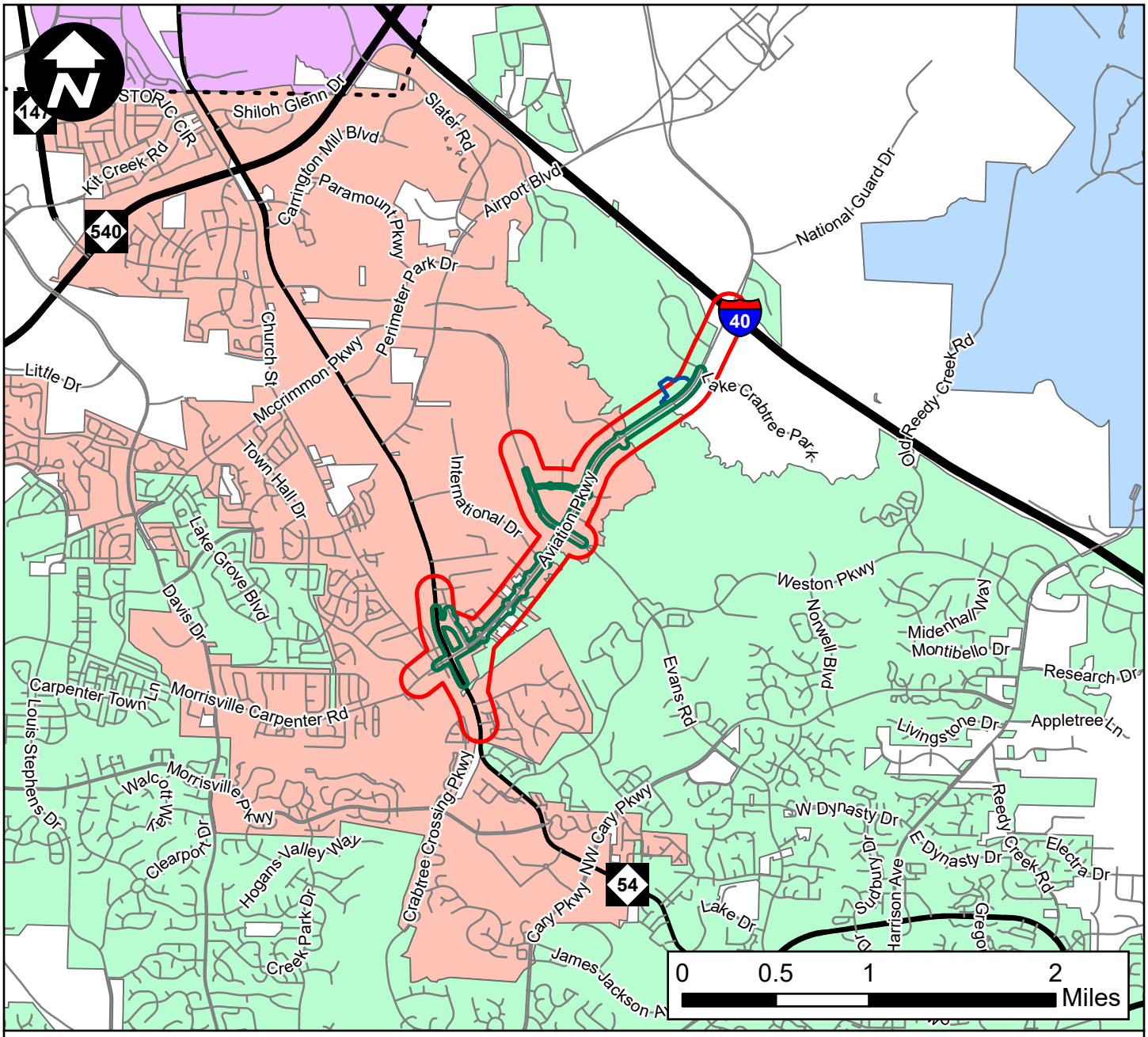
- Site 4: Cut and fill will be balanced within the floodpool at this location, and no additional mitigation is required
- Site 5: To balance the fill added as part of the project, NCDOT proposes a 4.5-acre mitigation site in a contiguous upland area in the northeastern quadrant of the Lake Crabtree causeway

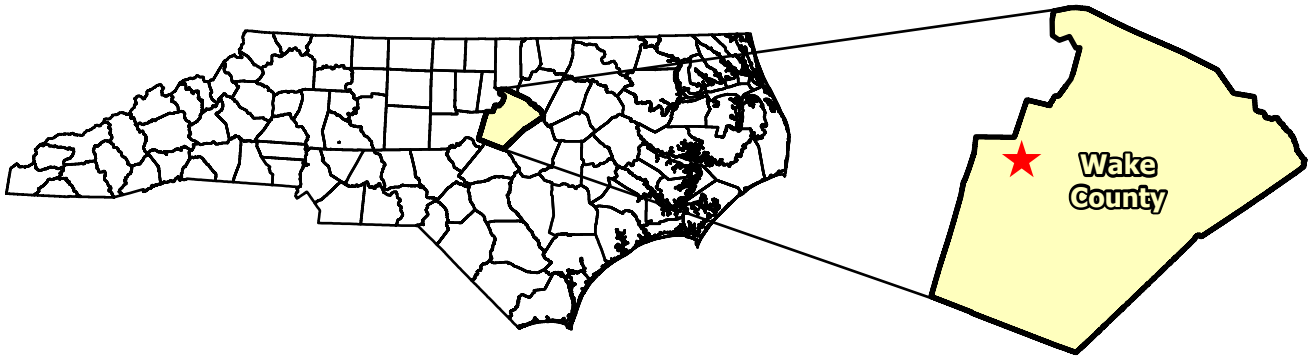
NCDOT and Wake County will enter into a Memorandum of Understanding (MOU) for the use of Wake County land in the northeastern quadrant of the Lake Crabtree causeway to be utilized for mitigation efforts related to fill within the Crabtree Creek Watershed floodpool. NCDOT is preparing a Crabtree Creek Watershed Floodpool Permit Application to submit to Wake County. The package of materials will include permit drawings and mitigation plans that will be discussed in further detail during CP 4C. Coordination with Wake County and NRCS is ongoing.

Figures

Vicinity Map

Docusign Envelope ID: 45420136-3772-4525-800E-B43356A18DFF





Project Study Area
Natural Resources Study Area
Flood Mitigation Area
County Boundaries
Cary
Durham
Morrisville
Raleigh

Figure 1: Vicinity Map
STIP Project No. U-5811
Aviation Parkway Widening
Division 5, Wake County, NC

Appendix A

Merger History

CP 1 & 2 (Update): Met 2/14/2024; Signed 2/23/2024

i) Add FHWA to the Merger team

ii) Purpose and Need

(1) Congestion: The primary purpose of this project is to reduce congestion on Aviation Parkway in order to improve the Level of Service (LOS) in the design year peak hours along the corridor and at signalized intersections.

(2) Mobility: A secondary benefit of this project is to improve east-west mobility through Morrisville and to I-40 and I-540/NC 540

iii) Study area: a 1000'-foot wide corridor, 500 feet on either side of the Aviation Parkway centerline, with a wider area around the NC 54 intersection.

iv) Build Alternative 1: Widen Aviation Parkway to a four-lane median divided best fit section with a 23' median and multimodal accommodations.

v) No Build Alternative

CP 2A & 3 (Update): Met 2/12/2025, Signed 2/25/2025

i) Bridging Decisions

(1) Site 1 – Remove and replace existing culvert with 2 @ 8' x 8' RCBC

(2) Site 1A - Remove and replace existing culvert with 2 @ 10' x 7' RCBC

(3) Site 2 – Remove and replace existing culvert with 2 @ 72" RCPs

(4) Site 4 – Remove and replace existing culvert with 2 @ 8' x 7' RCBC

(5) Site 5 – Remove and replace existing culvert with 1 @ 16' x 14' RCBC

ii) Least Environmentally Damaging Practicable Alternative (LEDPA)

(1) Build Alternative 1: Widen Aviation Parkway to a four-lane median divided best fit section with a 23-foot median and multimodal accommodations.

(a) With a minimized typical section across the NC 54/Railroad intersection with two 11-foot travel lanes, two 14-foot outside travel lanes, a 4-foot median, and 5-foot sidewalks on both sides.

(b) With a minimized typical section across the Lake Crabtree causeway with four 12-foot travel lanes, 10-foot shoulders, a 4-foot median, and a 10-foot multiuse path on the east (south) side.

(2) Alternative A loop (northeast quadrant) at the Aviation Parkway/NC 54 intersection.

CP 4A: Met 5/13/2026, Signed 7/21/2026

i) Avoidance and Minimization Measures

(1) Utilizing best-fit widening strategy to allow for alignment shifts

(2) Narrowing of typical section across the Lake Crabtree causeway and west of NC 54

(3) Sidewalk alignment shifts to avoid impacts to structures at the Pugh House. NCDOT will submit a landscaping plan and obtain a COA prior to right-of-way acquisition on the Pugh House property

(4) Using sidewalks instead of multiuse path along the northern side of Aviation Parkway

(5) Causeway alignment shifts to avoid Section 4(f) impacts to Lake Crabtree County Park

(6) NC 54 Quadrant Loop alignment shift to eliminate a stream crossing and avoid impacts to Cotten Pond

(7) Steepening slopes on the eastern side of NC 54 to avoid impacts to Cedar Fork District Park.

(8) Utilizing headwalls and wingwalls to shorten culvert lengths at stream crossings.

(9) Selection of the northeastern causeway quadrant for flood pool mitigation to avoid an eagle's nest and Lake Crabtree County Park, as well as minimize wetland impacts

(10) NCDOT will continue coordinating and collaborating with Wake County and the USDA Natural Resource Conservation Service (NRCS) to resolve the plans, processes, and areas utilized for flood pool mitigation.

Appendix B

Type III Categorical Exclusion

Docusign Envelope ID: 45420136-3772-4525-800E-B43356A18DFF

Type III Categorical Exclusion Action Classification Form

STIP Project No.	**U-5811**
WBS Element	44384.1.1
Federal Project No.	N/A

A. Project Description:

NCDOT is proposing to widen Aviation Parkway (S.R. 1002) for approximately 2.5 miles from NC 54 (Chapel Hill Road) to I-40 in Morrisville, Wake County (Division 5). The project would upgrade Aviation Parkway from a two-lane undivided roadway to a four-lane median-divided roadway. The project is located in Morrisville, Cary, and unincorporated areas of Wake County (Please see Figure 1: Vicinity Map.)

A quadrant loop intersection is proposed at the intersection of Aviation Parkway and NC 54, and NC 54 will shift slightly eastward to increase the separation between the roadway and the existing North Carolina Railroad (NCRR) train tracks. A quadrant loop intersection, utilizing Southport Drive, is also proposed at the intersection of Aviation Parkway and McCrimmon Parkway/Evans Road. These designs improve capacity through the two intersections. U-turn bulbs will be constructed to allow drivers to change direction at designated points.

A 5-foot-wide sidewalk would be constructed along the northern side of Aviation Parkway, ending just before the Lake Crabtree causeway, and a 10-foot-wide multi-use path would be constructed along the southern side of Aviation Parkway that continues across the causeway. Marked pedestrian crossings would be added across Aviation Parkway at NC 54, the new quadrant loop east of NC 54, International Drive, and Dominion Drive.

The culvert under the Lake Crabtree causeway will be replaced with a new culvert to the west. Other culverts and drainage structures will be extended or replaced as required to accommodate anticipated stormwater flows in the 2050 design year. The Lake Crabtree causeway will be closed for approximately 4 to 6 months during construction; however, access to all properties along the corridor will be maintained through detour routes, primarily utilizing McCrimmon Parkway, Airport Boulevard, and I-40.

B. Description of Need and Purpose:

In the design year (2050), at least one segment and one intersection on Aviation Parkway are anticipated to operate at unacceptable levels (level of service E or F). Additionally, with recently completed projects adjacent to U-5811, the project corridor is the only 2-lane section along an approximately 8-mile stretch between Davis Drive and I-540/Brier Creek.

The primary purpose of the project is to reduce congestion on Aviation Parkway to improve the level of service in the design year peak hours along the corridor and at signalized intersections. Another purpose is to improve east-west mobility through the Town of Morrisville and to I-40 and NC 540.

C. Categorical Exclusion Action Classification:

Type III

D. Proposed Improvements:

N/A

Docusign Envelope ID: 45420136-3772-4525-800E-B43356A18DFF

E. Special Project Information:

Project and Merger History
When the project began in 2015, NCDOT planned to use state funds, and a Minimum Criteria Determination Checklist (MCDC) was proposed. Merger meetings were held in March 2018 (Concurrence Point [CP] 1 and 2) and July 2019 (CP 2A and 3). A scoping letter was mailed to agencies in April 2019.

The project was suspended in late 2019 due to funding restrictions and restarted in 2023. NCDOT now anticipates using federal funds for right-of-way (ROW) and/or construction of the project, and the Federal Highway Administration (FHWA) was added to the Merger Team as the lead federal agency. Since the project restart, the project purpose, design, and coordination have been re-evaluated. Concurrence on CP1 and 2 were updated in February 2024. Concurrence on CP 2A and 3 were updated in February 2025.

Based on the current schedule, ROW is anticipated to begin in Summer 2026 and construction will begin in Summer 2029.

Anticipated Permits
An Individual Section 404 Permit from the U.S. Army Corps of Engineers (USACE) and corresponding Section 401 Individual Water Quality Certification from the North Carolina Division of Water Resources (NCDWR) are anticipated. In addition, a Neuse River Basin Buffer Authorization from NCDWR is anticipated. Permitting decisions are at the discretion of the USACE and NCDWR.

A flood control permit from Wake County and the Natural Resource Conservation Service (NRCS) will be prepared due to proposed fill within the Crabtree Creek Watershed.

A State Floodplain Compliance Permit Type A or B will be prepared for this project because of encroachment into the floodplain and floodway.

Water Resources
Natural Resources Study Area Overview – The Natural Resources Study Area is a 25-foot buffer from the proposed construction limits, and is anticipated to encompass impacts to natural resources resulting from this project. In addition, a separate Flood Mitigation Area has been identified in the northwest quadrant of the Aviation Parkway/Lake Crabtree crossing; flood mitigation is required to offset the fill within the Lake Crabtree Flood Easement (see Flood Control Mitigation section below for more detail).

Water resources in the Natural Resources Study Area and Flood Mitigation Area are part of the Neuse River Basin (US Geological Survey (USGS) Hydrologic Unit [03020201]). No streams within 1.0 mile downstream have been designated as Outstanding Resource Waters (ORW), High Quality Waters (HQW), or water supply watersheds (WS-I or WS-II). The North Carolina 2022 Final 303(d) list of impaired waters identifies Brier Creek and Crabtree Creek as impaired waters due to fair, poor, or severe bioclassification present in, or located within 1.0 mile downstream of these study areas. There is no Section 303(d) impairment listed for sedimentation or turbidity. No streams within these study areas have been designated by the USACE as Navigable Waters under Section 10 of the Rivers and Harbors Act.

Field Investigations – Delineations have been conducted several times as the design was refined and because of updated waters of the U.S. (WOTUS) regulations. Additional delineations are planned within the Flood Mitigation Area as the design of that area is refined.

- August 2016 – within the original U-5811 study area (200 feet off centerline); note, the 2016 delineation is now obsolete due to time lapsed and changes in WOTUS regulations and is superseded by the 2024 update.

- July 2018 – within an additional project area at the intersection of Aviation Parkway and NC 54; note, the 2018 delineation is now obsolete due to time lapsed and changes in WOTUS regulations and is superseded by the 2024 update.
- October 2024 – updated the entire corridor within a narrower area (25-foot buffer of proposed project slope stakes)
- October 2025 – within additional project areas at the intersection of Aviation Parkway and McCrimmon Parkway/Evans Road, and an area on the west side of Aviation Parkway near Lake Crabtree that may be used for flood pool mitigation

Aquatic resources anticipated to be impacted by the project or resulting flood mitigation are summarized in **Table 1**. These total approximately 3.9 acres of wetland, 830 linear feet of stream, and 3.6 acres of open water.

Table 1: Aquatic Resources Anticipated to be Impacted

Map ID	Aquatic Resource Type	Hydrologic Classification	Amount in Flood Mitigation Study Area	Amount in Natural Resources Study Area
Lake Crabtree	Non-wetland Open Water	Littoral	1.28 ac.	2.50 ac.
Pond PA	Non-wetland Open Water	Littoral	-	0.07 ac.
SAA	Non-wetland Stream	Intermittent Stream	-	N/A (Outside Natural Resources Study Area)[1]
SB	Non-wetland Stream	Perennial Stream	-	451 LF
SD	Non-wetland Stream	Perennial Stream	-	194 LF
SP	Non-wetland Stream	Perennial Stream	-	190 LF
SQ	Non-wetland Stream	Intermittent Stream	-	108 LF
WB	Headwater Forest Wetland	Riparian Wetland	-	0.12 ac.
WC	Headwater Forest Wetland	Riparian Wetland	0.36 ac.	0.53 ac.
WS	Bottomland Hardwood Forest Wetland	Riparian Wetland	0.63 ac.	2.28 ac.
WT	Bottomland Hardwood Forest Wetland	Riparian Wetland	-	0.23 ac.

[1]Streams located outside Natural Resources Study Area, but within 50 feet of boundary and subject to riparian buffer rules

Jurisdictional Determination – A combined Preliminary Jurisdictional Determination (PJD) and Approved Jurisdictional Determination (AJD) for the project was issued by the USACE on May 5, 2025 (SAW-2024-02307). The combined PJD/AJD determined Pond PA as non-jurisdictional water. A portion of the Natural Resources Study Area is documented in a pending Jurisdictional Determination for a Town of Morrisville project (SAW-2024-02307). All wetlands within the Natural Resources Study Area documented in the Town of Morrisville Jurisdictional Determination were determined non-jurisdictional and are therefore not documented in this Categorical Exclusion.

Streamside riparian zones within the Natural Resources Study Area are protected under provisions of the Neuse River Basin Buffer Rules administered by NCDWR. A Buffer Determination for the Natural Resources Study Area was issued by the NC Division of Water Resources (NCDWR) on February 26, 2025. A Buffer Determination for Stream SAA located outside the Natural Resources Study Area is anticipated to be submitted in Winter 2026.

A JD and Buffer Determination for aquatic resources in the Flood Mitigation Area are anticipated to be submitted in Spring 2026.

Protected Species

The U.S. Fish and Wildlife Service (USFWS) Information for Planning and Consultation (IPaC) tool lists the following federally protected species as potentially occurring within the Natural Resources Study

Docusign Envelope ID: 45420136-3772-4525-800E-B43356A18DFF

Area, under the Endangered Species Act (ESA). Species status, habitat presence and biological conclusion are summarized in **Table 2**.

Table 2: Protected species potentially occurring within the Natural Resources Study Area[1]

Scientific Name	Common Name	Federal Status	Habitat Presence	Biological Conclusion
Perimyotis subflavus	Tricolored bat	PE	Yes	MA-LAA
Danaus plexippus	Monarch butterfly	PT	Unresolved	Not Required
Rhus michauxii	Michaux's sumac	E	No	No Effect
Haliaeetus leucocephalus	Bald eagle	BGPA	Yes	No Effect
Myotis septentrionalis	Northern long-eared bat	E	Yes	MA-LAA

[1]IPaC data checked on December 15, 2025

PE – Proposed Endangered, E – Endangered, PT – Proposed Threatened, BGPA – Bald and Golden Eagle Protection Act, MA-LAA – May Affect Likely to Adversely Affect

Tricolored Bat – The US Fish and Wildlife Service has issued a programmatic conference opinion (PCO) in conjunction with FHWA, USACE, and NCDOT for the tricolored bat (TCB) (*Perimyotis subflavus*) in eastern North Carolina. The PCO covers the entire NCDOT program in Divisions 1-8, including all NCDOT projects and activities. NCDOT, FHWA, and USACE have agreed to conservation measures which will avoid/minimize take to TCBs. These conservation measures apply to all counties in Divisions 1-8. The programmatic determination for TCB for the NCDOT program is May Affect, Likely to Adversely Affect. Once the TCB is officially listed, the PCO will become the programmatic biological opinion (PBO) by formal request from FHWA and USACE. The PBO will ensure compliance with Section 7 of the Endangered Species Act for approximately five years (effective through December 31, 2028) for all NCDOT projects with a federal nexus in Divisions 1-8, which includes Wake County, where U-5811 is located.

Monarch Butterfly – The U.S. Fish and Wildlife Service (USFWS) proposed to list the monarch butterfly as a threatened species under the Endangered Species Act (ESA) in December 2024. However, as of December 2025 the final decision has been delayed, and the status has been moved to "long-term action," meaning no final ruling is expected for at least another year. No regulatory protections will take effect until the listing is finalized. Until that time, proposed species do not receive formal ESA protections, though federal action agencies are still required to ensure that their actions do not jeopardize the continued existence of the species. Action agencies may initiate consultation with the USFWS to obtain a conference opinion. If and when the listing is finalized, and at the agency's request, the Service may adopt the conference opinion as a biological opinion—provided no relevant new information has emerged and no substantial changes to the proposed action have occurred.

Michaux's Sumac – Potentially suitable habitat for Michaux's sumac is present along the maintained rights-of-way within the Natural Resources Study Area. Suitable Michaux's sumac habitat is not present within the Flood Mitigation Study Area. Kimley-Horn biologists conducted pedestrian surveys for Michaux's sumac within areas of potentially suitable habitat in the Natural Resources Study Area on September 16, 2016, October 8, 2024, and again on October 8, 2025, and no individuals were observed. Additionally, a review of the NCNHP database records (updated October 2025) indicates that there are no known occurrences of Michaux's sumac in or within 1.0 mile of either study area. Due to the lack of observed individuals and the lack of known occurrences, it has been determined that the proposed project will have "No Effect" on Michaux's sumac.

Bald and Golden Eagle Protection Act – The Bald and Golden Eagle Protection Act is enforced by the USFWS. Golden eagles do not nest in North Carolina. Habitat for the bald eagle primarily consists of mature forests in proximity to large bodies of open water for foraging. Large dominant trees are utilized for nesting sites, typically within 1 mile of open water.

A desktop-GIS assessment of the Natural Resources Study Area and Flood Mitigation Area, as well as the area within a 1.13-mile radius of the project limits, was performed in October 2024 and October 2025

Docusign Envelope ID: 45420136-3772-4525-800E-B43356A18DFF

using 2023 and 2025 color aerials, respectively. One waterbody (Lake Crabtree) large enough or sufficiently open to be considered a potential feeding source was identified. A review of the NCNHP database records (updated October 2025) indicates there was an active bald eagle nest observed within 1.0 mile of the study areas; however, the nest was noted as inactive in 2011. Since there is foraging habitat as well as a known occurrence within the review area, a bald eagle survey of the study areas and the area within 660 feet of the project limits was conducted by Kimley-Horn biologists on October 8, 2024, and again on October 8, 2025. No bald eagle nests were observed in or within 660 feet of the study areas. However, as part of the October 2024 species surveys, Kimley-Horn observed a nesting pair of bald eagles utilizing the headwaters of Lake Crabtree northwest of Aviation Parkway. Further information regarding this nest and potential effects from the project can be found in the *2024 Protected Species Memorandum*.

Northern Long-Eared Bat – The USFWS has issued a programmatic biological opinion (PBO) in conjunction with the FHWA, the USACE, and NCDOT for the northern long-eared bat (NLEB) (*Myotis septentrionalis*) in eastern North Carolina. The PBO covers the entire NCDOT program in Divisions 1-8, including all NCDOT projects and activities. Although this programmatic covers Divisions 1-8, the USFWS only considers NLEBs to be known or potentially found in 30 counties in Divisions 1-8 (Figure 2, PBO). NCDOT, FHWA, and USACE have agreed to conservation measures which will avoid/minimize mortality of NLEBs. The programmatic determination for NLEB for the NCDOT program is May Affect, Likely to Adversely Affect. The PBO will ensure compliance with Section 7 of the Endangered Species Act for ten years (effective through December 31, 2030) for all NCDOT projects with a federal nexus in Divisions 1-8, which includes Wake County, where TIP U-5811 is located.

Flood Control Mitigation

The proposed road widening will result in impacts to the Lake Crabtree Flood Easement managed by Wake County as the local sponsor to the NRCS. The current project design is anticipated to result in the discharge of approximately 22,800 cubic yards of fill within the flood pool, defined as areas within Lake Crabtree between 275.1 and 284.0 feet in elevation, and approximately 1,100 cubic yards of fill as sediment storage, defined as areas within Lake Crabtree between 275.1 feet in elevation and the bottom of the existing lake.

On-site mitigation for the loss of flood storage will be conducted. NCDOT has identified the northwest quadrant of the Lake Crabtree crossing as the preferred location to provide this flood mitigation (see Figure 2C for approximate location). The necessary flood pool mitigation will result in approximately 0.8 acres of wetland impacts and 1.0 acres of open water impacts. Water resource impacts resulting from the necessary flood pool mitigation will be included in the Section 404 permit from USACE. The mitigation is anticipated to be on land owned by Wake County, who will be responsible for maintaining the area following completion of the mitigation construction.

Floodplains

Approximately 9.7 acres of regulatory floodways, 8.9 acres of 100-year floodplains, and 3.6 acres 500-year floodplains cross the Natural Resources Study Area, as shown on Figures 2A-2C.

Community Resources

A Community Characteristics Report (CCR) and Indirect and Cumulative Effects Screening Report (ICE) were prepared in 2016. A Community Impact Assessment (CIA) was prepared in February 2024 and an addendum was prepared in January 2026 to reflect design refinements. Community resources are illustrated in Figures 3A-3C.

Recreational Resources – Four recreational resources are located along the project corridor and several others are located nearby as described in the 2024 CIA and 2026 CIA Addendum.

Docusign Envelope ID: 45420136-3772-4525-800E-B43356A18DFF

Lake Crabtree County Park is located south of Aviation Parkway at the project's eastern terminus. The property is leased by Wake County from the Raleigh-Durham Airport Authority (RDUAA). Based on the current design, there are no impacts to Lake Crabtree County Park.

Lake Crabtree, also near the eastern terminus, is used for recreational purposes. Based on the current design, less than 0.1 acres of ROW acquisition and approximately 0.3 acres of temporary construction easement (TCE) are needed for the culvert replacement across the causeway. A cofferdam is likely to be used for construction of the culvert, with construction anticipated to last 4 to 6 months. The new culvert will allow for boat access to the northern side of the causeway, and the new ROW will not affect the recreational use of Lake Crabtree.

The project will modify the driveway and have a small encroachment into Sarah Woody Jenkins Park, a 0.25-acre Town of Morrisville pocket park located on the west side of NC 54 within NCDOT and NCRR ROW. These changes will not affect use of the park which is not considered a 4(f) resource.

Cedar Fork District Park is located near the project's western terminus at the southeastern quadrant of the Aviation Parkway/NC 54 intersection. The parcels utilized for the park property are owned by Wake County and maintained by the Town of Morrisville for recreational purposes. The park is accessed from Aviation Parkway at Liberty Hill Pass. Left turns out of the park entrance will be restricted with the addition of a median along Aviation Parkway; however, U-turn bulbs will be constructed on Aviation Parkway to allow drivers to change direction at designated points.

Businesses – Three business parks are located along the project corridor: Gateway Centre, Commonwealth, and Southport. Minor right-of-way acquisition and construction easement are proposed on ten multi-business properties along Aviation Parkway within the business parks; however, the use and access of business parks will be maintained during and after project construction. Access to some businesses will be restricted to right-in/right-out with the addition of a median along Aviation Parkway; however, U-turn bulbs will be constructed to allow drivers to change direction at designated points.

Places of Worship – The Hindu Society of North Carolina (HSNC) and BAPS Mandir are located along the project corridor. The access drive to BAPS Mandir will be reconfigured but all existing movements will be retained.

Schools – A Campbell University satellite campus is in the southwestern quadrant of the Aviation Parkway/Southport Drive intersection. Access to and use of the campus will be maintained during and after project construction.

There are 15 Wake County Public School System bus stops on Aviation Parkway within the project corridor and approximately 62 school buses use this route daily resulting in 124 daily trips. The majority of the corridor will be constructed in phases, allowing for bus stops to continue in place; however detour routes will be required for approximately 4 to 6 months while the Lake Crabtree causeway is closed. Wake County Public Schools will be notified in advance of any construction activities that result in school bus detours.

Multimodal Accommodations

The Town of Morrisville noted that the project corridor is frequently used by pedestrians, especially between HSNC and Cedar Fork District Park (where guests often park during HSNC events). Due to the lack of existing facilities along this route, pedestrians often walk along the grass strip on the side of Aviation Parkway. The addition of a 5-foot sidewalk on the north side of Aviation Parkway and a multi-use path on the south side will improve multimodal connectivity by creating a continuous corridor. Phased construction will allow one side of Aviation Parkway to remain open at all times during construction. Additional construction-phase pedestrian accommodations will be evaluated during final design.

Docusign Envelope ID: 45420136-3772-4525-800E-B43356A18DFF

GoTriangle Regional Route 310 travels along Evans Road/McCrimmon Parkway, crossing Aviation Parkway. Two bus stops servicing Regional Route 310 are located within the project study area on the eastern side of McCrimmon Parkway and the western side of Evans Road near the McCrimmon-Evans/Aviation Parkway intersection. Construction of the proposed project will not impact the Route 310 bus stops along the corridor, and detours along this bus route are not anticipated.

Emergency Services
The Morrisville Fire Department Administrative building is located along the project corridor in the northwest quadrant of the NC 54/Aviation Parkway intersection. The project will remove an access drive along Morrisville-Carpenter Road intended for emergency vehicles at this facility. However, emergency dispatches no longer originate from this facility, and this impact is not anticipated to affect the use of the property.

Aviation Parkway is used regularly by emergency responders to access adjacent areas, including I-40. Phased construction will allow for emergency responders to utilize the corridor during most construction activities, and detours will be available while the Lake Crabtree causeway is closed. Wake County EMS and the Morrisville Fire Department will be notified of the closure schedule and detour routes during the construction phase.

Public Involvement
The first public meeting was held on February 18, 2016 to introduce the project to the community. Approximately 30 attendees attended and six comments were received. Comments generally expressed concern over increased traffic in the area and access to businesses along the corridor. The public also voiced the need for safety, multimodal improvements, and improving the wildlife corridor along the Lake Crabtree causeway.

A second public meeting was held on June 12, 2019 to present the preliminary design, including two alternatives for a quadrant loop at the NC 54 intersection. Approximately 60 attendees attended and a total of 274 written comments were received at the meeting, through mail after the meeting, via email, and from publicinput.com in addition to responses from the Town of Morrisville, Cotten Place HOA, BAPS Mandir, and Southport Business Park. There was not a clear preference by the public on the quadrant alternative. Four comments were opposed to the addition of a quadrant loop in either location, citing concerns with longer travel distances, traffic delays, and access concerns at the Aviation Parkway/NC 54 intersection, as well as community impacts from the quadrant loop footprint.

A third public meeting was held on May 12, 2025 to present the updated design. A newsletter with public meeting information was translated in English, Mandarin Chinese, Hindi, and Vietnamese. Approximately 28 people attended and 43 comments were received, with most of them expressing opinions on the design details. Topics cited most frequently in the comments included access concerns, queuing/traffic concerns, intersection design, traffic signal design, typical sections, ROW/property impacts, bicycle and pedestrian mobility, public transit questions, safety concerns, and project schedule.

Right-of-Way and Relocations
It is anticipated that temporary construction easement (TCE) will be required on 81 parcels along the project corridor. Permanent ROW acquisition is anticipated for 71 parcels along the project corridor, and relocations are anticipated for five parcels. Further information regarding relocations is highlighted in **Table 3.**

Docusign Envelope ID: 45420136-3772-4525-800E-B43356A18DFF

Table 3: Project Relocation Details

Property Owner	Plan Parcel Number	Structures Relocated	Structure Use
Reali, LLC.	8	2	Residence and associated carport
Town of Morrisville	50	1	Public Works facility in process of redesign
Julia Cotten Heirs, LLC.	74	1	Vacant structure
Brian W. Dumont	80	2	Landscaping business
Becklee Place, Inc.	81	1	Landscaping business

Cultural Resources

Historic Architecture – A review of the NC State Historic Preservation Office (NC SHPO) HPOWEB 2.0 online database identified two National Register listed properties, Pugh House (WA4868) and Williamson Page House (WA0708), and one Study List historic district, Morrisville Historic District (WA0707) within the project study area. The NCDOT Historic Architecture Group determined that an effects assessment for the Pugh House was necessary on June 10, 2016. The boundaries of Williamson Page House will not be affected by the proposed project. In a letter on March 24, 2016, NC SHPO stated that while the Morrisville Historic District was placed on the State Study List in 1991, changes over time have changed the district to the point that they no longer consider it historic. Therefore, the Morrisville Historic District is not subject to any federal or state preservation law or regulation.

The project is anticipated to have a total permanent impact of 635 square feet on the Pugh House historic designated property as well as approximately 1,750 square feet of temporary construction easement. Construction would require removal of two trees and four shrubs; however the affected landscaping will be replaced. NCDOT has coordinated with Town of Morrisville (the property owner) and Capital Area Preservation (Wake County's historic preservation organization) and will prepare a landscape plan and request a Certificate of Appropriateness prior to right-of-way (ROW) acquisition. Additionally, protection fencing will be utilized around the remaining landscaping and smokehouse during construction activities. The NCDOT Historic Architecture Group and NC SHPO determined that the project would have No Adverse Effect on the Pugh House on April 23, 2026.

As the project design was refined and expanded into areas outside the initial cultural resources study area, NCDOT Historic Architecture also provided three separate No Historic Properties Affected Forms for expansion areas to the cultural resources study area.

Archaeology – On October 2, 2018, the NCDOT Archaeology Group provided a No Archaeological Survey Required Form, stating that based on the modern development and previous surveys of the initial cultural resources study area, it is unlikely that significant, intact archaeological remains would be present and impacted by the project. In January 2025, the NCDOT Archaeology Group conducted a field investigation of expansion areas to the cultural resources study area, noting that the study area update encroaches upon the Clements-Cotten Cemetery near the corner of NC 54 and Johnnie Robertson Street. In an updated No Archaeological Survey Required Form on July 1, 2025, the NCDOT Archaeology Group determined that this cemetery is outside of the construction limits for the project, and that the project should be considered compliant under Section 106.

Tribal Coordination – On November 20, 2023, a tribal coordination letter was sent to the Catawba Indian Nation for comment on the proposed project. In a letter dated December 29, 2023, the Catawba Indian Nation stated they had no immediate concerns with regard to traditional cultural properties, sacred sites, or Native American archaeological sites within the boundaries of the study area. The Catawba Nation requested the be notified if Native American artifacts or human remains during ground disturbing activities.

Section 4(f)

FHWA determined that Sarah Woody Jenkins Park is not a Section 4(f) resource through coordination with the Town of Morrisville. FHWA also determined that the anticipated temporary impacts to Lake

Docusign Envelope ID: 45420136-3772-4525-800E-B43356A18DFF

Crabtree and the change in access to Cedar Fork District Park would not result in a Section 4(f) impact to these recreational resources.

The National Register-listed Pugh House (WA4868) property is located along the project corridor, south of Morrisville-Carpenter Road and west of NC 54. On April 23, 2026, NC SHPO, as the Official with Jurisdiction for historic properties in accordance with Section 4(f), acknowledges that its concurrence with FHWA's 'no adverse effect' finding under Section 106 will be used as the basis for a 4(f) *de minimis* determination by FHWA.

Hazardous Materials

The NCDOT GeoEnvironmental Section performed an initial Phase I Environmental Site Assessment (ESA) for the project on August 28, 2019. Five sites of concern were identified within the project study area. Four of the sites were determined to have a low anticipated impact on the project. The Lake Crabtree Area was determined to have a high anticipated impact due to its downstream location from the Ward Transformer Company Superfund Site.

Subsequently, the NCDOT GeoEnvironmental Section reviewed records and sample data associated with the Ward Transformer Superfund Site. Sample results did not indicate PCB soil and sediment impacts above EPA established clean up levels in the project study area, and the closest contaminated location is approximately 0.75 miles upstream of Aviation Parkway. In a letter dated April 19, 2024, the GeoEnvironmental Section concluded that PCBs do not pose adverse impacts to project U-5811. Soil and sediments will not require sampling or additional handling with regards to perceived PCB impacts in the project study area. The US Environmental Protection Agency (EPA) plans to conduct a sampling event prior to construction of Project U-5811.

The NCDOT GeoEnvironmental Section issued a Revised Phase I Report for the project on April 21, 2025 following design revisions and a modified project study area. No additional sites of concern were identified within the expanded survey area. The 2025 report identified five sites of concern, including three that were previously identified in the 2019 report. The Lake Crabtree Area was not identified to be a site of concern in the 2025 report. All sites of concern identified in the 2025 report are anticipated to have a low anticipated impact on the project.

In the event that sites of concern are discovered during project construction, the GeoEnvironmental Section should be notified immediately so their potential impacts may be assessed. Sites of concern identified in the 2025 report should be reviewed by the GeoEnvironmental Section once the final ROW plans are complete to determine if Phase II Investigations and ROW recommendations are necessary prior to ROW acquisition.

Noise

The source of this traffic noise information is the U-5811 Traffic Noise Report (Widening of Aviation Parkway (SR 1002) from NC 54 (Chapel Hill Road) to Interstate 40 (I - 40) Kimley-Horn, March 2026).

Traffic Noise Impacts – The number of noise sensitive receptors in each project alternative predicted to be impacted by future traffic noise is shown in the table below. The table includes those receptors expected to experience traffic noise impacts by either approaching or exceeding the FHWA Noise Abatement Criteria or by a substantial increase in exterior noise levels as defined in the NCDOT Traffic Noise Policy.

Table 4: Predicted Traffic Noise Impacts by Alternative*

Alternative	Residential (NAC B)	Places of Worship/Schools, Parks, etc. (NAC C & D)	Businesses (NAC E)	Total
Build	154	16	0	170

*Per TNM 2.5 and in accordance with 23 CFR Part 772 and the NCDOT Traffic Noise Policy

Docusign Envelope ID: 45420136-3772-4525-800E-B43356A18DFF

Noise Barriers – Measures for reducing noise levels were considered everywhere traffic noise impacts occurred.

This project will maintain uncontrolled right of way access, meaning that most noise-sensitive land uses will have direct access connections to the proposed project, and most intersections will adjoin the project at grade. The traffic noise analysis for this project confirmed that the physical breaks in potential noise barriers that would occur due to uncontrolled right of way access, as well as conflicts with adjacent utilities, would prohibit any noise barrier from providing the minimum required traffic noise level reductions at predicted traffic noise impacts, as defined by the noise abatement measure feasibility criteria of the NCDOT Traffic Noise Policy. Therefore, noise abatement would not be feasible.

A preliminary traffic noise evaluation was performed, and traffic noise abatement is not likely for construction. No traffic noise abatement measures are recommended for detailed analysis during final design, and no noise abatement measures are proposed for incorporation into the project based on the preliminary design. Unless modifications to the project design occur, including consideration of additional detailed study alternatives and/or changes to the project alignment, predicted Design Year (2050) Build traffic volumes, truck percentages, design speed, and/or surrounding land use development, no additional noise analysis will be performed for this project, and this evaluation completes the highway traffic noise requirements of Title 23 CFR Part 772 and the NCDOT Traffic Noise Policy.

In accordance with the NCDOT Traffic Noise Policy, Federal/State governments are not responsible for providing noise abatement measures for new development for which building permits are issued after the Date of Public Knowledge. The Date of Public Knowledge of the proposed highway project will be the approval date of the Categorical Exclusion (CE). NCDOT strongly advocates the planning, design and construction of noise-compatible development and encourages its practice among planners, building officials, developers and others.

F. Project Impact Criteria Checklists:

F3. Type III Actions

For proposed improvement(s) that fit Type III Actions (NCDOT-FHWA CE Programmatic Agreement, Appendix C), answer the questions below.

- Qualified NCDOT staff will certify the Categorical Exclusion for FHWA review/approval.
- If any questions are marked "Yes" then additional information will be required for those questions in Section G.

		Yes	No
1	Does the project involve potential effects to Threatened or Endangered species listed by the US Fish and Wildlife Service (USFWS) or National Marine Fisheries Service (NMFS)? (Source: Protected Species Memo, 2024; NRTR Addendum, 2025)	☐	☒
2	Does the project result in impacts subject to the conditions of the Bald and Golden Eagle Protection Act (BGEPA)? (Source: Flood Mitigation NRTM, 2025)	☐	☒
3	Does the project generate substantial controversy or public opposition regarding human or natural environment impacts, on environmental grounds, following appropriate public involvement? (Source: Public Comment Summary, 2025)	☐	☒
4	[redacted]		
5	Does the project involve substantial residential or commercial displacements, or substantial right of way acquisition? (Source: N/A)	☒	☐
6	Does the project "use" Section 4(f) property, and/or result in a *de minimis* determination? (Source: NC SHPO Section 4(f) Determination, 2026)	☒	☐
7	Does the proposed project require a Land Use Scenario Assessment (LUSA) based on the NCDOT community studies screening tool? (Source: Final ICE Screening Report, 2016)	☐	☒
8	Does the project impact anadromous fish spawning waters? (Source: NCDEQ, Common North Carolina Marine Fisheries Commission Rules Application, 2025)	☐	☒
9	Does the project impact waters classified as Outstanding Resource Waters (ORW), High Quality Waters (HQW), Water Supply Watershed Critical Areas, 303(d)-listed impaired water bodies, buffer rules, or submerged aquatic vegetation (SAV)? (Source: Delineation Memo, 2024; NRTR Addendum, 2025)	☒	☐
10	Does the project impact waters of the United States in any of the designated mountain trout streams? (Source: NCDOT Atlas Search Tool, NC WRC Public Mountain Trout Waters, 2026)	☐	☒
11	Does the project require a US Army Corps of Engineers (USACE) Individual Section 404 Permit? (Source: PJD & AJD Request, 2025)	☒	☐
12	Will the project require an easement from a Federal Energy Regulatory Commission (FERC) licensed facility? (Source: NCDOT Atlas Search Tool, NCDOT ATLAS FERC Data – Boundaries, 2026)	☐	☒
13	Does the project include Section 106 of the National Historic Preservation Act (NHPA) effects determination other than a No Effect, including archaeological remains? No matter the effects determination detailed in Appendix G, list commitments (conditions) for the determination in Appendix I. (Source: Historic Architecture Effects Finding, 2026)	☒	☐
14	Does the project involve GeoEnvironmental Sites of Concerns such as gas stations, dry cleaners, landfills, etc.? (Source: 2025 Phase I ESA, 2025)	☒	☐

15	Does the project require work encroaching and adversely effecting a regulatory floodway or work affecting the base floodplain (100-year flood) elevations of a water course or lake, pursuant to Executive Order 11988 and 23 CFR 650 subpart A? (Source: FEMA Flood Map Service Center, 2026)	☒	☐
16	Is the project in a Coastal Area Management Act (CAMA) county and substantially affects the coastal zone and/or any Areas of Environmental Concern (AEC)? (Source: NCDEQ, CAMA Counties, 2026)	☐	☒
17	Does the project require a US Coast Guard (USCG) permit? (Source: N/A)	☐	☒
18	Does the project involve Coastal Barrier Resource Act (CBRA) resources? (Source: USFWS, Coastal Barrier Resources System Mapper, 2026)	☐	☒
19	Does the project involve construction activities in, across, or adjacent to a designated Wild and Scenic River? (Source: NPS, Nationwide Rivers Inventory, 2026)	☐	☒
20	Does the project impact federal lands (e.g., US Forest Service (USFS), US Fish and Wildlife Service (USFWS), etc.) or Tribal Lands? (Source: NCDOT Atlas Search Tool, Federal Owned Lands, 2026)	☐	☒
21	Does the project involve any changes in access control or the modification or construction of an interchange on an interstate? (Source: N/A)	☐	☒
22	Does the project have a permanent adverse effect on local traffic patterns or community cohesiveness? (Source: U-5811 CIA, 2024; U-5811 CIA Addendum, 2026)	☐	☒
23	Will maintenance of traffic or detours cause substantial disruption? (Source: U-5811 CIA, 2024; U-5811 CIA Addendum, 2026)	☒	☐
24	Is the project inconsistent with the NCDOT's federally approved 4-year STIP or NCDOT's BMIP, and where applicable, the Metropolitan Planning Organization's (MPO) Transportation Improvement Program (TIP)? (Source: NCDOT Current STIP 2026-2035, 2025)	☐	☒
25	Does the project require the acquisition of lands under the protection of the Land and Water Conservation Act, the Federal Aid in Fish Restoration Act, the Federal Aid in Wildlife Restoration Act, TVA, Tribal Lands, or other unique areas or special lands that were acquired in fee or assessment with public-use money and have deed restrictions or covenants on the property? (Source: N/A)	☐	☒
26	Does the project involve Federal Emergency Management Act (FEMA) buyout properties under the Hazard Mitigation Grant Program (HMGP)? (Source: NCDOT Atlas Search Tool, FEMA Hazard Mitigation Properties, 2026)	☐	☒
27	Is the project considered a Type I under the NCDOT's Noise Policy? (Source: NCDOT's Traffic Noise Policy, 2025; U-5811 Traffic Noise Report, 2026)	☒	☐
28	Does the project impact VAD-enrolled property, or prime or important farmland soil, as defined by the Farmland Protection Policy Act (FPPA)? (Source: U-5811 CIA, 2024; U-5811 CIA Addendum, 2026)	☐	☒

Docusign Envelope ID: 45420136-3772-4525-800E-B43356A18DFF

G. Additional documentation as required from Section F; documentation should address the context and intensity (or severity) of the impact. (Required for all questions marked 'Yes.')

5. Permanent ROW acquisition is anticipated for 71 parcels along the project corridor and relocations are anticipated on 5 parcels. Because the project is expected to receive federal funds, NCDOT will follow the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Uniform Act). The Uniform Act provides protections and assistance for people whose real property is acquired, or who move as a result of projects receiving Federal funds, ensuring they are treated fairly and equitably and receive just compensation for, and assistance in moving from, the property they occupy.

6. The National Register-listed Pugh House (WA4868) property is located along the project corridor. The project will result in approximately 1,750 square feet of TCE within the property boundaries. Approximately 635 square feet of the property is within the slope stakes for the project. In an email on December 30, 2025, FHWA confirmed that this property falls under the Section 106 Programmatic Agreement. On April 23, 2026, NC SHPO, as the Official with Jurisdiction for historic properties in accordance with Section 4(f), acknowledges that its concurrence with FHWA's 'no adverse effect' finding under Section 106 will be used as the basis for a 4(f) *de minimis* determination by FHWA.

9. The North Carolina 2022 Final 303(d) list of impaired waters identifies Brier Creek and Crabtree Creek as impaired waters due to fair, poor, or severe bioclassification present in, or located within 1.0 mile downstream of, the Natural Resources Study Area or Flood Mitigation Area. There is no Section 303(d) impairment listed for sedimentation or turbidity. Additionally, streamside riparian zones within the Natural Resources Study Area are protected under provisions of the Neuse River Basin Buffer Rules administered by NCDWR.

11. An Individual Section 404 Permit from the USACE and corresponding Section 401 Individual Water Quality Certification form the NCDWR are anticipated.

13. On April 23, 2026, FHWA, the NCDOT Historic Architecture Group, and NC SHPO signed an Assessment of Effects Form determining that the project will have no adverse effect on the Pugh House property.

14. The NCDOT GeoEnvironmental Section issued a Revised Phase I Report for the project on April 21, 2025. The report identified five sites of concern, all of which have a low anticipated impact on the project.

15. The project crosses multiple regulatory floodways, 100-year floodplains, and 500-year floodplains. A State Floodplain Compliance Permit Type A or B will be prepared for this project.

23. The Lake Crabtree causeway will be closed for approximately 4 to 6 months during construction to replace the existing culvert across the causeway. Access to all properties along the corridor will be maintained through detour routes, utilizing McCrimmon Parkway, Airport Boulevard, I-40, and other local routes. A Traveler Information Plan is being developed as a part of this project, which will identify ways to inform the public of impacts during construction.

27. According to NCDOT's *2025 Traffic Noise Policy,* the project is classified as a Type I Project under Criteria C: the addition of a through-traffic lane(s).

Docusign Envelope ID: 45420136-3772-4525-800E-B43356A18DFF

H. Categorical Exclusion Approval:

STIP Project No.	**U-5811**
WBS Element	44384.1.1
Federal Project No.	N/A

Prepared By:

5/11/2026
Date

Ethan Blume
Ethan Blume, NEPA Analyst
Kimley-Horn & Associates, Inc.

Prepared For: Joel Perlin, Project Management Unit

Reviewed By:

5/11/2026
Date

DocuSigned by:
Morgan Weatherford
B8ED306C5CEB44E...
Morgan Weatherford, EPU Eastern Regional Team Lead
North Carolina Department of Transportation

☐ **Approved**

☑ **Certified** • If classified as Type III Categorical Exclusion.

5/13/2026
Date

Signed by:
CA084D4A6412432...
John Jamison, PWS, CPM, Environmental Policy Unit Head
North Carolina Department of Transportation

FHWA Approved: For Projects Certified by NCDOT (above), FHWA signature required.

5/14/2026
Date

Signed by:
Seth Wilcher
9967A500F8714F0...
for Yolonda K. Jordan, Division Administrator
Federal Highway Administration

Note: Prior to ROW or Construction authorization, a consultation may be required (please see Section VIII of the NCDOT-FHWA CE Programmatic Agreement for more details). Upload final documentation to ATLAS workbench and add commitments to the green sheet and Commitments dashboard.

Docusign Envelope ID: 45420136-3772-4525-800E-B43356A18DFF

I. Project Commitments (attach as Green Sheet to CE Form):

NCDOT PROJECT COMMITMENTS

STIP Project No. **U-5811**
Aviation Parkway Widening from NC 54 to I-40
Wake County
Federal Aid Project No. N/A
WBS Element 44384.1.1

COMMITMENTS FROM PROJECT DEVELOPMENT AND DESIGN

NCDOT Project Management Unit – Flood Pool Mitigation
NCDOT will continue coordinating and collaborating with Wake County and the USDA Natural Resource Conservation Service (NRCS) to resolve the plans, processes, and areas utilized for flood pool mitigation.

NCDOT Project Management Unit – Detour Route
NCDOT will develop a Traveler Information Plan to identify ways to inform the public of travel pattern impacts. The public will be informed of proposed road closures and detour routes prior to project construction.

NCDOT Project Management Unit – Historic Architecture
NCDOT will prepare a landscape plan in coordination with Capital Area Preservation and the Town of Morrisville for planting vegetation at the affected Pugh House property.

NCDOT will receive an approved Certificate of Appropriateness (COA) prior to beginning right-of-way acquisition for the Pugh House property.

NCDOT will use protection fencing around the remaining trees and smokehouse on the Pugh House property during construction activities.

NCDOT Biological Surveys Group – Bat Species
No tree clearing* will occur within 150 feet of a known maternity roost tree May 1 – July 15 in order to protect non-volant young. Winter roost trees are not considered maternity roost trees. NCDOT will cross-reference information provided by the Service for locations of maternity roosts.
*Tree clearing is considered removing trees. Clearing limbs along the ROW is not considered 'clearing'

Note: At this time, no TCB maternity roost trees have been identified in Div 1-8.

In order to monitor the impacts of incidental take, the NCDOT must report the progress of the Action and its impact on the species to the Service as specified in the ITS (50 CFR §402.14(i)(3)). Specific instruction for such monitoring and reporting (M&R) are listed below. These M&R requirements are mandatory.

- If dead bats suspected of being TCB are observed during clearing, demolition, or construction activities of the Action, such bats should be collected and preserved for identification. Gary Jordan of the Service's Raleigh Field Office should be contacted at gary_jordan@fws.gov to arrange a transfer of the bats. Dead bats should be placed in a freezer until they can be transferred.
- Structure bat surveys will be performed during the Natural Resource Technical Report phase of projects that are to replace a bridge or culvert > 5 feet in diameter. This information will then be recorded in NCDOT's database on bridges and culverts. NCDOT staff and/or consultants must follow the NCDOT Bat Habitat Assessment SOP by filling out Bat Habitat Assessment Forms for projects that affect bridges and culverts. These forms will be submitted to the NCDOT Biological Surveys Group and entered into its database even if no bat presence is detected. If TCBs are detected at a bridge or culvert, the Service will be notified via email at gary_jordan@fws.gov.

Appendix C

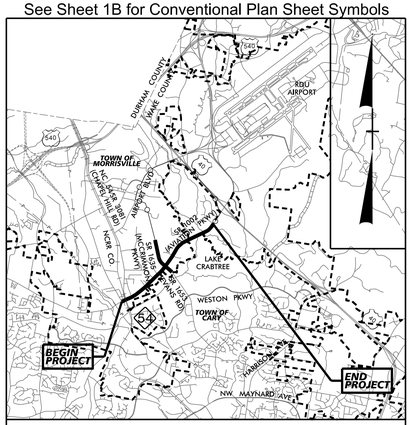
Redline Drainage Plans

01/16/24

TIP PROJECT: U-5811

CONTRACT:

See Sheet 1A for Index of Sheets
See Sheet 1B for Conventional Plan Sheet Symbols



VICINITY MAP (NTS)

FIELD INSPECTION PLAN SET

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

WAKE COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-5811	1	

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
44384.1.1		P.E.
44384.2.1		R/W
44384.2.2		UTIL.
44384.3.1		CONST.

LOCATION: *SR 1002 (AVIATION PARKWAY), WIDENING FROM NC 54 TO I-40*

TYPE OF WORK: *GRADING, PAVING, DRAINAGE, CULVERTS WIDENING, SIGNALS*

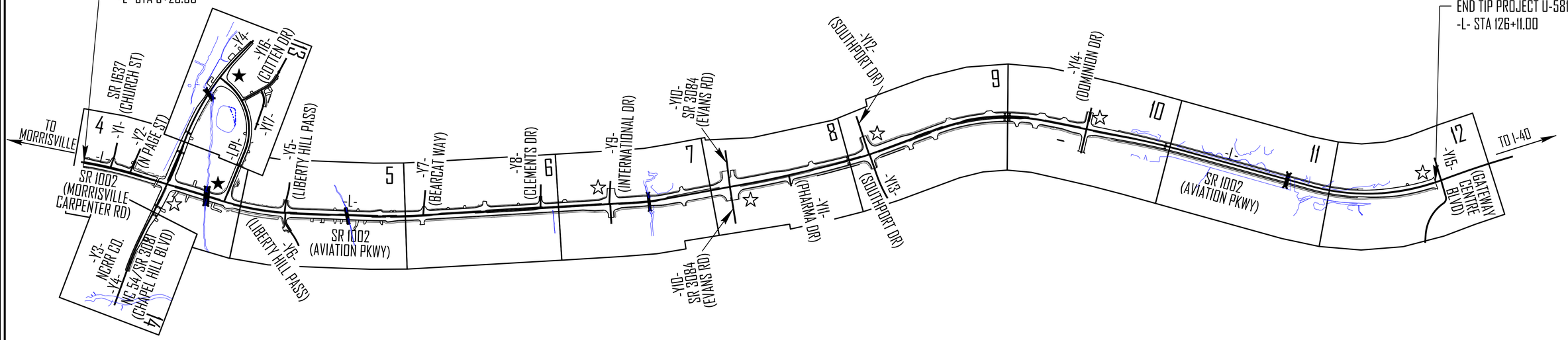
REDLINE DRAINAGE PLANS
AUGUST 31, 2026

4B PLANS
AUGUST 31, 2026

NAD 83/NA 2011

BEGIN TIP PROJECT U-5811
-L- STA 9+20.00

END TIP PROJECT U-5811
-L- STA 126+11.00



THIS PROJECT IS WITHIN THE MUNICIPAL BOUNDARIES OF TOWN OF CARY AND TOWN OF MORRISVILLE.
CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD II.

THIS IS A PARTIAL CONTROLLED ACCESS PROJECT WITH ACCESS BEING LIMITED TO POINTS SHOWN ON THE PLANS.

★ PROPOSED TRAFFIC SIGNAL
☆ EXISTING TRAFFIC SIGNAL TO BE MODIFIED

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

GRAPHIC SCALES

PLANS: 50 25 0 50 100
PROFILE (HORIZONTAL): 50 25 0 50 100
PROFILE (VERTICAL): 5 2.5 0 5 10

DESIGN DATA

ADT 2029 = 32800
ADT 2049 = 43200
K = 8 %
D = 60 %
T = 7 % *
V = 50 MPH
* TTST = 2%
* DUAL = 5%
FUNCTIONAL CLASS = MINOR ARTERIAL
REGIONAL TIER

PROJECT LENGTH

LENGTH OF ROADWAY TIP PROJECT U-5811 = 2.214 MILES
LENGTH OF STRUCTURE TIP PROJECT U-5811 = 0.000 MILE
TOTAL LENGTH OF TIP PROJECT U-5811 = 2.214 MILES

2024 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: NOVEMBER 20, 2026

LETTING DATE: JULY 17, 2029

EVERETT LOVING, P.E.
PROJECT ENGINEER

MITCHELL CROSS, E.I.
PROJECT DESIGN ENGINEER

JOEL PERLIN, PMP
NCDOT PROJECT MANAGER

HYDRAULICS ENGINEER

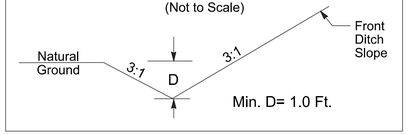
SIGNATURE: P.E.

ROADWAY DESIGN ENGINEER

SIGNATURE: P.E.

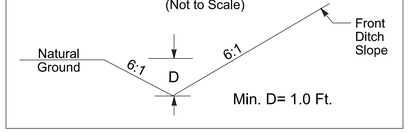
STATE OF NORTH CAROLINA • DEPARTMENT OF TRANSPORTATION •

DETAIL 1
SPECIAL 'V' DITCH
(Not to Scale)



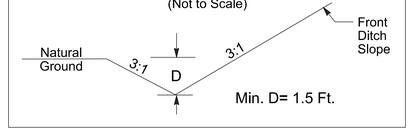
-L- FROM STA. 09+88 TO STA. 11+18 LT
-L- FROM STA. 11+92 TO STA. 13+07 LT
-L- FROM STA. 35+25 TO STA. 35+65 LT
-L- FROM STA. 36+37 TO STA. 36+95 LT
-L- FROM STA. 39+00 TO STA. 40+53 LT
-L- FROM STA. 40+88 TO STA. 41+30 LT
-L- FROM STA. 47+65 TO STA. 48+10 LT
-L- FROM STA. 61+12 TO STA. 63+85 LT
-L- FROM STA. 93+70 TO STA. 94+70 RT
-L- FROM STA. 96+61 TO STA. 98+75 RT
-LP1- FROM STA. 10+73 TO STA. 12+30 LT
-Y14- FROM STA. 12+68 TO STA. 13+50 RT
-Y16- FROM STA. 10+58 TO STA. 13+75 LT
-Y16- FROM STA. 12+13 TO STA. 12+40 RT
-Y16- FROM STA. 12+75 TO STA. 13+10 RT
-Y17- FROM STA. 10+64 TO STA. 10+96 LT
-DRWY2- FROM STA. 10+39 TO STA. 10+62 LT

DETAIL 2
SPECIAL 'V' DITCH
(Not to Scale)



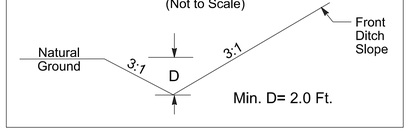
-Y4- FROM STA. 25+60 TO STA. 28+25 RT

DETAIL 3
SPECIAL 'V' DITCH
(Not to Scale)



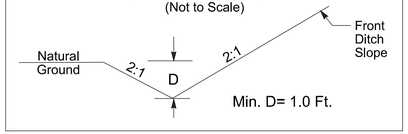
-L- FROM STA. 49+02 TO STA. 49+50 LT
-L- FROM STA. 50+60 TO STA. 51+25 LT
-Y8- FROM STA. 11+01 TO STA. 11+40 LT

DETAIL 4
SPECIAL 'V' DITCH
(Not to Scale)



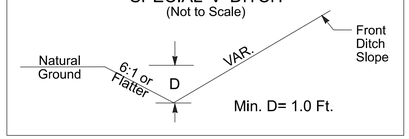
-L- FROM STA. 44+11 TO STA. 46+25 LT
-L- FROM STA. 46+75 TO STA. 47+65 LT

DETAIL 5
SPECIAL 'V' DITCH
(Not to Scale)



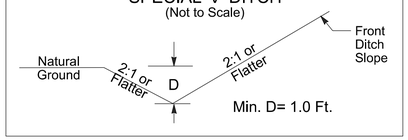
-L- FROM STA. 96+40 TO STA. 98+00 LT

DETAIL 6
SPECIAL 'V' DITCH
(Not to Scale)



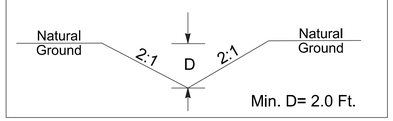
-Y4- FROM STA. 28+25 TO STA. 30+70 RT

DETAIL 7
SPECIAL 'V' DITCH
(Not to Scale)



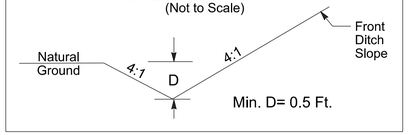
-LP1 FROM STA. 16+40 TO STA. 19+40 LT

DETAIL 8
STANDARD 'V' DITCH
(Not to Scale)



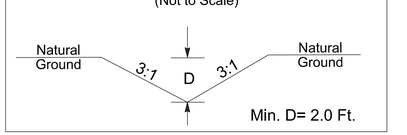
TAIL DITCH -L- STA. 39+88 RT

DETAIL 9
SPECIAL 'V' DITCH
(Not to Scale)



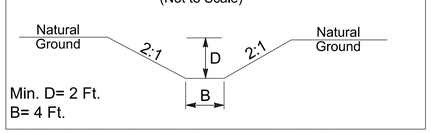
-LP1- FROM STA. 10+48 TO STA. 10+73 LT

DETAIL 10
SPECIAL 'V' DITCH
(Not to Scale)



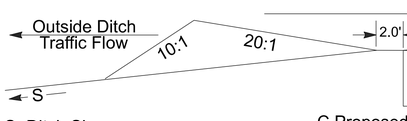
-L- FROM STA. 94+70 TO STA. 95+17 RT
-LP1- FROM STA. 13+05 TO STA. 16+05 LT
-Y4- FROM STA. 10+70 TO STA. 14+04 LT

DETAIL 11
SPECIAL 'V' DITCH
(Not to Scale)



-Y4- FROM STA. 15+11 TO STA. 15+77 RT

DETAIL 12
SPECIAL 'V' DITCH
(Not to Scale)



TAIL DITCH FROM -L- STA. 22+56 TO STA. 26+20 RT

DETAIL 13
SPECIAL 'V' DITCH
(Not to Scale)

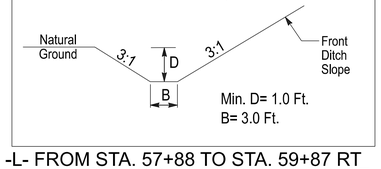


-L- FROM STA. 49+50 TO STA. 50+60 LT

DETAIL 14
SPECIAL BASE DITCH
(Not to Scale)

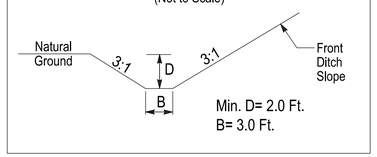
-L- FROM STA. 57+68 TO STA. 59+80 LT

DETAIL 15
SPECIAL BASE DITCH
(Not to Scale)



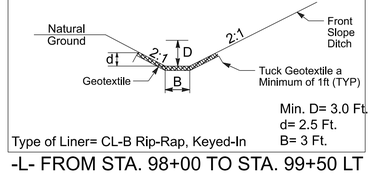
-L- FROM STA. 57+88 TO STA. 59+87 RT
-L- FROM STA. 123+50 TO STA. 124+25 LT

DETAIL 16
SPECIAL BASE DITCH
(Not to Scale)



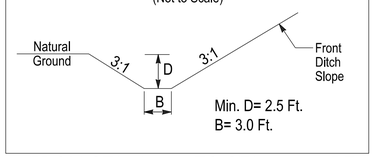
-L- FROM STA. 119+50 TO STA. 123+50 LT

DETAIL 17
SPECIAL BASE DITCH
(Not to Scale)



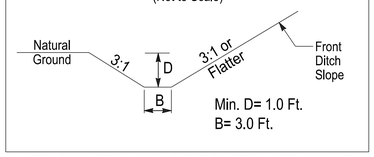
-L- FROM STA. 98+00 TO STA. 99+50 LT

DETAIL 18
SPECIAL BASE DITCH
(Not to Scale)



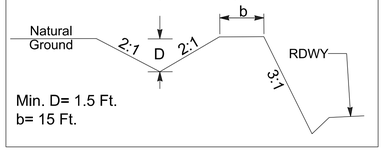
-L- FROM STA. 42+45 TO STA. 49+52 RT

DETAIL 19
SPECIAL BASE DITCH
(Not to Scale)



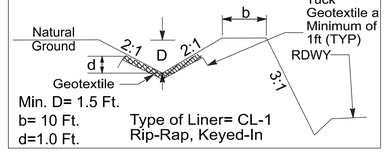
-L- FROM STA. 55+35 TO STA. 57+50 LT

DETAIL 20
BERM 'V' DITCH
(Not to Scale)



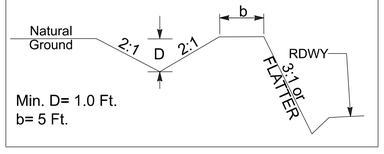
-L- FROM STA. 66+25 TO STA. 69+00 LT

DETAIL 21
BERM 'V' DITCH
(Not to Scale)



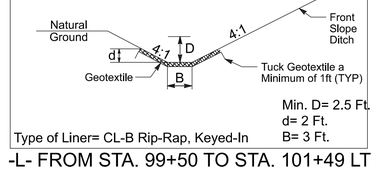
-L- FROM STA. 65+66 TO STA. 66+25 LT

DETAIL 22
BERM 'V' DITCH
(Not to Scale)



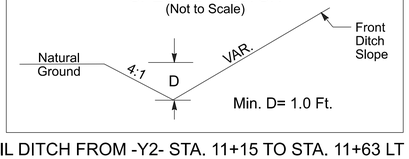
-Y10- FROM STA. 11+22 TO STA. 12+16 LT

DETAIL 23
SPECIAL BASE DITCH
(Not to Scale)



-L- FROM STA. 99+50 TO STA. 101+49 LT

DETAIL 24
SPECIAL 'V' DITCH
(Not to Scale)



TAIL DITCH FROM -Y2- STA. 11+15 TO STA. 11+63 LT

DETAIL 25
STANDARD 'V' DITCH
(Not to Scale)

TAIL DITCH -Y4- STA. 15+46 TO STA. 17+22 LT

DETAIL 26
STANDARD BASE DITCH
(Not to Scale)

TAIL DITCH FROM L STA. 19+79 TO STA. 20+80 LT

DETAIL 27
FALSE SUMP
(Not to Scale)

-L- FROM STA. 23+63.90 TO STA. 2381.42 RT

U-5811
2D-1

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
WAKE COUNTY



ROADWAY DESIGN UNIT

ROADWAY DESIGN ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

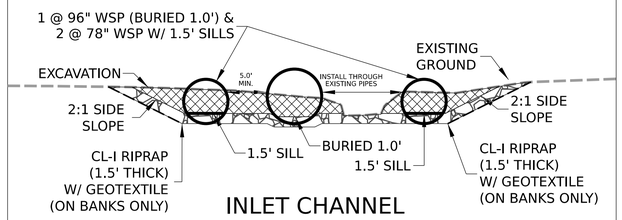
PREPARED BY

Kimley»Horn

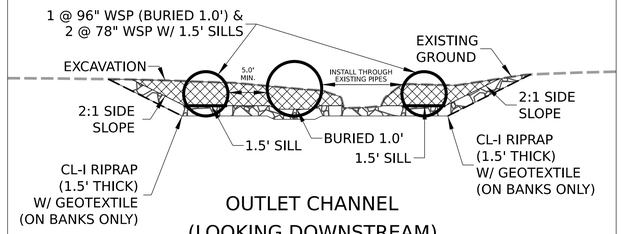
NC LICENSE #F-0102
421 FAYETTEVILLE STREET, SUITE 600
RALEIGH, NORTH CAROLINA 27601
PHONE: (919) 677-2000

REVISIONS

DETAIL 1 - INLET AND OUTLET CHANNEL IMPROVEMENTS

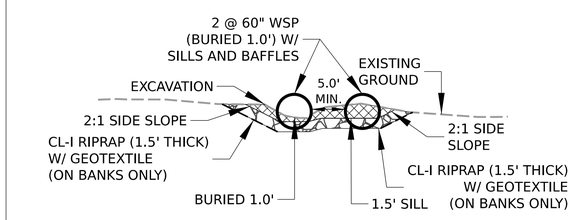


INLET CHANNEL
(LOOKING DOWNSTREAM)
NTS

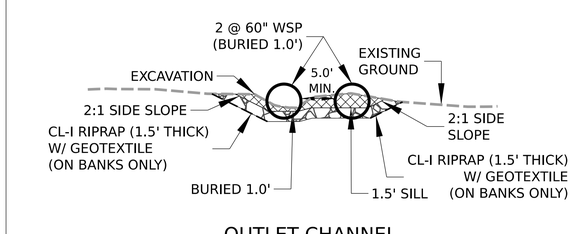


OUTLET CHANNEL
(LOOKING DOWNSTREAM)
NTS

DETAIL 2 - INLET AND OUTLET CHANNEL IMPROVEMENTS

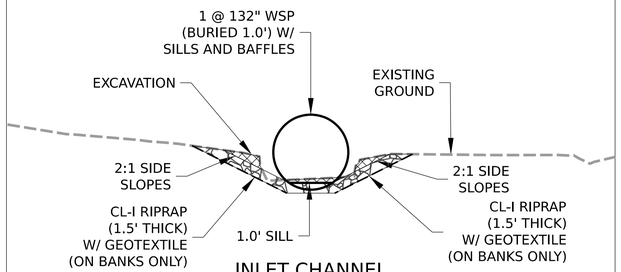


INLET CHANNEL
(LOOKING DOWNSTREAM)
NTS

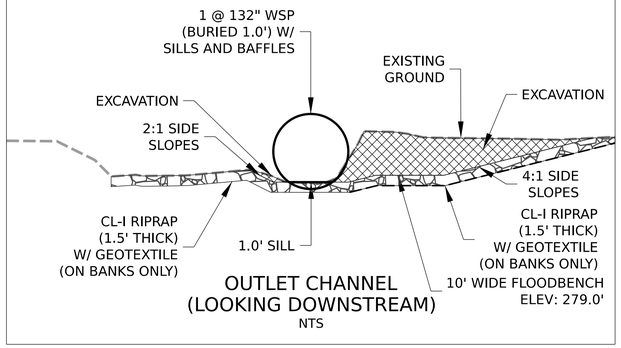


OUTLET CHANNEL
(LOOKING DOWNSTREAM)
NTS

DETAIL 3 - INLET AND OUTLET CHANNEL IMPROVEMENTS

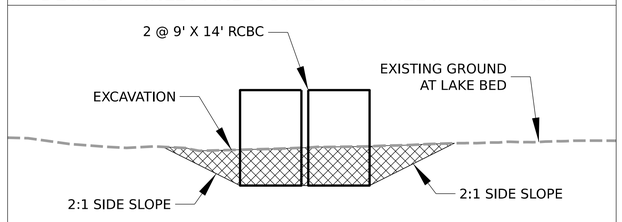


INLET CHANNEL
(LOOKING DOWNSTREAM)
NTS



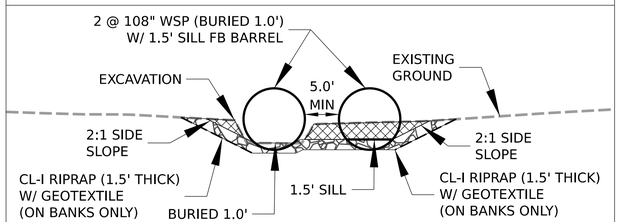
OUTLET CHANNEL
(LOOKING DOWNSTREAM)
NTS

DETAIL 4 - INLET AND OUTLET CHANNEL IMPROVEMENTS

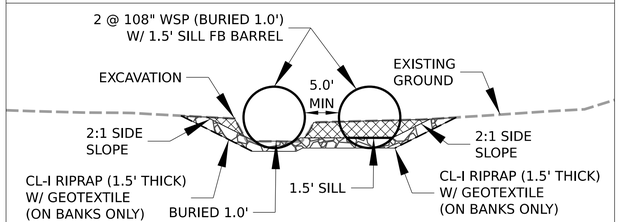


INLET & OUTLET CHANNEL
(LOOKING DOWNSTREAM)
NTS

DETAIL 5 - INLET AND OUTLET CHANNEL IMPROVEMENTS



INLET CHANNEL
(LOOKING DOWNSTREAM)
NTS



OUTLET CHANNEL
(LOOKING DOWNSTREAM)
NTS

DETAIL 06

(NOT TO SCALE)

MULTI- BARREL CULVERT LOW FLOW CHANNEL,SILLS AND FLOOD PLAIN BENCH

*NOTES:

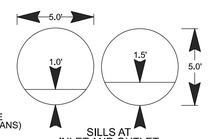
1) NATIVE MATERIAL BETWEEN SILLS/BAFFLES WILL RIP-RAP MAY BE USED TO SUPPLEMENT THE NATIVE BED MATERIAL IN THE HIGH FLOW CULVERT BARREL(S). IF RIP-RAP IS USED TO LINE THE HIGH FLOW CULVERT BARREL(S), NATIVE MATERIAL SHOULD BE PLACED ON TOP TO FILL VOIDS AND PROVIDE A FLAT SURFACE FOR ANIMAL PASSAGE. NATIVE MATERIAL IS SUBJECT TO APPROVAL BY THE ENGINEER AND MAY BE SUBJECT TO PERMIT CONDITIONS.

2) SILLS/BAFFLES ARE TO BE 1.0 FT. WIDE, CAST SEPARATELY AND ATTACHED BY DOWELS.

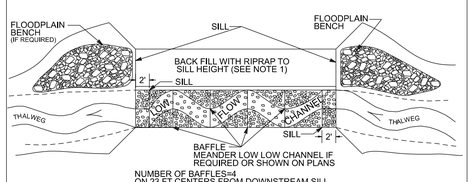
3) TOP OF LOW FLOW SILLS/BAFFLES SHOULD MATCH STREAM BED ELEVATION IN LOW FLOW CHANNEL OF STREAM. (THALWEG)

4) DO NOT SET ELEVATION OF HIGH SILL/BAFFLES ABOVE BANK FULL.

5) NUMBER OF SILL/BAFFLES DETERMINED BY THE ENGINEER. (UNLESS OTHERWISE NOTED ON PLANS)



SILLS AT
INLET AND OUTLET



NUMBER OF BAFFLES=4
ON 23 FT CENTERS FROM DOWNSTREAM SILL
(SEE STRUCTURE PLANS)

PLAN VIEW

DETAIL 07

(NOT TO SCALE)

SINGLE BARREL CULVERT LOW FLOW CHANNEL AND SILLS

*NOTES:

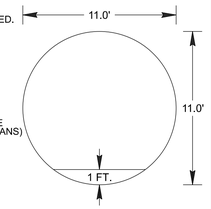
1) NATIVE MATERIAL BETWEEN SILLS/BAFFLES WILL BACKFILL NATURALLY AND IS NOT REQUIRED.

2) SILLS/BAFFLES ARE TO BE 1.0 FT. WIDE, CAST SEPARATELY AND ATTACHED BY DOWELS.

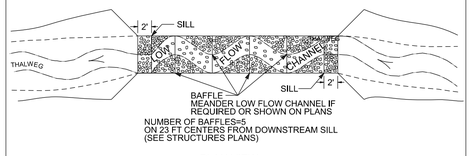
3) TOP OF LOW FLOW SILLS/BAFFLES SHOULD MATCH STREAM BED ELEVATION IN LOW FLOW CHANNEL OF STREAM. (THALWEG)

4) DO NOT SET ELEVATION OF HIGH SILL/BAFFLES ABOVE BANK FULL.

5) NUMBER OF SILL/BAFFLES DETERMINED BY THE ENGINEER. (UNLESS OTHERWISE NOTED ON PLANS)



SILLS AT
INLET AND OUTLET



NUMBER OF BAFFLES=5
ON 23 FT CENTERS FROM DOWNSTREAM SILL
(SEE STRUCTURES PLANS)

PLAN VIEW

REVISIONS

U-5811
2D-6

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
WAKE COUNTY

ROADWAY DESIGN UNIT

ROADWAY DESIGN ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PREPARED BY

Kimley»Horn
NC LICENSE #1162
421 FAYETTEVILLE STREET, SUITE 600
RALEIGH, NORTH CAROLINA 27601
PHONE: (919) 677-2000

11/14/23

MATCH LINE - SEE INSET THIS SHEET

MATCH LINE -Y4- STA 21+00.00 SEE SHEET 13

MATCH LINE -LP1- STA 18+50.00 SEE SHEET 13

MATCH LINE -L- STA 23+00.00 SEE SHEET 5

MATCH LINE -Y4- STA 27+50.00 SEE SHEET 14

MATCH LINE - INSET

-Y1- SR 1637 (CHURCH STREET)

-Y2- PAGE STREET

-Y4- NC 54 / SR 3081 (CHAPEL HILL BLVD)

-L- SR 1002 (MORRISVILLE CARPENTER RD)

-LP1- 2'-6" C&G AND PAVEMENT REPLACEMENT

BEGIN CONSTRUCTION -Y1- Sta. 11+35.00

BEGIN CONSTRUCTION -Y2- Sta. 11+10.00

BEGIN TIP PROJECT U-5811
BEGIN CONSTRUCTION
-L- Sta. 9+20.00

CREST 14+15.00 302.64'

CREST 23+69.93 302.54'

SAG 22+19.60 292.16'

SPECIAL V DITCH SEE SHEET 2D-1/DETAIL 24

SPECIAL V DITCH SEE SHEET 2D-1/DETAIL 1

SPECIAL V DITCH SEE SHEET 2D-1/DETAIL 2

SPECIAL V DITCH SEE SHEET 2D-1/DETAIL 12

SPECIAL BASE DITCH SEE SHEET 2D-1/DETAIL 26 S=0.5%

1 @ 96" & 2 @ 78" WSP - APPROX. 65 LF INSTALLED TRENCHLESSLY FLOODBENCHING W/ CL-I RIPRAP ON BANKS (STRUCTURES PAY ITEM) EST. 120 TONS CL-I EST. 190 SY GFD SEE SHEET 2D-6/DETAIL 1

WIDENING W/ CL-I RIPRAP ON BANKS AND EMBEDDED 1.5 FT INTO CHANNEL (STRUCTURES PAY ITEM) EST. 120 TONS CL-I EST. 195 SY GFD SEE SHEET 2D-6/DETAIL 1 OUTFALL ANALYSIS 4.1

OUTFALL ANALYSIS 4.2

RETAIN 184 LF

RETAIN EXISTING CANOPY

FILL AND ABANDON

REMOVE 123 LF

REMOVE AND RESET FENCE

DO NOT DISTURB

DOUBLE PRECAST CONC BOX CULVERT (SEE PLANS FOR SIZE)

VELOCITY ENTERING BUFFER ZONE (DITCH CALCS) -L- STA 20+31 LT

BASE WIDTH	4.00 FT
SIDE SLOPES	2:1
I	5.80 IN./HR
Q_p	34.53 C.F.S
V	3.05 F.P.S
SLOPE	0.005 FT/FT
N	0.035
LINER TYPE	GRASS

FOR -L- PROFILE, SEE SHEET 15
FOR -LP1- PROFILE, SEE SHEET 20
FOR -Y4- PROFILE, SEE SHEETS 21

REVISIONS

U-5811

4

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
WAKE COUNTY

ROADWAY DESIGN UNIT

ROADWAY DESIGN ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

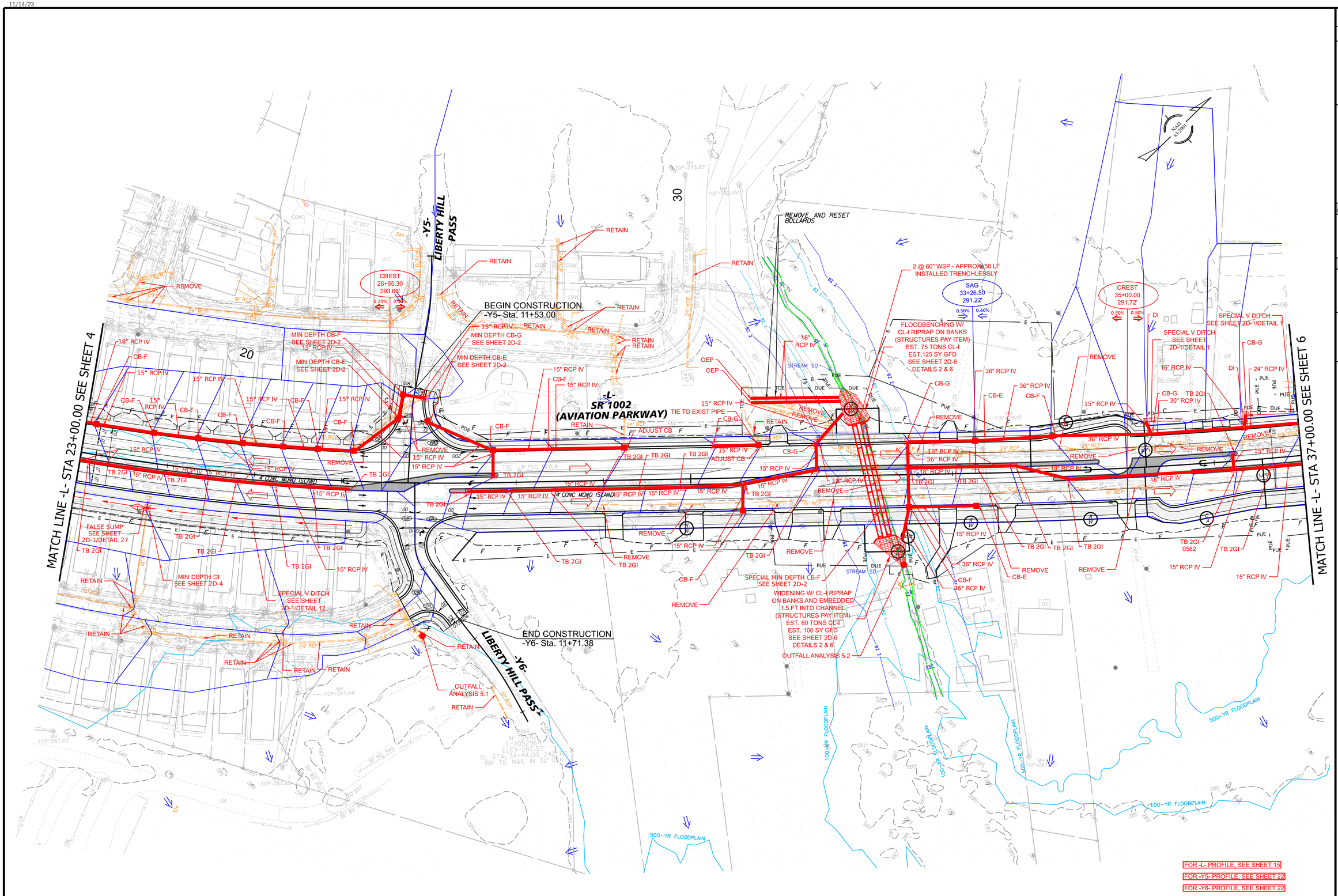
HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PREPARED BY
Kimley»Horn

NC LICENSE #1162
421 FAYETTEVILLE STREET, SUITE 600
RALEIGH, NORTH CAROLINA 27601
PHONE (919) 677-2000

11/14/23



U-5811

5

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
WAKE COUNTY

ROADWAY DESIGN UNIT

ROADWAY DESIGN ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

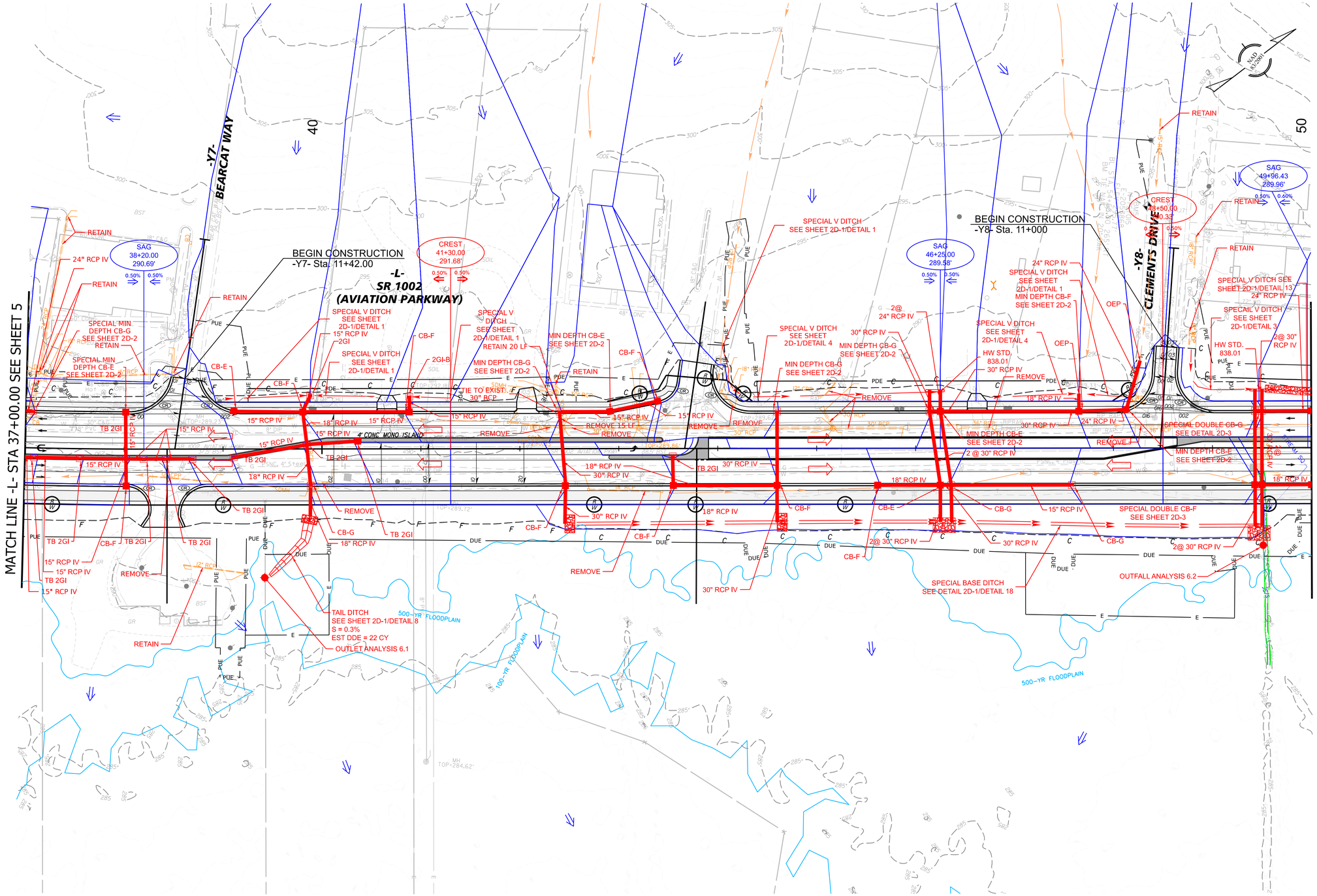
PREPARED BY

Kimley»Horn

NC LICENSE #F-0102
421 FAYETTEVILLE STREET, SUITE 600
RALEIGH, NORTH CAROLINA 27601
PHONE: (919) 677-2000

REVISIONS

KIMLEY-HORN/Hannah.Day 8/31/2026



U-5811

6

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
WAKE COUNTY

ROADWAY DESIGN UNIT

ROADWAY DESIGN ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

HYDRAULICS ENGINEER

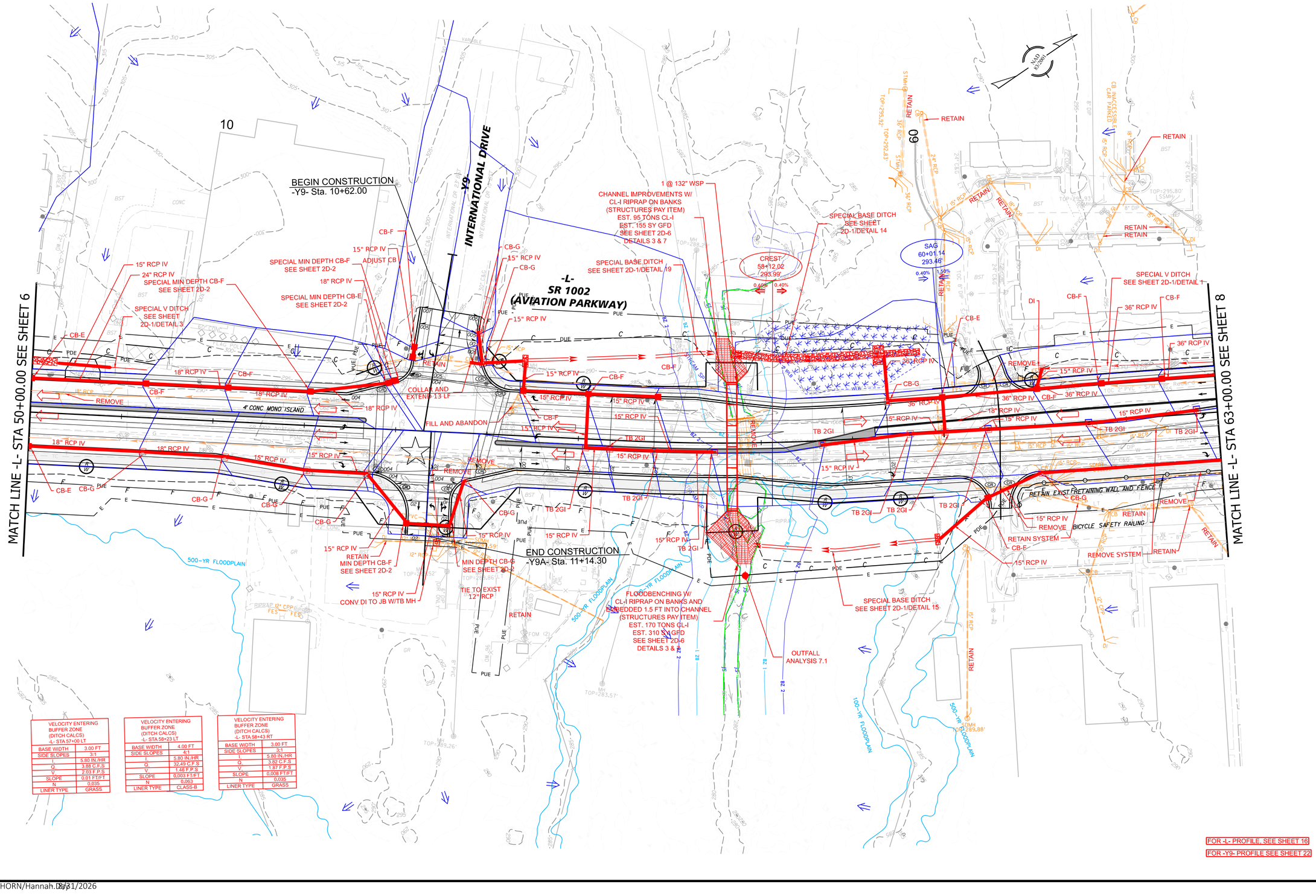
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PREPARED BY

Kimley»Horn

NC LICENSE #P-0102
421 FAYETTEVILLE STREET, SUITE 600
RALEIGH, NORTH CAROLINA 27601
PHONE (919) 677-2000

REVISIONS



VELOCITY ENTERING BUFFER ZONE (DITCH CALCS) -L- STA 57+00 LT	
BASE WIDTH	3.00 FT
SIDE SLOPES	3:1
I	5.80 IN./HR
Q	3.88 C.F.S.
V	2.03 F.P.S.
SLOPE	0.01 FT/FT
N	0.035
LINER TYPE	GRASS

VELOCITY ENTERING BUFFER ZONE (DITCH CALCS) -L- STA 58+23 LT	
BASE WIDTH	4.00 FT
SIDE SLOPES	4:1
I	5.80 IN./HR
Q	32.49 C.F.S.
V	1.46 F.P.S.
SLOPE	0.003 FT/FT
N	0.063
LINER TYPE	CLASS-B

VELOCITY ENTERING BUFFER ZONE (DITCH CALCS) -L- STA 58+43 RT	
BASE WIDTH	3.00 FT
SIDE SLOPES	3:1
I	5.80 IN./HR
Q	3.82 C.F.S.
V	1.87 F.P.S.
SLOPE	0.008 FT/FT
N	0.035
LINER TYPE	GRASS

U-5811

7

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
WAKE COUNTY

ROADWAY DESIGN UNIT

ROADWAY DESIGN ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PREPARED BY

Kimley»Horn

NC LICENSE #P-0102
421 FAYETTEVILLE STREET, SUITE 600
RALEIGH, NORTH CAROLINA 27601
PHONE:(919)677-2000

REVISIONS

MATCH LINE -L- STA 63+00.00 SEE SHEET 7

MATCH LINE -L- STA 75+00.00 SEE SHEET 9

-Y10-
SR 3084
(MCCRIMMON PARKWAY)

-L-
SR 1002
(AVIATION PARKWAY)

-Y10-
SR 3084
(EVANS ROAD)

-Y11-
(PHARMA DRIVE)

BEGIN CONSTRUCTION
-Y10- Sta. 11+74.32

END GRADE
-Y10- Sta. 12+66.41

BEGIN GRADE
-Y10- Sta. 13+57.64

END CONSTRUCTION
-Y10- Sta. 14+27.32

END CONSTRUCTION
-Y11- Sta. 10+75.00

BEGIN RETAINING WALL #1
-W1- POT Sta. 10+00.00 =
-L- POC Sta. 72+05.00 (62' RT)

SPECIAL BERM DITCH
SEE SHEET 2D-1/DETAIL 22

SPECIAL BERM DITCH
SEE SHEET 2D-1/DETAIL 21

SPECIAL BERM DITCH
SEE SHEET 2D-1/DETAIL 20

RETAIN 127 LF

OUTFALL
ANALYSIS 8.1

FOR -L- PROFILE, SEE SHEET 17

FOR -Y10- PROFILE, SEE SHEET 23

FOR -Y11-PROFILE, SEE SHEET 23

REVISIONS

U-5811

8

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
WAKE COUNTY

ROADWAY DESIGN UNIT

ROADWAY DESIGN ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

HYDRAULICS ENGINEER

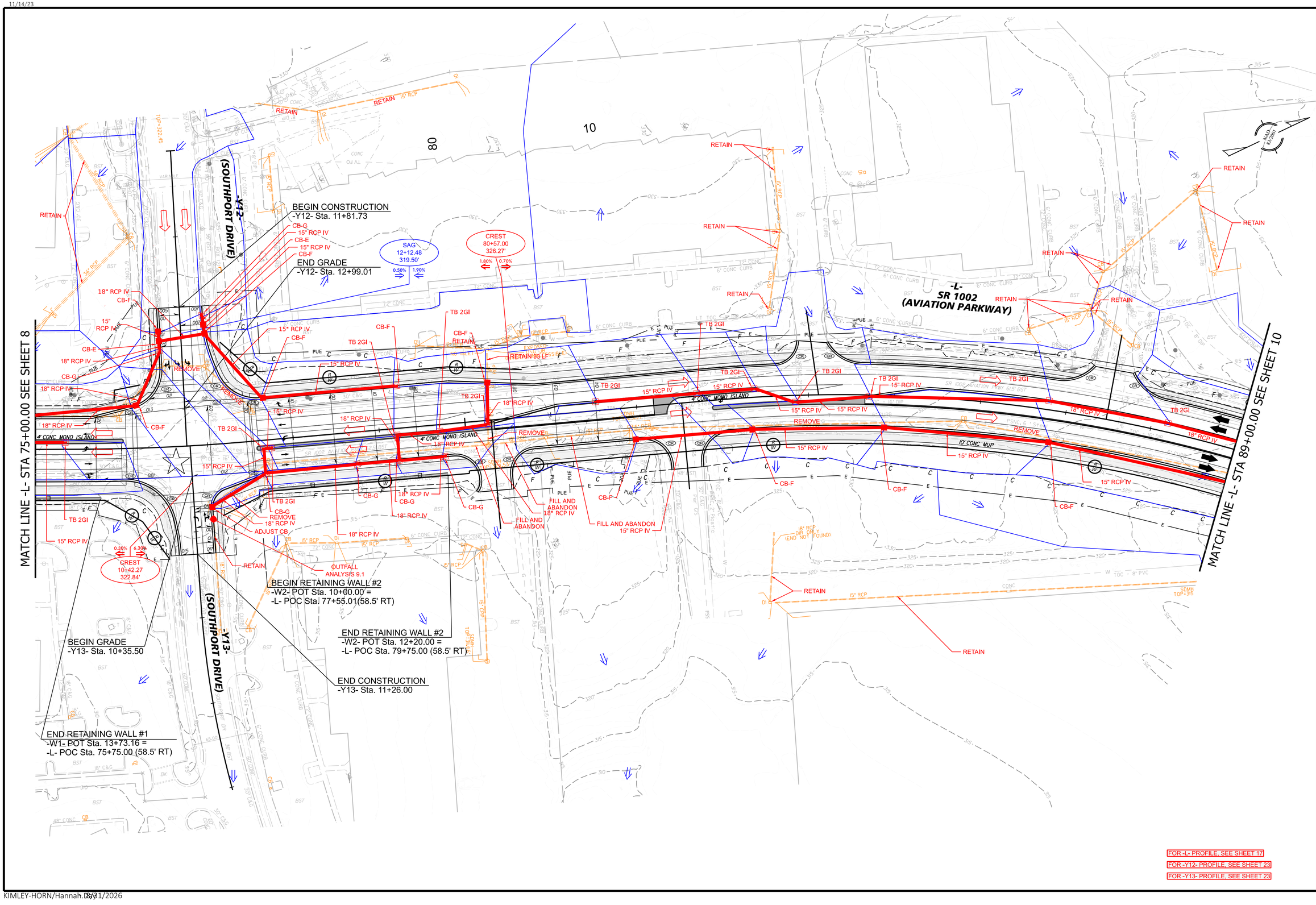
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PREPARED BY

Kimley»Horn

NC LICENSE #F-0102
421 FAYETTEVILLE STREET, SUITE 600
RALEIGH, NORTH CAROLINA 27601
PHONE: (919) 677-2000

11/14/23



U-5811

9

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
WAKE COUNTY

ROADWAY DESIGN UNIT

ROADWAY DESIGN ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PREPARED BY

Kimley»Horn

NC LICENSE #P-0102
421 FAYETTEVILLE STREET, SUITE 600
RALEIGH, NORTH CAROLINA 27601
PHONE: (919) 677-2000

REVISIONS

BEGIN CONSTRUCTION
-Y14- Sta. 10+40.80

-L-
SR 1002
(AVIATION PARKWAY)

-Y14-
(DOMINION DRIVE)

END CONSTRUCTION
-Y14- Sta. 13+85.00

MATCH LINE -L- STA 89+00.00 SEE SHEET 9

MATCH LINE -L- STA 103+00.00 SEE SHEET 11

RETAIN
RETAIN 62 LF
REMOVE 33 LF
REMOVE
RETAIN 165 LF 18" RCP
TIE TO EXIST 18" RCP
24" RCP IV
18" RCP IV
15" RCP IV
30" RCP IV
24" RCP IV
36" RCP IV
JB w/MH
CB-E
CB-F
CB-G
2GI-A
TB 2GI
4' CONC MONO ISLAND
10' CONC MUP
SPECIAL V DITCH SEE SHEET 2D-1/DETAIL 1
SPECIAL V DITCH SEE SHEET 2D-1/DETAIL 5
SPECIAL MIN DEPTH CB-G SEE SHEET 2D-2
SPECIAL MIN DEPTH CB-E SEE SHEET 2D-2
SPECIAL BASE DITCH SEE SHEET 2D-1/DETAIL 17
SPECIAL BASE DITCH SEE SHEET 2D-1/DETAIL 23
SAG 99+57.50 285.33'
2.00% 0.00%
OUTFALL ANALYSIS 10.1
OUTFALL ANALYSIS 10.2
OUTLET ANALYSIS 10.3
ENDWALL STD. 838.01
MIN DEPTH CB-F SEE SHEET 2D-2
BICYCLE SAFETY RAILING
RELOCATE EXISTING BENCH AND BIKE RACK TO PROPOSED CONC.
FILL AND ABANDON
500-YR FLOODPLAIN
100-YR FLOODPLAIN
WATER VAULT
NAD 83/2001

VELOCITY ENTERING WETLAND (DITCH CALCS) -L- STA 99+57 LT	
BASE WIDTH	3.00 FT
SIDE SLOPES	4:1
I	5.80 IN./HR
Q	30.16 C.F.S
V	1.43 F.P.S
SLOPE	0.003 FT/FT
N	0.063
LINER TYPE	CLASS-B

FOR -L- PROFILE, SEE SHEET 18
FOR -Y14- PROFILE, SEE SHEET 23

U-5811
10

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
WAKE COUNTY

ROADWAY DESIGN UNIT

ROADWAY DESIGN ENGINEER

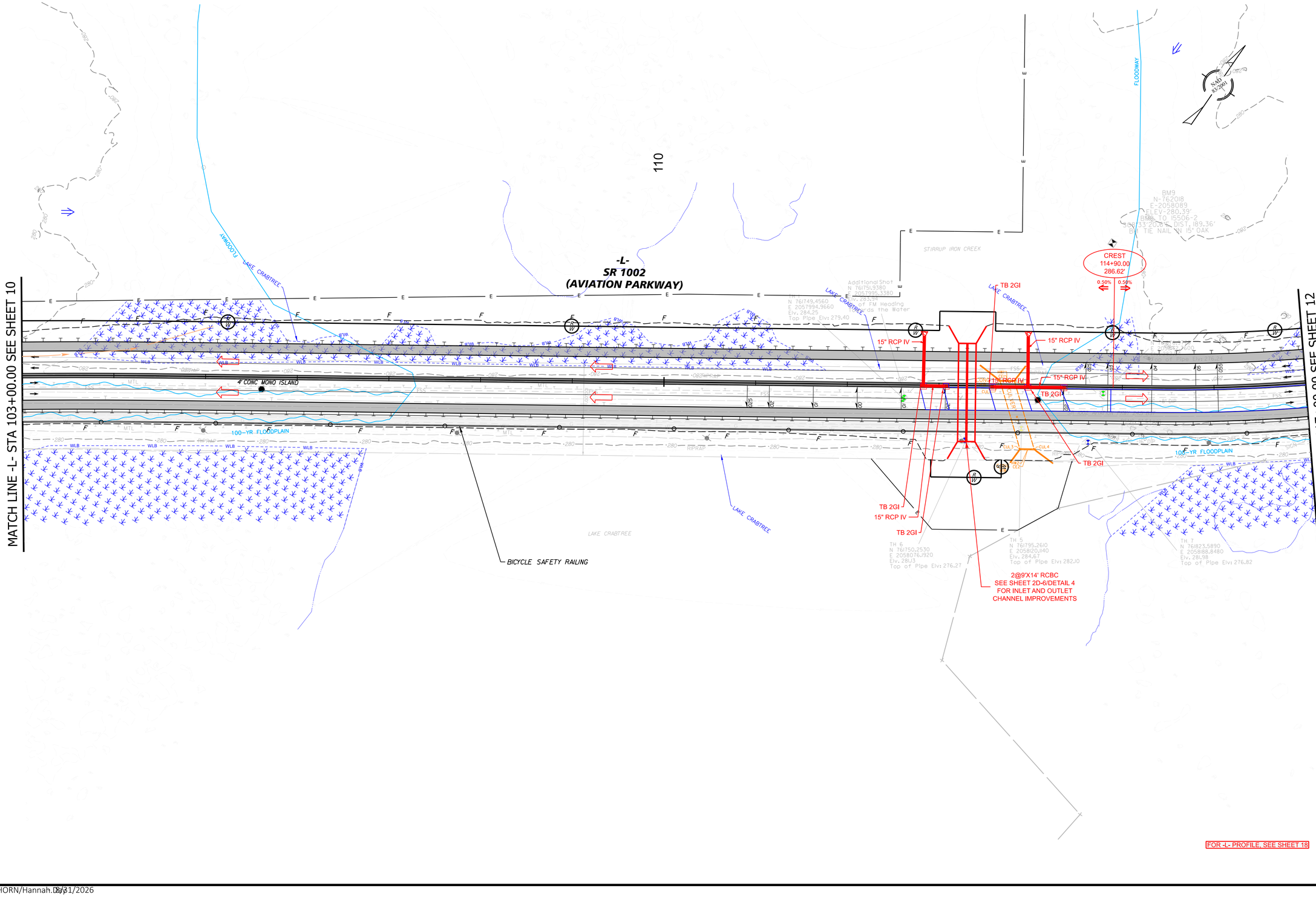
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PREPARED BY
Kimley»Horn

REVISIONS



U-5811

II

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
WAKE COUNTY

ROADWAY DESIGN UNIT

ROADWAY DESIGN ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

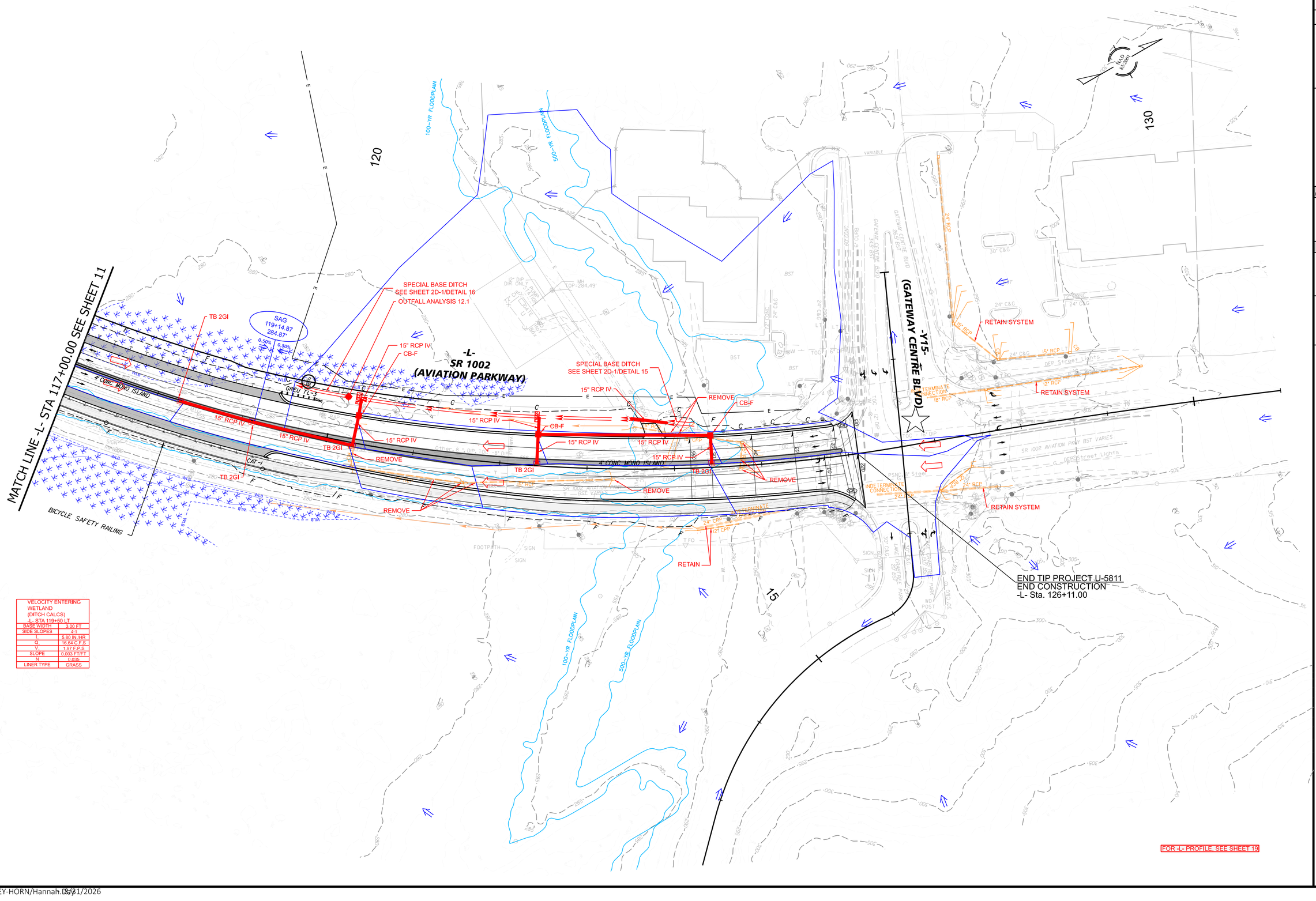
HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PREPARED BY

Kimley»Horn

REVISIONS



VELOCITY ENTERING WETLAND (DITCH CALCS) -L- STA 119+50 LT	
BASE WIDTH	3.00 FT
SIDE SLOPES	4:1
I	5.80 IN./HR
Q	16.64 C.F.S.
V	1.97 F.P.S.
SLOPE	0.003 FT/FT
N	0.035
LINER TYPE	GRASS

U-5811

12

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
WAKE COUNTY

ROADWAY DESIGN UNIT

ROADWAY DESIGN ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PREPARED BY

Kimley»Horn

NC LICENSE #F-0102
421 FAYETTEVILLE STREET, SUITE 600
RALEIGH, NORTH CAROLINA 27601
PHONE: (919) 677-2000

REVISIONS

END CONSTRUCTION
-Y16- Sta. 13+75.00

BEGIN CONSTRUCTION
-Y4- Sta. 10+70.00

END CONSTRUCTION
-Y17- Sta. 11+43.00

-Y16-
COTTEN DRIVE

-LP1-

-Y4-
NC 54 / SR 3081
(CHAPEL HILL BLVD)

TERMINAL END SECTION

5' PAVEMENT REPLACEMENT

RETAIN 98 LF
2'-6" C&G

SAG
11+89.57
297.07'

CREST
12+91.92
298.10'

SAG
17+03.17
293.78'

CREST
18+28.33
294.14'

SAG
15+00.00
298.69'

CREST
16+50.00
299.13'

SAG
19+73.53
298.26'

2 @ 108" WSP - APPROX. 48 LF
INSTALLED TRENCHLESSLY

WIDENING W/ CL-I RIPRAP
ON BANKS AND EMBEDDED
1.5 FT INTO CHANNEL
(STRUCTURES PAY ITEM)
EST. 95 TONS CL-I
EST. 155 SY GFD
SEE SHEET 2D-6/DETAIL 5

FLOODBENCHING W/
CL-I RIPRAP ON BANKS
(STRUCTURES PAY ITEM)
EST. 90 TONS CL-I
EST. 150 SY GFD
SEE SHEET 2D-6/DETAIL 5

SPECIAL V DITCH
SEE SHEET 2D-1/DETAIL 25
S=0.3%

OUTFALL ANALYSIS 13.1

OUTFALL ANALYSIS 13.2

MIN DEPTH 2GI-A
SEE SHEET 2D-5

MATCH LINE -LP1- STA 18+50.00 SEE SHEET 4

MATCH LINE -Y4- STA 21+00.00 SEE SHEET 4

FOR -Y4- PROFILE, SEE SHEET 21
FOR -LP1- PROFILE, SEE SHEET 20
FOR -Y16- PROFILE, SEE SHEET 24
FOR -Y17- PROFILE, SEE SHEET 24

U-5811
13

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
WAKE COUNTY

ROADWAY DESIGN UNIT

ROADWAY DESIGN ENGINEER

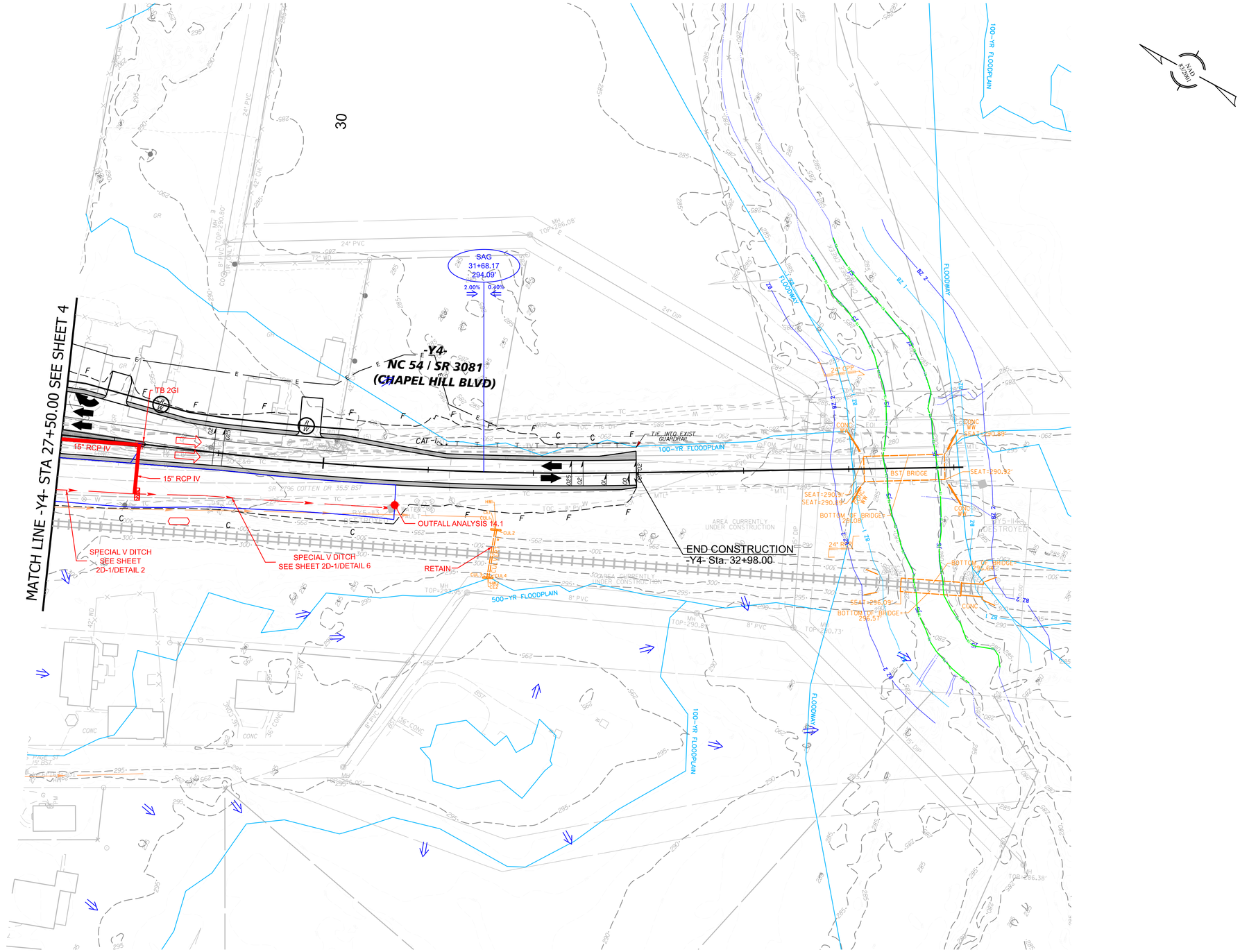
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PREPARED BY
Kimley»Horn

REVISIONS



U-5811

14

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
WAKE COUNTY

ROADWAY DESIGN UNIT

ROADWAY DESIGN ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

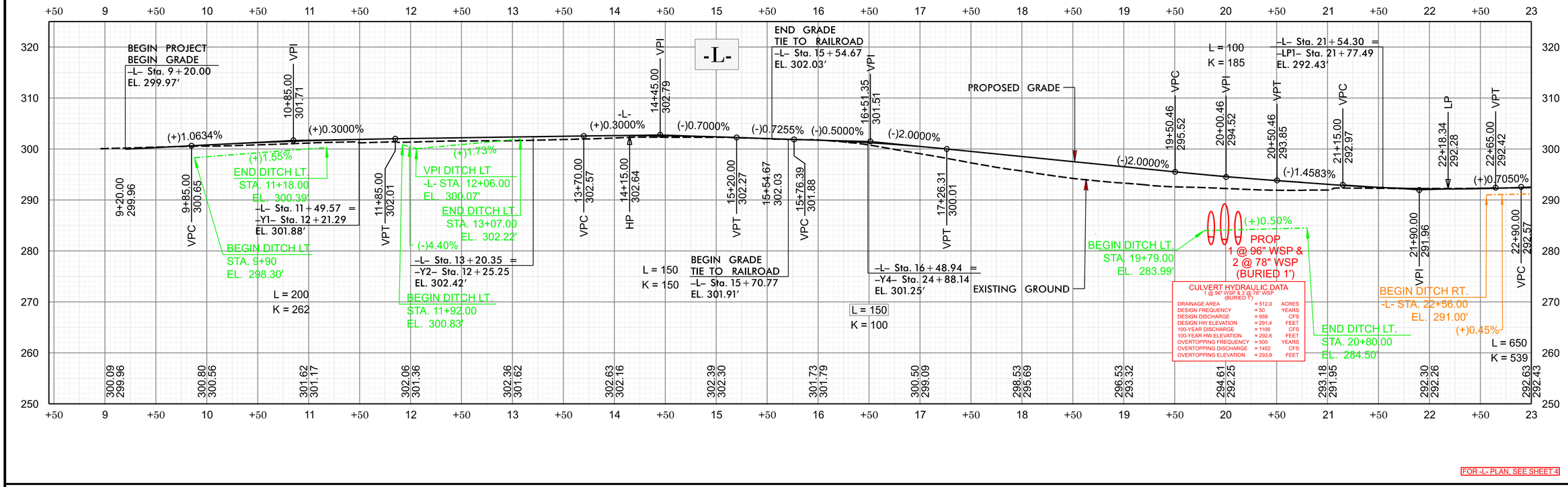
PREPARED BY

Kimley»Horn

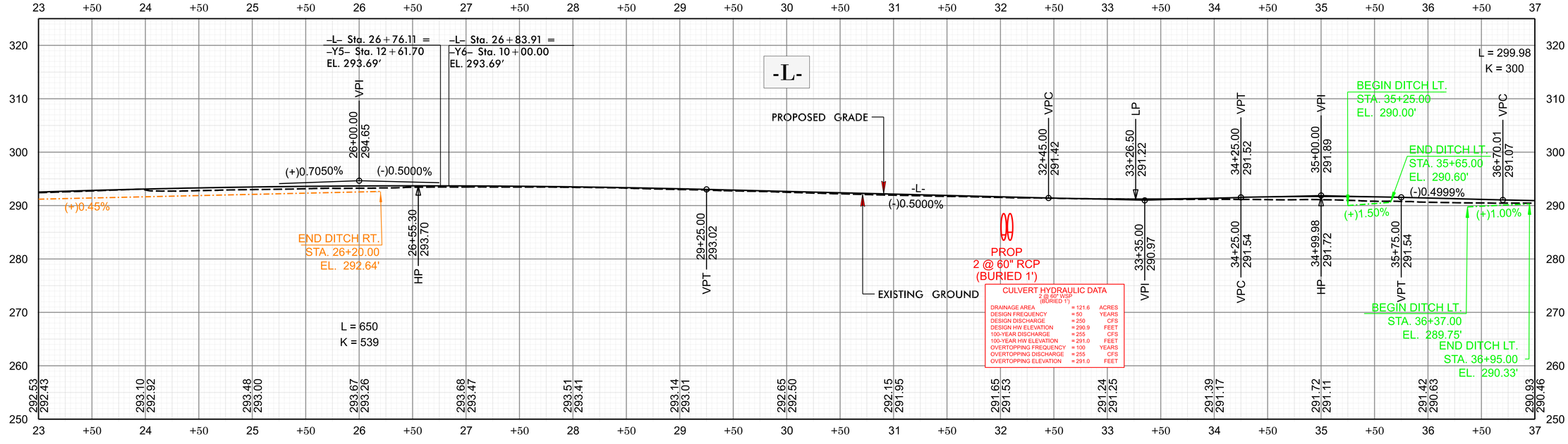
NC LICENSE #1162
421 FAYETTEVILLE STREET, SUITE 600
RALEIGH, NORTH CAROLINA 27601
PHONE: (919) 677-2000

REVISIONS

5/26/20



FOR -L- PLAN, SEE SHEET 4



FOR -L- PLAN, SEE SHEET 5

REVISIONS

U-5811
15

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
WAKE COUNTY

ROADWAY DESIGN UNIT

ROADWAY DESIGN ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

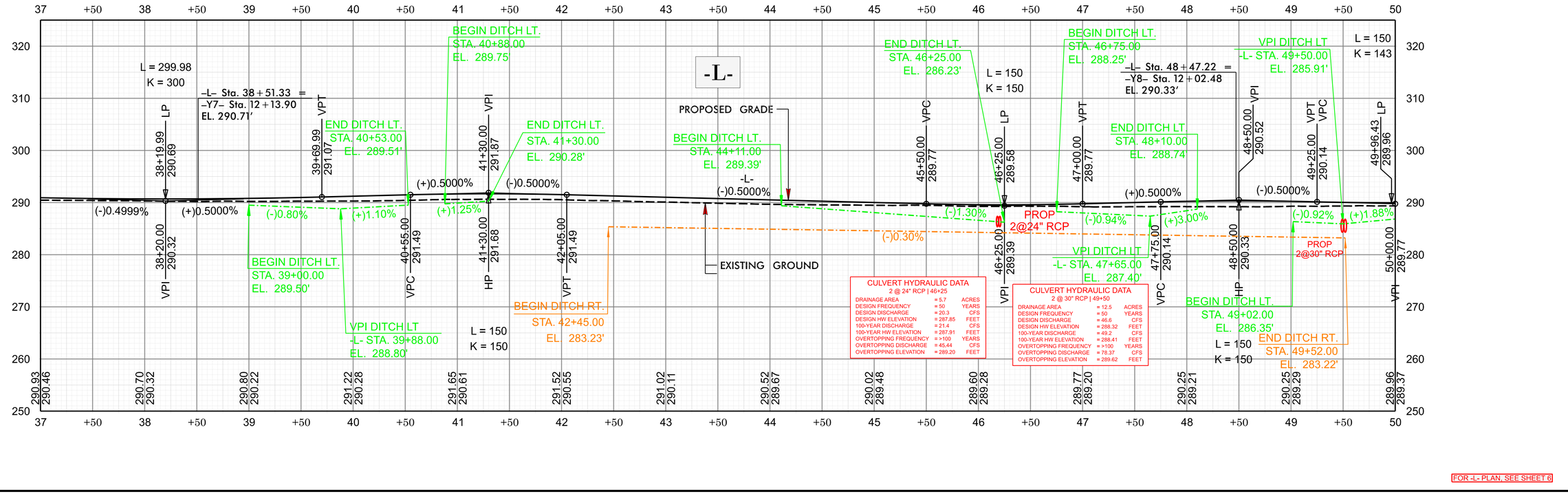
HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

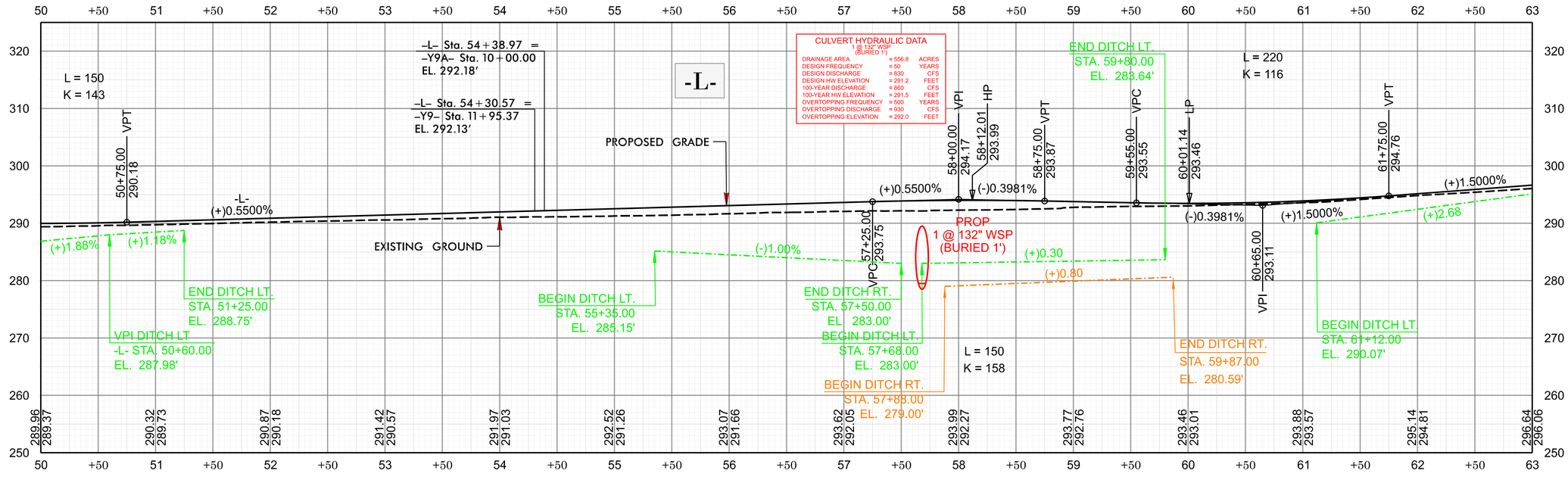
PREPARED BY

Kimley»Horn
NC LICENSE #P1312
421 FAYETTEVILLE STREET, SUITE 600
RALEIGH, NORTH CAROLINA 27601
PHONE: (919) 677-2000

5/26/20



FOR -L- PLAN, SEE SHEET 6



FOR -L- PLAN, SEE SHEET 7

REVISIONS

U-5811

16

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
WAKE COUNTY

ROADWAY DESIGN UNIT

ROADWAY DESIGN ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

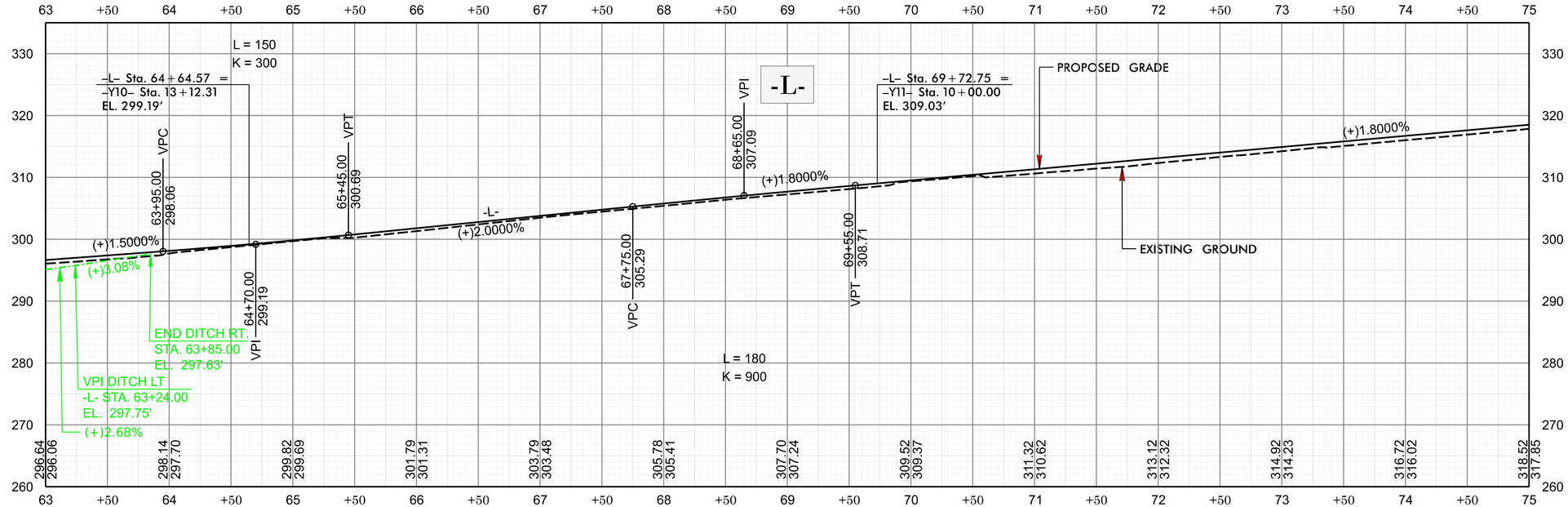
HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT SEE FOR R/W ACQUISITION

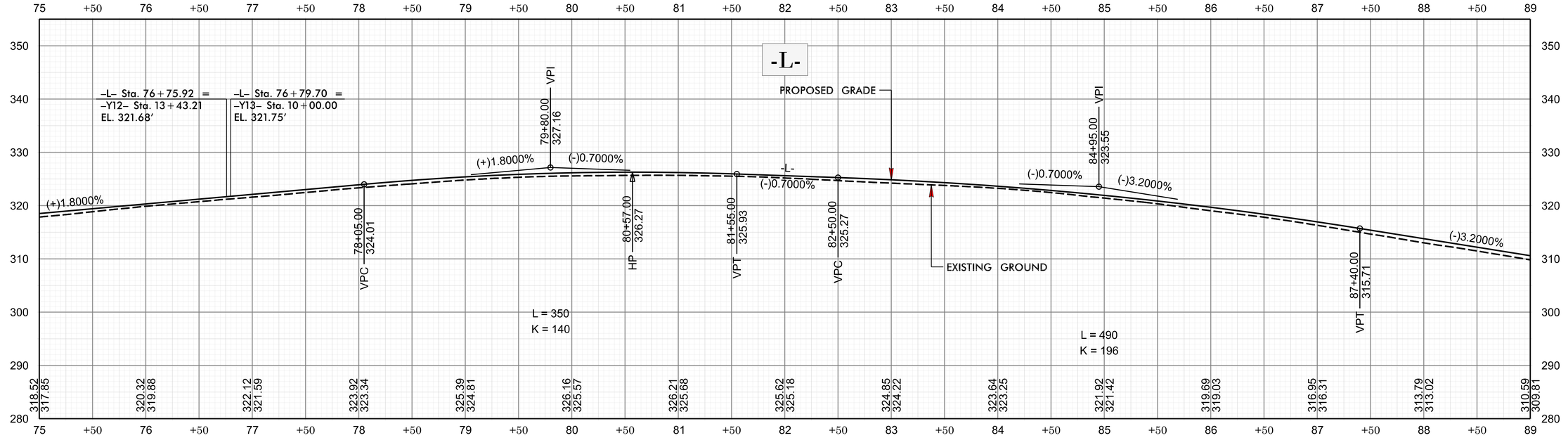
PREPARED BY

Kimley»Horn
NC LICENSE #P1312
421 FAYETTEVILLE STREET, SUITE 600
RALEIGH, NORTH CAROLINA 27601
PHONE: (919) 677-2000

5/26/20



FOR -L- PLAN, SEE SHEET 8



FOR -L- PLAN, SEE SHEET 9

U-5811

17

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
WAKE COUNTY

ROADWAY DESIGN UNIT

ROADWAY DESIGN ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

HYDRAULICS ENGINEER

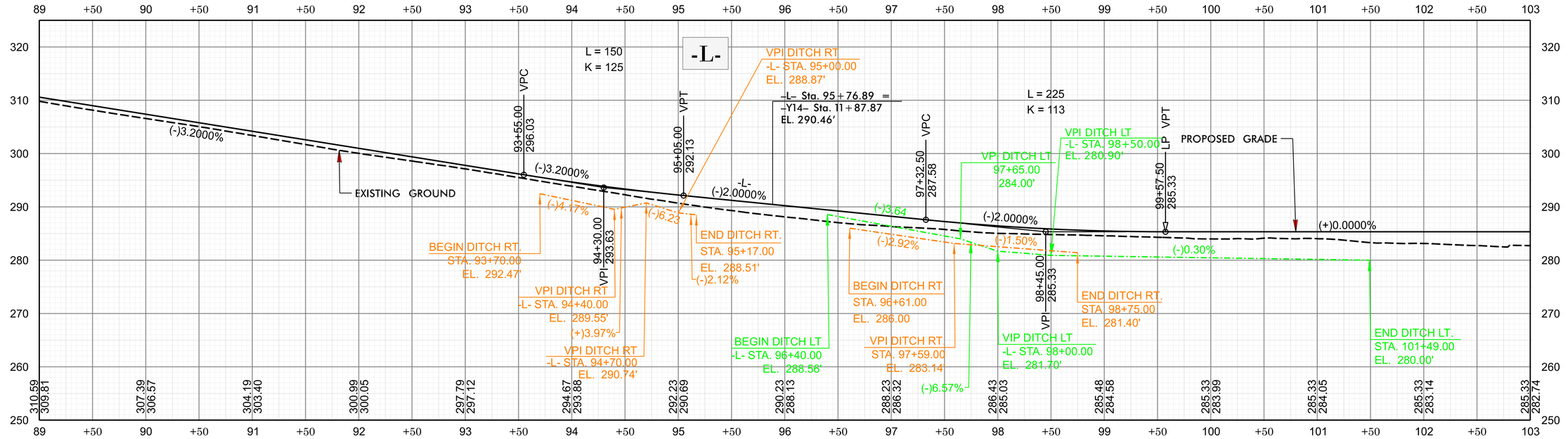
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PREPARED BY

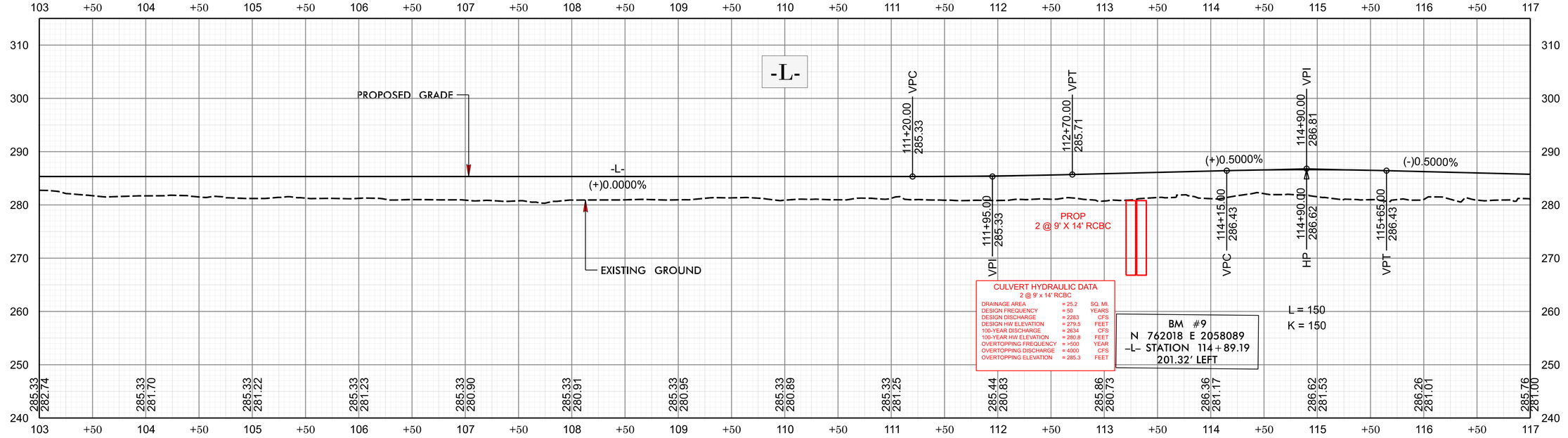
Kimley»Horn

REVISIONS

5/26/20



FOR -L- PLAN, SEE SHEET 10



FOR -L- PLAN, SEE SHEET 11

REVISIONS

U-5811

18

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
WAKE COUNTY

ROADWAY DESIGN UNIT

ROADWAY DESIGN ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

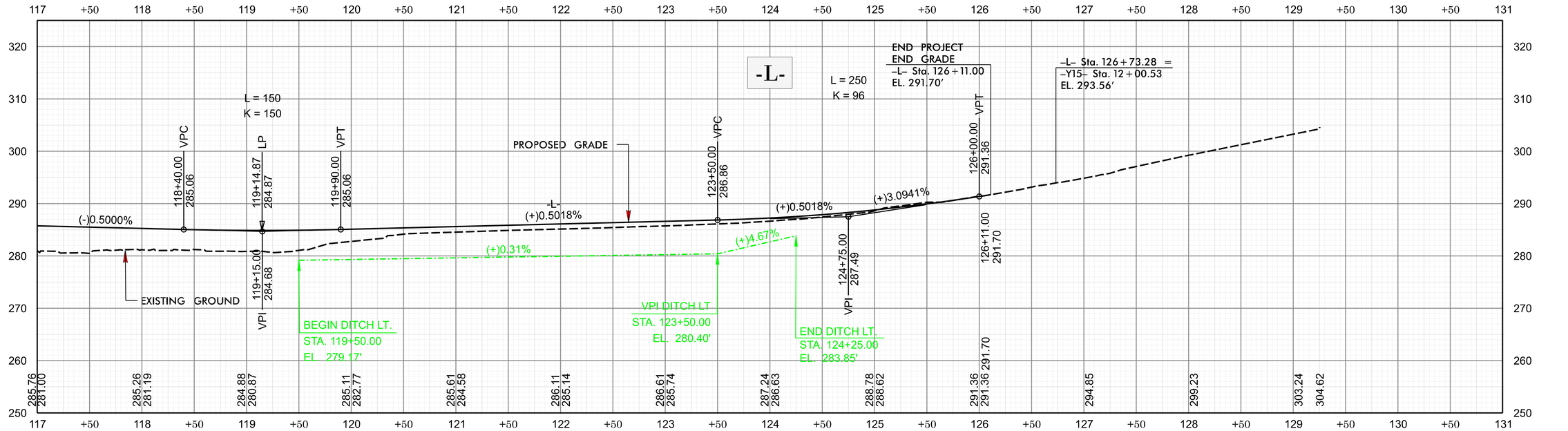
HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PREPARED BY

Kimley»Horn
NC LICENSE #P1312
421 FAYETTEVILLE STREET, SUITE 600
RALEIGH, NORTH CAROLINA 27601
PHONE: (919) 677-2000

5/26/20



FOR -L- PLAN, SEE SHEET 12

U-5811

19

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
WAKE COUNTY

ROADWAY DESIGN UNIT

ROADWAY DESIGN ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

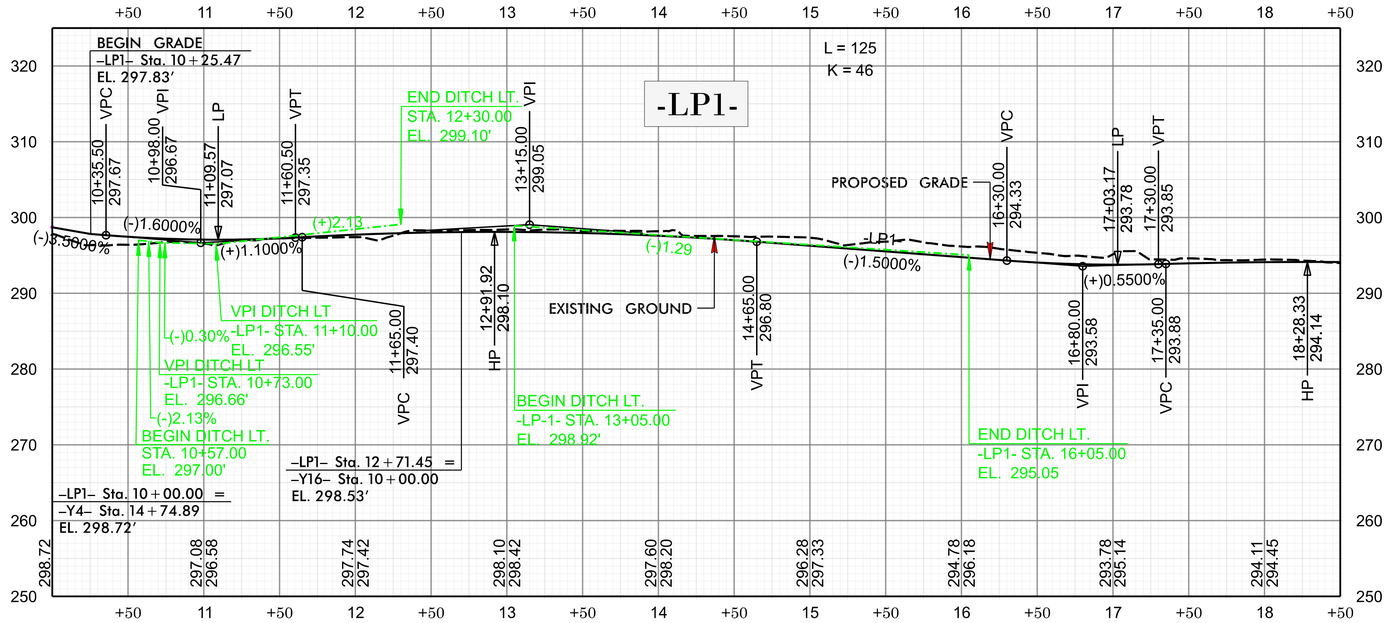
HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

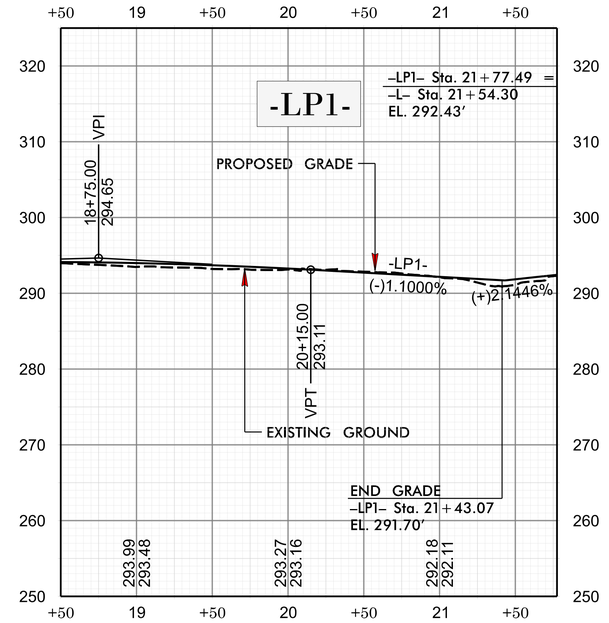
PREPARED BY

Kimley»Horn
NC LICENSE #P1312
421 FAYETTEVILLE STREET, SUITE 600
RALEIGH, NORTH CAROLINA 27601
PHONE: (919) 677-2000

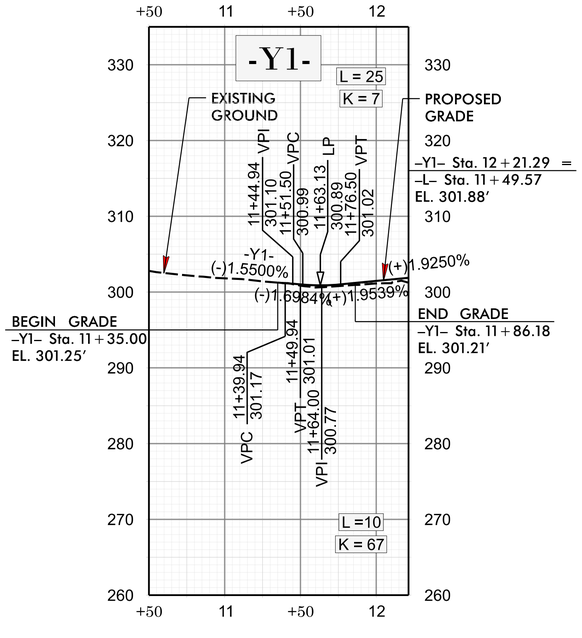
REVISIONS

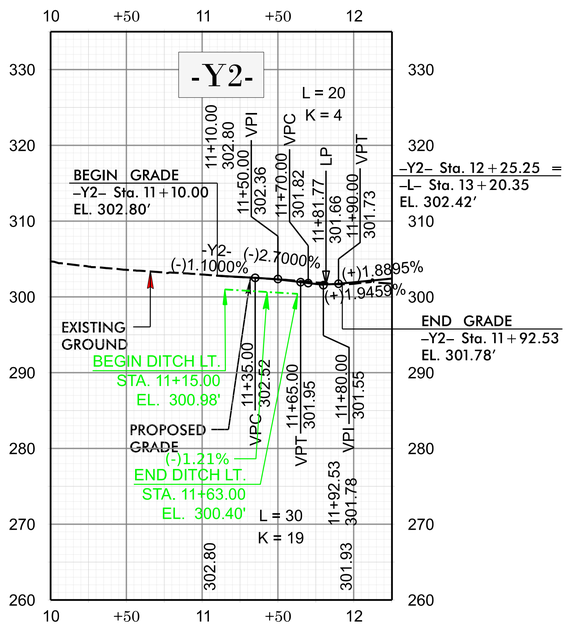


FOR -LP1- PLAN, SEE SHEET 13



FOR -LP1- PLAN, SEE SHEET 4





FOR -Y1- PLAN, SEE SHEET 4
FOR -Y2- PLAN, SEE SHEET 4

REVISIONS

U-5811
20

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
WAKE COUNTY

ROADWAY DESIGN UNIT

ROADWAY DESIGN ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

HYDRAULICS ENGINEER

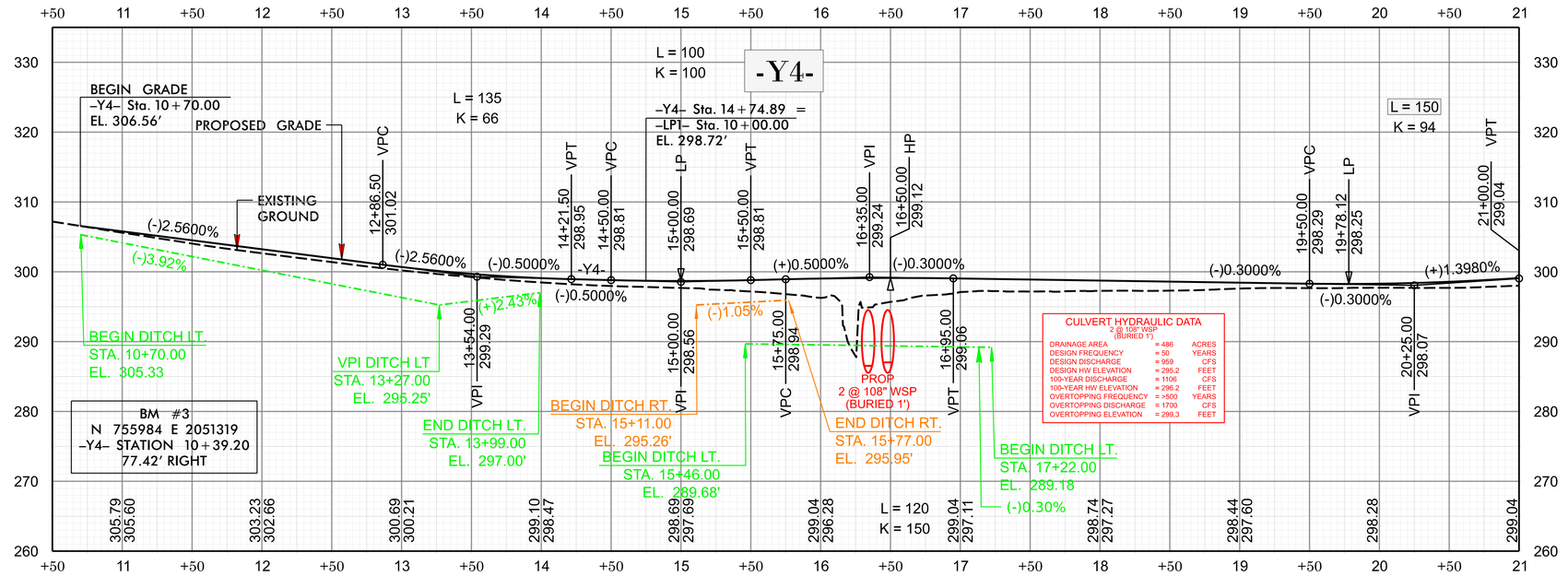
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

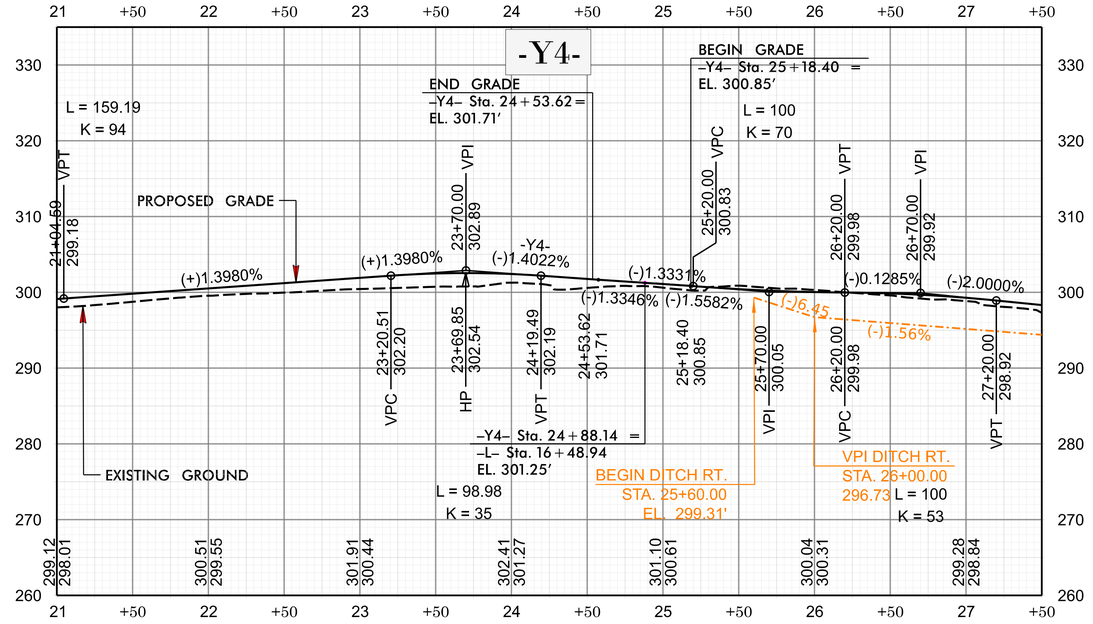
PREPARED BY

Kimley»Horn

5/26/20

5/26/20





(-)1.5600%

U-5811

21

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
WAKE COUNTY

ROADWAY DESIGN UNIT

ROADWAY DESIGN ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

HYDRAULICS ENGINEER

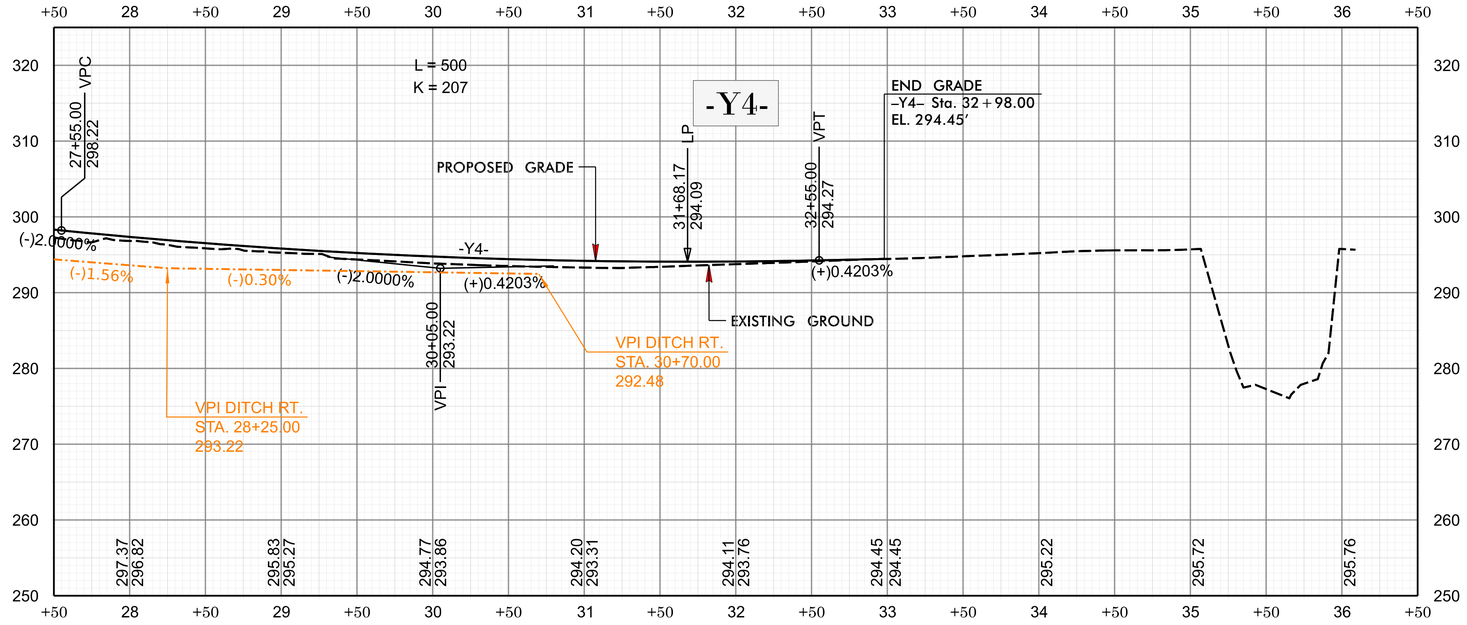
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

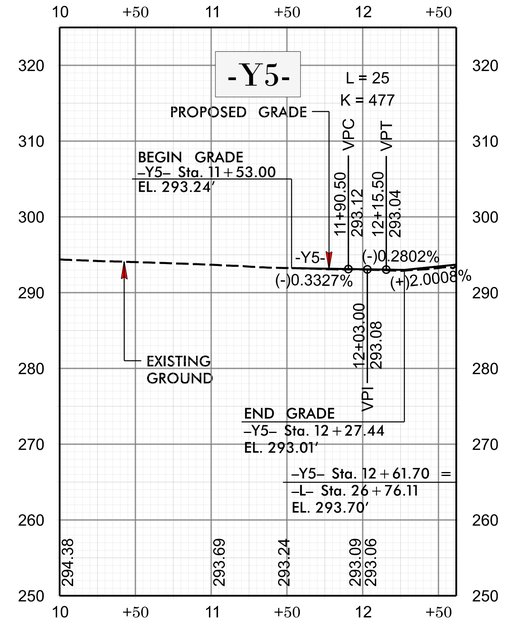
PREPARED BY

Kimley»Horn

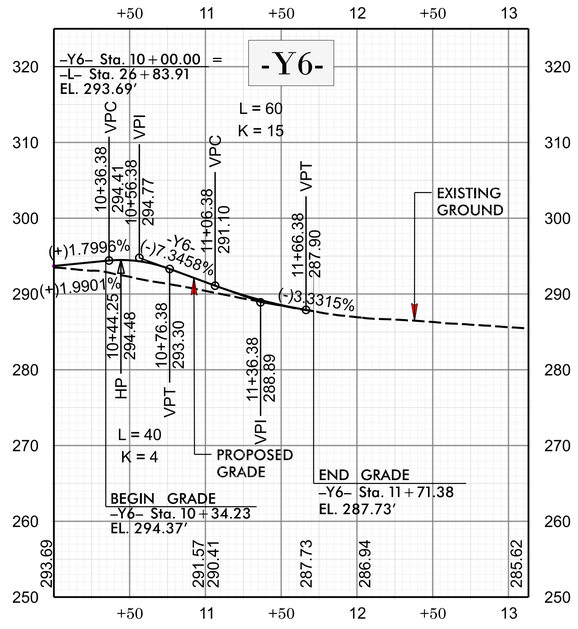
REVISIONS

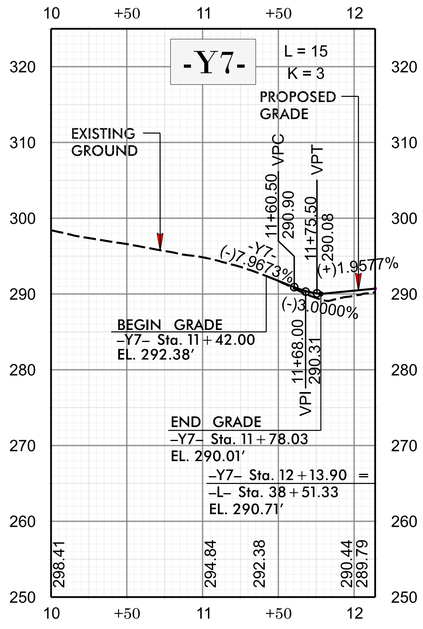
5/26/20

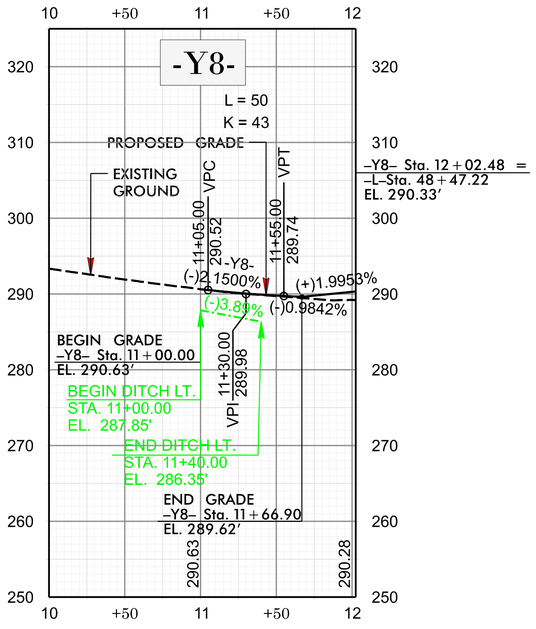


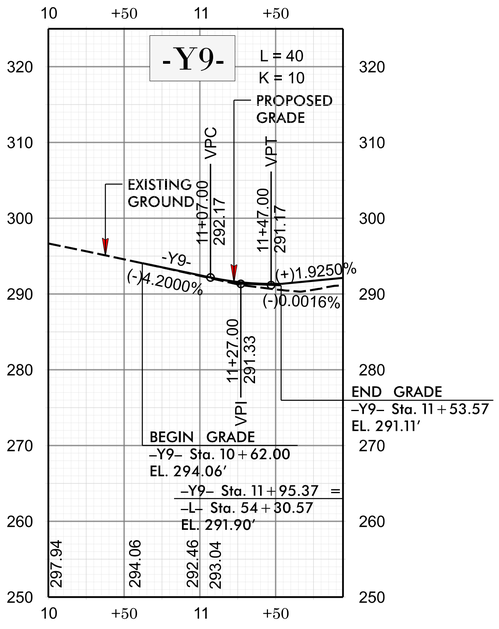


FOR -Y4- PLAN, SEE SHEET 14
FOR -Y5- PLAN, SEE SHEET 5









FOR -Y6- PLAN, SEE SHEET 5
FOR -Y7- PLAN, SEE SHEET 6
FOR -Y8- PLAN, SEE SHEET 6
FOR -Y9- PLAN, SEE SHEET 7

REVISIONS

U-5811

22

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
WAKE COUNTY

ROADWAY DESIGN UNIT

ROADWAY DESIGN ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

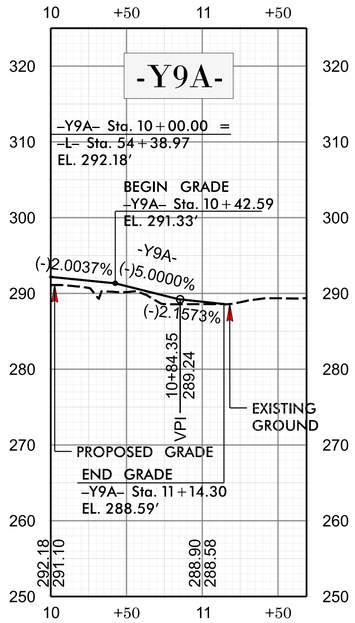
HYDRAULICS ENGINEER

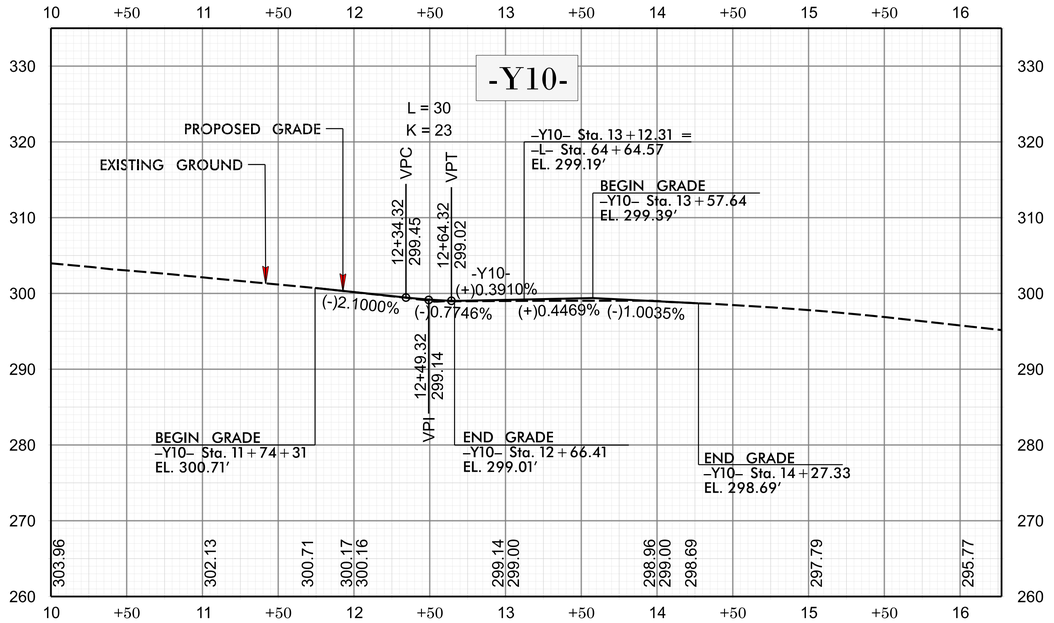
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

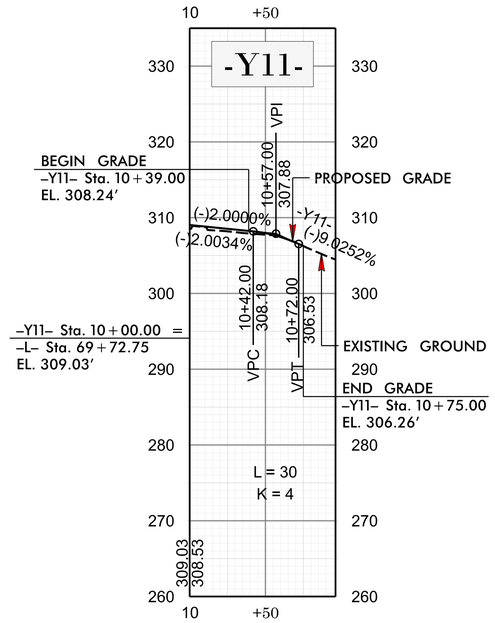
PREPARED BY

Kimley»Horn
NC LICENSE #P1312
421 FAYETTEVILLE STREET, SUITE 600
RALEIGH, NORTH CAROLINA 27601
PHONE: (919) 677-2000

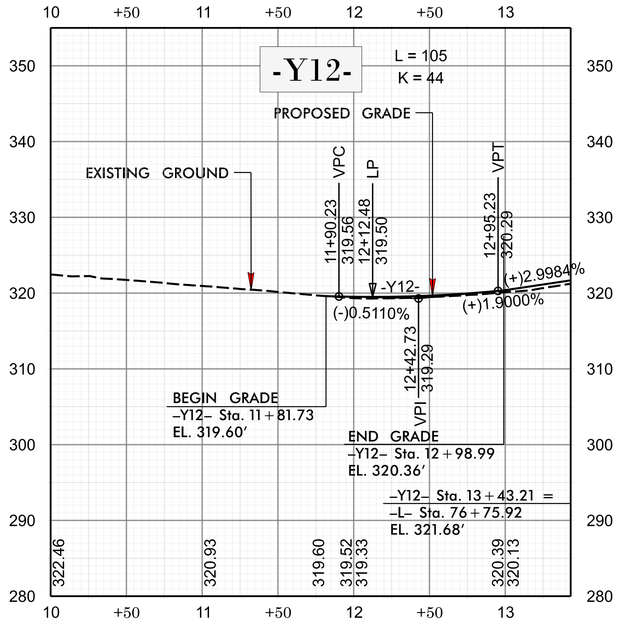
5/26/20

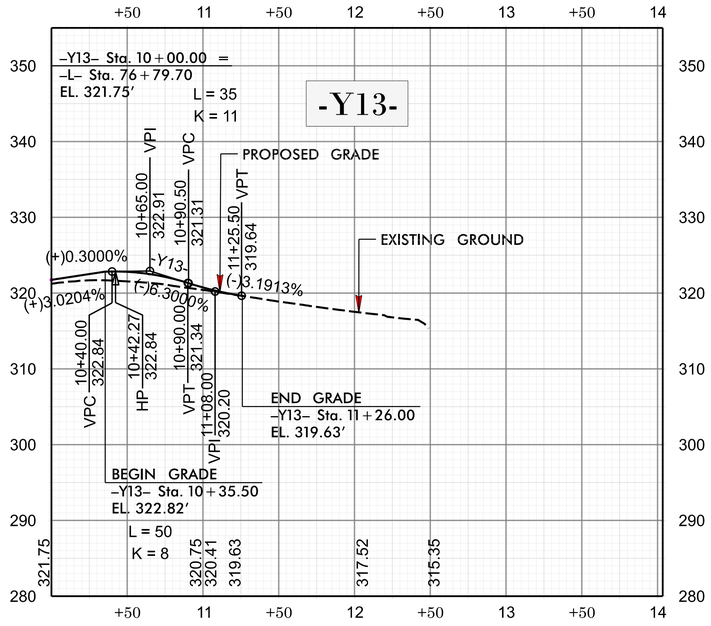


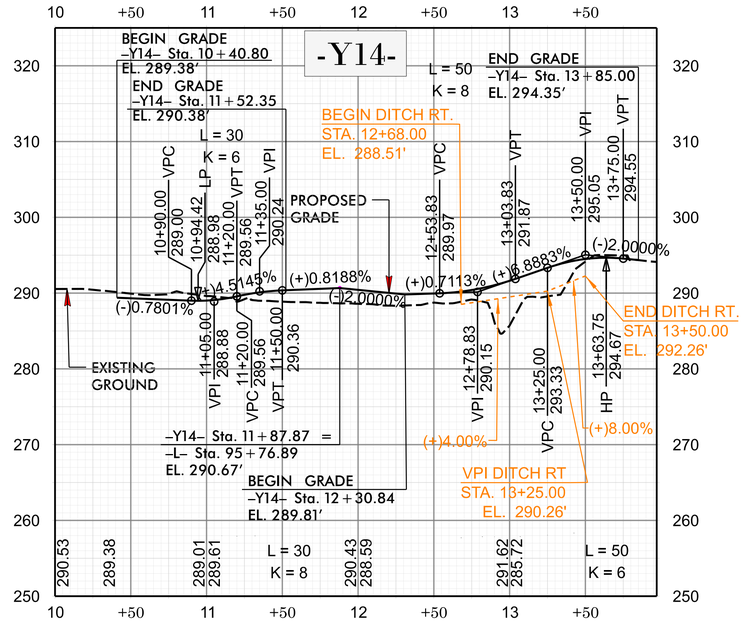




FOR -Y9A- PLAN, SEE SHEET 7
FOR -Y10- PLAN, SEE SHEET 8
FOR -Y11- PLAN, SEE SHEET 8







FOR -Y12- PLAN, SEE SHEET 9
FOR -Y13- PLAN, SEE SHEET 9
FOR -Y14- PLAN, SEE SHEET 10

REVISIONS

U-5811
23

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
WAKE COUNTY



ROADWAY DESIGN UNIT

ROADWAY DESIGN ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

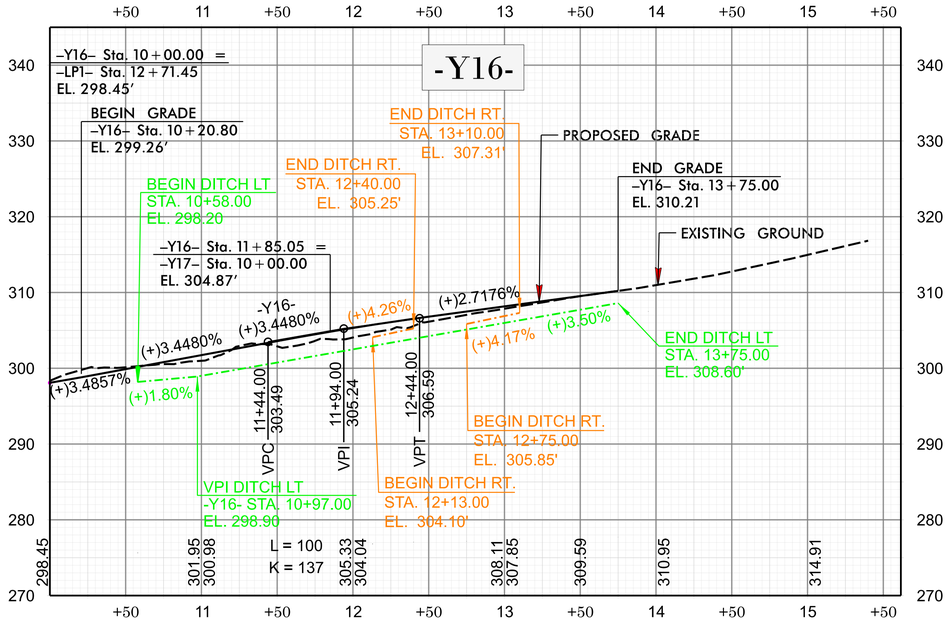
HYDRAULICS ENGINEER

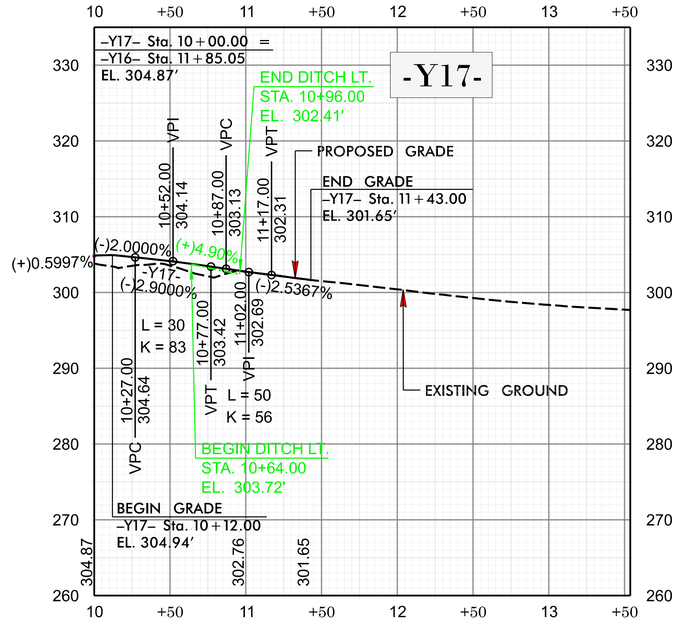
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PREPARED BY

Kimley»Horn
NC LICENSE #P-0102
421 FAYETTEVILLE STREET, SUITE 600
RALEIGH, NORTH CAROLINA 27601
PHONE (919) 677-2000

5/26/20





FOR -Y16- PLAN, SEE SHEET 13
FOR -Y17- PLAN, SEE SHEET 13

U-5811

24

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
WAKE COUNTY

ROADWAY DESIGN UNIT

ROADWAY DESIGN ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PREPARED BY

Kimley»Horn

REVISIONS

Appendix D

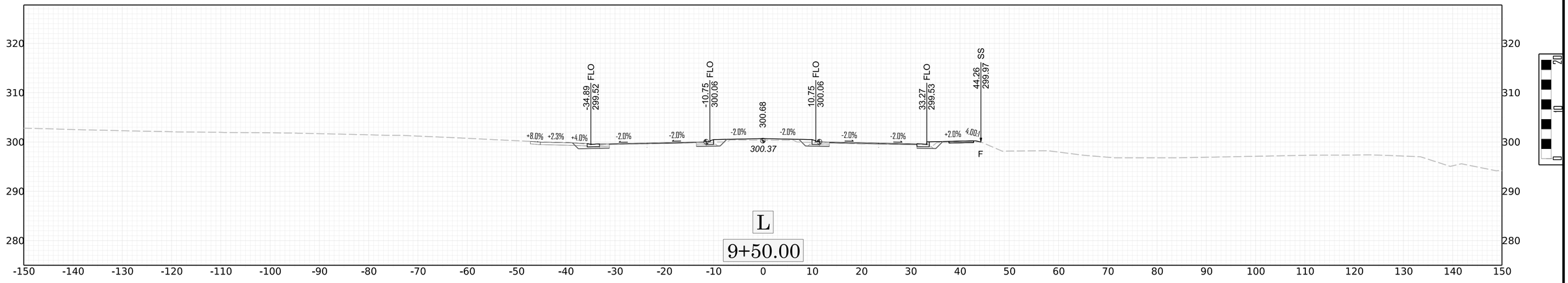
Drainage Cross Sections

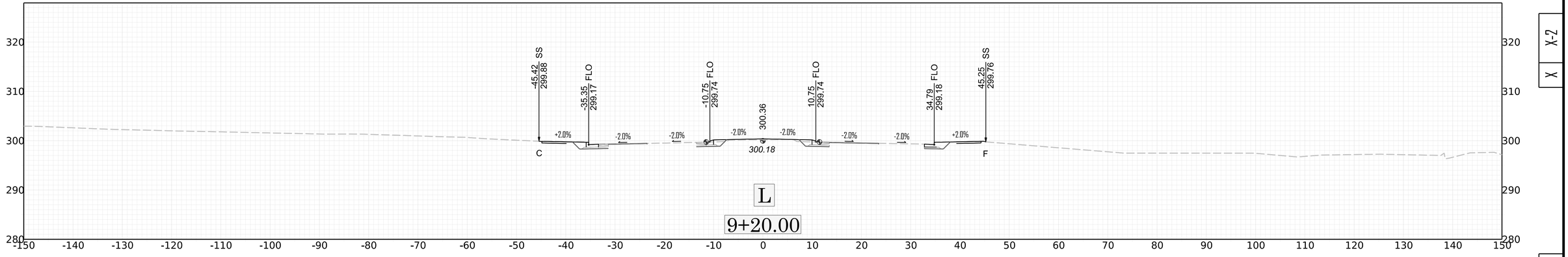
11/14/23

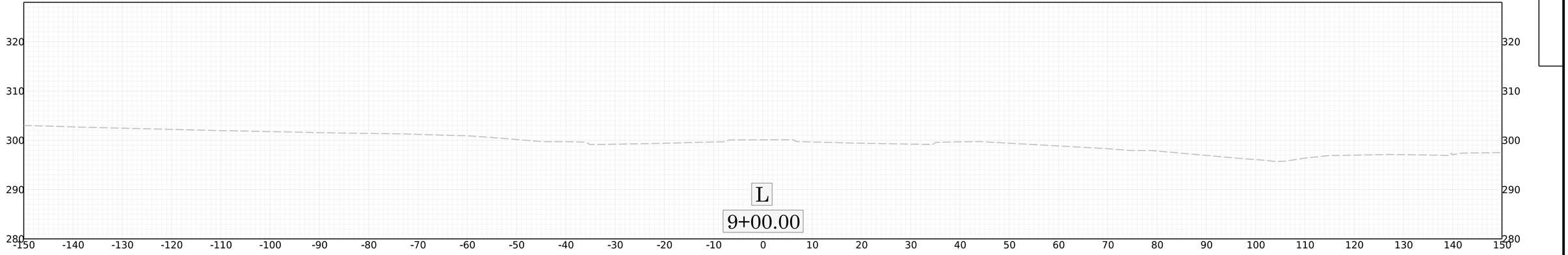
U-5811
AVIATION PARKWAY
CROSS-SECTION INDEX

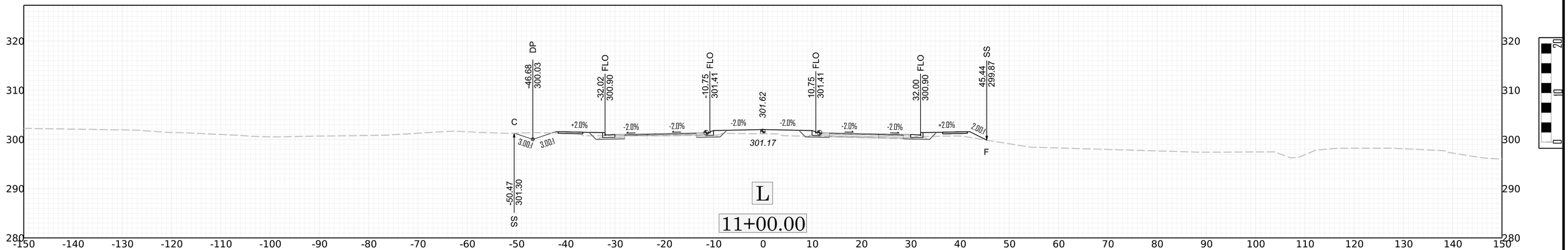
-L- SR 1002 (MORRISVILLE CARPENTER ROAD/AVIATION PARKWAY)	X-2 THRU X-89
-LP1-	X-90 THRU X-98
-Y1- (CHURCH STREET)	X-99
-Y2- (PAGE STREET)	X-100
-Y4- SR 3081 NC 54 (CHAPEL HILL ROAD)	X-101 THRU X-123
-Y5- (LIBERTY HILL PASS)	X-124
-Y6- (LIBERTY HILL PASS)	X-125 THRU X-126
-Y7- (BEARCAT WAY)	X-127 THRU X-128
-Y8- (CLEMENTS DRIVE)	X-129
-Y9- (INTERNATIONAL DRIVE)	X-130 THRU X-131
-Y9A-	X-132 THRU X-133
-Y10- SR 3084 (MCCRIMMON PARKWAY/EVANS ROAD)	X-134 THRU X-136
-Y11- (PHARMA DRIVE)	X-137
-Y12- (SOUTHPORT DRIVE)	X-138 THRU X-139
-Y13- (SOUTHPORT DRIVE)	X-140 THRU X-141
-Y14- (DOMINION DRIVE)	X-142 THRU X-145
-Y16- (COTTEN DRIVE)	X-146 THRU X-147
-Y17-	X-148 THRU X-149

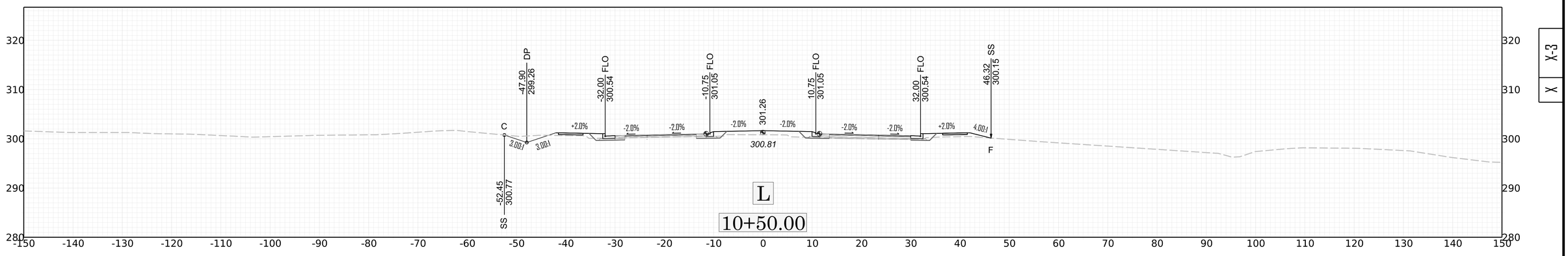
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

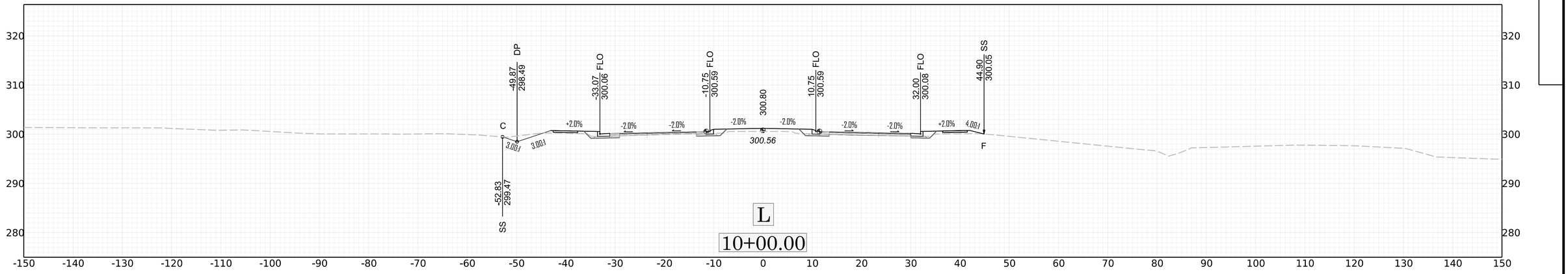


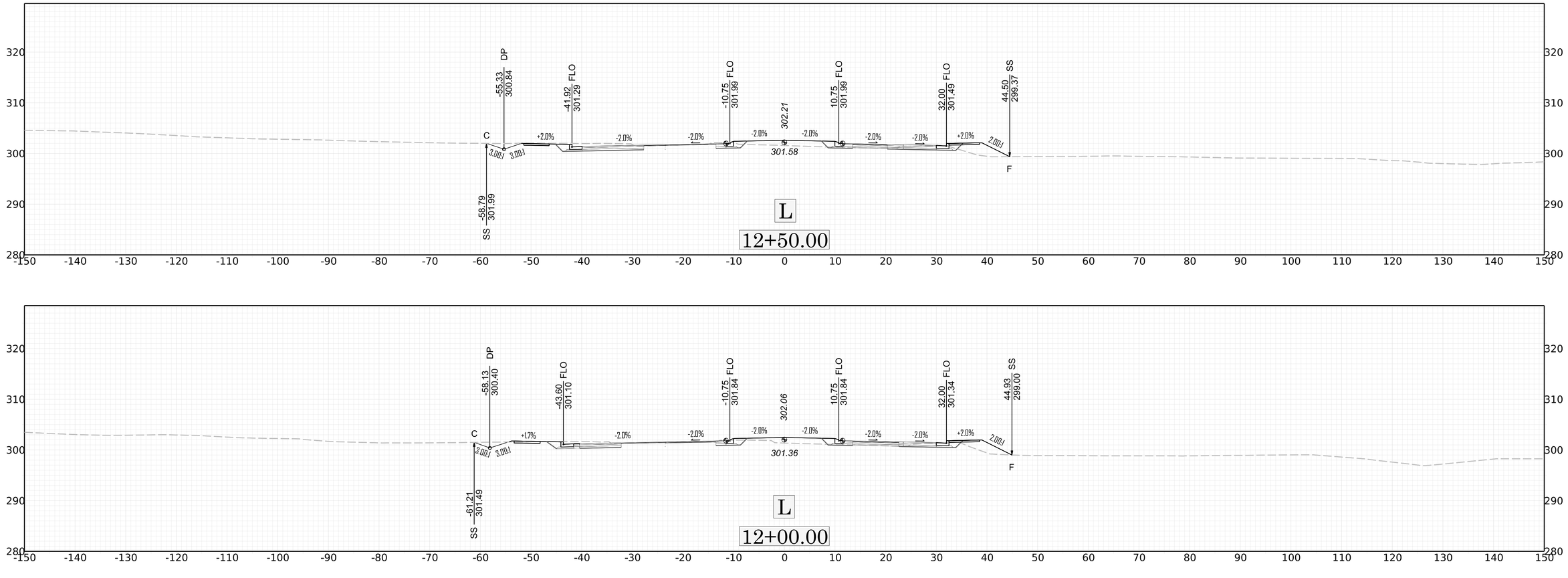


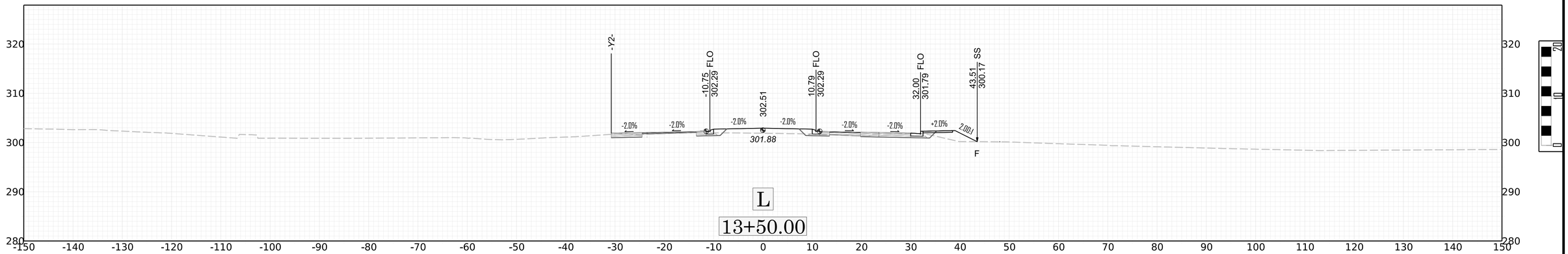


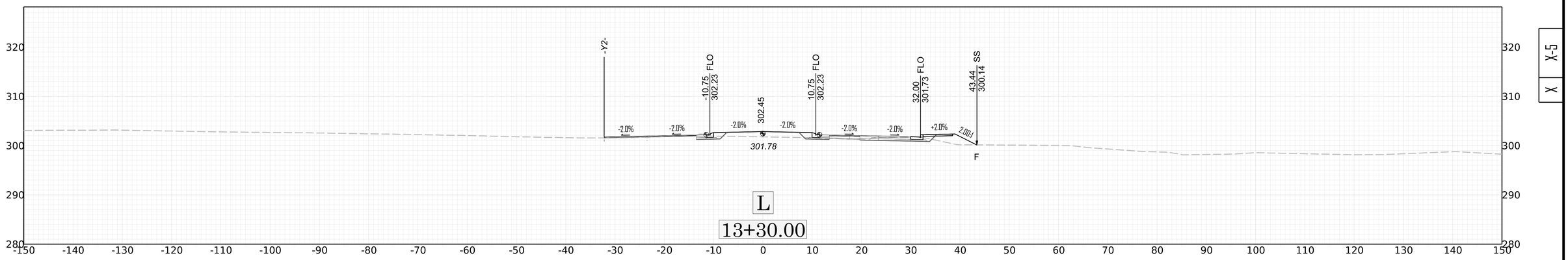

DP
-46.68
300.03
FLO
-32.02
300.90
FLO
-10.75
301.41
FLO
10.75
301.41
FLO
32.00
300.90
SS
45.44
299.87
301.62
301.17
C
F
+2.0%
-2.0%
4.00:1
3.00:1
SS
-50.47
301.30
L
11+00.00

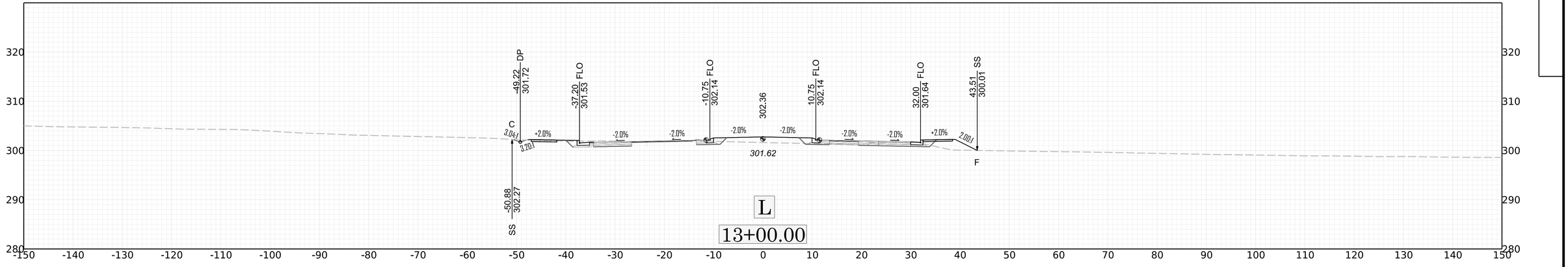

DP
-47.90
299.26
FLO
-32.00
300.54
FLO
-10.75
301.05
FLO
10.75
301.05
FLO
32.00
300.54
SS
46.32
300.15
301.26
300.81
C
F
+2.0%
-2.0%
4.00:1
3.00:1
SS
-52.45
300.77
L
10+50.00

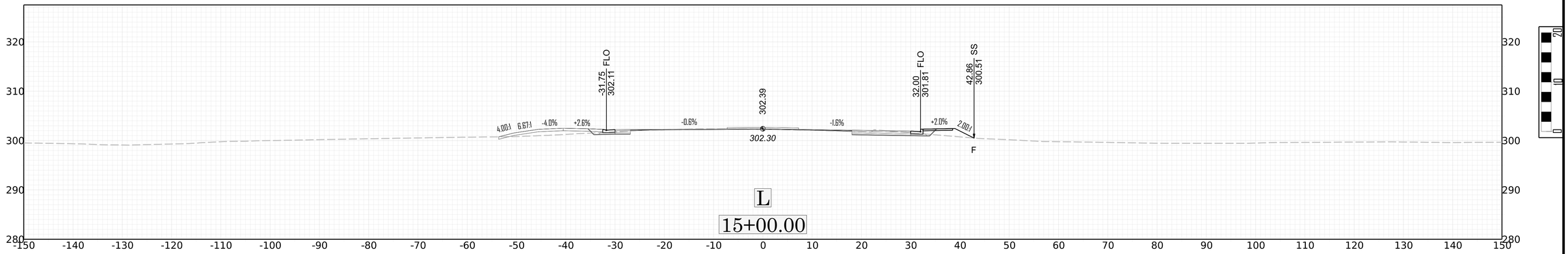

DP
-49.87
298.49
FLO
-33.07
300.06
FLO
-10.75
300.59
FLO
10.75
300.59
FLO
32.00
300.08
SS
44.90
300.05
300.80
300.56
C
F
+2.0%
-2.0%
4.00:1
3.00:1
SS
-52.83
299.47
L
10+00.00

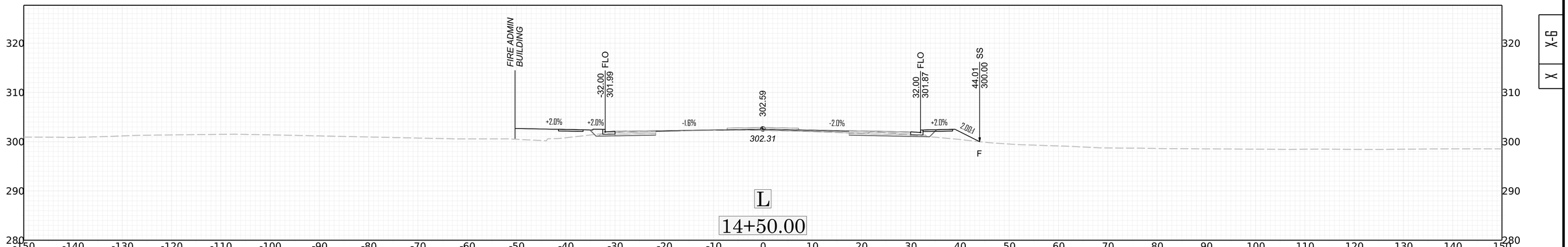

DP
-55.33
300.84
FLO
-41.92
301.26
FLO
-10.75
301.99
FLO
10.75
301.99
FLO
32.00
301.48
SS
44.50
299.37
C
+2.0%
-2.0%
3.00:1
2.00:1
302.21
301.58
F
SS
-58.79
301.99
L
12+50.00
DP
-58.13
300.40
FLO
-43.60
301.10
FLO
-10.75
301.84
FLO
10.75
301.84
FLO
32.00
301.34
SS
44.93
299.00
+1.7%
302.06
301.36
-61.21
301.49
L
12+00.00
-Y1-
FLO
-10.75
301.67
FLO
10.75
301.67
FLO
32.00
301.16
SS
41.49
300.55
302.29
301.24
L
11+50.00
320
310
300
290
280
-150
-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

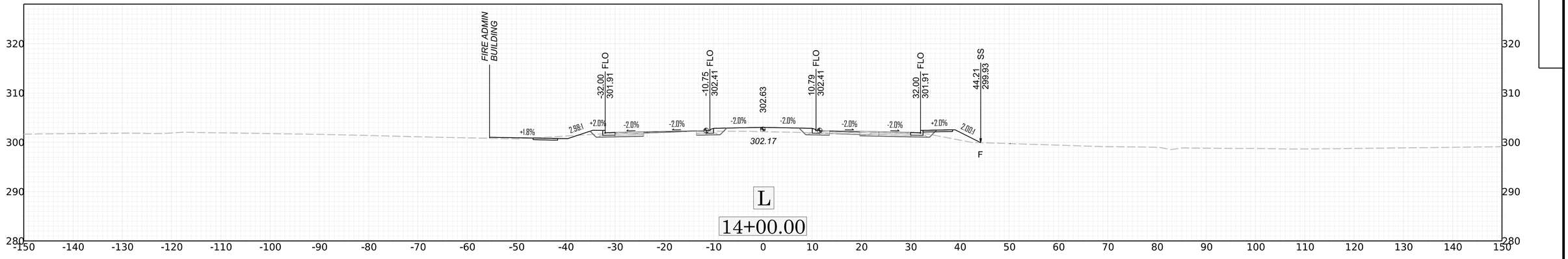

-Y2-
-10.75 FLO 302.29
302.51
10.79 FLO 302.29
32.00 FLO 301.79
43.51 SS 300.17
-2.0%
+2.0%
2.00:1
301.88
F
L
13+50.00

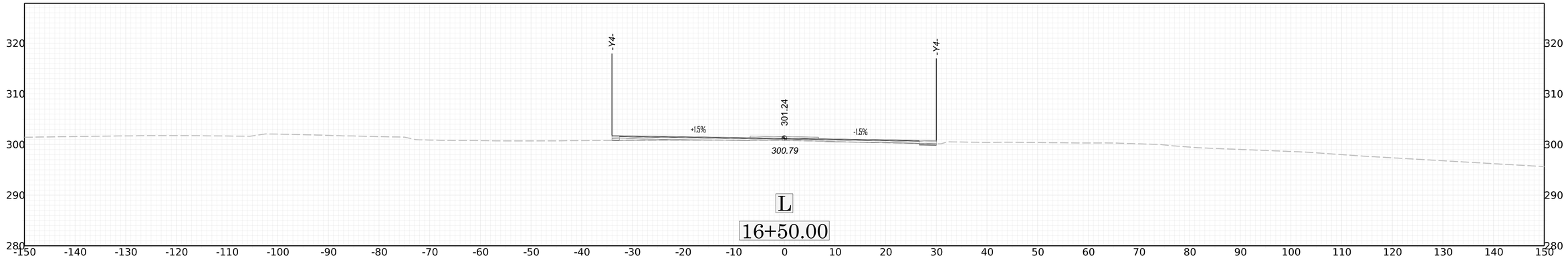

-Y2-
-10.75 FLO 302.23
302.45
10.75 FLO 302.23
32.00 FLO 301.73
43.44 SS 300.14
-2.0%
+2.0%
2.00:1
301.78
F
L
13+30.00


C
3.04:1
3.20:1
-49.22 DP 301.72
-37.20 FLO 301.53
-10.75 FLO 302.14
302.36
10.75 FLO 302.14
32.00 FLO 301.64
43.51 SS 300.01
-50.88 SS 302.27
-2.0%
+2.0%
2.00:1
301.62
F
L
13+00.00


320
310
300
290
280
-150 -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
-31.75
302.11
FLO
302.39
32.00
301.81
FLO
42.86
300.51
SS
4.00:1
6.67:1
-4.0%
+2.6%
-0.6%
-1.6%
+2.0%
2.00:1
302.30
F
L
15+00.00

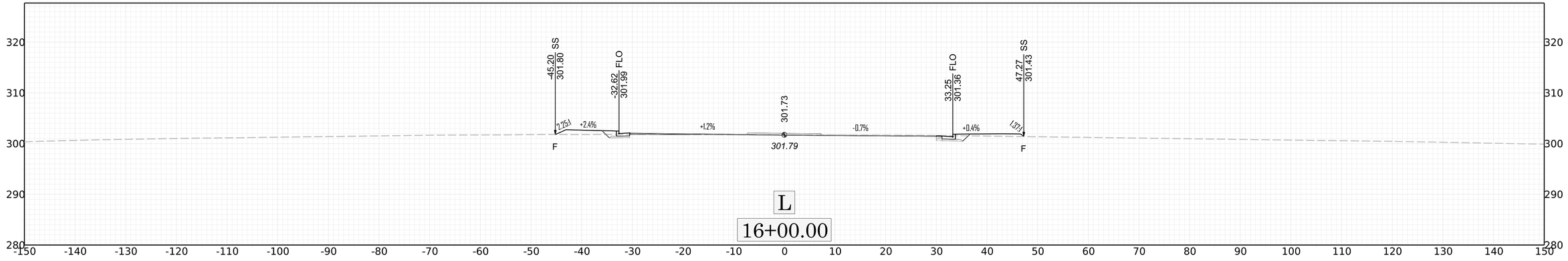

320
310
300
290
280
-150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
FIRE ADMIN BUILDING
-32.00
301.99
FLO
302.59
32.00
301.87
FLO
44.01
300.00
SS
+2.0%
+2.0%
-1.6%
-2.0%
+2.0%
2.00:1
302.31
F
L
14+50.00


320
310
300
290
280
-150 -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
FIRE ADMIN BUILDING
-32.00
301.91
FLO
-10.75
302.41
FLO
302.63
10.79
302.41
FLO
32.00
301.91
FLO
44.21
299.93
SS
+1.8%
2.98:1
+2.0%
-2.0%
-2.0%
-2.0%
-2.0%
-2.0%
-2.0%
+2.0%
2.00:1
302.17
F
L
14+00.00



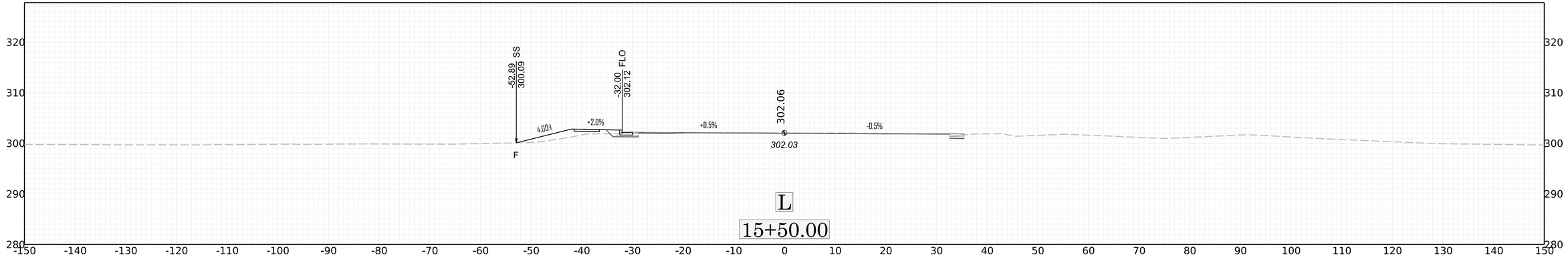
L

16+50.00



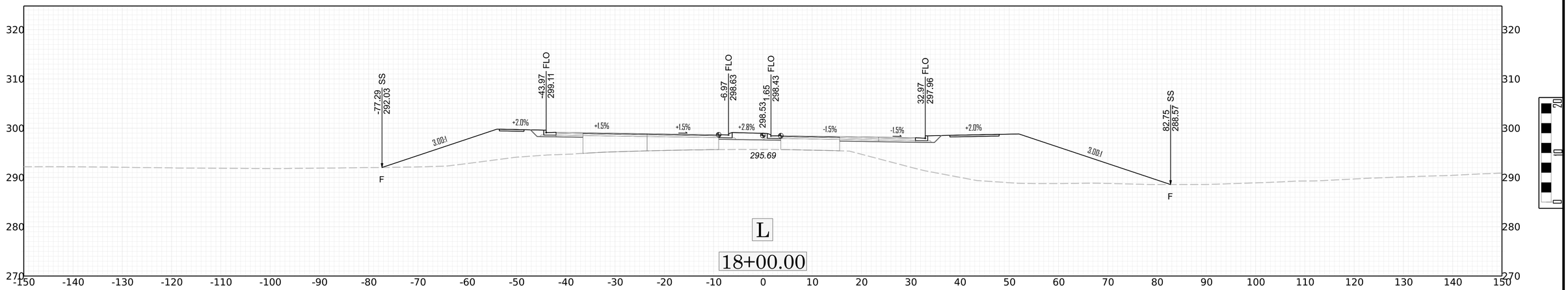
L

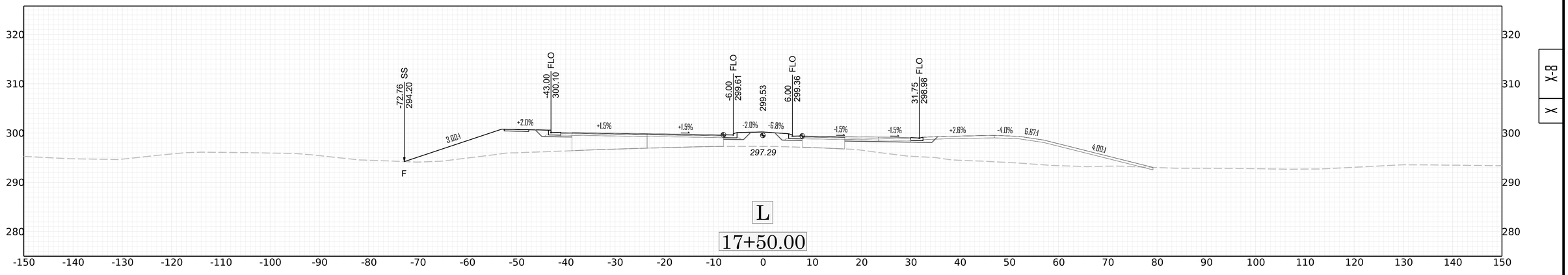
16+00.00

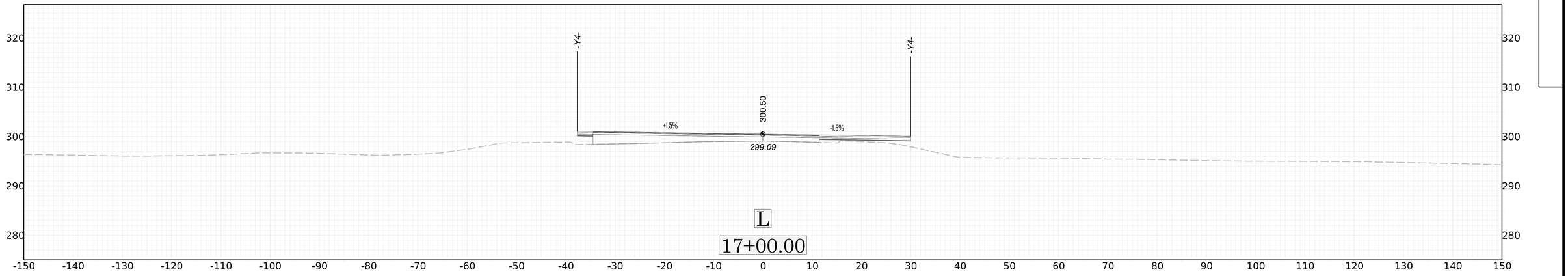


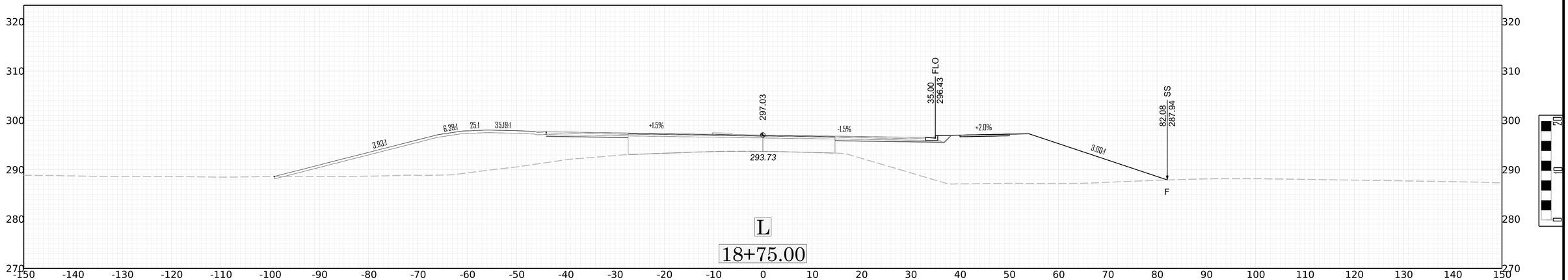
L

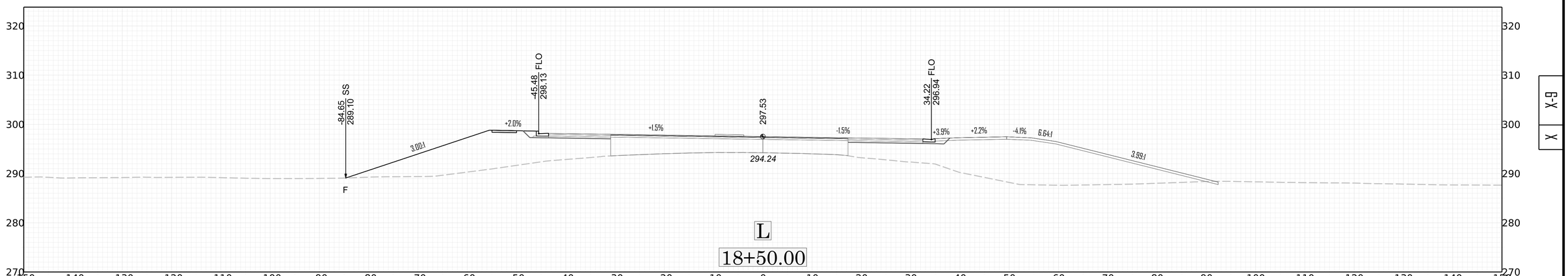
15+50.00

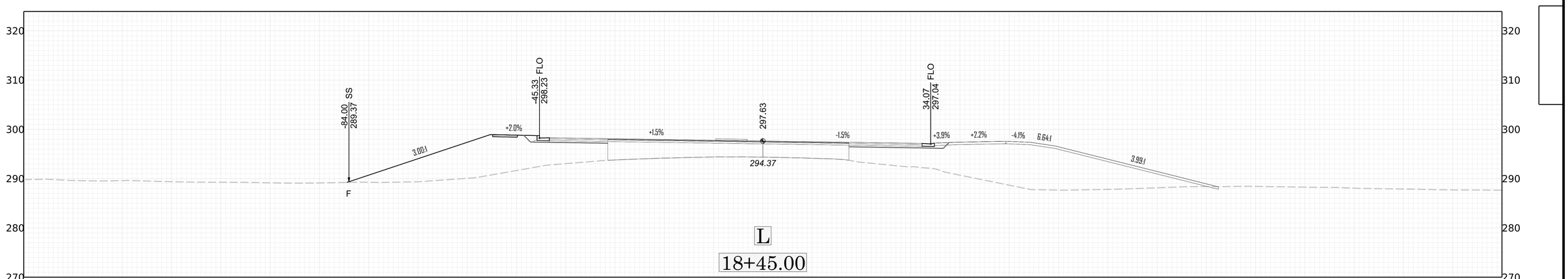

-77.29
292.03
SS
-43.97
299.11
FLO
-6.97
298.63
FLO
1.65
298.43
FLO
298.53
32.97
297.96
FLO
82.75
288.57
SS
3.00:1
+2.0%
+1.5%
+1.5%
+2.8%
-1.5%
-1.5%
+2.0%
3.00:1
295.69
F
F
L
18+00.00

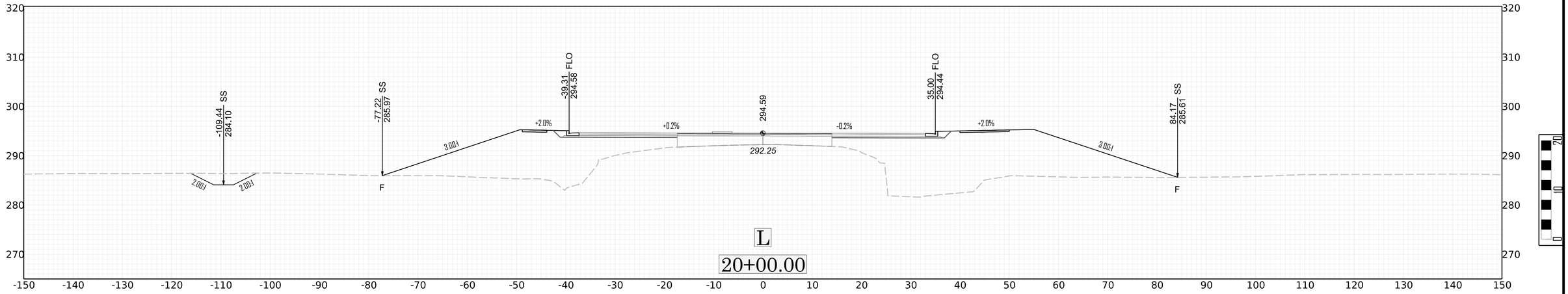

-72.76
294.20
SS
-43.00
300.10
FLO
-6.00
299.61
FLO
299.53
6.00
299.36
FLO
31.75
298.98
FLO
3.00:1
+2.0%
+1.5%
+1.5%
-2.0%
-6.8%
-1.5%
-1.5%
+2.6%
-4.0%
6.67:1
4.00:1
297.29
F
L
17+50.00

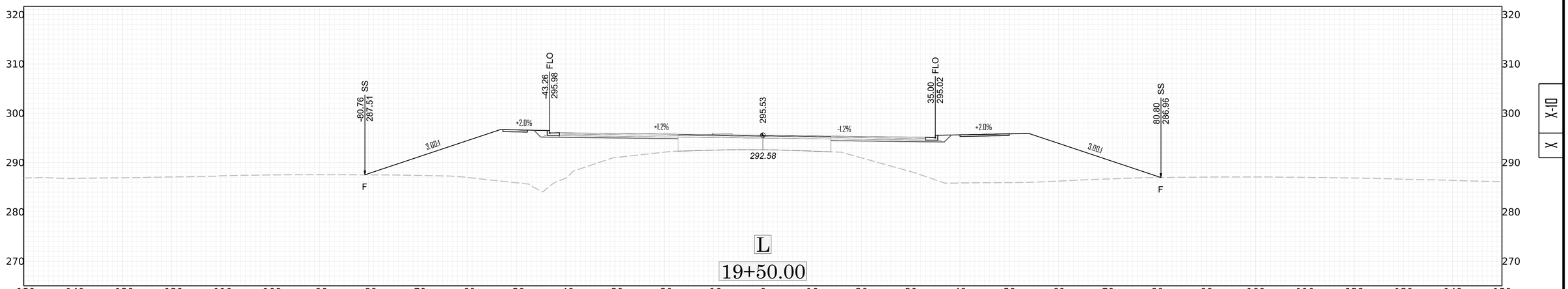

-Y4-
-Y4-
300.50
+1.5%
-1.5%
299.09
L
17+00.00

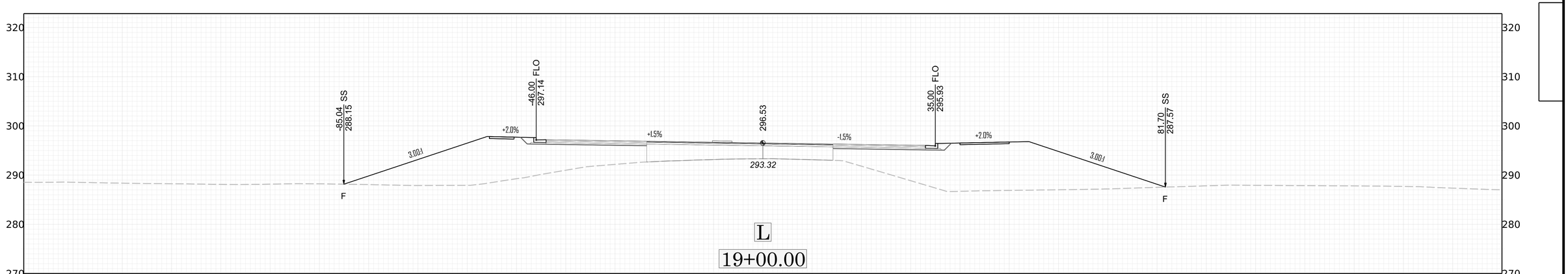

3.93:1
6.39:1
25:1
35.19:1
+1.5%
297.03
293.73
-1.5%
35.00
296.43
FLO
+2.0%
82.08
287.94
SS
3.00:1
F
L
18+75.00

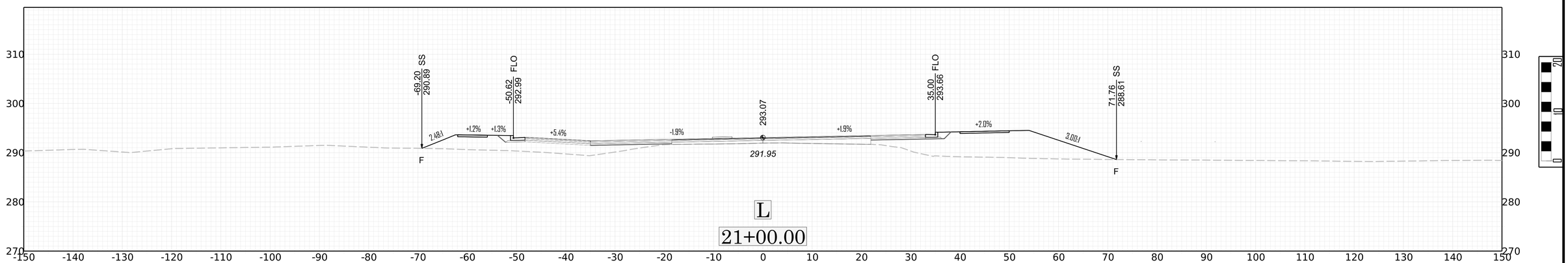

-84.65
289.10
SS
3.00:1
+2.0%
-45.48
298.13
FLO
+1.5%
297.53
294.24
-1.5%
34.22
296.94
FLO
+3.9%
+2.2%
-4.1%
6.64:1
3.99:1
F
L
18+50.00


-84.00
289.37
SS
3.00:1
+2.0%
-45.33
298.23
FLO
+1.5%
297.63
294.37
-1.5%
34.07
297.04
FLO
+3.9%
+2.2%
-4.1%
6.64:1
3.99:1
F
L
18+45.00


-109.44
284.10
SS
-77.22
285.97
SS
-39.31
294.58
FLO
294.59
35.00
294.44
FLO
84.17
285.61
SS
+2.0%
+0.2%
-0.2%
+2.0%
3.00:1
3.00:1
2.00:1
2.00:1
292.25
F
F
L
20+00.00

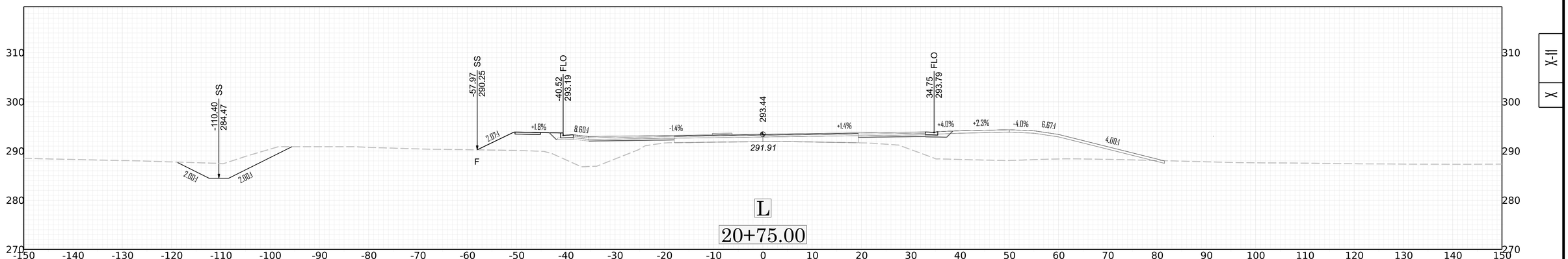

-80.76
287.51
SS
-43.26
295.98
FLO
295.53
35.00
295.02
FLO
80.80
286.96
SS
+2.0%
+1.2%
-1.2%
+2.0%
3.00:1
3.00:1
292.58
F
F
L
19+50.00


-85.04
288.15
SS
-46.00
297.14
FLO
296.53
35.00
295.93
FLO
81.70
287.57
SS
+2.0%
+1.5%
-1.5%
+2.0%
3.00:1
3.00:1
293.32
F
F
L
19+00.00



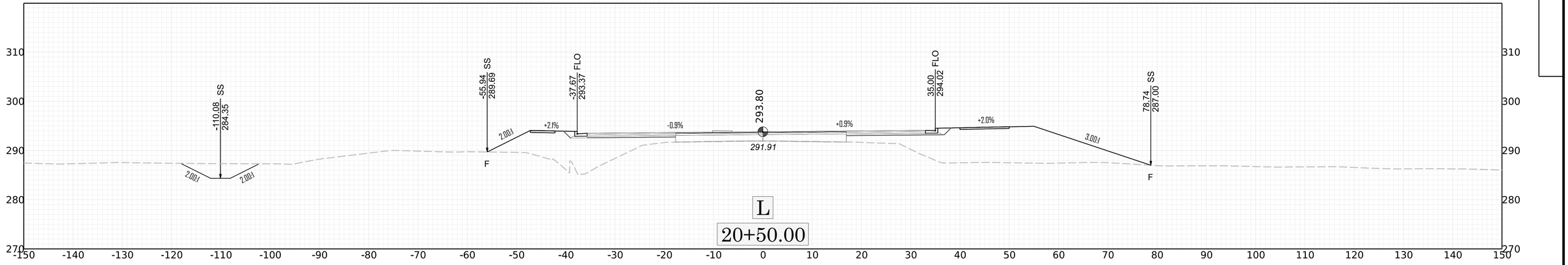
L

21+00.00



L

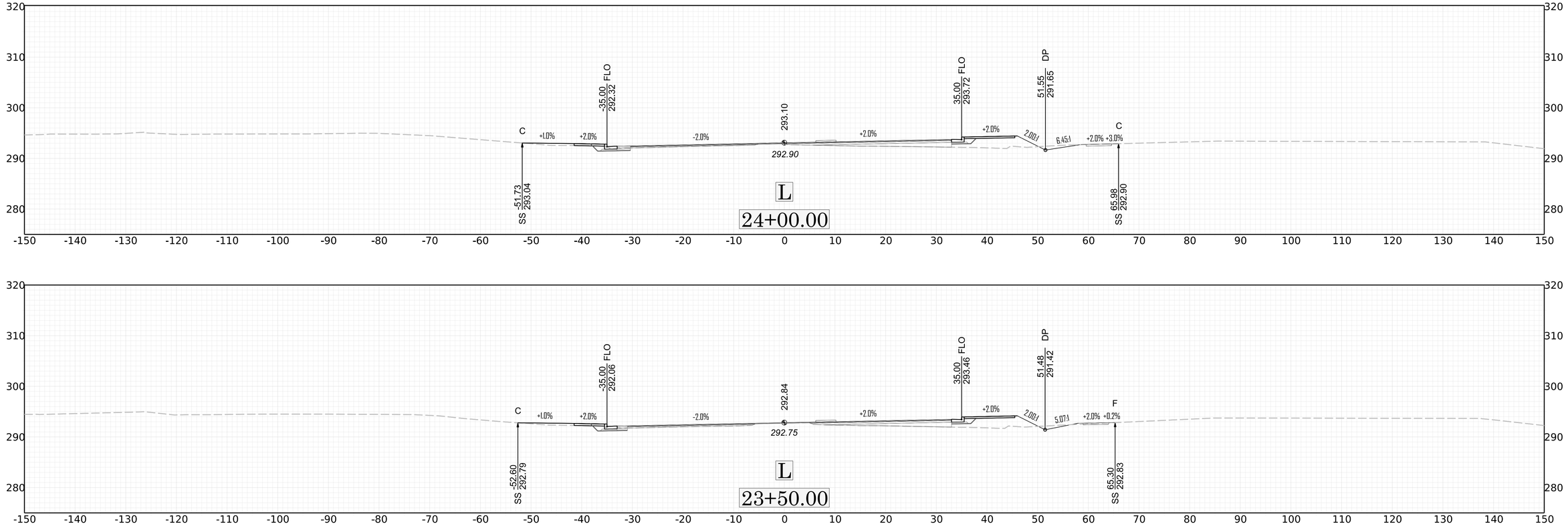
20+75.00

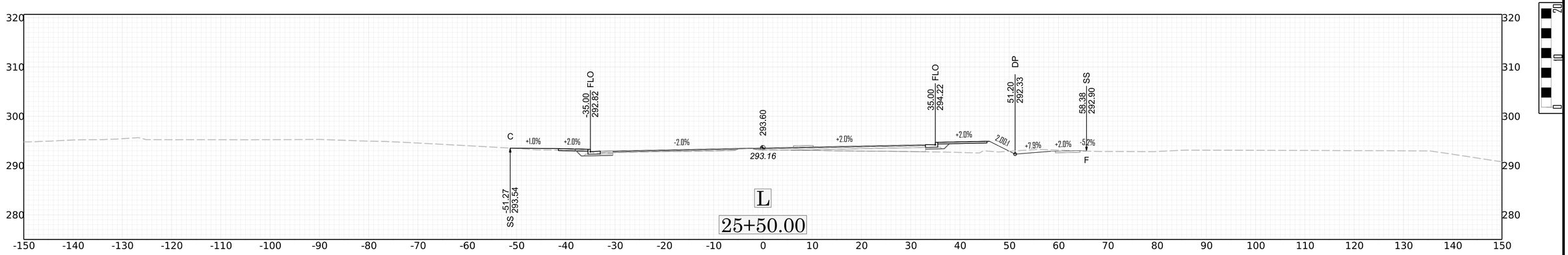


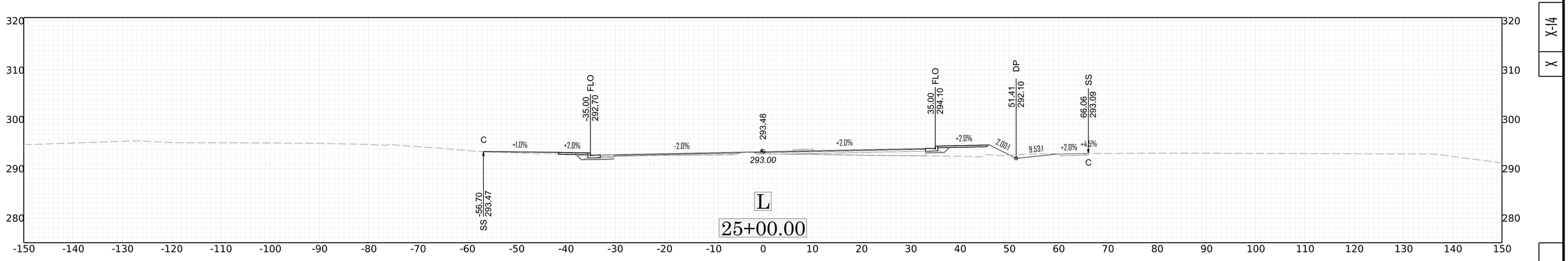
L

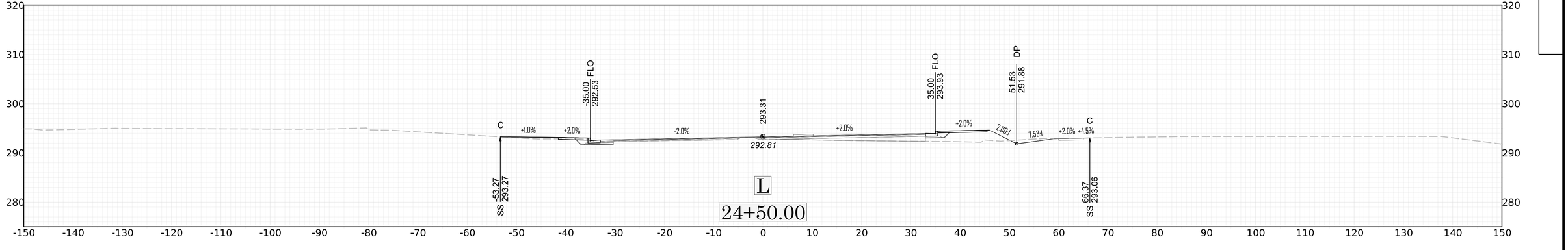
20+50.00

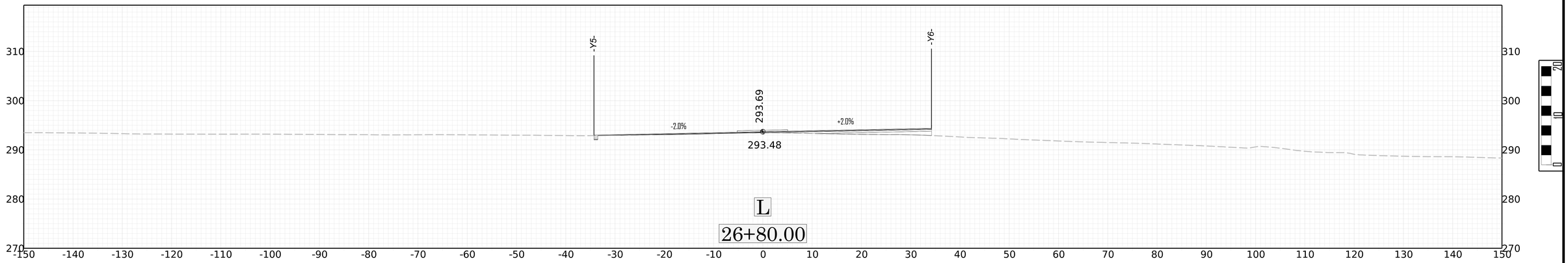
-LP1-
292.22
-2.0%
+2.0%
292.30
35.00
292.84
FLO
+2.0%
8.69:1
62.50
292.50
SS
+2.0%
+6.2%
F
L
22+50.00
-LP1-
292.19
-2.0%
+2.0%
292.26
48.68
293.00
FLO
29.47:1
77.20
293.08
SS
F
L
22+00.00
-LP1-
292.47
-2.0%
+2.0%
292.31
35.00
293.09
FLO
+2.0%
4.00:1
68.88
290.24
SS
F
L
21+50.00
310
300
290
280
-150 -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
0
10
20
X-17
X

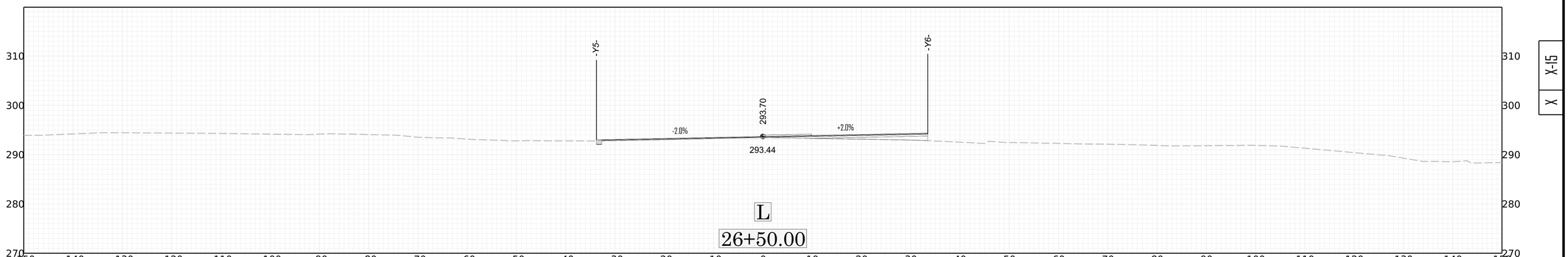

C
+1.0%
+2.0%
-35.00
292.32
FLO
-2.0%
293.10
292.90
+2.0%
35.00
293.72
FLO
+2.0%
51.55
291.65
DP
2.00:1
6.45:1
+2.0%
+3.0%
C
SS -51.73
293.04
SS 65.98
292.90
L
24+00.00
C
+1.0%
+2.0%
-35.00
292.06
FLO
-2.0%
292.84
292.75
+2.0%
35.00
293.46
FLO
+2.0%
51.48
291.42
DP
2.00:1
5.07:1
+2.0%
+0.2%
F
SS -52.60
292.79
SS 65.30
292.83
L
23+50.00
C
+1.0%
+2.0%
-35.00
291.75
FLO
-2.0%
292.53
292.43
+2.0%
35.00
293.15
FLO
+2.0%
51.32
291.20
DP
2.00:1
4.44:1
+2.0%
-5.0%
F
SS -52.71
292.49
SS 64.76
292.66
L
23+00.00
320
310
300
290
280
-150
-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
0
10
20
X-13
X

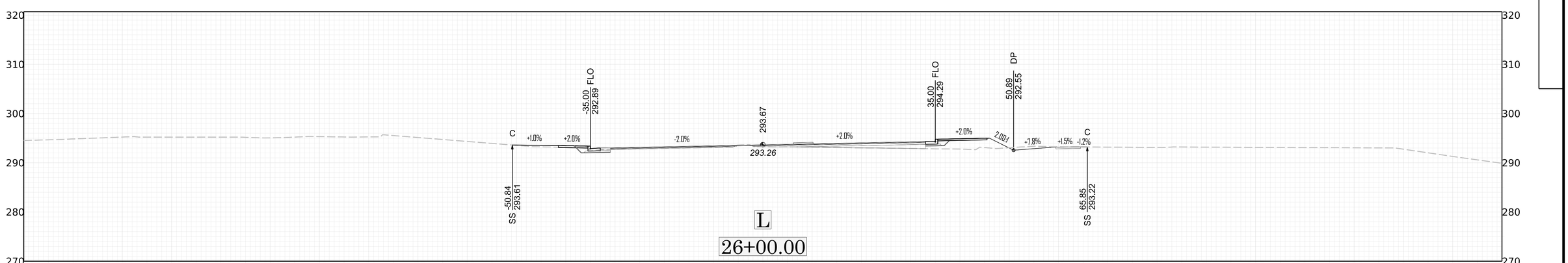

320
310
300
290
280
-150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
C
+1.0%
+2.0%
-2.0%
+2.0%
+2.0%
2.00:1
+7.5%
+2.0%
-5.2%
F
-35.00 FLO 292.82
293.60
293.16
35.00 FLO 294.22
51.20 DP 292.33
58.38 SS 292.90
-51.27 SS 293.54
L
25+50.00

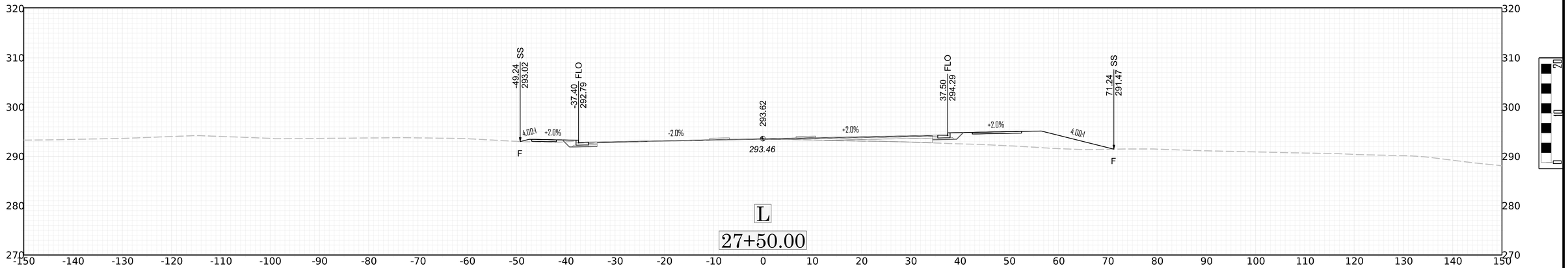

320
310
300
290
280
-150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
C
+1.0%
+2.0%
-2.0%
+2.0%
+2.0%
2.00:1
9.53:1
+2.0%
+4.5%
C
-35.00 FLO 292.70
293.48
293.00
35.00 FLO 294.10
51.41 DP 292.10
66.06 SS 293.09
-56.70 SS 293.47
L
25+00.00

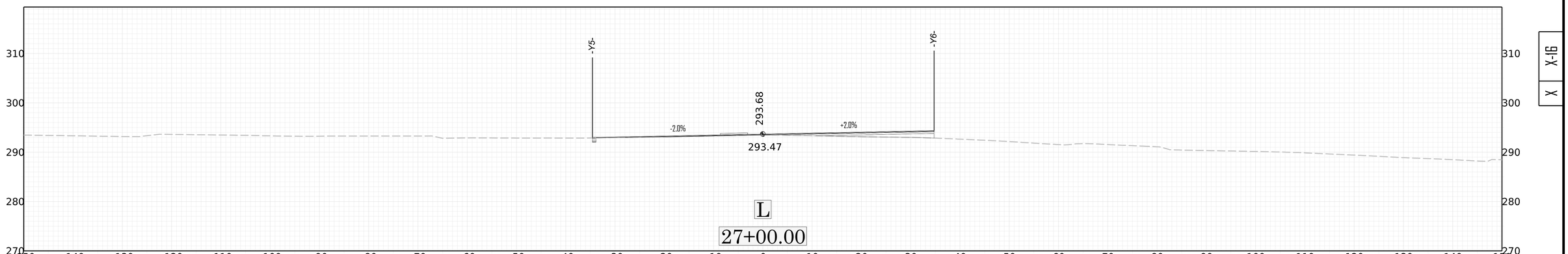

320
310
300
290
280
-150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
C
+1.0%
+2.0%
-2.0%
+2.0%
+2.0%
2.00:1
7.53:1
+2.0%
+4.5%
C
-35.00 FLO 292.53
293.31
292.81
35.00 FLO 293.93
51.53 DP 291.88
66.37 SS 293.06
-53.27 SS 293.27
L
24+50.00

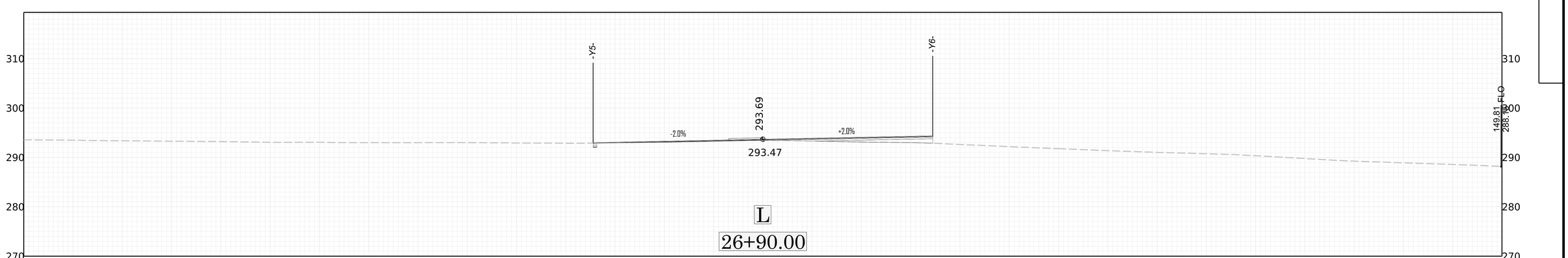

-Y5-
-Y6-
293.69
-2.0%
+2.0%
293.48
L
26+80.00
310
300
290
280
270
-150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
20
10
0

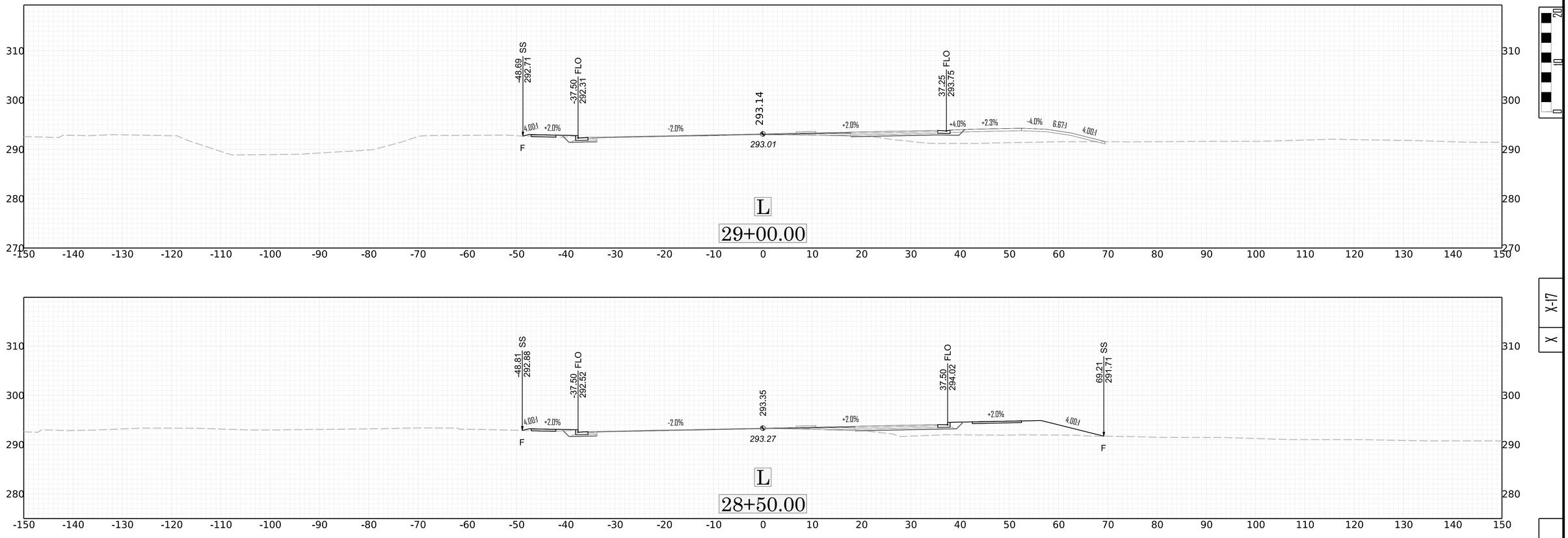

-Y5-
-Y6-
293.70
-2.0%
+2.0%
293.44
L
26+50.00
310
300
290
280
270
-150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
5-Y
Y

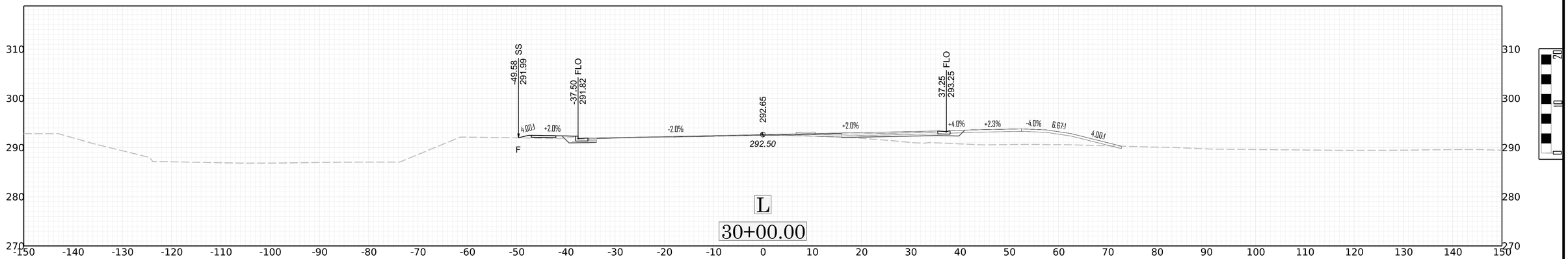

C
+1.0%
+2.0%
-35.00
FLO
292.89
-2.0%
293.67
293.26
+2.0%
35.00
FLO
294.29
+2.0%
2.00%
50.89
DP
292.55
+7.8%
+1.5%
-1.2%
C
50.84
293.61
SS
65.85
293.22
SS
L
26+00.00
320
310
300
290
280
270
-150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

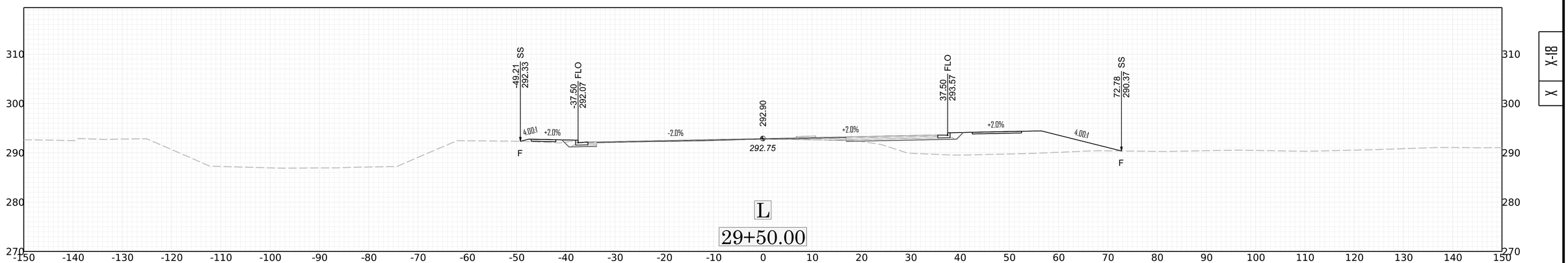

-49.24
293.02
SS
-37.40
292.79
FLO
293.62
37.50
294.29
FLO
71.24
291.47
SS
4.00:1
+2.0%
-2.0%
+2.0%
+2.0%
4.00:1
293.46
F
F
L
27+50.00

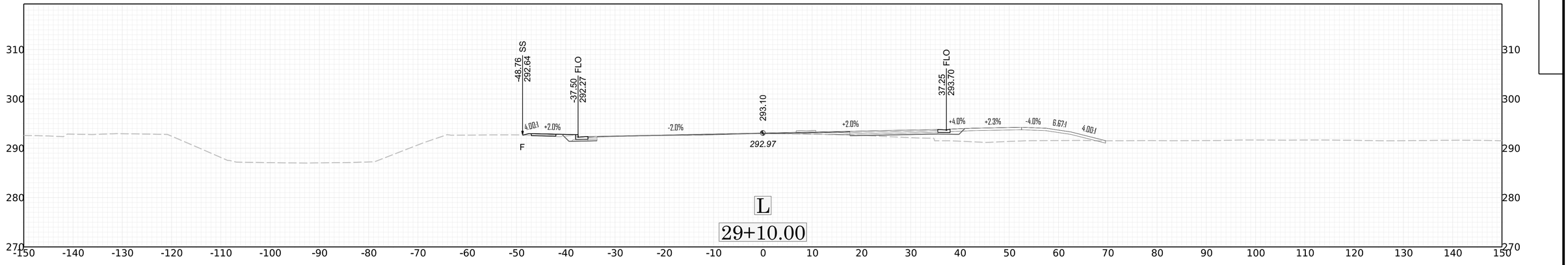

-Y5-
-Y6-
293.68
-2.0%
+2.0%
293.47
L
27+00.00

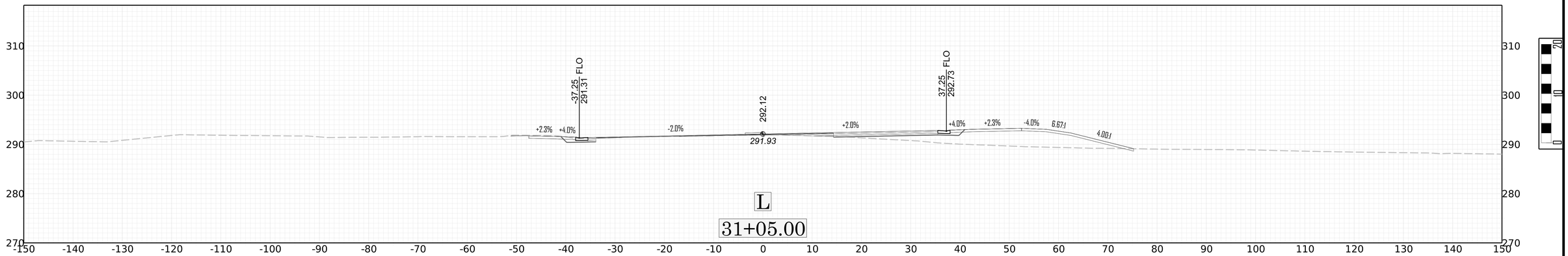

-Y5-
-Y6-
293.69
-2.0%
+2.0%
293.47
149.81
288.16
FLO
L
26+90.00

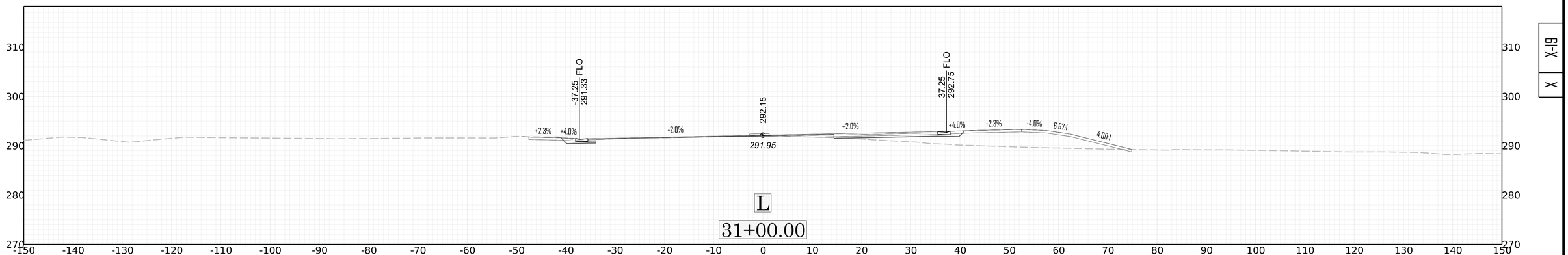

-48.69
292.71
SS
-37.50
292.31
FLO
293.14
293.01
37.25
293.75
FLO
4.00:1
+2.0%
-2.0%
+2.0%
+4.0%
+2.3%
-4.0%
6.67:1
4.00:1
F
L
29+00.00
-48.81
292.88
SS
-37.50
292.52
FLO
293.35
293.27
37.50
294.02
FLO
69.21
291.71
SS
+2.0%
F
L
28+50.00
-49.27
292.92
SS
-37.50
292.68
FLO
293.51
293.41
37.50
294.18
FLO
72.85
290.96
SS
F
L
28+00.00

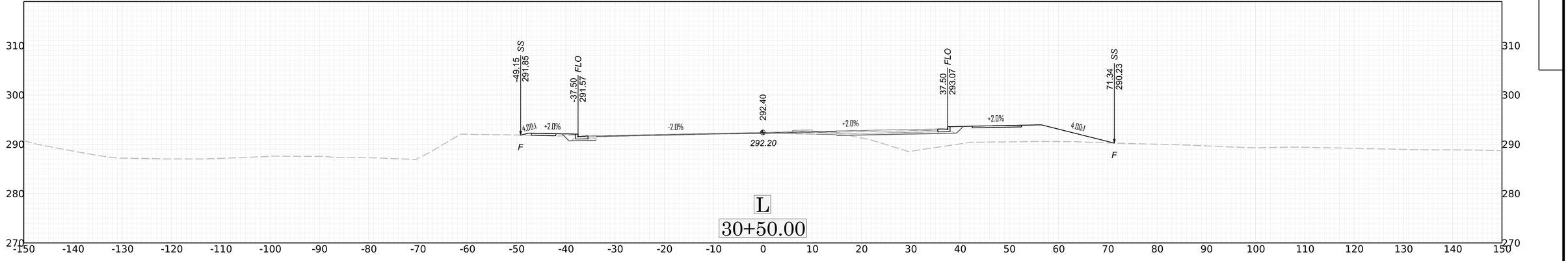

-49.58
291.99
SS
-37.50
291.82
FLO
292.65
37.25
293.25
FLO
4.00:1
+2.0%
-2.0%
+2.0%
+4.0%
+2.3%
-4.0%
6.67:1
4.00:1
292.50
F
L
30+00.00

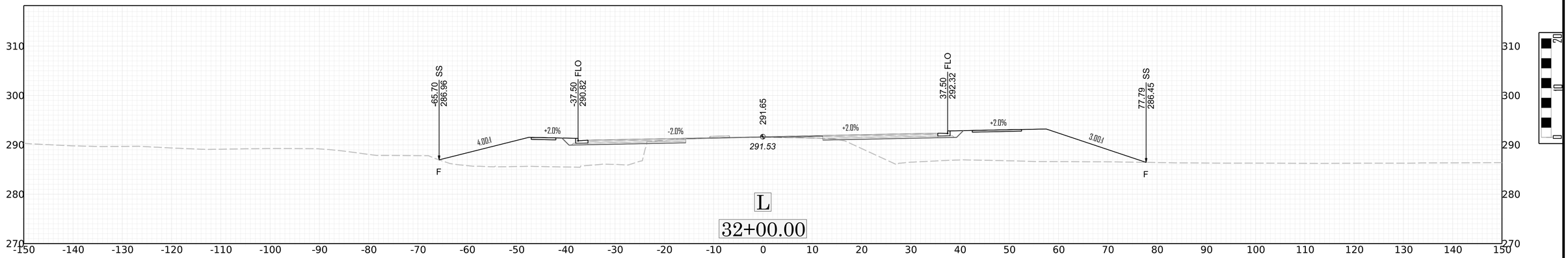

-49.21
292.33
SS
-37.50
292.07
FLO
292.90
37.50
293.57
FLO
72.78
290.37
SS
4.00:1
+2.0%
-2.0%
+2.0%
+2.0%
4.00:1
292.75
F
F
L
29+50.00


-48.76
292.64
SS
-37.50
292.27
FLO
293.10
37.25
293.70
FLO
4.00:1
+2.0%
-2.0%
+2.0%
+4.0%
+2.3%
-4.0%
6.67:1
4.00:1
292.97
F
L
29+10.00


-37.25 FLO
291.31
292.12
291.93
37.25 FLO
292.73
+2.3%
+4.0%
-2.0%
+2.0%
+4.0%
+2.3%
-4.0%
6.67:1
4.00:1
L
31+05.00

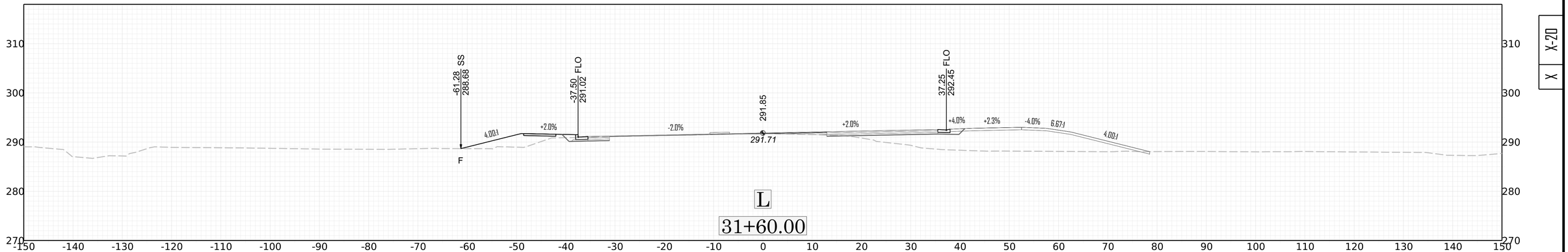

-37.25 FLO
291.33
292.15
291.95
37.25 FLO
292.75
+2.3%
+4.0%
-2.0%
+2.0%
+4.0%
+2.3%
-4.0%
6.67:1
4.00:1
L
31+00.00


-49.15 SS
291.85
-37.50 FLO
291.57
292.40
292.20
37.50 FLO
293.07
71.34 SS
290.23
4.00:1
+2.0%
-2.0%
+2.0%
+2.0%
4.00:1
F
F
L
30+50.00



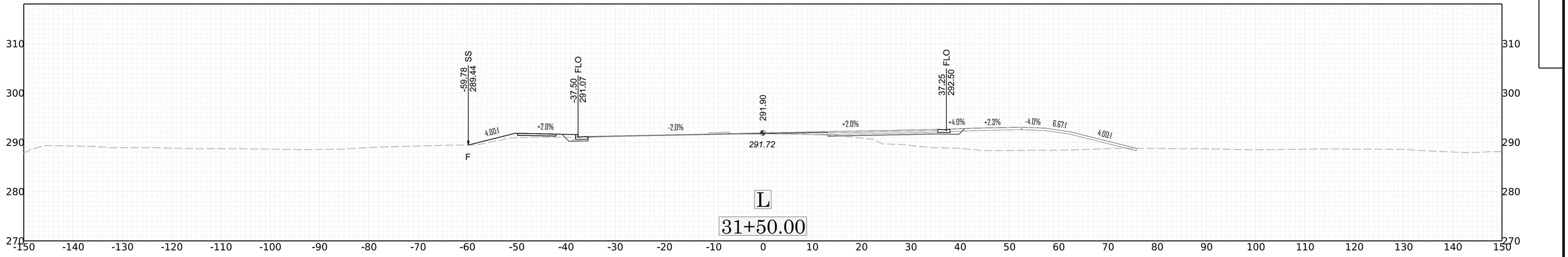
L

32+00.00



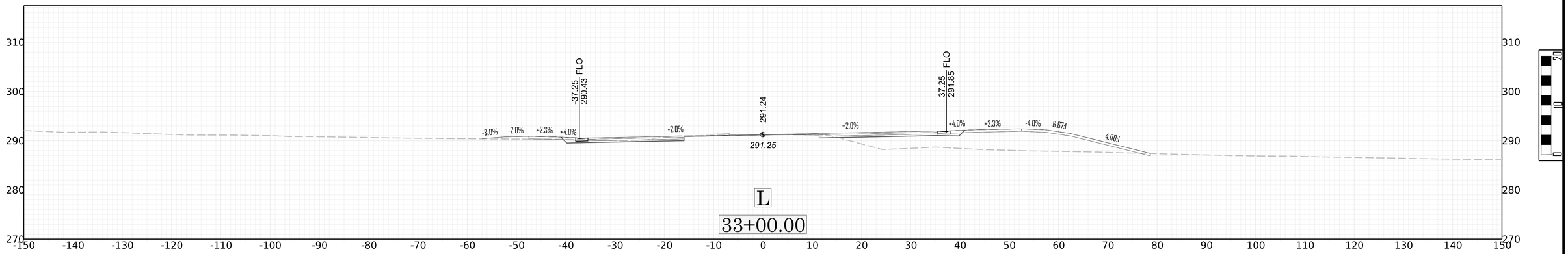
L

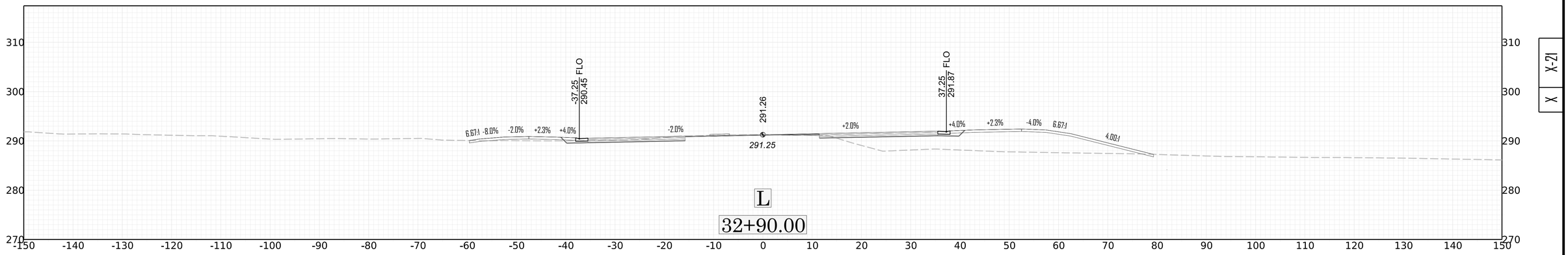
31+60.00

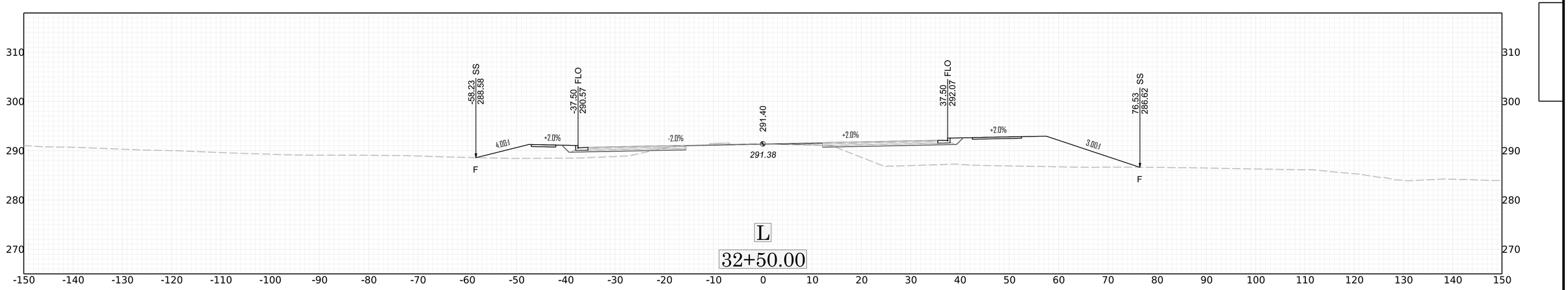


L

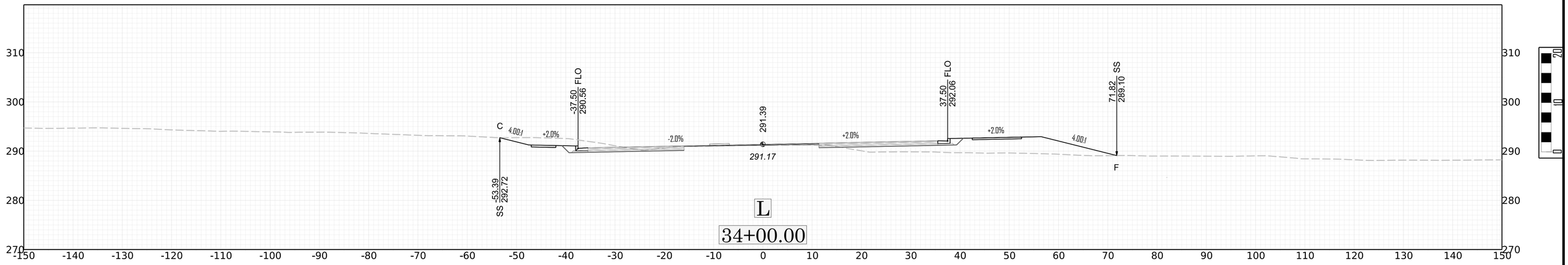
31+50.00

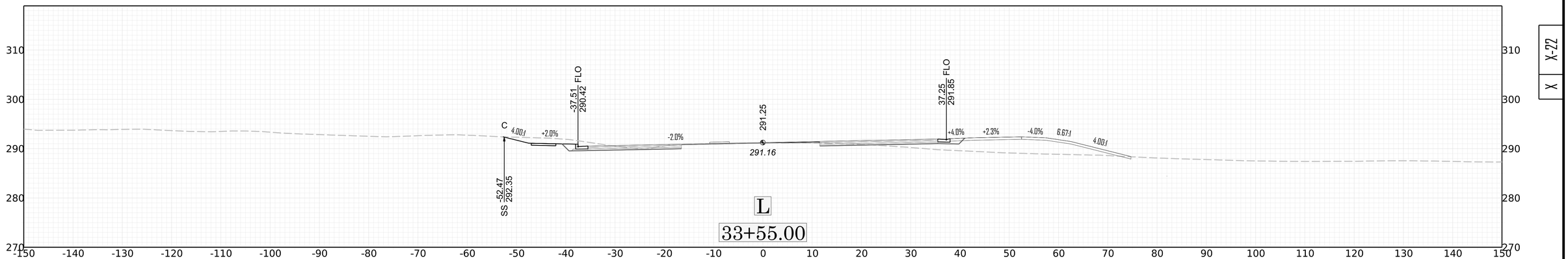

310
300
290
280
270
-150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
-37.25 FLO
290.43
37.25 FLO
291.85
291.24
291.25
-8.0%
-2.0%
+2.3%
+4.0%
-2.0%
+2.0%
+4.0%
+2.3%
-4.0%
6.67:1
4.00:1
L
33+00.00

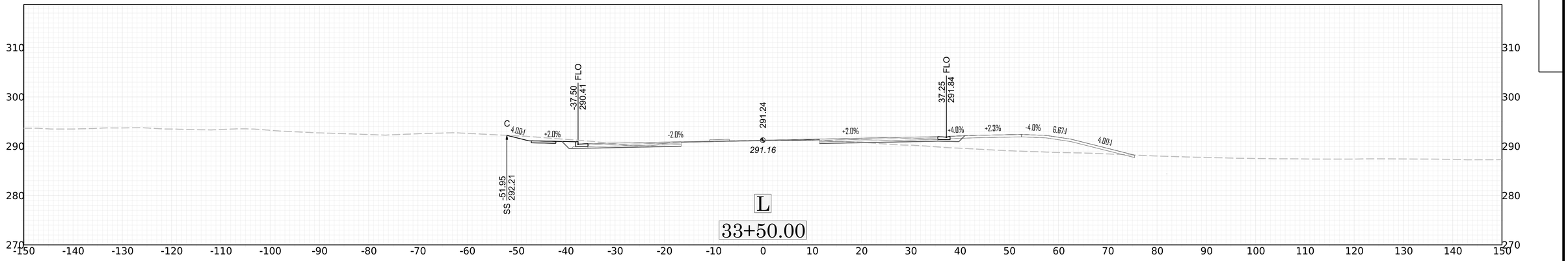

310
300
290
280
270
-150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
-37.25 FLO
290.45
37.25 FLO
291.87
291.26
291.25
6.67:1
-8.0%
-2.0%
+2.3%
+4.0%
-2.0%
+2.0%
+4.0%
+2.3%
-4.0%
6.67:1
4.00:1
L
32+90.00

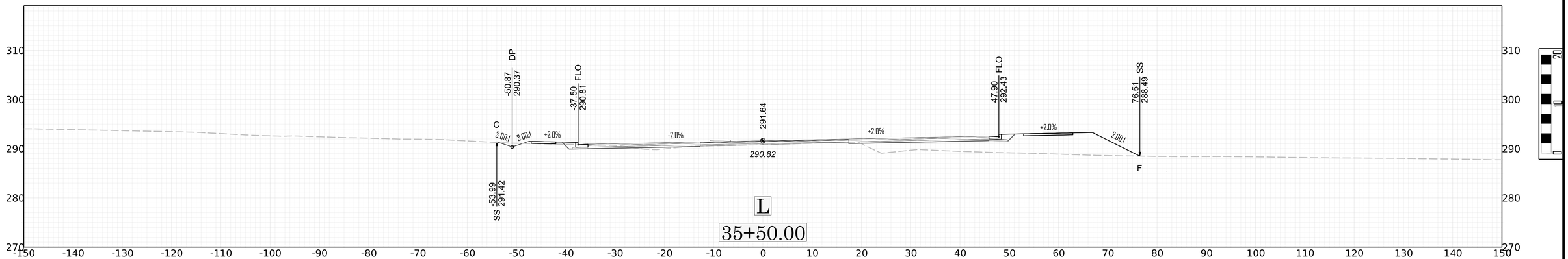

310
300
290
280
270
-150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
-58.23 SS
288.58
-37.50 FLO
290.57
37.50 FLO
292.07
76.53 SS
286.62
291.40
291.38
4.00:1
+2.0%
-2.0%
+2.0%
+2.0%
3.00:1
F
F
L
32+50.00

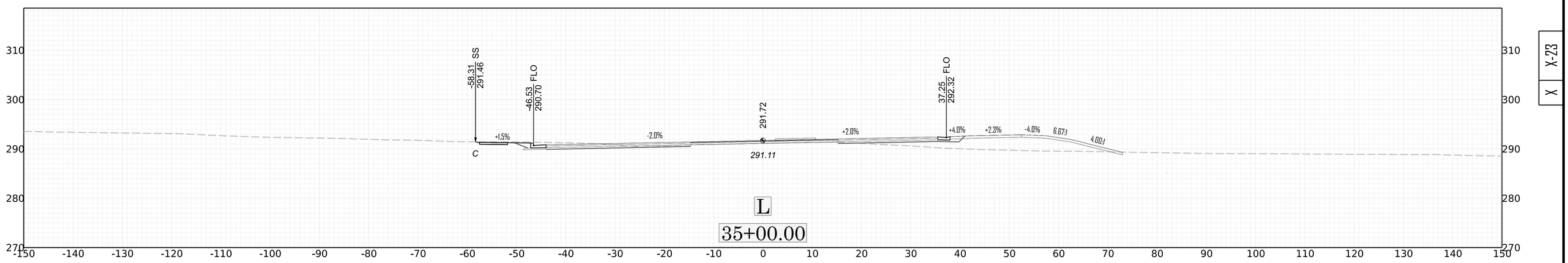
X-21

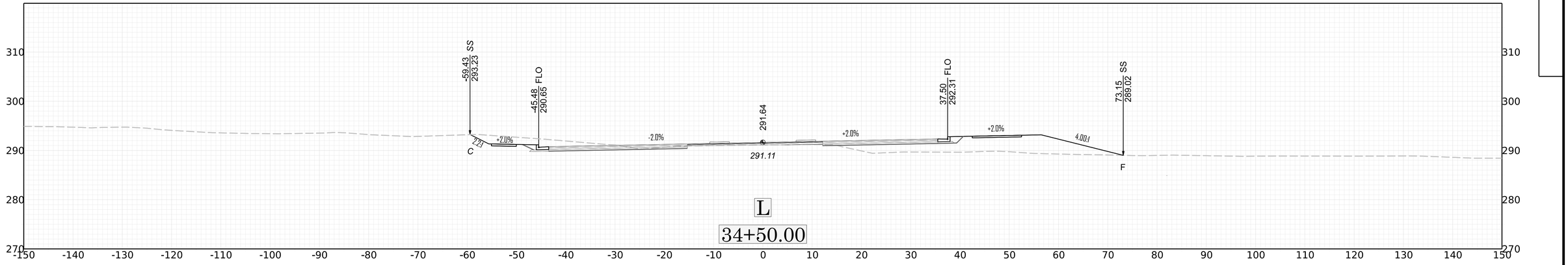

C
4.00:1
+2.0%
-37.50
290.56
FLO
-2.0%
291.39
291.17
+2.0%
37.50
292.06
FLO
+2.0%
4.00:1
71.82
289.10
SS
F
-53.39
292.72
SS
L
34+00.00
310
300
290
280
270
-150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
20
10
0

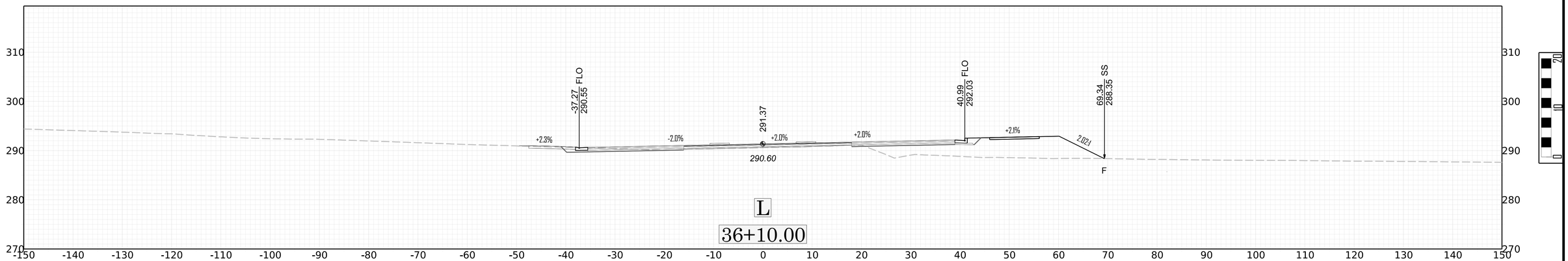

C
4.00:1
+2.0%
-37.51
290.42
FLO
-2.0%
291.25
291.16
+4.0%
+2.3%
-4.0%
6.67:1
4.00:1
37.25
291.85
FLO
-52.47
292.35
SS
L
33+55.00
310
300
290
280
270
-150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
X-22
X

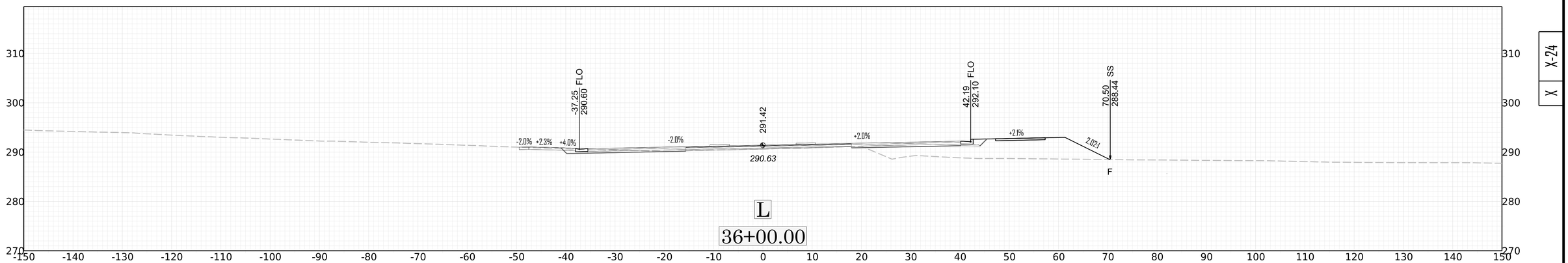

C
4.00:1
+2.0%
-37.50
290.41
FLO
-2.0%
291.24
291.16
+2.0%
+4.0%
+2.3%
-4.0%
6.67:1
4.00:1
37.25
291.84
FLO
-51.95
292.21
SS
L
33+50.00
310
300
290
280
270
-150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

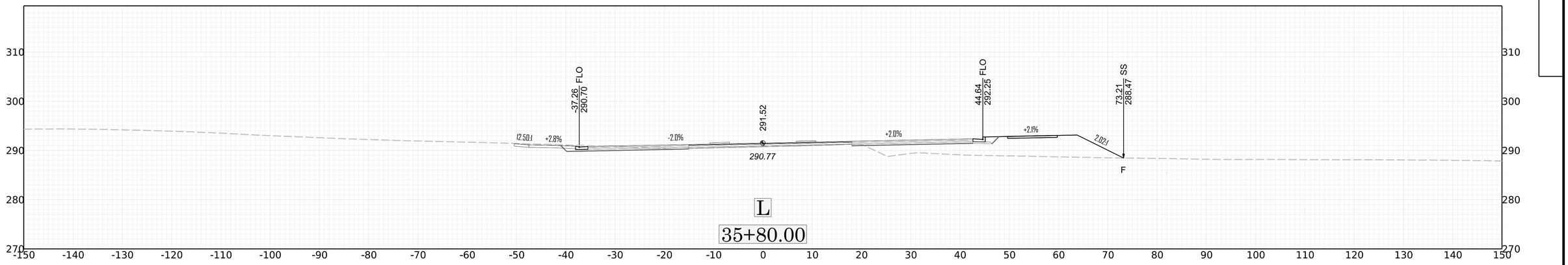

DP
-50.87
290.37
FLO
-37.50
290.81
FLO
47.90
292.43
SS
76.51
288.49
C
3.00:1
3.00:1
+2.0%
-2.0%
291.64
+2.0%
+2.0%
2.00:1
290.82
F
SS
-53.99
291.42
L
35+50.00

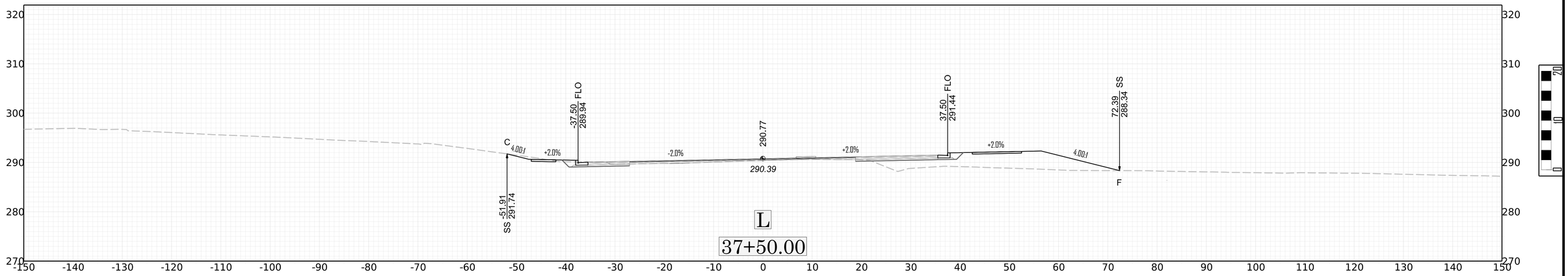

SS
-58.31
291.46
FLO
-46.53
290.70
FLO
37.25
292.32
+1.5%
-2.0%
291.72
+2.0%
+4.0%
+2.3%
-4.0%
6.67:1
4.00:1
C
291.11
L
35+00.00

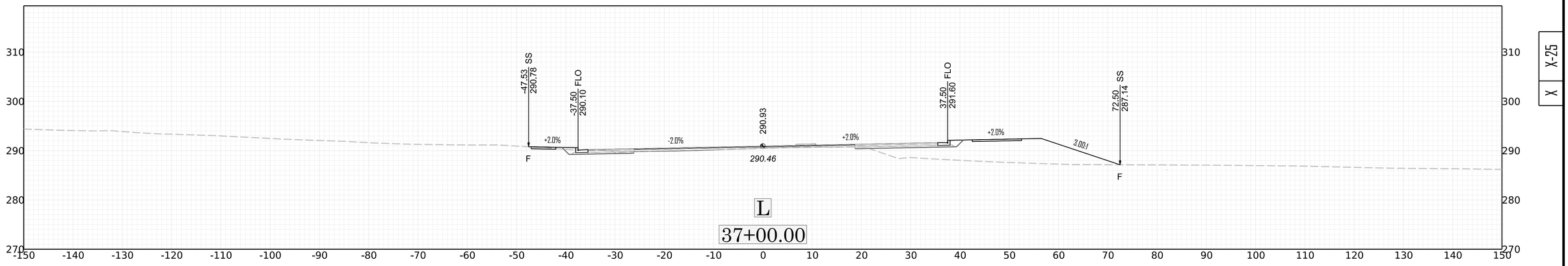

SS
-59.43
293.23
FLO
-45.48
290.65
FLO
37.50
292.31
SS
73.15
289.02
+2.0%
2.2:1
-2.0%
291.64
+2.0%
+2.0%
4.00:1
C
291.11
F
L
34+50.00

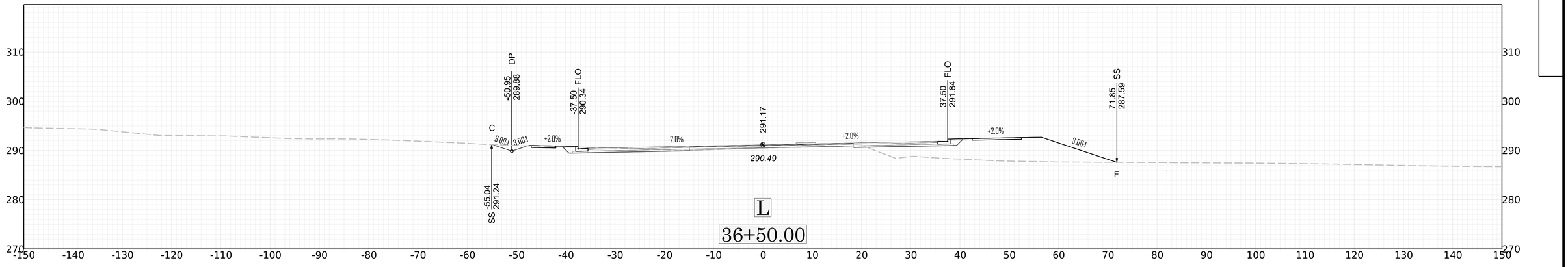

-37.27
FLO
290.55
291.37
40.99
FLO
292.03
69.34
SS
288.35
+2.3%
-2.0%
+2.0%
+2.0%
+2.1%
2.02:1
290.60
F
L
36+10.00
310
300
290
280
270
-150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
20
10
0

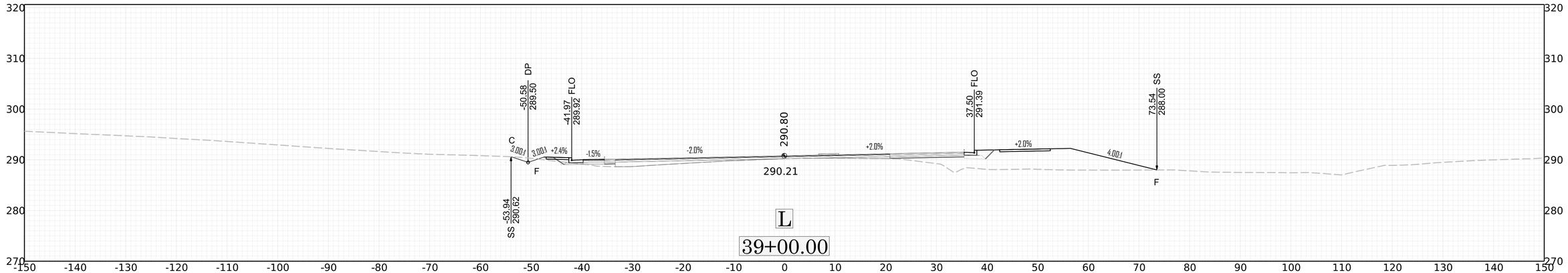

-37.25
FLO
290.60
291.42
42.19
FLO
292.10
70.50
SS
288.44
-2.0%
+2.3%
+4.0%
-2.0%
+2.0%
+2.1%
2.02:1
290.63
F
L
36+00.00
310
300
290
280
270
-150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
X-24
X

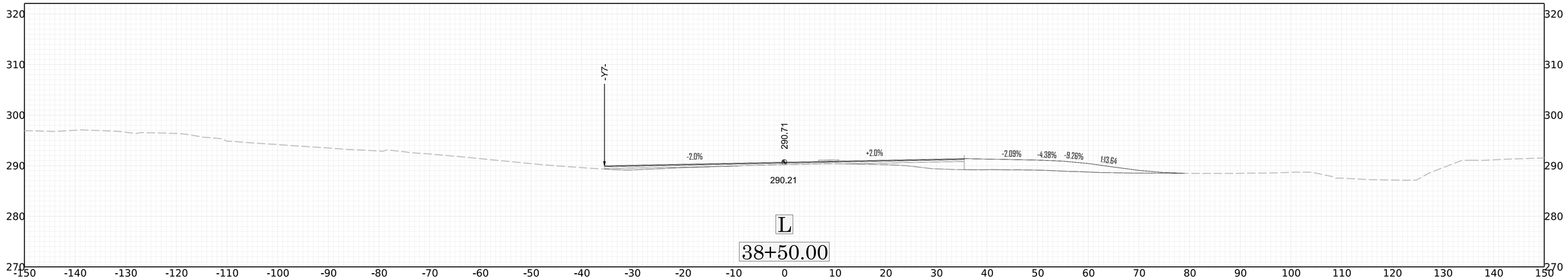

-37.26
FLO
290.70
291.52
44.64
FLO
292.25
73.21
SS
288.47
12.50:1
+2.8%
-2.0%
+2.0%
+2.1%
2.02:1
290.77
F
L
35+80.00
310
300
290
280
270
-150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

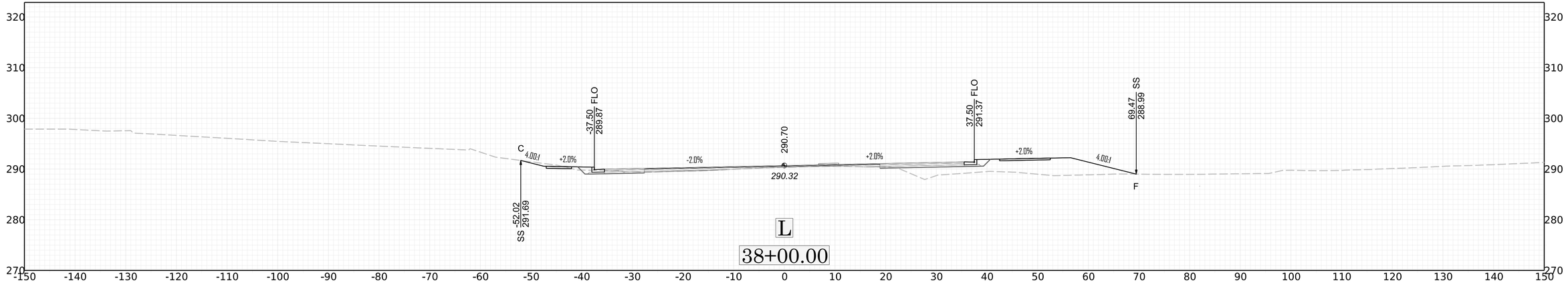

C
4.00:1
+2.0%
-37.50
289.94
FLO
-2.0%
290.77
290.39
+2.0%
37.50
291.44
FLO
+2.0%
4.00:1
72.39
288.34
SS
F
-51.91
291.74
SS
L
37+50.00


-47.53
290.78
SS
F
-37.50
290.10
FLO
+2.0%
-2.0%
290.93
290.46
+2.0%
37.50
291.60
FLO
+2.0%
3.00:1
72.50
287.14
SS
F
L
37+00.00

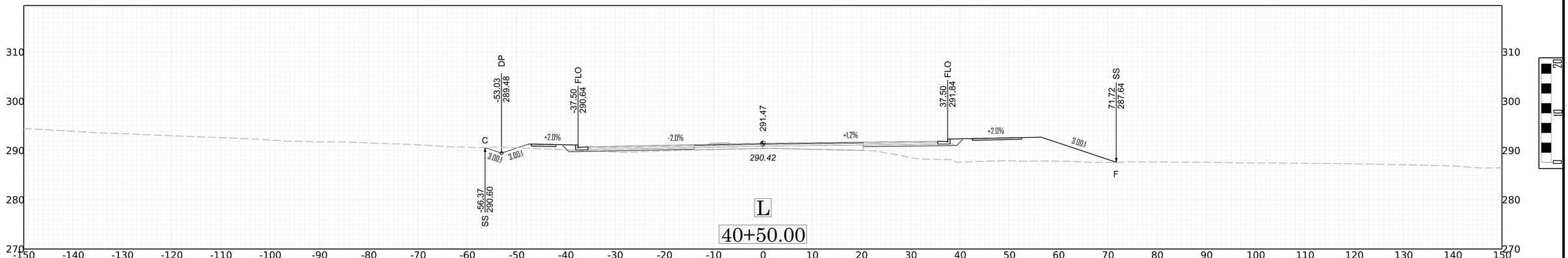

C
3.00:1
3.00:1
-50.95
289.88
DP
+2.0%
-37.50
290.34
FLO
-2.0%
291.17
290.49
+2.0%
37.50
291.84
FLO
+2.0%
3.00:1
71.85
287.59
SS
F
-55.04
291.24
SS
L
36+50.00

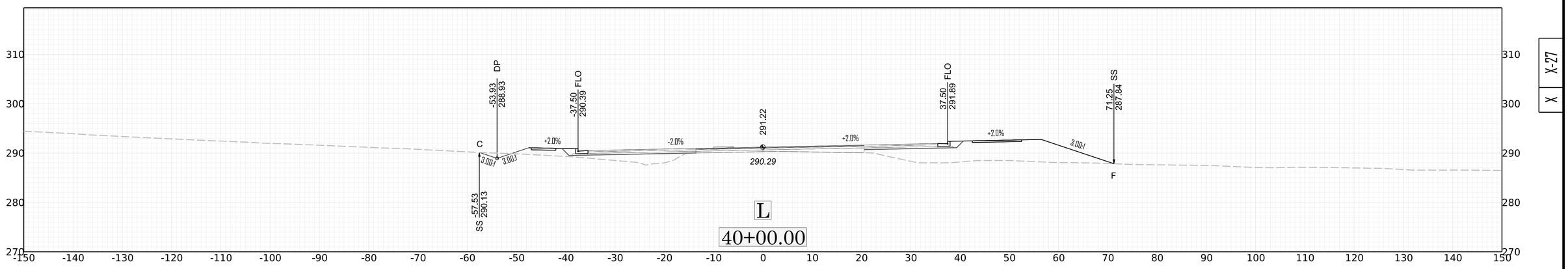

DP
-50.58
289.50
FLO
-41.97
289.92
FLO
37.50
291.39
SS
73.54
288.00
C
5.00:1
3.00:1
+2.4%
-1.5%
-2.0%
290.80
+2.0%
+2.0%
4.00:1
F
290.21
SS
-53.94
290.62
L
39+00.00

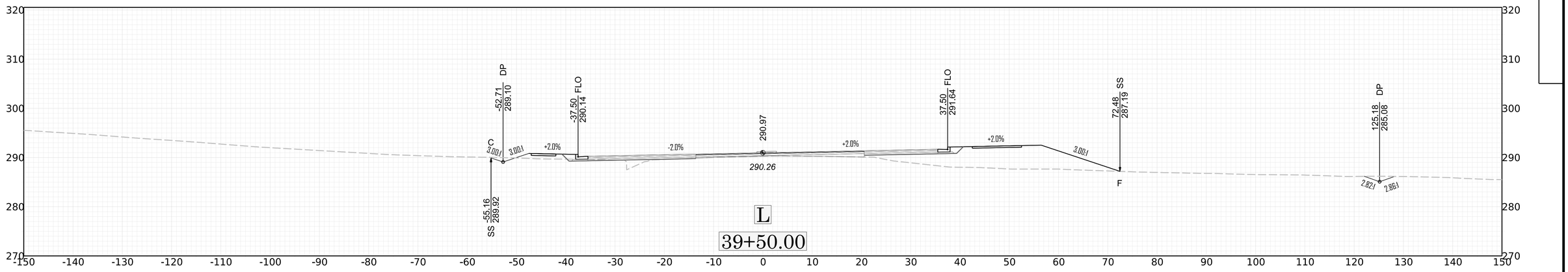

-Y7-
-2.0%
290.71
+2.0%
-2.09%
-4.38%
-9.26%
143.64
290.21
L
38+50.00


C
4.00:1
+2.0%
FLO
-37.50
289.87
-2.0%
290.70
+2.0%
FLO
37.50
291.37
+2.0%
4.00:1
SS
69.47
288.99
290.32
F
SS
-52.02
291.69
L
38+00.00

X-26

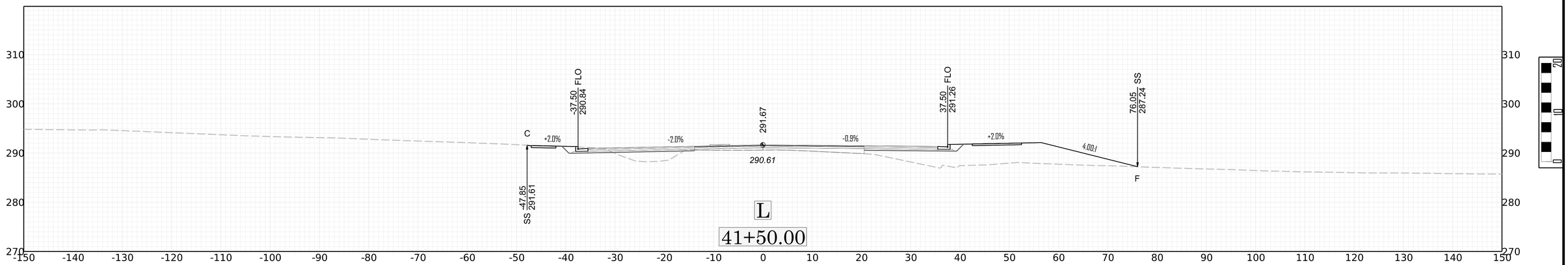

DP
-53.03
289.48
FLO
-37.50
290.64
291.47
FLO
37.50
291.84
SS
71.72
287.64
C
+2.0%
-2.0%
+1.2%
+2.0%
3.00:1
3.00:1
3.00:1
290.42
F
SS
-56.37
290.60
L
40+50.00

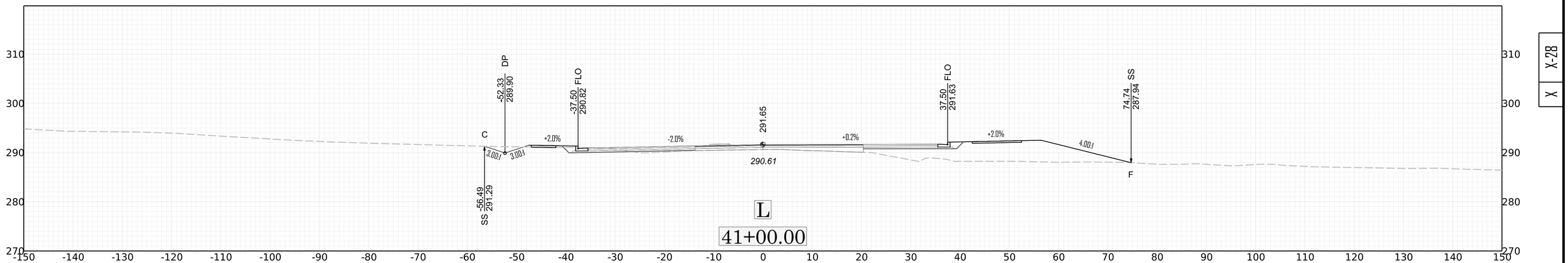

DP
-53.93
288.93
FLO
-37.50
290.39
291.22
FLO
37.50
291.89
SS
71.25
287.84
C
+2.0%
-2.0%
+2.0%
+2.0%
3.00:1
3.00:1
3.00:1
290.29
F
SS
-57.53
290.13
L
40+00.00

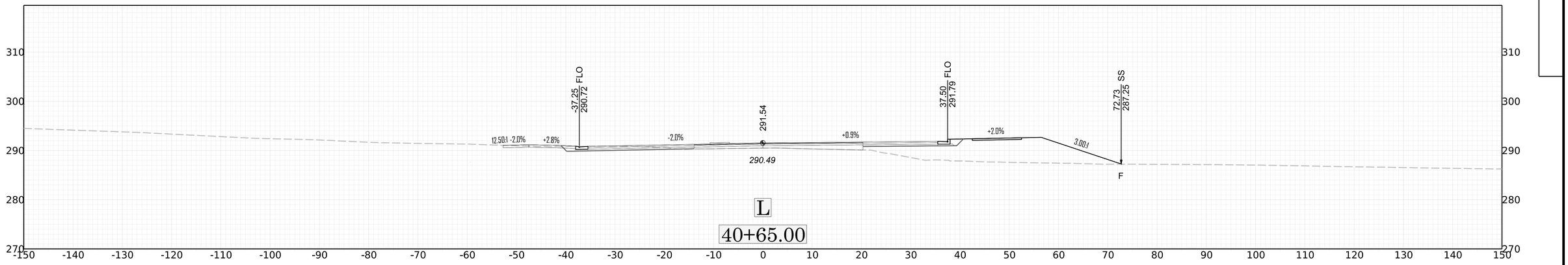

DP
-52.71
289.10
FLO
-37.50
290.14
290.97
FLO
37.50
291.64
SS
72.48
287.19
DP
125.18
285.08
C
3.00:1
3.00:1
+2.0%
-2.0%
+2.0%
+2.0%
3.00:1
2.82:1
2.86:1
290.26
F
SS
-55.16
289.92
L
39+50.00

X-27

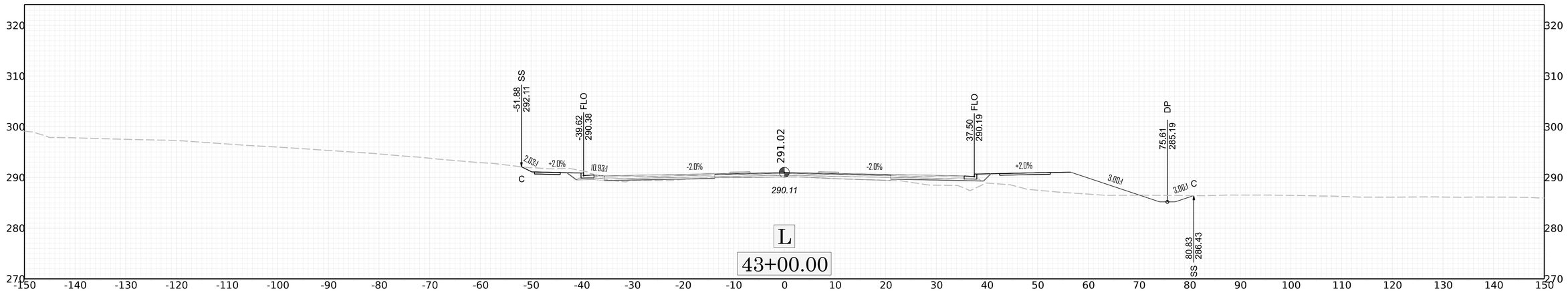
X

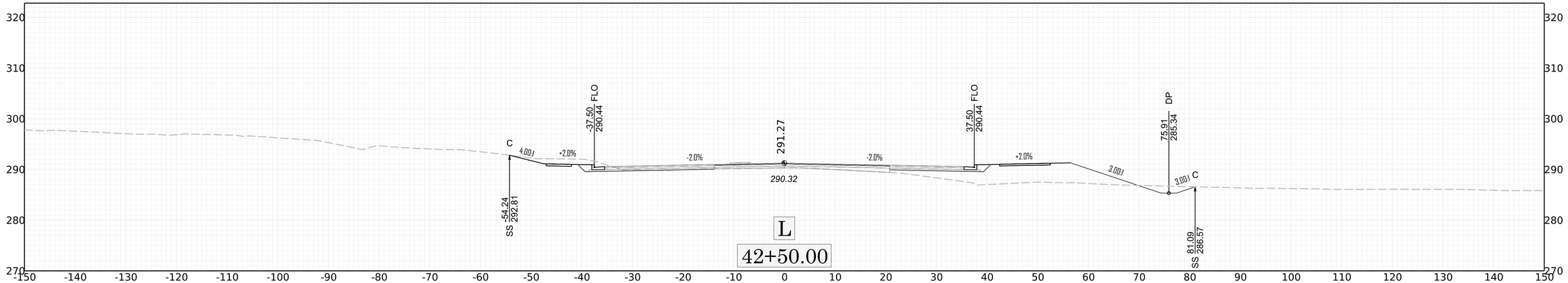

C
+2.0%
-2.0%
-0.9%
+2.0%
4.00:1
-47.85
291.61
SS
-37.50
290.84
FLO
291.67
290.61
37.50
291.26
FLO
76.05
287.24
SS
F
L
41+50.00

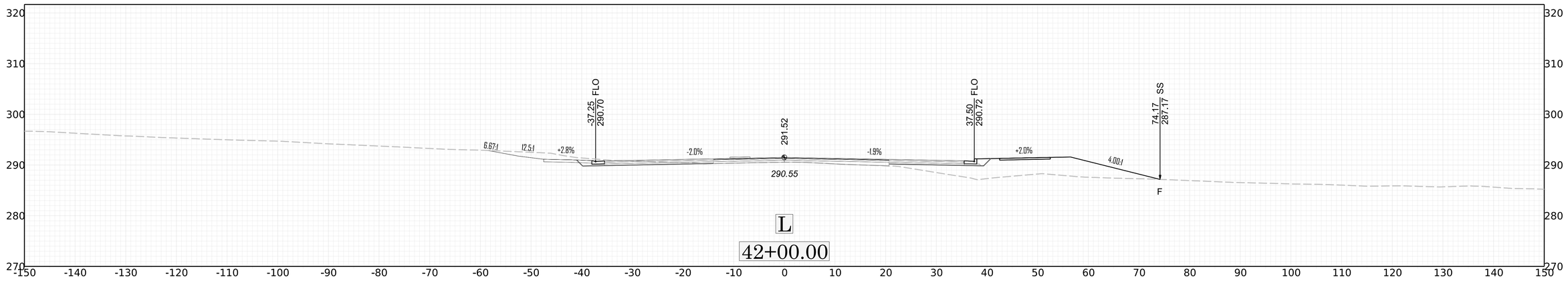

DP
-52.33
289.90
-37.50
290.82
FLO
C
+2.0%
-2.0%
+0.2%
+2.0%
3.00:1
3.00:1
4.00:1
-56.49
291.29
SS
291.65
290.61
37.50
291.63
FLO
74.74
287.94
SS
F
L
41+00.00

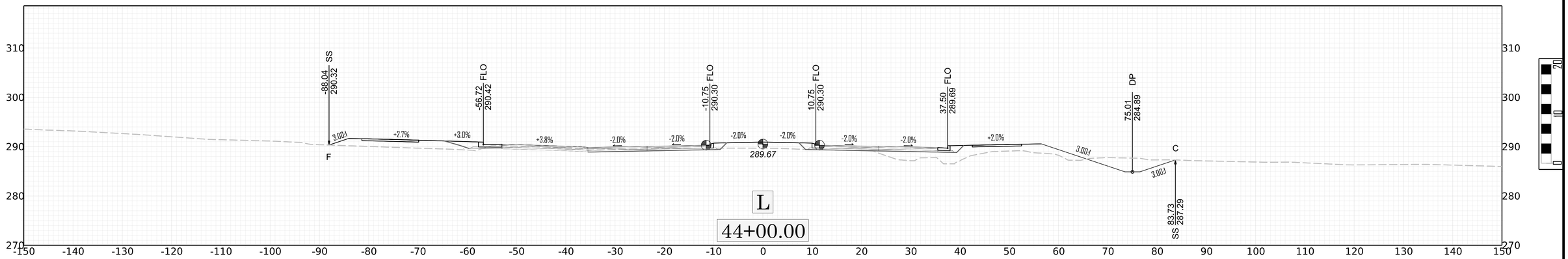

-37.25
290.72
FLO
12.50:1
-2.0%
+2.8%
-2.0%
+0.9%
+2.0%
3.00:1
291.54
290.49
37.50
291.79
FLO
72.73
287.25
SS
F
L
40+65.00

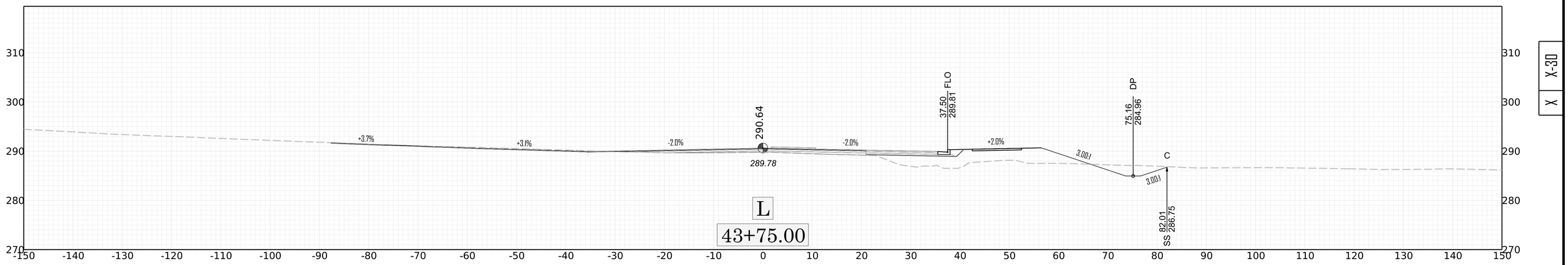
11/14/23

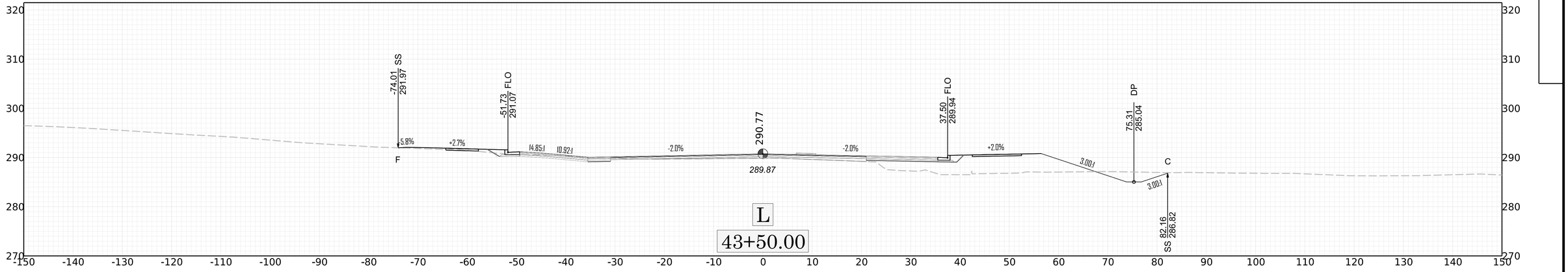

320
310
300
290
280
270
-150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
-51.88
292.11
SS
-39.62
290.38
FLO
37.50
290.19
FLO
75.61
285.19
DP
80.83
286.43
SS
291.02
290.11
2.0:1
+2.0%
10.9:1
-2.0%
-2.0%
+2.0%
3.00:1
3.00:1
C
C
L
43+00.00

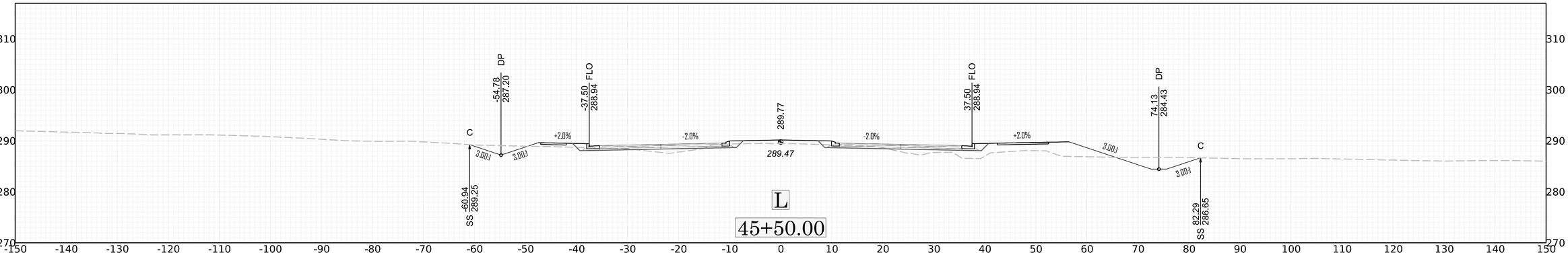

320
310
300
290
280
270
-150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
-54.24
292.81
SS
-37.50
290.44
FLO
37.50
290.44
FLO
75.91
285.34
DP
81.09
286.57
SS
291.27
290.32
C
4.00:1
+2.0%
-2.0%
-2.0%
+2.0%
3.00:1
3.00:1
C
L
42+50.00

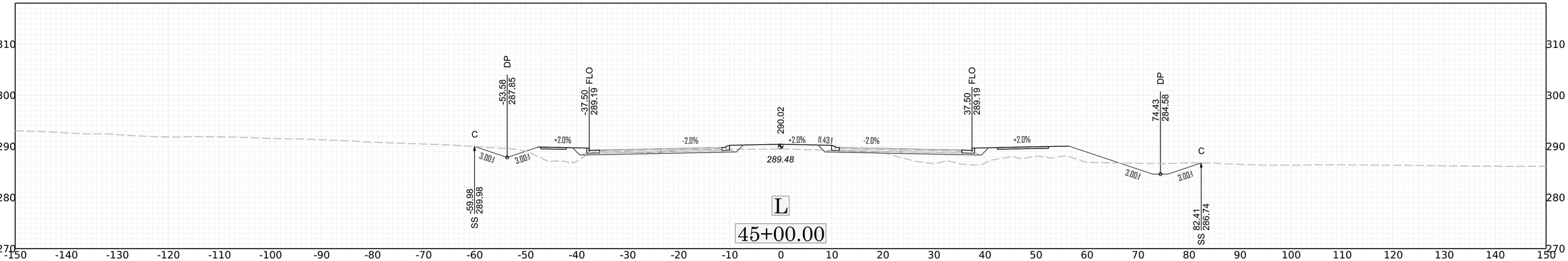

320
310
300
290
280
270
-150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
-37.25
290.70
FLO
37.50
290.72
FLO
74.17
287.17
SS
291.52
290.55
6.67:1
12.5:1
+2.8%
-2.0%
-1.9%
+2.0%
4.00:1
F
L
42+00.00

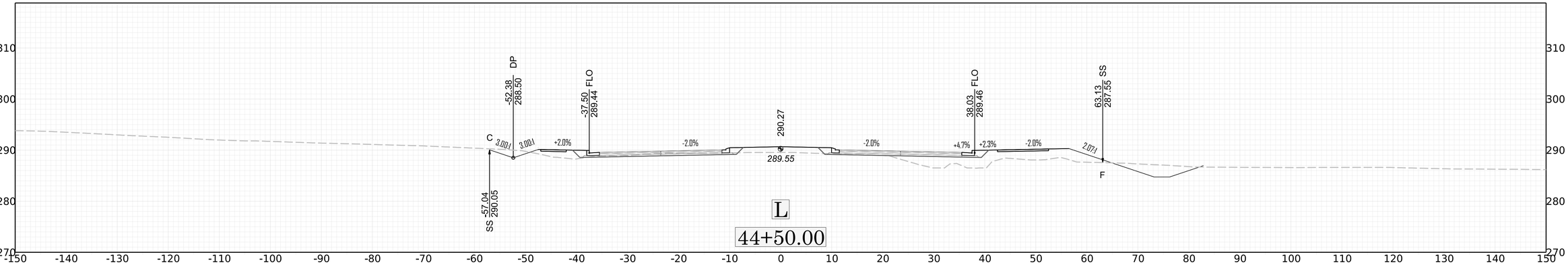

SS
-88.04
290.32
FLO
-56.72
290.42
FLO
-10.75
290.30
FLO
10.75
290.30
FLO
37.50
289.69
DP
75.01
284.89
SS
83.73
287.29
F
C
3.00:1
+2.7%
+3.0%
+3.8%
-2.0%
+2.0%
289.67
L
44+00.00


DP
75.16
284.96
FLO
37.50
289.81
290.64
SS
82.01
286.75
C
3.00:1
+3.7%
+3.1%
-2.0%
+2.0%
289.78
L
43+75.00

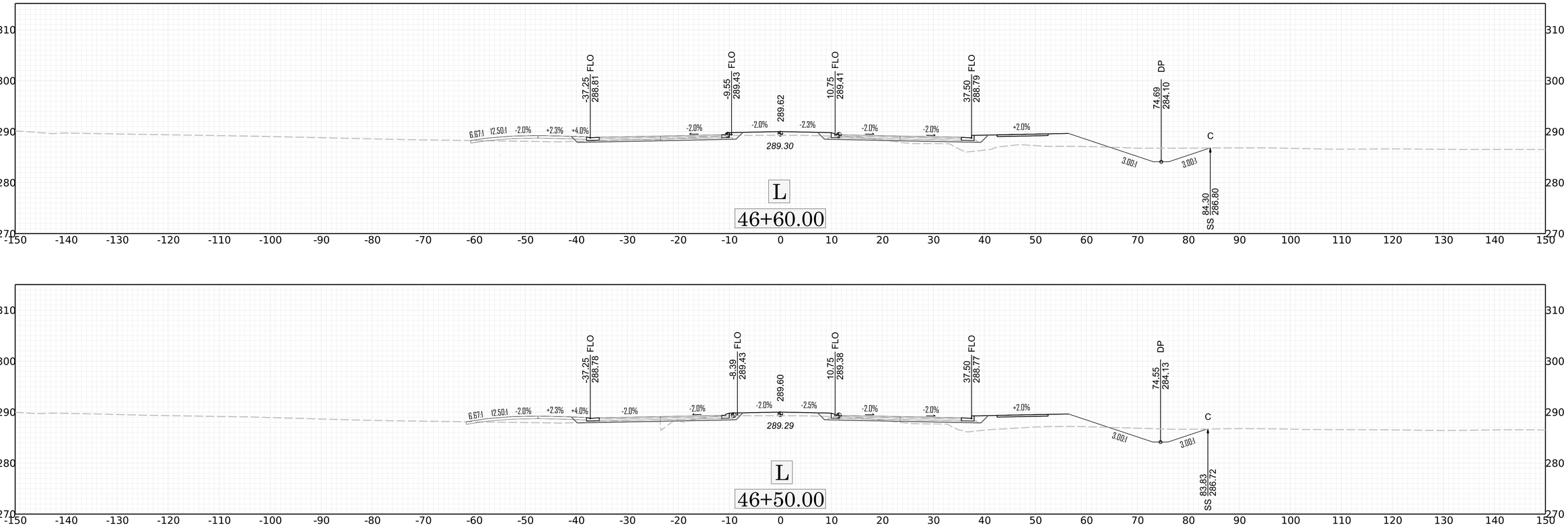

SS
-74.01
291.97
FLO
-51.73
291.07
FLO
37.50
289.94
DP
75.31
285.04
290.77
SS
82.16
286.82
F
C
5.8%
+2.7%
14.85:1
10.92:1
-2.0%
+2.0%
3.00:1
289.87
L
43+50.00

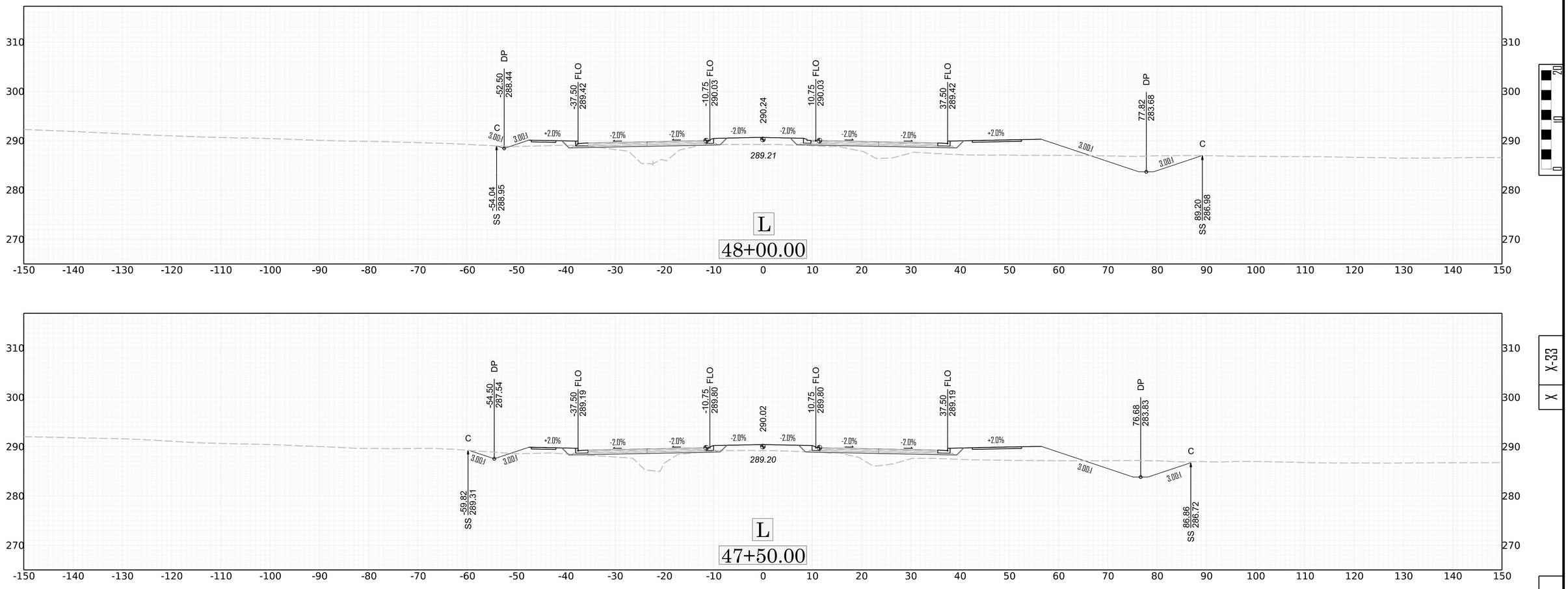

DP
-54.78
287.20
FLO
-37.50
288.94
289.77
289.47
FLO
37.50
288.94
DP
74.13
284.43
C
C
3.00:1
3.00:1
+2.0%
-2.0%
-2.0%
+2.0%
3.00:1
3.00:1
SS
-60.94
289.25
SS
82.29
286.65
L
45+50.00
310
300
290
280
270
-150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150


DP
-53.58
287.85
FLO
-37.50
289.19
290.02
289.48
FLO
37.50
289.19
DP
74.43
284.58
C
C
3.00:1
3.00:1
+2.0%
-2.0%
+2.0%
11.43:1
-2.0%
+2.0%
3.00:1
3.00:1
SS
-59.98
289.98
SS
82.41
286.74
L
45+00.00
310
300
290
280
270
-150 -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

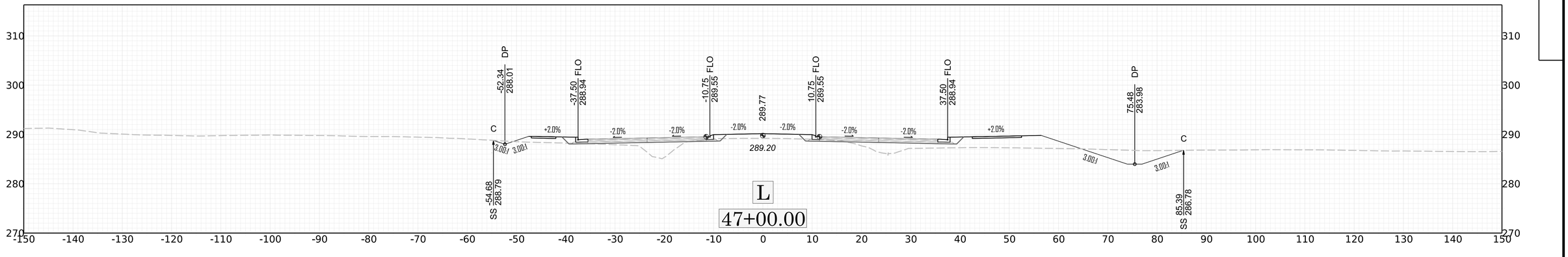

DP
-52.38
288.50
FLO
-37.50
289.44
290.27
289.55
FLO
38.03
289.46
SS
63.13
287.55
C
3.00:1
3.00:1
+2.0%
-2.0%
-2.0%
+4.7%
+2.3%
-2.0%
2.07:1
F
SS
-57.04
290.05
L
44+50.00
310
300
290
280
270
-150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

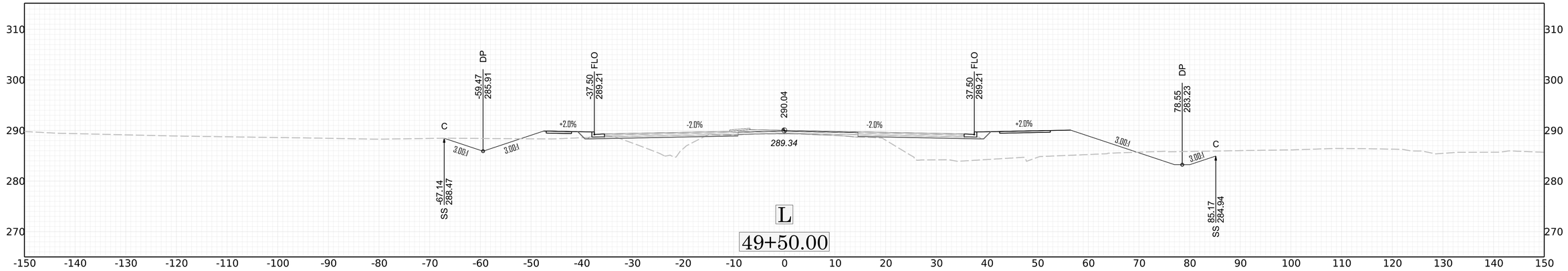
11/14/23

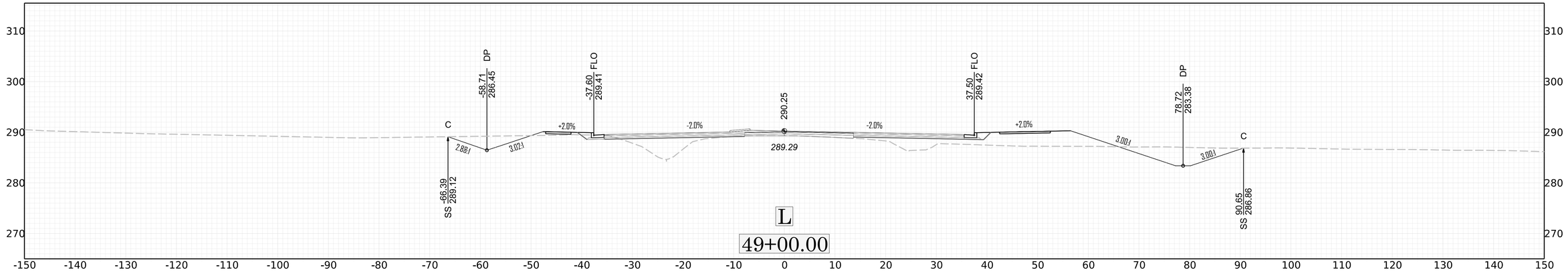

310
300
290
280
270
-150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
6.67:1
12.50:1
-2.0%
+2.3%
+4.0%
-37.25 FLO 288.81
-9.55 FLO 289.43
289.62
289.30
-2.0%
-2.3%
10.75 FLO 289.41
37.50 FLO 288.79
+2.0%
74.69 DP 284.10
3.00:1
C
84.30 SS 286.80
L
46+60.00
-37.25 FLO 288.78
-8.39 FLO 289.43
289.60
289.29
-2.5%
10.75 FLO 289.38
37.50 FLO 288.77
74.55 DP 284.13
83.83 SS 286.72
46+50.00
56.23 DP 286.55
0.36 FLO 289.61
74.08 DP 284.28
63.28 SS 288.90
82.57 SS 286.61
46+00.00

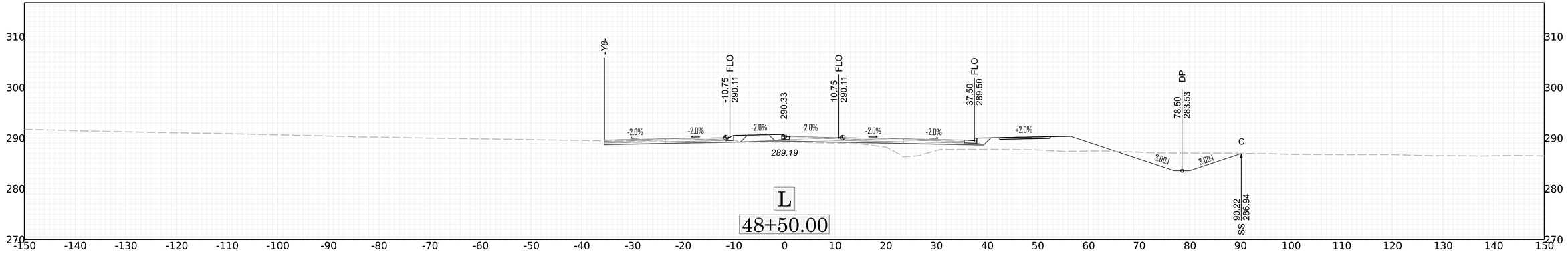

DP
-52.50
288.44
FLO
-37.50
289.42
FLO
-10.75
290.03
290.24
FLO
10.75
290.03
FLO
37.50
289.42
DP
77.82
283.68
C
3.00:1
+2.0%
-2.0%
289.21
SS
-54.04
288.95
SS
89.20
286.98
L
48+00.00
310
300
290
280
270
-150
-140
-130
-120
-110
-100
-90
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150

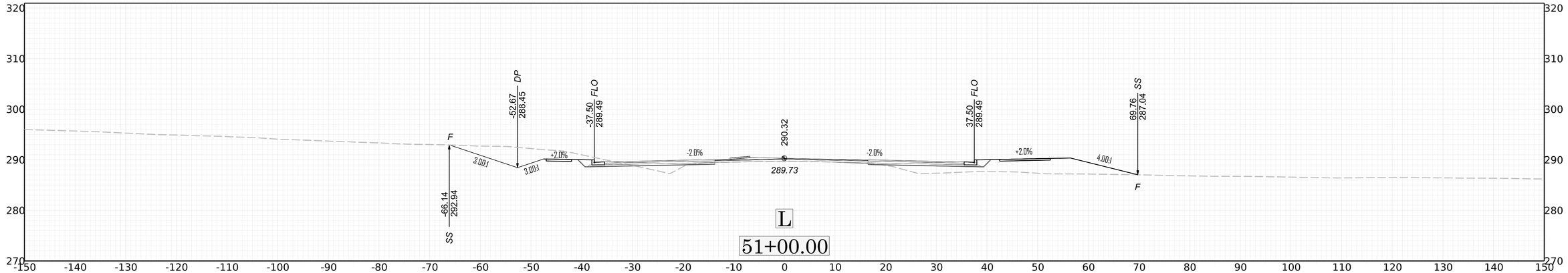
DP
-54.50
287.54
FLO
-37.50
289.19
FLO
-10.75
289.80
290.02
FLO
10.75
289.80
FLO
37.50
289.19
DP
76.68
283.83
C
3.00:1
+2.0%
-2.0%
289.20
SS
-59.82
289.31
SS
86.86
286.72
L
47+50.00
310
300
290
280
270
-150
-140
-130
-120
-110
-100
-90
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150

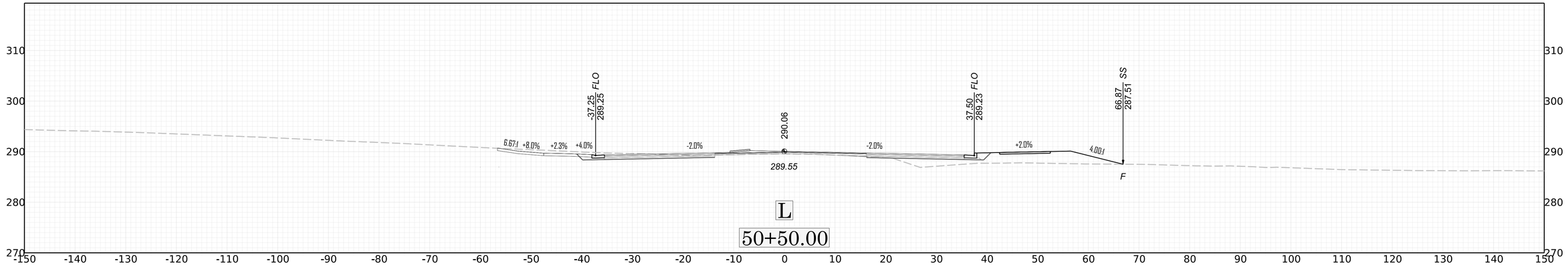

DP
-52.34
288.01
FLO
-37.50
288.94
FLO
-10.75
289.55
289.77
FLO
10.75
289.55
FLO
37.50
288.94
DP
75.48
283.98
C
3.00:1
+2.0%
-2.0%
289.20
SS
-54.68
288.79
SS
85.39
286.78
L
47+00.00
310
300
290
280
270
-150
-140
-130
-120
-110
-100
-90
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150

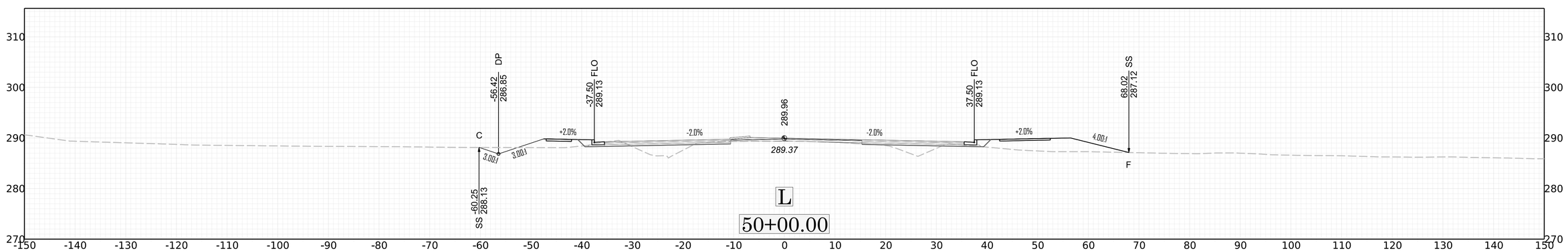

310
300
290
280
270
-150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
C
DP
-59.47
285.91
FLO
-37.50
289.21
290.04
289.34
37.50
289.21
FLO
DP
78.55
283.23
C
-67.14
288.47
SS
85.17
284.94
SS
+2.0%
-2.0%
-2.0%
+2.0%
3.00:1
3.00:1
3.00:1
3.00:1
L
49+50.00

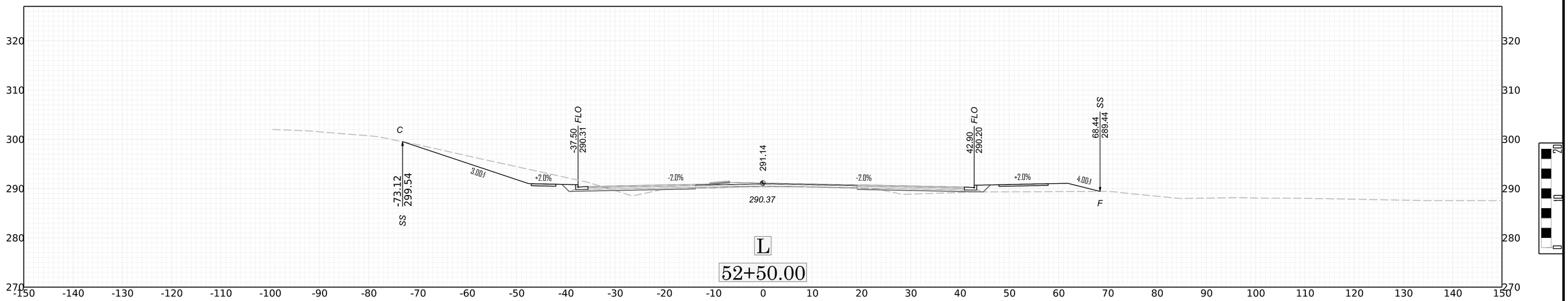

310
300
290
280
270
-150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
C
DP
-58.71
286.45
FLO
-37.60
289.41
290.25
289.29
37.50
289.42
FLO
DP
78.72
283.38
C
-66.39
289.12
SS
90.65
286.86
SS
+2.0%
-2.0%
-2.0%
+2.0%
2.88:1
3.02:1
3.00:1
3.00:1
L
49+00.00

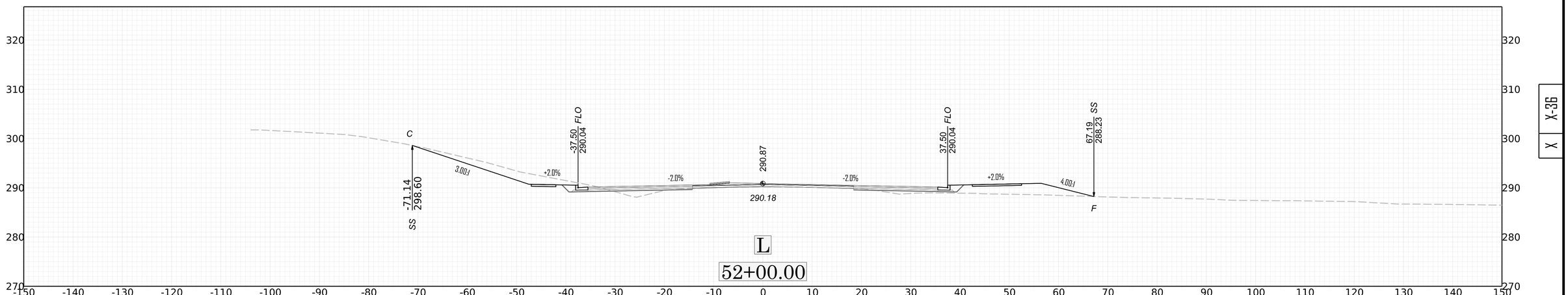

310
300
290
280
270
-150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
-Y8-
FLO
-10.75
290.11
FLO
10.75
290.11
290.33
289.19
37.50
289.50
FLO
DP
78.50
283.53
C
90.22
286.94
SS
-2.0%
-2.0%
-2.0%
-2.0%
-2.0%
-2.0%
+2.0%
3.00:1
3.00:1
L
48+50.00

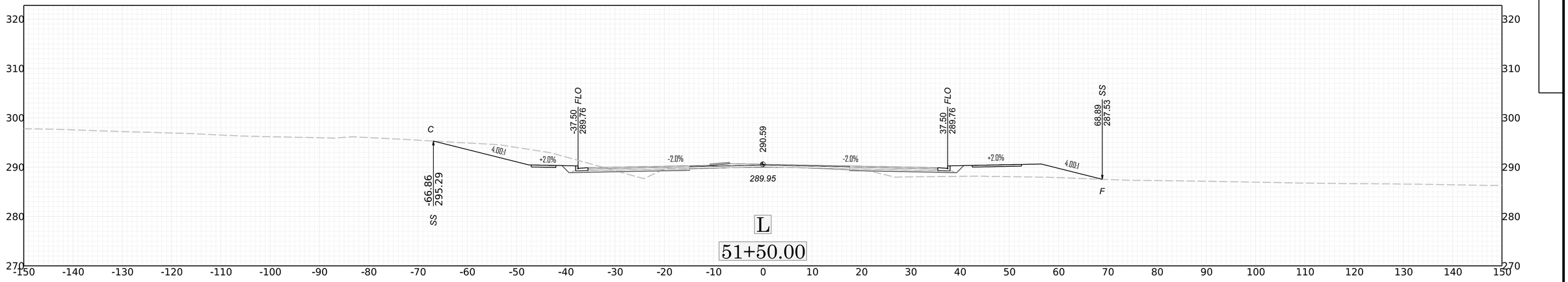

320
310
300
290
280
270
-150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
F
-52.67
288.45
DP
-37.50
289.49
FLO
290.32
289.73
37.50
289.49
FLO
69.76
287.04
SS
F
-66.14
292.94
SS
3.00:1
3.00:1
+2.0%
-2.0%
-2.0%
+2.0%
4.00:1
L
51+00.00


310
300
290
280
270
-150 -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
-37.25
289.25
FLO
290.06
289.55
37.50
289.23
FLO
66.87
287.51
SS
F
6.67:1
+8.0%
+2.3%
+4.0%
-2.0%
-2.0%
+2.0%
4.00:1
L
50+50.00

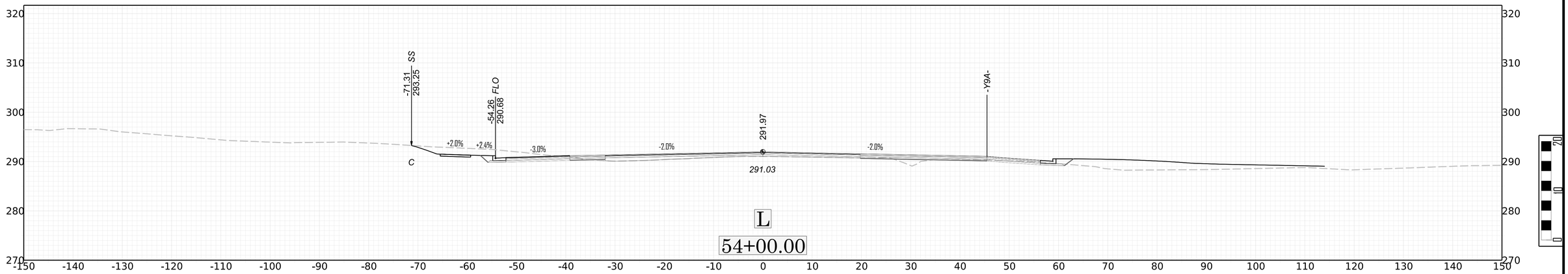

310
300
290
280
270
-150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
C
-56.42
286.85
DP
-37.50
289.13
FLO
289.96
289.37
37.50
289.13
FLO
68.02
287.12
SS
F
-60.25
288.13
SS
3.00:1
3.00:1
+2.0%
-2.0%
-2.0%
+2.0%
4.00:1
L
50+00.00

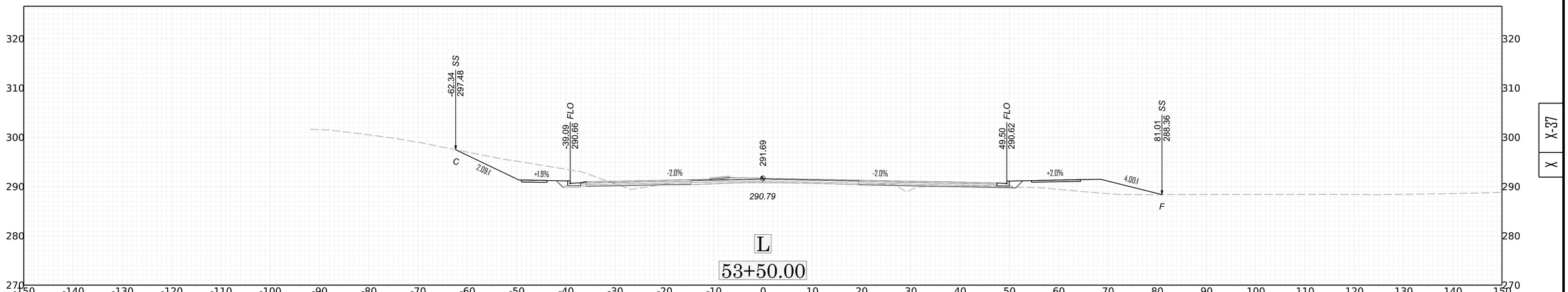

C
-73.12
299.54
SS
3.00:1
+2.0%
-37.50
290.31
FLO
-2.0%
291.14
290.37
-2.0%
42.90
290.20
FLO
+2.0%
4.00:1
68.44
289.44
SS
F
L
52+50.00

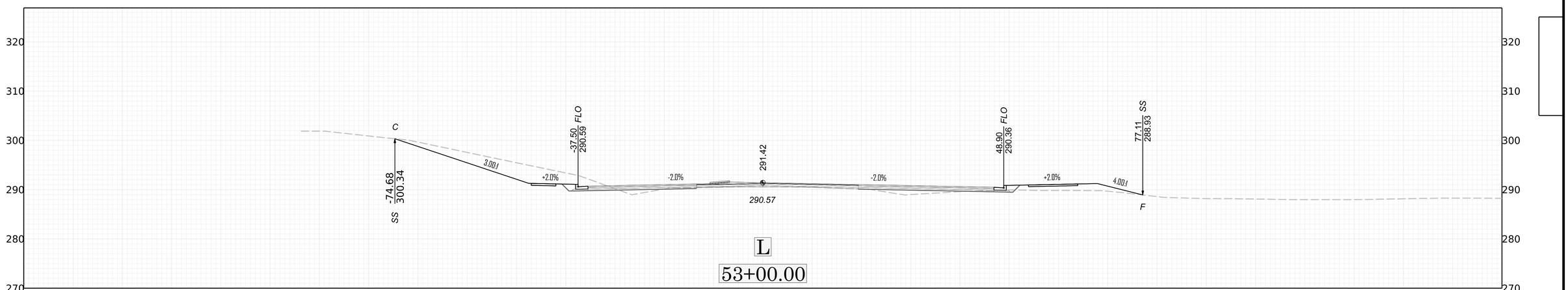

C
-71.14
298.60
SS
3.00:1
+2.0%
-37.50
290.04
FLO
-2.0%
290.87
290.18
-2.0%
37.50
290.04
FLO
+2.0%
4.00:1
67.19
288.23
SS
F
L
52+00.00

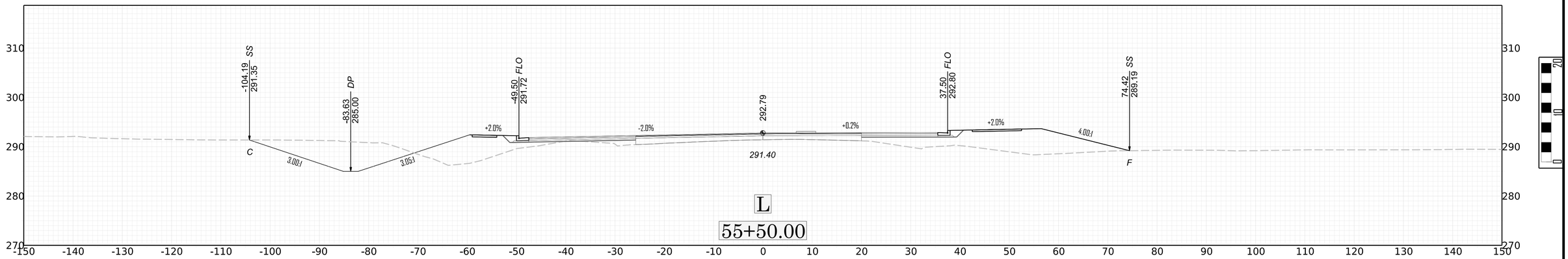

C
-66.86
295.29
SS
4.00:1
+2.0%
-37.50
289.76
FLO
-2.0%
290.59
289.95
-2.0%
37.50
289.76
FLO
+2.0%
4.00:1
68.89
287.53
SS
F
L
51+50.00

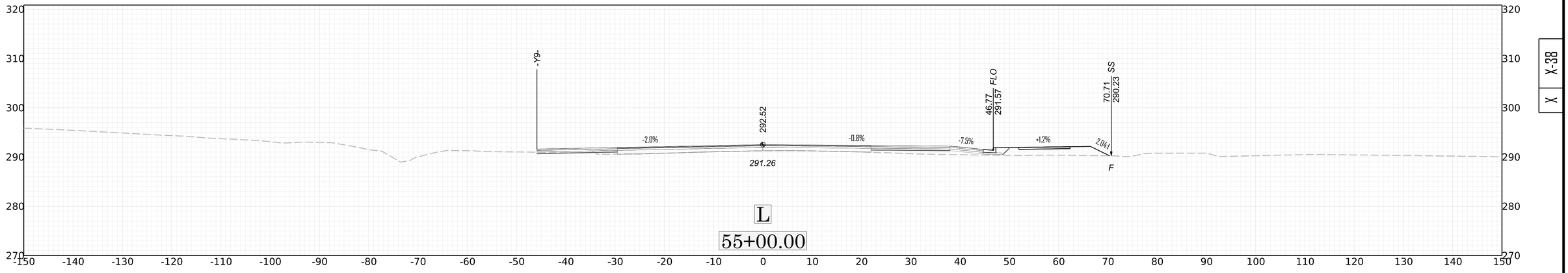
X-36
X

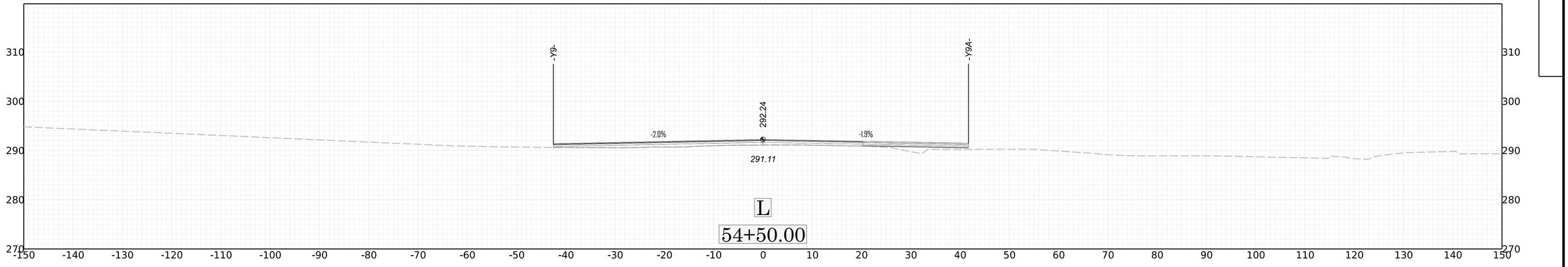

-71.31
293.25
SS
-54.26
290.68
FLO
- Y9A -
291.97
291.03
+2.0%
+2.4%
-3.0%
-2.0%
-2.0%
C
L
54+00.00

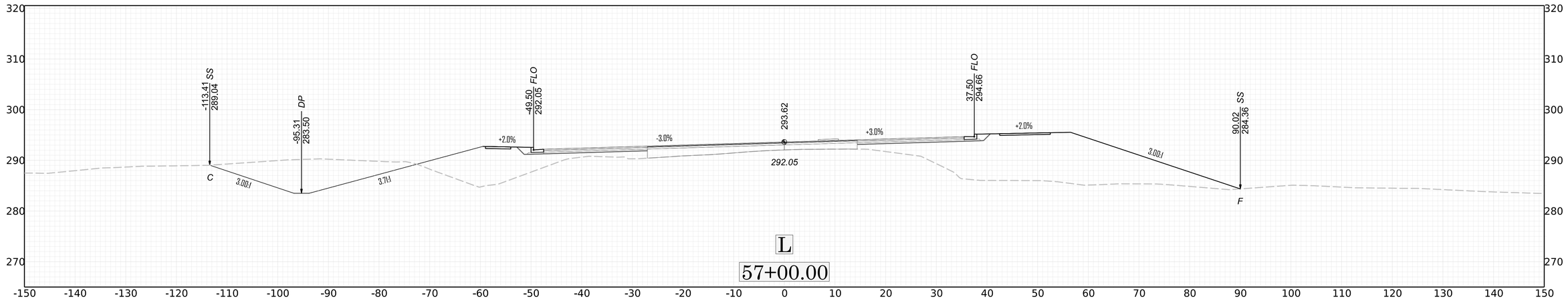

-62.34
297.48
SS
-39.09
290.66
FLO
49.50
290.62
FLO
81.01
288.36
SS
291.69
290.79
C
2.0H:1V
+1.9%
-2.0%
-2.0%
+2.0%
4.0H:1V
F
L
53+50.00

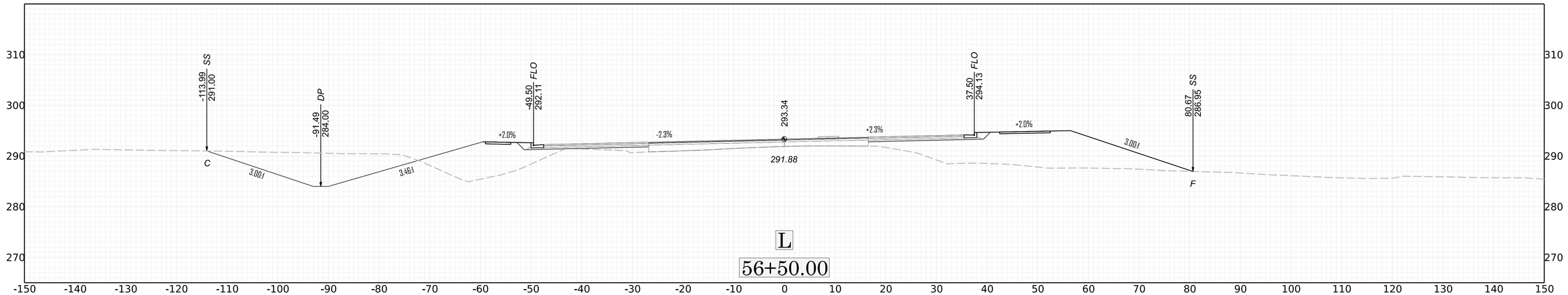

C
-74.68
300.34
SS
3.0H:1V
-37.50
290.59
FLO
48.90
290.36
FLO
77.11
288.93
SS
291.42
290.57
+2.0%
-2.0%
-2.0%
+2.0%
4.0H:1V
F
L
53+00.00

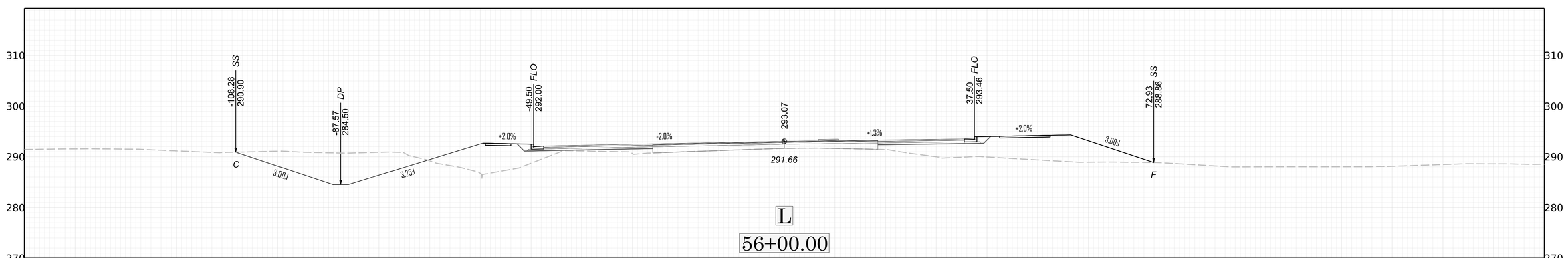

-104.19
291.35
SS
-83.63
285.00
DP
-49.50
291.72
FLO
37.50
292.80
FLO
74.42
289.19
SS
292.79
291.40
+2.0%
-2.0%
+0.2%
+2.0%
4.00:1
3.00:1
3.05:1
C
F
310
300
290
280
270
-150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
L
55+50.00

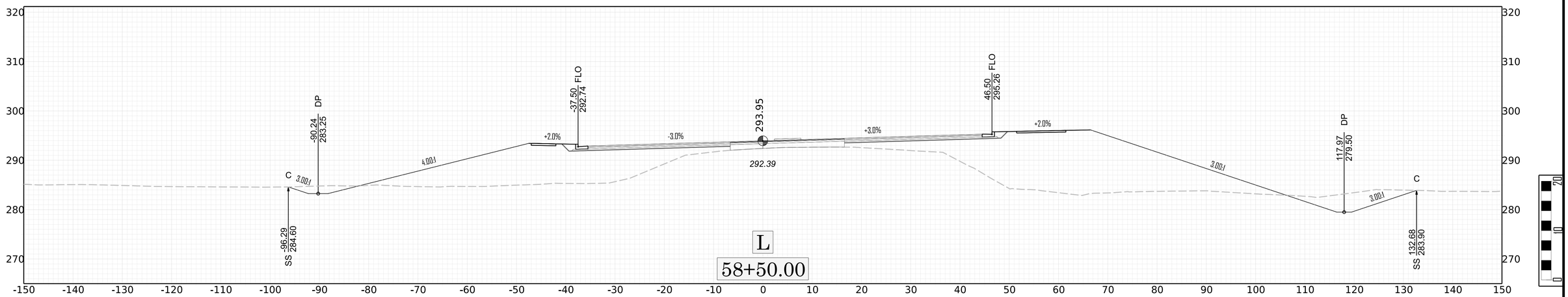

-Y9-
292.52
291.26
-2.0%
-0.8%
-7.5%
+1.2%
46.77
291.57
FLO
70.71
290.23
SS
2.04:1
F
310
300
290
280
270
-150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
L
55+00.00

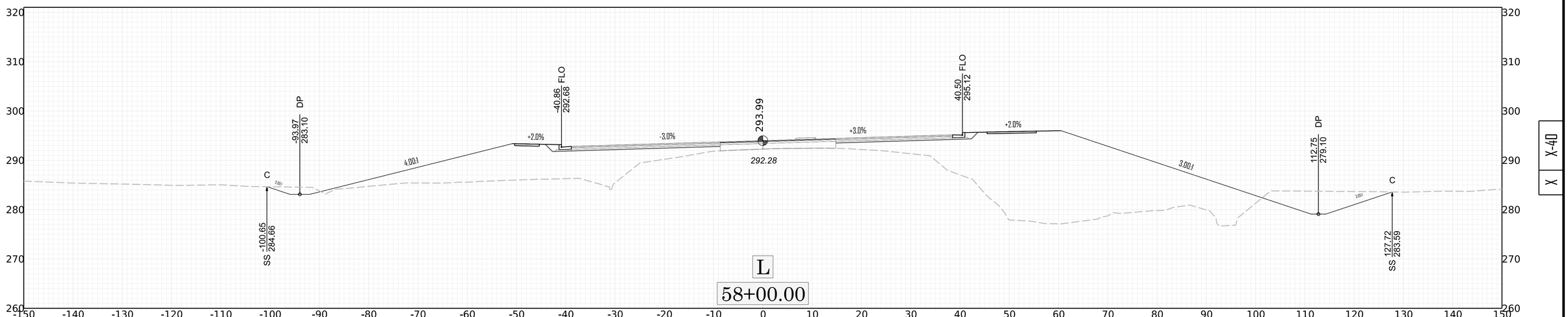

-Y9-
-Y9A-
292.24
291.11
-2.0%
-1.9%
310
300
290
280
270
-150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
L
54+50.00

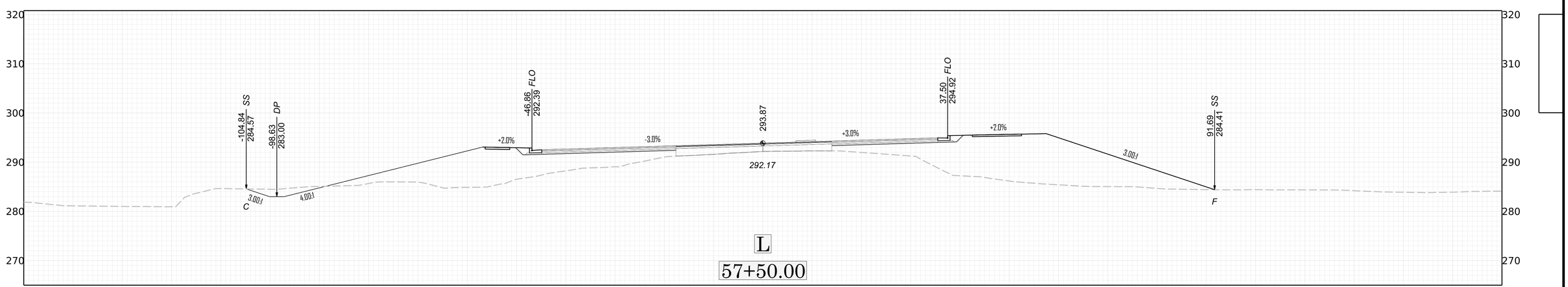

-113.41
289.04
SS
-95.31
283.50
DP
-49.50
292.05
FLO
293.62
37.50
294.66
FLO
90.02
284.36
SS
C
F
+2.0%
-3.0%
+3.0%
+2.0%
3.00:1
3.71:1
3.00:1
292.05
L
57+00.00

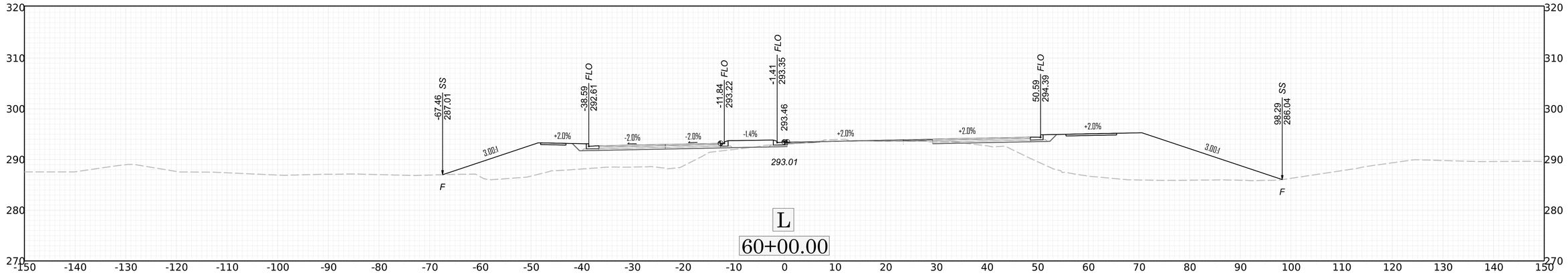

-113.99
291.00
SS
-91.49
284.00
DP
-49.50
292.11
FLO
293.34
37.50
294.13
FLO
80.67
286.95
SS
C
F
+2.0%
-2.3%
+2.3%
+2.0%
3.00:1
3.46:1
3.00:1
291.88
L
56+50.00

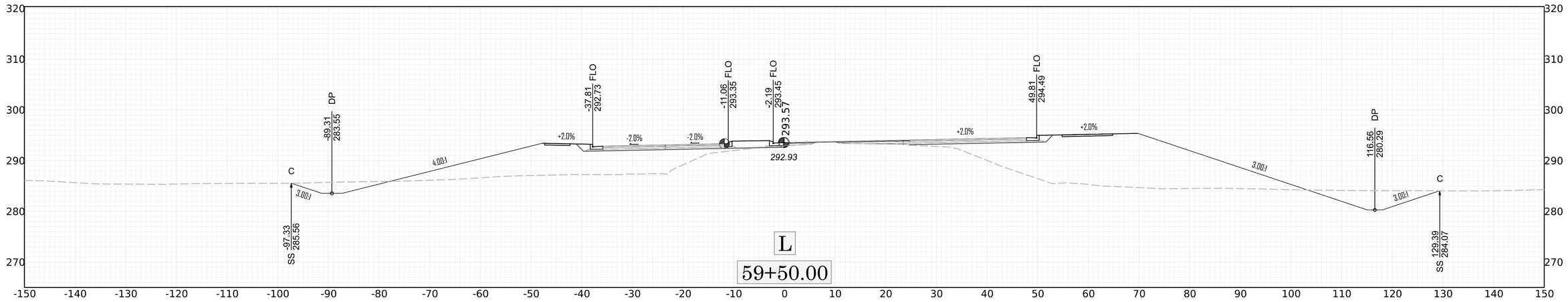

-108.28
290.90
SS
-87.57
284.50
DP
-49.50
292.00
FLO
293.07
37.50
293.46
FLO
72.93
286.86
SS
C
F
+2.0%
-2.0%
+1.3%
+2.0%
3.00:1
3.25:1
3.00:1
291.66
L
56+00.00

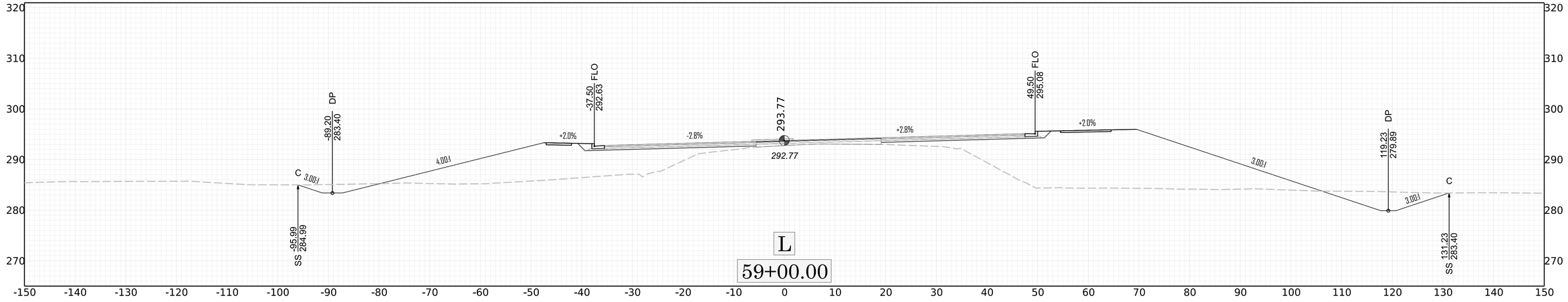

-96.29
284.60
SS
C
3.00:1
-90.24
283.25
DP
4.00:1
+2.0%
-37.50
292.74
FLO
-3.0%
293.95
292.39
+3.0%
46.50
295.26
FLO
+2.0%
3.00:1
117.97
279.50
DP
3.00:1
C
132.68
283.90
SS
L
58+50.00


-100.65
284.66
SS
C
3.00:1
-93.97
283.10
DP
4.00:1
+2.0%
-40.86
292.68
FLO
-3.0%
293.99
292.28
+3.0%
40.50
295.12
FLO
+2.0%
3.00:1
112.75
279.10
DP
C
3.00:1
127.72
283.59
SS
L
58+00.00

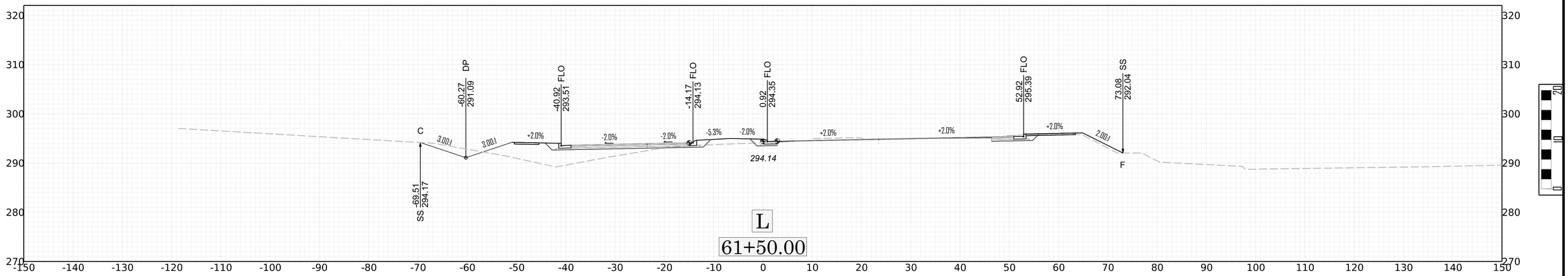

-104.84
284.57
SS
C
3.00:1
-98.63
283.00
DP
4.00:1
+2.0%
-46.86
292.39
FLO
-3.0%
293.87
292.17
+3.0%
37.50
294.92
FLO
+2.0%
3.00:1
91.69
284.41
SS
F
L
57+50.00

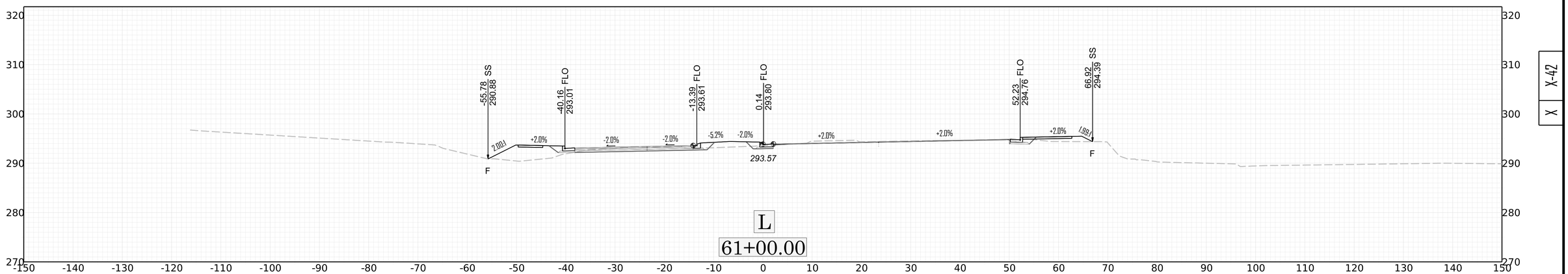

-67.46
287.01
SS
-38.59
292.61
FLO
-11.84
293.22
FLO
-1.41
293.35
FLO
293.46
50.59
294.39
FLO
98.29
286.04
SS
+2.0%
-2.0%
-2.0%
-1.4%
+2.0%
+2.0%
+2.0%
3.00:1
3.00:1
293.01
F
F
L
60+00.00

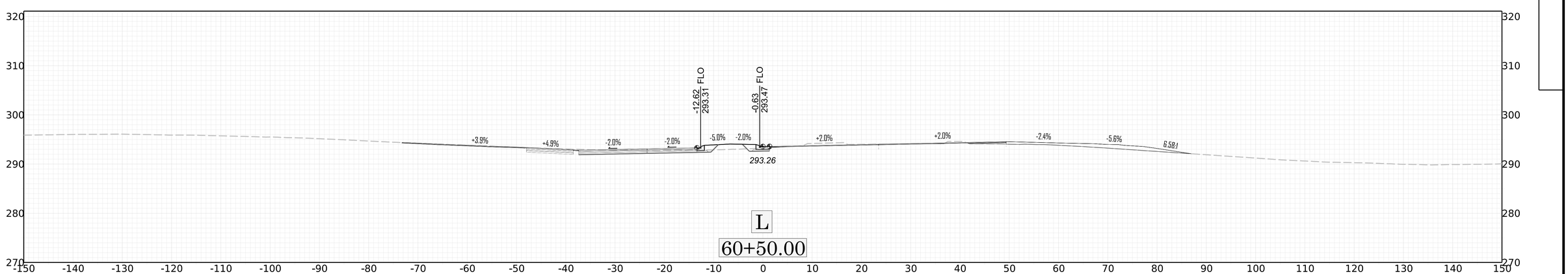

-89.31
283.55
DP
-37.81
292.73
FLO
-11.06
293.35
FLO
-2.19
293.45
FLO
293.57
49.81
294.49
FLO
116.56
280.29
DP
+2.0%
-2.0%
-2.0%
+2.0%
+2.0%
+2.0%
4.00:1
3.00:1
3.00:1
3.00:1
292.93
C
C
-97.33
285.56
SS
129.39
284.07
SS
L
59+50.00

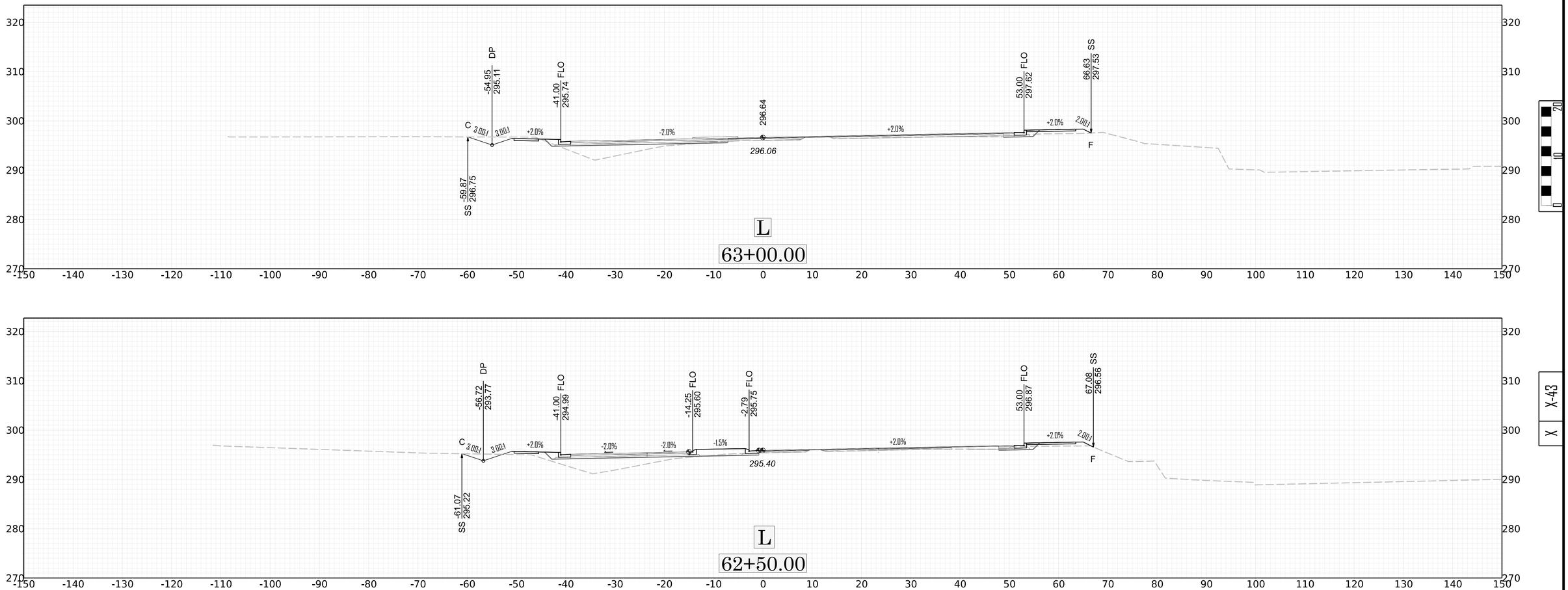

-89.20
283.40
DP
-37.50
292.63
FLO
293.77
49.50
295.08
FLO
119.23
279.89
DP
+2.0%
-2.8%
+2.8%
+2.0%
4.00:1
3.00:1
3.00:1
3.00:1
292.77
C
C
-95.99
284.99
SS
131.23
283.40
SS
L
59+00.00

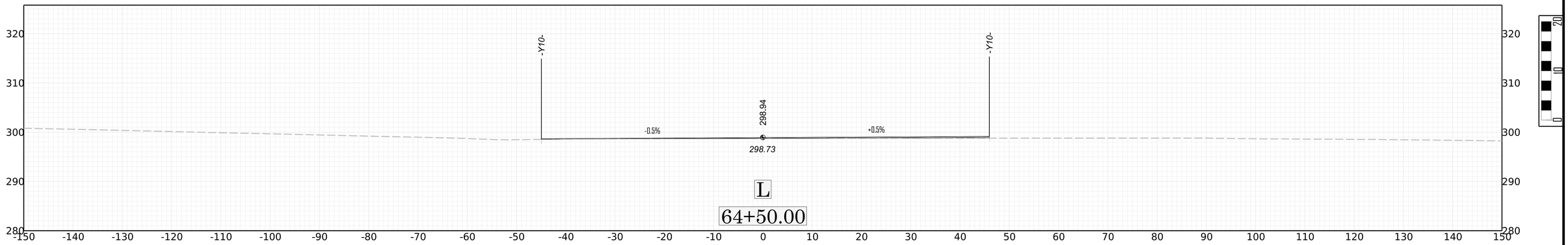
X-41

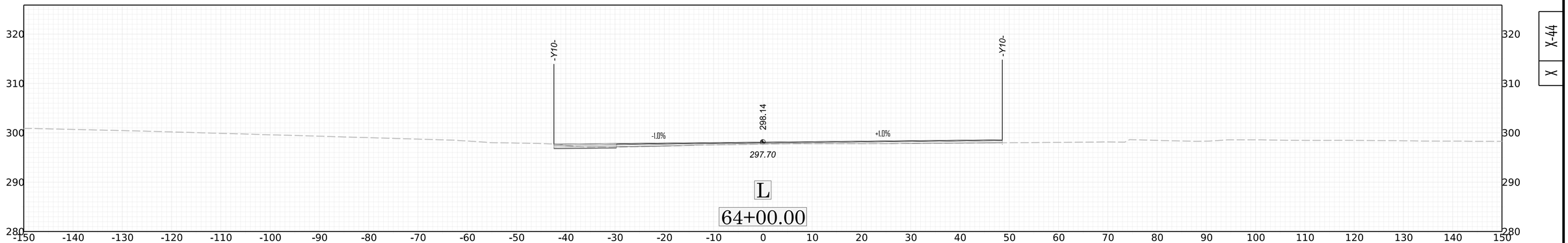

C
DP
-60.27
291.09
FLO
-40.92
293.51
FLO
-14.17
294.13
FLO
0.92
294.35
FLO
52.92
295.39
SS
73.08
292.04
F
SS
-69.51
294.17
3.00:1
3.00:1
+2.0%
-2.0%
-2.0%
-5.3%
-2.0%
+2.0%
+2.0%
+2.0%
2.00:1
294.14
L
61+50.00

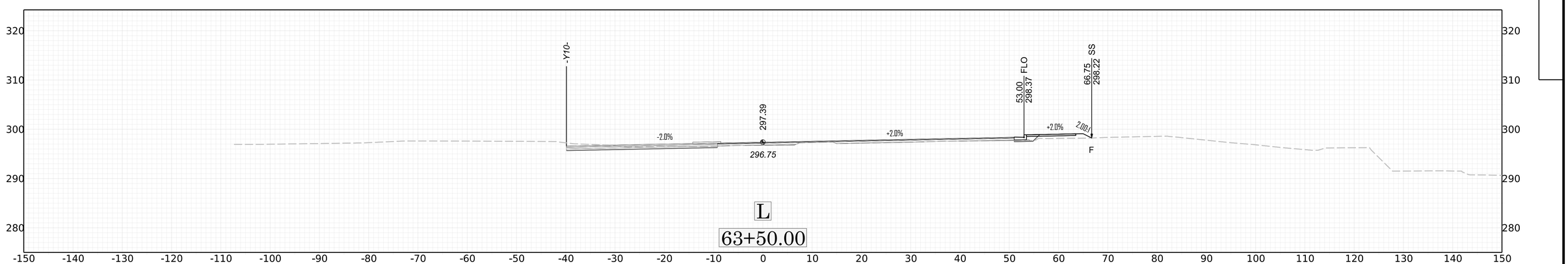

SS
-55.78
290.88
FLO
-40.16
293.01
FLO
-13.39
293.61
FLO
0.14
293.80
FLO
52.23
294.76
SS
66.92
294.39
F
F
2.00:1
+2.0%
-2.0%
-2.0%
-5.2%
-2.0%
+2.0%
+2.0%
+2.0%
1.99:1
293.57
L
61+00.00

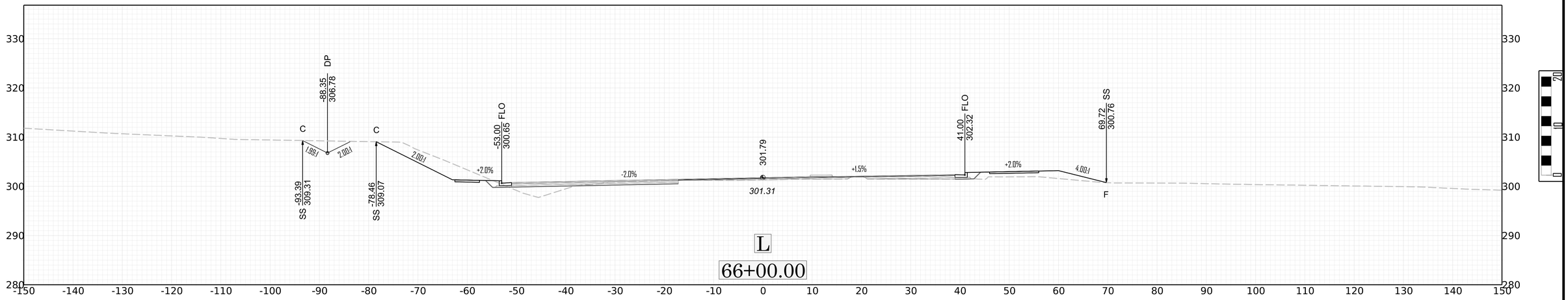

FLO
-12.62
293.31
FLO
-0.63
293.47
+3.9%
+4.9%
-2.0%
-2.0%
-5.0%
-2.0%
+2.0%
+2.0%
-2.4%
-5.6%
6.58:1
293.26
L
60+50.00

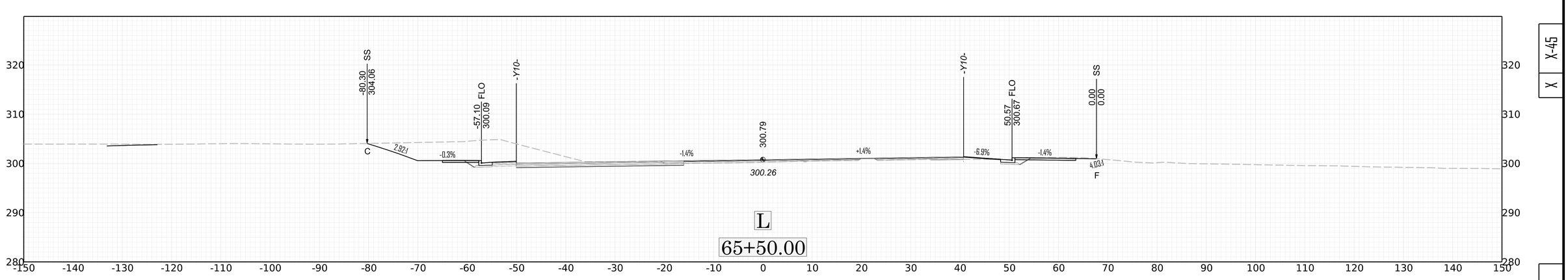

DP
-54.95
295.11
FLO
-41.00
295.74
296.64
FLO
53.00
297.62
SS
66.63
297.53
C
3.00:1
3.00:1
+2.0%
-2.0%
+2.0%
+2.0%
2.00:1
F
296.06
SS
-59.87
296.75
L
63+00.00
DP
-56.72
293.77
FLO
-41.00
294.99
FLO
-14.25
295.60
FLO
-2.79
295.75
FLO
53.00
296.87
SS
67.08
296.56
C
3.00:1
3.00:1
+2.0%
-2.0%
-2.0%
-1.5%
+2.0%
+2.0%
2.00:1
F
295.40
SS
-61.07
295.22
L
62+50.00
DP
-58.49
292.43
FLO
-41.00
294.24
FLO
-14.25
294.85
FLO
0.71
295.07
FLO
53.00
296.12
SS
73.21
292.74
C
3.00:1
3.00:1
+2.0%
-2.0%
-2.0%
-5.3%
-2.0%
+2.0%
+2.0%
+2.0%
2.00:1
F
294.81
SS
-63.92
294.24
L
62+00.00
320
310
300
290
280
270
-150
-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
20
10
0
X-43
X

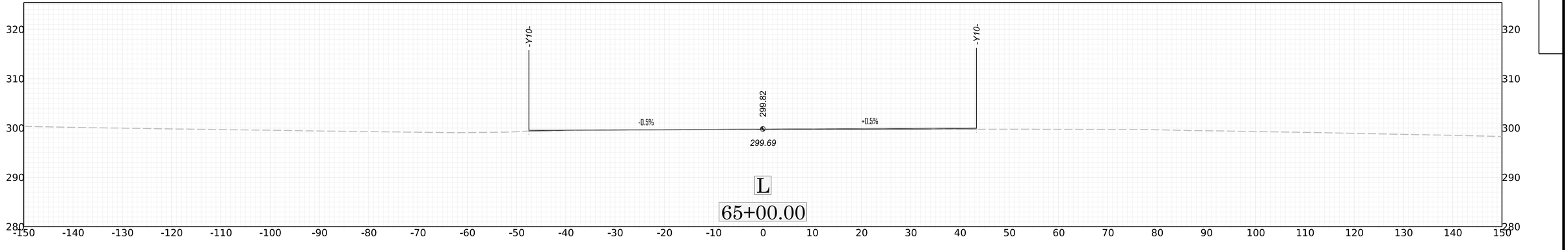

-Y10-
-Y10-
298.94
-0.5%
+0.5%
298.73
L
64+50.00

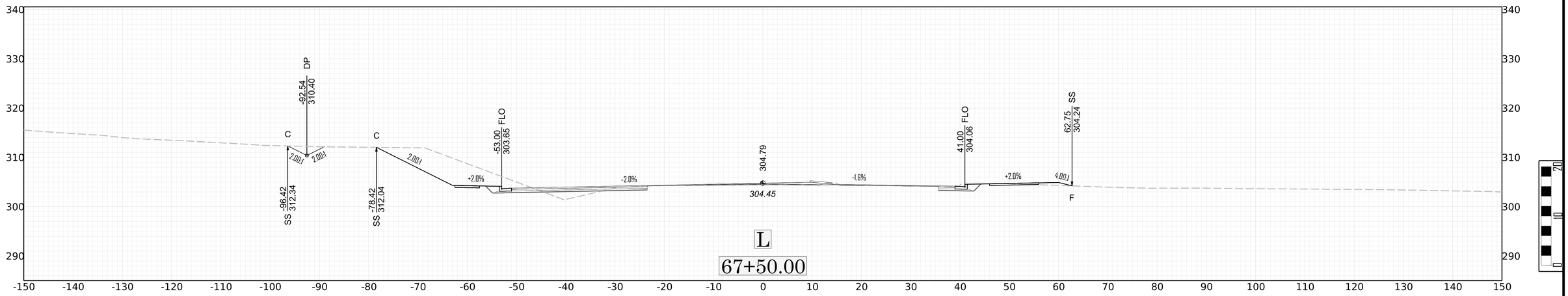

-Y10-
-Y10-
298.14
-1.0%
+1.0%
297.70
L
64+00.00

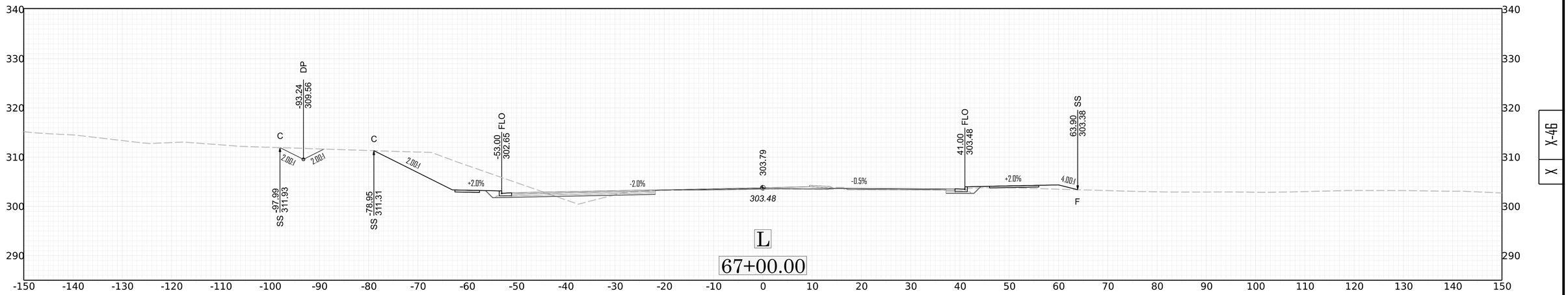

-Y10-
297.39
-2.0%
+2.0%
53.00
FLO
298.37
66.75
SS
298.22
+2.0%
2.00%
296.75
F
L
63+50.00

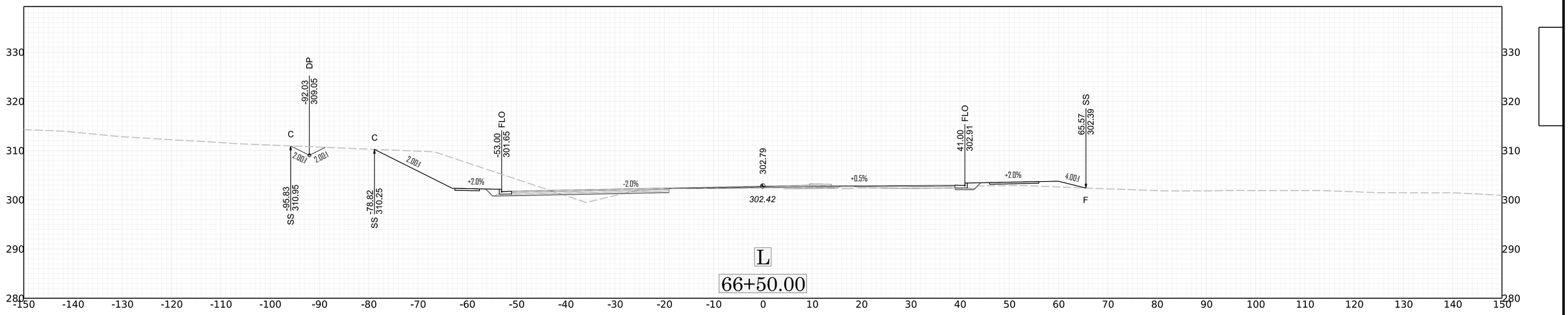

DP
-88.35
306.78
C
C
SS
-93.39
309.31
SS
-78.46
309.07
1.99:1
2.00:1
2.00:1
FLO
-53.00
300.65
+2.0%
-2.0%
301.79
301.31
+1.5%
FLO
41.00
302.32
+2.0%
SS
69.72
300.76
4.00:1
F
L
66+00.00

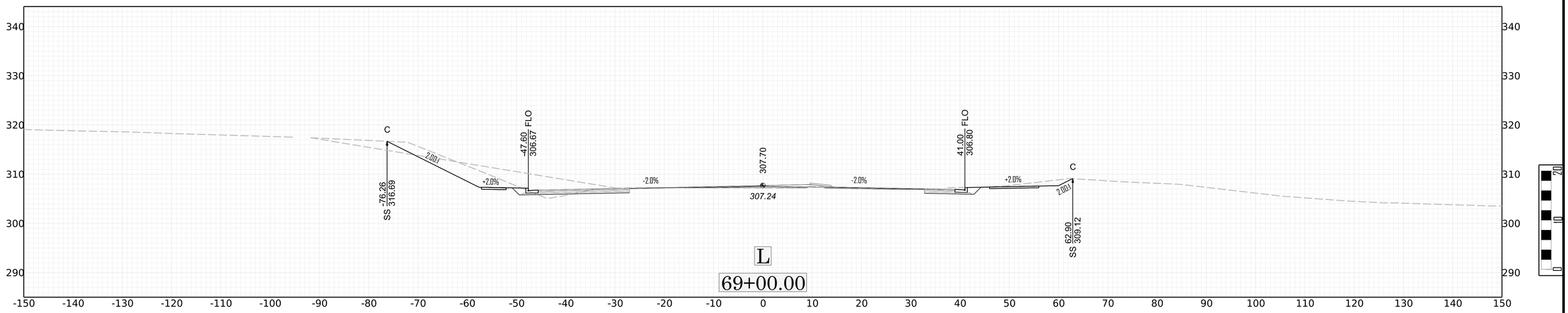

SS
-80.30
304.06
C
2.82:1
-0.3%
FLO
-57.10
300.09
-Y10-
-1.4%
300.79
300.26
+1.4%
-Y10-
-6.8%
FLO
50.57
300.67
-1.4%
SS
0.00
0.00
4.03:1
F
L
65+50.00

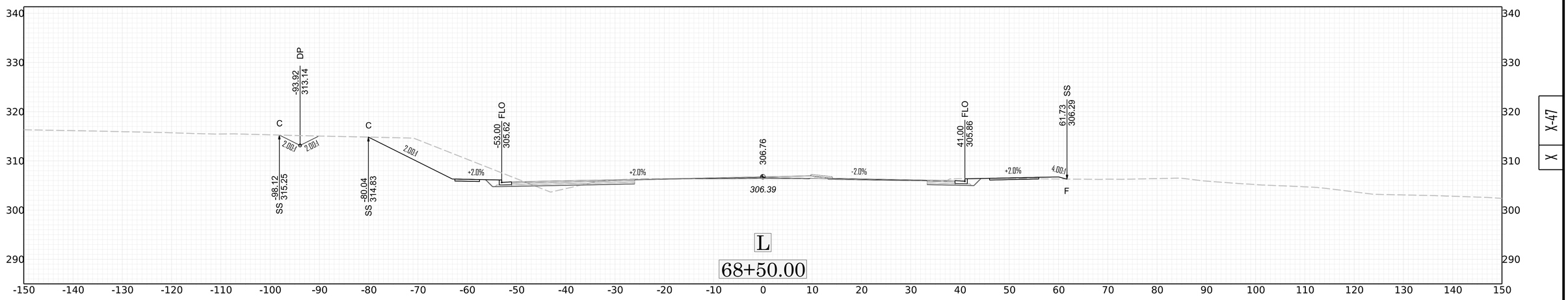

-Y10-
-0.5%
299.82
299.69
+0.5%
-Y10-
L
65+00.00

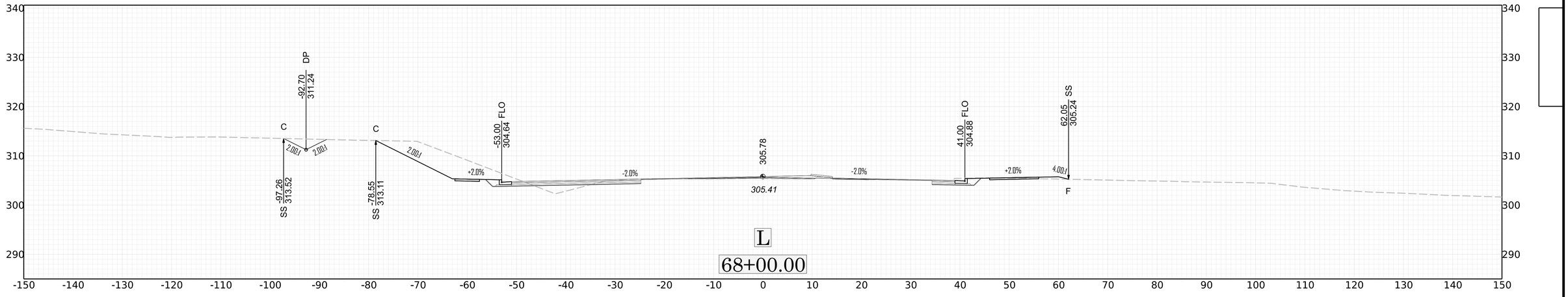

DP
-92.54
310.40
C
C
2.00:1
2.00:1
2.00:1
2.00:1
-53.00
303.65
FLO
304.79
304.45
41.00
304.06
FLO
62.75
304.24
SS
+2.0%
-2.0%
-1.6%
+2.0%
4.00:1
SS
-96.42
312.34
SS
-78.42
312.04
F
L
67+50.00


DP
-93.24
309.56
C
C
2.00:1
2.00:1
2.00:1
2.00:1
-53.00
302.65
FLO
303.79
303.48
41.00
303.48
FLO
63.90
303.38
SS
+2.0%
-2.0%
-0.5%
+2.0%
4.00:1
SS
-97.99
311.93
SS
-78.95
311.31
F
L
67+00.00

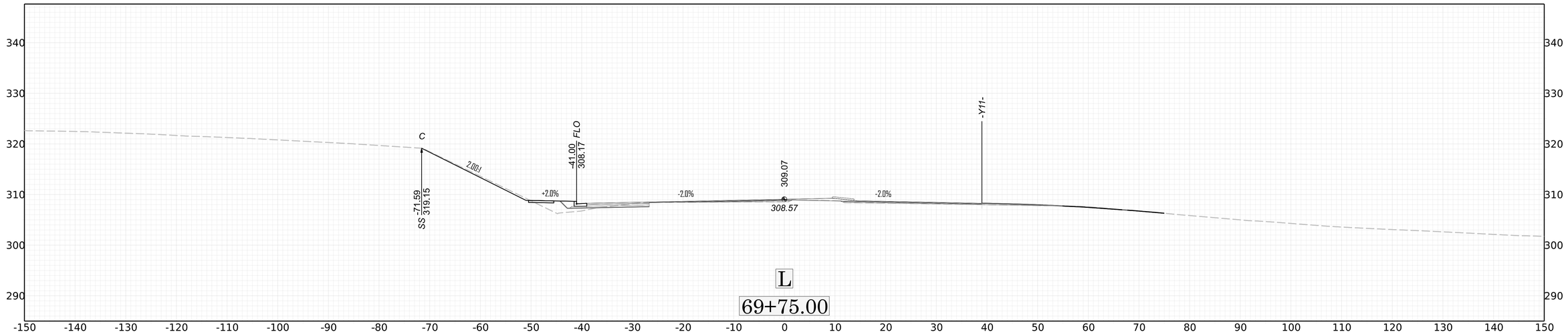

DP
-92.03
309.05
C
C
2.00:1
2.00:1
2.00:1
2.00:1
-53.00
301.65
FLO
302.79
302.42
41.00
302.91
FLO
65.57
302.39
SS
+2.0%
-2.0%
+0.5%
+2.0%
4.00:1
SS
-95.83
310.95
SS
-78.82
310.25
F
L
66+50.00

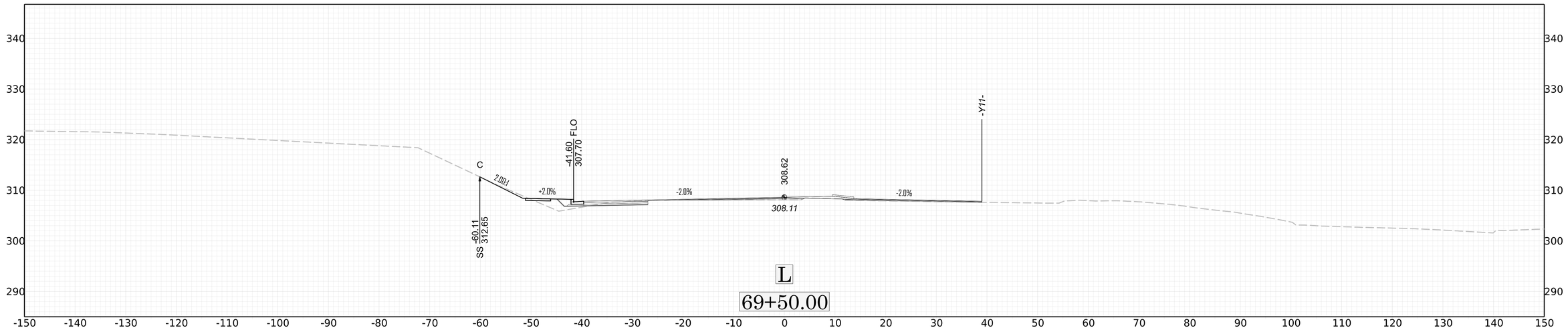

C
-47.60
306.67
FLO
307.70
41.00
306.80
FLO
C
2.00:1
+2.0%
-2.0%
-2.0%
+2.0%
2.00:1
SS
-76.26
316.69
307.24
SS
62.90
309.12
L
69+00.00


DP
-93.92
313.14
C
C
2.00:1
2.00:1
2.00:1
-53.00
305.62
FLO
306.76
41.00
305.86
FLO
61.73
306.29
SS
+2.0%
+2.0%
-2.0%
+2.0%
4.00:1
SS
-98.12
315.25
SS
-80.04
314.83
306.39
F
L
68+50.00


DP
-92.70
311.24
C
C
2.00:1
2.00:1
2.00:1
-53.00
304.64
FLO
305.78
41.00
304.88
FLO
62.05
305.24
SS
+2.0%
-2.0%
-2.0%
+2.0%
4.00:1
SS
-97.26
313.52
SS
-78.55
313.11
305.41
F
L
68+00.00

11/14/23



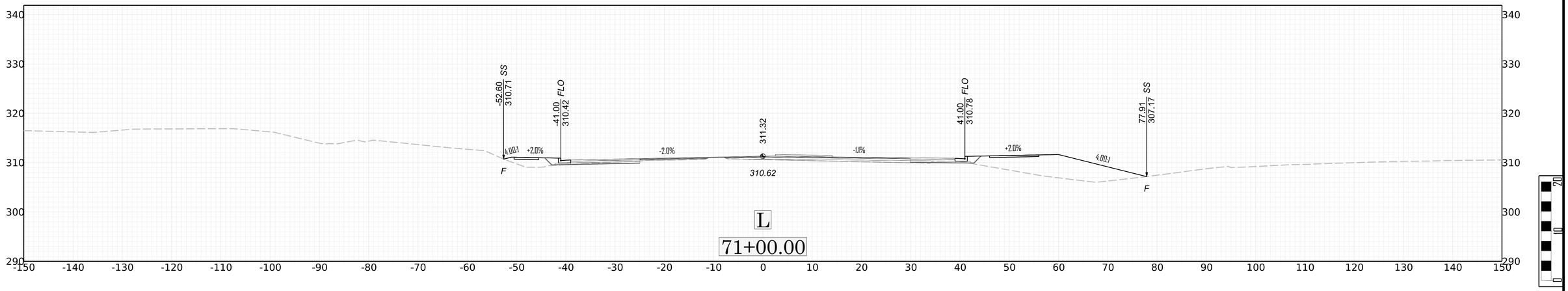


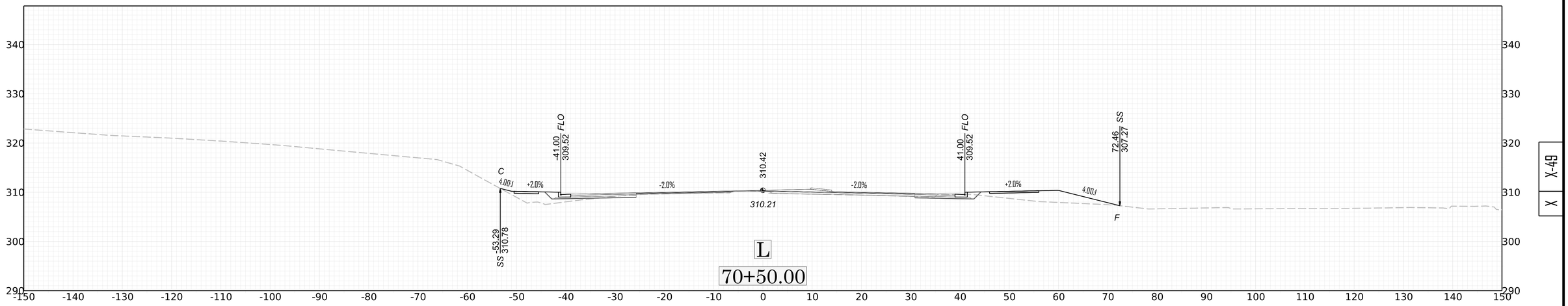


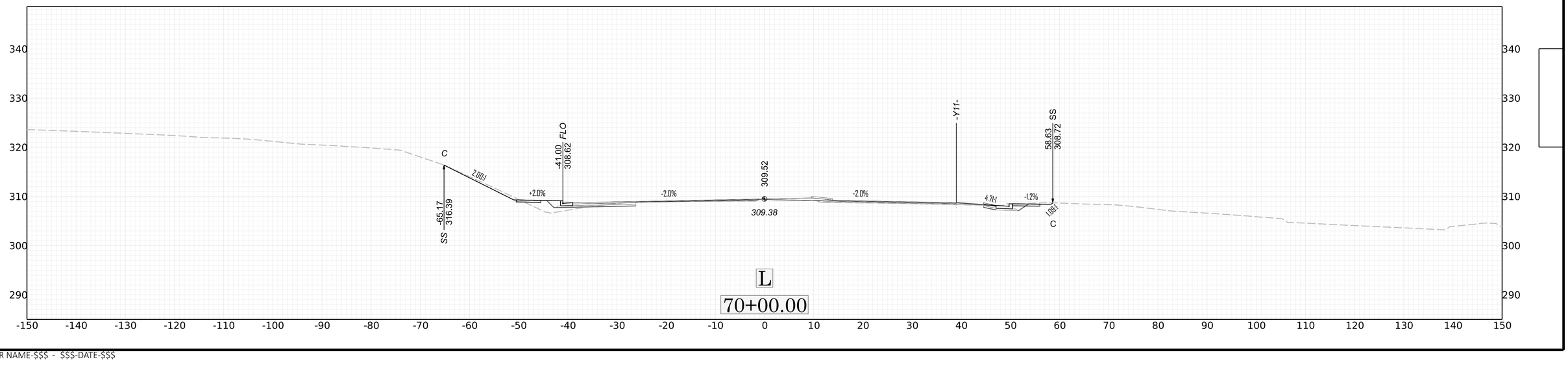
X-48

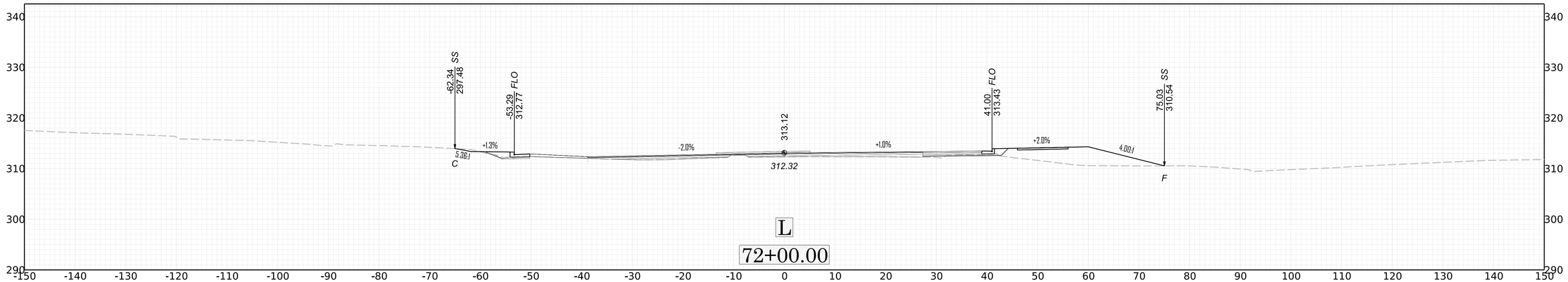
X

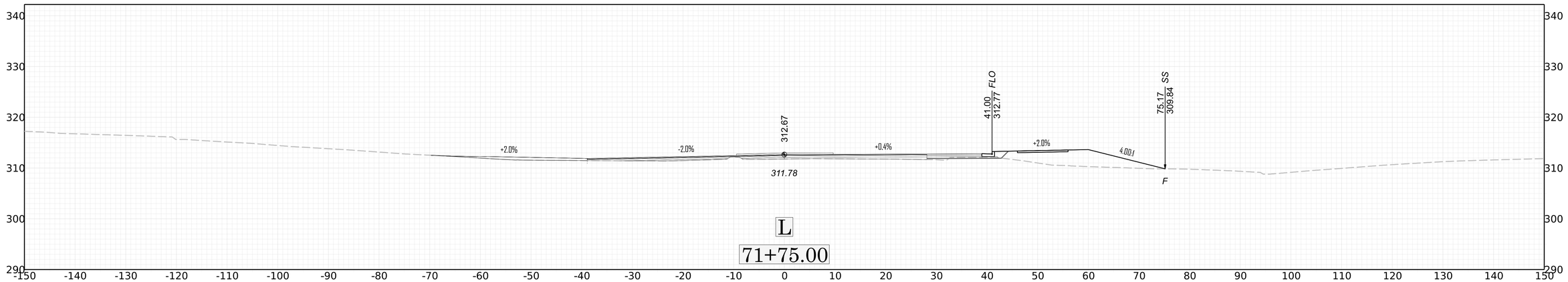
$$$-USER NAME-$$$ - $$$-DATE-$$$

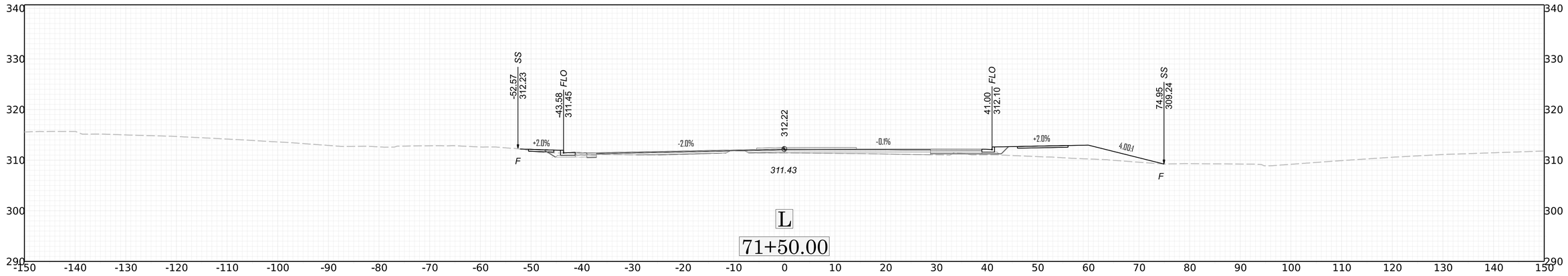

52.60
310.71
SS
41.00
310.42
FLO
41.00
310.78
FLO
77.91
307.17
SS
311.32
310.62
4.00:1
+2.0%
-2.0%
-1.0%
+2.0%
4.00:1
F
F
L
71+00.00

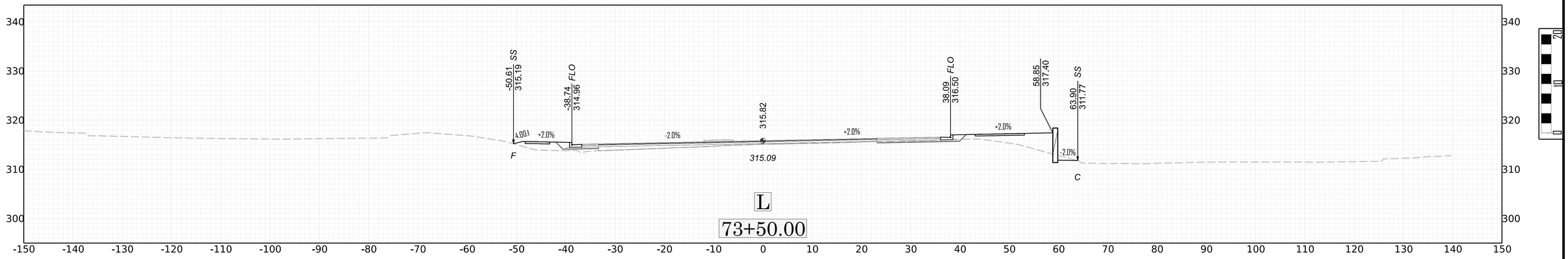

41.00
309.52
FLO
41.00
309.52
FLO
72.46
307.27
SS
C
4.00:1
+2.0%
-2.0%
310.42
310.21
-2.0%
+2.0%
4.00:1
F
53.29
310.78
SS
L
70+50.00

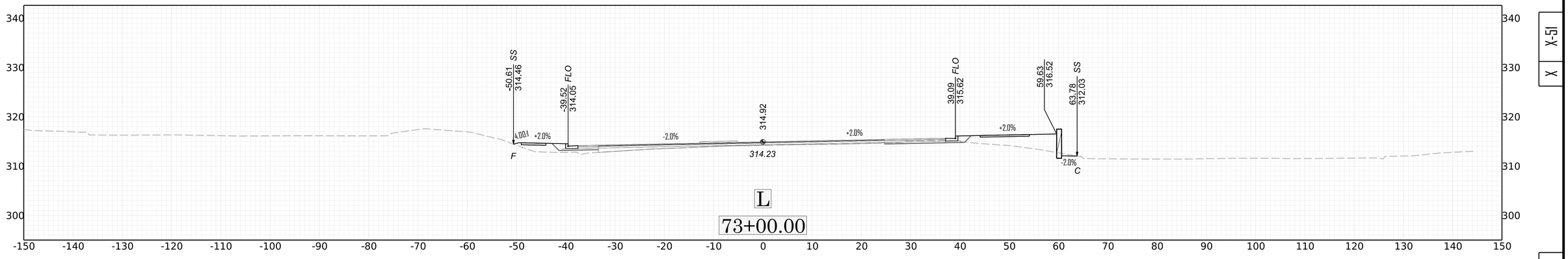

C
2.00:1
65.17
316.39
SS
41.00
308.62
FLO
+2.0%
-2.0%
309.52
309.38
-2.0%
-Y11-
4.71:1
-1.2%
58.63
308.72
SS
1.09:1
C
L
70+00.00

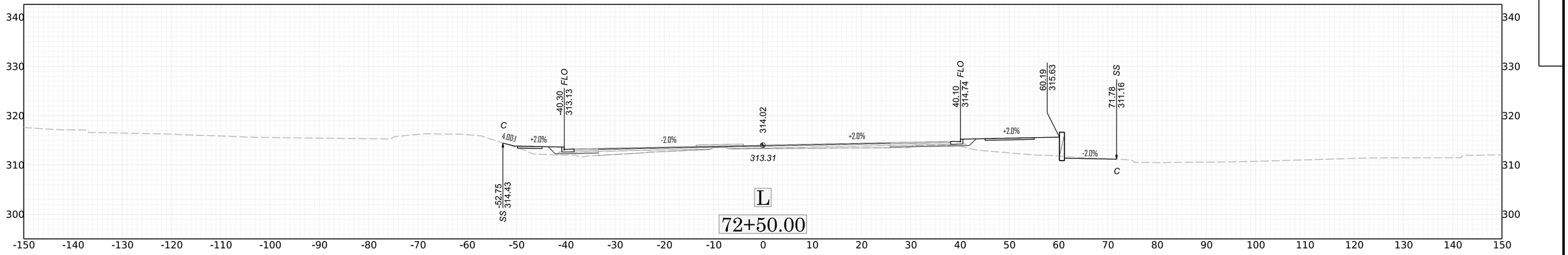

-62.34
297.48
SS
-53.29
312.77
FLO
313.12
41.00
313.43
FLO
75.03
310.54
SS
+1.3%
-2.0%
+1.0%
+2.0%
5.36:1
4.00:1
312.32
C
F
L
72+00.00

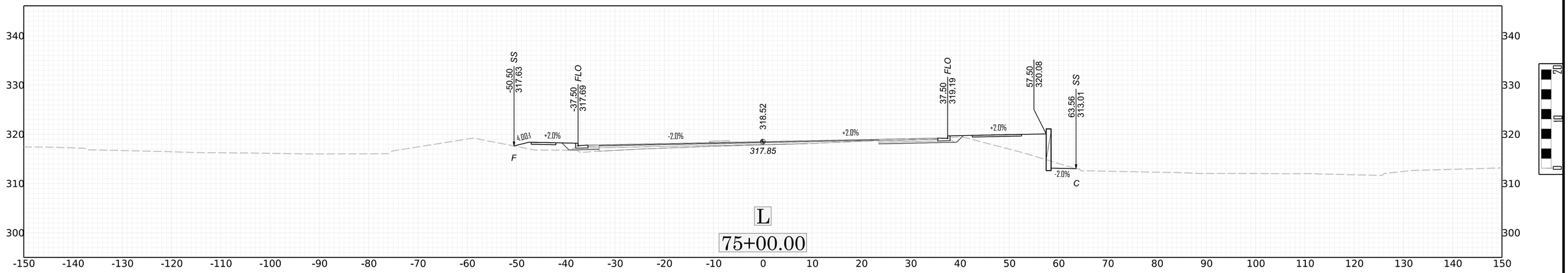

312.67
41.00
312.77
FLO
75.17
309.84
SS
+2.0%
-2.0%
+0.4%
+2.0%
4.00:1
311.78
F
L
71+75.00


-52.57
312.23
SS
-43.58
311.45
FLO
312.22
41.00
312.10
FLO
74.95
309.24
SS
+2.0%
-2.0%
-0.1%
+2.0%
4.00:1
311.43
F
F
L
71+50.00


-50.61
315.19
SS
-38.74
314.96
FLO
315.82
38.09
316.50
FLO
58.85
317.40
63.90
311.77
SS
4.00:1
+2.0%
-2.0%
+2.0%
+2.0%
-2.0%
F
315.09
C
L
73+50.00

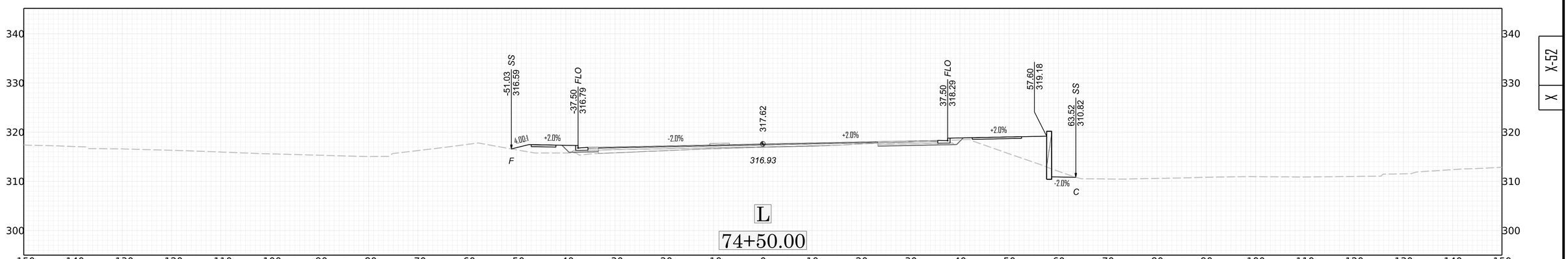

-50.61
314.46
SS
-39.52
314.05
FLO
314.92
39.09
315.62
FLO
59.63
316.52
63.78
312.03
SS
4.00:1
+2.0%
-2.0%
+2.0%
+2.0%
-2.0%
F
314.23
C
L
73+00.00


C
4.00:1
+2.0%
-40.30
313.13
FLO
314.02
40.10
314.74
FLO
60.19
315.63
71.78
311.16
SS
-2.0%
+2.0%
-2.0%
+2.0%
313.31
C
-52.75
314.43
SS
L
72+50.00



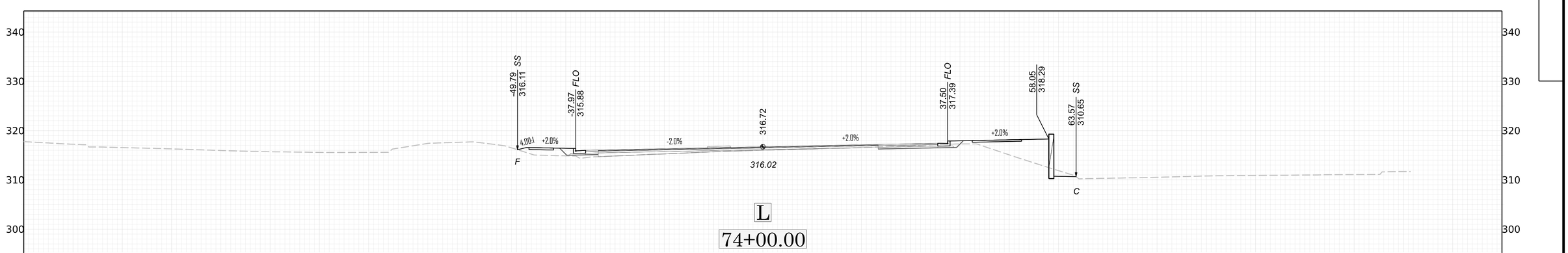
L

75+00.00



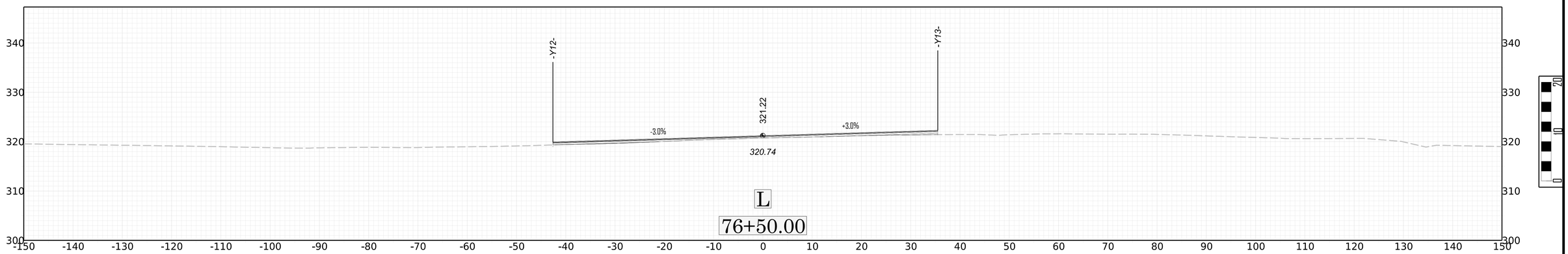
L

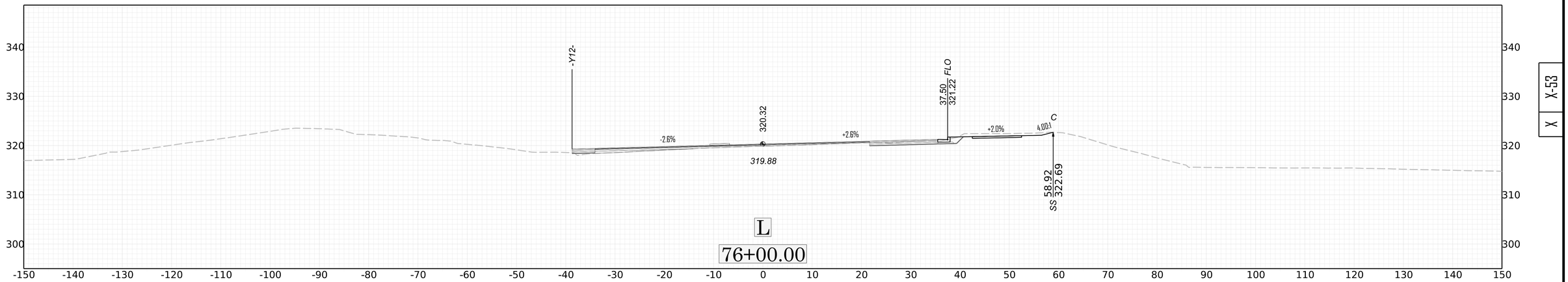
74+50.00

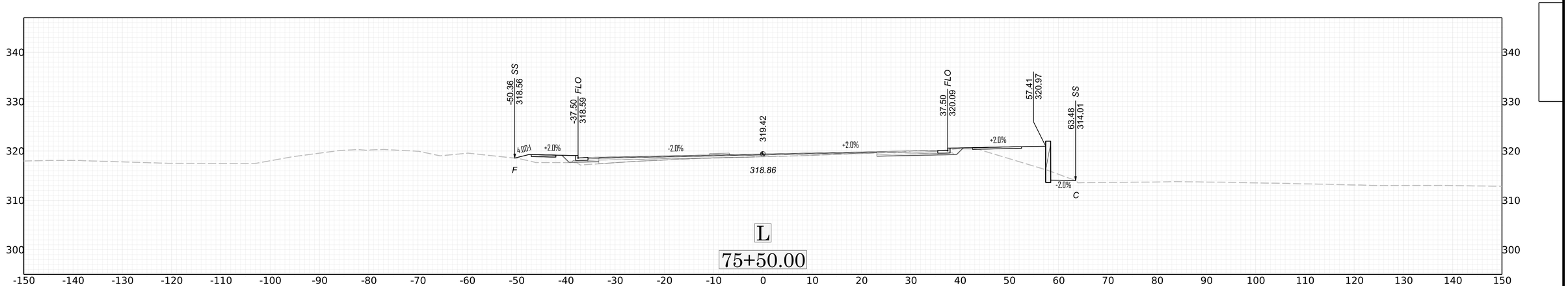


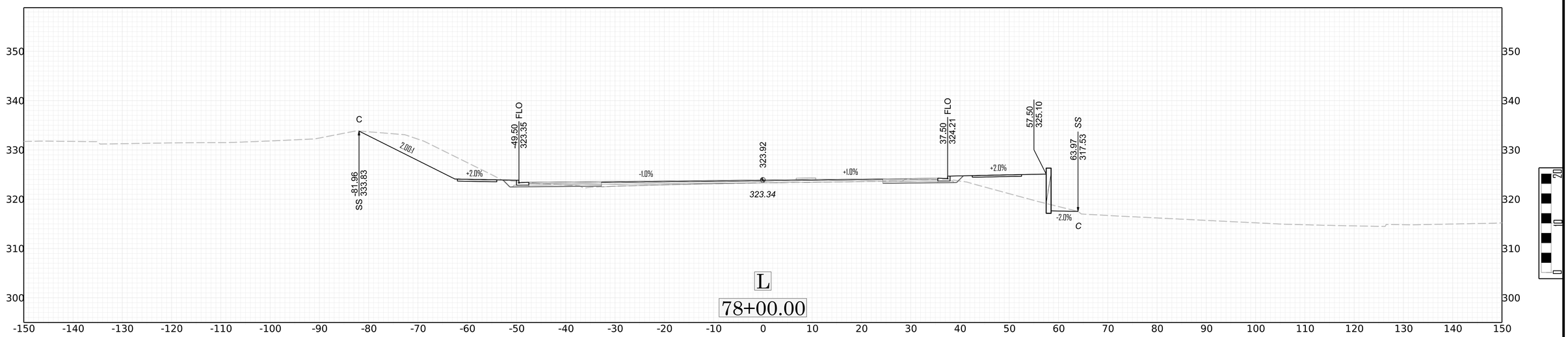
L

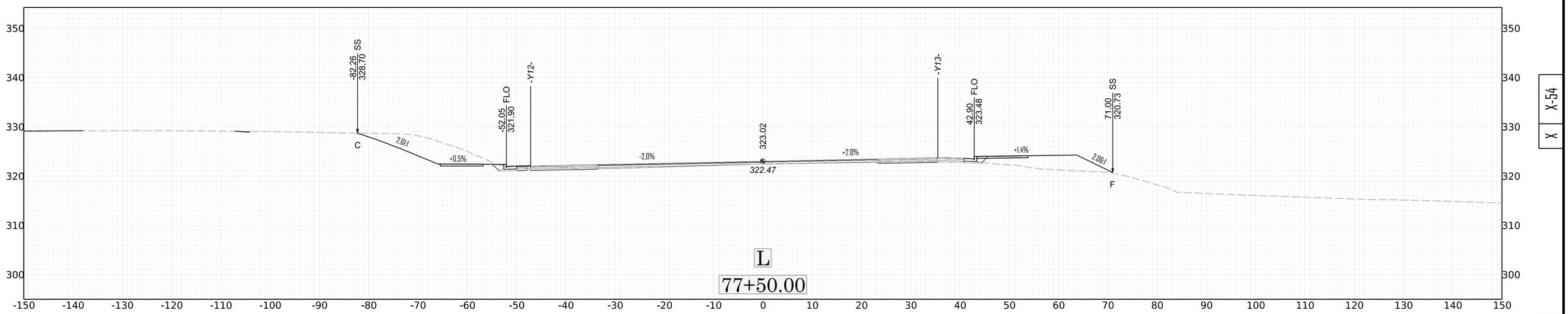
74+00.00

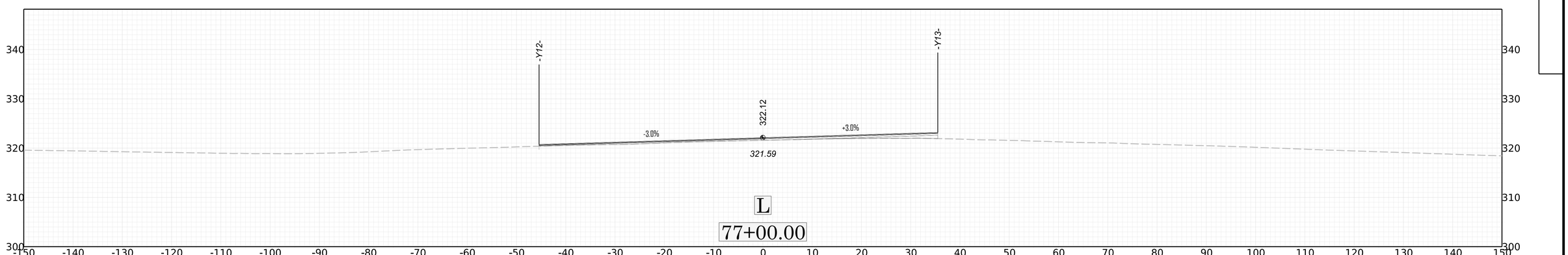

-Y12-
-Y13-
321.22
-3.0%
+3.0%
320.74
L
76+50.00


-Y12-
320.32
-2.6%
+2.6%
319.88
37.50 FLO
321.22
+2.0%
4.00:1
C
58.92
SS 322.69
L
76+00.00

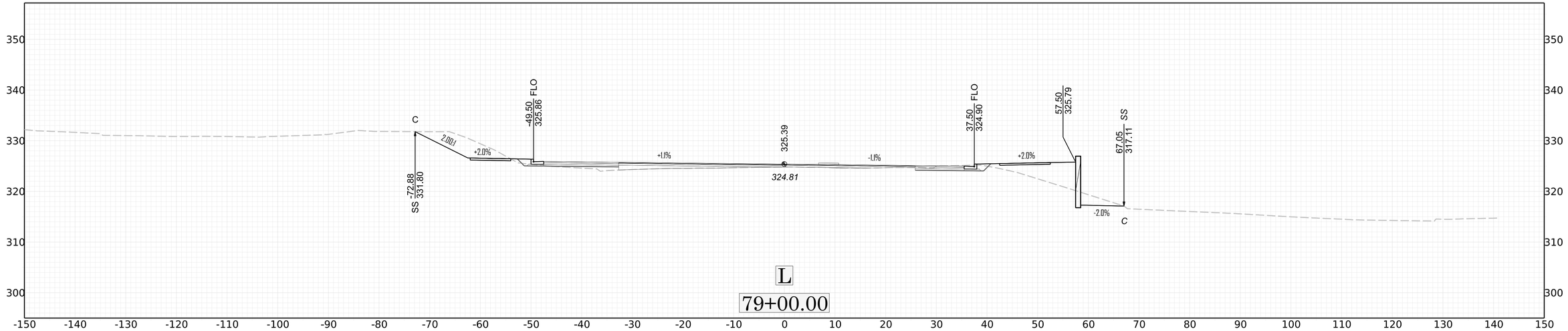

-50.36 SS
318.56
-37.50 FLO
318.59
4.00:1
+2.0%
F
-2.0%
319.42
318.86
+2.0%
37.50 FLO
320.09
+2.0%
57.41
320.97
63.48 SS
314.01
-2.0%
C
L
75+50.00

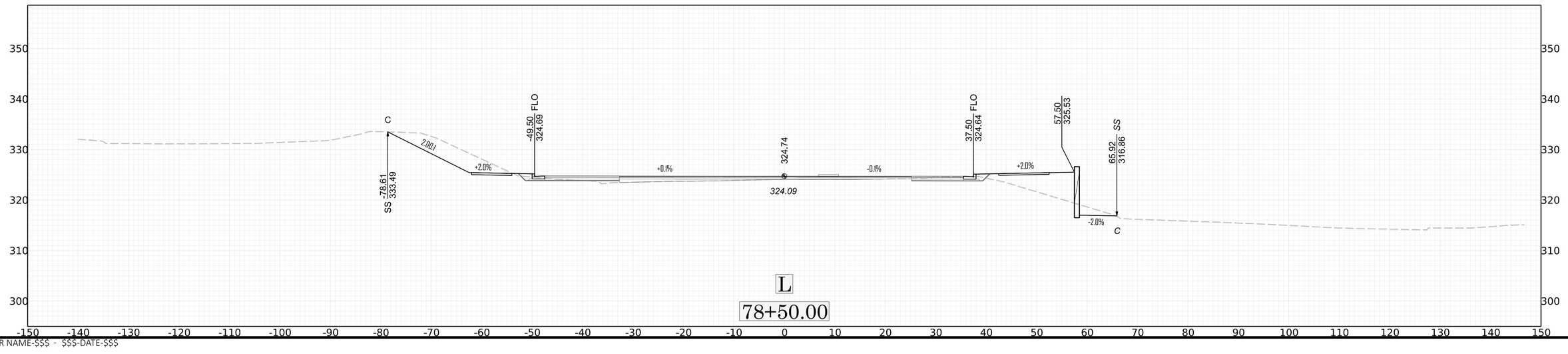

C
-81.96
333.83
SS
2.00:1
+2.0%
-49.50
323.35
FLO
-1.0%
323.92
323.34
+1.0%
37.50
324.21
FLO
+2.0%
57.50
325.10
63.97
317.53
SS
-2.0%
C
L
78+00.00

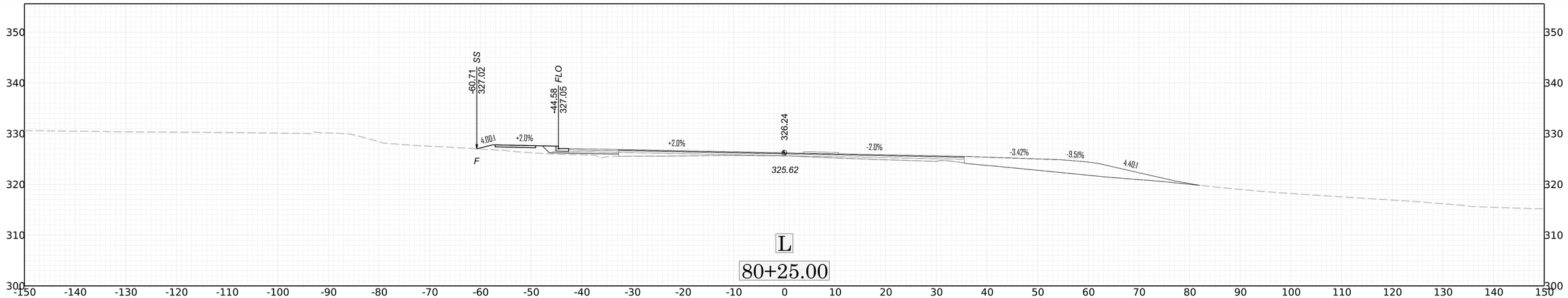

-82.26
328.70
SS
C
2.6:1
+0.5%
-52.05
321.90
FLO
-Y12-
-2.0%
323.02
322.47
+2.0%
-Y13-
42.90
323.48
FLO
+1.4%
71.00
320.73
SS
2.06:1
F
L
77+50.00

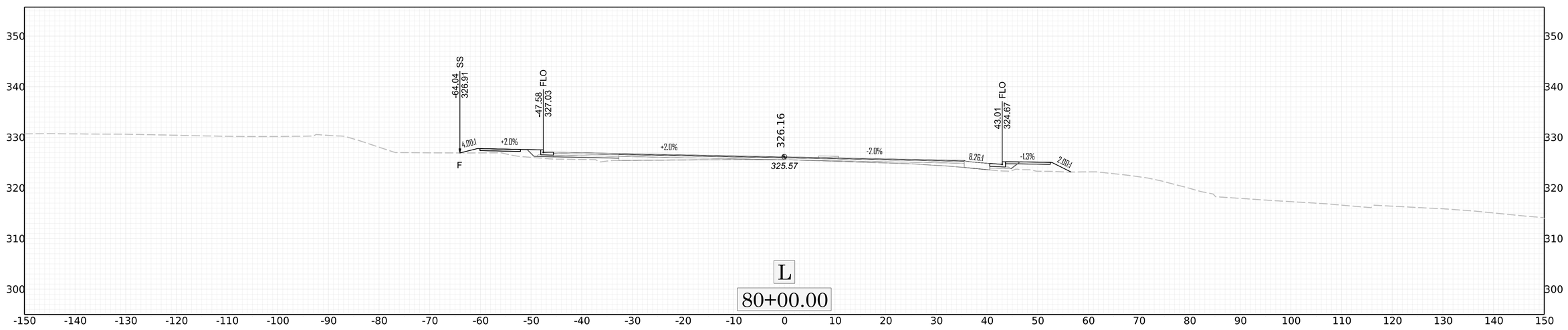

-Y12-
-Y13-
-3.0%
322.12
321.59
+3.0%
L
77+00.00

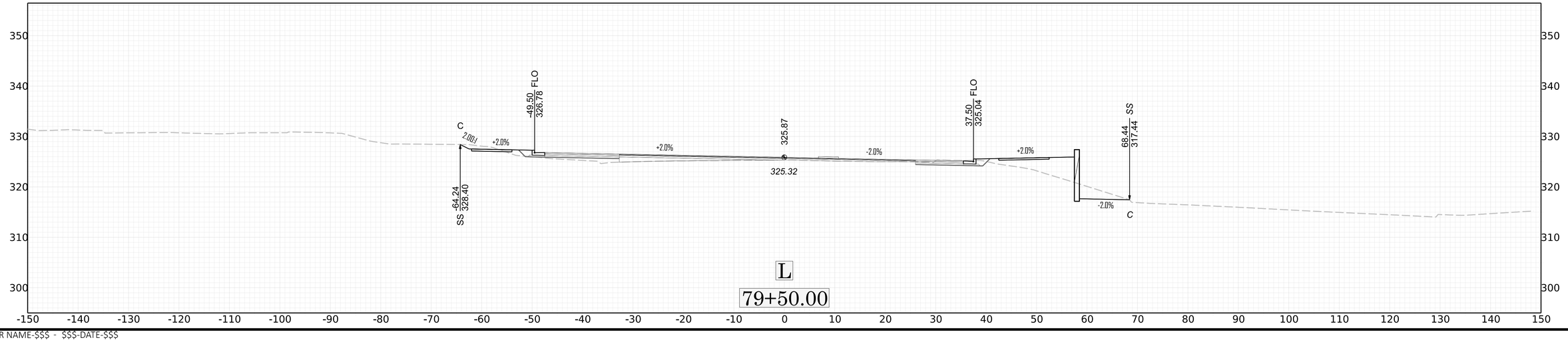
X-54

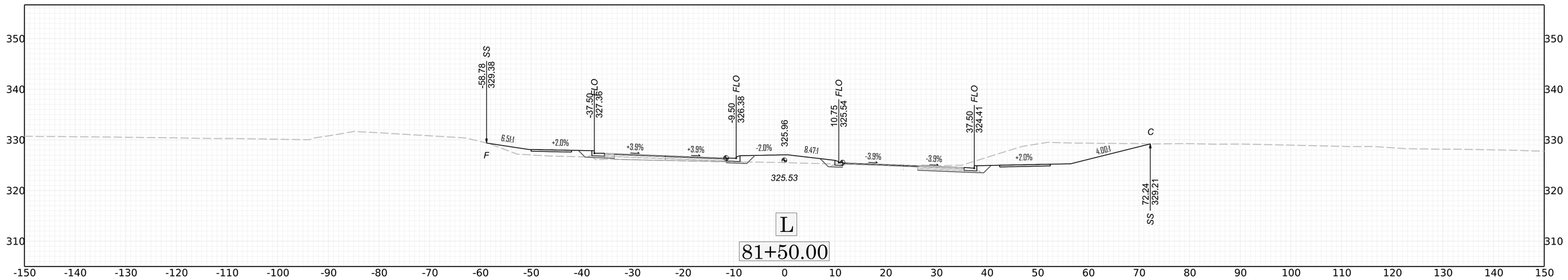

350
340
330
320
310
300
-150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
C
2.00:1
+2.0%
-49.50
325.86
FLO
+1.1%
325.39
324.81
-1.1%
37.50
324.90
FLO
+2.0%
57.50
325.79
67.05
317.11
SS
-2.0%
C
72.88
331.80
SS
L
79+00.00

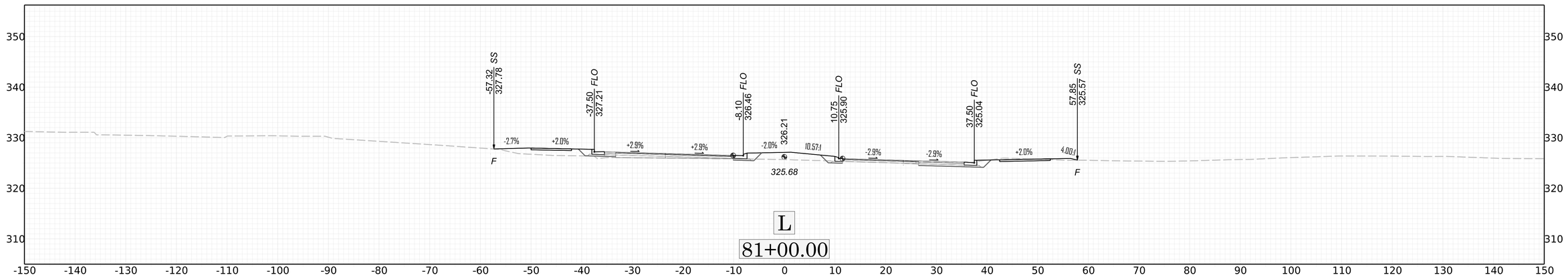

350
340
330
320
310
300
-150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
C
2.00:1
+2.0%
-49.50
324.69
FLO
+0.1%
324.74
324.09
-0.1%
37.50
324.64
FLO
+2.0%
57.50
325.53
65.92
316.86
SS
-2.0%
C
78.61
333.49
SS
L
78+50.00

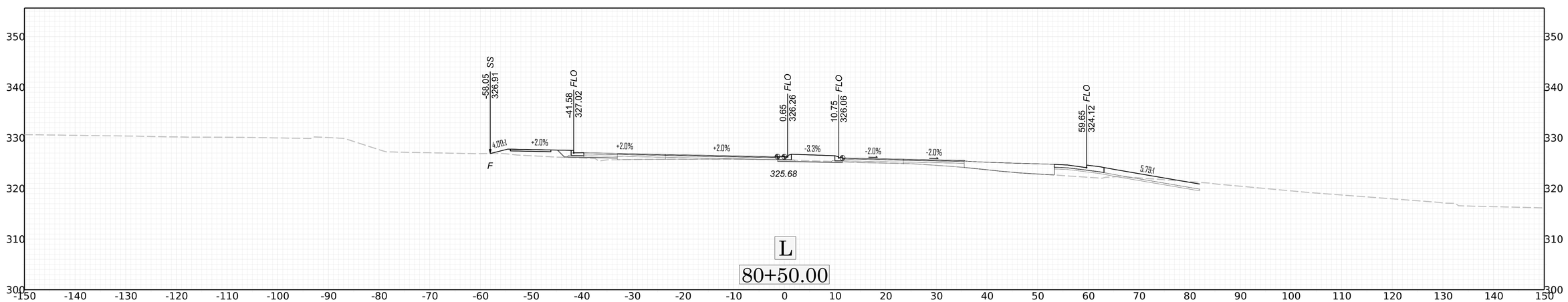

-60.71
327.02
SS
-44.58
327.05
FLO
4.00:1
+2.0%
+2.0%
326.24
-2.0%
-3.42%
-9.51%
4.40:1
F
325.62
L
80+25.00

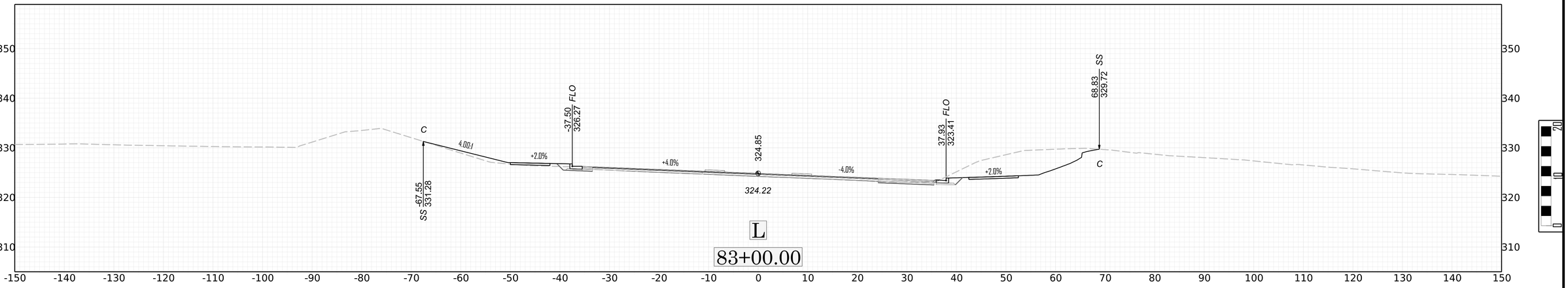

-64.04
326.91
SS
-47.58
327.03
FLO
43.01
324.67
FLO
4.00:1
+2.0%
+2.0%
326.16
-2.0%
8.26:1
-1.3%
2.00:1
F
325.57
L
80+00.00

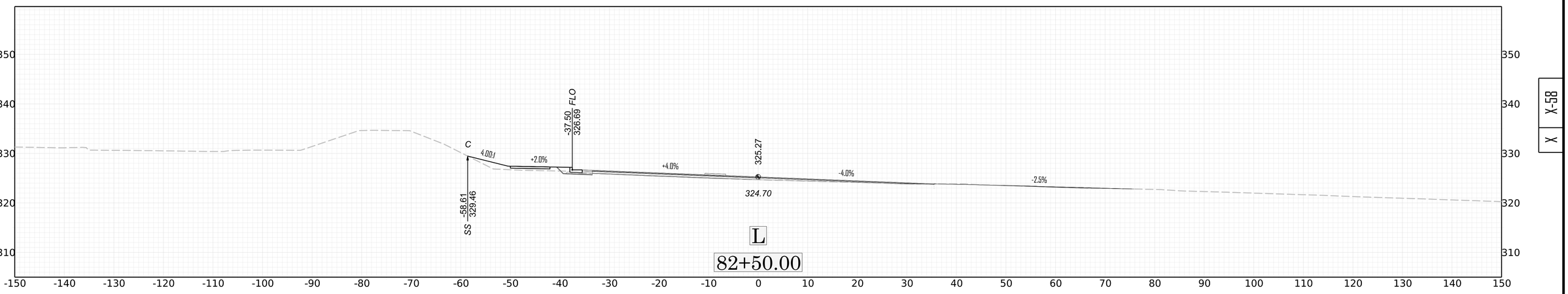

C
2.00:1
+2.0%
-49.50
326.78
FLO
+2.0%
325.87
-2.0%
37.50
325.04
FLO
+2.0%
68.44
317.44
SS
-64.24
328.40
SS
325.32
-2.0%
C
L
79+50.00

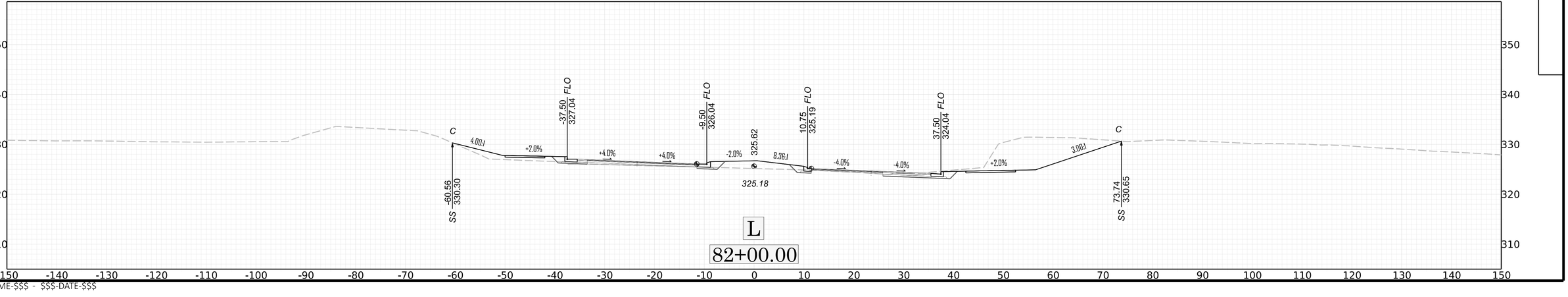

-58.78
329.38
SS
-37.50
327.36
FLO
-9.50
326.38
FLO
325.96
10.75
325.54
FLO
37.50
324.41
FLO
72.24
329.21
SS
C
F
325.53
6.5:1
+2.0%
+3.9%
+3.9%
-2.0%
8.47:1
-3.9%
-3.9%
+2.0%
4.00:1
L
81+50.00


-57.32
327.78
SS
-37.50
327.21
FLO
-8.10
326.46
FLO
326.21
10.75
325.90
FLO
37.50
325.04
FLO
57.85
325.57
SS
F
F
325.68
-2.7%
+2.0%
+2.9%
+2.9%
-2.0%
10.57:1
-2.9%
-2.9%
+2.0%
4.00:1
L
81+00.00


-58.05
326.91
SS
-41.58
327.02
FLO
0.65
326.26
FLO
10.75
326.06
FLO
59.65
324.12
FLO
F
325.68
4.00:1
+2.0%
+2.0%
+2.0%
-3.3%
-2.0%
-2.0%
5.79:1
L
80+50.00

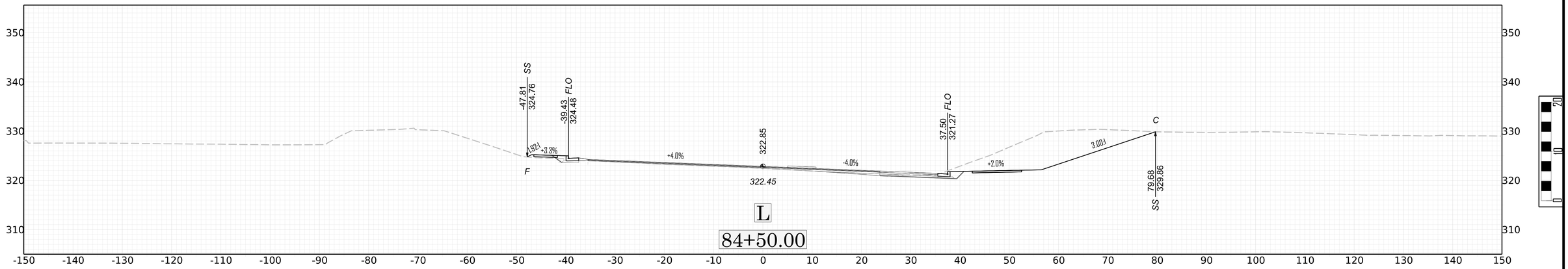


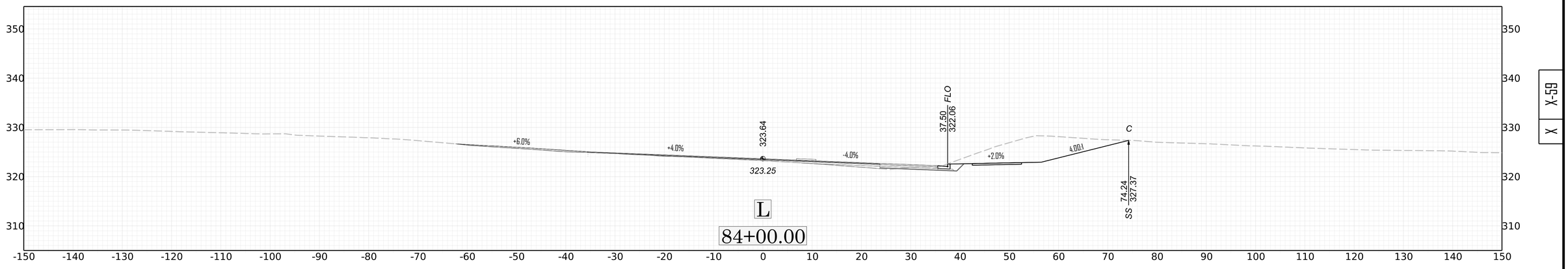


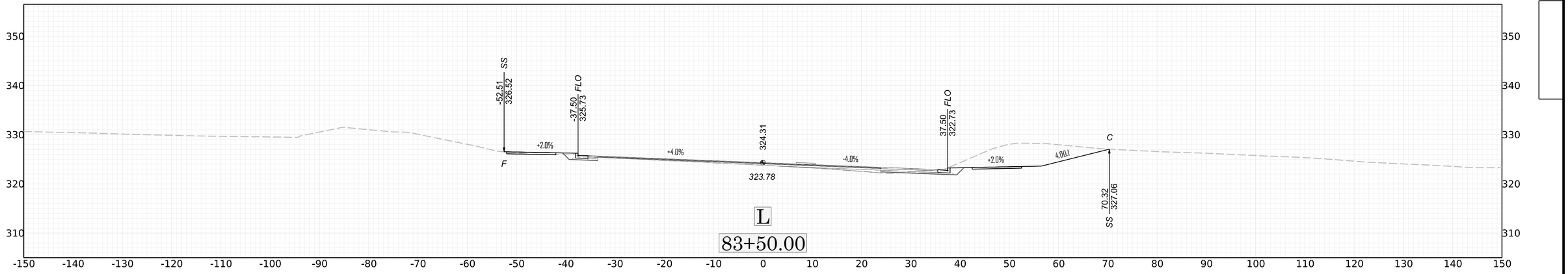


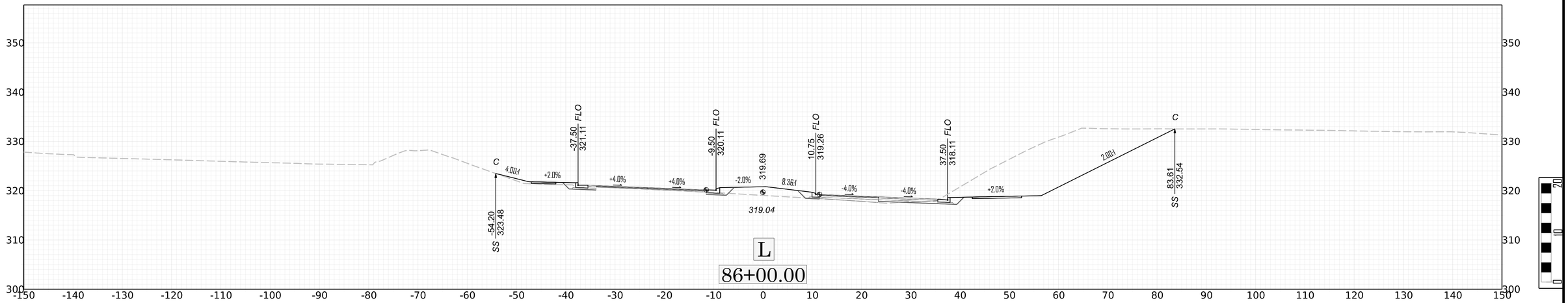
X-58

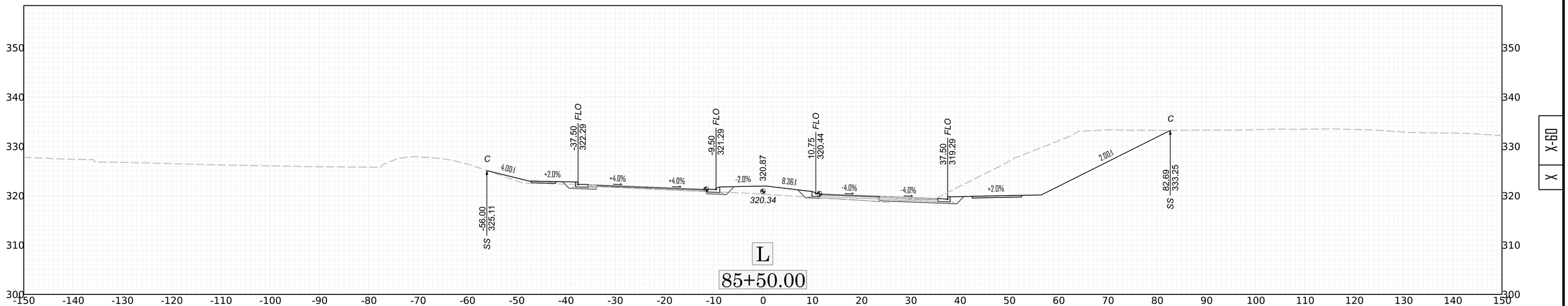
$$$-USER NAME-$$$ - $$$-DATE-$$$

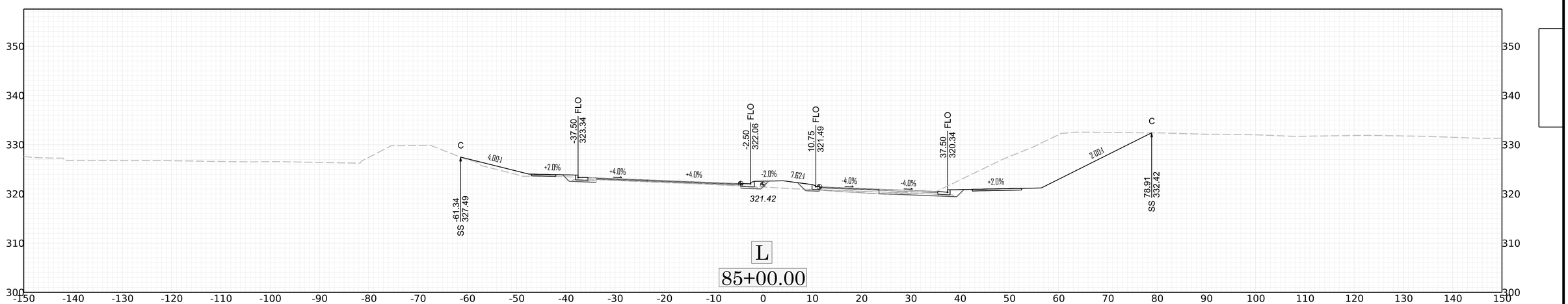

-47.81
324.76
SS
-39.43
324.48
FLO
37.50
321.27
FLO
322.85
322.45
F
C
79.68
329.86
SS
+3.3%
+4.0%
-4.0%
+2.0%
3.00:1
L
84+50.00

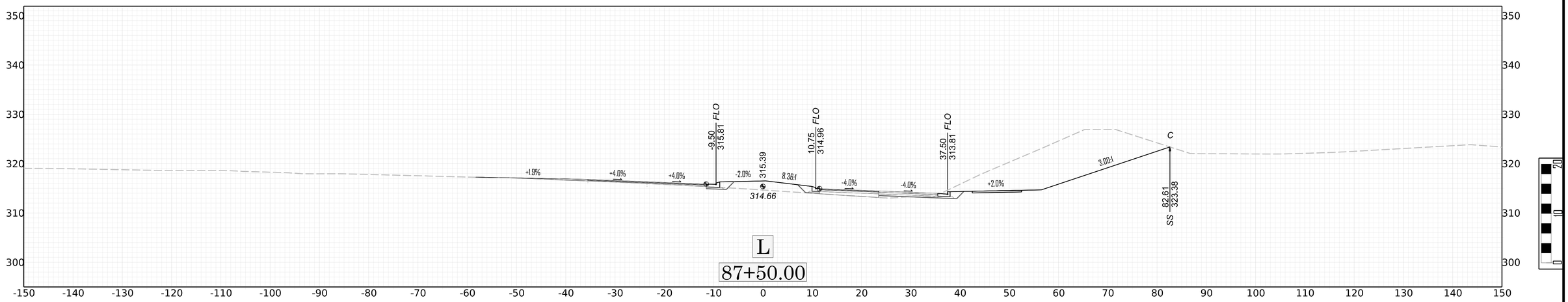

37.50
322.06
FLO
323.64
323.25
C
74.24
327.37
SS
+6.0%
+4.0%
-4.0%
+2.0%
4.00:1
L
84+00.00

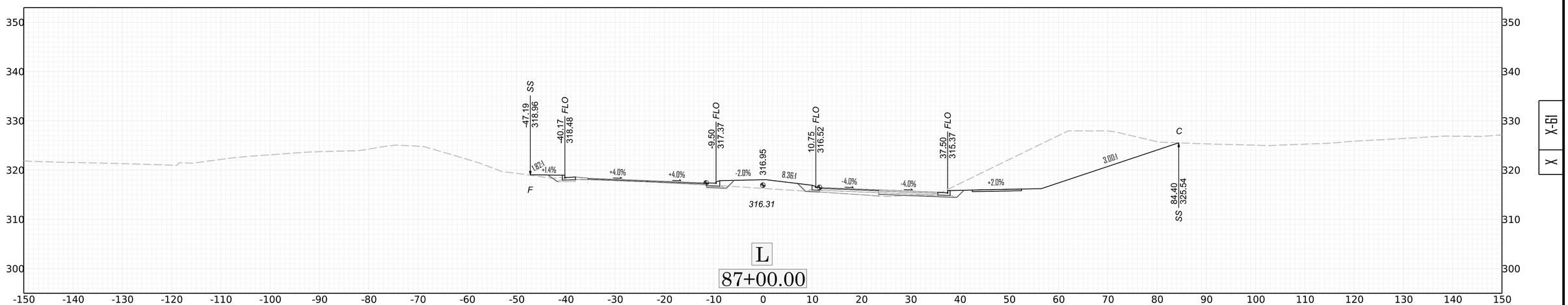

-52.51
326.52
SS
-37.50
325.73
FLO
37.50
322.73
FLO
324.31
323.78
F
C
70.32
327.06
SS
+2.0%
+4.0%
-4.0%
+2.0%
4.00:1
L
83+50.00

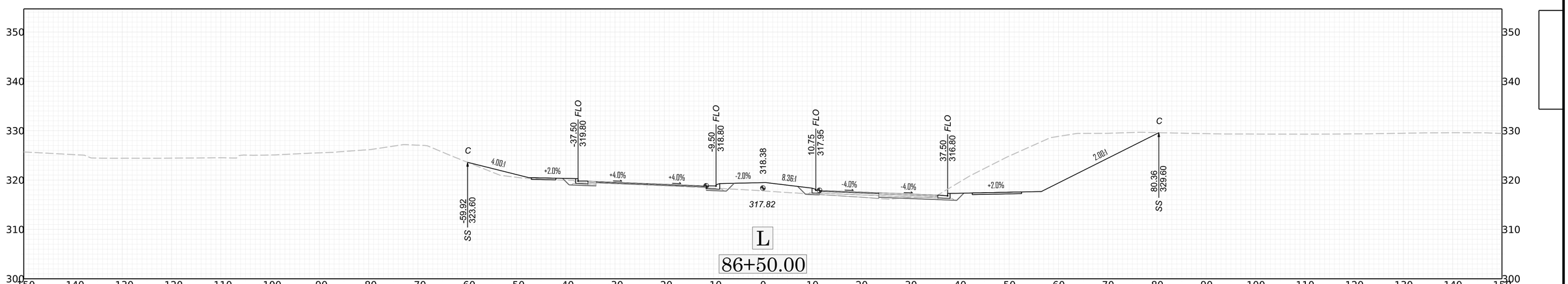

C
4.00:1
+2.0%
-37.50
321.11
FLO
+4.0%
+4.0%
-9.50
320.11
FLO
-2.0%
319.69
8.36:1
10.75
319.26
FLO
-4.0%
-4.0%
37.50
318.11
FLO
+2.0%
2.00:1
C
83.61
332.54
SS
-54.20
323.48
SS
319.04
L
86+00.00
350
340
330
320
310
300
-150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
20
10
0

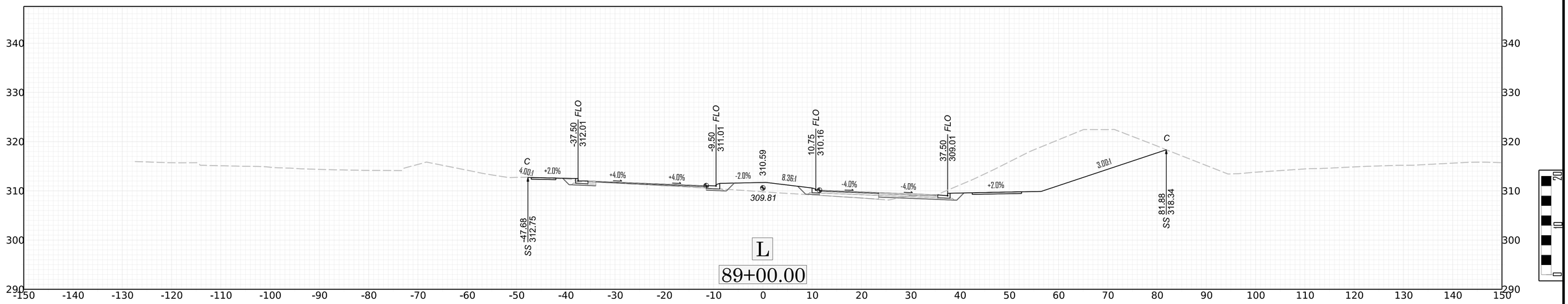

C
4.00:1
+2.0%
-37.50
322.29
FLO
+4.0%
+4.0%
-9.50
321.29
FLO
-2.0%
320.87
8.36:1
10.75
320.44
FLO
-4.0%
-4.0%
37.50
319.29
FLO
+2.0%
2.00:1
C
82.69
333.25
SS
-56.00
325.11
SS
320.34
L
85+50.00
350
340
330
320
310
300
-150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
X-60
X

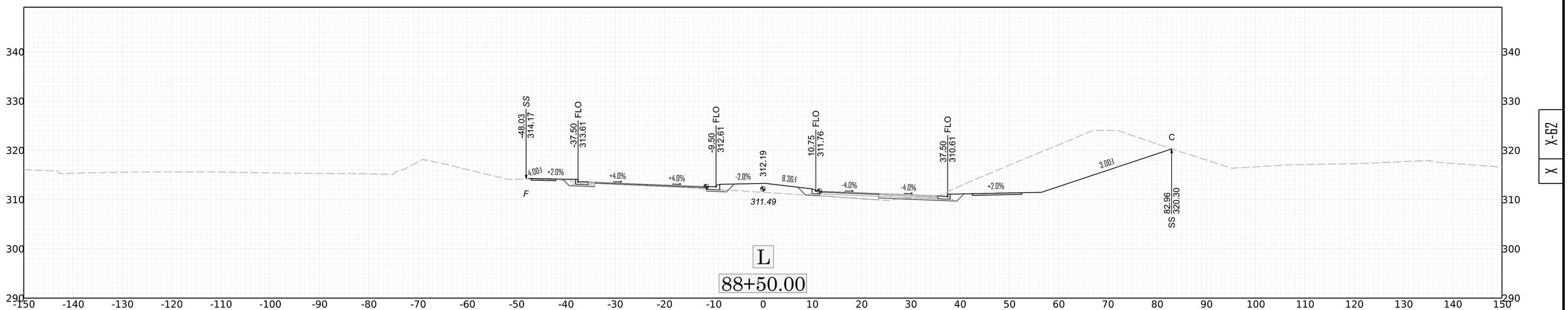

C
4.00:1
+2.0%
-37.50
323.34
FLO
+4.0%
+4.0%
-2.50
322.06
FLO
-2.0%
7.62:1
10.75
321.49
FLO
-4.0%
-4.0%
37.50
320.34
FLO
+2.0%
2.00:1
C
78.91
332.42
SS
-61.34
327.49
SS
321.42
L
85+00.00
350
340
330
320
310
300
-150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

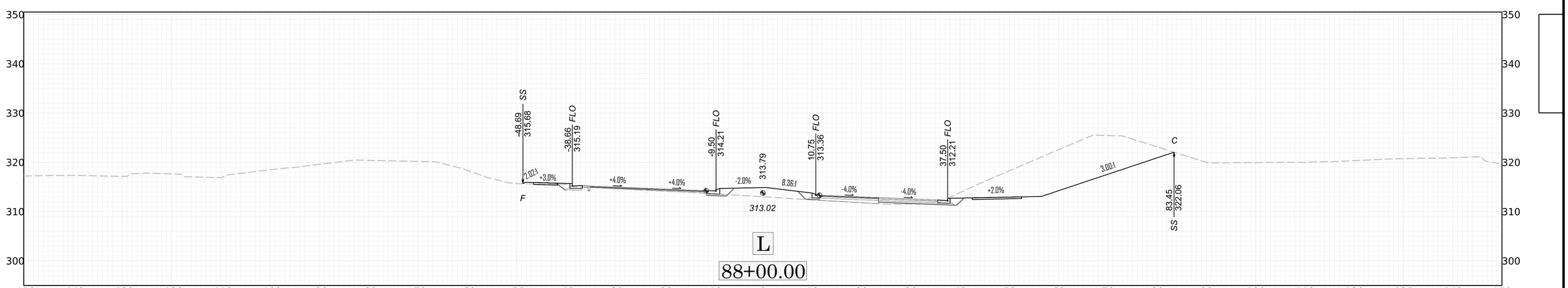

-9.50
315.81
FLO
10.75
314.96
FLO
37.50
313.81
FLO
315.39
8.36:1
314.66
+1.9%
+4.0%
+4.0%
-2.0%
-4.0%
-4.0%
+2.0%
3.00:1
C
82.61
323.38
SS
L
87+50.00


-47.19
318.96
SS
-40.17
318.48
FLO
-9.50
317.37
FLO
10.75
316.52
FLO
37.50
315.37
FLO
316.95
8.36:1
316.31
1.82:1
1.4%
+4.0%
+4.0%
-2.0%
-4.0%
-4.0%
+2.0%
3.00:1
F
C
84.40
325.54
SS
L
87+00.00

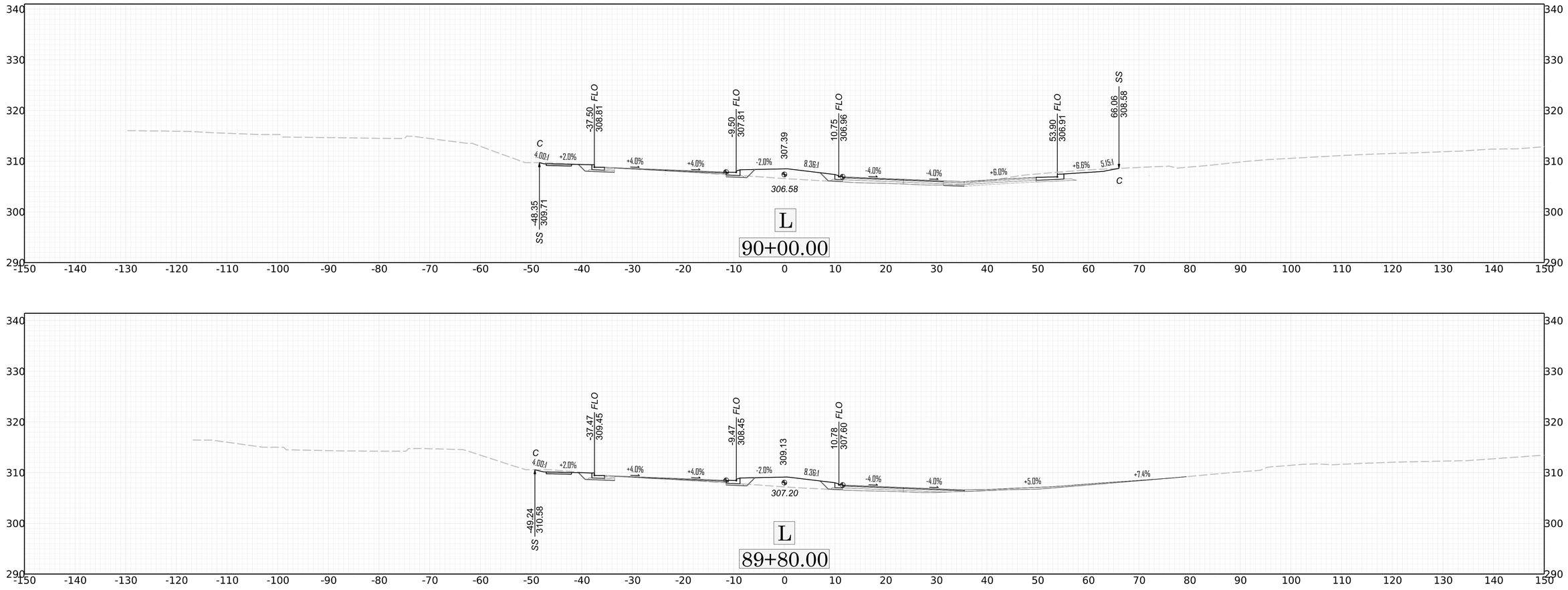

C
4.00:1
-59.92
323.60
SS
-37.50
319.80
FLO
-9.50
318.80
FLO
10.75
317.95
FLO
37.50
316.80
FLO
318.38
8.36:1
317.82
+2.0%
+4.0%
+4.0%
-2.0%
-4.0%
-4.0%
+2.0%
2.00:1
C
80.36
329.60
SS
L
86+50.00

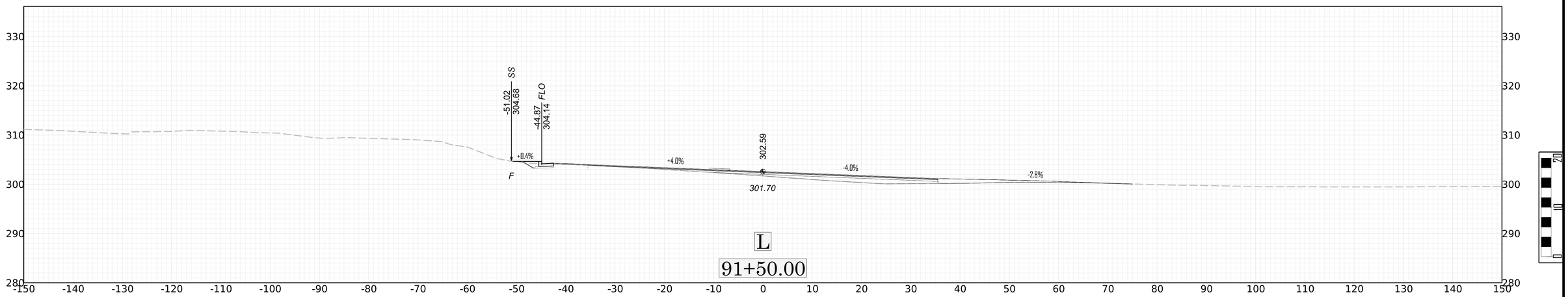

-47.68
312.75
SS
4.00:1
+2.0%
-37.50
312.01
FLO
+4.0%
+4.0%
-9.50
311.01
FLO
-2.0%
310.59
8.36:1
309.81
10.75
310.16
FLO
-4.0%
-4.0%
37.50
309.01
FLO
+2.0%
3.00:1
C
81.88
318.34
SS
L
89+00.00

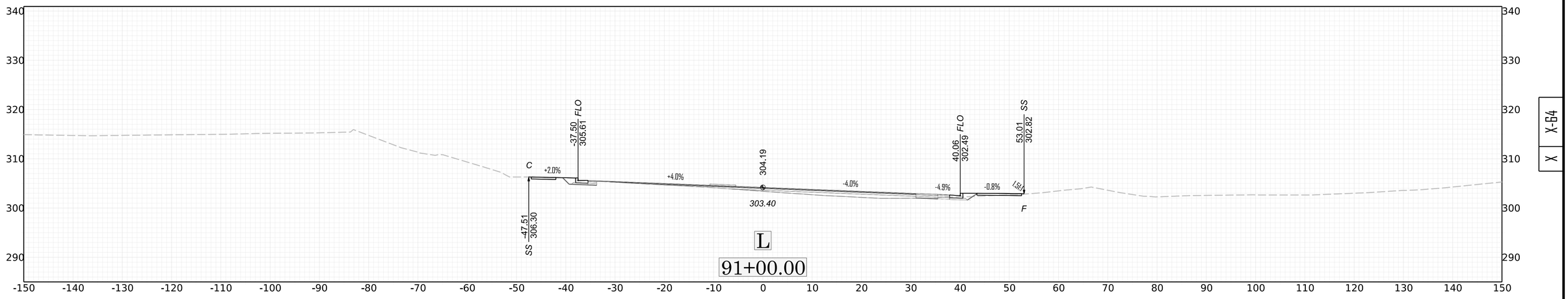

-48.03
314.17
SS
4.00:1
+2.0%
-37.50
313.61
FLO
+4.0%
+4.0%
-9.50
312.61
FLO
-2.0%
312.19
8.36:1
311.49
10.75
311.76
FLO
-4.0%
-4.0%
37.50
310.61
FLO
+2.0%
3.00:1
C
82.96
320.30
SS
F
L
88+50.00

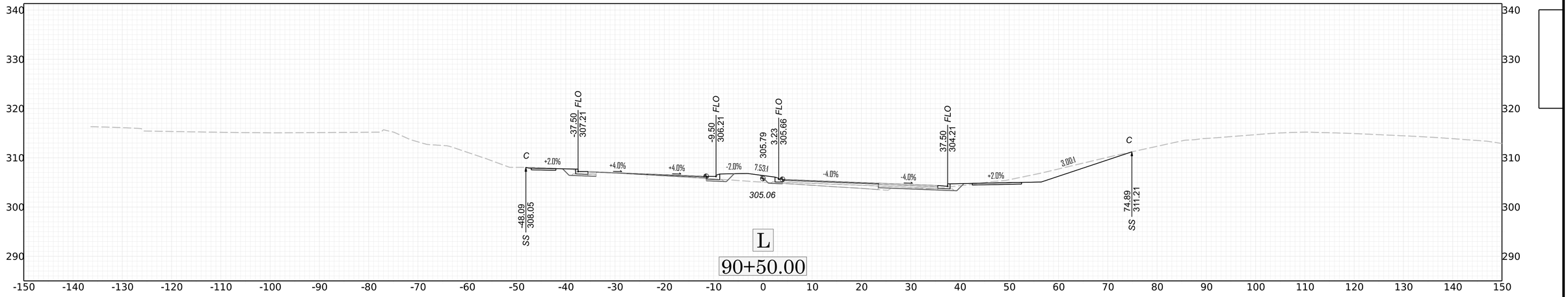

-48.69
315.68
SS
2.02:1
+3.0%
-38.66
315.19
FLO
+4.0%
+4.0%
-9.50
314.21
FLO
-2.0%
313.79
8.36:1
313.02
10.75
313.36
FLO
-4.0%
-4.0%
37.50
312.21
FLO
+2.0%
3.00:1
C
83.45
322.06
SS
F
L
88+00.00

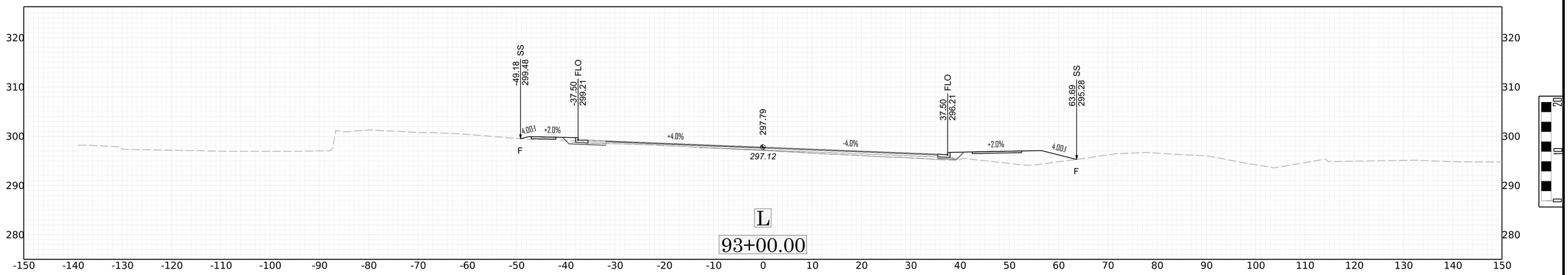
X-62

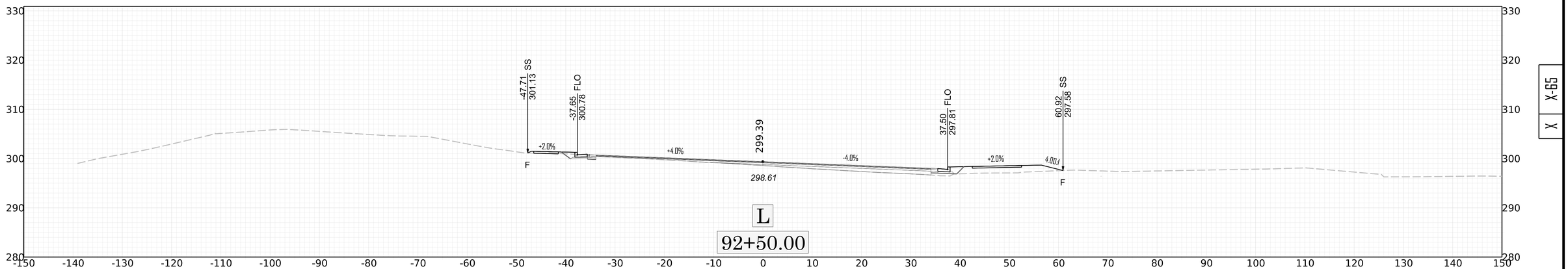

C
4.00:1
+2.0%
-37.50
308.81
FLO
+4.0%
+4.0%
-9.50
307.81
FLO
-2.0%
307.39
8.36:1
10.75
306.96
FLO
-4.0%
-4.0%
+6.0%
53.90
306.91
FLO
+6.6%
5.15:1
66.06
308.58
SS
C
-48.35
309.71
SS
306.58
L
90+00.00
309.13
307.20
-49.24
310.58
SS
-37.47
309.45
-9.47
308.45
10.78
307.60
+5.0%
+7.4%
308.99
308.14
-48.90
311.45
-37.50
310.41
-9.50
309.41
10.75
308.56
75.85
313.12
+2.0%
4.00:1

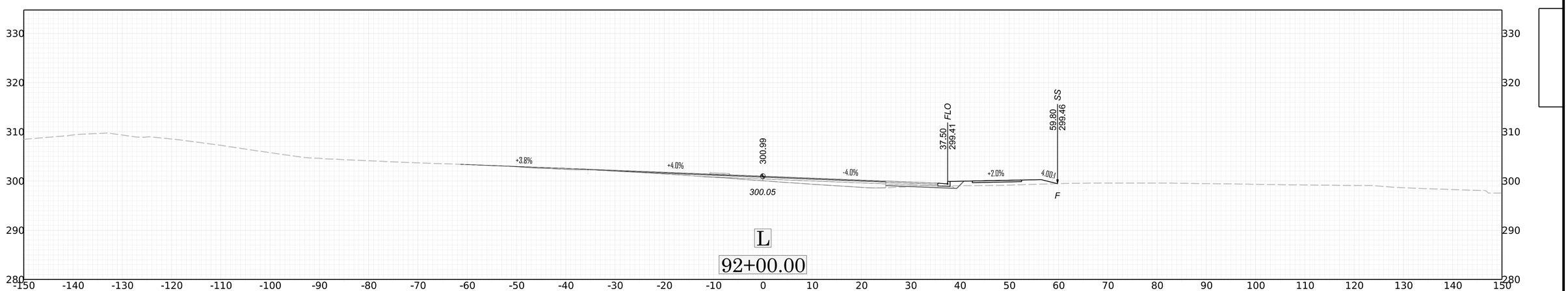

SS
-51.02
304.68
FLO
-44.87
304.14
+0.4%
F
+4.0%
302.59
-4.0%
-2.8%
301.70
L
91+50.00


C
+2.0%
-37.50
305.61
FLO
+4.0%
304.19
-4.0%
40.06
302.49
FLO
-4.9%
-0.8%
4.5%
53.01
302.82
SS
303.40
F
SS
-47.51
306.30
L
91+00.00

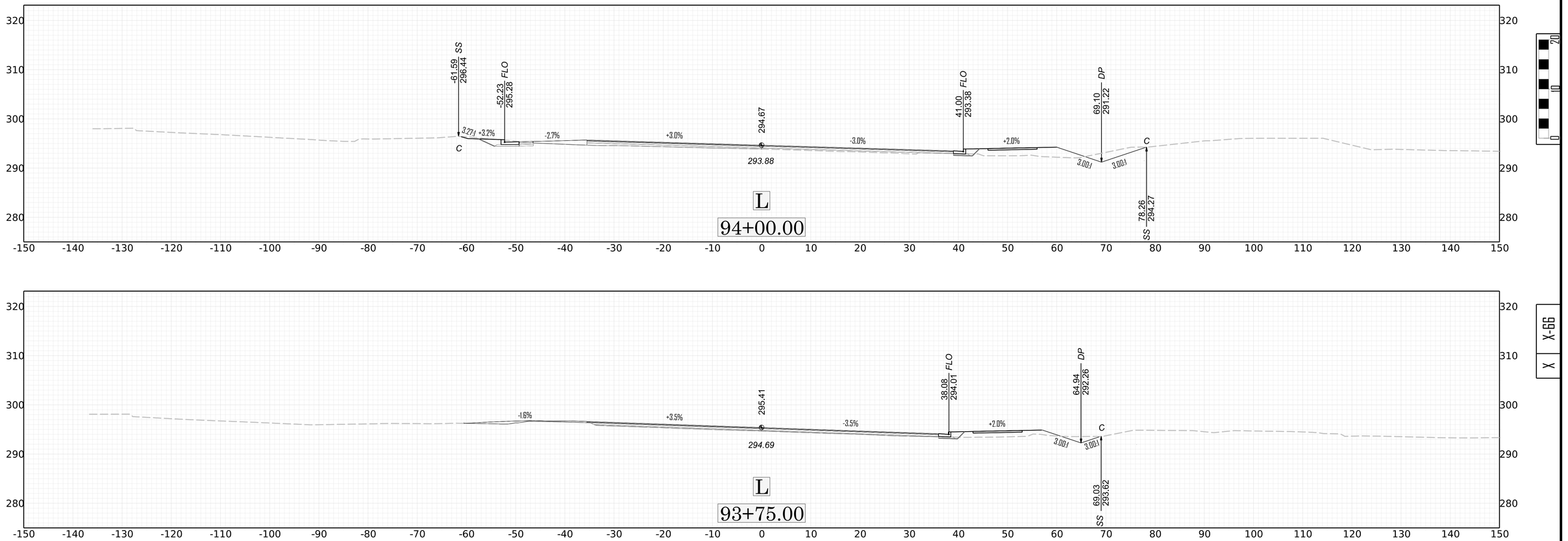

C
+2.0%
-37.50
307.21
FLO
+4.0%
+4.0%
-9.50
306.21
FLO
-2.0%
7.53:1
305.79
3.23
305.66
FLO
-4.0%
-4.0%
37.50
304.21
FLO
+2.0%
3.00:1
C
305.06
SS
-48.09
308.05
L
90+50.00
SS
74.89
311.21

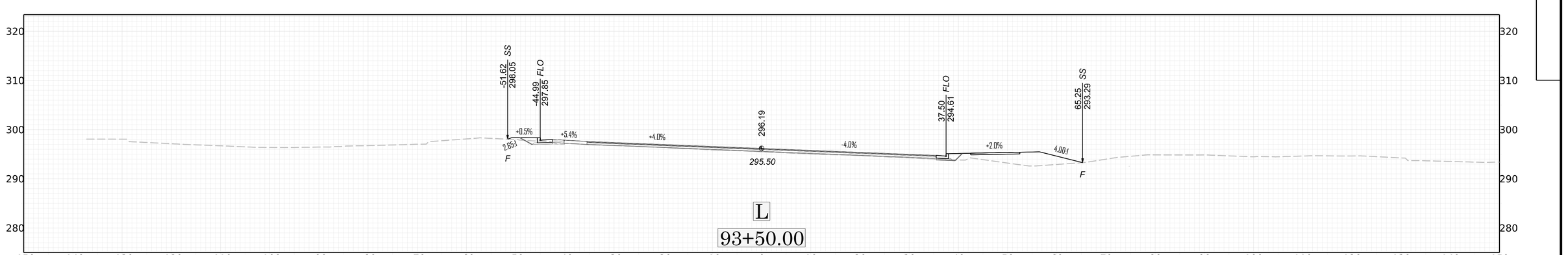

-49.18
299.48
SS
-37.50
299.21
FLO
37.50
296.21
FLO
63.69
295.28
SS
297.79
297.12
4.00:1
+2.0%
+4.0%
-4.0%
+2.0%
4.00:1
F
F
L
93+00.00


-47.71
301.13
SS
-37.65
300.78
FLO
37.50
297.81
FLO
60.92
297.58
SS
299.39
298.61
+2.0%
+4.0%
-4.0%
+2.0%
4.00:1
F
F
L
92+50.00


37.50
299.41
FLO
59.80
299.46
SS
300.99
300.05
+3.8%
+4.0%
-4.0%
+2.0%
4.00:1
F
L
92+00.00

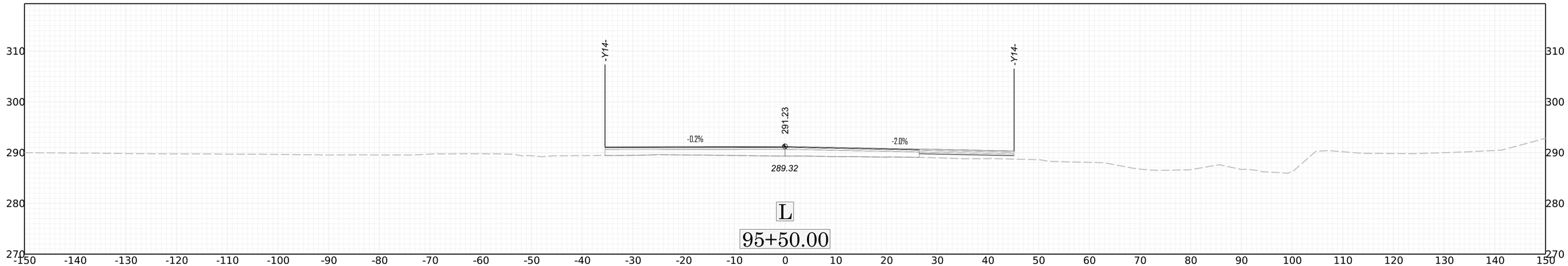
11/14/23

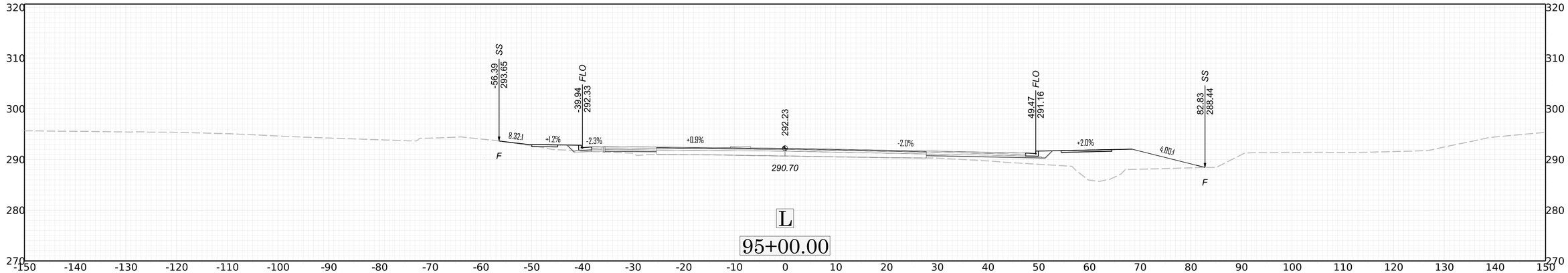


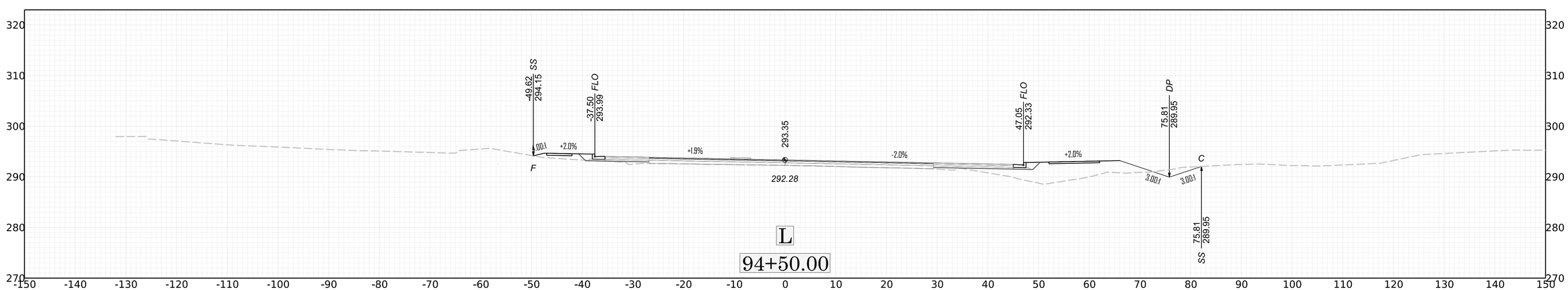


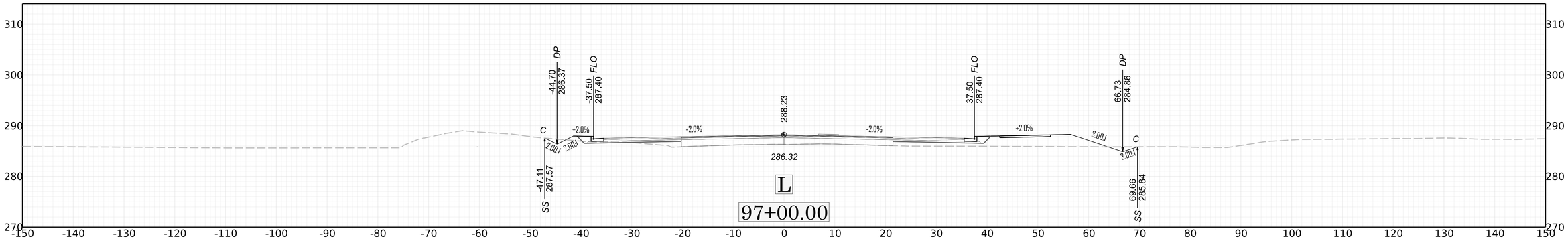
X-66

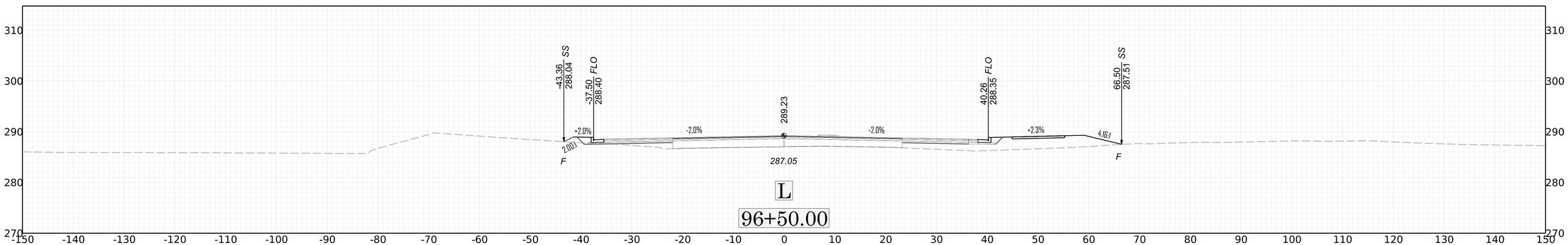
$$$-USER NAME-$$$ - $$$-DATE-$$$

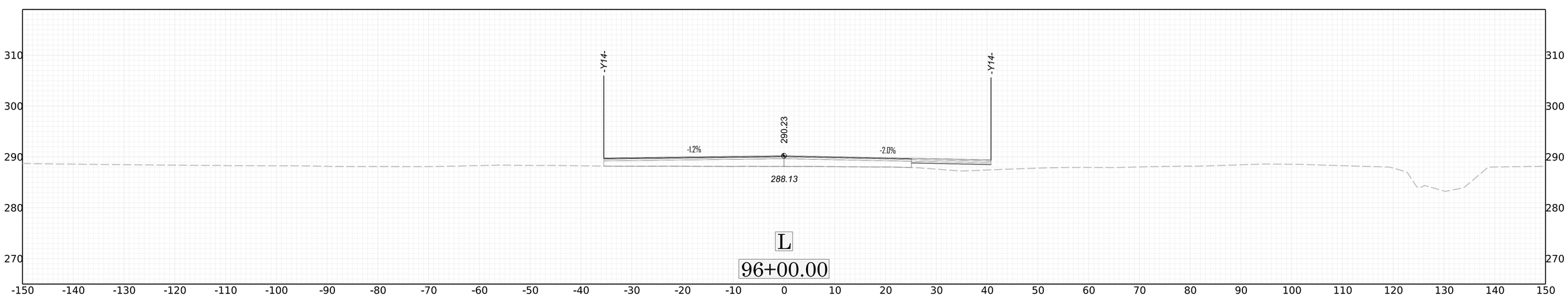

-Y14-
-Y14-
291.23
-0.2%
-2.0%
289.32
L
95+50.00


56.39
293.65
SS
39.94
292.33
FLO
49.47
291.16
FLO
82.83
288.44
SS
8.32:1
+1.2%
-2.3%
+0.9%
292.23
-2.0%
+2.0%
4.00:1
F
290.70
F
L
95+00.00

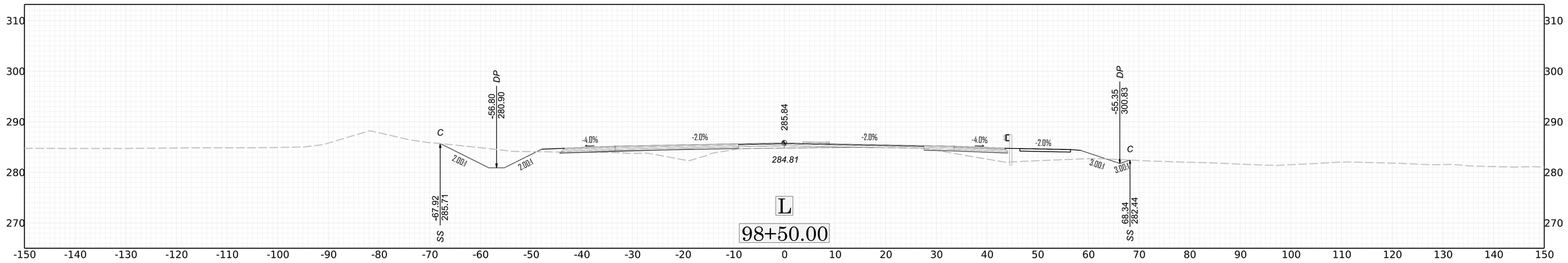

49.62
294.15
SS
37.50
293.99
FLO
47.05
292.33
FLO
75.81
289.95
DP
4.00:1
+2.0%
+1.9%
293.35
-2.0%
+2.0%
3.00:1
3.00:1
C
F
292.28
75.81
289.95
SS
L
94+50.00

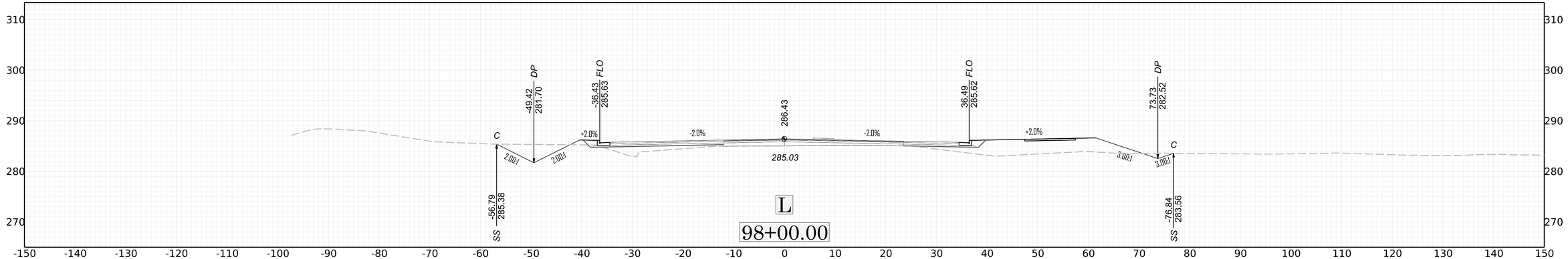

-44.70
286.37
DP
-37.50
287.40
FLO
288.23
37.50
287.40
FLO
66.73
284.86
DP
C
+2.0%
-2.0%
-2.0%
+2.0%
3.00:1
2.00:1
2.00:1
3.00:1
C
286.32
-47.11
287.57
SS
69.66
285.84
SS
L
97+00.00
310
300
290
280
270
-150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
20
10
0

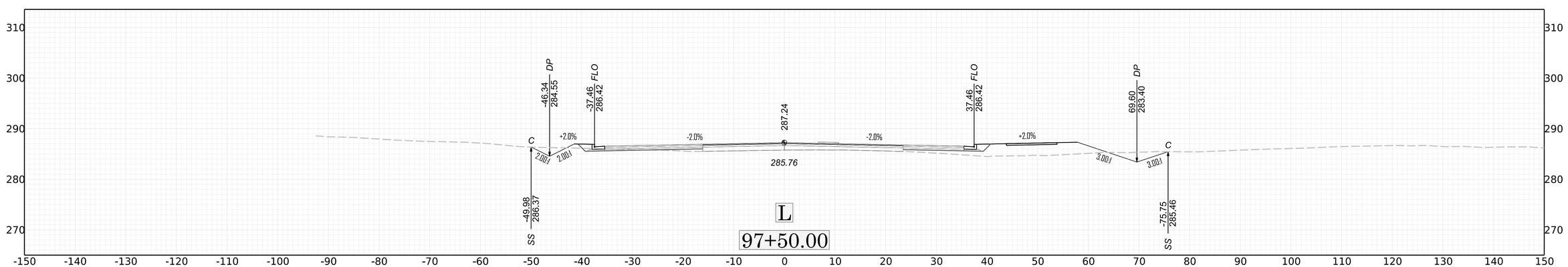

-43.36
288.04
SS
-37.50
288.40
FLO
289.23
40.26
288.35
FLO
66.50
287.51
SS
+2.0%
-2.0%
-2.0%
+2.3%
2.00:1
4.16:1
F
F
287.05
L
96+50.00
310
300
290
280
270
-150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
X-68
X

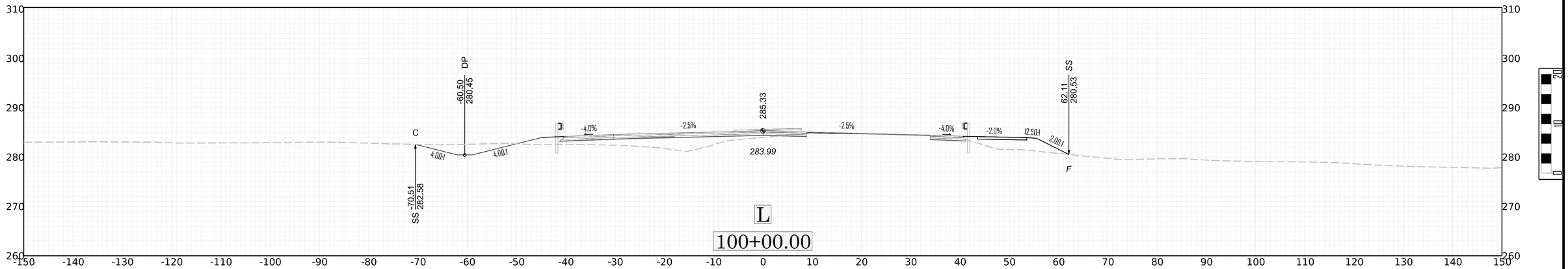

-Y14-
290.23
-Y14-
-1.2%
-2.0%
288.13
L
96+00.00
310
300
290
280
270
-150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

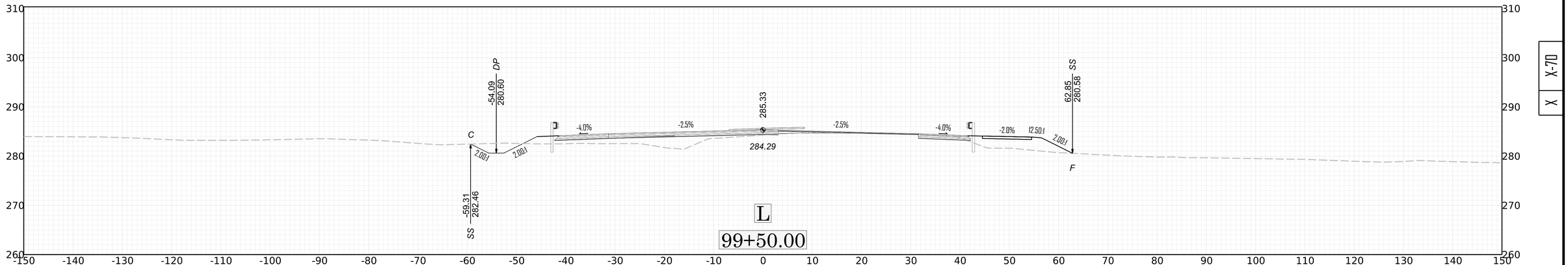
11/14/23

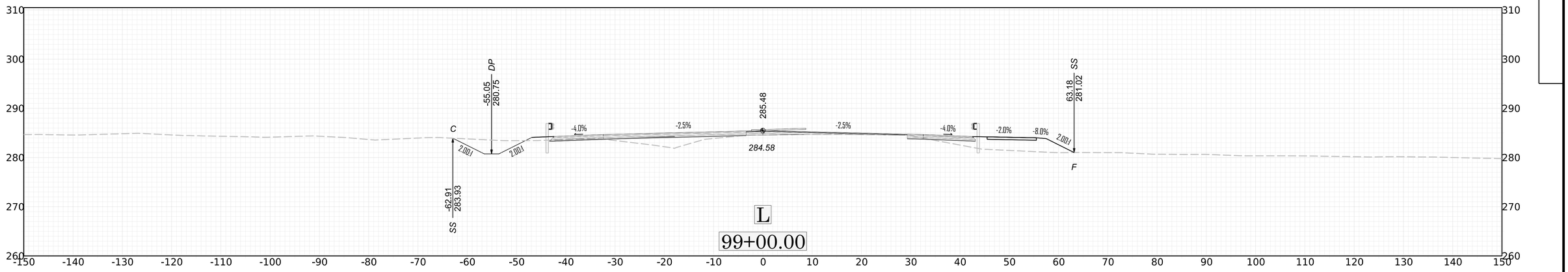

310
300
290
280
270
-150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
C
DP
-56.80
280.90
-67.92
285.71
SS
2.00:1
2.00:1
-4.0%
-2.0%
285.84
284.81
-2.0%
-4.0%
C
-2.0%
DP
-55.35
300.83
C
3.00:1
3.00:1
68.34
282.44
SS
L
98+50.00

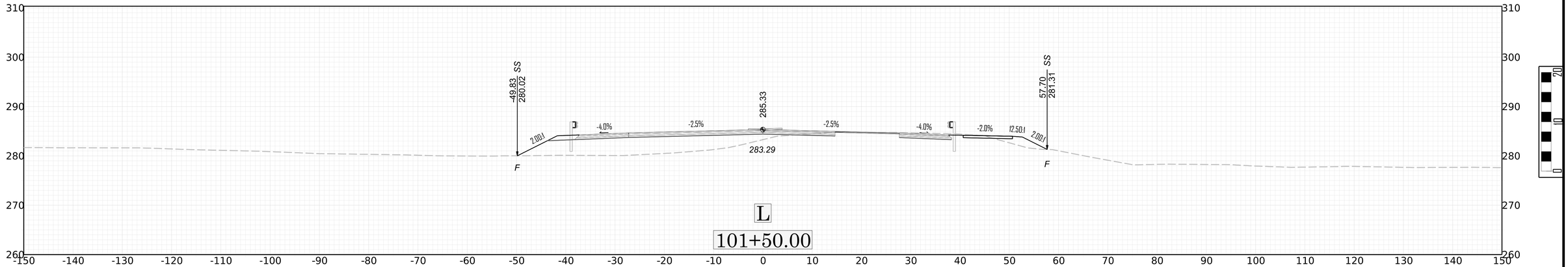

310
300
290
280
270
-150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
DP
-49.42
281.70
FLO
-36.43
285.63
C
+2.0%
-2.0%
286.43
-2.0%
FLO
36.49
285.62
+2.0%
DP
73.73
282.52
C
2.00:1
2.00:1
285.03
3.00:1
3.00:1
-56.79
285.38
SS
-76.84
283.56
SS
L
98+00.00

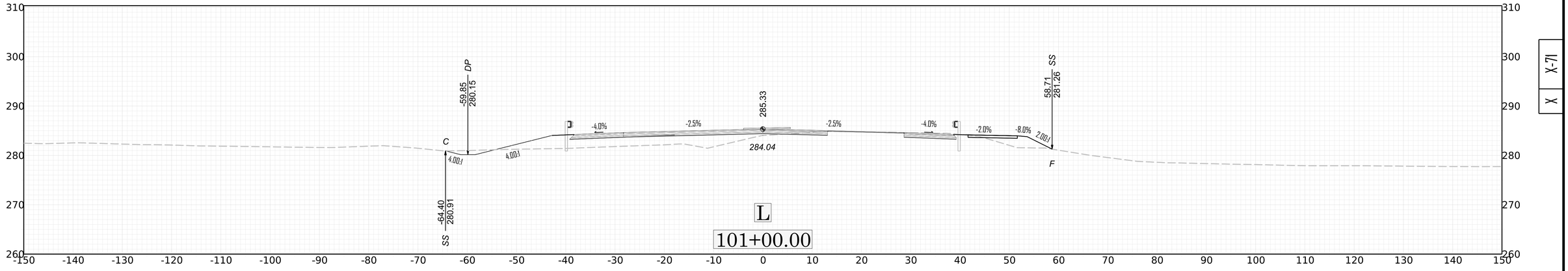

310
300
290
280
270
-150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
DP
-46.34
284.55
FLO
-37.46
286.42
C
+2.0%
-2.0%
287.24
-2.0%
FLO
37.46
286.42
+2.0%
DP
69.60
283.40
C
2.00:1
2.00:1
285.76
3.00:1
3.00:1
-49.98
286.37
SS
-75.75
285.46
SS
L
97+50.00

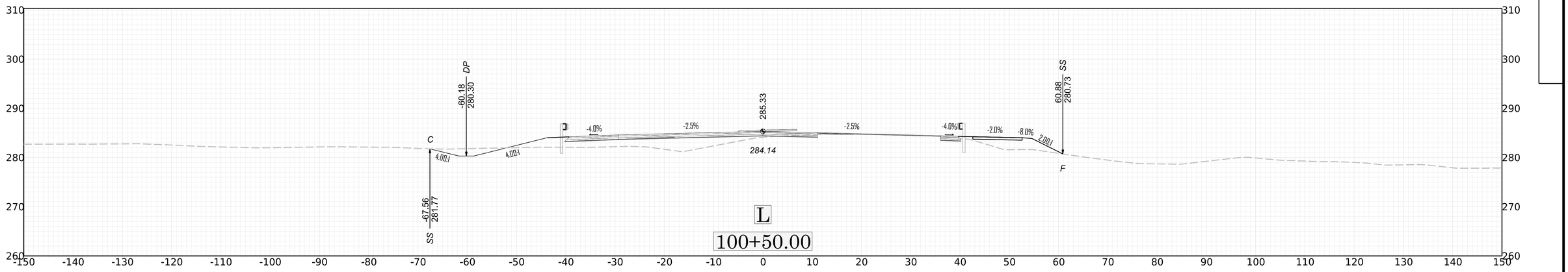

C
DP
-60.50
280.45
SS
-70.51
282.58
4.00:1
4.00:1
-4.0%
-2.5%
285.33
283.99
-2.5%
-4.0%
-2.0%
12.50:1
2.00:1
SS
62.11
280.53
F
L
100+00.00

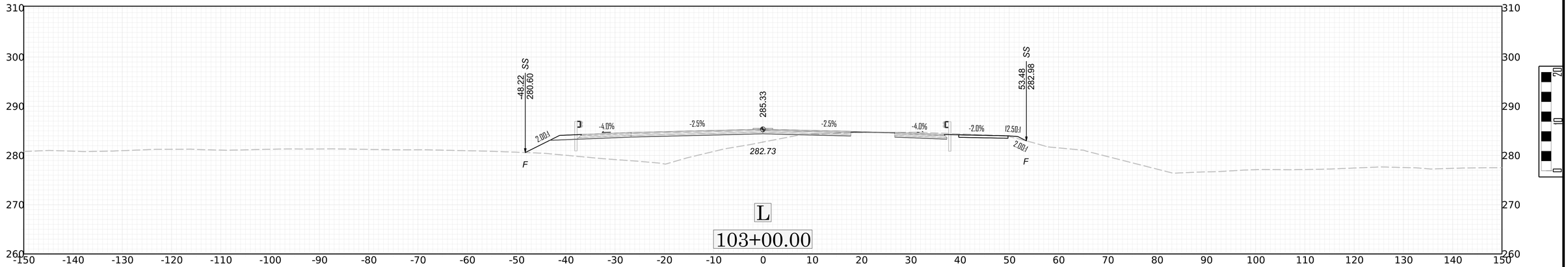

C
DP
-54.09
280.60
SS
-59.31
282.46
2.00:1
2.00:1
-4.0%
-2.5%
285.33
284.29
-2.5%
-4.0%
-2.0%
12.50:1
2.00:1
SS
62.85
280.58
F
L
99+50.00

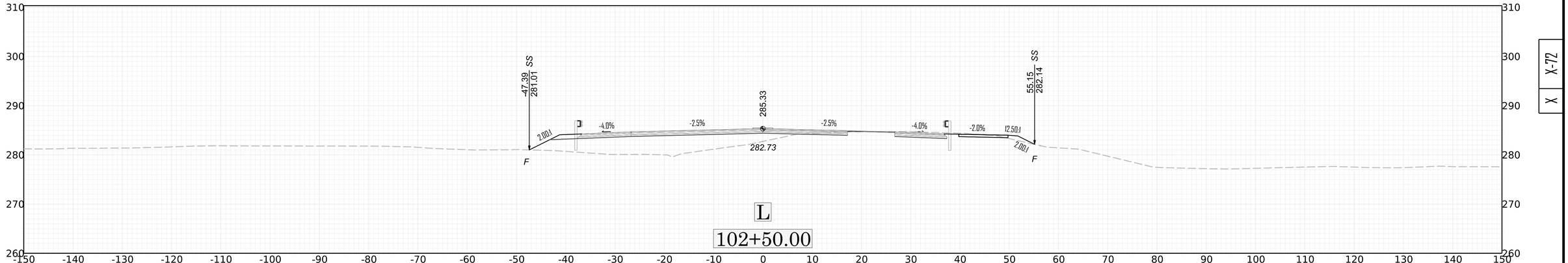

C
DP
-55.05
280.75
SS
-62.91
283.93
2.00:1
2.00:1
-4.0%
-2.5%
285.48
284.58
-2.5%
-4.0%
-2.0%
-8.0%
2.00:1
SS
63.18
281.02
F
L
99+00.00

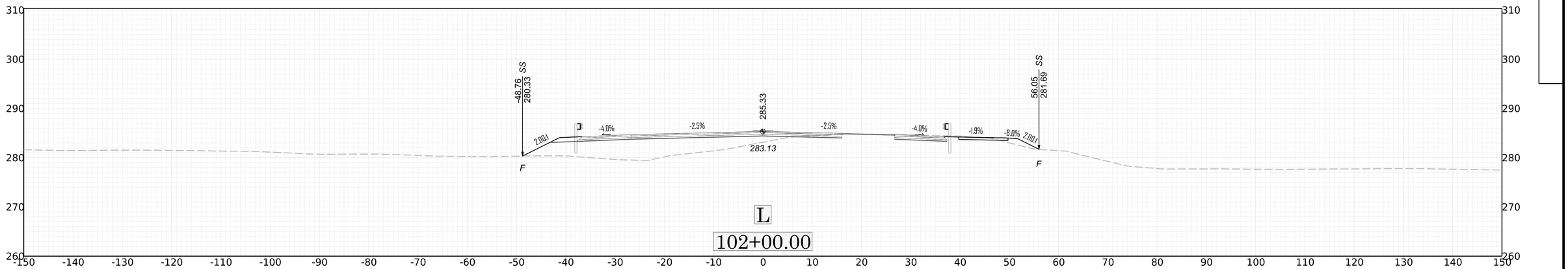

-49.83
280.02
SS
2.00:1
-4.0%
-2.5%
285.33
283.29
-2.5%
-4.0%
-2.0%
12.50:1
2.00:1
57.70
281.31
SS
F
F
L
101+50.00

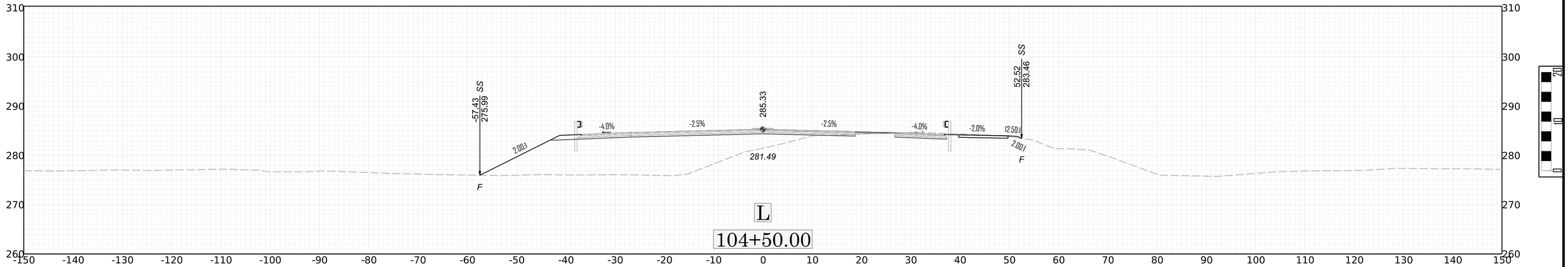

DP
-59.95
280.15
C
4.00:1
4.00:1
-4.0%
-2.5%
285.33
284.04
-2.5%
-4.0%
-2.0%
-8.0%
2.00:1
58.71
281.26
SS
-64.40
280.91
SS
F
L
101+00.00

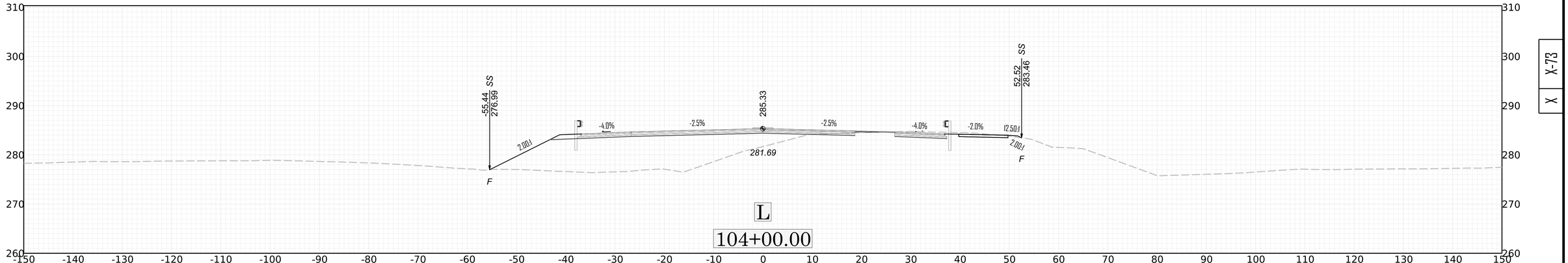

DP
-60.18
280.30
C
4.00:1
4.00:1
-4.0%
-2.5%
285.33
284.14
-2.5%
-4.0%
-2.0%
-8.0%
2.00:1
60.88
280.73
SS
-67.56
281.77
SS
F
L
100+50.00

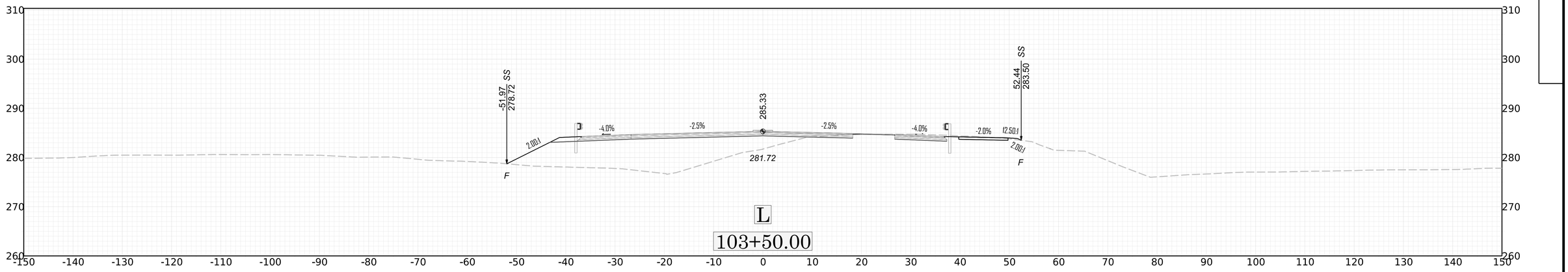

310
300
290
280
270
260
-150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
-48.22
280.60
SS
53.48
282.98
SS
285.33
282.73
-4.0%
-2.5%
-2.5%
-4.0%
-2.0%
2.00:1
12.50:1
2.00:1
F
F
L
103+00.00


310
300
290
280
270
260
-150 -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
-47.39
281.01
SS
55.15
282.14
SS
285.33
282.73
-4.0%
-2.5%
-2.5%
-4.0%
-2.0%
2.00:1
12.50:1
2.00:1
F
F
L
102+50.00

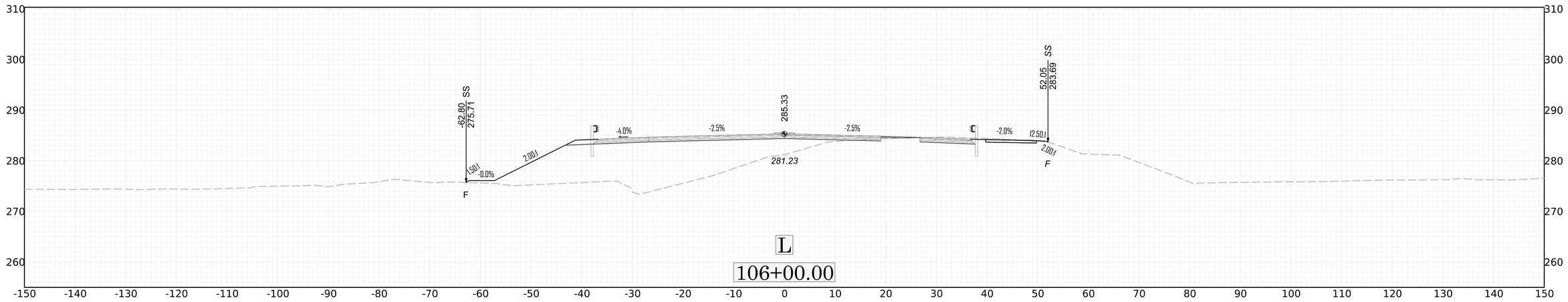

310
300
290
280
270
260
-150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
-48.76
280.33
SS
56.05
281.69
SS
285.33
283.13
-4.0%
-2.5%
-2.5%
-4.0%
-1.9%
-8.0%
2.00:1
2.00:1
F
F
L
102+00.00

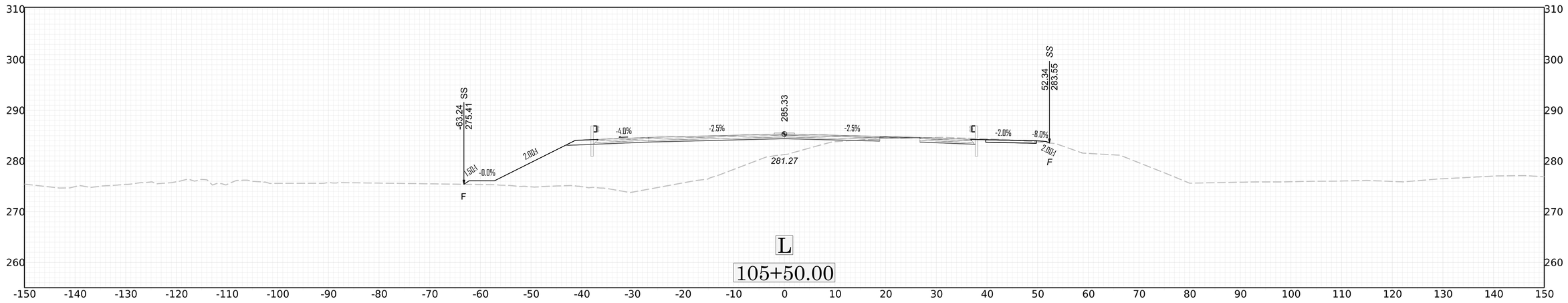

310
300
290
280
270
260
-150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
-57.43
275.99
SS
2.00:1
-4.0%
-2.5%
285.33
-2.5%
-4.0%
-2.0%
12.50:1
52.52
283.46
SS
2.00:1
F
281.49
F
L
104+50.00

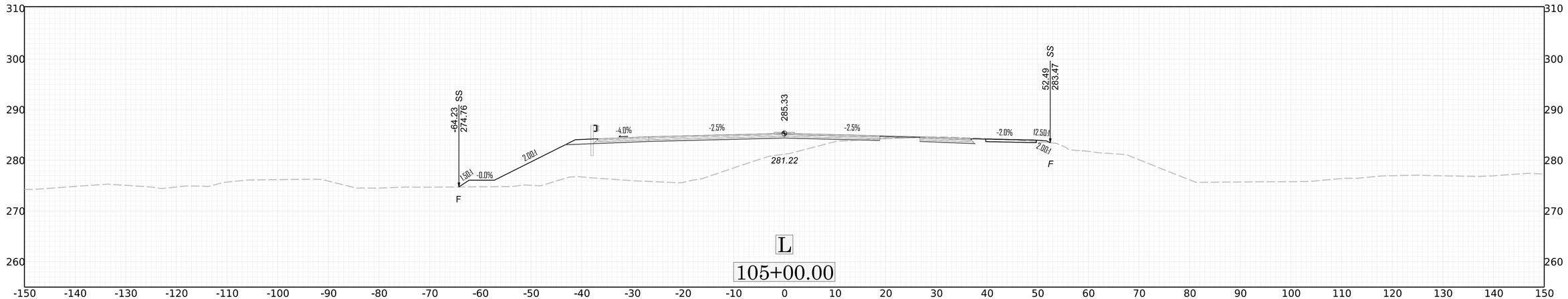

310
300
290
280
270
260
-150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
-55.44
276.99
SS
2.00:1
-4.0%
-2.5%
285.33
-2.5%
-4.0%
-2.0%
12.50:1
52.52
283.46
SS
2.00:1
F
281.69
F
L
104+00.00

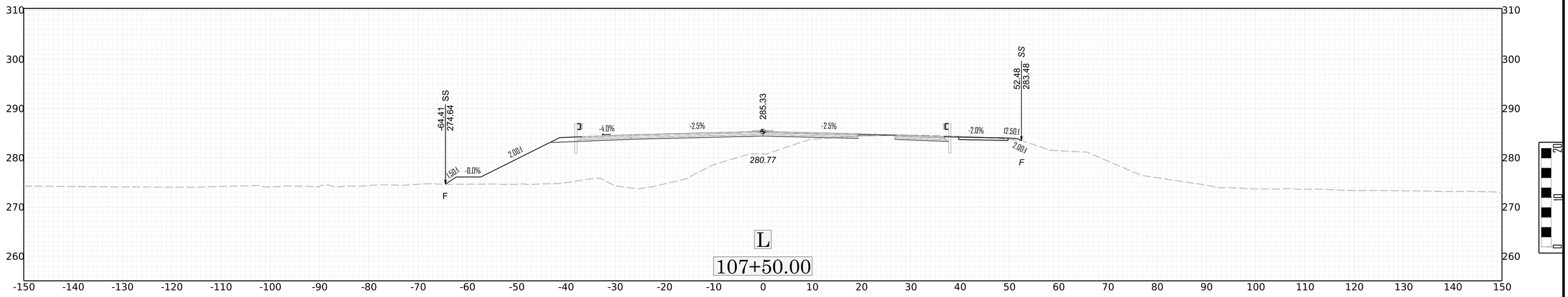

310
300
290
280
270
260
-150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
-51.97
278.72
SS
2.00:1
-4.0%
-2.5%
285.33
-2.5%
-4.0%
-2.0%
12.50:1
52.44
283.50
SS
2.00:1
F
281.72
F
L
103+50.00

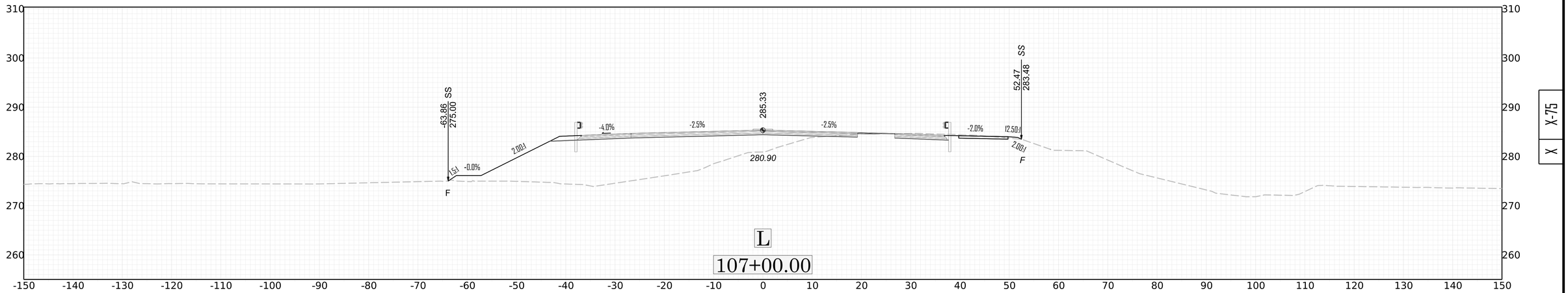
X-73

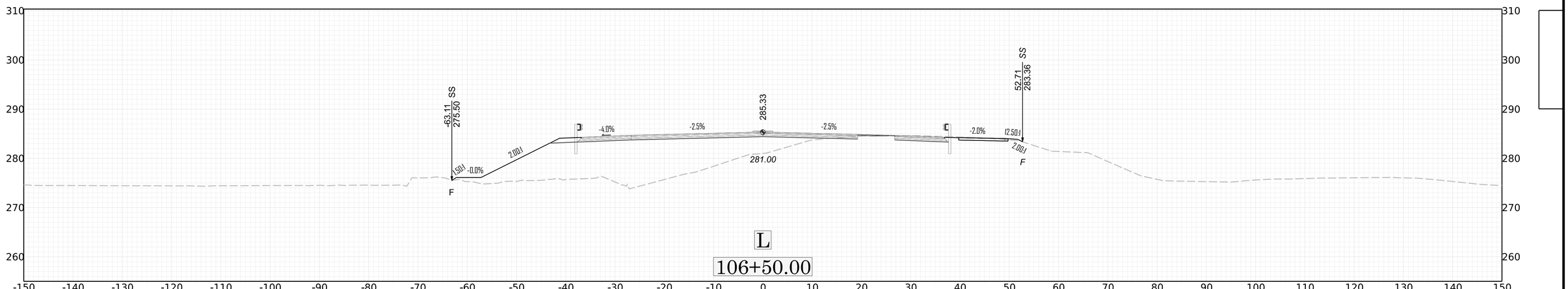

-62.80
275.71
SS
285.33
52.05
283.69
SS
-4.0%
-2.5%
-2.5%
-2.0%
12.50:1
2.00:1
1.50:1
-0.0%
2.00:1
2.00:1
281.23
F
F
L
106+00.00

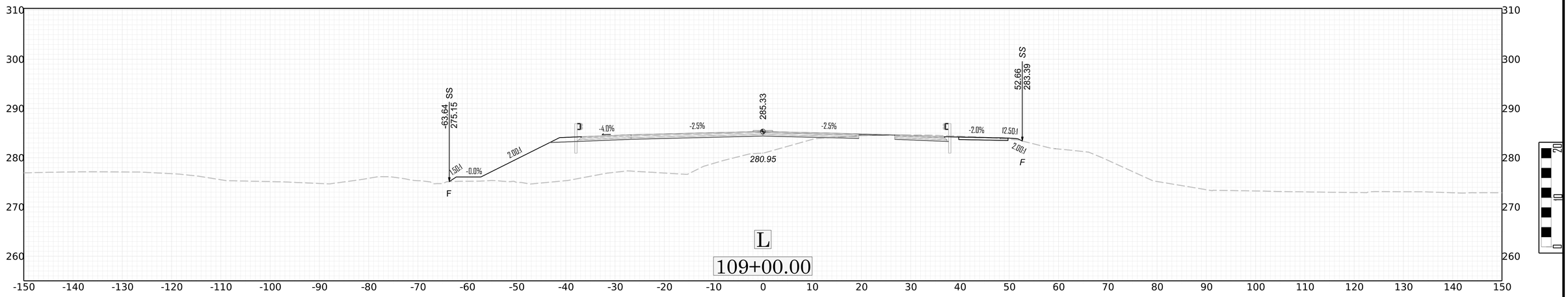

-63.24
275.41
SS
285.33
52.34
283.55
SS
-4.0%
-2.5%
-2.5%
-2.0%
-8.0%
2.00:1
1.50:1
-0.0%
2.00:1
2.00:1
281.27
F
F
L
105+50.00

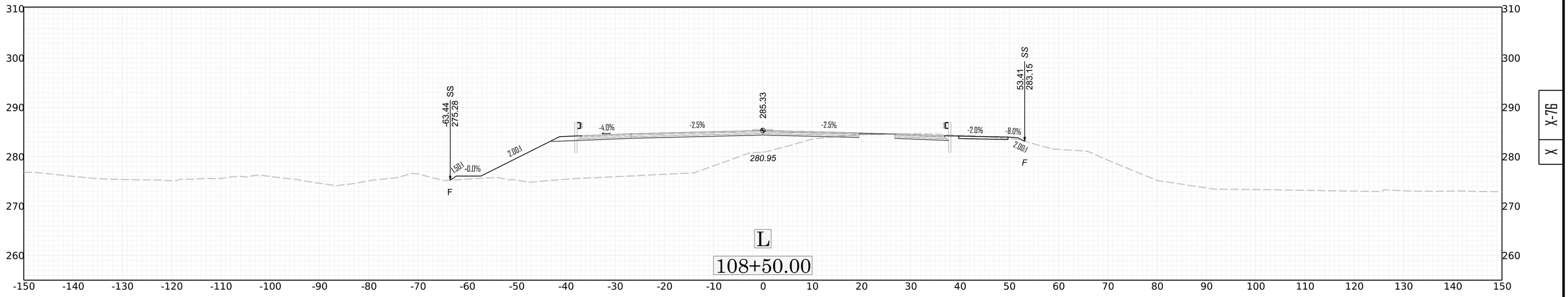

-64.23
274.76
SS
285.33
52.49
283.47
SS
-4.0%
-2.5%
-2.5%
-2.0%
12.50:1
2.00:1
1.50:1
-0.0%
2.00:1
2.00:1
281.22
F
F
L
105+00.00

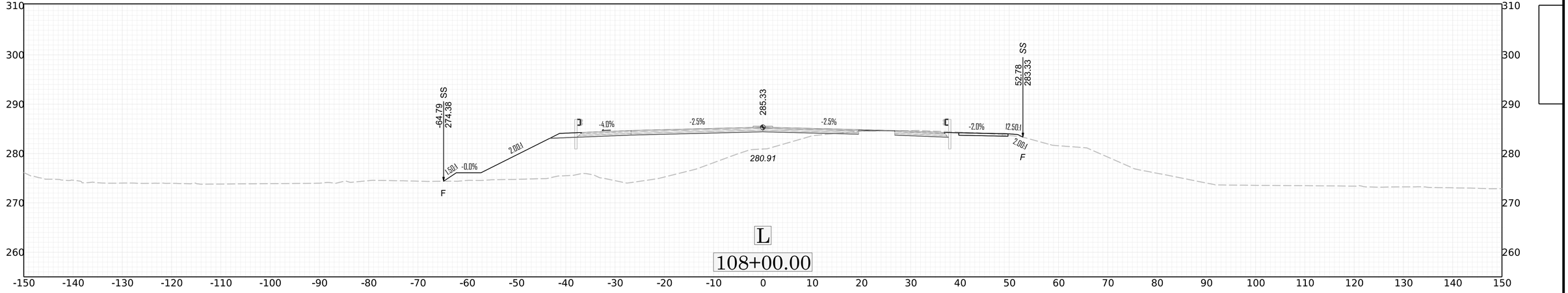

-64.41 SS
274.64
2.00:1
-0.0%
1.50:1
F
-4.0%
-2.5%
285.33
-2.5%
280.77
-2.0%
12.50:1
2.00:1
F
52.48 SS
283.48
L
107+50.00

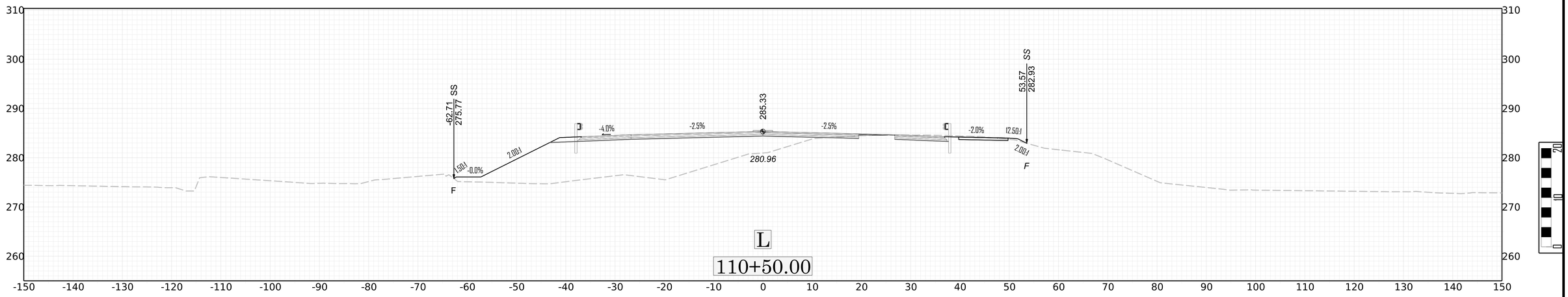

-63.86 SS
275.00
2.00:1
-0.0%
1.5:1
F
-4.0%
-2.5%
285.33
-2.5%
280.90
-2.0%
12.50:1
2.00:1
F
52.47 SS
283.48
L
107+00.00

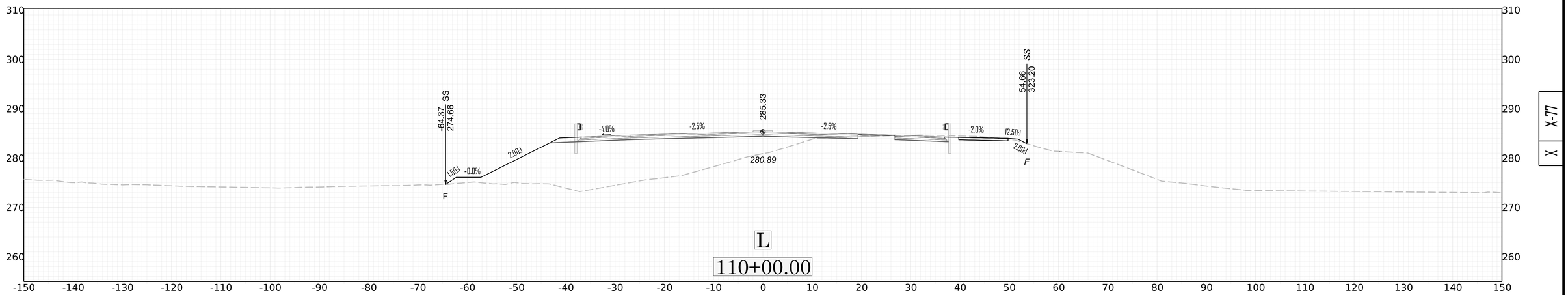

-63.11 SS
275.50
2.00:1
-0.0%
1.50:1
F
-4.0%
-2.5%
285.33
-2.5%
281.00
-2.0%
12.50:1
2.00:1
F
52.71 SS
283.36
L
106+50.00

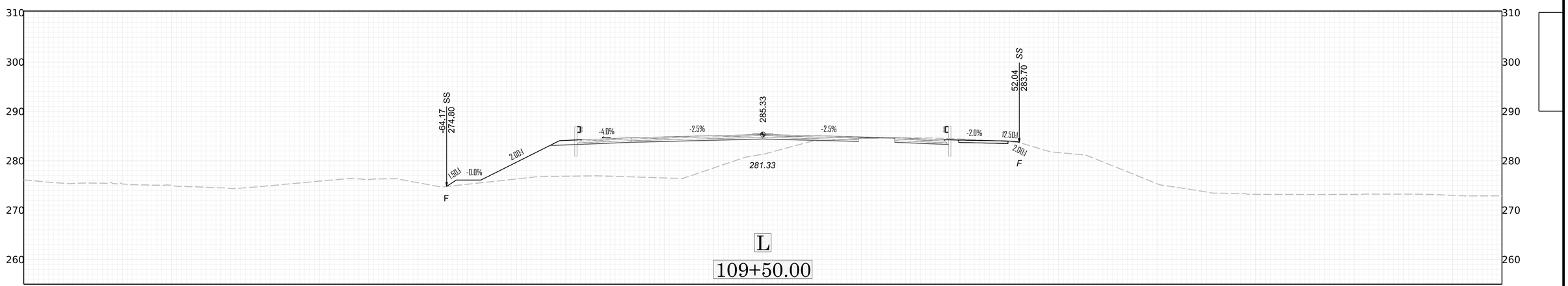

-63.64
275.15
SS
1.50:1
-0.0%
2.00:1
-4.0%
-2.5%
285.33
-2.5%
-2.0%
12.50:1
52.66
283.39
SS
2.00:1
F
280.95
F
L
109+00.00

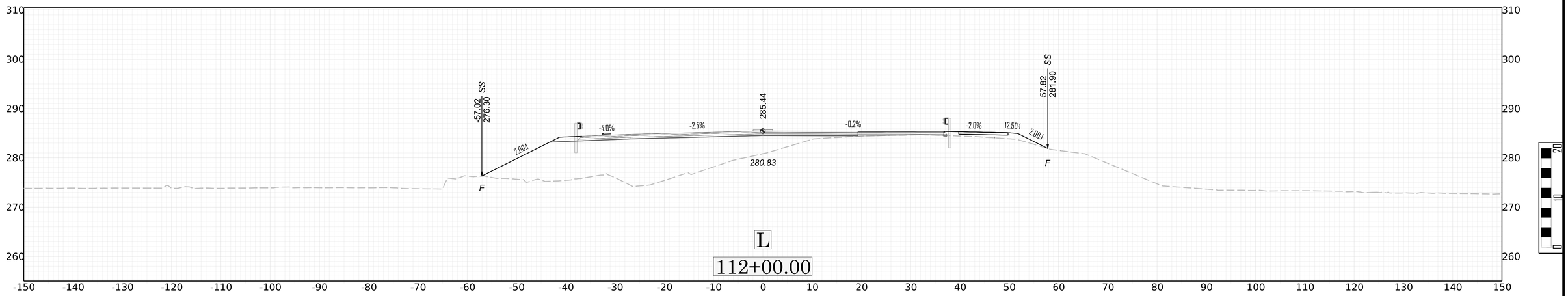

-63.44
275.28
SS
1.50:1
-0.0%
2.00:1
-4.0%
-2.5%
285.33
-2.5%
-2.0%
-8.0%
53.41
283.15
SS
2.00:1
F
280.95
F
L
108+50.00

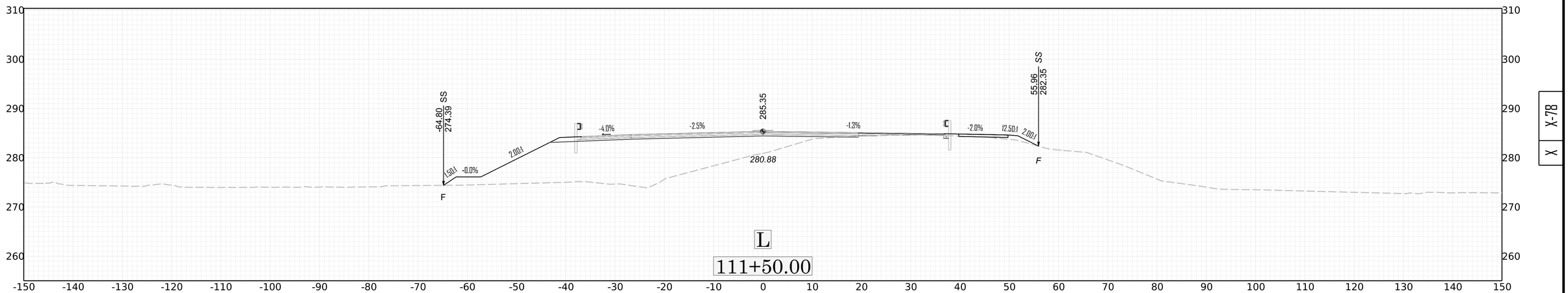

-64.79
274.38
SS
1.50:1
-0.0%
2.00:1
-4.0%
-2.5%
285.33
-2.5%
-2.0%
12.50:1
52.78
283.33
SS
2.00:1
F
280.91
F
L
108+00.00

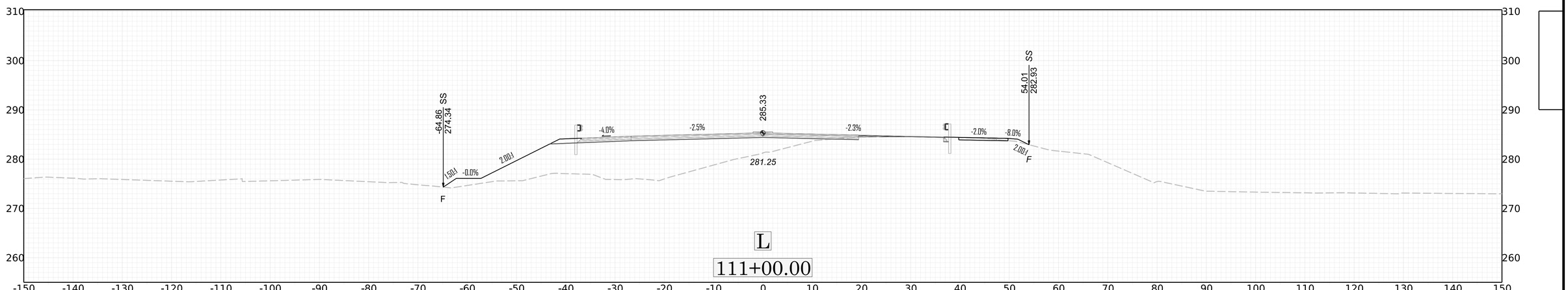

-62.71
275.77
SS
1.50:1
-0.0%
2.00:1
-4.0%
-2.5%
285.33
-2.5%
-2.0%
12.50:1
53.57
282.93
SS
2.00:1
F
280.96
F
L
110+50.00

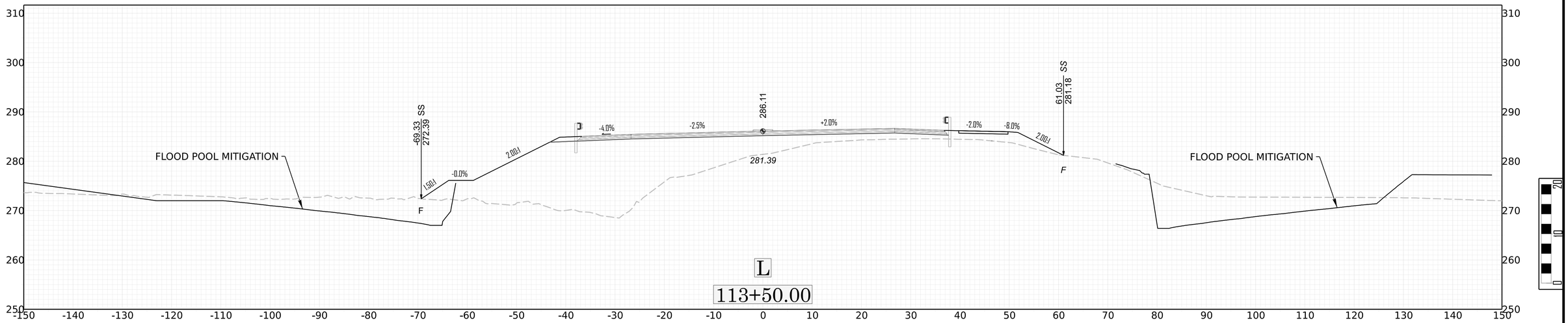

-64.37
274.66
SS
1.50:1
-0.0%
2.00:1
-4.0%
-2.5%
285.33
-2.5%
-2.0%
12.50:1
54.66
323.20
SS
2.00:1
F
280.89
F
L
110+00.00

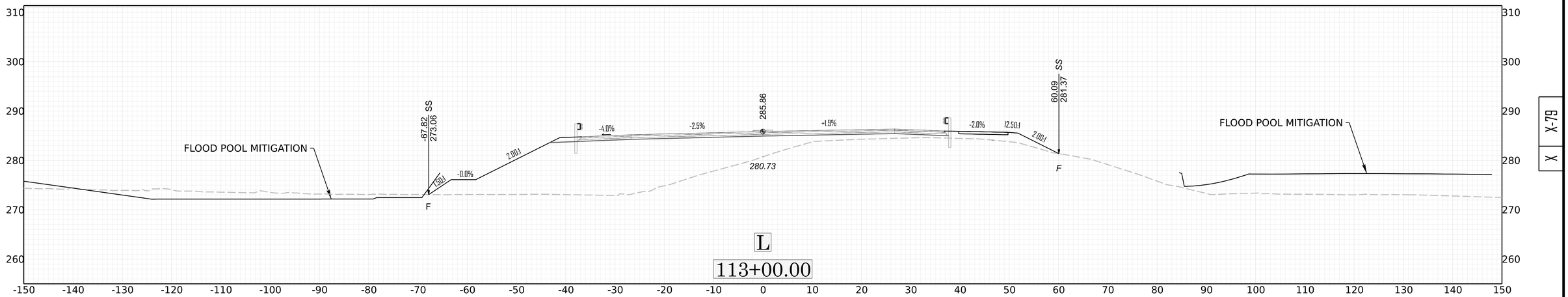

-64.17
274.80
SS
1.50:1
-0.0%
2.00:1
-4.0%
-2.5%
285.33
-2.5%
-2.0%
12.50:1
52.04
283.70
SS
2.00:1
F
281.33
F
L
109+50.00

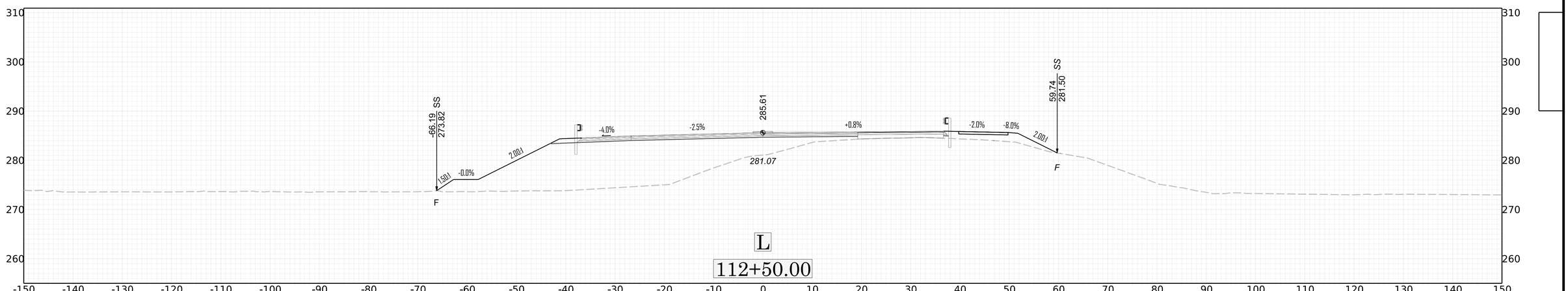

310
300
290
280
270
260
-150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
-57.02
276.30
SS
F
2.00:1
-4.0%
-2.5%
285.44
280.83
-0.2%
-2.0%
12.50:1
2.00:1
57.82
281.90
SS
F
L
112+00.00

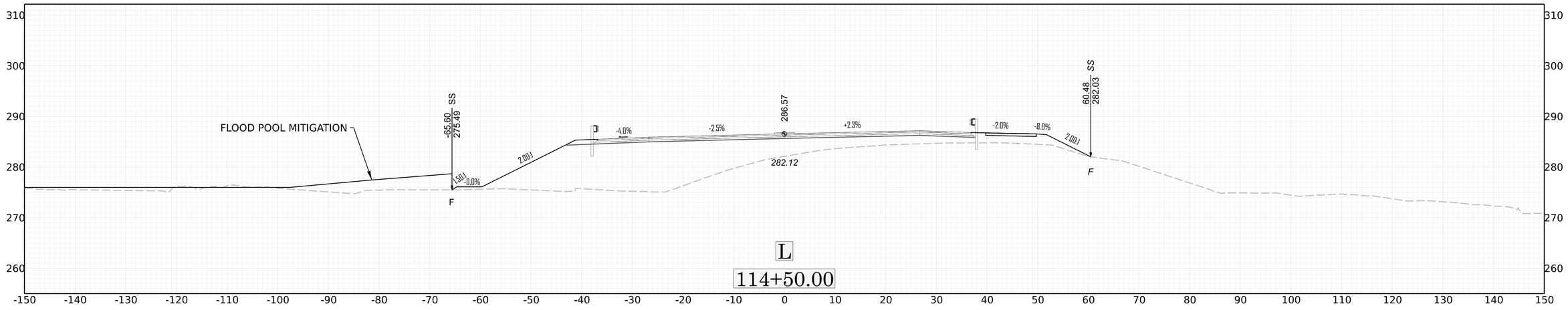

310
300
290
280
270
260
-150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
-64.80
274.39
SS
F
1.50:1
-0.0%
2.00:1
-4.0%
-2.5%
285.35
280.88
-1.3%
-2.0%
12.50:1
2.00:1
55.96
282.35
SS
F
L
111+50.00

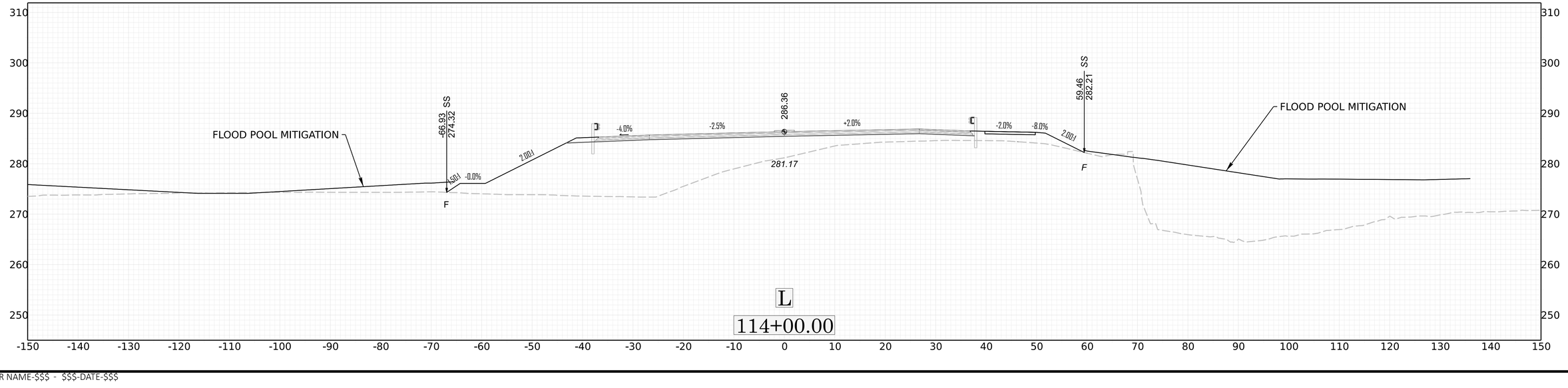

310
300
290
280
270
260
-150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
-64.86
274.34
SS
F
1.50:1
-0.0%
2.00:1
-4.0%
-2.5%
285.33
281.25
-2.3%
-2.0%
-8.0%
2.00:1
54.01
282.93
SS
F
L
111+00.00

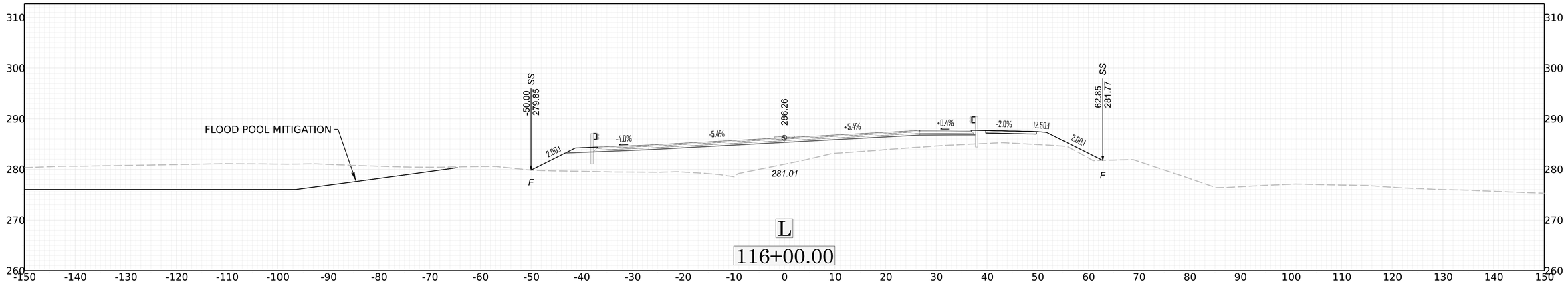

FLOOD POOL MITIGATION
-69.33
272.39
SS
1.50:1
-0.0%
2.00:1
-4.0%
-2.5%
286.11
+2.0%
-2.0%
-8.0%
2.00:1
61.03
281.18
SS
281.39
F
FLOOD POOL MITIGATION
L
113+50.00

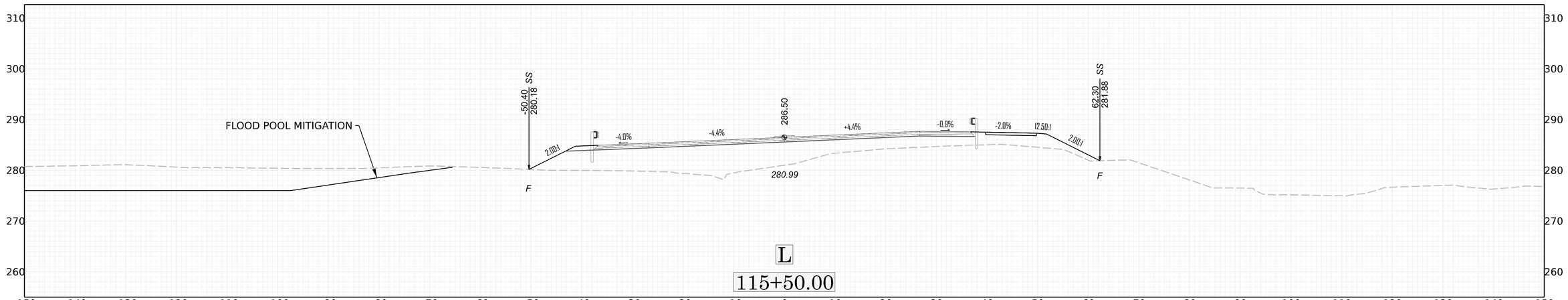

FLOOD POOL MITIGATION
-67.82
273.06
SS
1.50:1
-0.0%
2.00:1
-4.0%
-2.5%
285.86
+1.9%
-2.0%
12.50:1
2.00:1
60.09
281.37
SS
280.73
F
FLOOD POOL MITIGATION
L
113+00.00

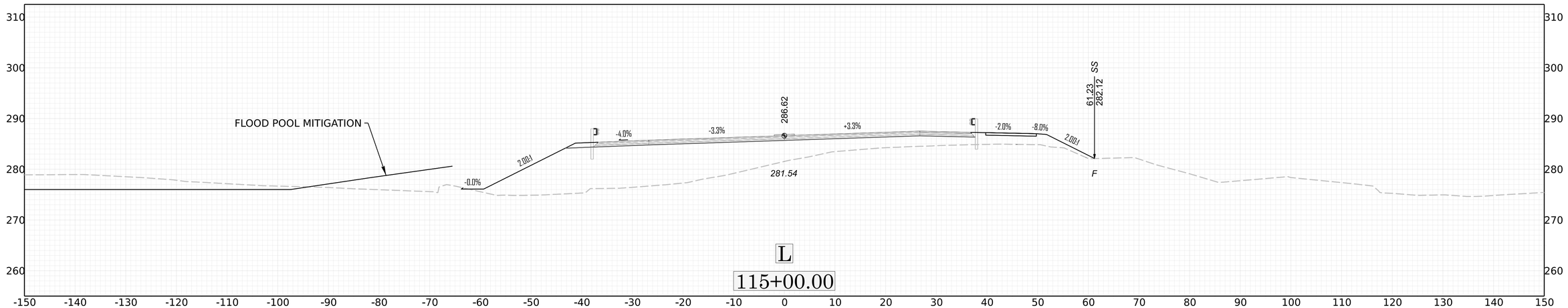

-66.19
273.82
SS
1.50:1
-0.0%
2.00:1
-4.0%
-2.5%
285.61
+0.8%
-2.0%
-8.0%
2.00:1
59.74
281.50
SS
281.07
F
L
112+50.00

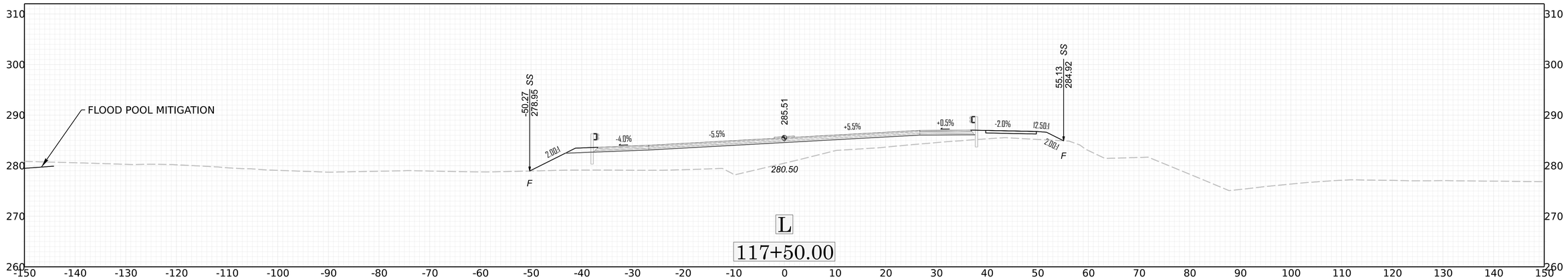

FLOOD POOL MITIGATION
65.60
275.49
SS
150.1
-0.0%
2.00:1
-4.0%
-2.5%
286.57
+2.3%
-2.0%
-8.0%
2.00:1
60.48
282.03
SS
282.12
F
F
L
114+50.00

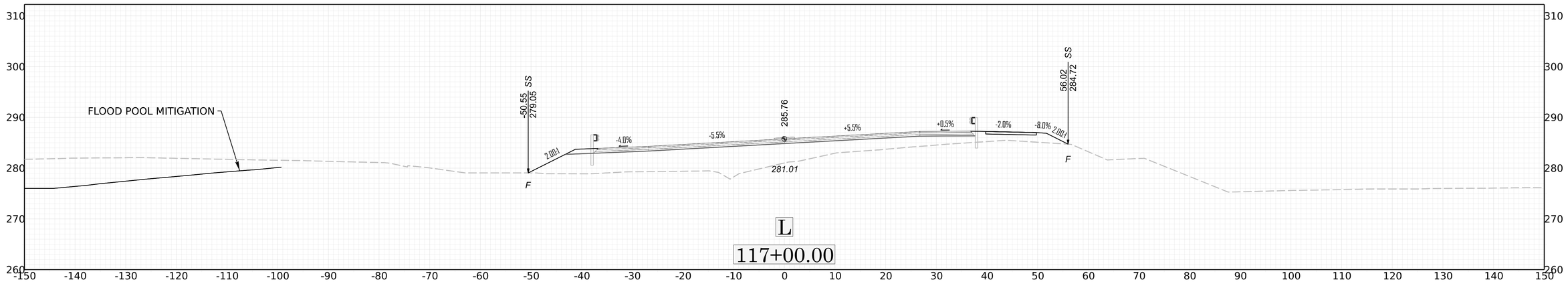

FLOOD POOL MITIGATION
66.93
274.32
SS
150.1
-0.0%
2.00:1
-4.0%
-2.5%
286.36
+2.0%
-2.0%
-8.0%
2.00:1
59.46
282.21
SS
281.17
F
F
FLOOD POOL MITIGATION
L
114+00.00

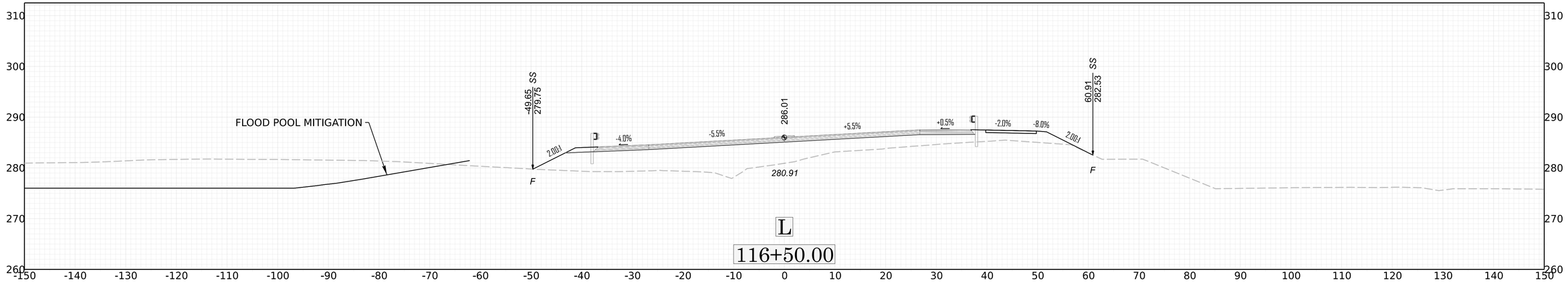

FLOOD POOL MITIGATION
-50.00
279.85
SS
2.00:1
-4.0%
-5.4%
286.26
+5.4%
+0.4%
-2.0%
12.50:1
2.00:1
62.85
281.77
SS
F
281.01
F
L
116+00.00


FLOOD POOL MITIGATION
-50.40
280.18
SS
2.00:1
-4.0%
-4.4%
286.50
+4.4%
-0.9%
-2.0%
12.50:1
2.00:1
62.30
281.88
SS
F
280.99
F
L
115+50.00

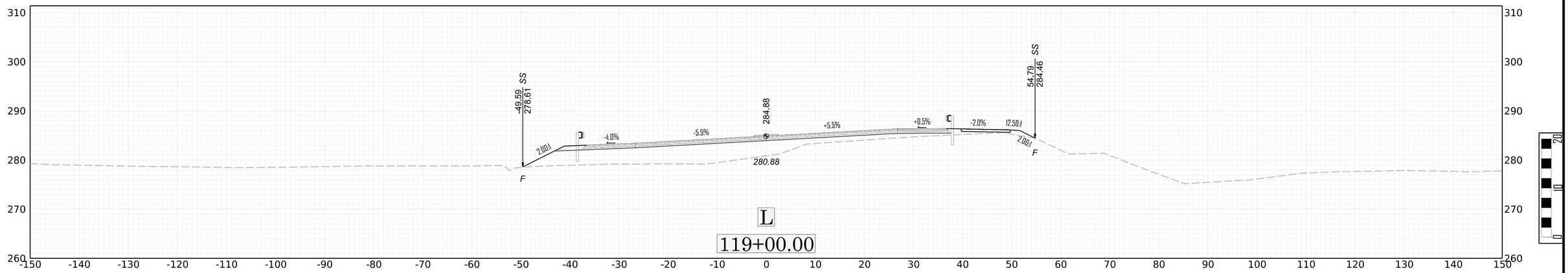

FLOOD POOL MITIGATION
-0.0%
2.00:1
-4.0%
-3.3%
286.62
+3.3%
-2.0%
-8.0%
2.00:1
61.23
282.12
SS
F
281.54
L
115+00.00

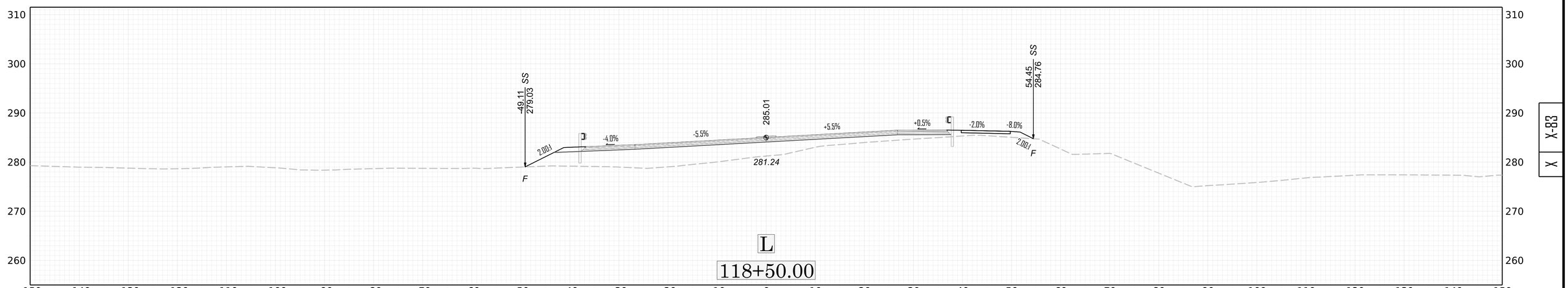

FLOOD POOL MITIGATION
-50.27
278.95
SS
F
2.00:1
-4.0%
-5.5%
285.51
+5.5%
+0.5%
-2.0%
12.50:1
2.00:1
55.13
284.92
SS
F
280.50
L
117+50.00

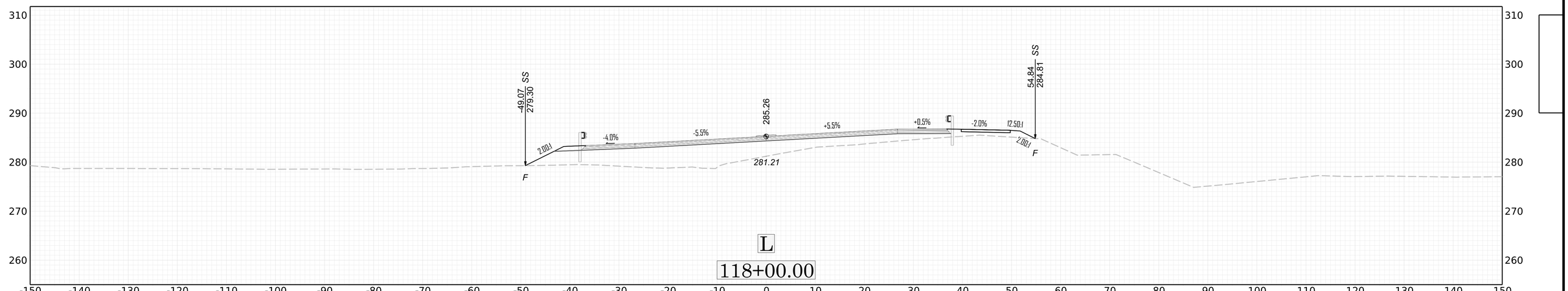

FLOOD POOL MITIGATION
-50.55
279.05
SS
F
2.00:1
-4.0%
-5.5%
285.76
+5.5%
+0.5%
-2.0%
-8.0%
2.00:1
56.02
284.72
SS
F
281.01
L
117+00.00

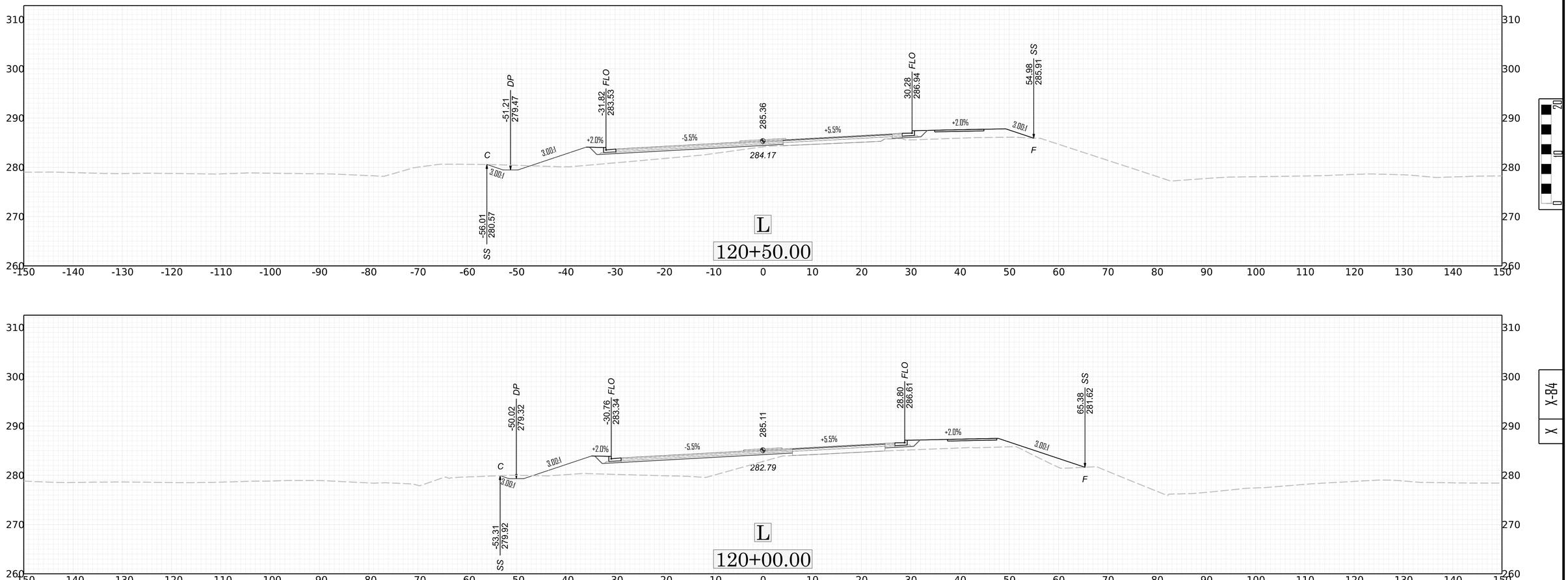

FLOOD POOL MITIGATION
-49.65
279.75
SS
F
2.00:1
-4.0%
-5.5%
286.01
+5.5%
+0.5%
-2.0%
-8.0%
2.00:1
60.91
282.53
SS
F
280.91
L
116+50.00

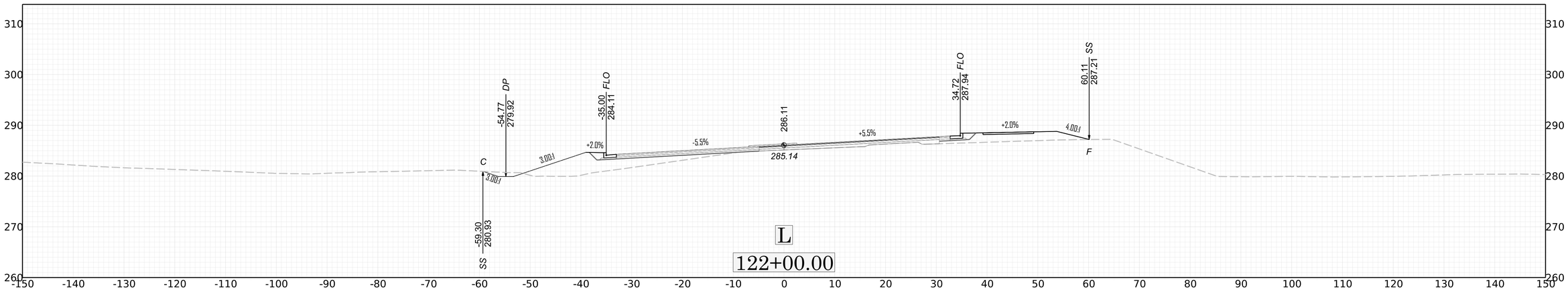
X-82

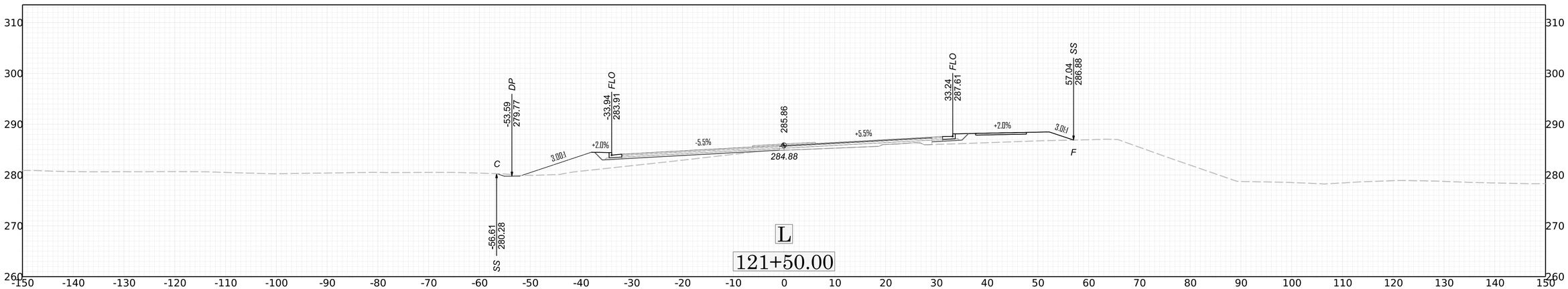

49.59
278.61
SS
2.00:1
-4.0%
-5.5%
284.88
+5.5%
+0.5%
-2.0%
12.50:1
54.79
284.46
SS
2.00:1
F
280.88
F
L
119+00.00

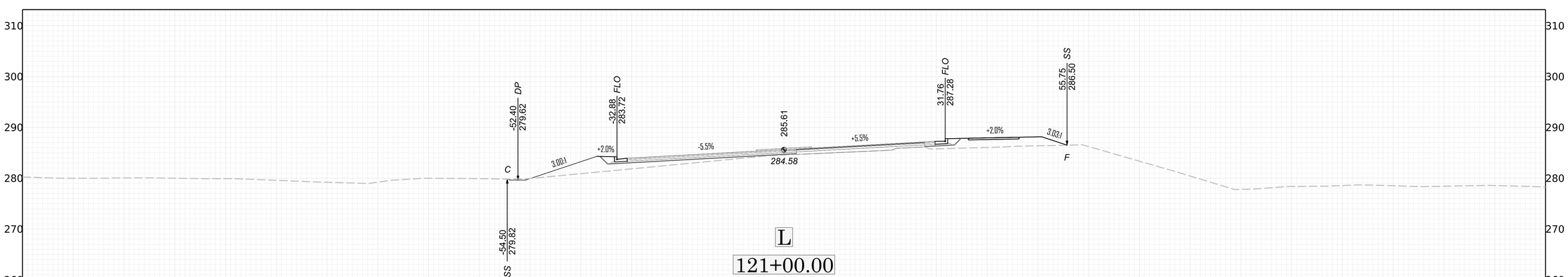

49.11
279.03
SS
2.00:1
-4.0%
-5.5%
285.01
+5.5%
+0.5%
-2.0%
-8.0%
54.45
284.76
SS
2.00:1
F
281.24
F
L
118+50.00


49.07
279.30
SS
2.00:1
-4.0%
-5.5%
285.26
+5.5%
+0.5%
-2.0%
12.50:1
54.84
284.81
SS
2.00:1
F
281.21
F
L
118+00.00

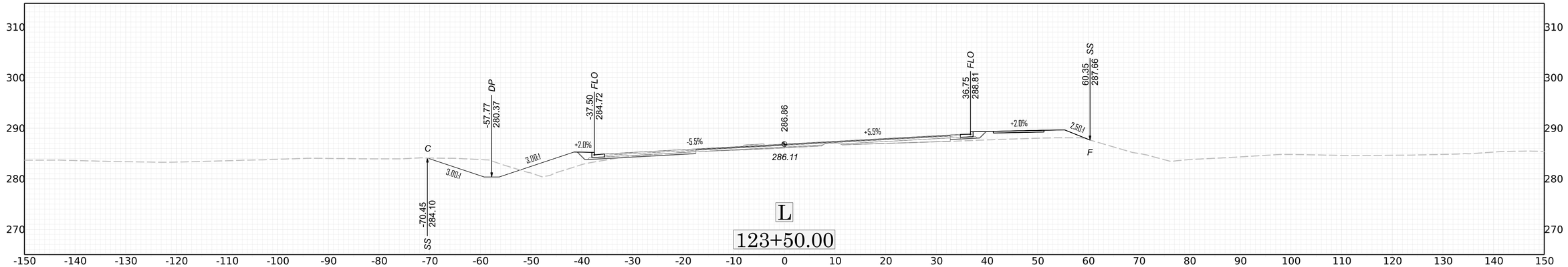

-51.21
279.47
DP
-31.82
283.53
FLO
285.36
30.28
286.94
FLO
54.98
285.91
SS
C
3.00:1
+2.0%
-5.5%
+5.5%
+2.0%
3.00:1
F
284.17
-56.01
280.57
SS
L
120+50.00
-50.02
279.32
DP
-30.76
283.34
FLO
285.11
28.80
286.61
FLO
65.38
281.62
SS
C
3.00:1
+2.0%
-5.5%
+5.5%
+2.0%
3.00:1
F
282.79
-53.31
279.92
SS
2.00:1
L
120+00.00
-54.74
279.23
SS
-30.46
283.12
FLO
284.91
30.14
286.43
FLO
65.25
281.33
SS
C
-0.0%
3.00:1
+2.0%
-5.5%
+5.5%
+2.0%
2.00:1
F
281.07
L
119+50.00
310
300
290
280
270
260
-150
-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
20
10
0

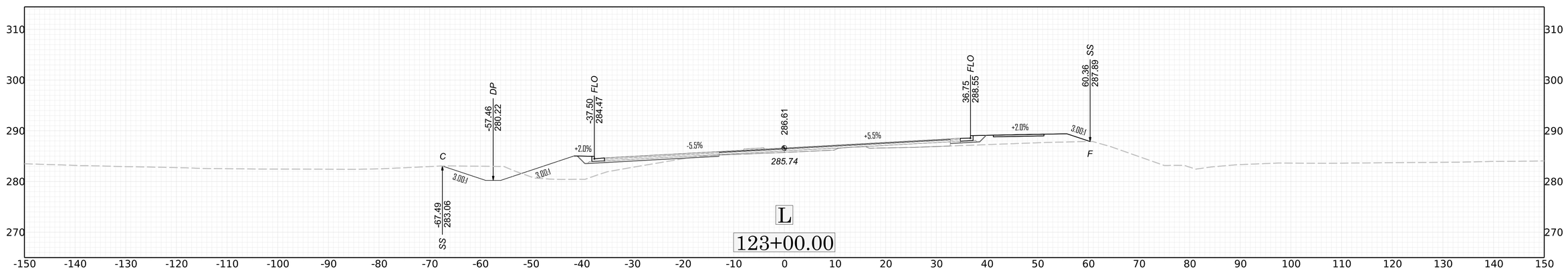

-54.77
279.92
DP
-35.00
284.11
FLO
34.72
287.94
FLO
60.11
287.21
SS
C
F
3.00:1
+2.0%
-5.5%
286.11
285.14
+5.5%
+2.0%
4.00:1
-59.30
280.93
SS
L
122+00.00

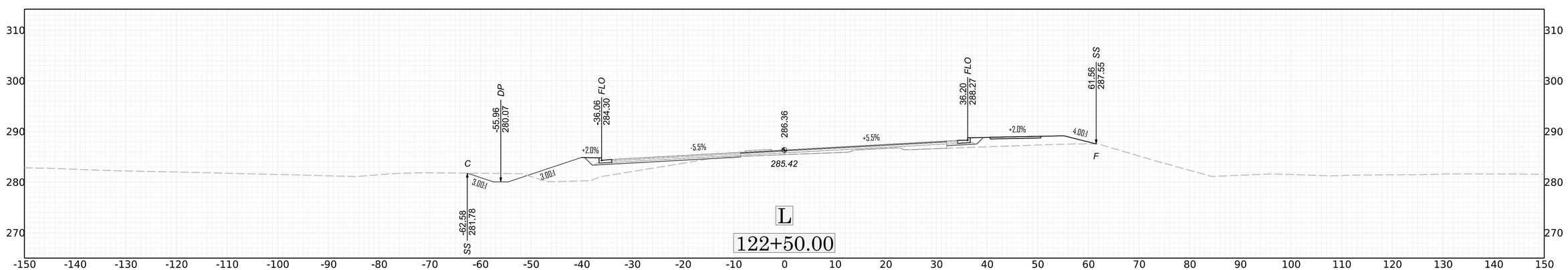

-53.59
279.77
DP
-33.94
283.91
FLO
33.24
287.61
FLO
57.04
286.88
SS
C
F
3.00:1
+2.0%
-5.5%
285.86
284.88
+5.5%
+2.0%
3.01:1
-56.61
280.28
SS
L
121+50.00

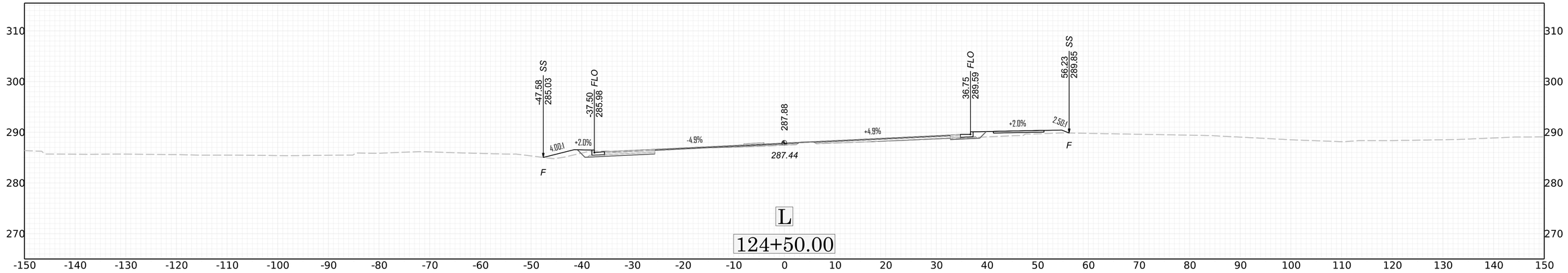

-52.40
279.62
DP
-32.88
283.72
FLO
31.76
287.28
FLO
55.75
286.50
SS
C
F
3.00:1
+2.0%
-5.5%
285.61
284.58
+5.5%
+2.0%
3.03:1
-54.50
279.62
SS
L
121+00.00

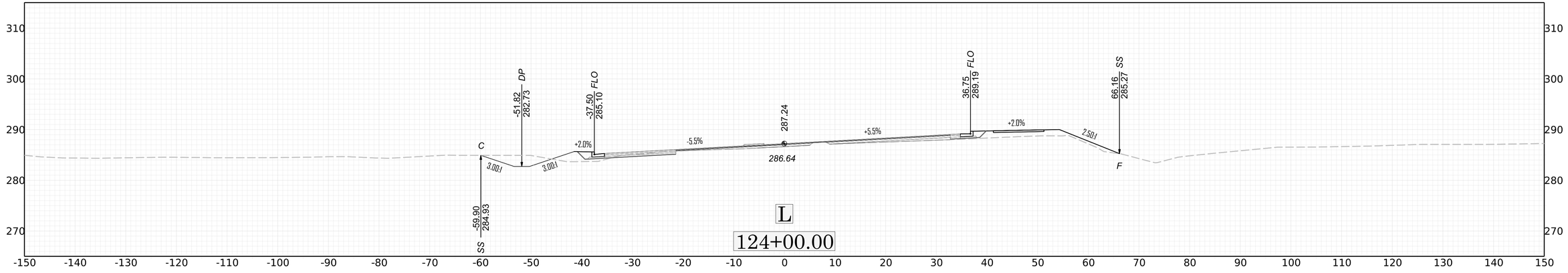
X-85

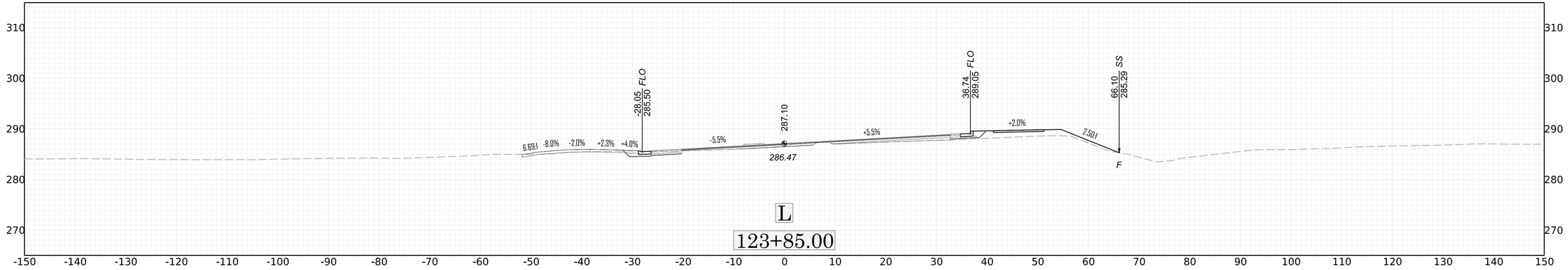

C
DP
-57.77
280.37
FLO
-37.50
284.72
286.86
286.11
FLO
36.75
288.81
SS
60.35
287.66
F
SS
-70.45
284.10
3.00:1
3.00:1
+2.0%
-5.5%
+5.5%
+2.0%
2.50:1
L
123+50.00

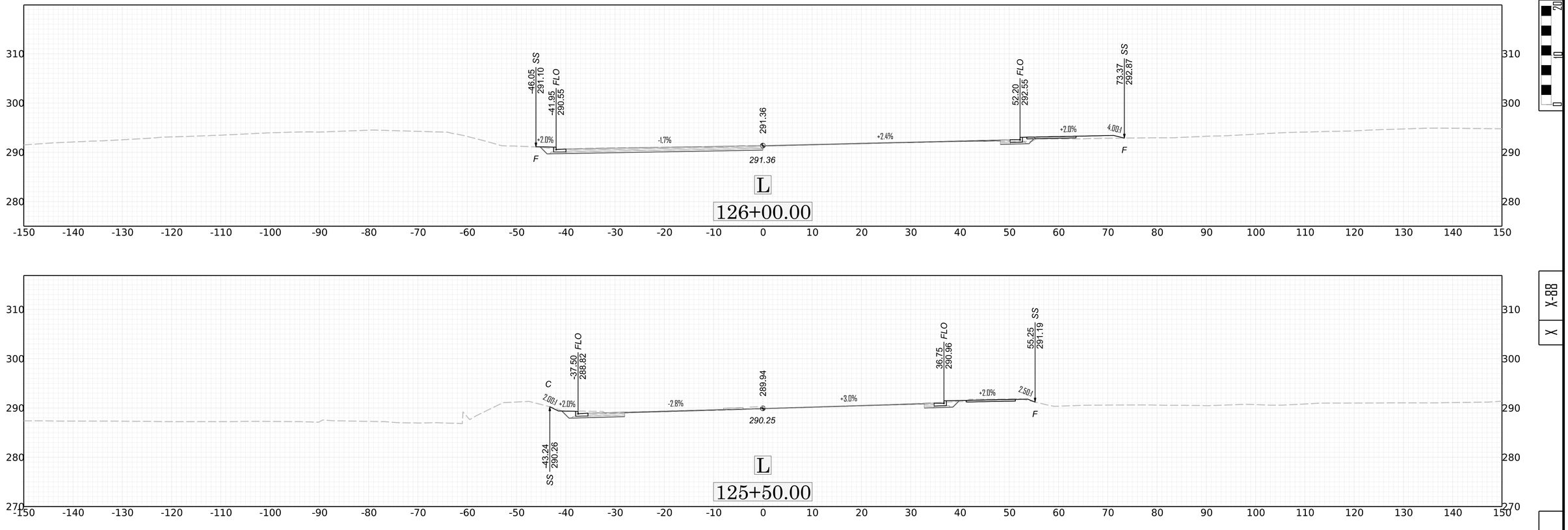

C
DP
-57.46
280.22
FLO
-37.50
284.47
286.61
285.74
FLO
36.75
288.55
SS
60.36
287.89
F
SS
-67.49
283.06
3.00:1
3.00:1
+2.0%
-5.5%
+5.5%
+2.0%
3.00:1
L
123+00.00

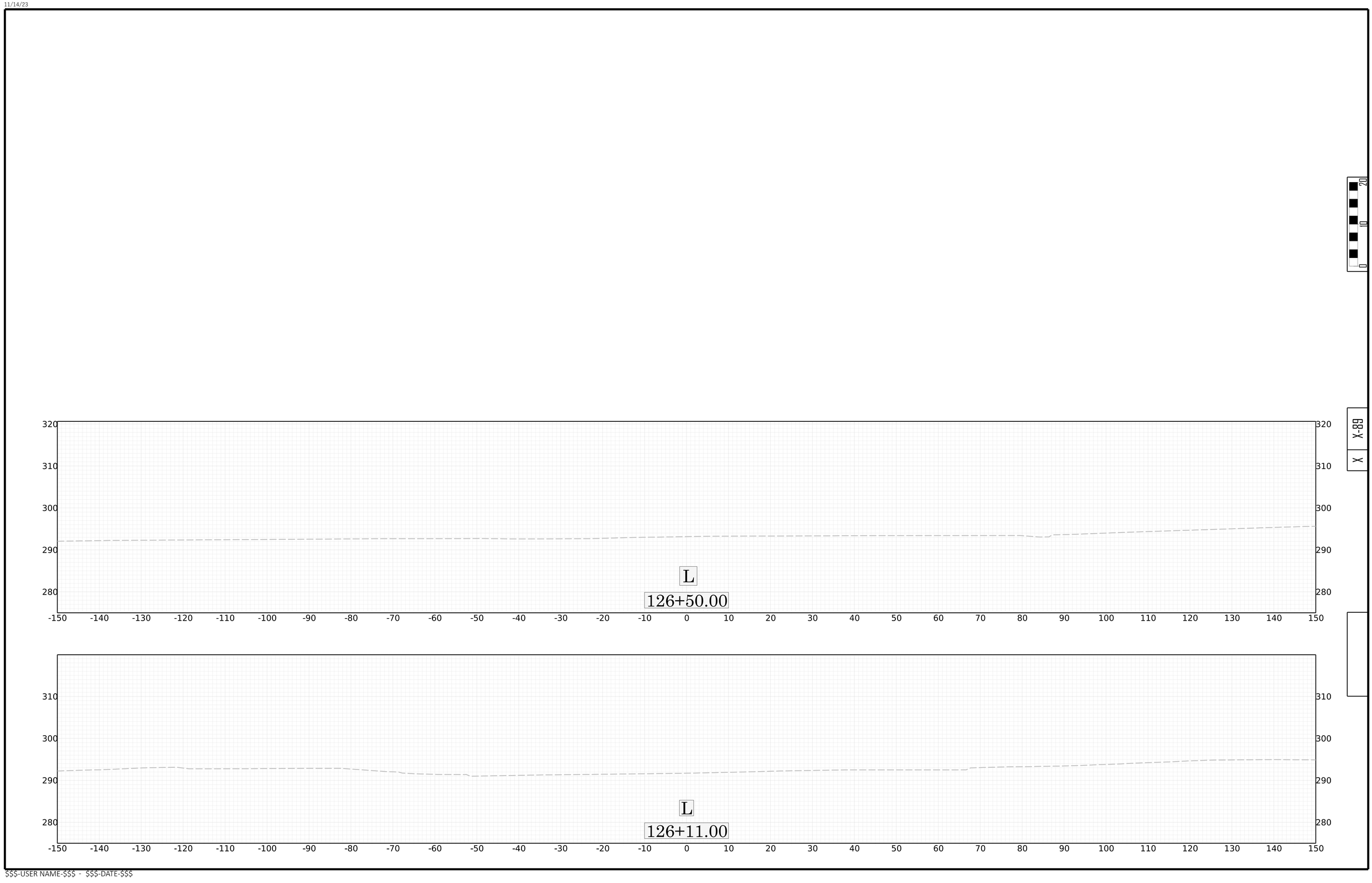

C
DP
-55.96
280.07
FLO
-36.06
284.30
286.36
285.42
FLO
36.20
288.27
SS
61.56
287.55
F
SS
-62.58
281.78
3.00:1
3.00:1
+2.0%
-5.5%
+5.5%
+2.0%
4.00:1
L
122+50.00


-47.58
285.03
SS
-37.50
285.98
FLO
287.88
36.75
289.59
FLO
56.23
289.85
SS
4.00:1
+2.0%
-4.9%
+4.9%
+2.0%
2.50:1
287.44
F
F
L
124+50.00
310
300
290
280
270
-150 -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
20
10
0

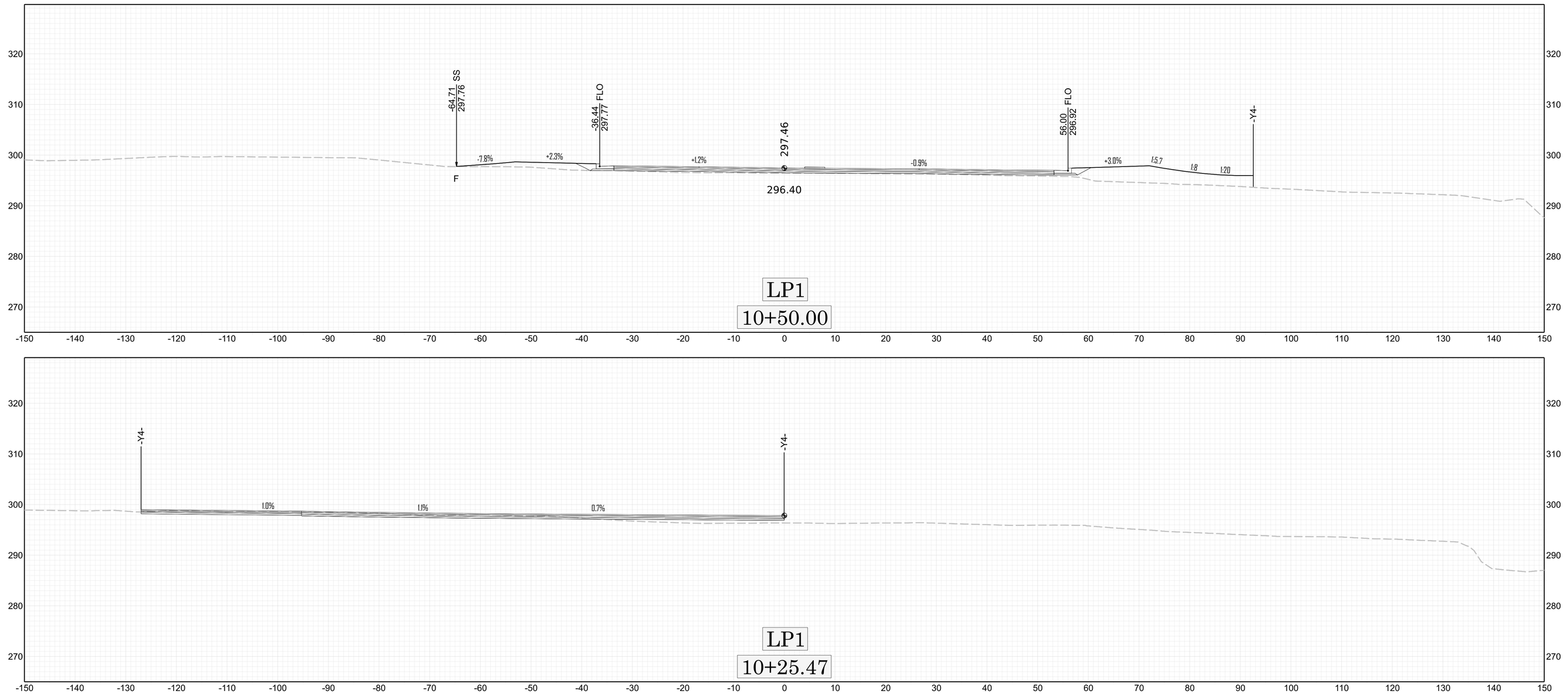

-51.82
282.73
DP
-37.50
285.10
FLO
287.24
36.75
289.19
FLO
66.16
285.27
SS
C
3.00:1
3.00:1
+2.0%
-5.5%
+5.5%
+2.0%
2.50:1
286.64
F
-59.90
284.93
SS
L
124+00.00
310
300
290
280
270
-150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
X-87
X

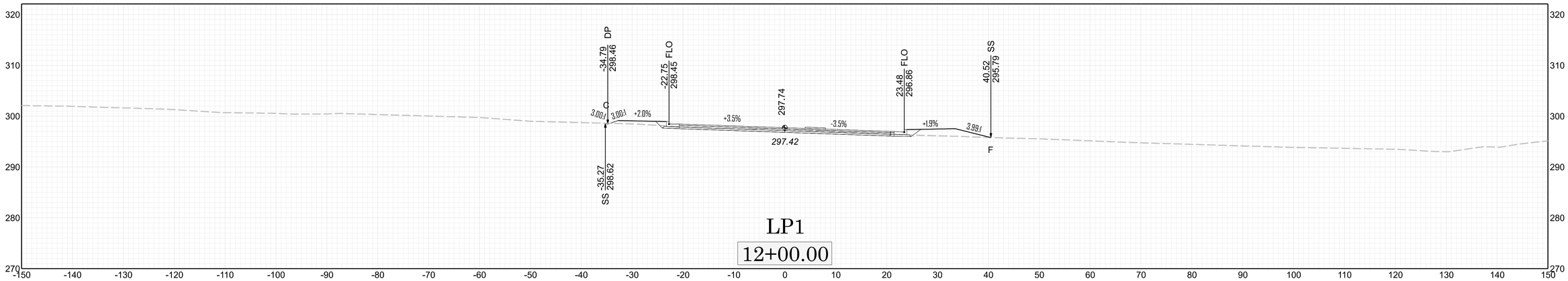

-28.05
285.50
FLO
287.10
36.74
289.05
FLO
66.10
285.29
SS
6.69:1
-8.0%
-2.0%
+2.3%
+4.0%
-5.5%
+5.5%
+2.0%
2.50:1
286.47
F
L
123+85.00
310
300
290
280
270
-150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150


310
300
290
280
-150 -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
-46.05
291.10
SS
-41.95
290.55
FLO
+2.0%
-1.7%
291.36
291.36
F
+2.4%
52.20
292.55
FLO
+2.0%
4.00:1
73.37
292.87
SS
F
L
126+00.00
C
2.00:1
+2.0%
-37.50
288.82
FLO
-2.8%
289.94
290.25
+3.0%
36.75
290.96
FLO
+2.0%
2.50:1
55.25
291.19
SS
F
-43.24
290.26
SS
L
125+50.00
C
4.00:1
+2.0%
-37.50
287.27
FLO
-3.8%
288.78
288.67
+3.8%
36.75
290.10
FLO
+2.0%
2.50:1
55.29
290.74
SS
F
-43.12
288.25
SS
L
125+00.00
0
10
20
X
X-88


320
310
300
290
280
-150 -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
L
126+50.00
320
310
300
290
280
-150 -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
L
126+11.00
0
10
20
BB-X
X

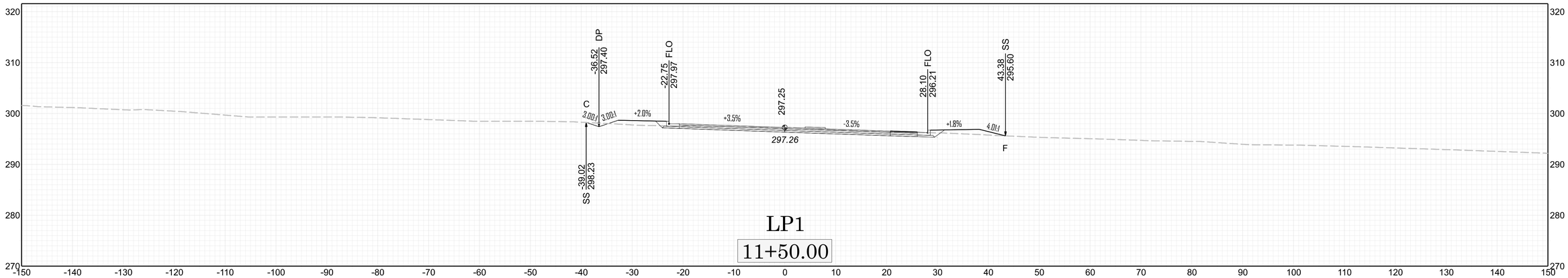
11/14/23


320
310
300
290
280
270
-64.71 SS
297.76
-36.44 FLO
297.77
297.46
56.00 FLO
296.92
-Y4-
-7.8%
+2.3%
+1.2%
-0.9%
+3.0%
1:5.7
1:8
1:20
F
296.40
-150 -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
LP1
10+50.00
-Y4-
-Y4-
1.0%
1.1%
0.7%
LP1
10+25.47
0
10
20
X
X-GD



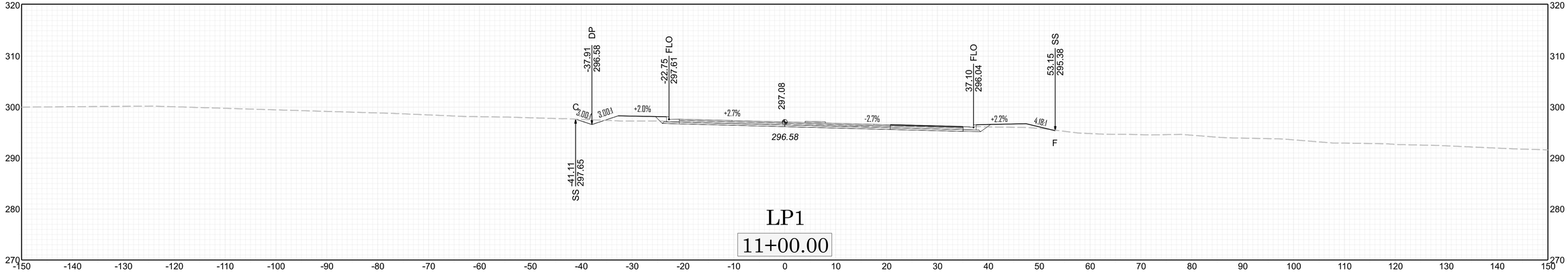
LP1

12+00.00



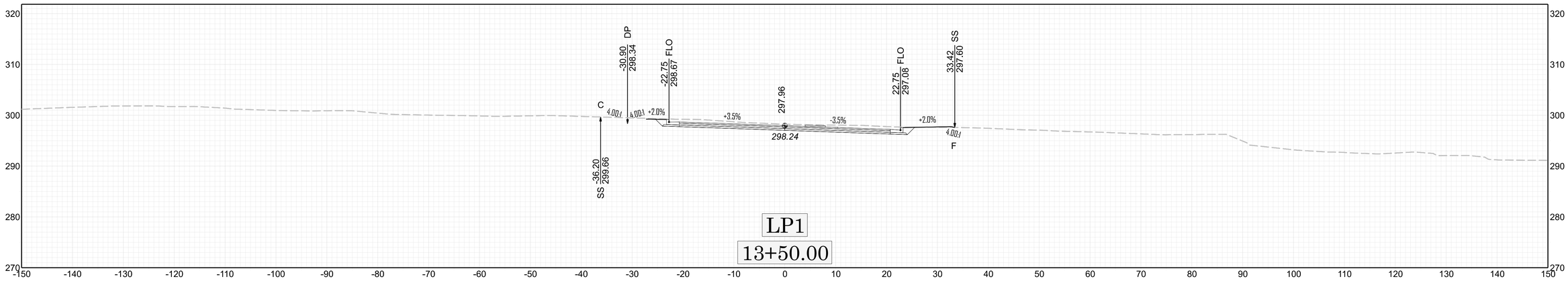
LP1

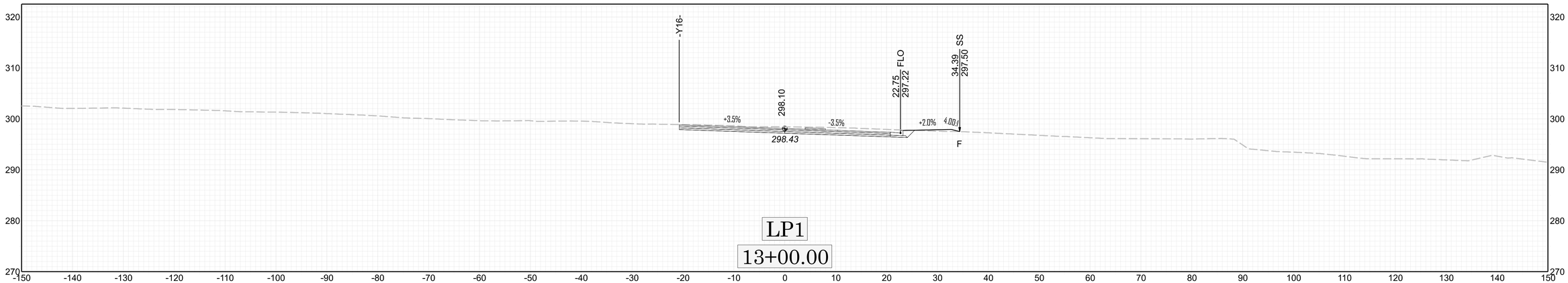
11+50.00

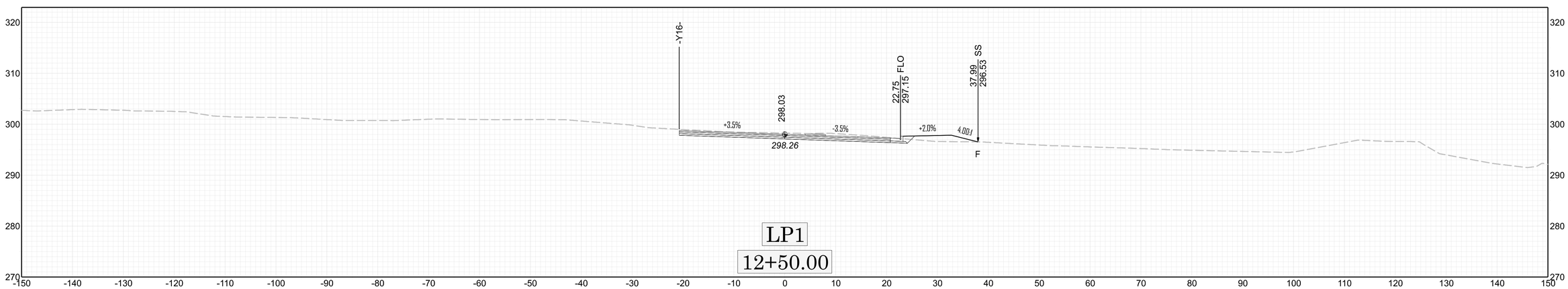


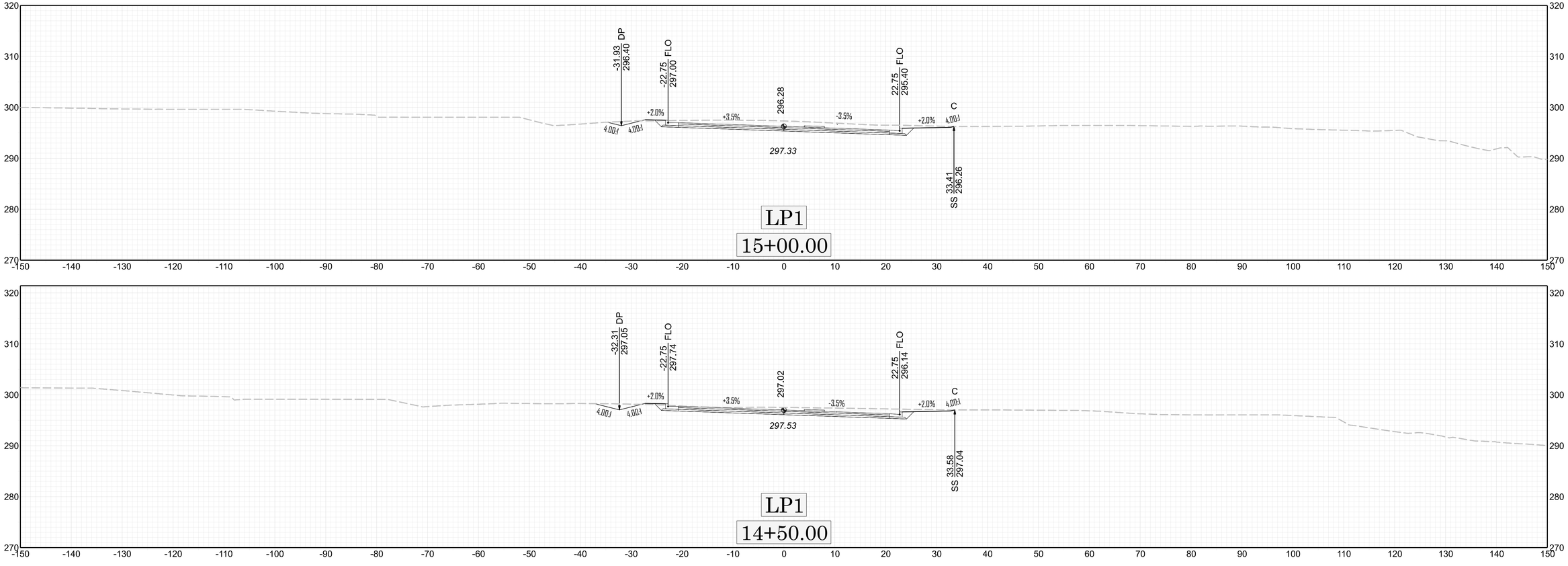
LP1

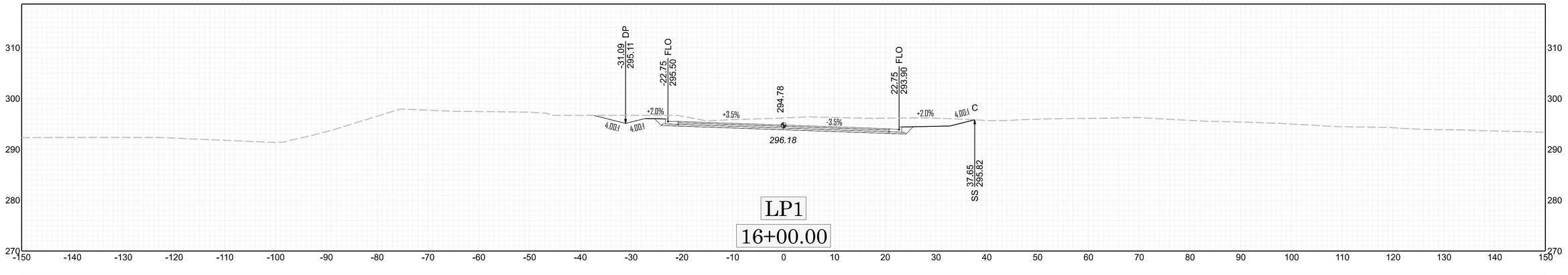
11+00.00


DP
-30.90
298.34
FLO
-22.75
298.67
297.96
FLO
22.75
297.08
SS
33.42
297.60
C
4.00:1
4.00:1
+2.0%
+3.5%
-3.5%
+2.0%
4.00:1
F
298.24
SS
-36.20
299.66
LP1
13+50.00


-Y16-
298.10
FLO
22.75
297.22
SS
34.39
297.50
+3.5%
-3.5%
+2.0%
4.00:1
F
298.43
LP1
13+00.00

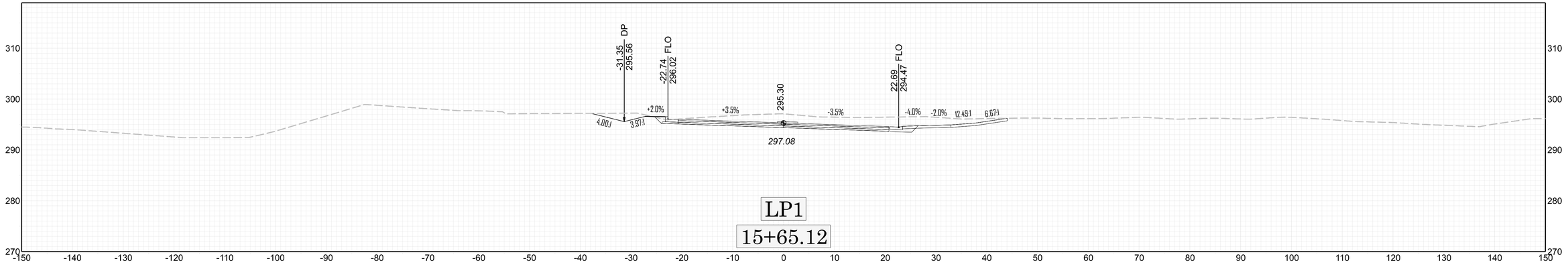

-Y16-
298.03
FLO
22.75
297.15
SS
37.99
296.53
+3.5%
-3.5%
+2.0%
4.00:1
F
298.26
LP1
12+50.00


-31.93 DP
296.40
-22.75 FLO
297.00
296.28
22.75 FLO
295.40
C
+2.0%
+3.5%
-3.5%
+2.0%
4.00:1
4.00:1
4.00:1
297.33
SS 33.41
296.26
LP1
15+00.00
-32.31 DP
297.05
-22.75 FLO
297.74
297.02
22.75 FLO
296.14
C
+2.0%
+3.5%
-3.5%
+2.0%
4.00:1
4.00:1
4.00:1
297.53
SS 33.58
297.04
LP1
14+50.00
-32.04 DP
297.69
-22.75 FLO
298.31
297.60
22.75 FLO
296.72
C
+2.0%
+3.5%
-3.5%
+2.0%
4.00:1
4.00:1
4.00:1
298.20
SS 33.47
297.59
LP1
14+00.00
320
310
300
290
280
270
-150
-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



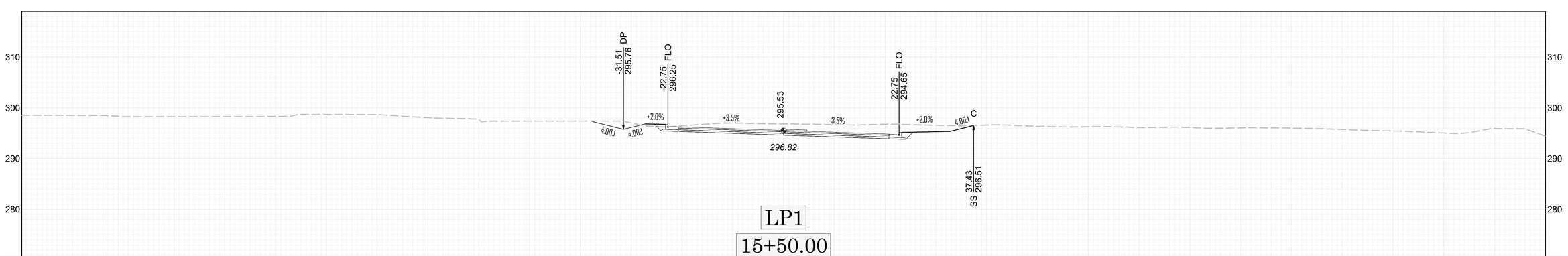
LP1

16+00.00



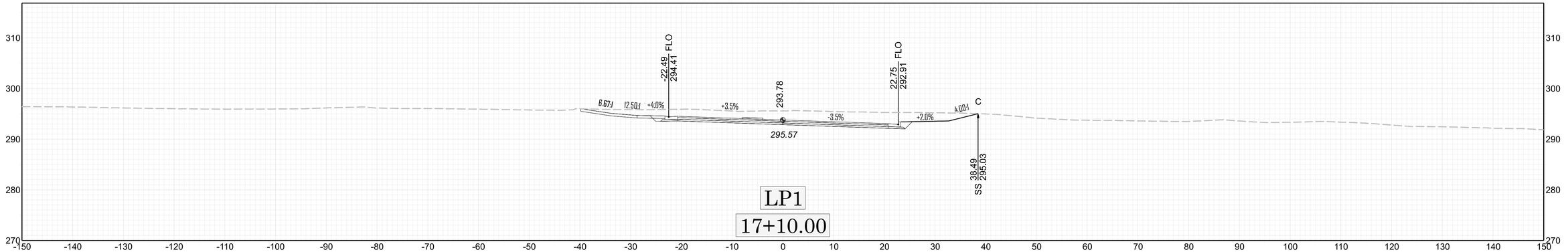
LP1

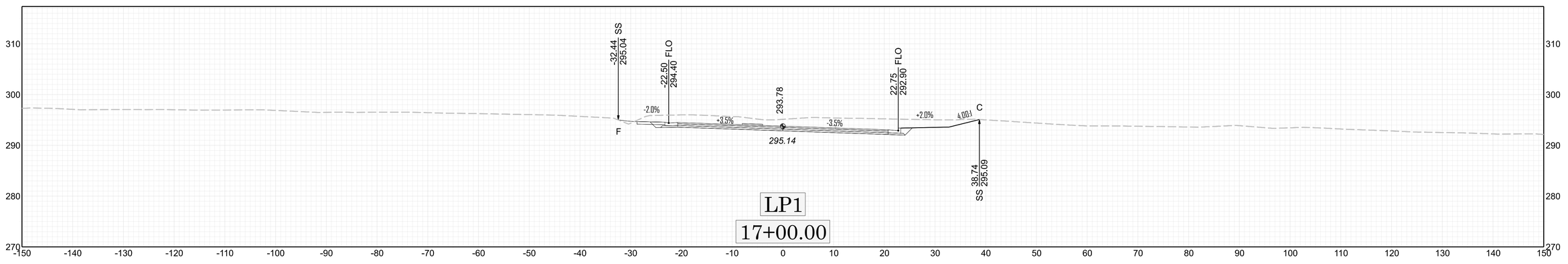
15+65.12

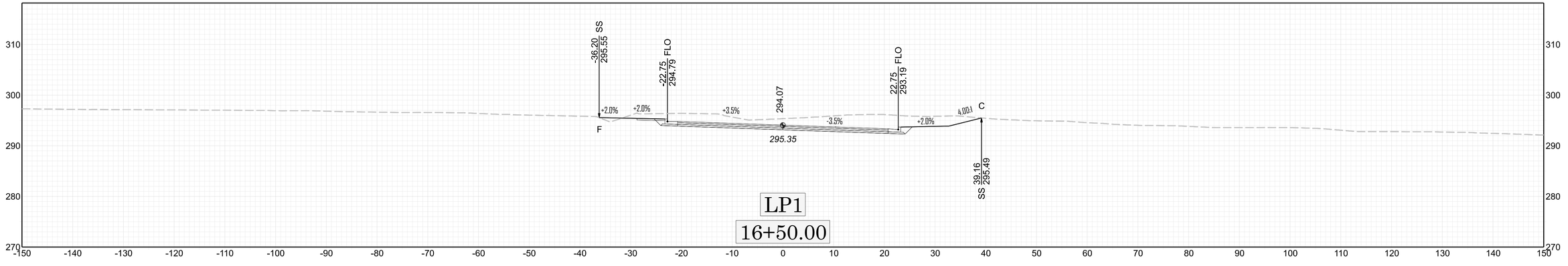


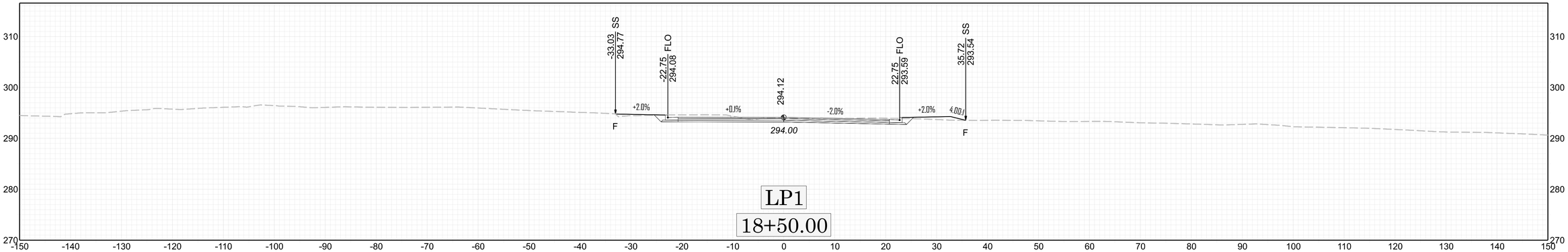
LP1

15+50.00


6.67:1
12.50:1
+4.0%
+3.5%
-3.5%
+2.0%
4.00:1
C
-22.49
294.41
FLO
293.78
22.75
292.91
FLO
295.57
38.49
295.03
SS
LP1
17+10.00

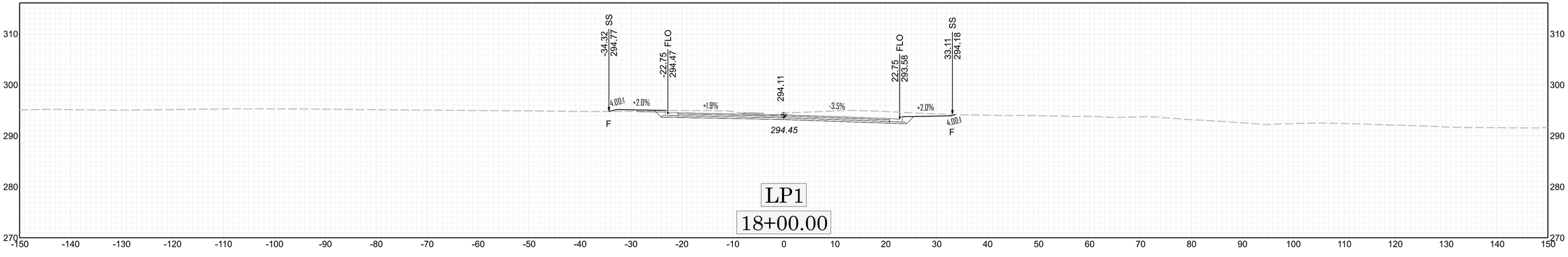

-32.44
295.04
SS
-22.50
294.40
FLO
293.78
22.75
292.90
FLO
-2.0%
+3.5%
-3.5%
+2.0%
4.00:1
C
F
295.14
38.74
295.09
SS
LP1
17+00.00


-36.20
295.55
SS
-22.75
294.79
FLO
294.07
22.75
293.19
FLO
+2.0%
+2.0%
+3.5%
-3.5%
+2.0%
4.00:1
C
F
295.35
39.16
295.49
SS
LP1
16+50.00



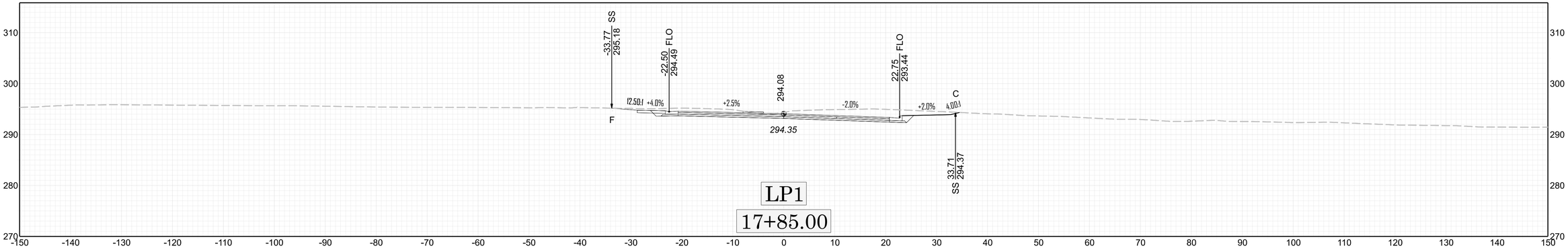
LP1

18+50.00



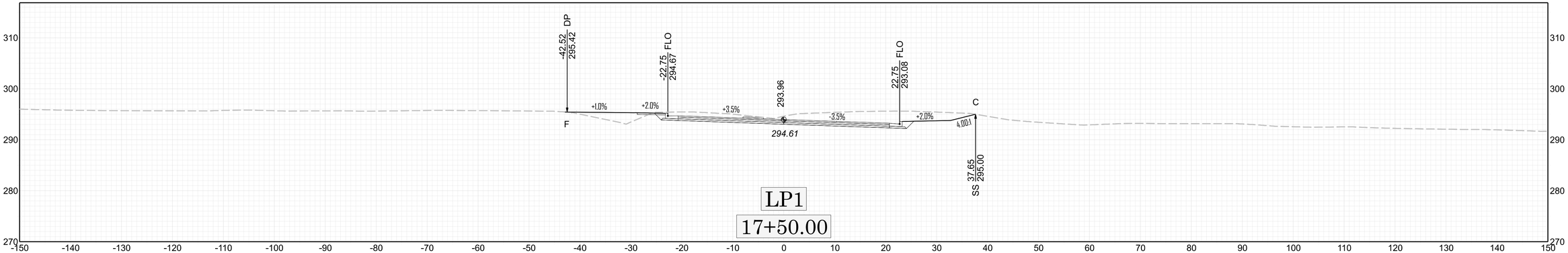
LP1

18+00.00



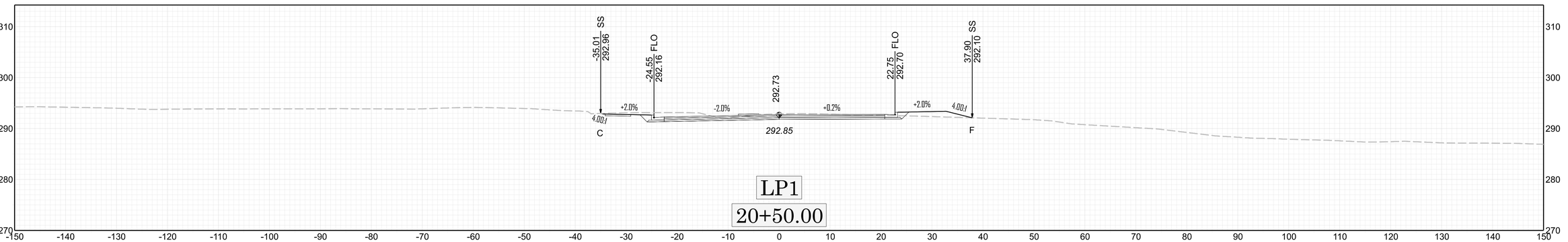
LP1

17+85.00



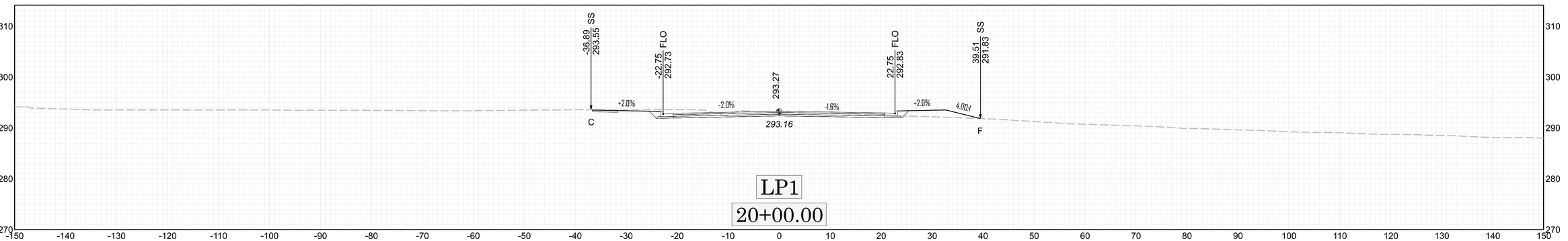
LP1

17+50.00



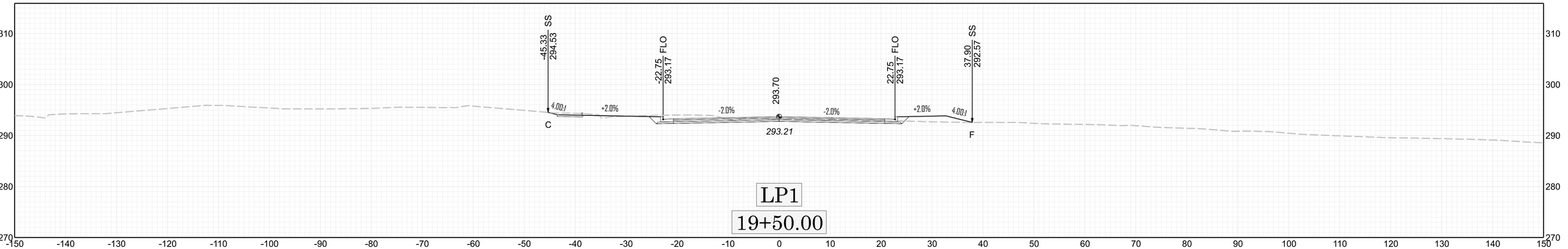
LP1

20+50.00



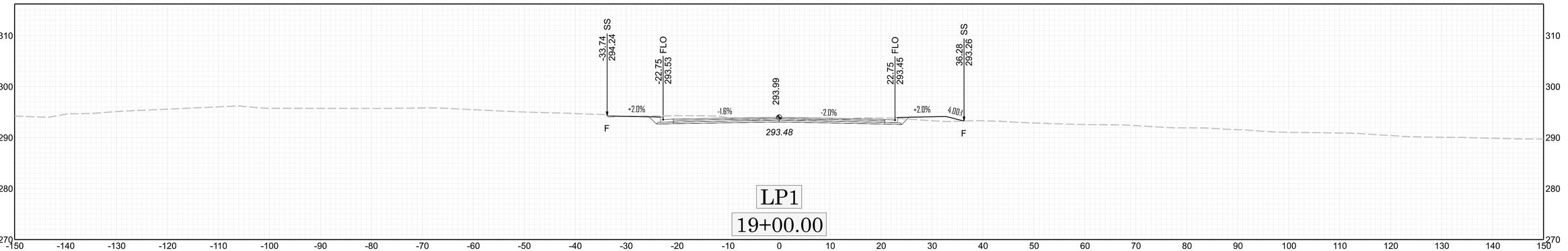
LP1

20+00.00



LP1

19+50.00



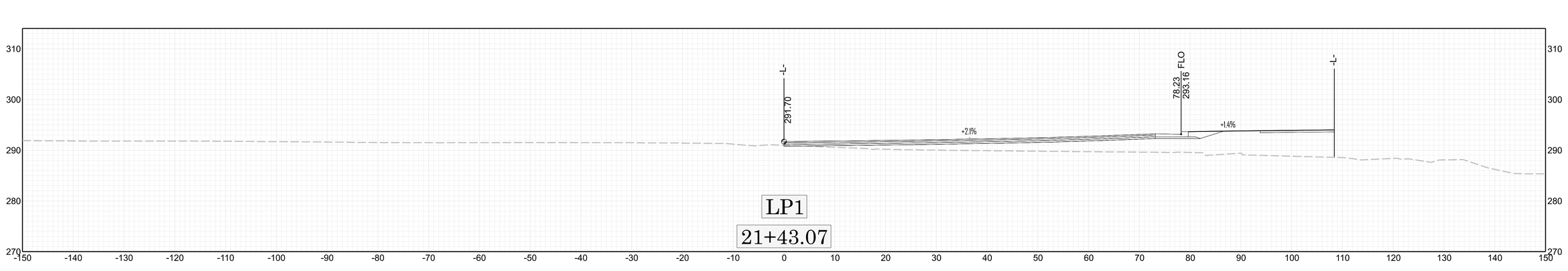
LP1

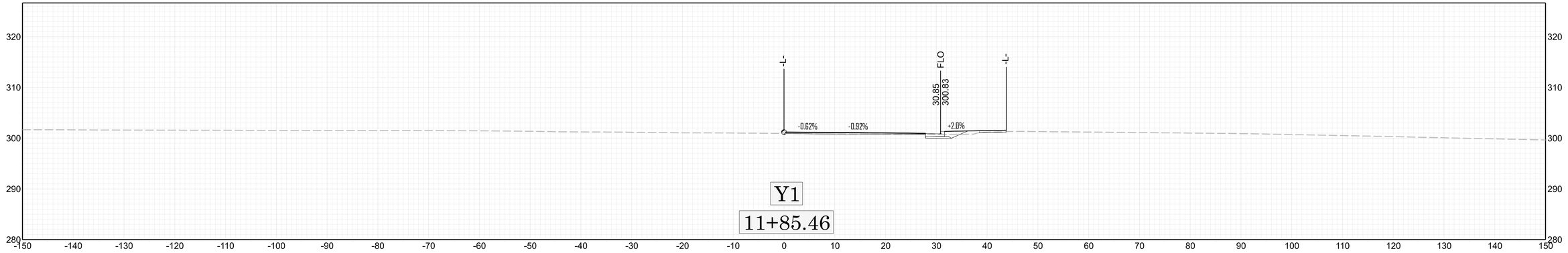
19+00.00

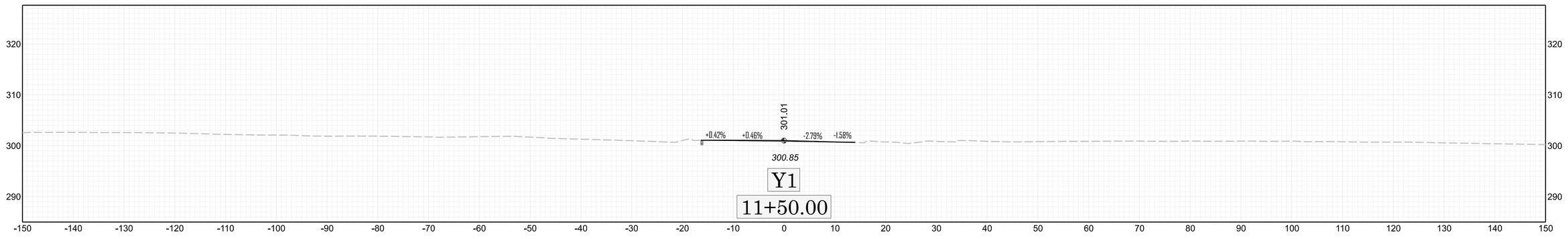
20
10
0

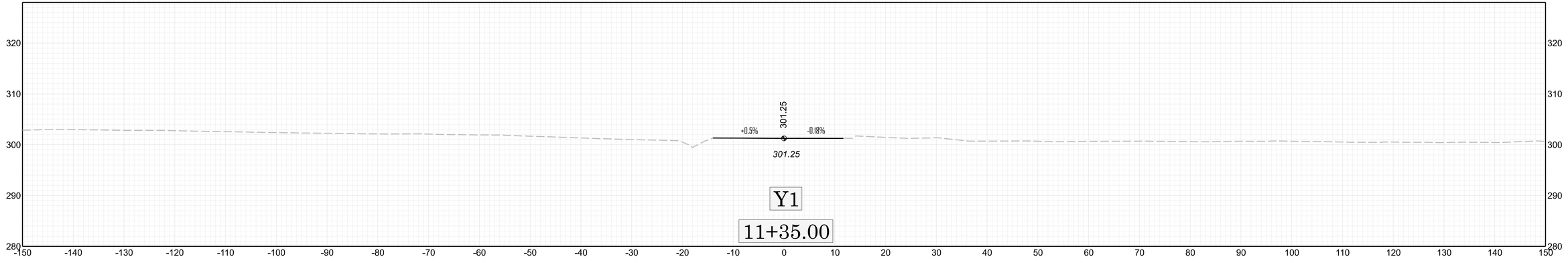
X-97

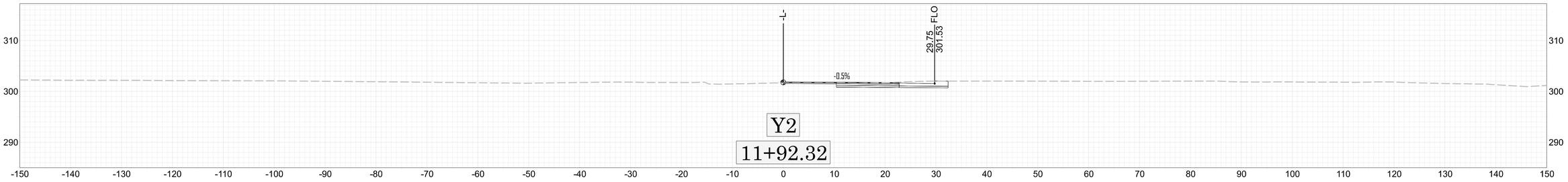
X

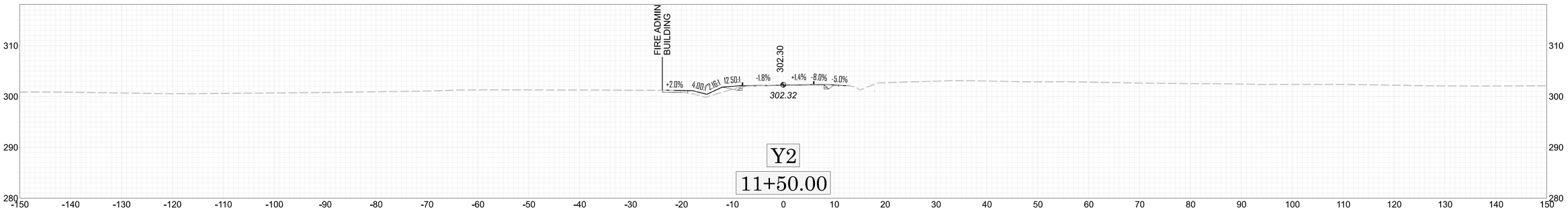

-L-
291.70
+2.1%
78.23
293.16
FLO
+1.4%
-L-
LP1
21+43.07
47.26
292.66
SS
-38.25
291.42
FLO
+1.6%
-1.8%
292.18
+2.0%
31.70
292.65
FLO
+1.7%
47.30
291.50
SS
2.331
2.241
C
F
292.11
LP1
21+00.00

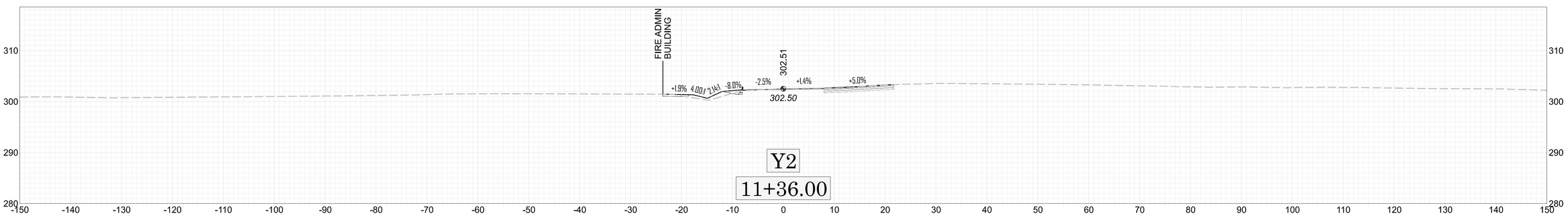

-L-
FLO
-L-
30.85
300.83
-0.62%
-0.92%
+2.0%
Y1
11+85.46

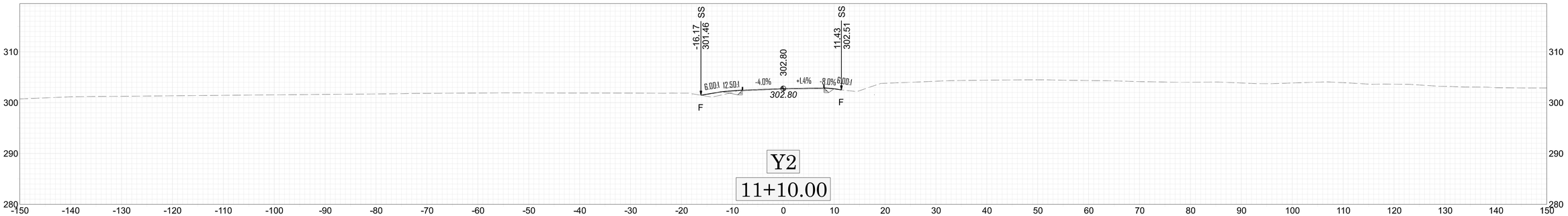

301.01
+0.42%
+0.46%
-2.79%
-1.58%
300.85
Y1
11+50.00

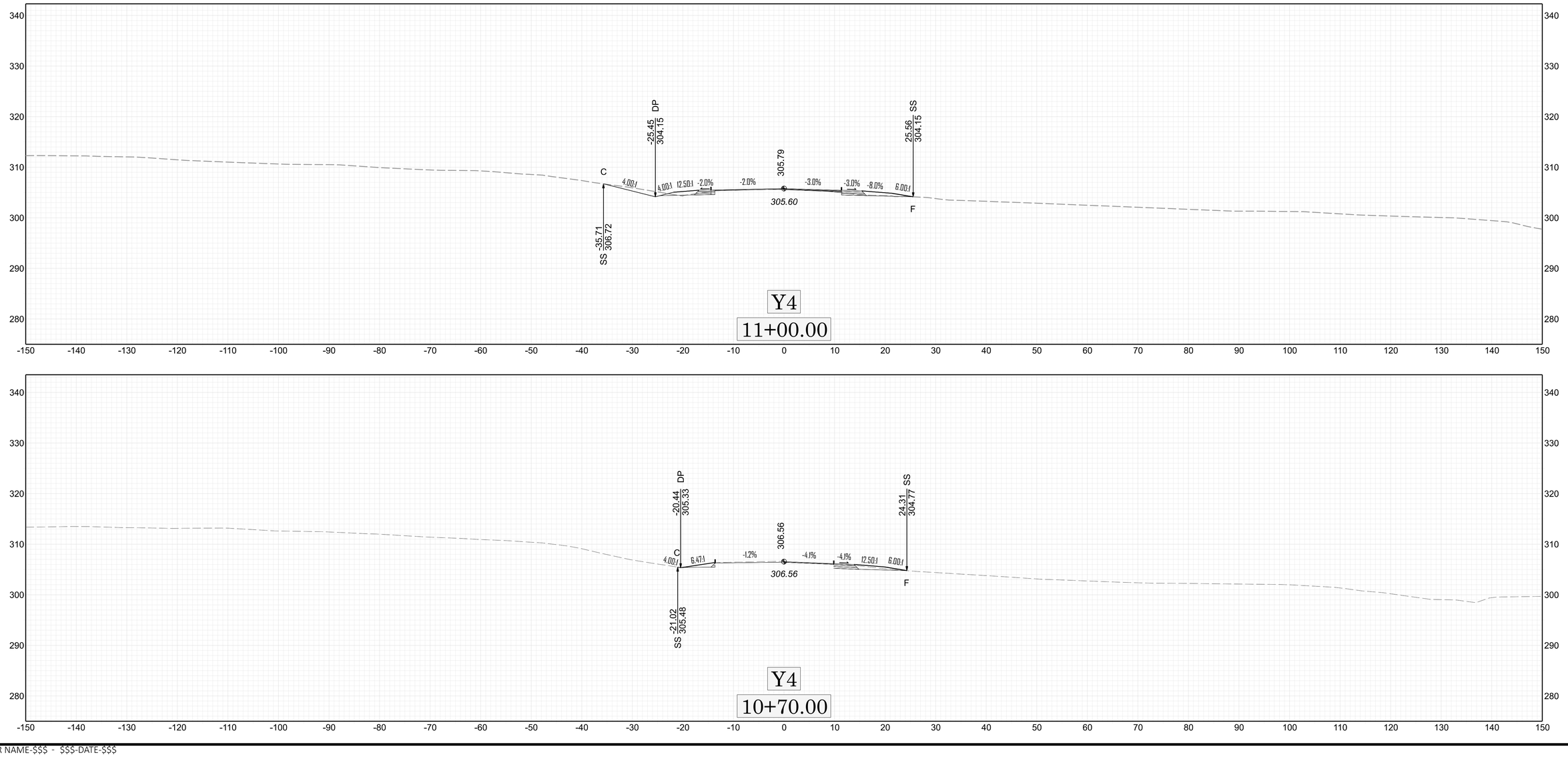

301.25
+0.5%
-0.18%
301.25
Y1
11+35.00

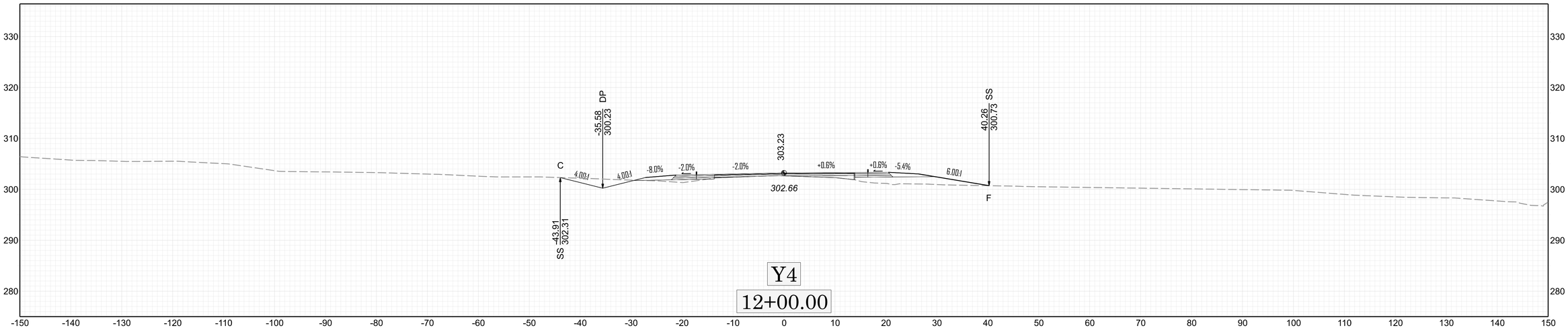

-L-
29.75
FLO
301.53
-0.5%
Y2
11+92.32

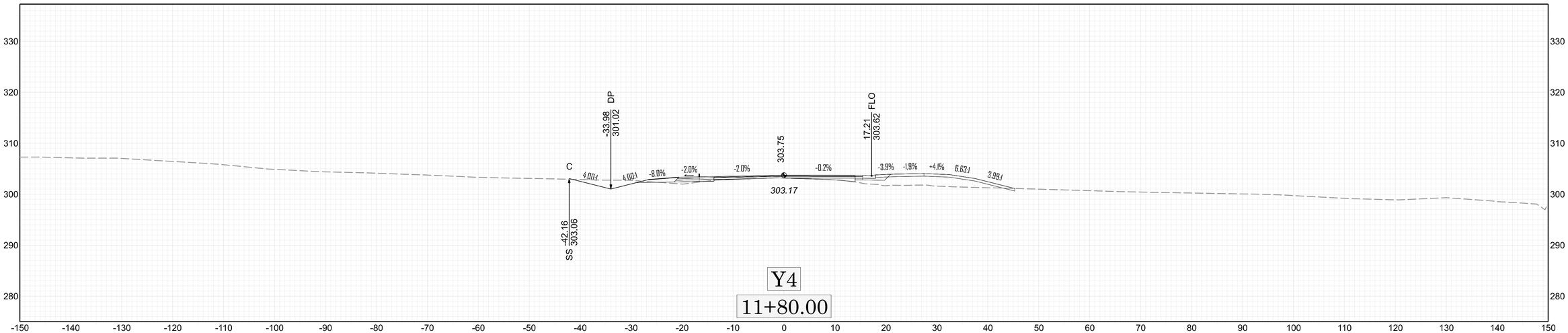

FIRE ADMIN BUILDING
+2.0%
4.00:1
2.16:1
12.50:1
-1.8%
302.30
+1.4%
-8.0%
-5.0%
302.32
Y2
11+50.00

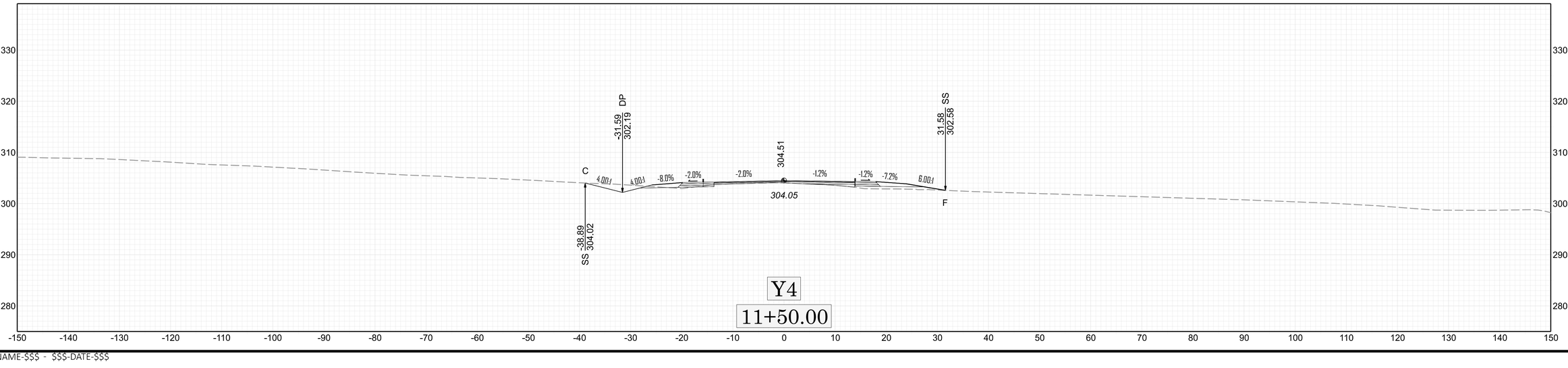

FIRE ADMIN BUILDING
+1.9%
4.00:1
2.14:1
-8.0%
-2.5%
302.51
+1.4%
+5.0%
302.50
Y2
11+36.00

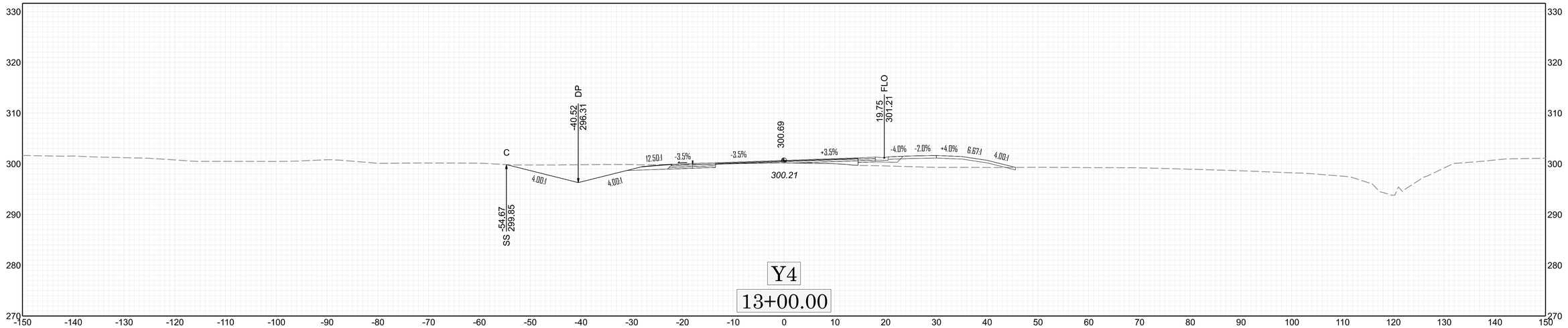

SS
-16.17
301.46
SS
11.43
302.51
302.80
6.00:1
12.50:1
-4.0%
+1.4%
-8.0%
6.00:1
302.80
F
F
Y2
11+10.00

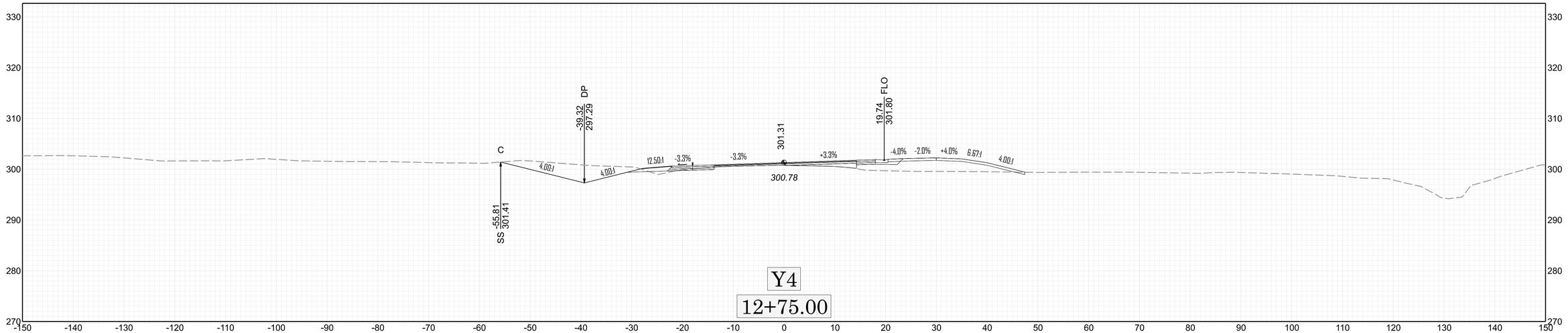

340
330
320
310
300
290
280
-150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
C
4.00:1
4.00:1
12.50:1
-2.0%
-2.0%
305.79
-3.0%
-3.0%
-8.0%
6.00:1
305.60
F
-25.45
304.15
DP
25.56
304.15
SS
-35.71
306.72
SS
Y4
11+00.00
-20.44
305.33
DP
306.56
24.31
304.77
SS
4.00:1
6.47:1
-1.2%
-4.1%
-4.1%
12.50:1
6.00:1
306.56
C
F
-21.02
305.48
SS
Y4
10+70.00
0
10
20
X
X-101

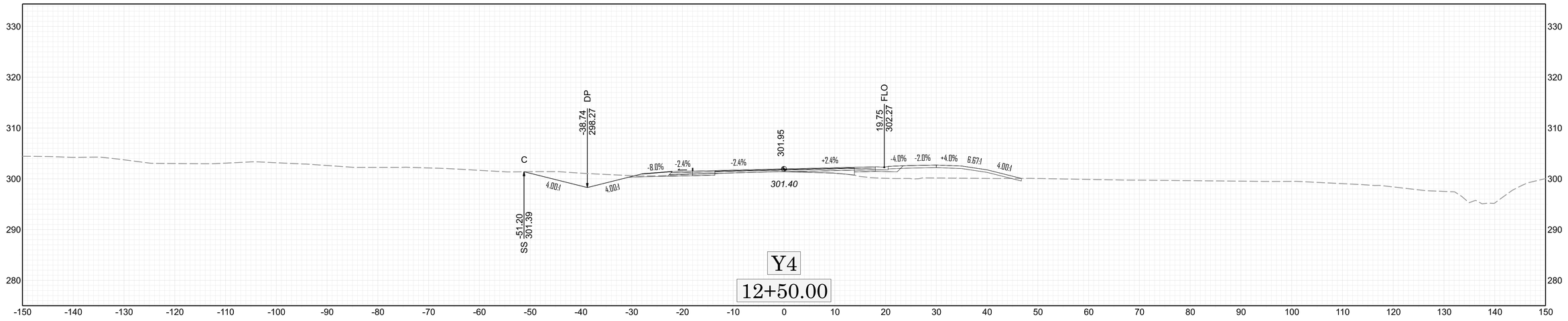

DP
-35.58
300.23
SS
40.26
300.73
303.23
C
4.00:1
4.00:1
-8.0%
-2.0%
-2.0%
+0.6%
+0.6%
-5.4%
6.00:1
302.66
F
SS
-43.91
302.31
Y4
12+00.00

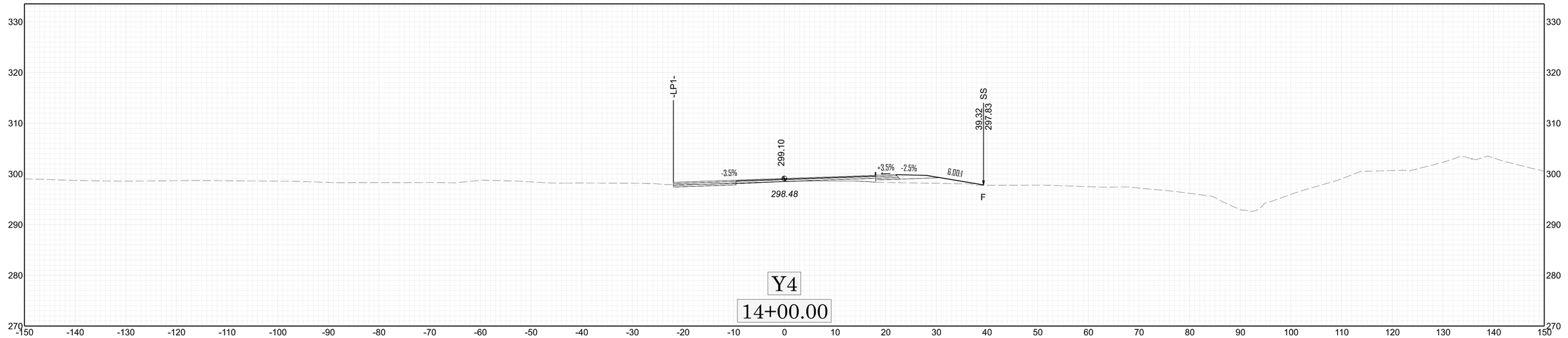

DP
-33.98
301.02
FLO
17.21
303.62
303.75
C
4.00:1
4.00:1
-8.0%
-2.0%
-2.0%
-0.2%
-3.9%
-1.9%
+4.1%
6.63:1
3.99:1
303.17
SS
-42.16
303.06
Y4
11+80.00

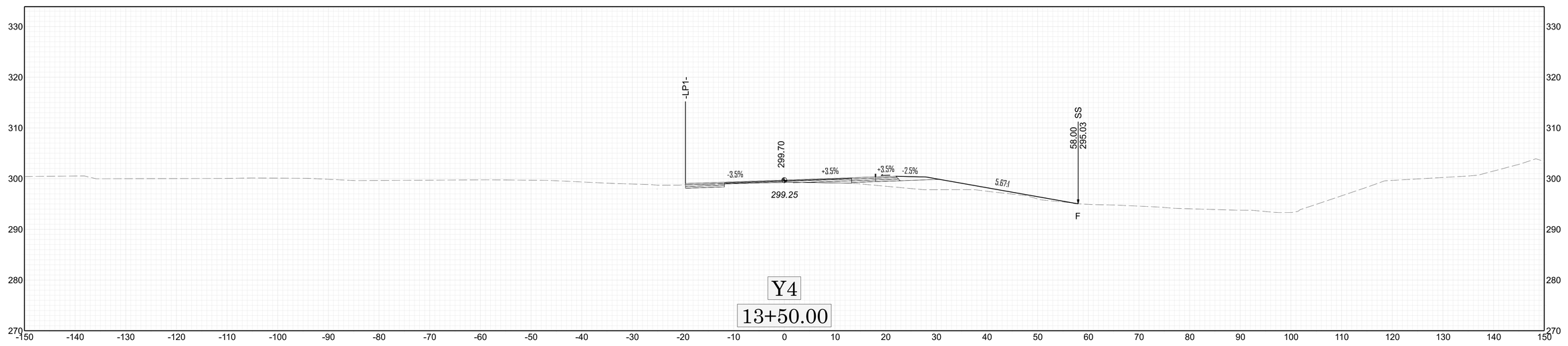

DP
-31.59
302.19
SS
31.58
302.58
304.51
C
4.00:1
4.00:1
-8.0%
-2.0%
-2.0%
-1.2%
-1.2%
-7.2%
6.00:1
304.05
F
SS
-38.89
304.02
Y4
11+50.00


C
-40.52
296.31
DP
19.75
301.21
FLO
300.69
-54.67
299.85
SS
12.50:1
-3.5%
-3.5%
+3.5%
-4.0%
-2.0%
+4.0%
6.67:1
4.00:1
4.00:1
4.00:1
300.21
Y4
13+00.00

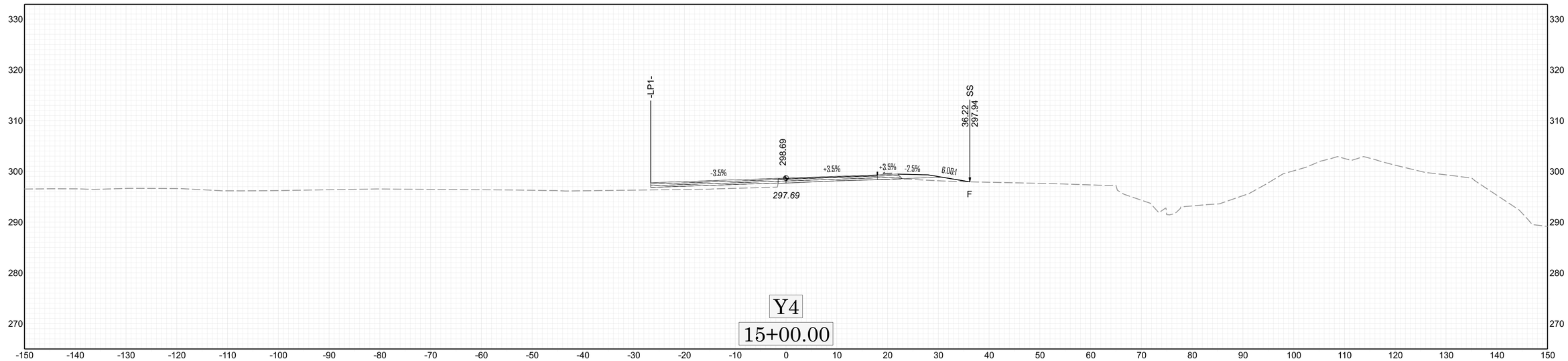

C
-39.32
297.29
DP
19.74
301.80
FLO
301.31
-55.81
301.41
SS
12.50:1
-3.3%
-3.3%
+3.3%
-4.0%
-2.0%
+4.0%
6.67:1
4.00:1
4.00:1
4.00:1
300.78
Y4
12+75.00


C
-38.74
298.27
DP
19.75
302.27
FLO
301.95
-51.20
301.39
SS
-8.0%
-2.4%
-2.4%
+2.4%
-4.0%
-2.0%
+4.0%
6.67:1
4.00:1
4.00:1
4.00:1
301.40
Y4
12+50.00


-LP1-
299.10
39.32
SS
297.83
-3.5%
+3.5%
-2.5%
6.00:1
298.48
F
Y4
14+00.00

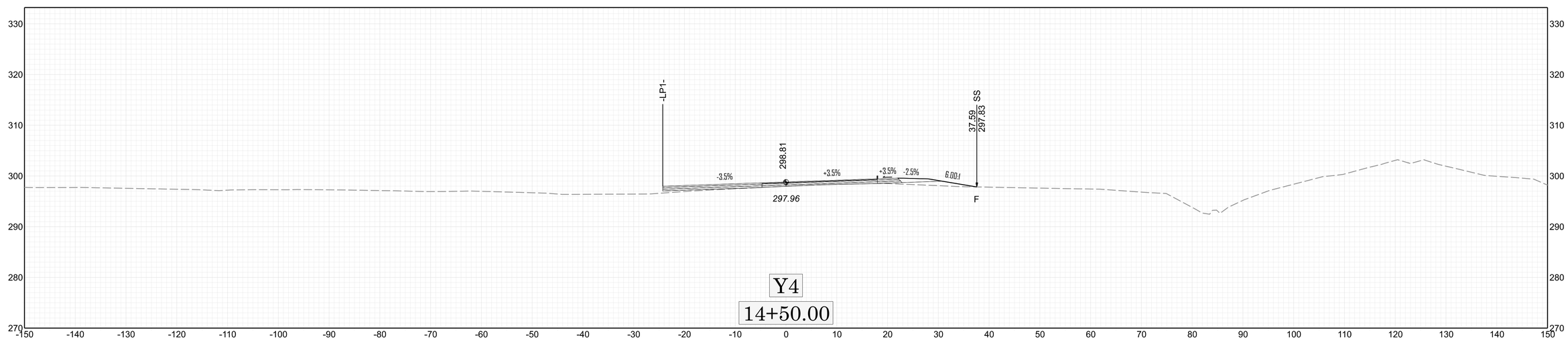

-LP1-
299.70
58.00
SS
295.03
-3.5%
+3.5%
+3.5%
-2.5%
5.67:1
299.25
F
Y4
13+50.00

X-104



Y4

15+00.00



Y4

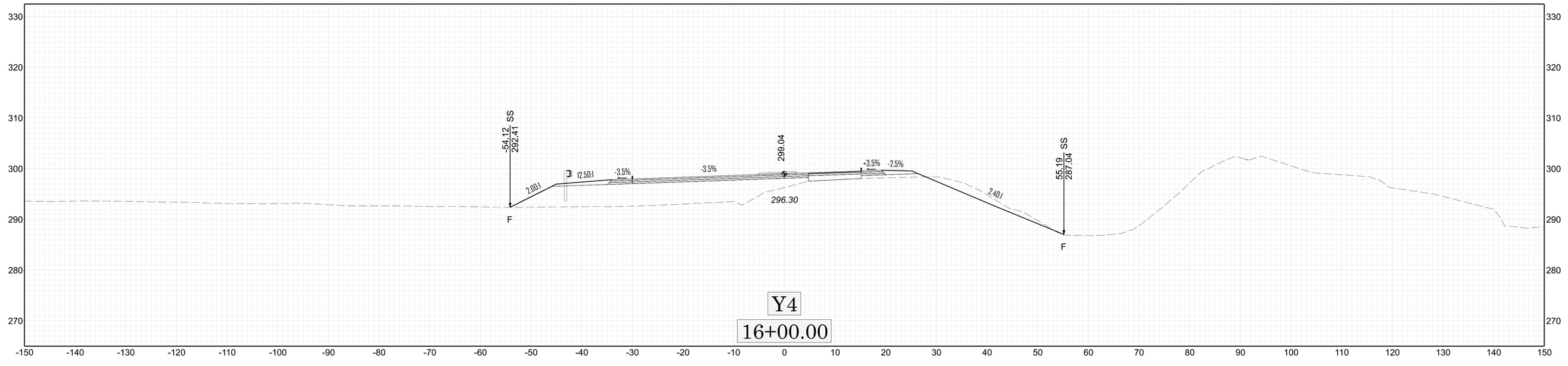
14+50.00

0 10 20

X

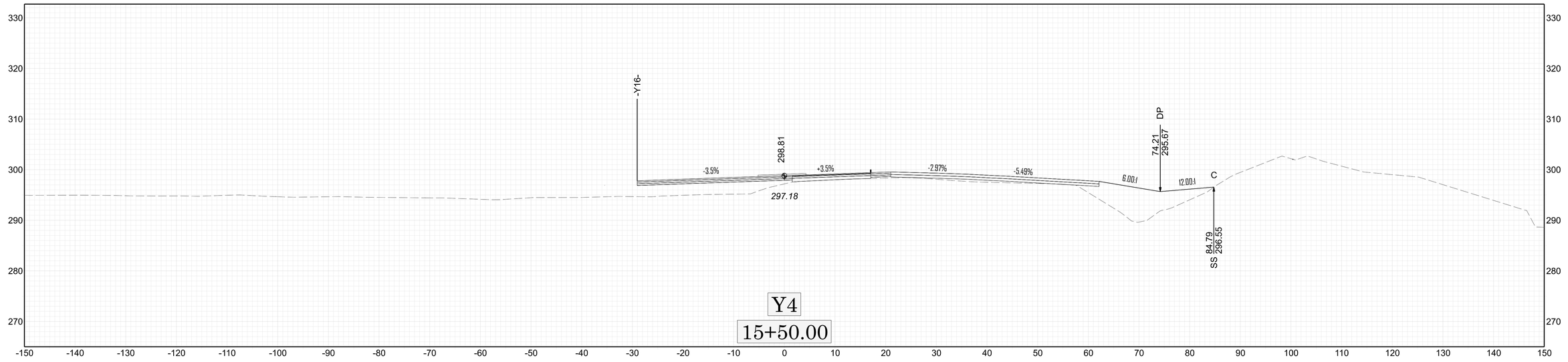
X-105

11/14/23



Y4

16+00.00



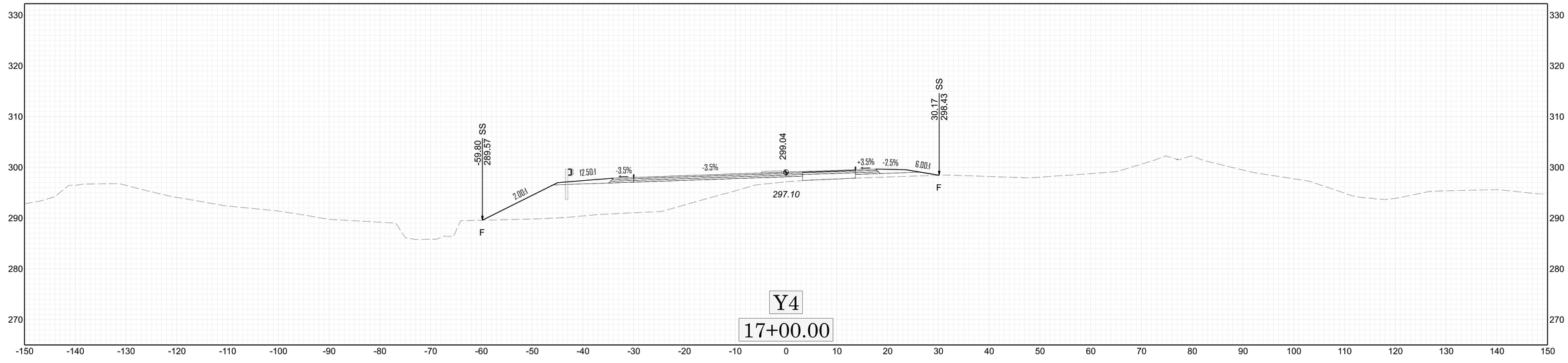
Y4

15+50.00

0 10 20

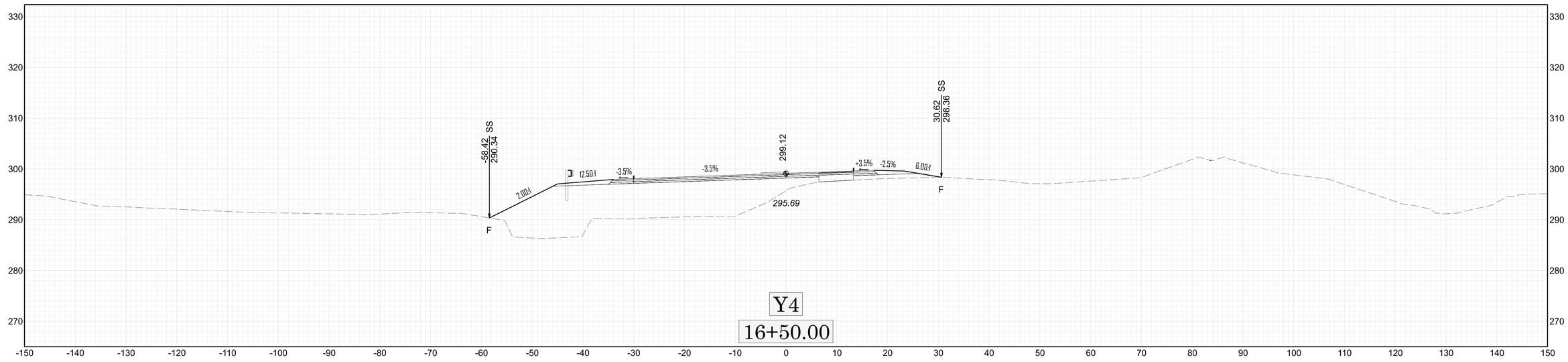
X | X-106

$$$-USER NAME-$$$ - $$$-DATE-$$$



Y4

17+00.00



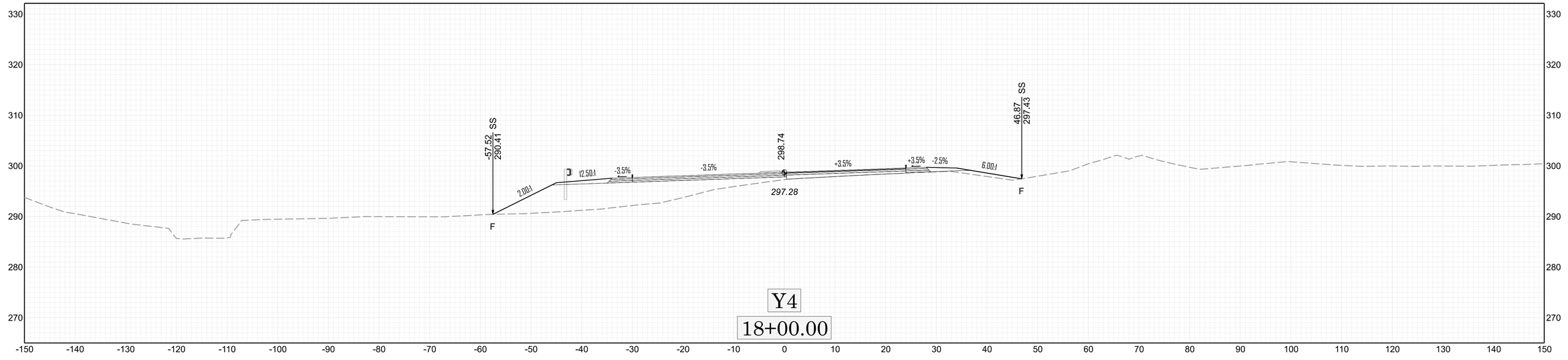
Y4

16+50.00

0 10 20

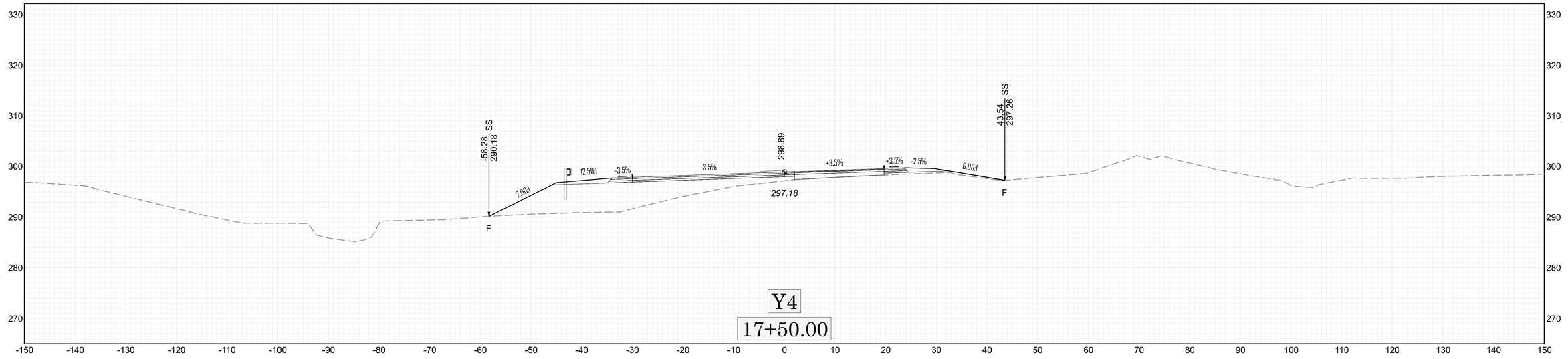
X

X-107



Y4

18+00.00

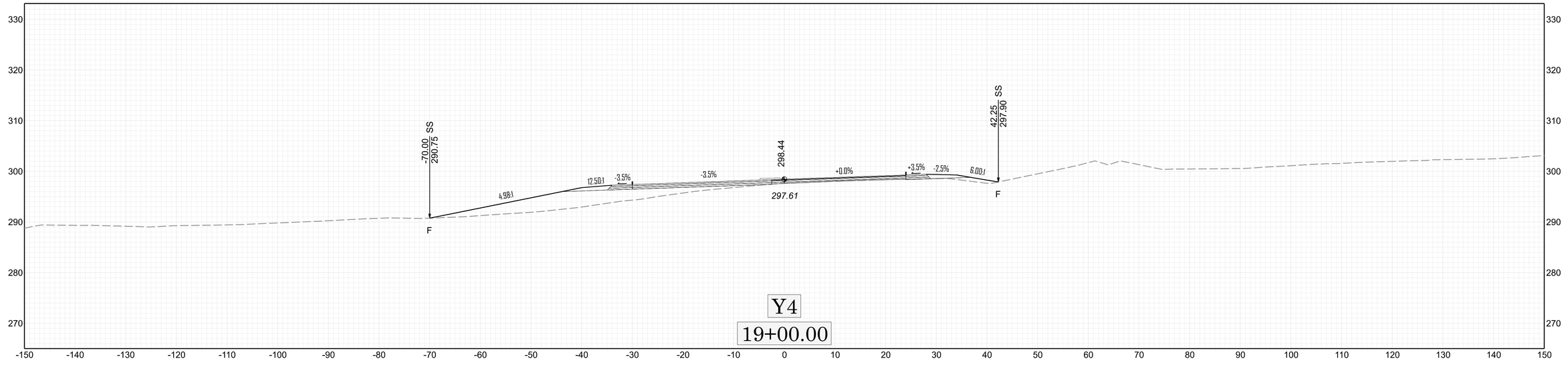


Y4

17+50.00

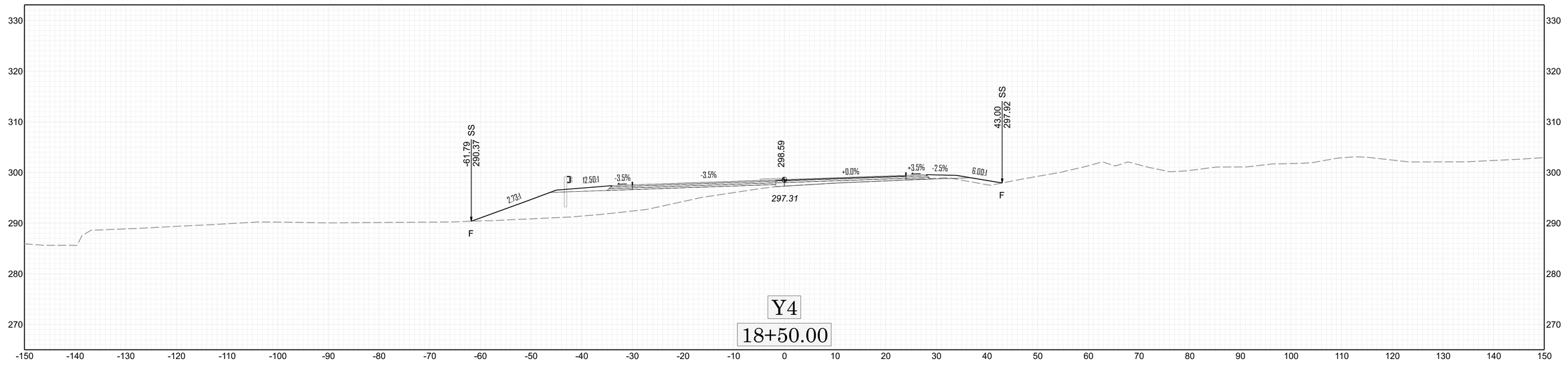
0 10 20

X X-108



Y4

19+00.00



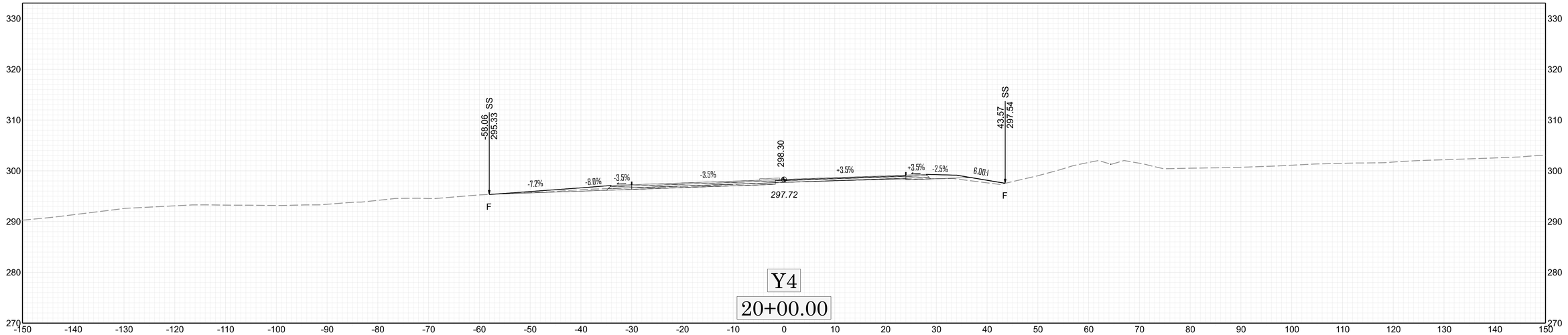
Y4

18+50.00

0 10 20

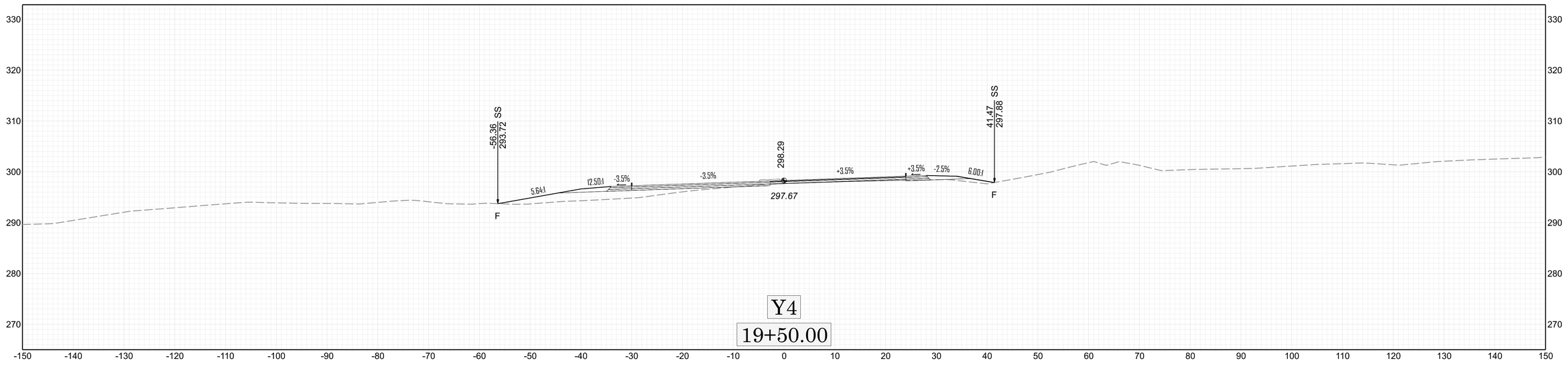
X-109

X



Y4

20+00.00

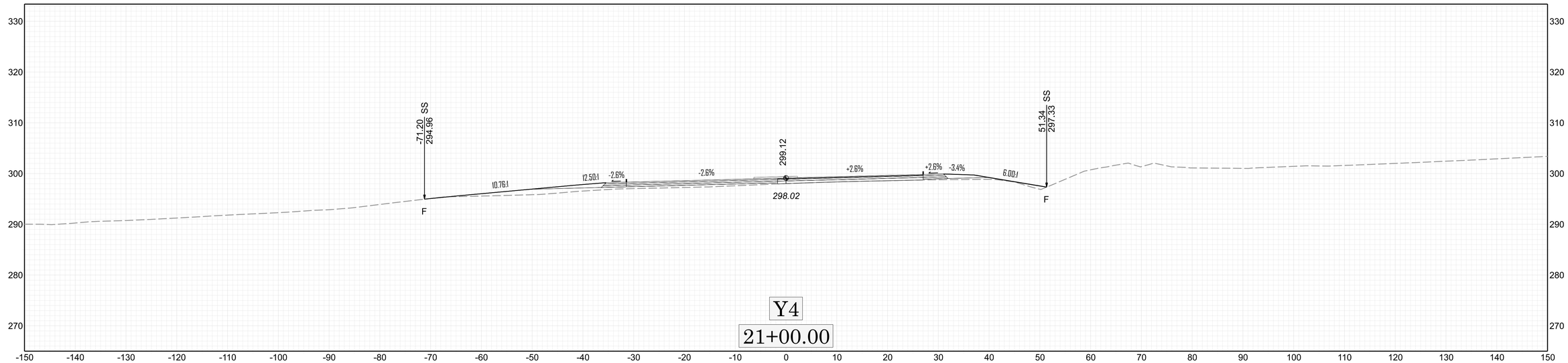


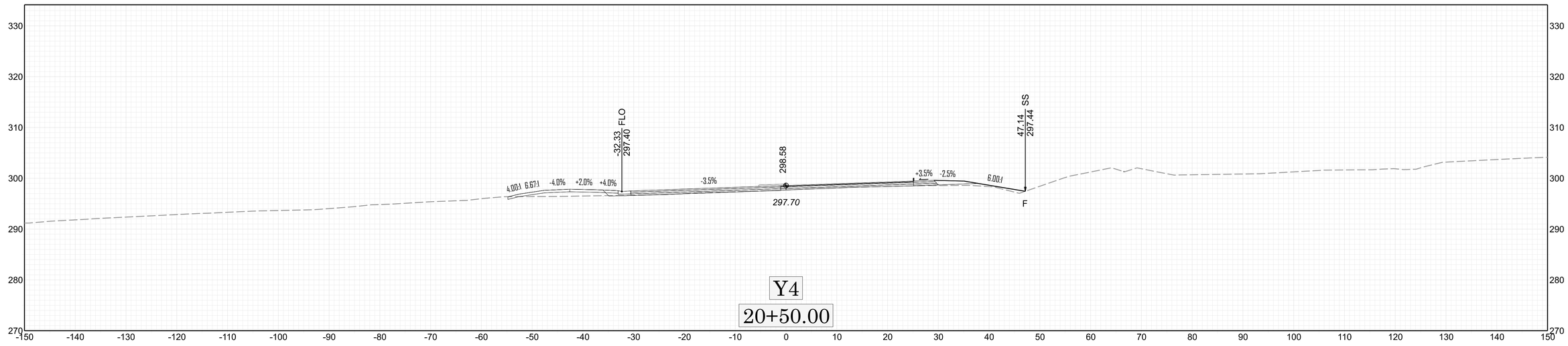
Y4

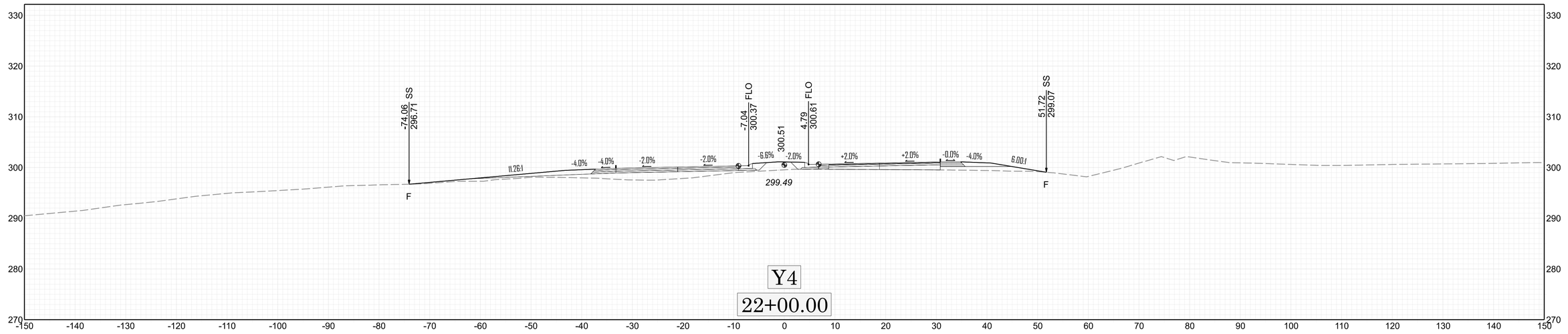
19+50.00

0 10 20

X X-110

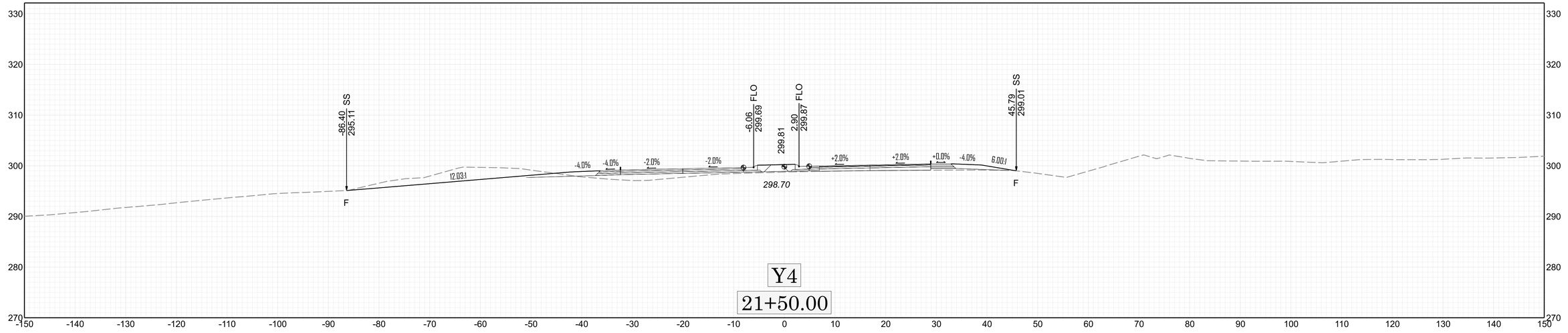

330
320
310
300
290
280
270
-150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
71.20
294.96
SS
F
10.76:1
12.50:1
-2.6%
-2.6%
299.12
298.02
+2.6%
+2.6%
-3.4%
6.00:1
51.34
297.33
SS
F
Y4
21+00.00


330
320
310
300
290
280
270
-150 -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
4.00:1
6.67:1
-4.0%
+2.0%
+4.0%
-32.33
297.40
FLO
-3.5%
298.58
297.70
+3.5%
-2.5%
6.00:1
47.14
297.44
SS
F
Y4
20+50.00



Y4

22+00.00



Y4

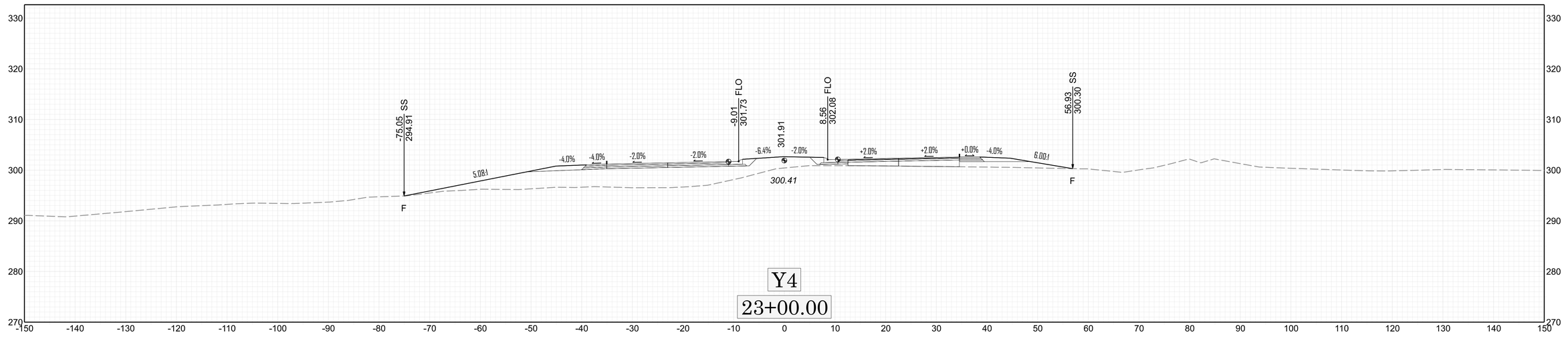
21+50.00

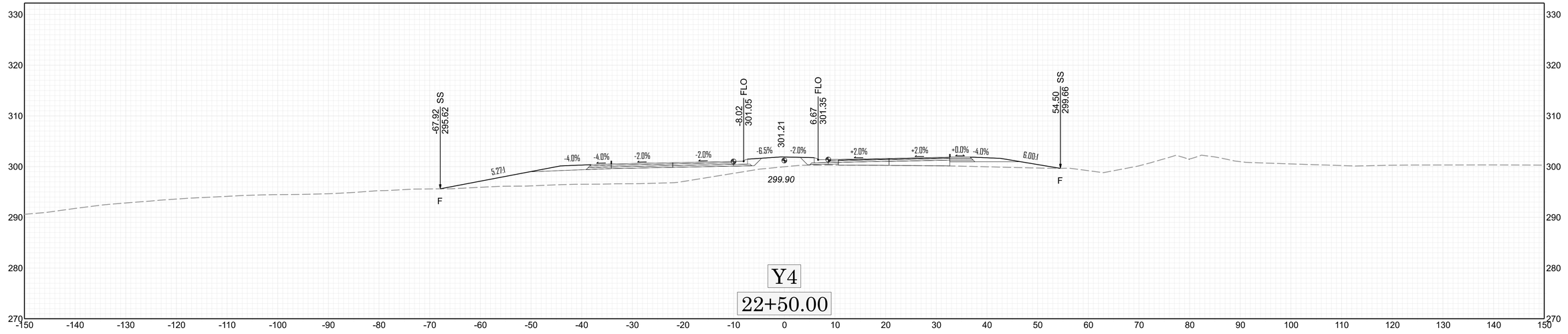
0 10 20

X

X-117

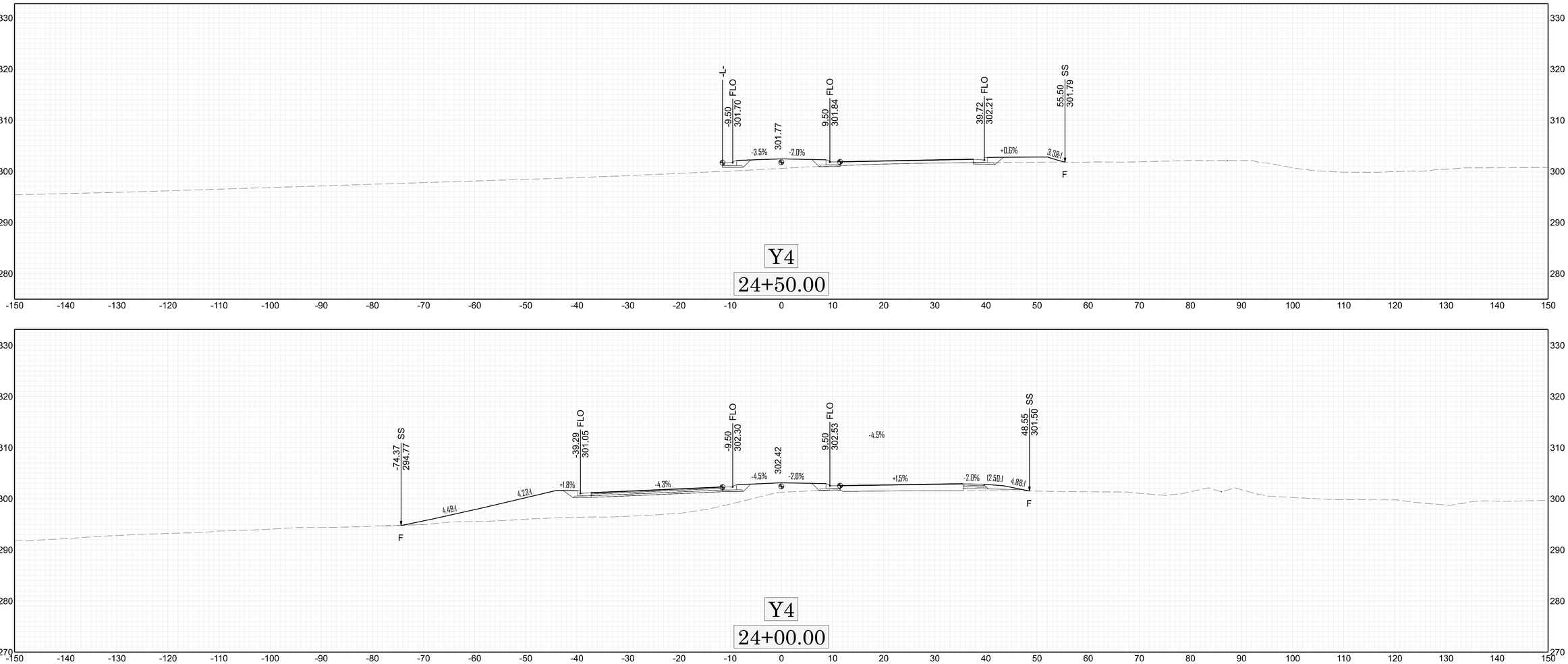
11/14/23





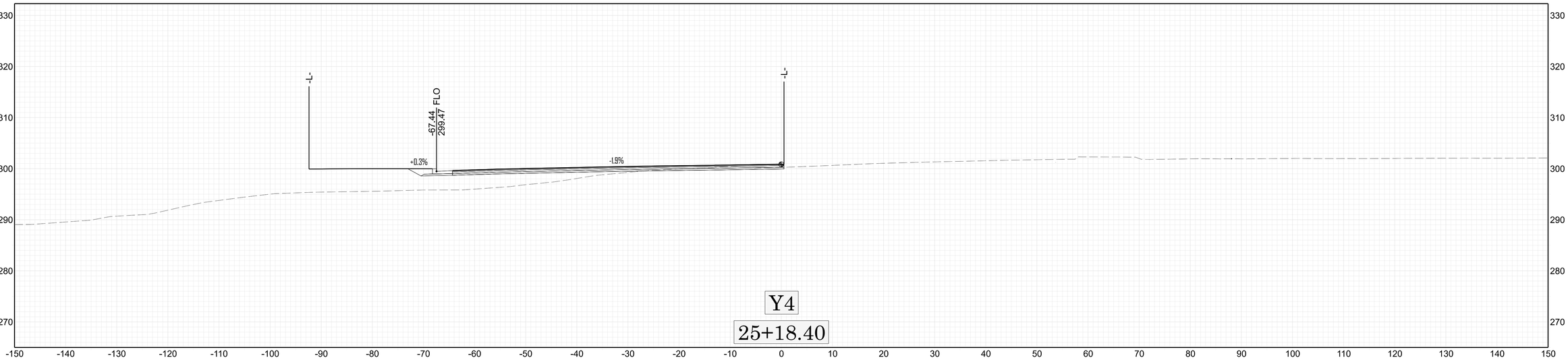
0 10 20

X X-113


-L-
-9.50 FLO 301.70
301.77
9.50 FLO 301.84
39.72 FLO 302.21
55.50 SS 301.79
-3.5%
-2.0%
+0.6%
3.38:1
F
Y4
24+50.00

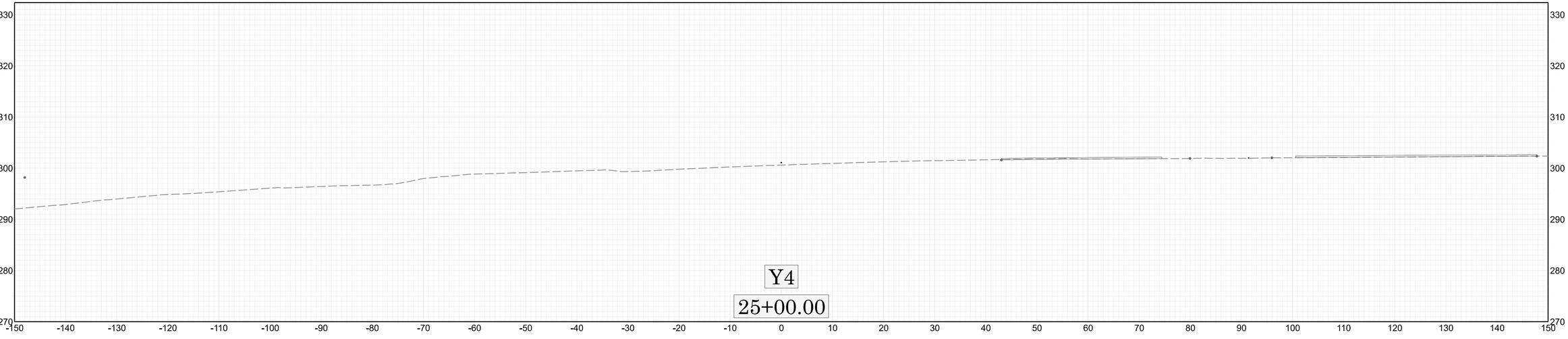
-74.37 SS 294.77
-39.29 FLO 301.05
-9.50 FLO 302.30
9.50 FLO 302.53
48.55 SS 301.50
302.42
4.48:1
4.73:1
+1.8%
-4.3%
-4.5%
-2.0%
-4.5%
+1.5%
-2.0%
12.50:1
4.88:1
F
Y4
24+00.00

-75.50 SS 295.17
-9.50 FLO 302.30
9.50 FLO 302.68
57.73 SS 300.92
302.49
4.84:1
-4.0%
-4.0%
-2.0%
-2.0%
-6.3%
-2.0%
+2.0%
+2.0%
-0.0%
-4.0%
6.00:1
300.73
F
Y4
23+50.00



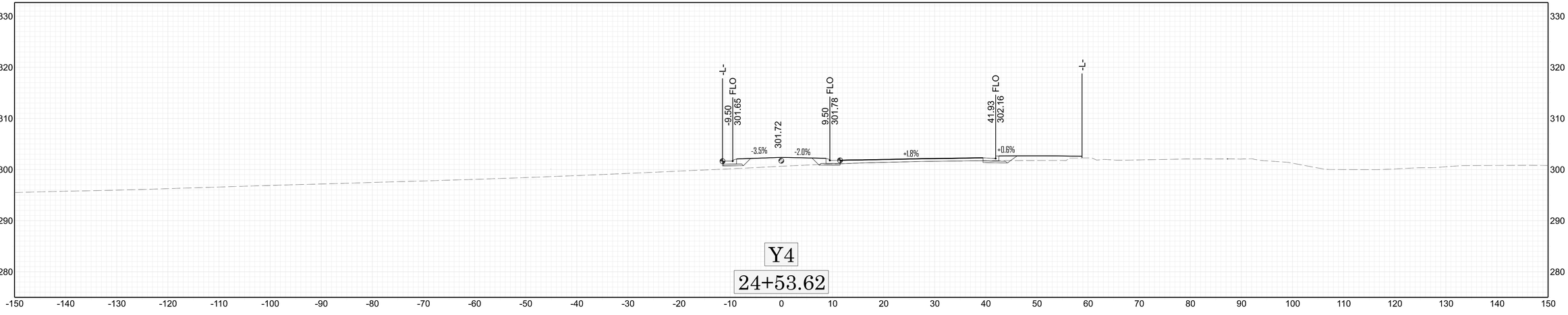
Y4

25+18.40



Y4

25+00.00

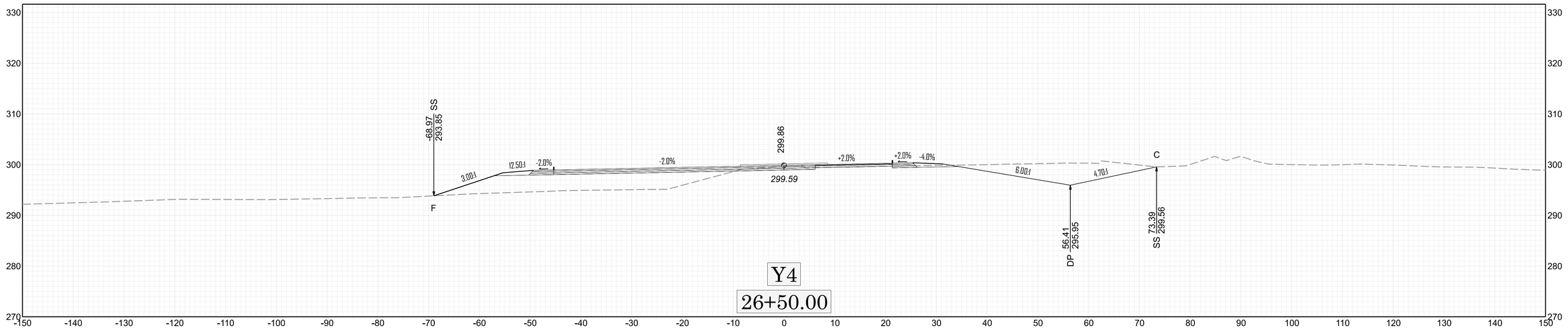


Y4

24+53.62

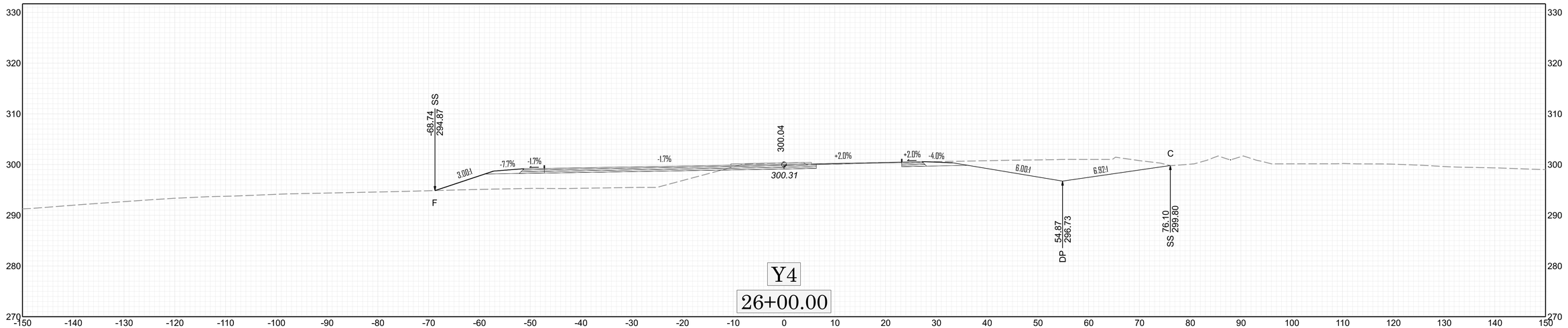
X-115

X



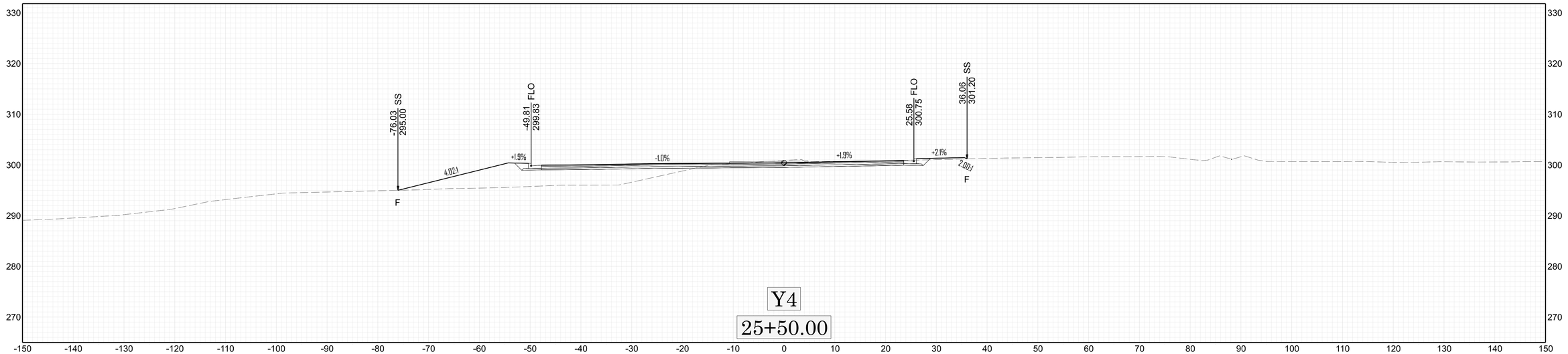
Y4

26+50.00



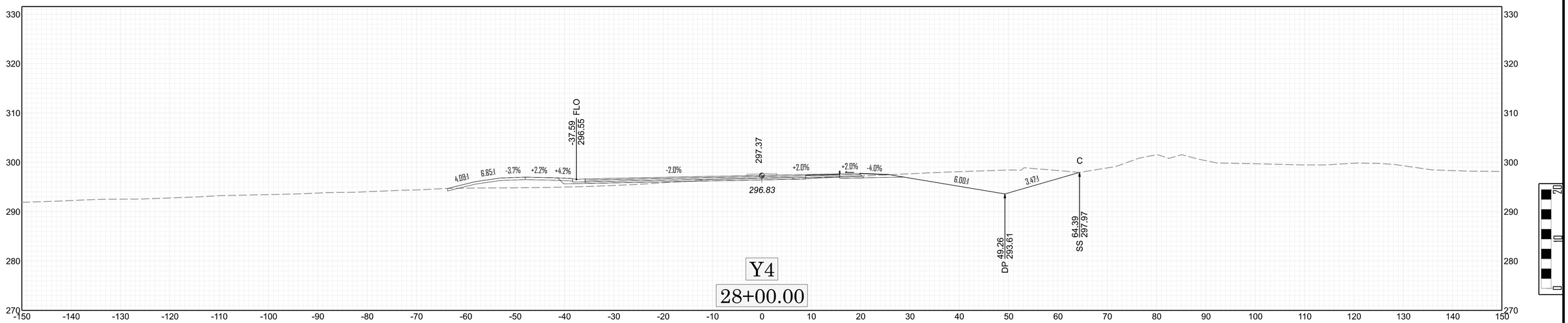
Y4

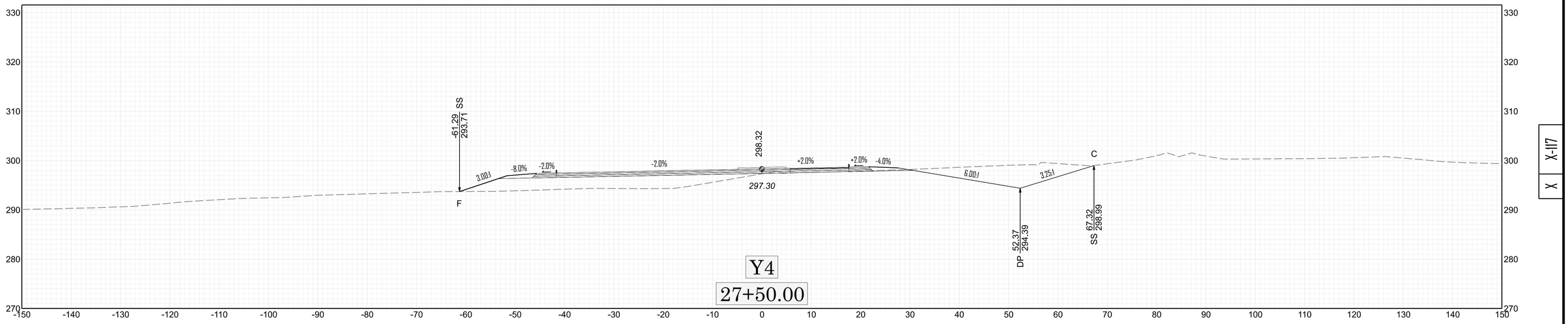
26+00.00

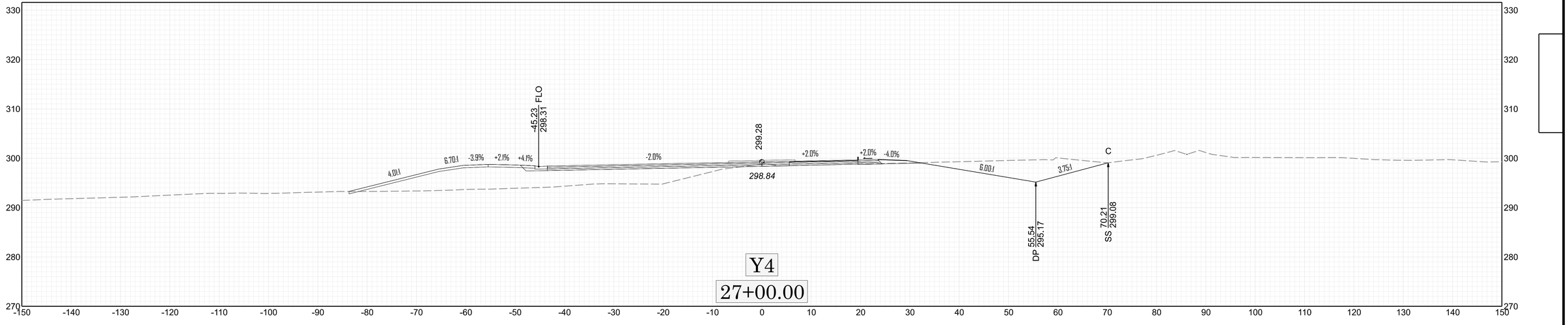


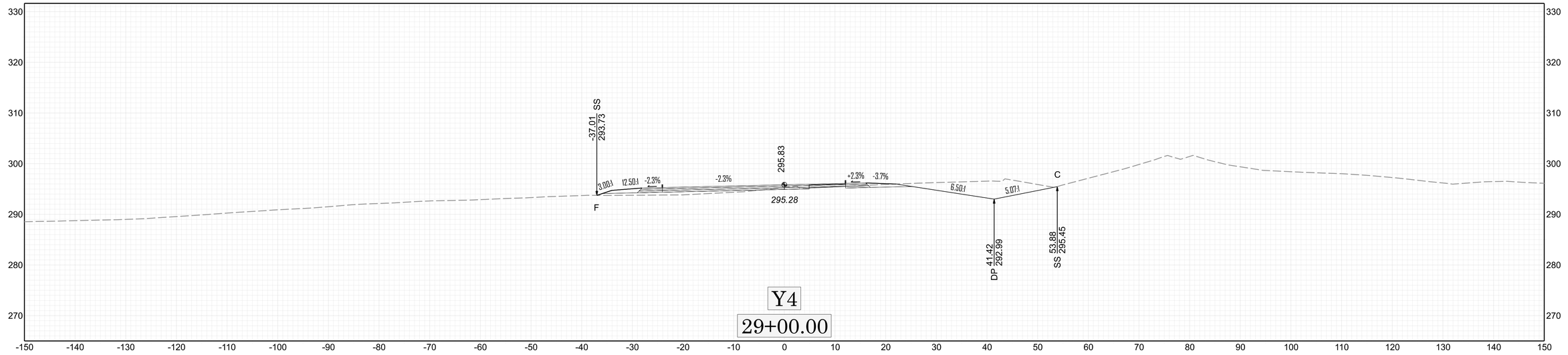
Y4

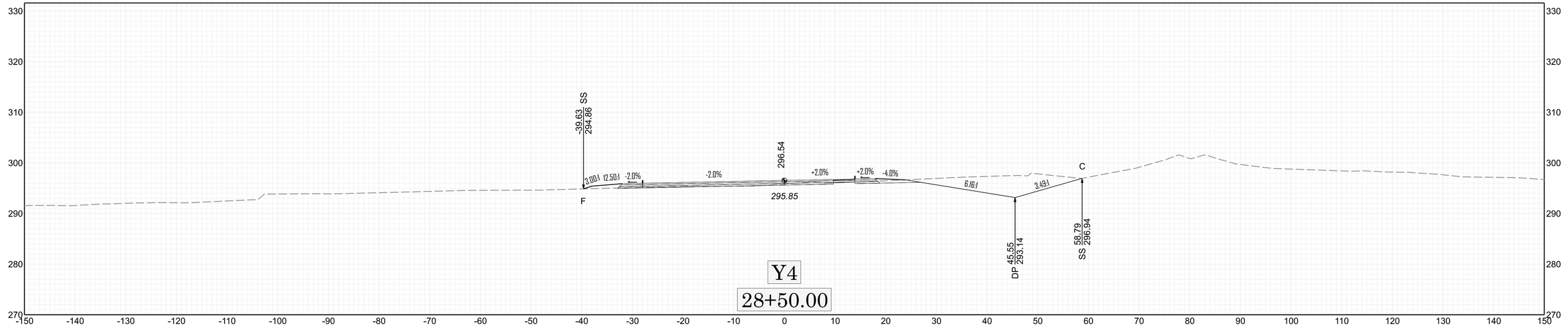
25+50.00


4.0|:1
6.85|:1
-3.7%
+2.2%
+4.2%
-2.0%
297.37
296.83
+2.0%
+2.0%
-4.0%
6.00|:1
3.41|:1
C
-37.59
FLO
296.55
49.26
DP
293.61
64.39
SS
297.97
Y4
28+00.00


-61.29
SS
293.71
3.00|:1
-8.0%
-2.0%
-2.0%
298.32
297.30
+2.0%
+2.0%
-4.0%
6.00|:1
3.25|:1
C
F
52.37
DP
294.39
67.32
SS
298.99
Y4
27+50.00


4.0|:1
6.70|:1
-3.9%
+2.1%
+4.1%
-45.23
FLO
298.31
-2.0%
299.28
298.84
+2.0%
+2.0%
-4.0%
6.00|:1
3.75|:1
C
55.54
DP
295.17
70.21
SS
299.08
Y4
27+00.00

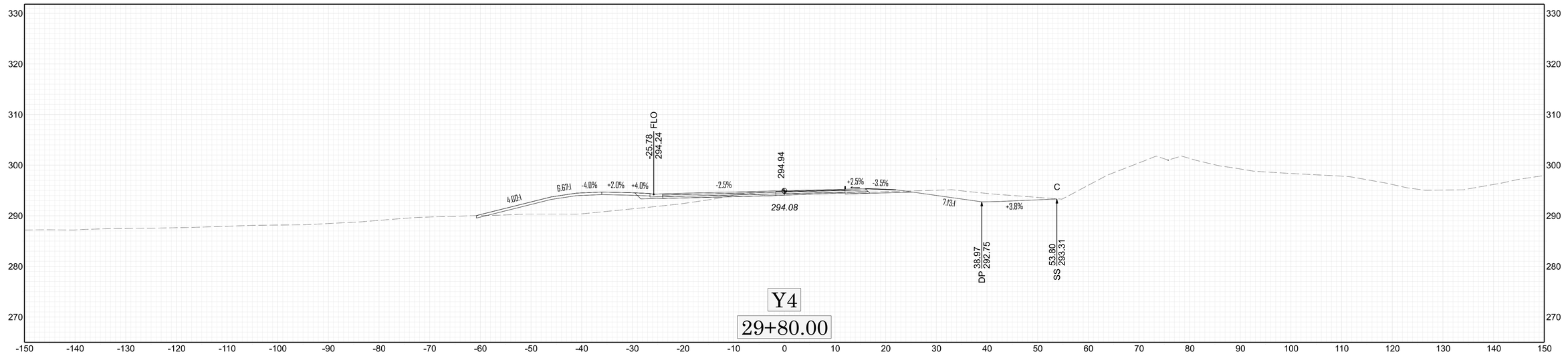

330
320
310
300
290
280
270
-150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
-37.01 SS
293.73
3.00:1
12.50:1
-2.3%
-2.3%
295.83
+2.3%
-3.7%
295.28
6.50:1
5.07:1
C
F
DP 41.42
292.99
SS 53.88
295.45
Y4
29+00.00

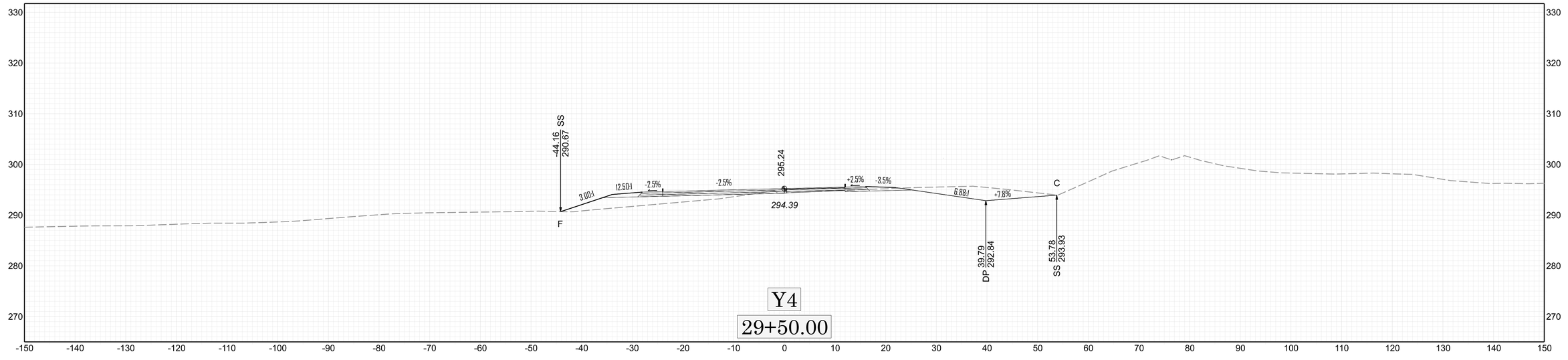

330
320
310
300
290
280
270
-150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
-39.63 SS
294.86
3.00:1
12.50:1
-2.0%
-2.0%
296.54
+2.0%
+2.0%
-4.0%
295.85
6.16:1
3.49:1
C
F
DP 45.55
293.14
SS 58.79
296.94
Y4
28+50.00

0 10 20

X-118

X


330
320
310
300
290
280
270
-150 -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
-25.78
294.24
FLO
294.94
294.08
4.00:1
6.67:1
-4.0%
+2.0%
+4.0%
-2.5%
+2.5%
-3.5%
7.13:1
+3.8%
C
38.97
292.75
DP
53.80
293.31
SS
Y4
29+80.00

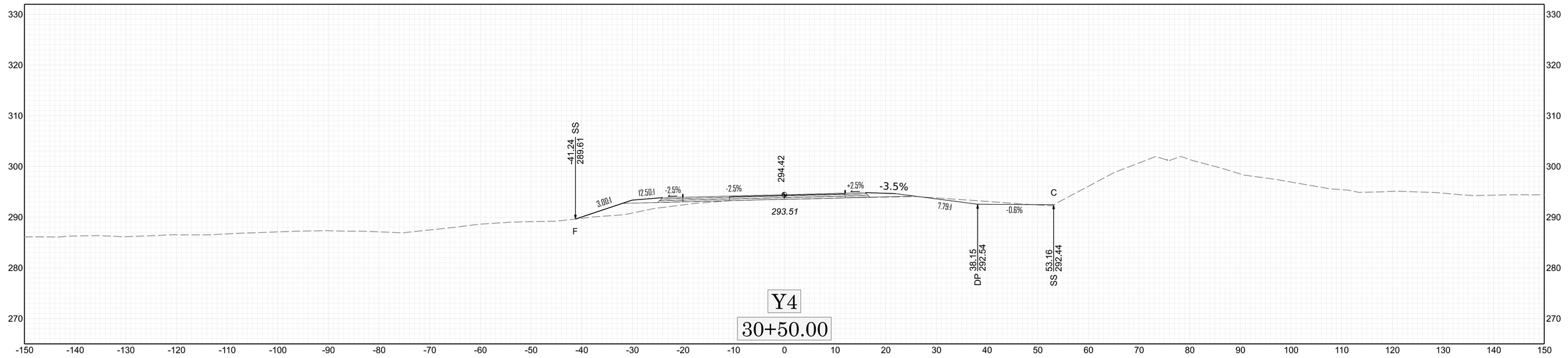

330
320
310
300
290
280
270
-150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
-44.16
290.67
SS
295.24
294.39
3.00:1
12.50:1
-2.5%
-2.5%
+2.5%
-3.5%
6.88:1
+7.8%
C
F
39.79
292.84
DP
53.78
293.93
SS
Y4
29+50.00

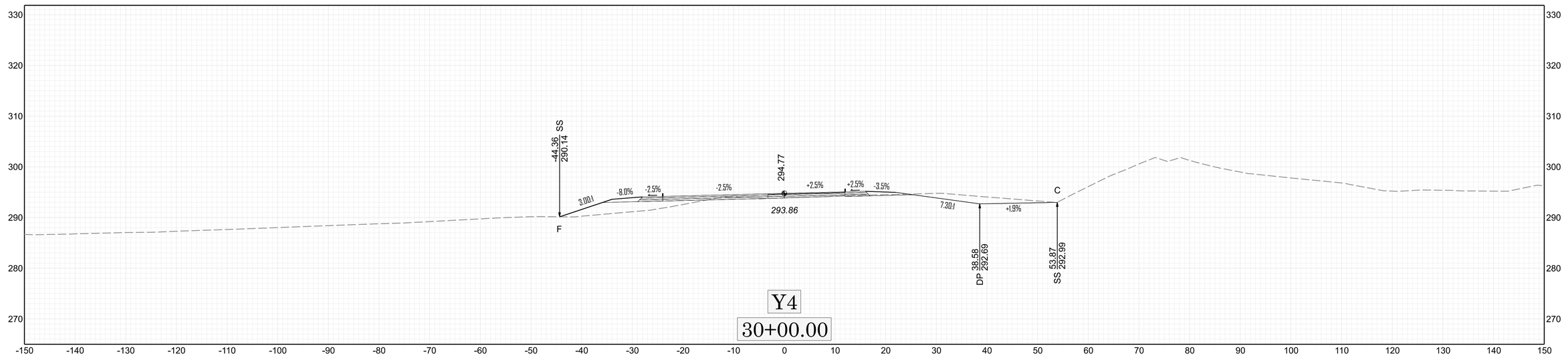
0 10 20

X-119

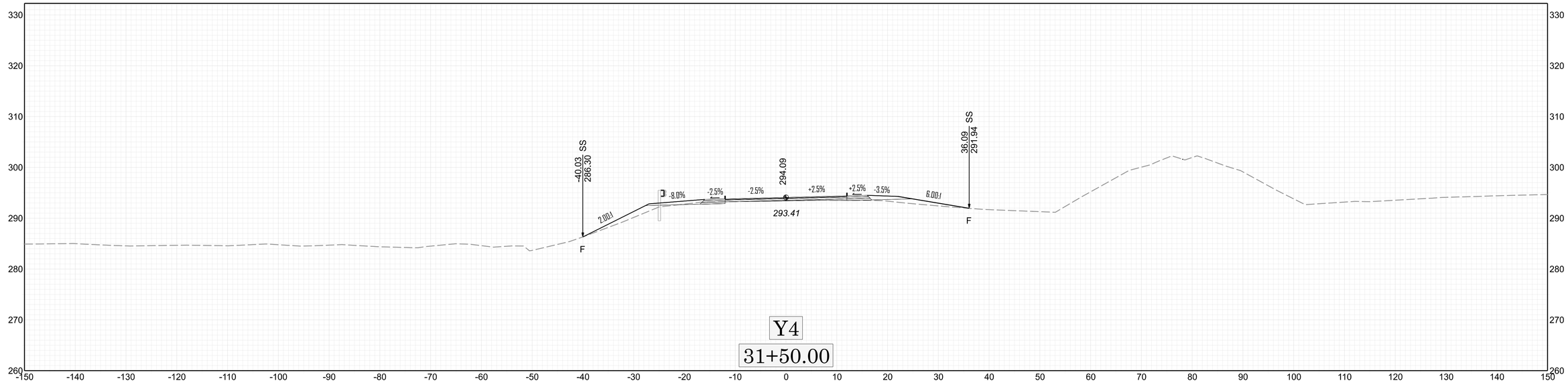
X

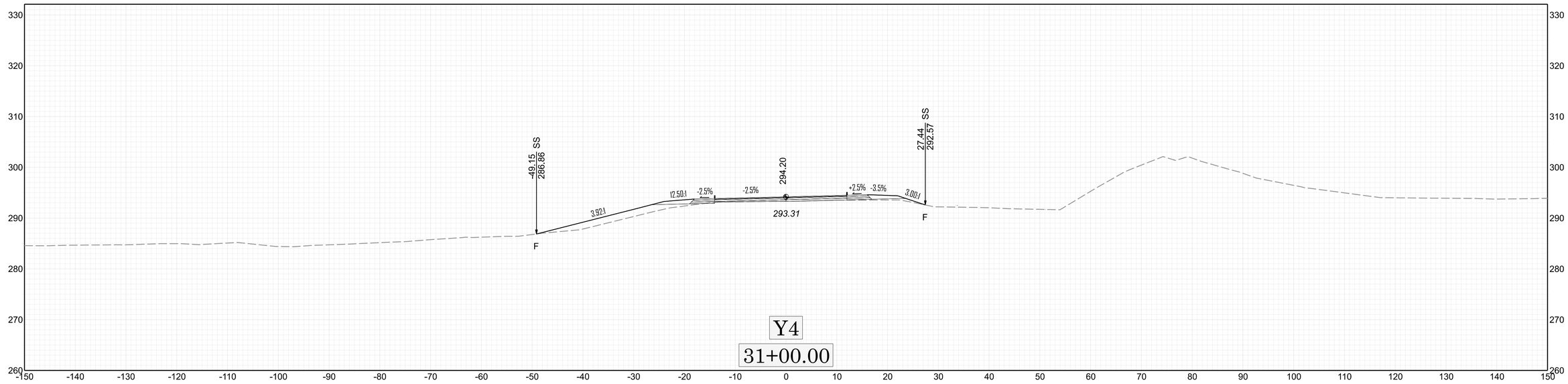
11/14/23


330
320
310
300
290
280
270
-150 -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
-41.24
289.61
SS
3.00:1
12.50:1
-2.5%
-2.5%
294.42
293.51
+2.5%
-3.5%
7.79:1
-0.6%
C
F
DP 38.15
292.54
SS 53.16
292.44
Y4
30+50.00


330
320
310
300
290
280
270
-150 -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
-44.36
290.14
SS
3.00:1
-8.0%
-2.5%
-2.5%
294.77
293.86
+2.5%
+2.5%
-3.5%
7.30:1
+1.9%
C
F
DP 38.58
292.69
SS 53.87
292.99
Y4
30+00.00

0
10
20
X
X-120

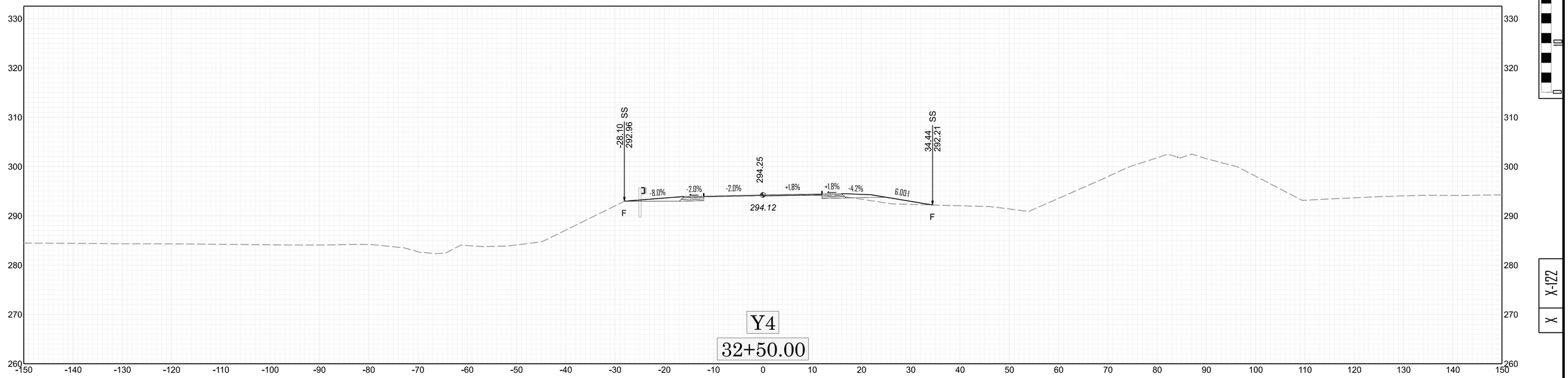

330
320
310
300
290
280
270
260
-150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
-40.03
286.30
SS
F
2.00:1
-8.0%
-2.5%
-2.5%
294.09
293.41
+2.5%
+2.5%
-3.5%
6.00:1
36.09
291.94
SS
F
Y4
31+50.00


330
320
310
300
290
280
270
260
-150 -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
-49.15
286.86
SS
F
3.92:1
12.50:1
-2.5%
-2.5%
294.20
293.31
+2.5%
-3.5%
3.00:1
27.44
292.57
SS
F
Y4
31+00.00

0 10 20

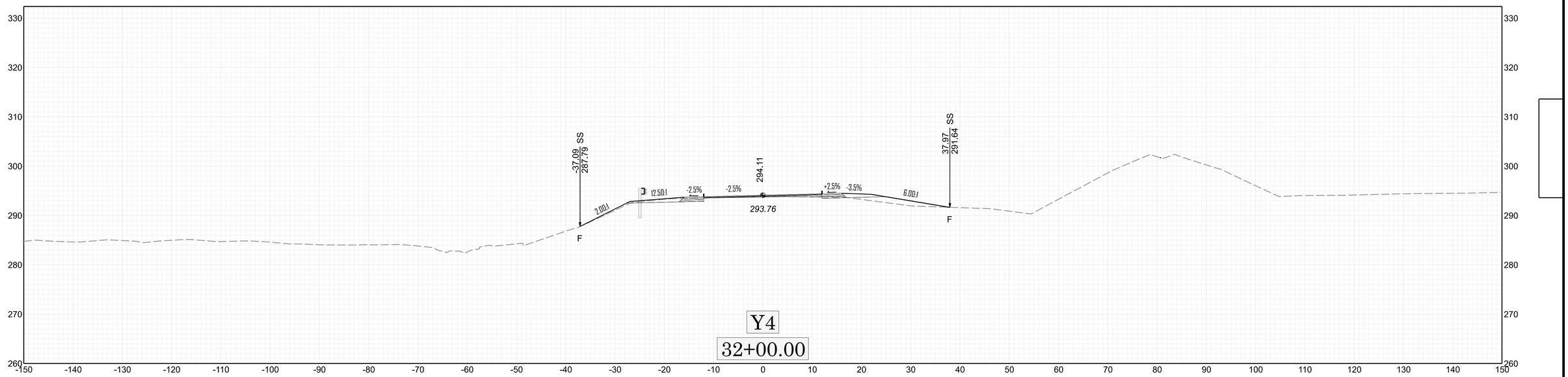
X-121

X



Y4

32+50.00



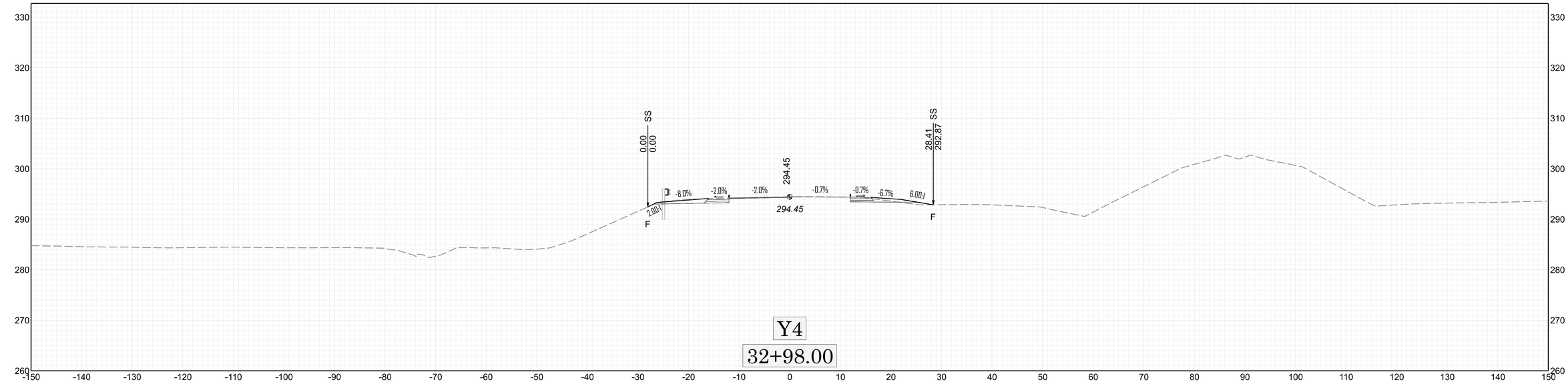
Y4

32+00.00

0 10 20

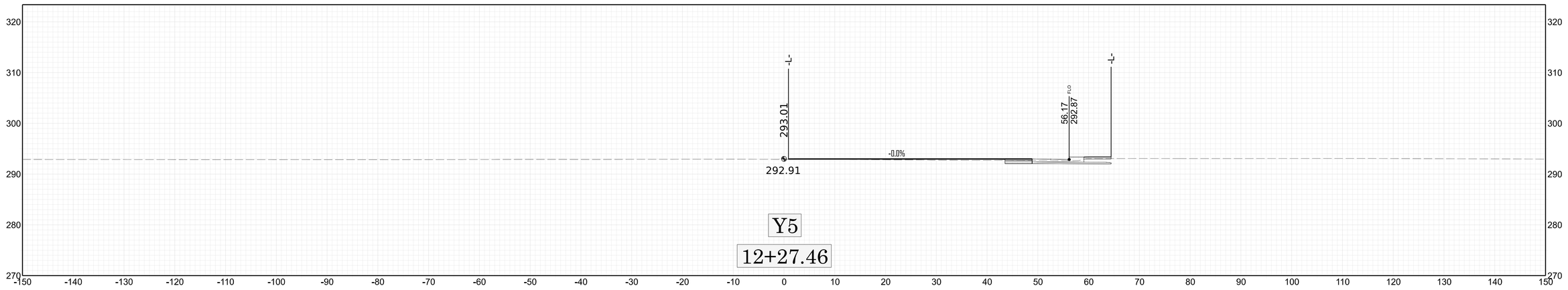
X

X-123



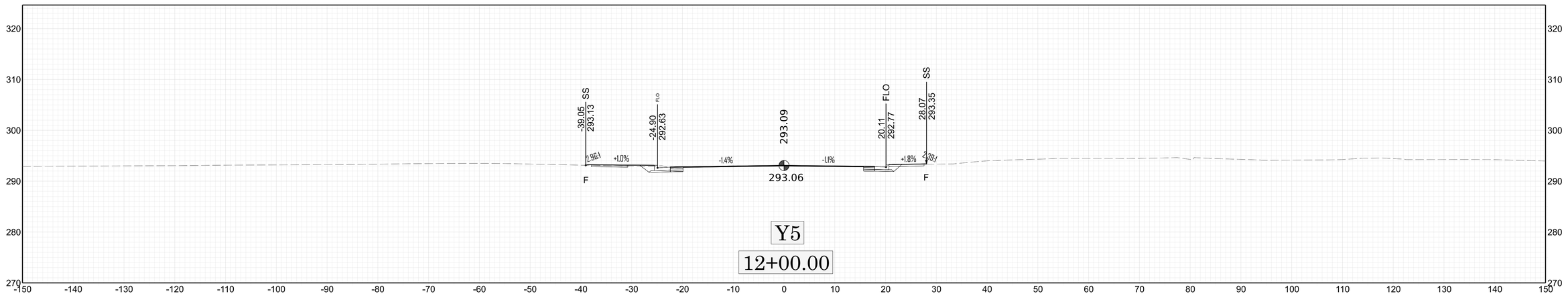
Y4

32+98.00



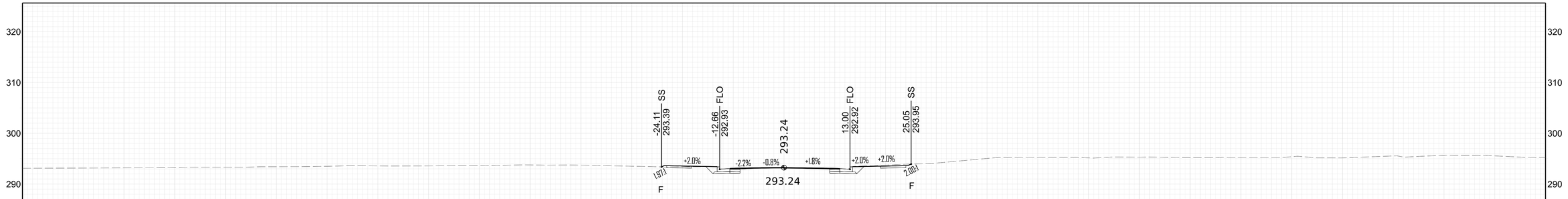
Y5

12+27.46



Y5

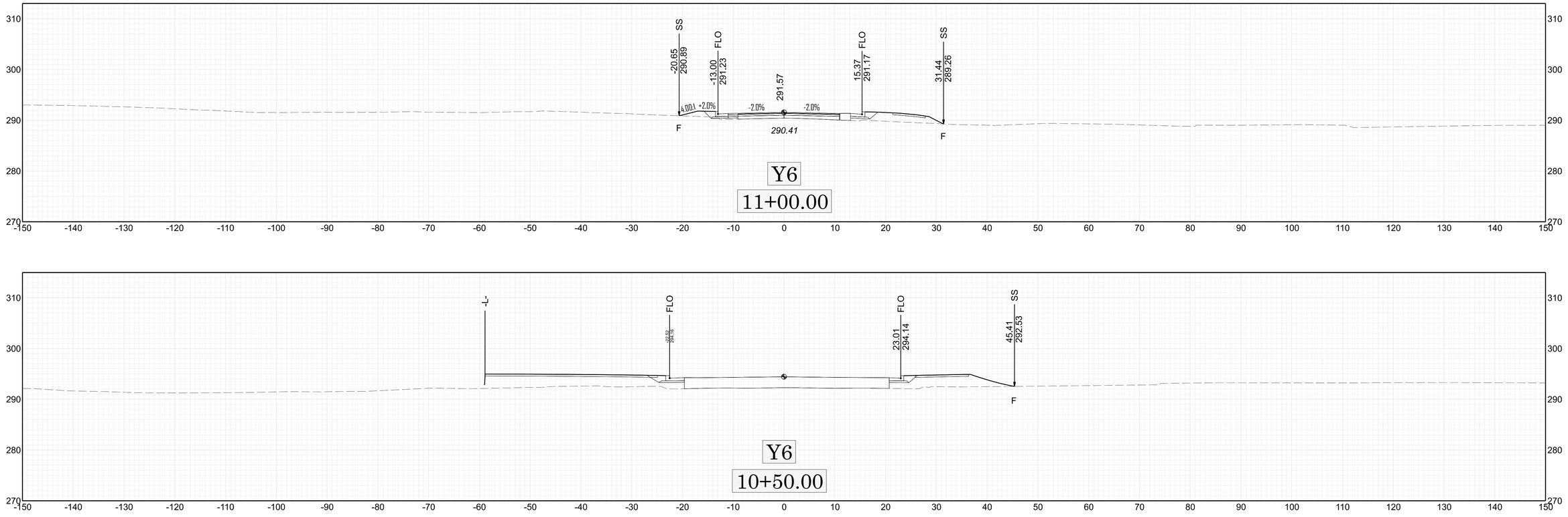
12+00.00

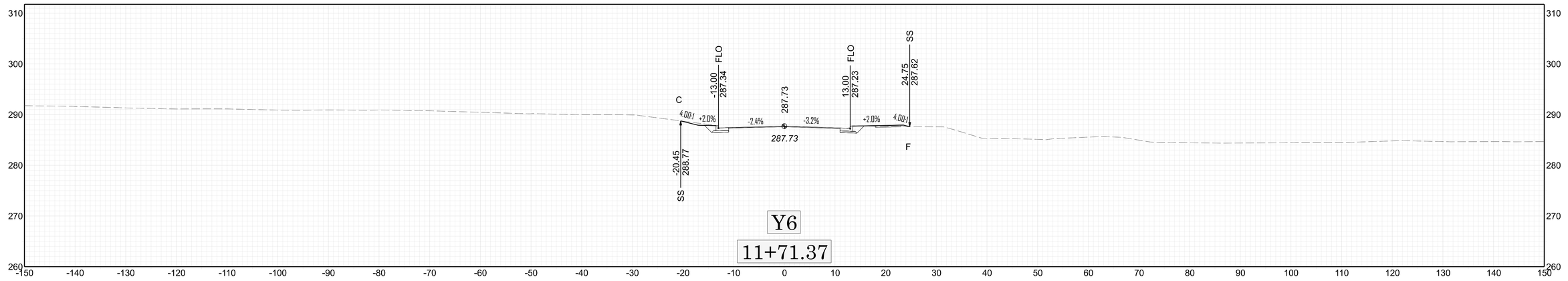


Y5

11+53.00

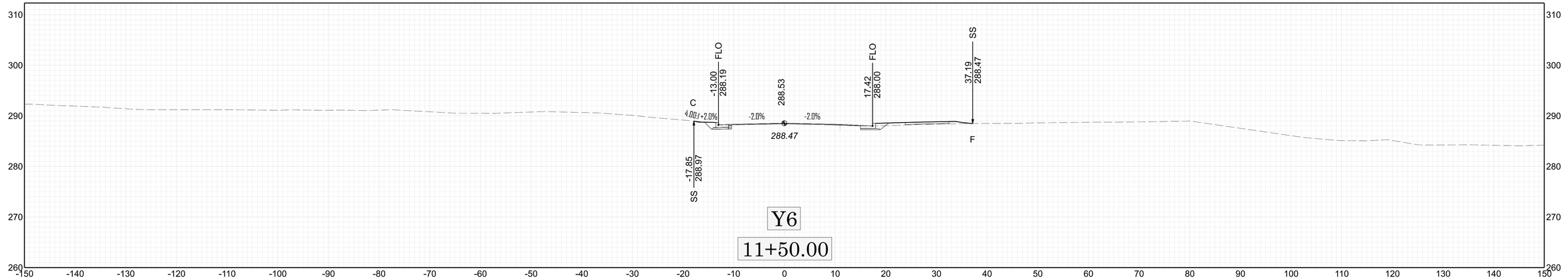
X-124


SS
-20.65
290.89
FLO
-13.00
291.23
291.57
FLO
15.37
291.17
SS
31.44
289.26
4.00Δ
+2.0%
-2.0%
-2.0%
F
290.41
F
Y6
11+00.00
-L-
FLO
-20.68
294.16
FLO
23.01
294.14
SS
45.41
292.53
F
Y6
10+50.00
-L-
294.37
-0.2%
292.90
FLO
45.63
294.19
-L-
Y6
10+34.23
310
300
290
280
270
-150
-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
0
10
20
X-125
X



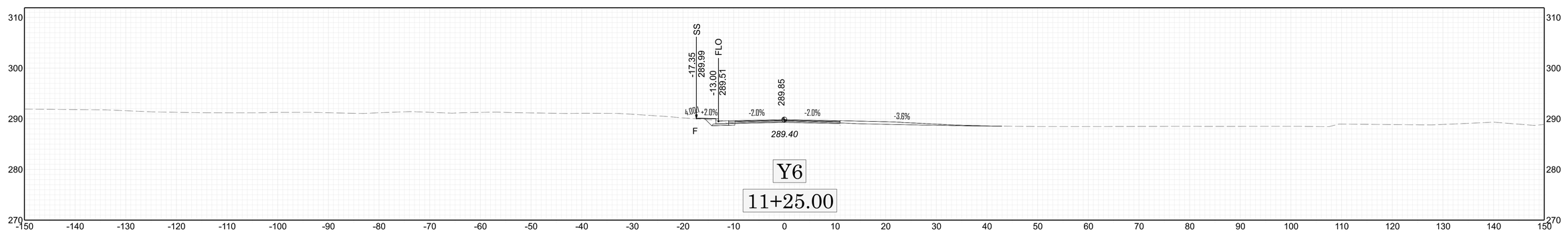
Y6

11+71.37



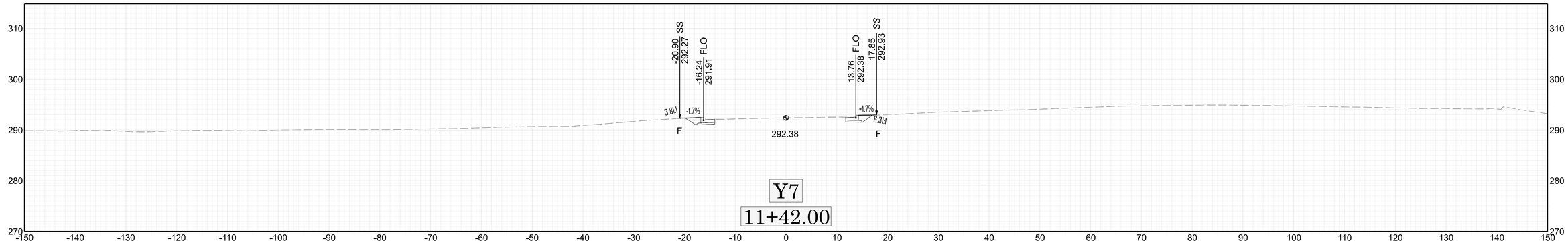
Y6

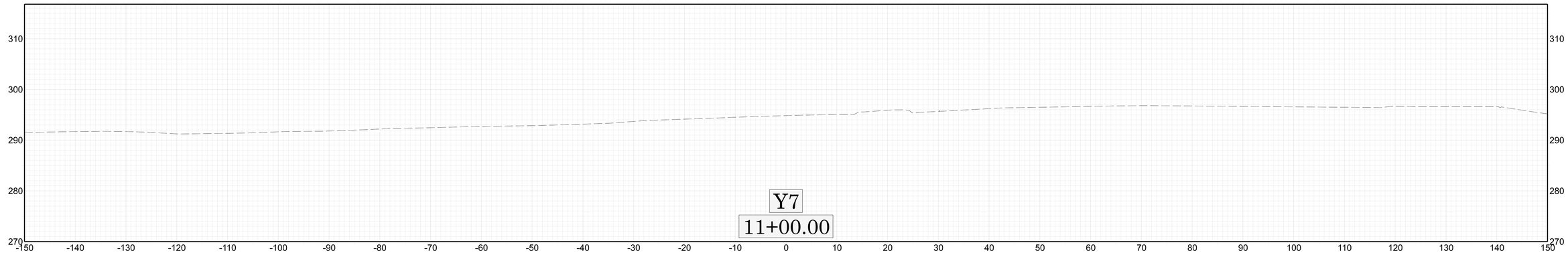
11+50.00



Y6

11+25.00

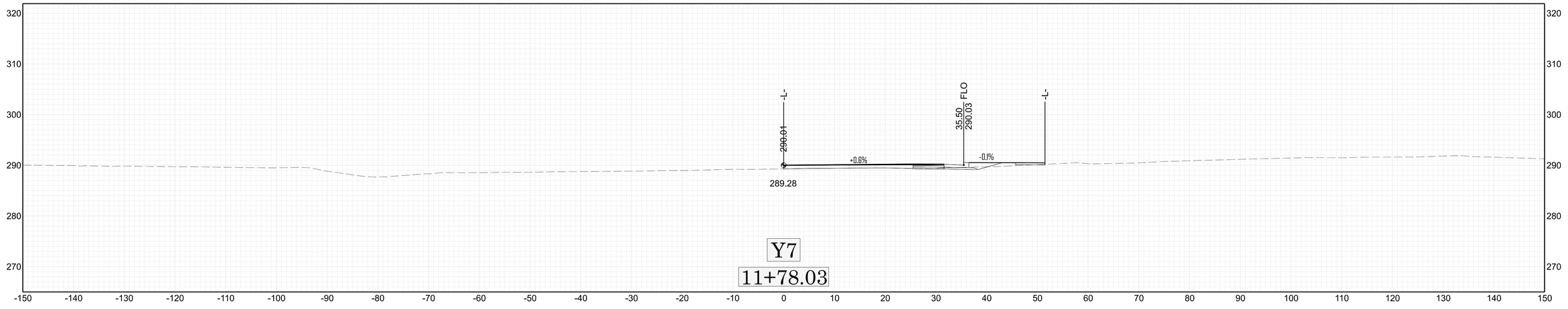

-20.90
292.27
SS
-16.24
291.91
FLO
3.81H
-1.7%
F
292.38
13.76
292.38
FLO
17.85
292.93
SS
+1.7%
6.3H
F
Y7
11+42.00
310
300
290
280
270
-150
-140
-130
-120
-110
-100
-90
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150

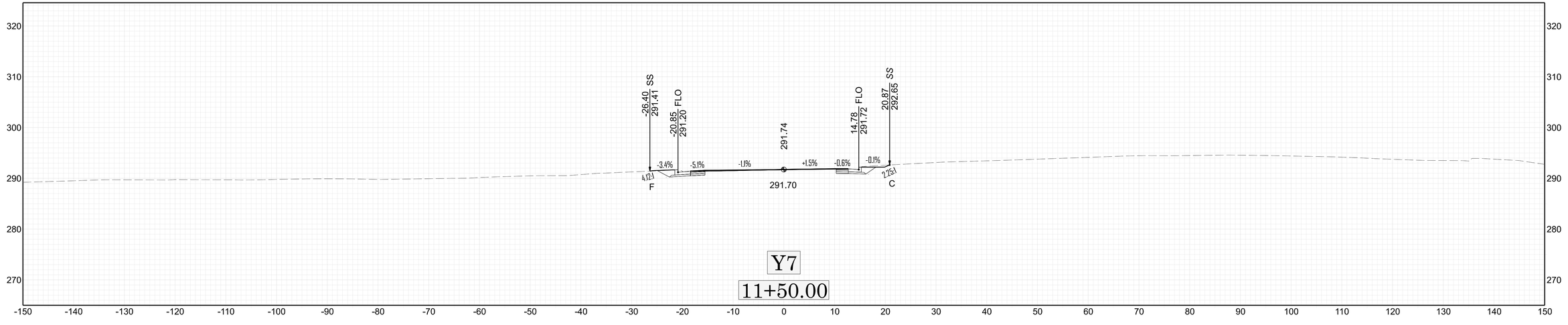

Y7
11+00.00
310
300
290
280
270
-150
-140
-130
-120
-110
-100
-90
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150


20
10
0

X-127

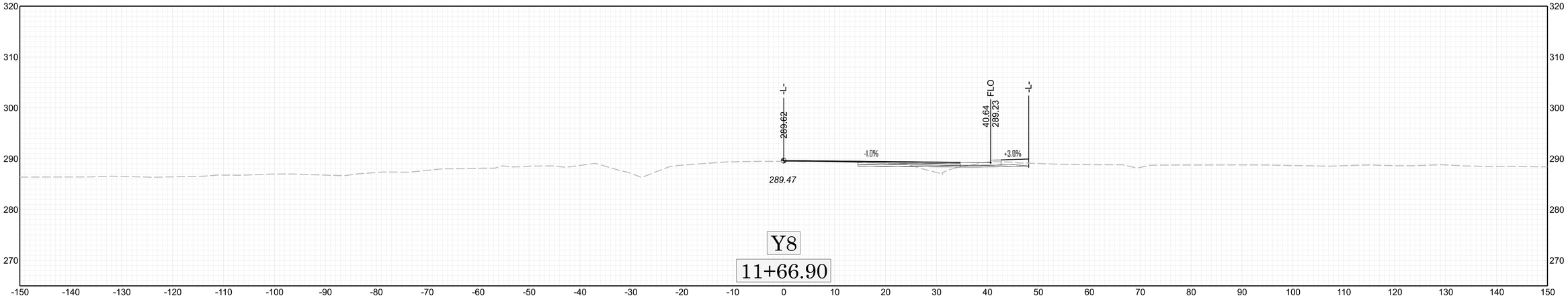
X

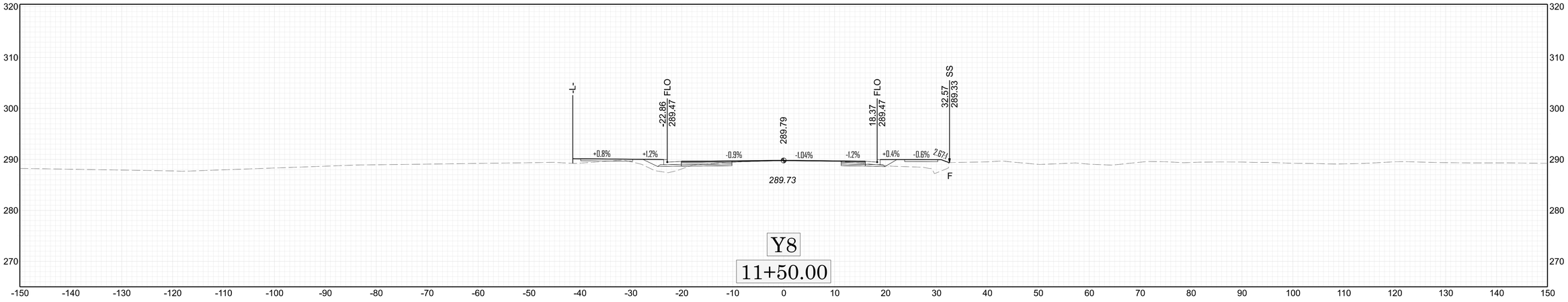


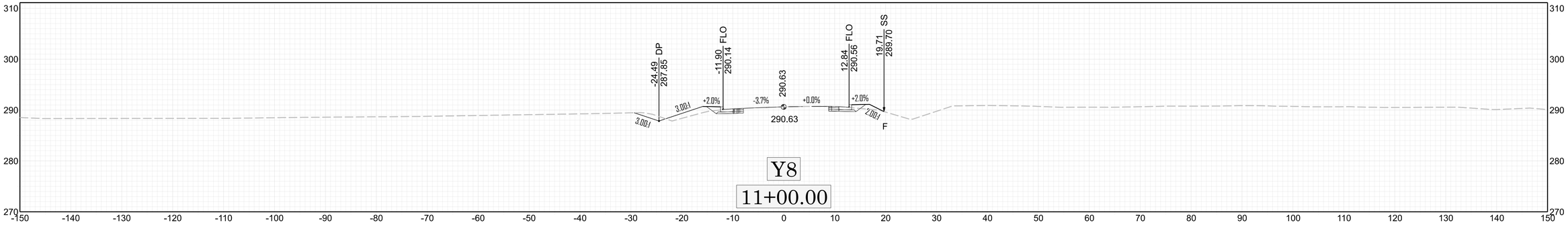


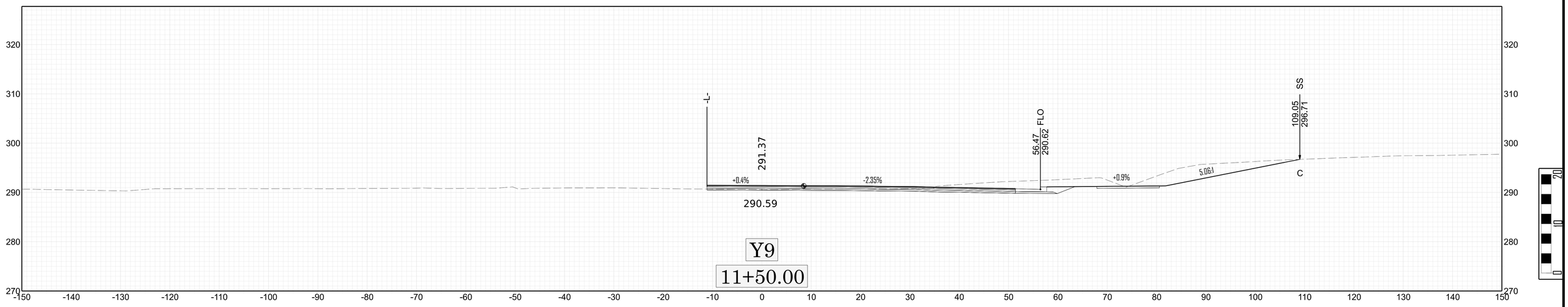
X-128

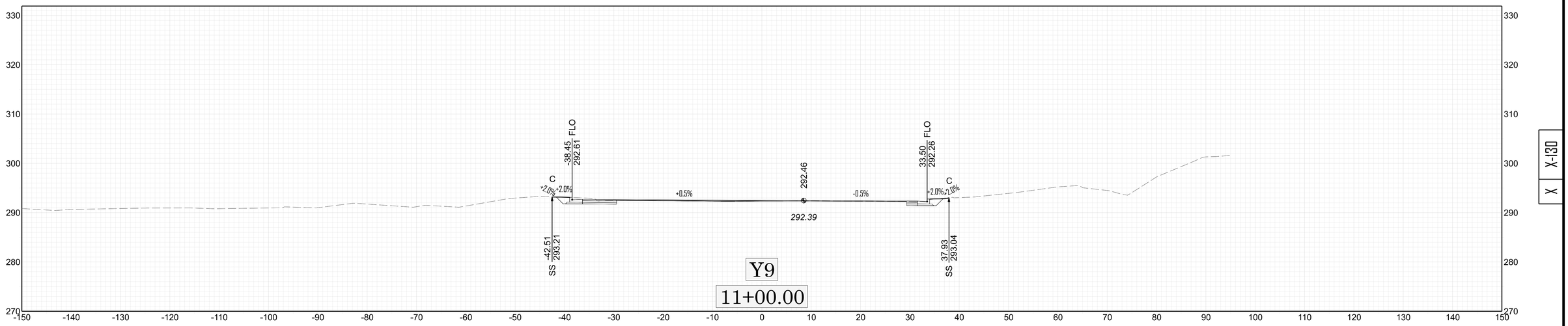
$$$-USER NAME-$$$ - $$$-DATE-$$$

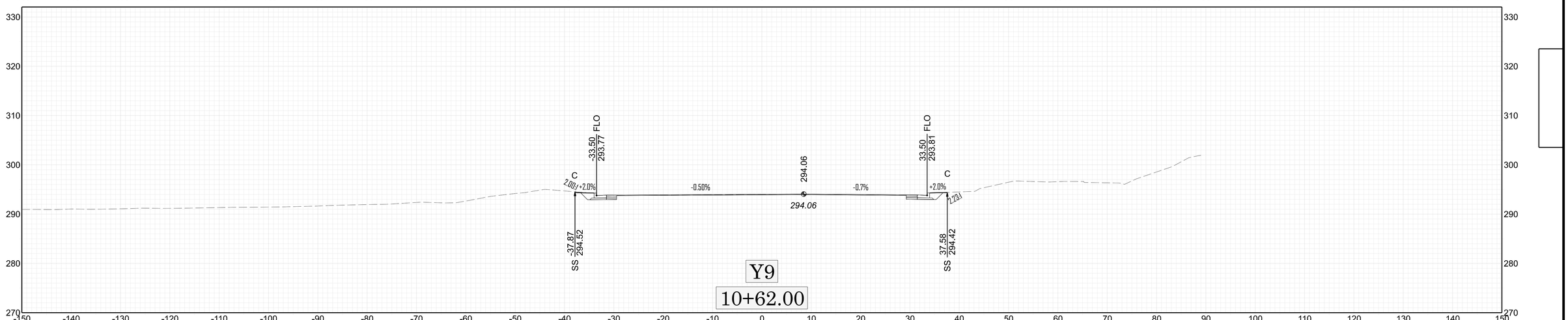

-L-
289.62
-1.0%
40.64
289.23
FLO
+3.0%
-L-
289.47
Y8
11+66.90


-L-
-22.86
289.47
FLO
+0.8%
+1.2%
-0.9%
289.79
-1.04%
-1.2%
18.37
289.47
FLO
+0.4%
-0.6%
2.67:1
32.57
289.33
SS
289.73
F
Y8
11+50.00


-24.49
287.85
DP
3.00:1
-11.90
290.14
FLO
+2.0%
-3.7%
290.63
+0.0%
12.84
290.56
FLO
+2.0%
19.71
289.70
SS
3.00:1
2.00:1
290.63
F
Y8
11+00.00


-L-
291.37
+0.4%
-2.35%
290.59
56.47
290.62
FLO
+0.9%
5.06:1
109.05
296.71
SS
C
Y9
11+50.00


-38.45
292.61
FLO
C
+2.0%
+2.0%
+0.5%
292.46
292.39
-0.5%
33.50
292.26
FLO
C
+2.0%
+2.0%
-42.51
293.21
SS
37.93
293.04
SS
Y9
11+00.00

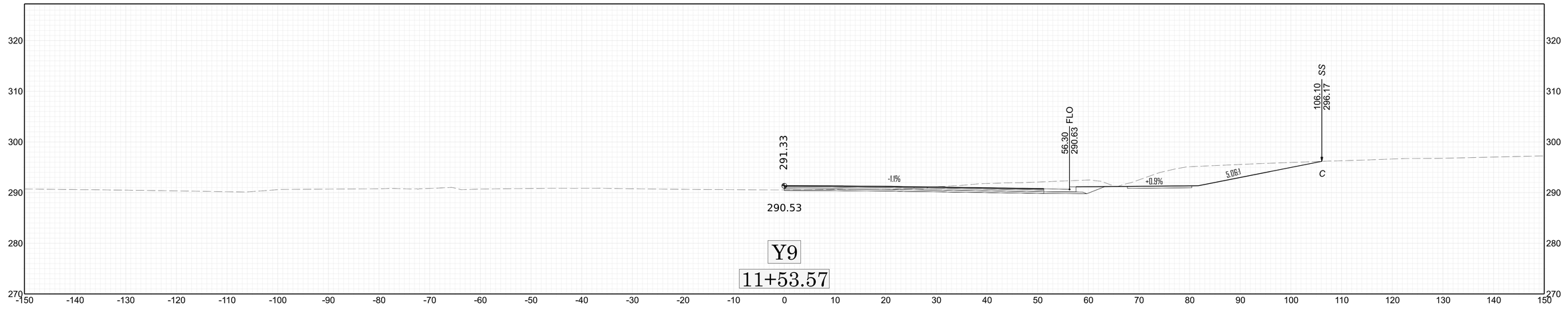

-33.50
293.77
FLO
C
2.00:1
+2.0%
-0.50%
294.06
294.06
-0.7%
33.50
293.81
FLO
C
+2.0%
2.23:1
-37.87
294.52
SS
37.58
294.42
SS
Y9
10+62.00

11/14/23



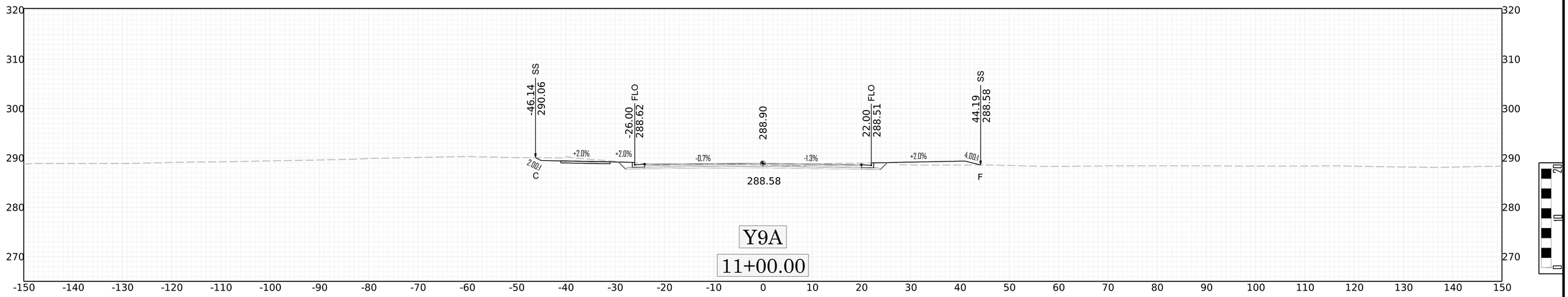
X

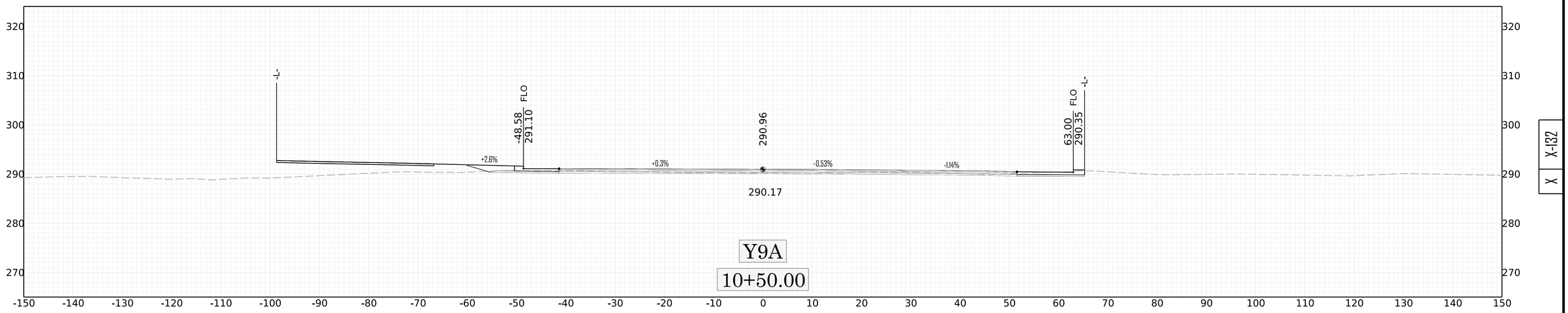
X-131

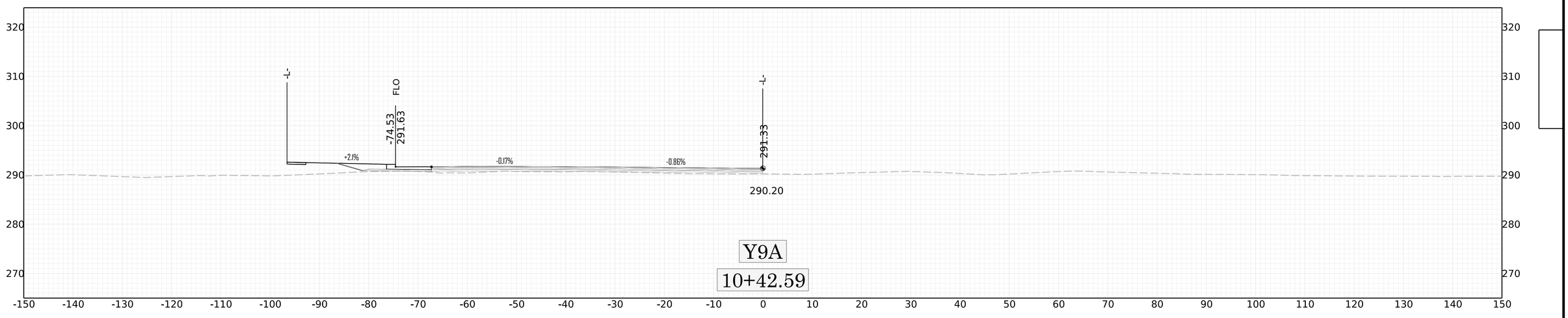


Y9

11+53.57

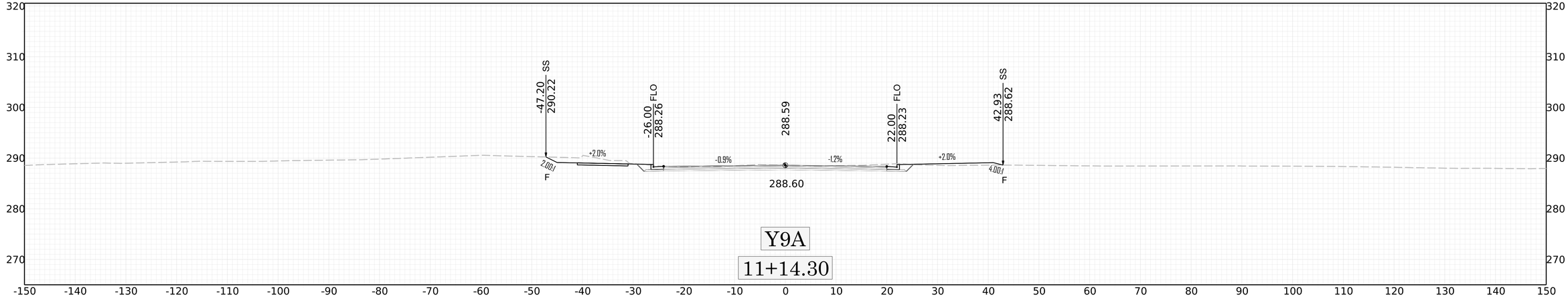

SS
-46.14
290.06
FLO
-26.00
288.62
288.90
FLO
22.00
288.51
SS
44.19
288.58
+2.0%
+2.0%
-0.7%
-1.3%
+2.0%
2.00:1
4.00:1
C
F
288.58
Y9A
11+00.00

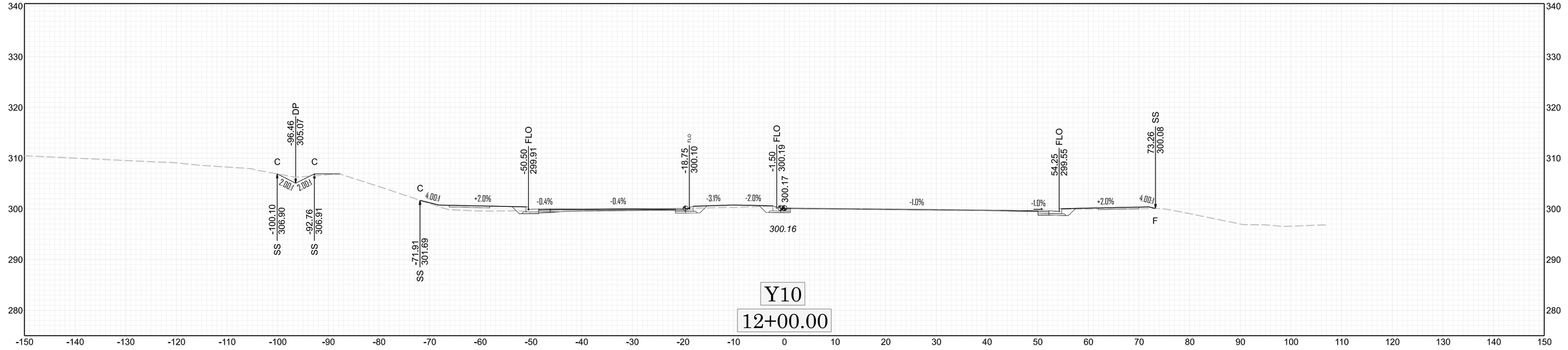

-L-
FLO
-48.58
291.10
290.96
FLO
63.00
290.35
-L-
+2.6%
+0.3%
-0.53%
-1.14%
290.17
Y9A
10+50.00

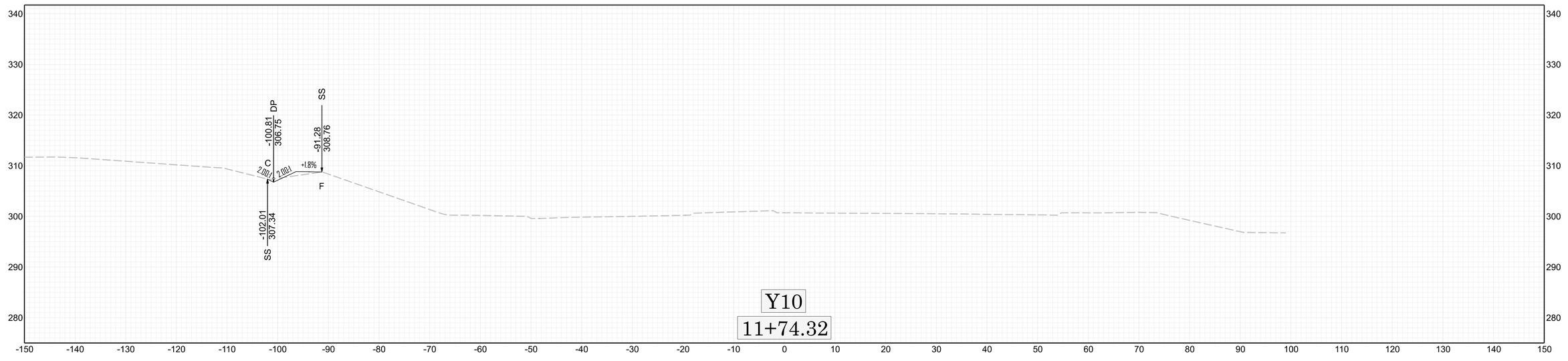

-L-
FLO
-74.53
291.63
-L-
291.33
+2.1%
-0.17%
-0.86%
290.20
Y9A
10+42.59

0 10 20

X X-133


320
310
300
290
280
270
-150 -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
-47.20
290.22
SS
-26.00
288.26
FLO
288.59
22.00
288.23
FLO
42.93
288.62
SS
+2.0%
-0.9%
-1.2%
+2.0%
2.00:1
F
4.00:1
F
288.60
Y9A
11+14.30

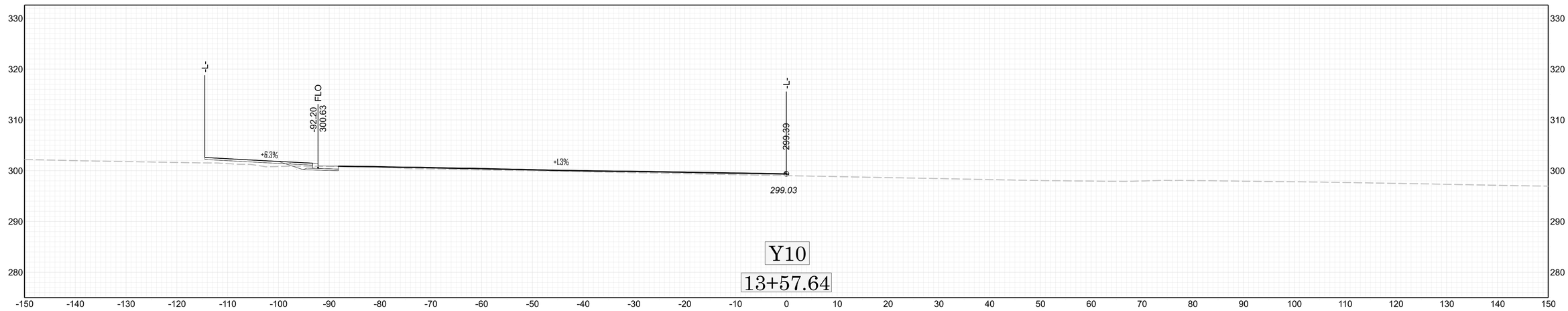




X-134

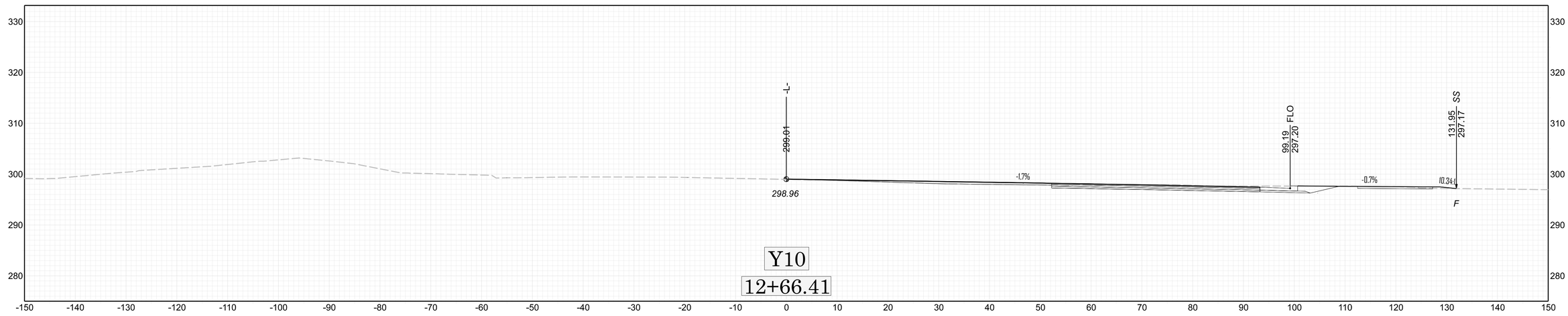
$$$-USER NAME-$$$ - $$$-DATE-$$$

11/14/23



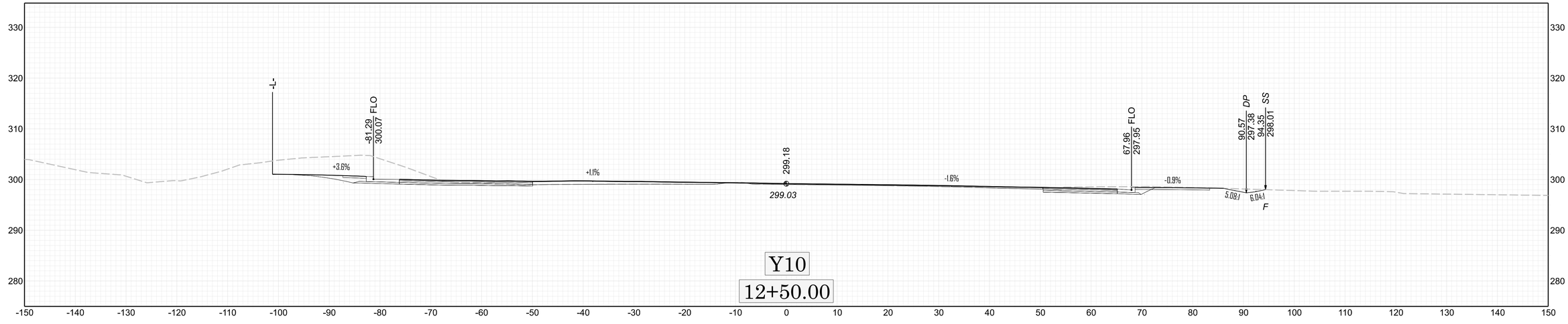
Y10

13+57.64



Y10

12+66.41



Y10

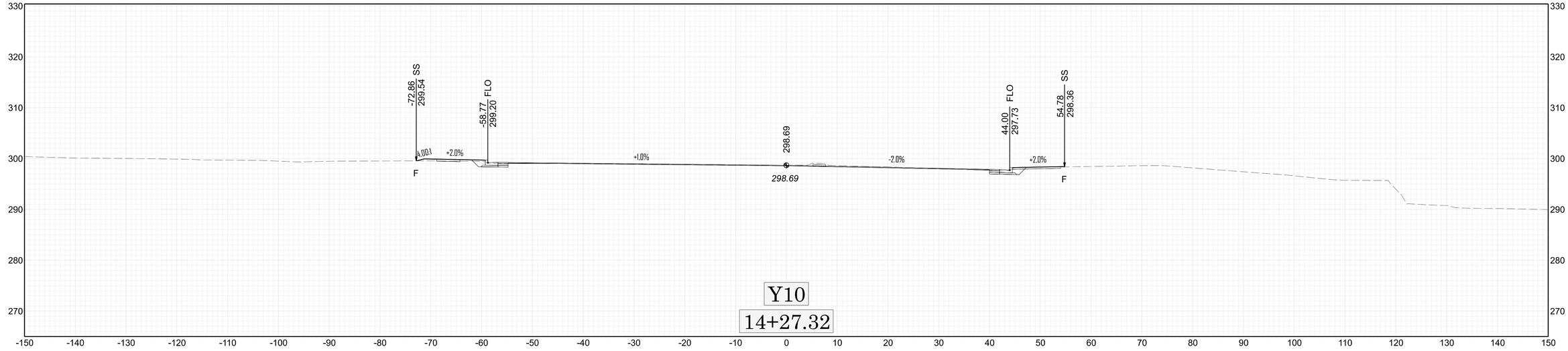
12+50.00

20
10
0

X-135

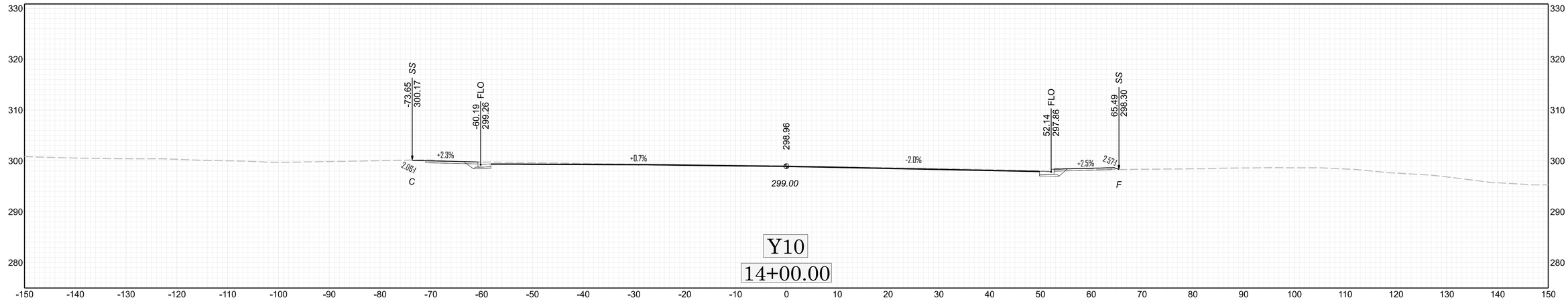
X

$$$-USER NAME-$$$ - $$$-DATE-$$$



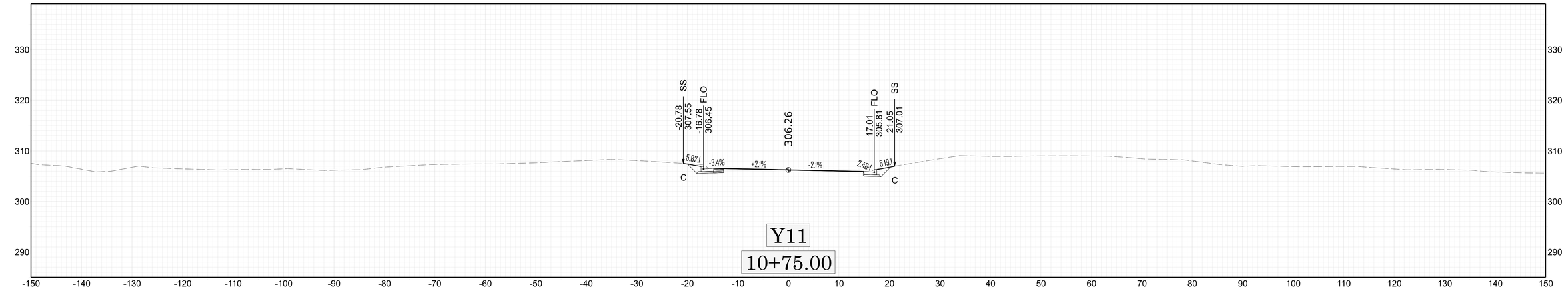
Y10

14+27.32



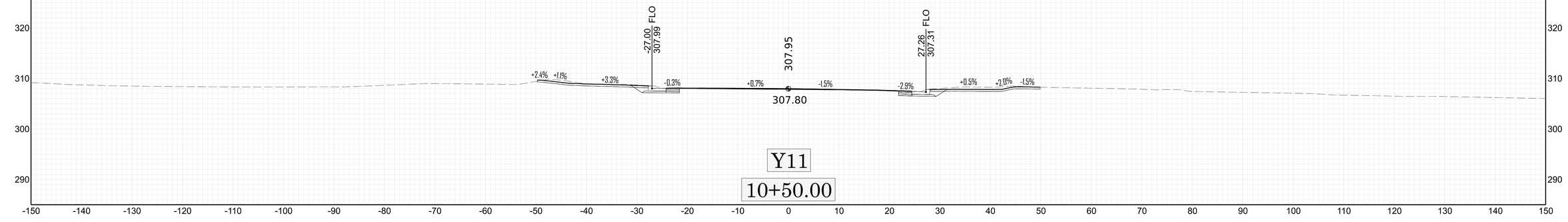
Y10

14+00.00



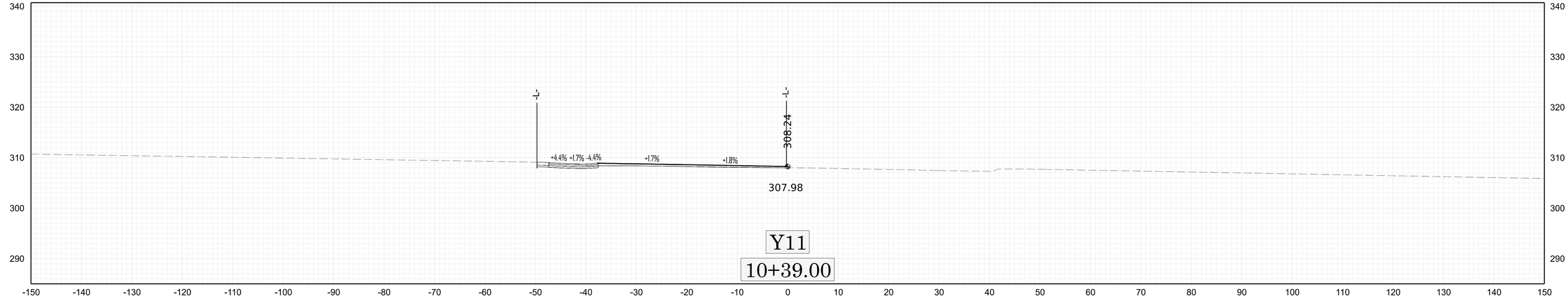
Y11

10+75.00



Y11

10+50.00



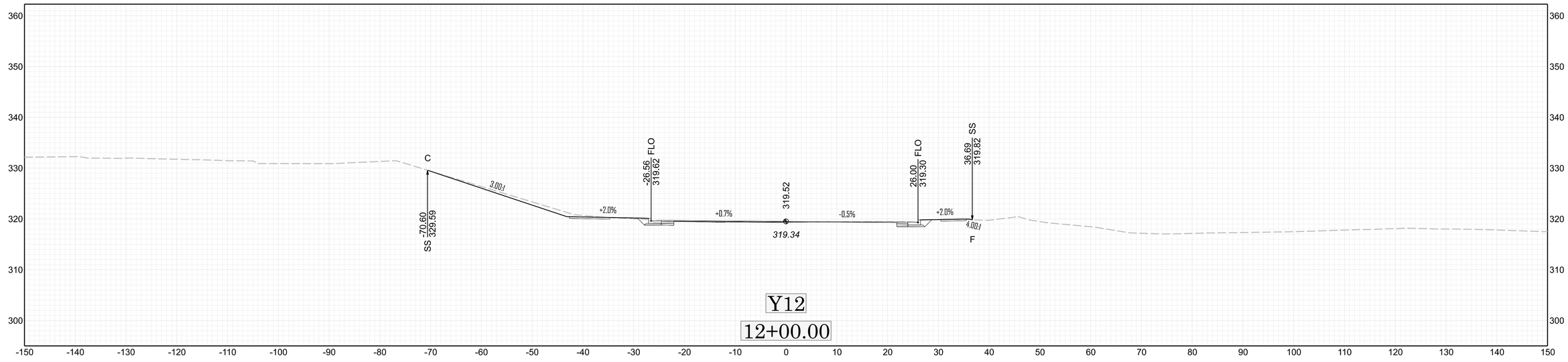
Y11

10+39.00

X-137

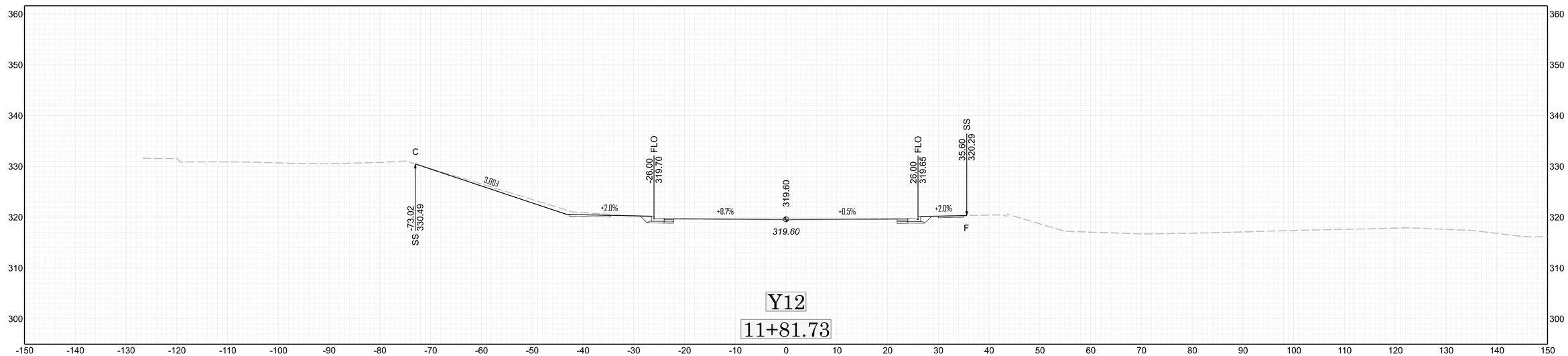
X

$$$-USER NAME-$$$ - $$$-DATE-$$$



Y12

12+00.00



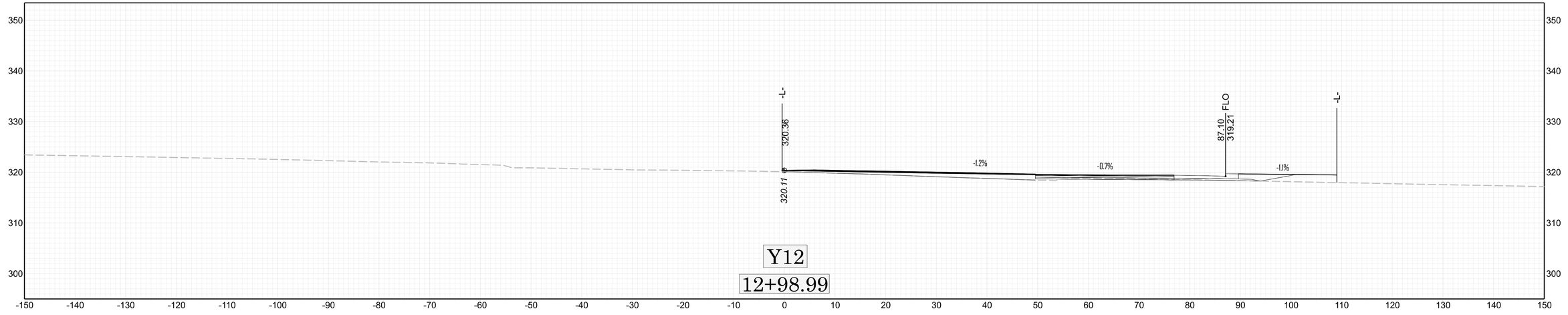
Y12

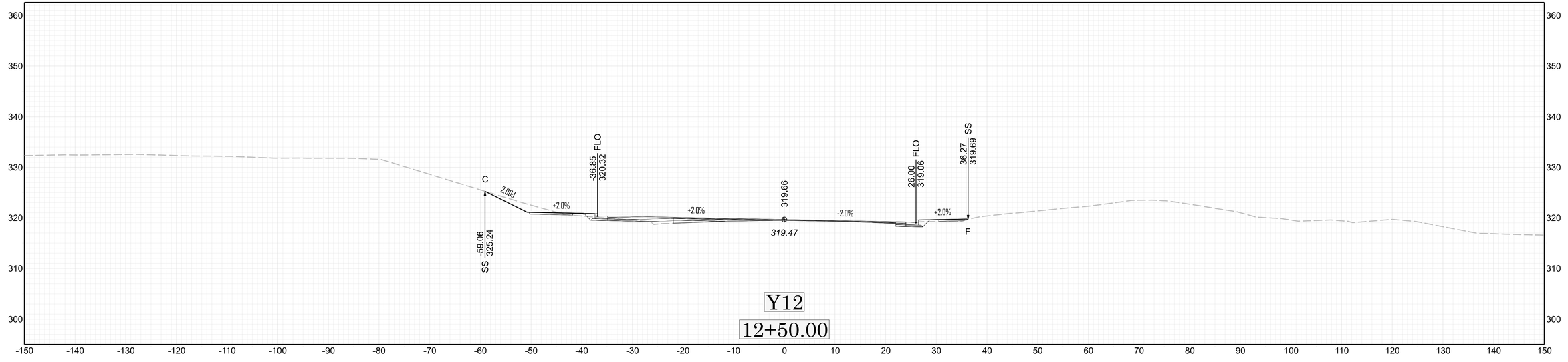
11+81.73

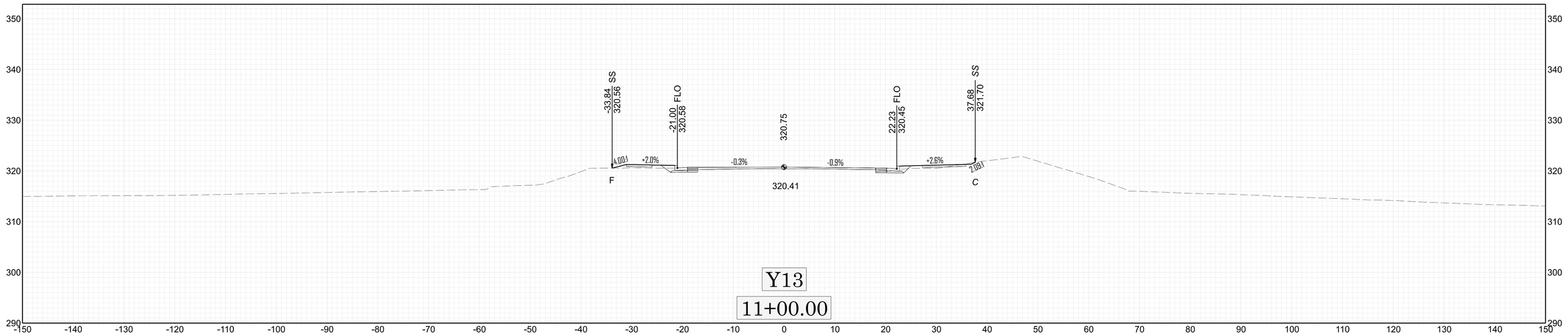
0 10 20

X

X-138

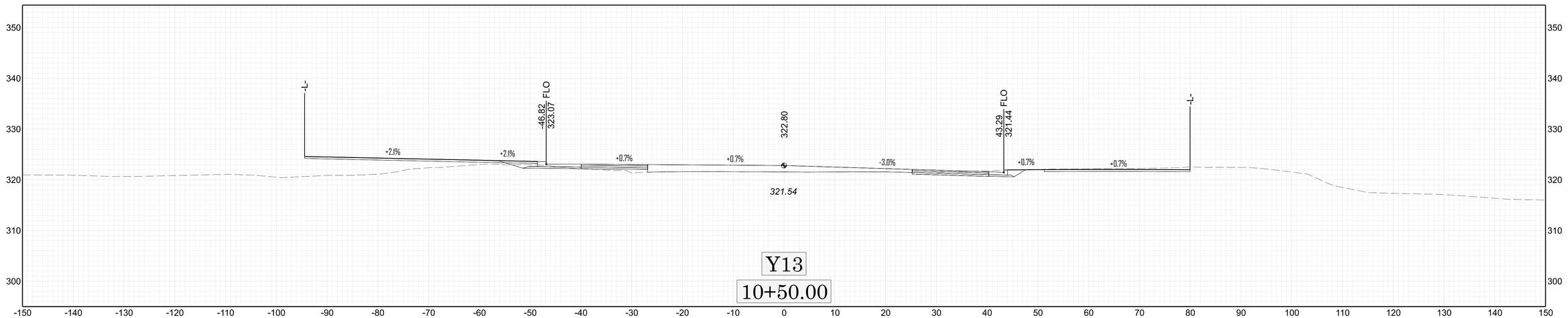

-L-
320.36
320.11
-1.2%
-0.7%
87.10
319.21
FLO
-L-
-1.1%
Y12
12+98.99


C
2.00:1
+2.0%
-36.85
320.32
FLO
+2.0%
319.66
-2.0%
26.00
319.06
FLO
+2.0%
36.27
319.69
SS
-59.06
325.24
SS
319.47
F
Y12
12+50.00



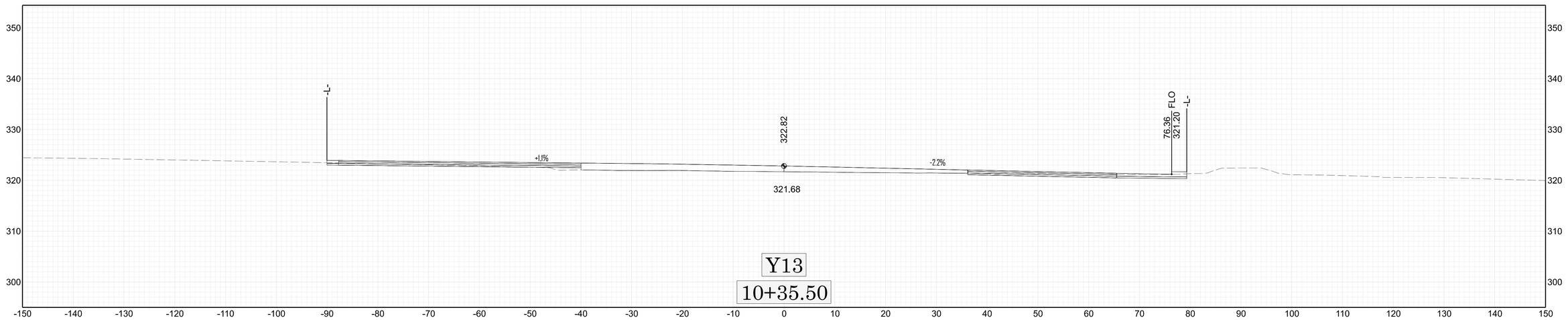
Y13

11+00.00



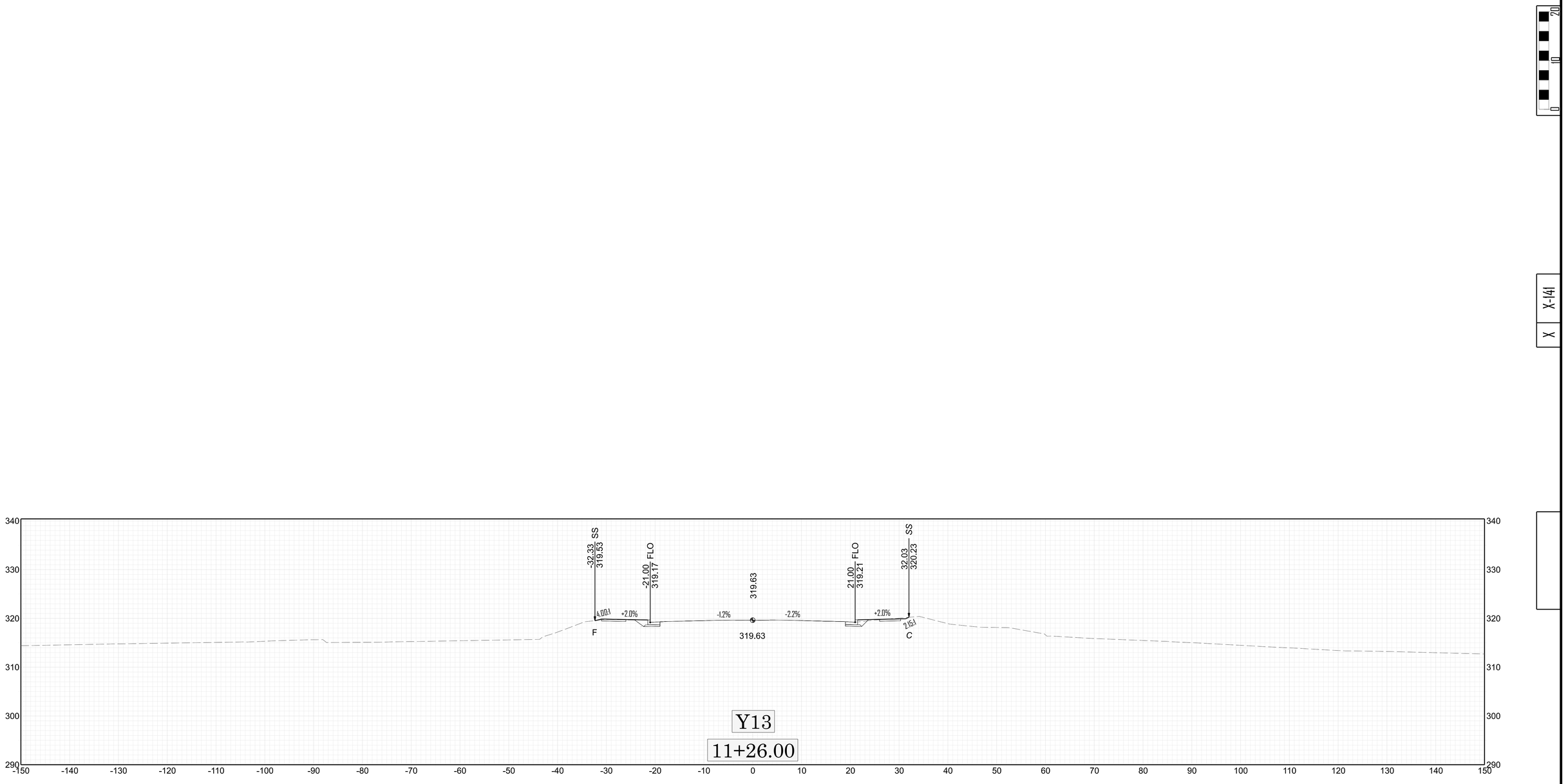
Y13

10+50.00



Y13

10+35.50



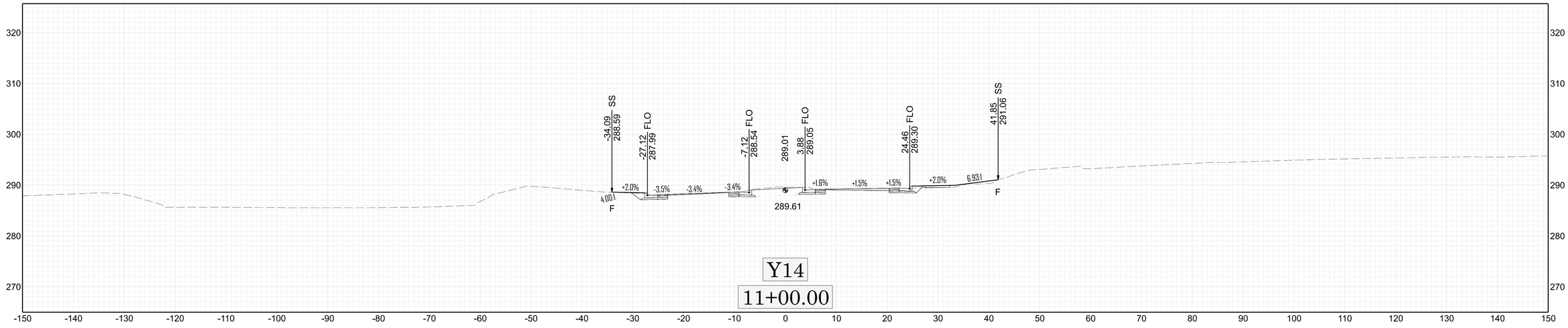
Y13

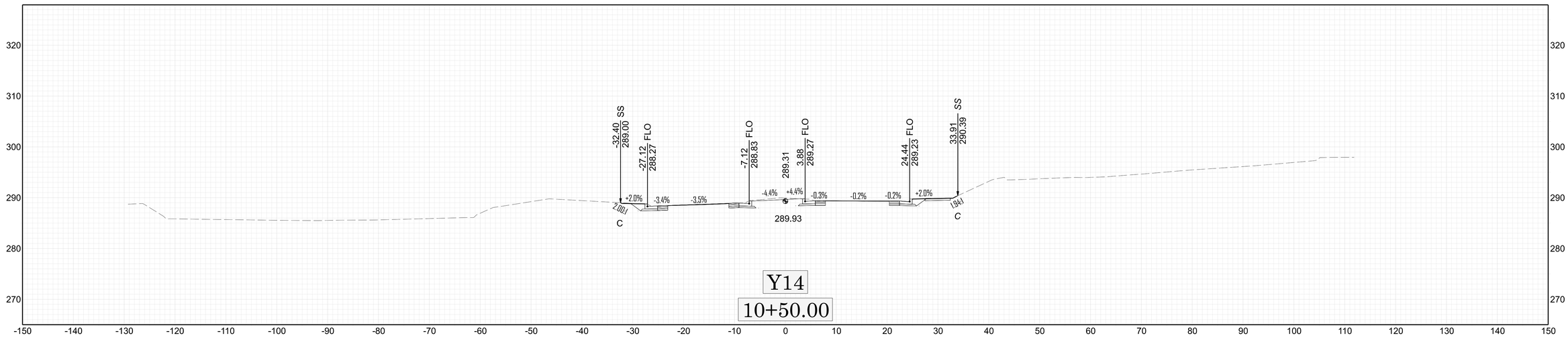
11+26.00

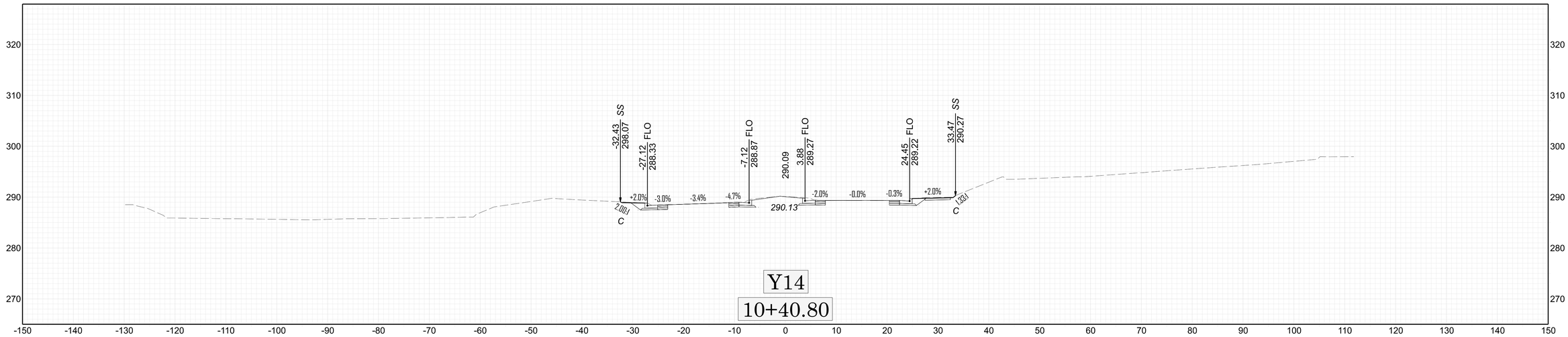
0 10 20

X

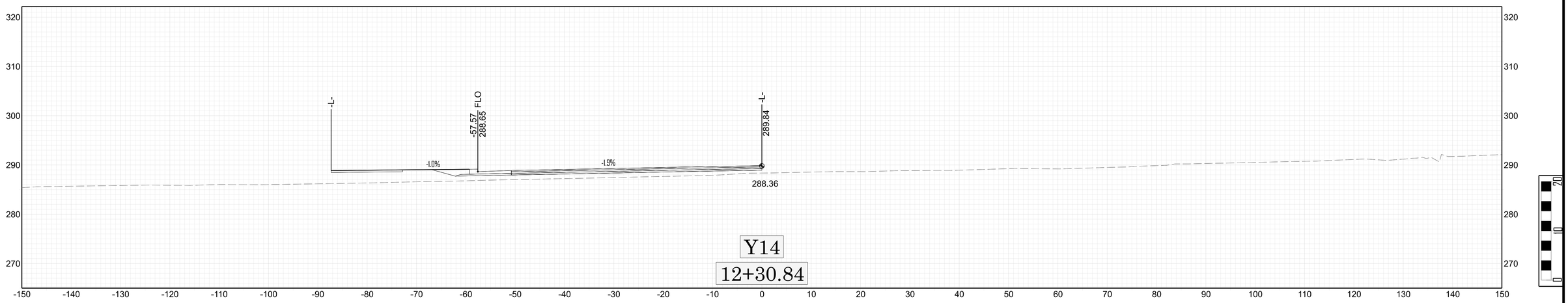
X-141

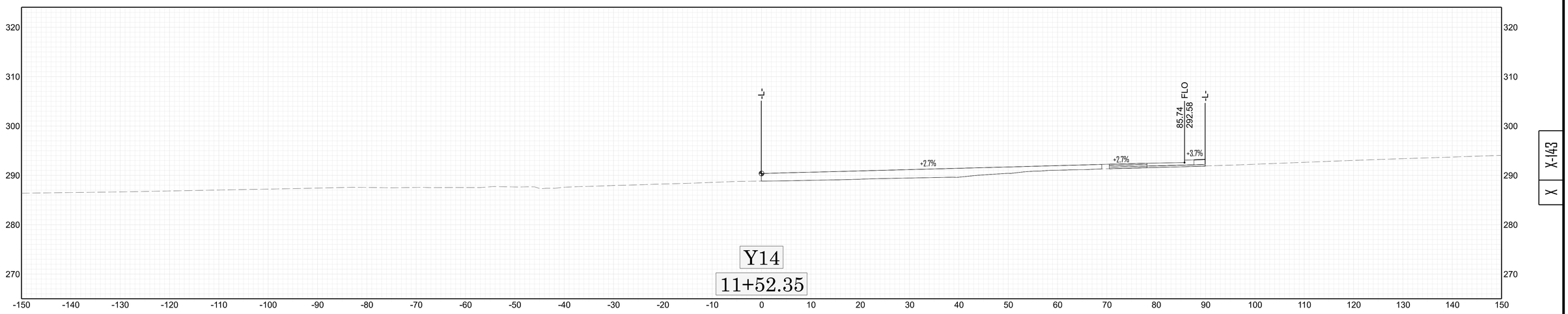

-34.09 SS 288.59
-27.12 FLO 287.99
-7.12 FLO 288.54
289.01
3.88 FLO 289.05
24.46 FLO 289.30
41.85 SS 291.06
+2.0%
-3.5%
-3.4%
-3.4%
+1.6%
+1.5%
+1.5%
+2.0%
6.93:1
4.00:1
F
F
289.61
Y14
11+00.00

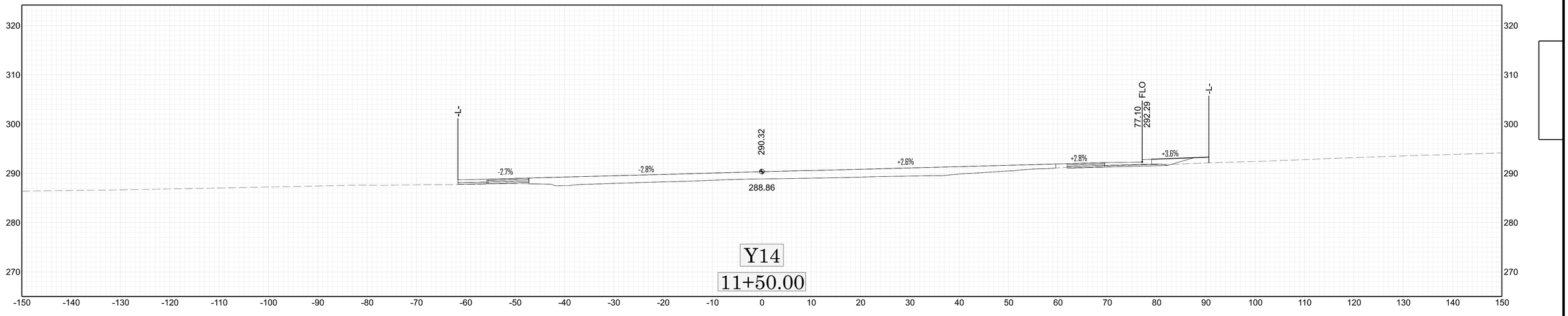

-32.40 SS 289.00
-27.12 FLO 288.27
-7.12 FLO 288.83
289.31
3.88 FLO 289.27
24.44 FLO 289.23
33.91 SS 290.39
+2.0%
-3.4%
-3.5%
-4.4%
+4.4%
-0.3%
-0.2%
-0.2%
+2.0%
2.00:1
1.94:1
C
C
289.93
Y14
10+50.00


-32.43 SS 298.07
-27.12 FLO 288.33
-7.12 FLO 288.87
290.09
3.88 FLO 289.27
24.45 FLO 289.22
33.47 SS 290.27
+2.0%
-3.0%
-3.4%
-4.7%
-2.0%
-0.0%
-0.3%
+2.0%
2.00:1
1.93:1
C
C
290.13
Y14
10+40.80

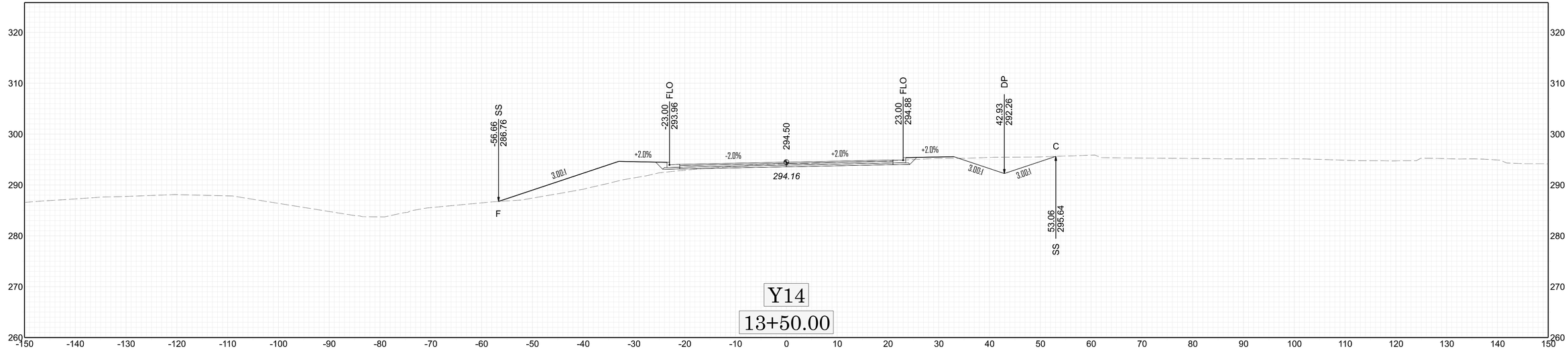
X-142

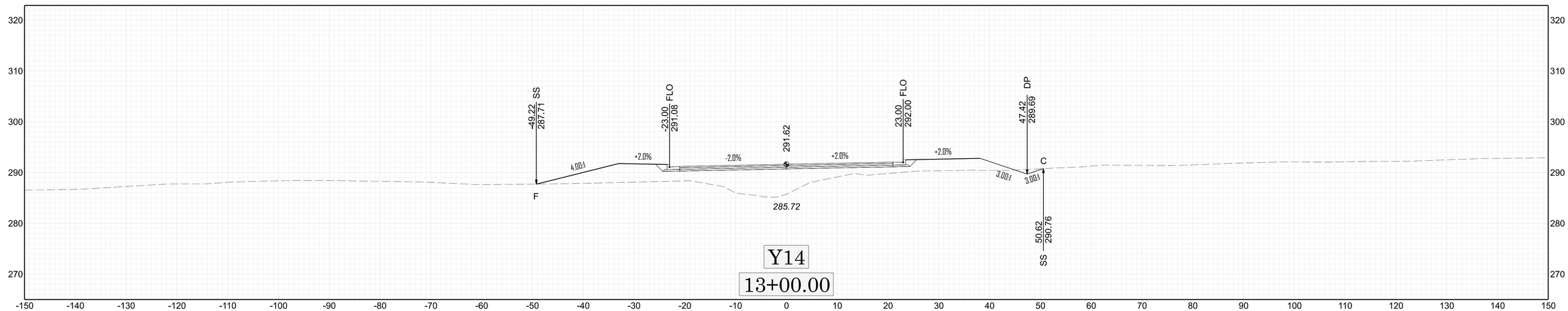

-L-
-57.57
288.65
FLO
-L-
289.84
-1.0%
-1.9%
288.36
Y14
12+30.84
320
310
300
290
280
270
-150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
0
10
20

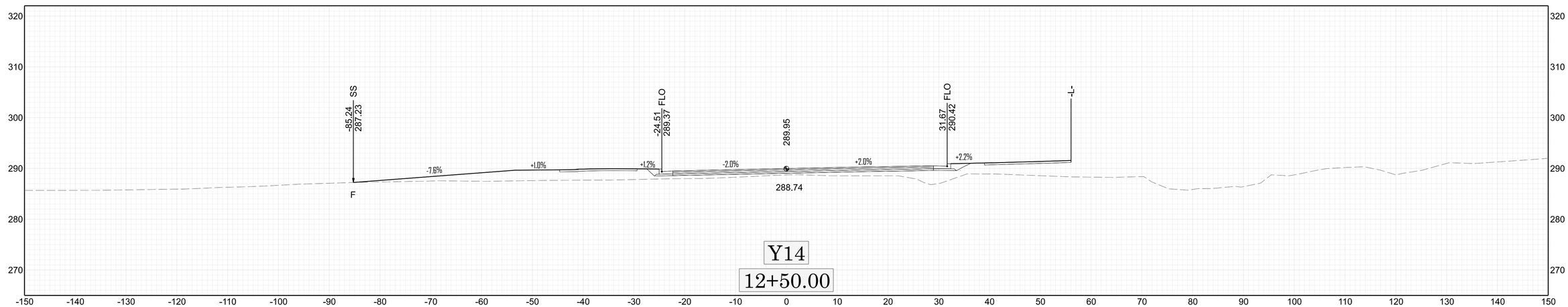

-L-
+2.7%
+2.7%
85.74
292.58
FLO
-L-
+3.7%
Y14
11+52.35
320
310
300
290
280
270
-150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150


-L-
-2.7%
-2.8%
290.32
+2.6%
+2.8%
77.10
292.29
FLO
-L-
+3.6%
288.86
Y14
11+50.00
320
310
300
290
280
270
-150 -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

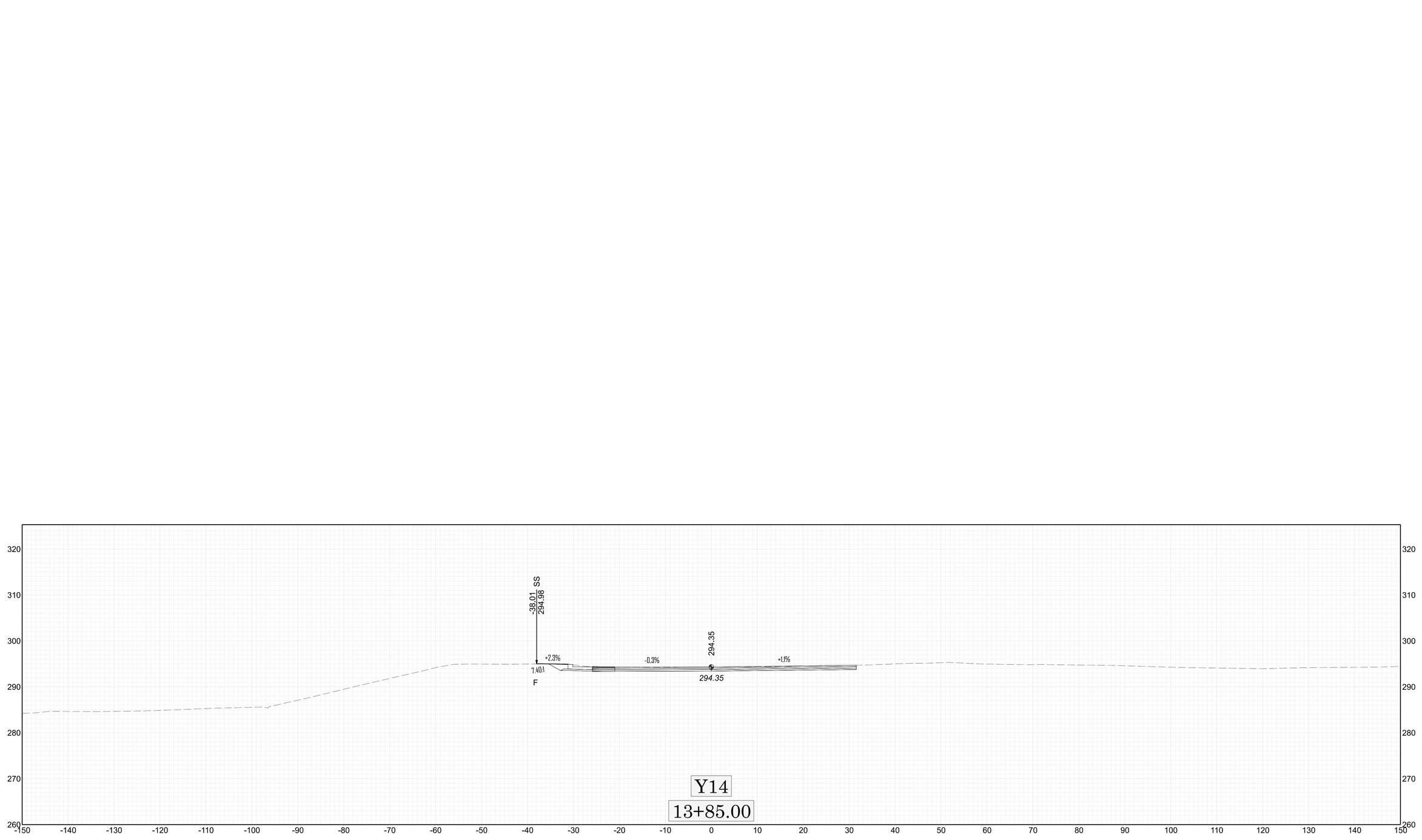
X-143


-56.66 SS 286.76
-23.00 FLO 293.96
294.50
23.00 FLO 294.88
42.93 DP 292.26
53.06 295.64 SS
C
F
3.00:1
+2.0%
-2.0%
294.16
Y14
13+50.00


-49.22 SS 287.71
-23.00 FLO 291.08
291.62
23.00 FLO 292.00
47.42 DP 289.69
50.62 290.76 SS
C
F
4.00:1
3.00:1
+2.0%
-2.0%
285.72
Y14
13+00.00

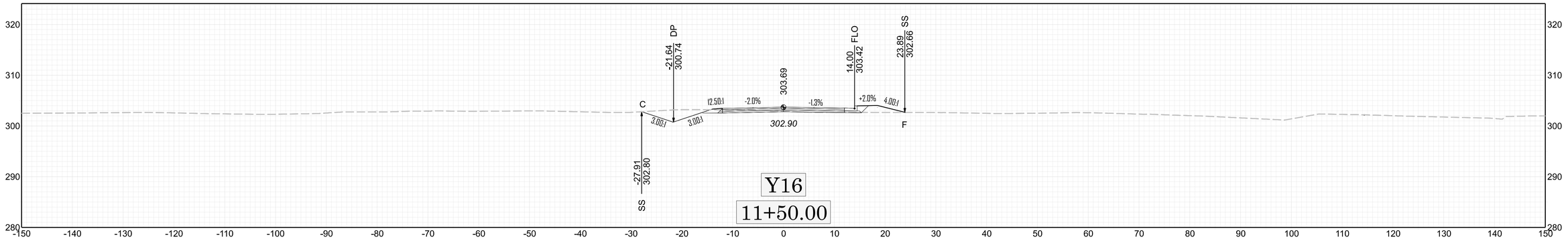

-85.24 SS 287.23
-24.51 FLO 289.37
289.95
31.67 FLO 290.42
-L-
F
-7.6%
+1.0%
+1.2%
-2.0%
+2.0%
+2.2%
288.74
Y14
12+50.00

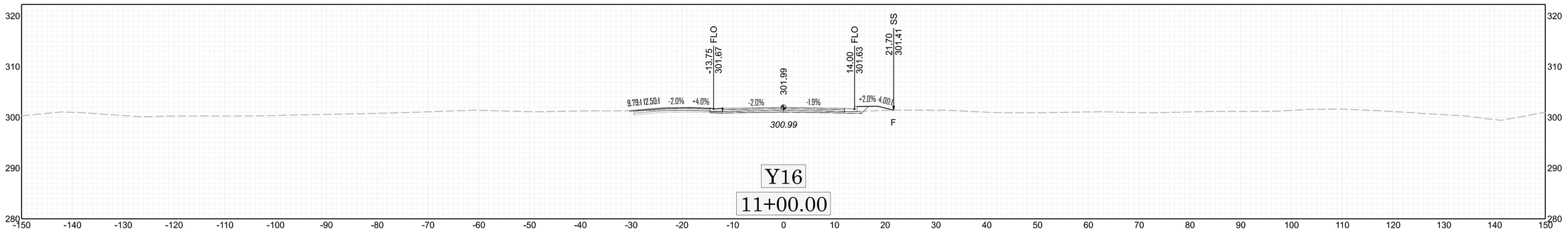
X-144

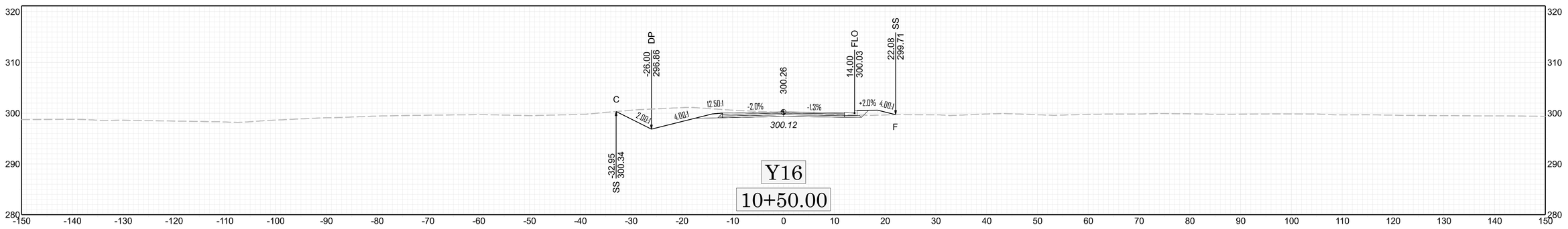

320
310
300
290
280
270
260
-150
-140
-130
-120
-110
-100
-90
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
SS
-38.01
294.98
+2.3%
-0.3%
+1.1%
294.35
294.35
2.40:1
F
Y14
13+85.00

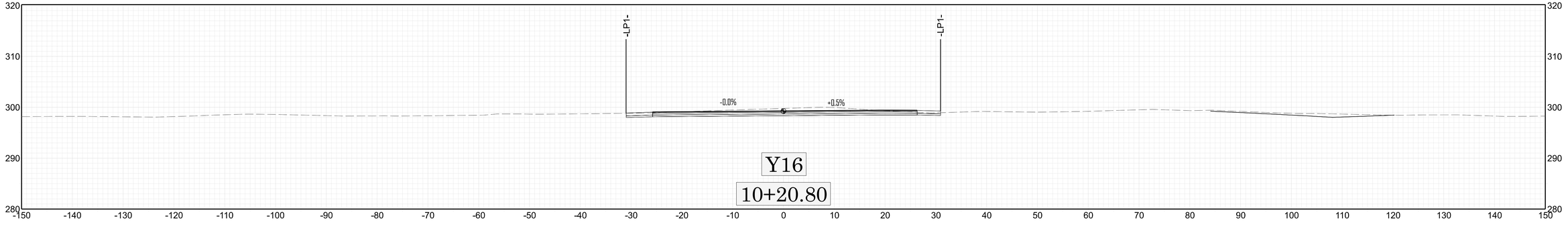
0 10 20

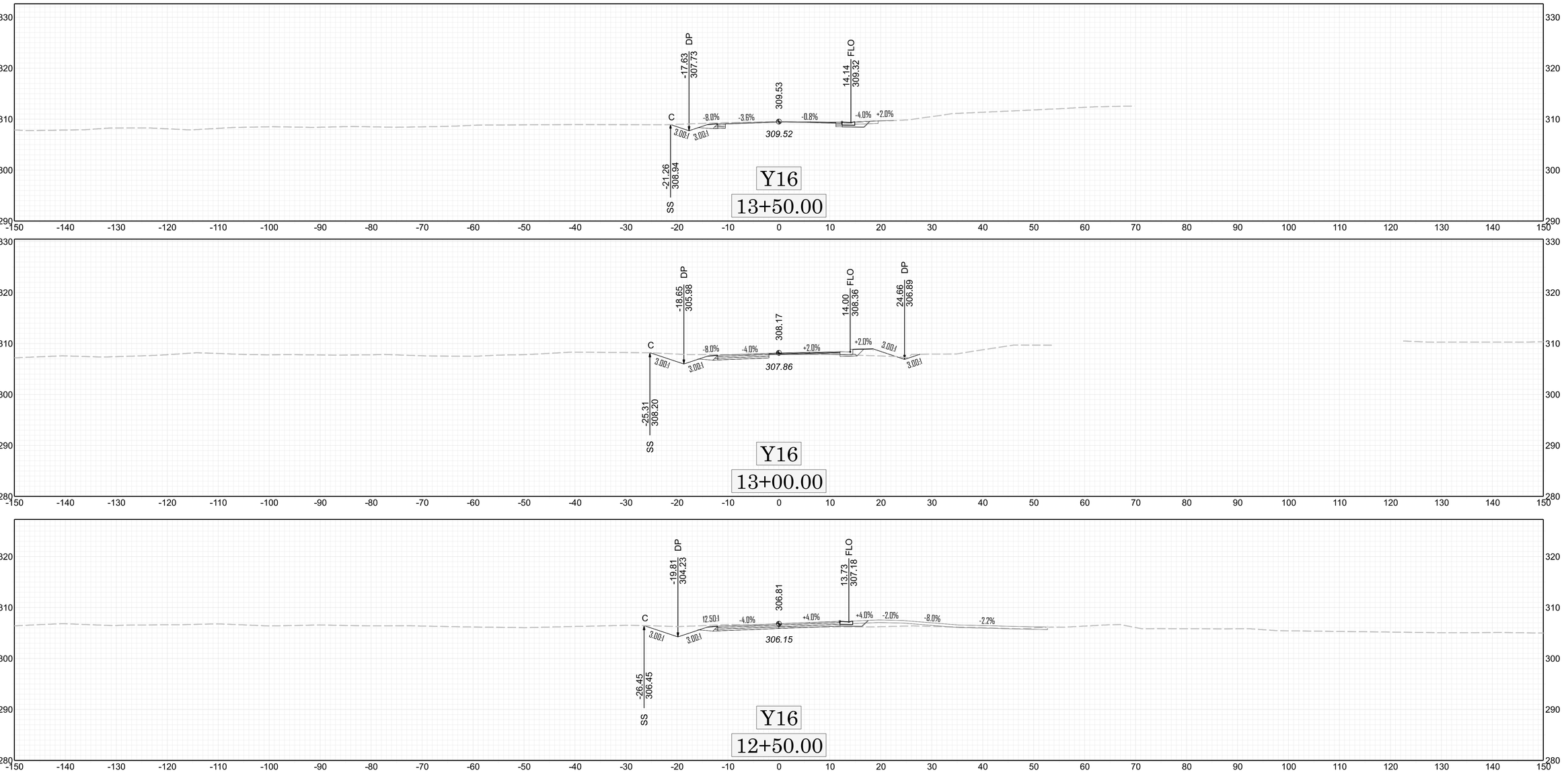
X X-145


C
DP
-21.64
300.74
303.69
FLO
14.00
303.42
SS
23.89
302.66
12.50:1
-2.0%
-1.3%
+2.0%
4.00:1
3.00:1
3.00:1
302.90
F
-27.91
302.80
SS
Y16
11+50.00

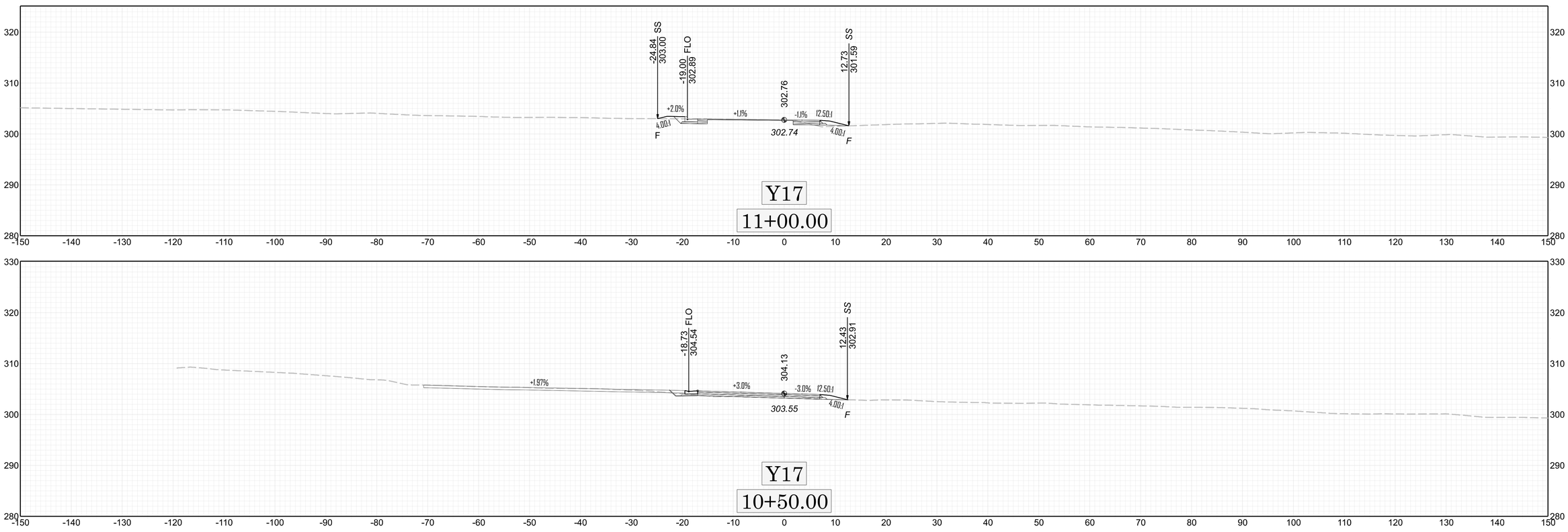

FLO
-13.75
301.67
301.99
FLO
14.00
301.63
SS
21.70
301.41
9.79:1
12.50:1
-2.0%
+4.0%
-2.0%
-1.9%
+2.0%
4.00:1
300.99
F
Y16
11+00.00


C
DP
-26.00
296.86
300.26
FLO
14.00
300.03
SS
22.08
299.71
12.50:1
-2.0%
-1.3%
+2.0%
4.00:1
2.00:1
4.00:1
300.12
F
-32.95
300.34
SS
Y16
10+50.00


-LP1-
-LP1-
-0.0%
+0.5%
Y16
10+20.80


DP
-17.63
307.73
309.53
FLO
14.14
309.32
C
-8.0%
-3.6%
-0.8%
-4.0%
+2.0%
3.00:1
3.00:1
309.52
-21.26
308.94
SS
Y16
13+50.00
DP
-18.65
305.98
308.17
FLO
14.00
308.36
DP
24.66
306.89
C
-8.0%
-4.0%
+2.0%
+2.0%
3.00:1
3.00:1
3.00:1
3.00:1
307.86
-25.31
308.20
SS
Y16
13+00.00
DP
-19.81
304.23
306.81
FLO
13.73
307.18
C
12.50:1
-4.0%
+4.0%
+4.0%
-2.0%
-8.0%
-2.2%
3.00:1
3.00:1
306.15
-26.45
306.45
SS
Y16
12+50.00
DP
-21.38
302.49
305.35
-Y17-
C
-8.0%
-2.0%
-1.5%
3.00:1
3.00:1
304.06
-27.07
304.38
SS
Y16
12+00.00

11/14/23

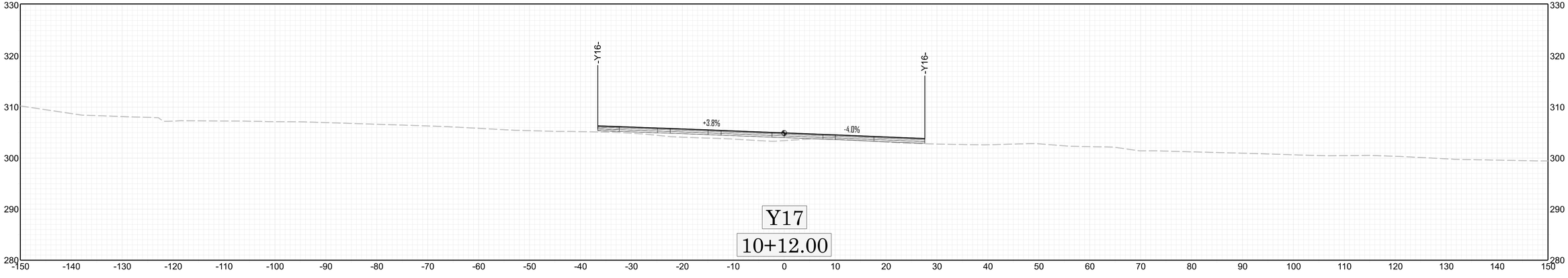


Y17

11+00.00

Y17

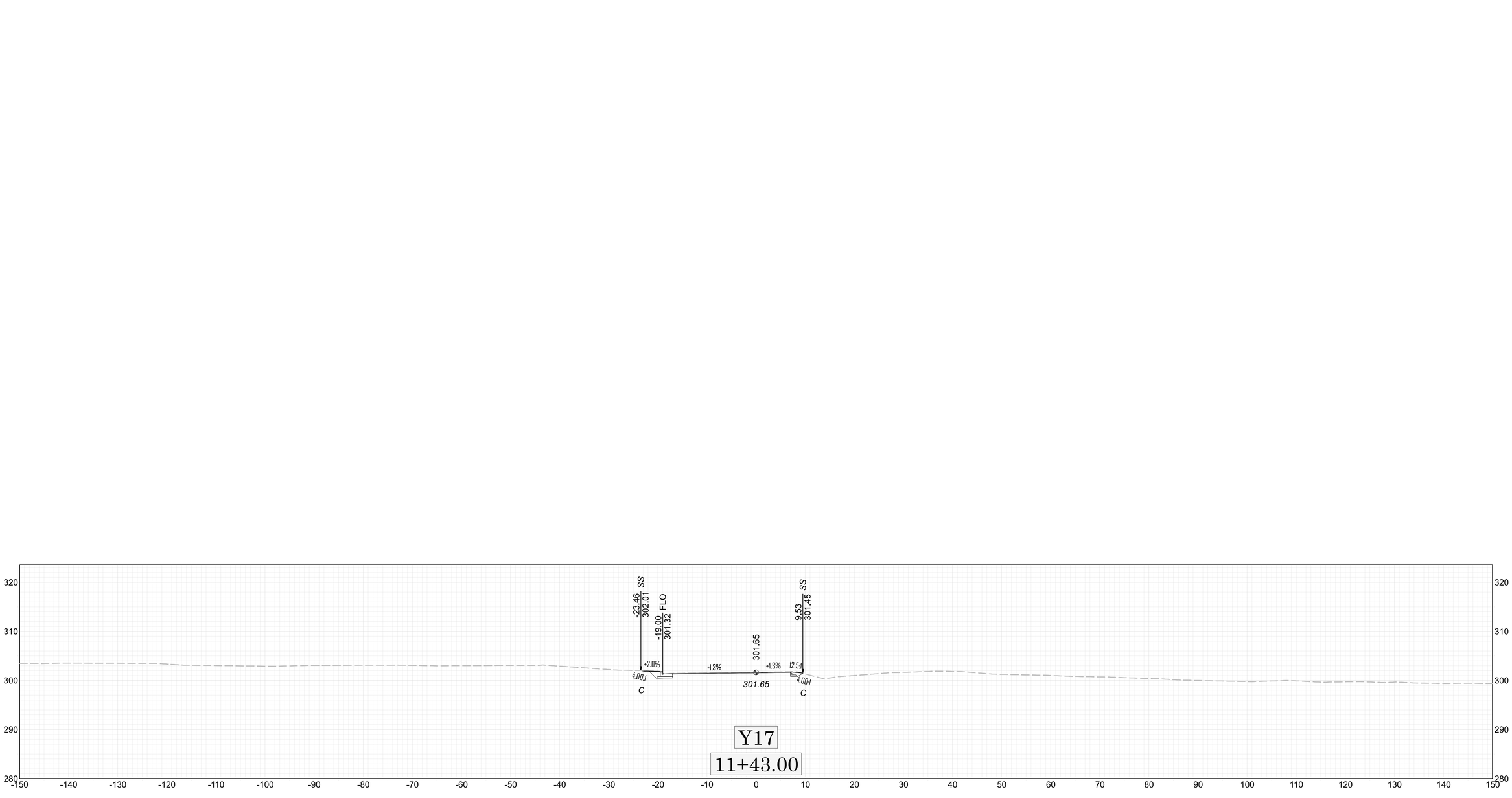
10+50.00



Y17

10+12.00

$$$-USER NAME-$$$ - $$$-DATE-$$$



Y17

11+43.00

0 10 20

X

X-149

Appendix E

Culvert Sizing Reports

Docusign Envelope ID: 5A1E24C7-E13D-8702-8260-F8B6B23EE23E

NCDOT ACCEPTANCE

CULVERT SURVEY & HYDRAULIC DESIGN REPORT

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
HYDRAULICS UNIT
RALEIGH, NC

1 OF 1

State Proj Reference No U-5811 WBS Proj No 44384.1.1 Proj Station 16+41 - Y4 -

County WAKE Bridge over UNNAMED TRIBUTARY TO CRABREE CREEK Struc Inv No 910C01

On Highway NC 54 (CHAPEL HILL RD) between SR 1002 (AVIATION PKWY) and SR 3015 (AIRPORT BLVD)

Recommended Structure 2 @ 108" WELDED STEEL PIPE (BURIED 1.0') W/ 1.5' SILL FLOODBENCH BARREL W/ CIP CONCRETE HEADWALL AND ENDWALL; OAL = 100 FT

Recommended Width of Roadway 64' SHLD. PT. TO SHLD. PT. Skew 110°

Recommended Location is (At) Upstream of, Downstream of) Existing Crossing AT

Latitude 35.82545 Longitude -78.82632

Statewide Tier ☐ Regional Tier ☒ Sub-Regional Tier ☐

Bench Mark is BM3 -Y4- STA. 10+39.20; 56' RT; BM TIE NAIL IN 20" PINE

Northing 755984 Easting 2051319 Elevation 305.35 ft Datum NAVD88

Temporary Crossing NO TEMPORARY CROSSING REQUIRED. PHASED CONSTRUCTION/TRENCHLESS INSTALLATION.



Designed by JORDAN BENDL, P.E.

Assisted by ETHAN BRAY, E.I.

Date 8/28/2026

NORTH CAROLINA PROFESSIONAL SEAL 050128 ENGINEER JORDAN BENDL

Reviewed by Date

Kimley»Horn

KHA Project No.: 080036302
Date Printed: 8/28/2026

SITE DATA

Drainage Area 486 AC. Source STREAMSTATS

River Basin NEUSE Character REGION 1 - PIEDMONT

Stream Classification (e.g., Trout, High Quality Water) C;NSW

Data on Existing Structure 1 @ 8' X 6' RCBC; 39 LF ALONG CENTERLINE OF CULVERT

Total Waterway Opening 48.0 ft²

Debris Potential: Low ☐ Moderate ☒ High ☐ Waterway Opening Below 100-yr WS Elev 48.0 ft²

Data on Structures Up and Down Stream UPSTREAM: 1 @ 5' X 5' RCBC 40' U/S AT RAILROAD

DOWNSTREAM: 3 @ 60" CIRCULAR RCP >800' D/S ON AVIATION PKWY

Gage Station No N/A Period of Records N/A

Max Discharge N/A cfs Date N/A Frequency N/A

Historical Flood Information:

Date N/A Elev N/A ft Est Freq N/A yr Source JACOB NICHOLSON BRIDGE MAINTENANCE ENGINEER (DIVISION 5) Period of Knowledge yrs

Date Elev ft Est Freq yr Source Period of Knowledge yrs

Date Elev ft Est Freq yr Source Period of Knowledge yrs

Allowable HW Elev 296.3' (50 YR HW/D < 1.2) ft Normal Water Surface Elev 288.3 ft

Manning's n: Left OB 0.09 Channel 0.05 Right OB 0.09 Source AERIAL AND FIELD VERIFIED

Flood Study / Status FIS REPORT 37183CV000E DETAILED STUDY (DATED 7/19/2022) (MAP #: 3720075500K) (PANEL #: 0755)

Flood Study 100-yr Discharge 1106 cfs WS Elev: With Floodway 299.8 ft Without Floodway 299.2 ft River Station 2021

DESIGN DATA

Hydrological Method EFFECTIVE FEMA PRELIMINARY MODEL

Hydraulic Design Method HEC-RAS 6.6 (U-5811_UT_To_Crabtree_Crk_SR_1002)

Design Tailwater: Q_{10} 4.6 ft Q_{25} 5.0 ft Q_{50} 5.4 ft Q_{100} 6.1 ft Q_{500} 7.9 ft

INLET INVERT ELEVATION = 285.7', OUTLET INVERT ELEVATION = 285.3'

SIZE & TYPE: 2@108" WSP | STATION 2021 APPROXIMATELY 29 FEET UPSTREAM OF CULVERT

FREQUENCY	Q (cfs)	INLET CONTROL			OUTLET CONTROL		REMARKS
		HW/D	HW	WSEL	HW	WSEL	
10-YEAR	628	0.79	6.3	293.0	6.6	293.3	OUTLET
25-YEAR	808	0.93	7.4	294.1	7.6	294.3	OUTLET
50-YEAR	959	1.03	8.2	294.9	8.5	295.2	OUTLET
100-YEAR	1106	1.13	9.0	295.7	9.5	296.2	OUTLET
500-YEAR	1482	1.33	10.6	297.3	12.9	299.6	OUTLET

Total Proposed Waterway Opening 116.4 sf

Outlet Velocity (V_{10}) 7.4 fps Natural Channel Velocity (V_{10}) 4.0 fps

Required Outlet Protection CL-I RIPRAP ON BANKS AND OUTLET

State Floodway Compliance Type SFC TYPE B (MAX WSEL DECREASE OF 2.72' @ RS 2021)

INFORMATION TO BE SHOWN ON PLANS

HYDRAULIC DATA

DESIGN DISCHARGE	= 959 C.F.S.
FREQUENCY OF DESIGN FLOOD	= 50 YRS.
DESIGN HIGH WATER ELEVATION	= 295.2
DRAINAGE AREA	= 486 AC.
BASIC DISCHARGE (Q100)	= 1106 C.F.S.
BASIC HIGH WATER ELEVATION	= 296.2

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE	= 1700 C.F.S.
FREQUENCY OF OVERTOPPING FLOOD	= >500 YRS.
OVERTOPPING FLOOD ELEVATION	= 299.3*

* OVERTOPPING WILL OCURR AT 13+00.00 (SAG POINT) SHOULDER ELEVATION ON HIGH SIDE OF SUPER ELEVATION)

WS EL. Taken @ River Station 2021

ADDITIONAL INFORMATION AND COMPUTATIONS

USGS REGRESSION EQUATIONS
SOURCE 2014-5030 (REGION 1)

Q_{10}= 381 (DA)$^{0.7535}$ 10$^{(0.0075*IMP)}$ = 680 CFS (USE FEMA)

Q_{25}= 518 (DA)$^{0.7752}$ 10$^{(0.0053*IMP)}$ = 726 CFS (USE FEMA)

Q_{50}= 632 (DA)$^{0.7939}$ 10$^{(0.0037*IMP)}$ = 746 CFS (USE FEMA)

Q_{100}= 753 (DA)$^{0.8083}$ 10$^{(0.0024*IMP)}$ = 774 CFS (USE FEMA)

Q_{500}= 1045 (DA)$^{0.8160}$ = 835 CFS (USE FEMA)

DA = 0.76 SQ MI; % IMP = 45 (FUTURE)

FEMA DISCHARGES

Q_{10}= 628 CFS

Q_{25}= 808 CFS

Q_{50}= 959 CFS

Q_{100}= 1106 CFS

Q_{500}= 1482 CFS

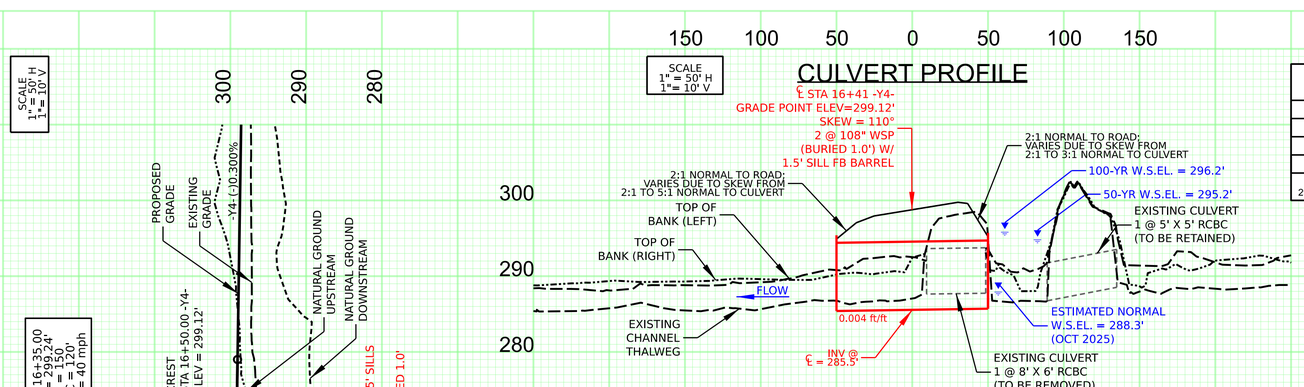
NOTE 1: D USED IN HW/D IS EFFECTIVE OPENING RISE OF THE MAIN BARREL ACCOUNTING FOR BURIED DEPTH

NOTE 2: PIPES INSTALLED TRENCHLESSLY MUST BE SPACED A MINIMUM OF 5' APART

NOTE 3: CULVERT PROFILE SHOWN IS THROUGH MAIN/LOW FLOW BARREL

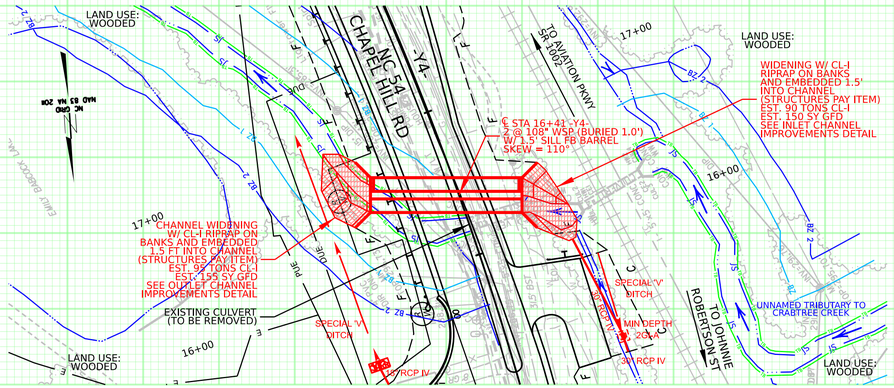
SCALE 1" = 50' H 1"= 10' V

CULVERT PROFILE



SCALE 1" = 50' H 1"= 10' V

PLAN VIEW



FEMA PERFORMANCE TABLE

	100-YEAR
DUPLICATE EFFECTIVE	299.23
CORRECTED EFFECTIVE	298.96
REVISED	296.24

SECTION 2021
29 FEET FROM UPSTREAM FACE OF CULVERT

NCDOT PERFORMANCE TABLE

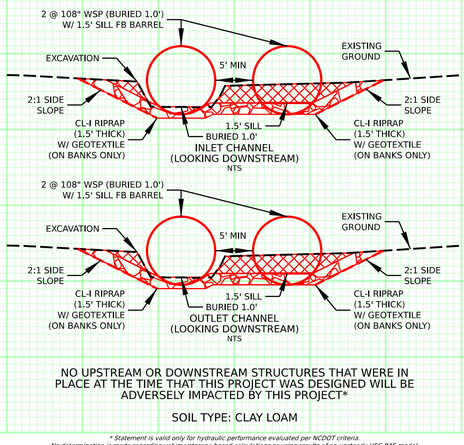
	10-YEAR	25-YEAR	50-YEAR	100-YEAR	500-YEAR
NATURAL	291.9	292.2	292.4	292.7	293.1
EXISTING	298.5	298.7	298.8	299.0	299.1
PROPOSED	293.3	294.3	295.2	296.2	299.6

SECTION 2021
29 FEET FROM UPSTREAM FACE OF CULVERT

QUANTITY ESTIMATE

CLASS-I RIPRAP	185 TONS
GEOTEXTILE	305 S.Y.
EXCAVATION	
CHANNEL	65 CY

CONSTRUCTION SEQUENCING:
1. TRENCHLESSLY INSTALL SOUTHERN BARREL, ROUTE FLOW THROUGH IT
2. EXTEND SOUTHERN BARREL
3. REMOVE EXISTING RCBC AND FILL
4. TRENCHLESSLY INSTALL NORTHERN BARREL
4. EXTEND NORTHERN BARREL
(SEE TRANSPORTATION MANAGEMENT PLAN FOR FULL CULVERT PHASING)



NO UPSTREAM OR DOWNSTREAM STRUCTURES THAT WERE IN PLACE AT THE TIME THAT THIS PROJECT WAS DESIGNED WILL BE ADVERSELY IMPACTED BY THIS PROJECT*

SOIL TYPE: CLAY LOAM

* Statement is valid only for hydraulic performance evaluated per NCDOT criteria.
No determination is made regarding volume/storage based calculations or using results of an unsteady HEC-RAS model.

Docusign Envelope ID: 5A1E24C7-E13D-8702-8260-F8B6B23EE23E

NCDOT ACCEPTANCE

CULVERT SURVEY & HYDRAULIC DESIGN REPORT

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
HYDRAULICS UNIT
RALEIGH, NC

1 OF 1

State Proj Reference No U-5811 WBS Proj No 44384.1.1 Proj Station 19+99 - L -

County WAKE Bridge over UNNAMED TRIBUTARY TO CRABTREE CREEK Struc Inv No 910C02

On Highway SR 1002 (AVIATION PKWY) between COTTON DR. and NC 54 (CHAPEL HILL RD.)

Recommended Structure 1 @ 96" WELDED STEEL PIPE (BURIED 1.0') & 2 @ 78" WSP W/ 1.5' SILLS W/ CIP CONCRETE HEADWALL AND ENDWALL; OAL = 152' (SEE NOTE 3 & 4)

Recommended Width of Roadway VARIES (TYPICAL: 106' SHLD. PT. TO SHLD. PT.) Skew 78°

Recommended Location is (AL) Upstream of, Downstream of) Existing Crossing AT

Latitude 35.82381 Longitude -78.82416

Statewide Tier ☐ Regional Tier ☒ Sub-Regional Tier ☐

Bench Mark is BM4 -L- STA. 28+31.66; 242' RT; BM TIE NAIL IN 32" OAK

Northing 755142 Easting 2052964 Elevation 287.57 ft Datum NAVD88

Temporary Crossing NO TEMPORARY CROSSING REQUIRED, PHASED CONSTRUCTION/TRENCHLES INSTALLATION.



Designed by JORDAN BENDL, P.E.

Assisted by ETHAN BRAY, E.I.

Date 8/28/2026

NORTH CAROLINA PROFESSIONAL SEAL 052128 ENGINEER JORDAN BENDL

Kimley»Horn

KHA Project No.: 011036302
Date Printed: 8/28/2026

Reviewed by Date

SITE DATA

Drainage Area 512 AC. Source STREAMSTATS

River Basin NEUSE Character REGION 1 - PIEDMONT; URBAN

Stream Classification (e.g., Trout, High Quality Water) C;NSW

Data on Existing Structure 3 @ 60" CIRCULAR RCP; 60 LF ALONG CENTERLINE OF CULVERT

Total Waterway Opening 58.9 ft²

Debris Potential: Low ☐ Moderate ☒ High ☐ Waterway Opening Below 100-yr WS Elev 58.9 ft²

Data on Structures Up and Down Stream UPSTREAM: 1 @ 8' X 6' RCBC >800' U/S ON NC-54

DOWNSTREAM: CONFLUENCE W/ CRABTREE CREEK

Gage Station No N/A Period of Records N/A

Max Discharge N/A cfs Date N/A Frequency N/A

Historical Flood Information: NO KNOWN FLOODING

Date N/A Elev N/A ft Est Freq N/A yr Source JACOB NICHOLSON BRIDGE MAINTENANCE ENGINEER (DIVISION 5) Period of Knowledge N/A yrs

Date Elev ft Est Freq yr Source Period of Knowledge yrs

Date Elev ft Est Freq yr Source Period of Knowledge yrs

Allowable HW Elev 292.4 (1.5' FREEBOARD FROM OVERTOPPING) ft Normal Water Surface Elev 283.3 ft

Manning's n: Left OB 0.055 Channel 0.03 Right OB 0.055 Source AERIAL AND FIELD VERIFIED

Flood Study / Status FIS REPORT 37183CV000E DETAILED STUDY (DATED 7/19/2022) (MAP #: 3720075500K) (PANEL #: 0755)

Flood Study 100-yr Discharge 1106 cfs WS Elev: With Floodway 293.6 ft Without Floodway 292.9 ft River Station 1093

DESIGN DATA

Hydrological Method USGS REGRESSION EQUATIONS & EFFECTIVE FEMA PRELIMINARY MODEL

Hydraulic Design Method HEC-RAS 6.4.1 (U-5811_UT_To_Crabtree_Crk_SR_1002)

Design Tailwater: Q_{10} 4.4 ft Q_{25} 4.7 ft Q_{50} 4.9 ft Q_{100} 5.1 ft Q_{500} 5.5 ft

INLET INVERT ELEVATION = 281.3, OUTLET INVERT ELEVATION = 281.2

SIZE & TYPE: 1@96" & 2@78" WSP — STATION 1125 APPROXIMATELY 9.8 FEET UPSTREAM OF CULVERT

FREQUENCY	Q (cfs)	INLET CONTROL			OUTLET CONTROL		REMARKS
		HW/D [1]	HW	WSEL	HW	WSEL	
10-YEAR	628	0.81	5.7	288.0	6.9	289.2	OUTLET
25-YEAR	808	0.94	6.6	288.9	8.1	290.4	OUTLET
50-YEAR	959	1.04	7.3	289.6	9.1	291.4	OUTLET
100-YEAR	1106	1.14	8.0	290.3	10.3	292.6	OUTLET
500-YEAR	1482	1.43	10.0	292.3	12.4	294.7	OUTLET

Total Proposed Waterway Opening 101.4 sf

Outlet Velocity (V_{10}) 7.0 fps Natural Channel Velocity (V_{10}) 5.5 fps

Required Outlet Protection CL-I RIPRAP ON BANKS AND OUTLET

State Floodway Compliance Type SFC TYPE B (MAX WSEL DECREASE 2.72'@ RS 2021 (SEE NOTE 1)

INFORMATION TO BE SHOWN ON PLANS

HYDRAULIC DATA

DESIGN DISCHARGE	= 959 C.F.S.
FREQUENCY OF DESIGN FLOOD	= 50 YRS.
DESIGN HIGH WATER ELEVATION	= 291.4
DRAINAGE AREA	= 512 AC.
BASIC DISCHARGE (Q100)	= 1106 C.F.S.
BASIC HIGH WATER ELEVATION	= 292.6

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE	= 1482 C.F.S.
FREQUENCY OF OVERTOPPING FLOOD	= 500 YRS.
OVERTOPPING FLOOD ELEVATION	= 293.9

* OVERTOPPING WILL OCCUR AT -L- STA.21+15.00 AT THE LOW POINT IN THE INTERSECTION RADIUS OF LP1

ADDITIONAL INFORMATION AND COMPUTATIONS

USGS REGRESSION EQUATIONS
SIR 2014-5030 (REGION 1)

Q_{10}= 381 (DA)$^{0.7536}$ 10$^{(0.0076*IMP)}$ = 707 CFS (USE FEMA)

Q_{25}= 518 (DA)$^{0.7752}$ 10$^{(0.0053*IMP)}$ = 755 CFS (USE FEMA)

Q_{50}= 632 (DA)$^{0.7939}$ 10$^{(0.0037*IMP)}$ = 777 CFS (USE FEMA)

Q_{100}= 753 (DA)$^{0.8083}$ 10$^{(0.0024*IMP)}$ = 807 CFS (USE FEMA)

Q_{500}= 1045 (DA)$^{0.8160}$ = 871 CFS (USE FEMA)

FEMA DISCHARGES

Q_{10}= 628 CFS

Q_{25}= 808 CFS

Q_{50}= 959 CFS

Q_{100}= 1106 CFS

Q_{500}= 1482 CFS

DA = 0.80 SQ. MI; % IMP = 45 (FUTURE)

NOTE 1: MAX DECREASE IS DUE TO PROPOSED UPSTREAM CULVERT SINCE BOTH CULVERTS ARE ON THE SAME STREAM THEY ARE BEING PERMITTED AS A SIGNLE SFC PACKAGE

NOTE 2: D USED IN HW/D IS EFFECTIVE OPENING RISE OF THE MAIN BARREL ACCOUNTING FOR BURIED DEPTH

NOTE 3: CULVERT DIAMETER CONSTRAINED BY EXISTING ROADWAY PROFILE AND THE NEED TO MAINTAIN TRAFFIC WHILE TRENCHLESSLY INSTALLING PIPES

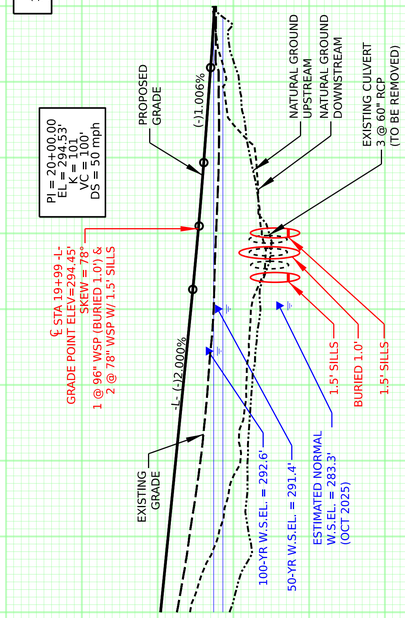
NOTE 4: EMAIL FROM ROBERT W BULLOCK (03/16/2026) - THREE PIPES WOULD BE PREFERED OVER TWO FOR INSTALLATION PURPOSES

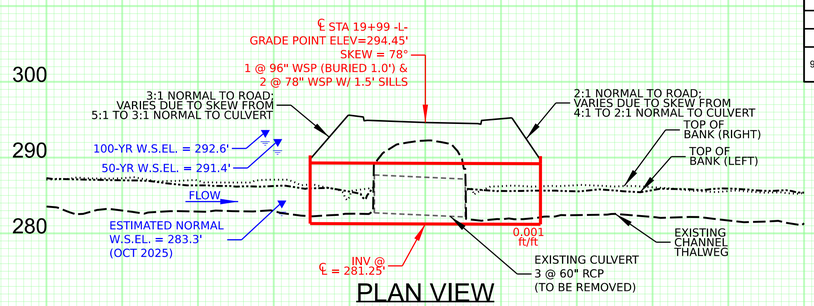
NOTE 5: PIPES INSTALLED TRENCHLESSLY MUST BE SPACED A MINIMUM OF 5' APART

NOTE 6: CULVERT PROFILE SHOWN IS THROUGH MAIN/LOW FLOW BARREL

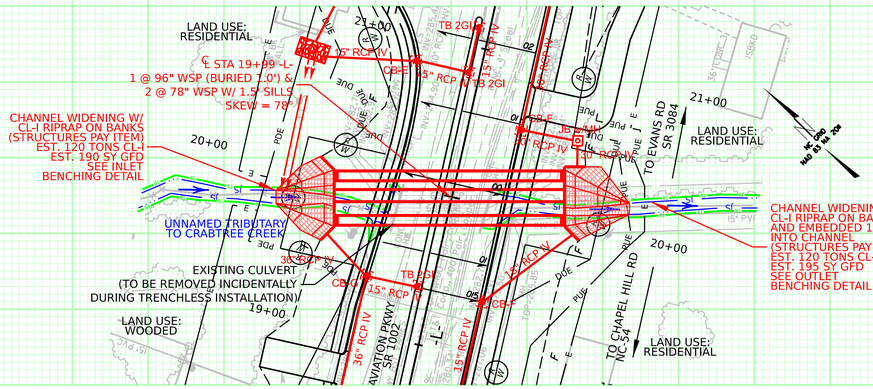
SCALE 1" = 50' H 1"= 10' V

CULVERT PROFILE





PLAN VIEW



FEMA PERFORMANCE TABLE

	100-YEAR
DUPLICATE EFFECTIVE	292.90
CORRECTED EFFECTIVE	292.85
REVISED	292.60

SECTION 1125
9.8 FEET FROM UPSTREAM FACE OF CULVERT
(DUPLICATE TAKEN FROM XS-1093)

NCDOT PERFORMANCE TABLE

	10-YEAR	25-YEAR	50-YEAR	100-YEAR	500-YEAR
NATURAL	288.6	288.9	289.1	289.3	289.8
EXISTING	290.8	292.4	292.7	292.9	293.2
PROPOSED	289.2	290.4	291.4	292.6	294.7

SECTION 1125
9.8 FEET FROM UPSTREAM FACE OF CULVERT

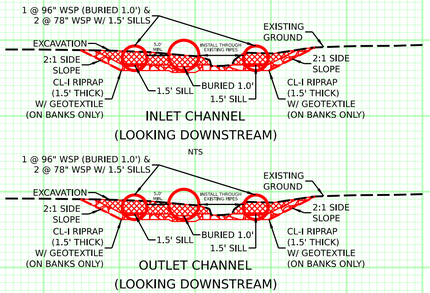
QUANTITY ESTIMATE

CLASS-I RIPRAP	250 TONS
GEOTEXTILE	400 S.Y.
EXCAVATION CHANNEL	200 CY

CONSTRUCTION SEQUENCING:

1. TRENCHLESSLY INSTALL NORTHERN BARREL, ROUTE FLOW THROUGH IT
2. EXTEND NORTHERN BARREL
3. TRENCHLESSLY INSTALL TWO SOUTHERN SOUTHERN BARRELS, ENCAPSULATING AND BORING THROUGH EXISTING CULVERT
4. EXTEND SOUTHERN BARRELS

(SEE TRANSPORTATION MANAGEMENT PLAN FOR FULL CULVERT PHASING)



NO UPSTREAM OR DOWNSTREAM STRUCTURES THAT WERE IN PLACE AT THE TIME THAT THIS PROJECT WAS DESIGNED WILL BE ADVERSELY IMPACTED BY THIS PROJECT*

SOIL TYPE: CLAY LOAM

*Statement is valid only for hydraulic performance evaluated per NCDOT criteria.
No determination is made regarding volume/storage based calculations or using results of an unsteady HEC-RAS model.

Docusign Envelope ID: 5A1E24C7-E13D-8702-8260-F8B6B23EE23E

NCDOT ACCEPTANCE

CULVERT SURVEY & HYDRAULIC DESIGN REPORT

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
HYDRAULICS UNIT
RALEIGH, NC

1 OF 1

State Proj Reference No U-5811 WBS Proj No 44384.1.1 Proj Station 32+08 - L -

County WAKE Bridge over UNNAMED TRIBUTARY TO CRABTREE CREEK Struc Inv No 920C03

On Highway SR 1002 (AVIATION PKWY) between NC-54 (CHAPEL HILL RD) and SR 3084 (EVANS RD)

Recommended Structure 2 @ 60" WELDED STEEL (BURIED 1.0') W/ 1.5' SILL FB BARREL AND SQUARE EDGE W/ CIP CONCRETE HEADWALL AND ENDWALL; OAL = 134 LF

Recommended Width of Roadway 104' SHLD. PT. TO SHLD. PT. Skew 78°

Recommended Location is (At, Upstream of, Downstream of) Existing Crossing AT

Latitude 35.82600 Longitude -78.82107

Statewide Tier ☐ Regional Tier ☒ Sub-Regional Tier ☐

Bench Mark is BM4 -L- STA. 28+31.66; 242' RT; BM TIE NAIL IN 32" OAK

Northing 755142 Easting 2052964 Elevation 287.57 ft Datum NAVD88

Temporary Crossing NO TEMPORARY CROSSING REQUIRED. PHASED CONSTRUCTION/TRENCHLESS INSTALLATION.



Designed by JORDAN BENDL, P.E.

Assisted by ETHAN BRAY, E.I.

Date 8/28/2026

NORTH CAROLINA PROFESSIONAL SEAL 052288 ENGINEER JORDAN BENDL

Kimley»Horn

KHA Project No.: 019036302
Date Printed: 8/28/2026

Reviewed by Date

SITE DATA

Drainage Area 121.6 ACRES Source QL2 LIDAR

River Basin NEUSE Character REGION 1 - PIEDMONT; URBAN

Stream Classification (e.g., Trout, High Quality Water) C;NSW

Data on Existing Structure 1 @ 48" CIRCULAR RCP ; 48 LF ALONG CENTERLINE OF CULVERT

Total Waterway Opening 12.6 ft²

Debris Potential: Low ☐ Moderate ☒ High ☐ Waterway Opening Below 100-yr WS Elev 12.6 ft²

Data on Structures Up and Down Stream UPSTEAM: 3 @ 24" RCP >1,000' U/S ON FAIRVIEW AVE DOWNSTEAM: CONFLUENCE W/ CRABTREE CREEK

Gage Station No N/A Period of Records N/A

Max Discharge N/A cfs Date N/A Frequency N/A

Historical Flood Information: NO KNOWN FLOODING

Date N/A Elev N/A ft Est Freq N/A yr Source JACOB NICHOLSON BRIDGE MAINTENANCE ENGINEER (DIVISION 5) Period of Knowledge yrs

Date Elev ft Est Freq yr Source Period of Knowledge yrs

Date Elev ft Est Freq yr Source Period of Knowledge yrs

Allowable HW Elev 291.0 (OVERTOPPING ELEV) (SEE NOTE 1) ft Normal Water Surface Elev 286.3 ft

Manning's n: Left OB 0.070 Channel 0.030 Right OB 0.070 Source AERIAL AND FIELD VERIFIED

Flood Study / Status N/A (NOT IN FLOOD STUDY)

Flood Study 100-yr Discharge N/A cfs WS Elev: With Floodway N/A ft Without Floodway N/A ft River Station N/A

DESIGN DATA

Hydrological Method USGS SIR 2014-5030

Hydraulic Design Method HY-8 v8.0

Design Tailwater: Q_{10} 2.9 ft Q_{25} 2.9 ft Q_{50} 2.9 ft Q_{100} 2.9 ft Q_{500} 3.0 ft

SIZE & TYPE	Q (cfs)	K_e	Inlet Control HW/D	Inlet Control HW	Outlet Control d_c	Outlet Control $\frac{d_c+D}{2}$	Outlet Control h_o	Outlet Control H	Outlet Control LS_o	Outlet Control HW	REMARKS
2@60" STEEL (1.0' BURIED)	240	0.5	1.34	5.34	2.79	3.40	3.40	3.87	1.60	5.14	290.6' / 10 YR
2@60" STEEL (1.0' BURIED)	250	0.5	1.39	5.56	2.86	3.43	3.43	4.02	1.60	5.32	290.9' / 25 YR
2@60" STEEL (1.0' BURIED)	250	0.5	1.39	5.56	2.86	3.43	3.43	4.02	1.60	5.32	290.9' / 50 YR
2@60" STEEL (1.0' BURIED)	255	0.5	1.42	5.68	2.89	3.45	3.45	4.10	1.60	5.42	291.0' / 100 YR
2@60" STEEL (1.0' BURIED)	270	0.5	1.44	5.77	2.91	3.46	3.46	4.14	1.60	5.50	291.1' / 500 YR

Total Proposed Waterway Opening 31.5 sf

Outlet Velocity (V_{10}) 9.7 fps Natural Channel Velocity (V_{10}) 4.0 fps

Required Outlet Protection CL-I RIPRAP ON BANKS AND STREAM BED AT OUTLET

State Floodway Compliance Type NON FEMA STREAM - N/A

INFORMATION TO BE SHOWN ON PLANS

HYDRAULIC DATA

DESIGN DISCHARGE	= 250 C.F.S.
FREQUENCY OF DESIGN FLOOD	= 50 YRS.
DESIGN HIGH WATER ELEVATION	= 290.9
DRAINAGE AREA	= 0.19 SQ. MI.
BASIC DISCHARGE (Q100)	= 255 C.F.S.
BASIC HIGH WATER ELEVATION	= 291.0

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE	= 255 C.F.S.
FREQUENCY OF OVERTOPPING FLOOD	= 100 YRS.
OVERTOPPING FLOOD ELEVATION	= 291.0*

* OVERTOPPING WILL OCCUR AT STA 32+85.00 AT THE INTERSECTION WITH THE DRIVEWAY

ADDITIONAL INFORMATION AND COMPUTATIONS

USGS REGRESSION EQUATIONS
SIR 2014-5030 (REGION 1)

Q_{10} = 381 (DA)$^{0.7536}$ 10$^{(0.0079*IMP)}$ = 239 CFS (SAY 240)

Q_{25} = 518 (DA)$^{0.7752}$ 10$^{(0.0053*IMP)}$ = 248 CFS (SAY 250)

Q_{50} = 632 (DA)$^{0.7939}$ 10$^{(0.0037*IMP)}$ = 249 CFS (SAY 250)

Q_{100} = 753 (DA)$^{0.8083}$ 10$^{(0.0024*IMP)}$ = 254 CFS (SAY 255)

Q_{500} = 1045 (DA)$^{0.8160}$ = 269 CFS (SAY 270)

DA = 0.19 SQ. MI; % IMP = 45 (FUTURE)

NOTE 1: DESIGN CRITERIA LOWERED FROM STANDARD TO BE NOT ALLOWING OT IN DESIGN YEAR. LOWERED DESIGN CRITERIA WAS BASED ON DECISION FROM MEETING WITH NCDOT ON 01/08/2026 IN ORDER TO AVOID TRIPLE BARREL CULVERTS

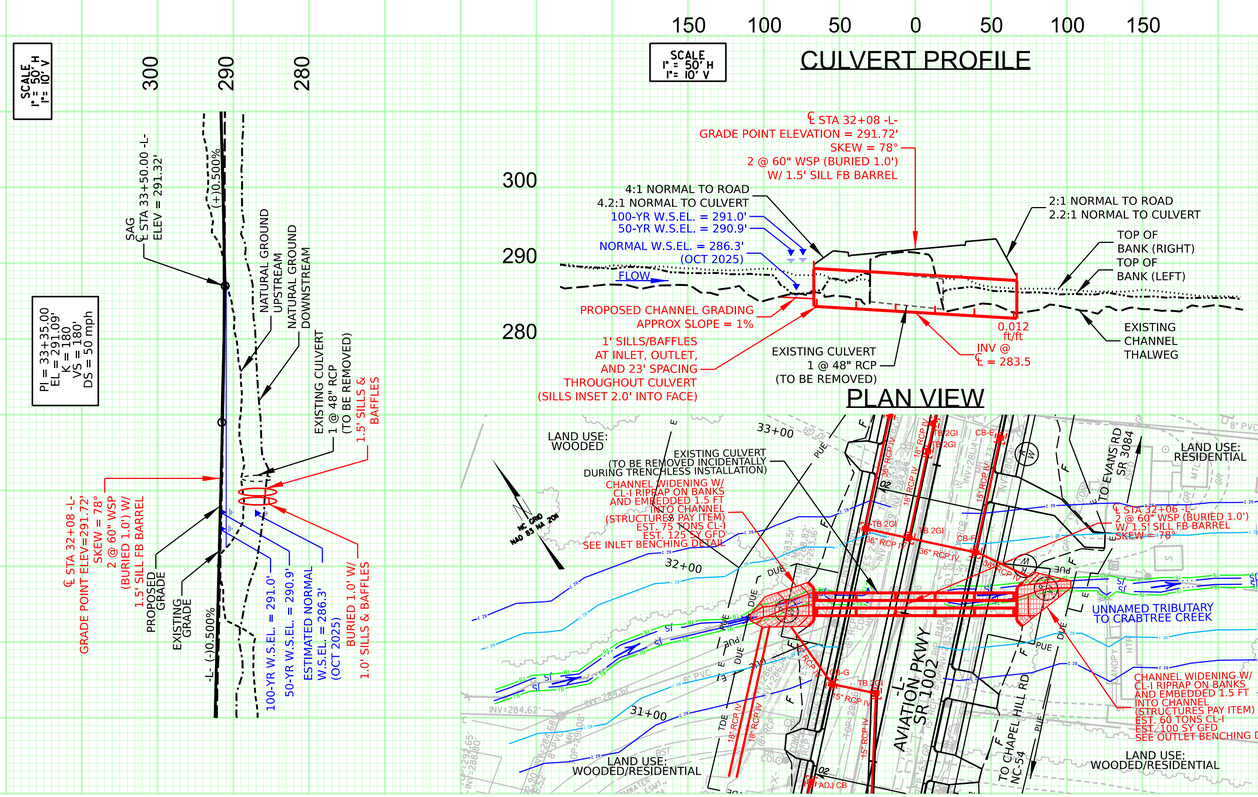
NOTE 2: VALUES USED IN DESIGN DATA COME FROM LOW FLOW CULVERT BARREL

NOTE 3: PIPES INSTALLED TRENCHLESSLY MUST BE SPACED MINIMUM OF 5' APART

NOTE 4: CULVERT PROFILE IS THROUGH MAIN/LOW FLOW BARREL

SCALE 1" = 50' H 1"= 10' V

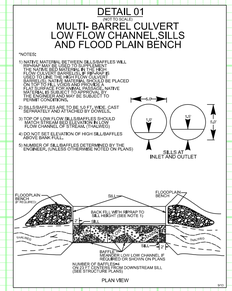
CULVERT PROFILE



SCALE 1" = 35.00' H 1"= 10' V

PLAN VIEW

DETAIL 01
NOT TO SCALE
MULTI- BARREL CULVERT
LOW FLOW CHANNEL,SILLS
AND FLOOD PLAIN BENCH



NCDOT PERFORMANCE TABLE

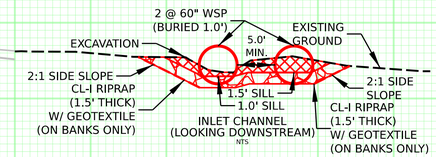
	10-YEAR	25-YEAR	50-YEAR	100-YEAR	500-YEAR
NATURAL	288.2	288.2	288.2	288.2	288.3
EXISTING	291.8	291.8	291.8	291.8	291.8
PROPOSED	290.6	290.9	290.9	291.0	291.1

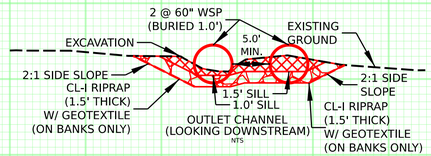
HY-8 CALCULATIONS

QUANTITY ESTIMATE

CLASS-I RIPRAP	135 TONS
GEOTEXTILE	225 S.Y.
EXCAVATION	
CHANNEL	45 CY

CONSTRUCTION SEQUENCING:
1. TRENCHLESSLY INSTALL SOUTHERN BARREL, ROUTE FLOW THROUGH IT
2. EXTEND SOUTHERN BARREL
3. TRENCHLESSLY INSTALL NORTHERN BARREL, ENCAPSULATING AND BORING THROUGH EXISTING CULVERT
4. EXTEND NORTH BARREL
(SEE TRANSPORTATION MANAGEMENT PLAN FOR FULL CULVERT PHASING)





NO UPSTREAM OR DOWNSTREAM STRUCTURES THAT WERE IN PLACE AT THE TIME THAT THIS PROJECT WAS DESIGNED WILL BE ADVERSELY IMPACTED BY THIS PROJECT*

SOIL TYPE: CLAY LOAM

*Statement is valid only for hydraulic performance evaluated per NCDOT criteria.
No determination is made regarding volume/storage based calculations or using results of an unsteady HEC-RAS model.

Docusign Envelope ID: 5A1E24C7-E13D-8702-8260-F8B6B23EE23E

NCDOT ACCEPTANCE

CULVERT SURVEY & HYDRAULIC DESIGN REPORT

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
HYDRAULICS UNIT
RALEIGH, NC

1 OF 1

State Proj Reference No U-5811 WBS Proj No 44384.1.1 Proj Station 57+68 - L -

County WAKE Bridge over UNNAMED TRIBUTARY TO CRABTREE CREEK Struc Inv No 920C04

On Highway SR 1002 (AVIATION PKWY) between NC-54 (CHAPEL HILL RD) and SR 3084 (EVANS RD)

Recommended Structure 1 @ 132" WELDED STEEL PIPE (WSP) W/ CIP CONCRETE HEADWALL & ENDWALL AND 1.0' SILLS/BAFFLES AT INLET, OUTLET, AND 23' SPACING THROUGHOUT CULVERT; OAL=140'

Recommended Width of Roadway 112' SHLD. PT. TO SHLD. PT. Skew 90°

Recommended Location is (At) Upstream of, Downstream of) Existing Crossing AT

Latitude 35.83149 Longitude -78.81570

Statewide Tier ☐ Regional Tier ☒ Sub-Regional Tier ☐

Bench Mark is BM5 -L- STA. 48+34.79; 265' RT; BM TIE NAIL IN 20" OAK

Northing 757015 Easting 2053868 Elevation 295.77 ft Datum NAVD88

Temporary Crossing NO TEMPORARY CROSSING REQUIRED. PHASED CONSTRUCTION



Designed by JORDAN BENDL, P.E.

Assisted by ETHAN BRAY, E.I.

Date 8/28/2026

NORTH CAROLINA PROFESSIONAL SEAL 050269 ENGINEER JORDAN BENDL

Kimley»Horn

KHA Project No.: 011036302
Date Printed: 8/28/2026

Reviewed by Date

SITE DATA

Drainage Area 556.8 AC. Source STREAMSTATS

River Basin NEUSE Character REGION 1 - PIEDMONT; URBAN

Stream Classification (e.g., Trout, High Quality Water) B;NSW

Data on Existing Structure 2 @ 72" CIRCULAR RCP; 65 LF ALONG CENTERLINE OF CULVERT

Total Waterway Opening 56.5 ft²

Debris Potential: Low ☐ Moderate ☒ High ☐ Waterway Opening Below 100-yr WS Elev 56.5 ft²

Data on Structures Up and Down Stream UPSTREAM: 1 @ 8'X6.5' RCBC >1 MI U/S ON AIRPORT BLVD

DOWNSTREAM: CONFLUENCE W/ CRABTREE CREEK

Gage Station No N/A Period of Records N/A

Max Discharge N/A cfs Date N/A Frequency N/A

Historical Flood Information: NO KNOWN FLOODING

Date N/A Elev N/A ft Est Freq N/A yr Source JACOB NICHOLSON BRIDGE MAINTENANCE ENGINEER (DIVISION 5) Period of Knowledge yrs

Date Elev ft Est Freq yr Source Period of Knowledge yrs

Date Elev ft Est Freq yr Source Period of Knowledge yrs

Allowable HW Elev 292.0 (O.T. ELEVATION) (SEE NOTE 2) ft Normal Water Surface Elev 281.9 ft

Manning's n: Left OB 0.070 Channel 0.035 Right OB 0.70 Source AERIAL AND FIELD VERIFIED

Flood Study / Status N/A (NOT IN FLOODSTUDY)

Flood Study 100-yr Discharge N/A cfs WS Elev: With Floodway N/A ft Without Floodway N/A ft River Station N/A

DESIGN DATA

Hydrological Method USGS SIR 2014-5030

Hydraulic Design Method HY-8 v8.0

Design Tailwater: Q_{10} 3.3 ft Q_{25} 3.4 ft Q_{50} 3.4 ft Q_{100} 3.5 ft Q_{500} 3.7 ft

SIZE & TYPE	Q (cfs)	K_e	Inlet Control		Outlet Control						REMARKS
			HW/D	HW	d_c	$\frac{d_c+D}{2}$	h_o	H	LS_o	HW	
1@11' WSP (1.0' BURIED)	750	0.5	0.95	9.46	5.80	7.90	7.90	8.13	1.50	9.89	290.4' / 10 YR
1@11' WSP (1.0' BURIED)	810	0.5	1.00	10.03	6.06	8.03	8.03	8.50	1.50	10.40	290.9' / 25 YR
1@11' WSP (1.0' BURIED)	830	0.5	1.02	10.23	6.14	8.07	8.07	8.62	1.50	10.56	291.1' / 50 YR
1@11' WSP (1.0' BURIED)	860	0.5	1.05	10.52	6.27	8.14	8.14	8.81	1.50	10.81	291.3' / 100 YR
1@11' WSP (1.0' BURIED)	930	0.5	1.12	11.24	6.55	8.28	8.28	9.24	1.50	11.39	291.9' / 500 YR

Total Proposed Waterway Opening 90.7 sf

Outlet Velocity (V_{10}) 13.1 fps Natural Channel Velocity (V_{10}) 9.9 fps

Required Outlet Protection CL-I RIPRAP ON BANKS AND STREAM BED

State Floodway Compliance Type NON FEMA STREAM - N/A

INFORMATION TO BE SHOWN ON PLANS

HYDRAULIC DATA

DESIGN DISCHARGE	=	830 C.F.S.
FREQUENCY OF DESIGN FLOOD	=	50 YRS.
DESIGN HIGH WATER ELEVATION	=	291.1
DRAINAGE AREA	=	0.87 SQ. MI.
BASIC DISCHARGE (Q100)	=	860 C.F.S.
BASIC HIGH WATER ELEVATION	=	291.3

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE	=	940 C.F.S.
FREQUENCY OF OVERTOPPING FLOOD	=	>500 YRS.
OVERTOPPING FLOOD ELEVATION	=	292.0*

* OVERTOPPING WILL OCCUR AT STA.55+25.00 AT THE LOW POINT IN THE INTERSECTION RADIUS OF INTERNATIONAL DRIVE

ADDITIONAL INFORMATION AND COMPUTATIONS

USGS REGRESSION EQUATIONS
SIR 2014-5030 (REGION 1)

Q_{10}= 381 (DA)$^{0.7536}$ 10$^{(0.0076*IMP)}$ = 753 CFS (SAY 750)

Q_{50}= 518 (DA)$^{0.7752}$ 10$^{(0.0053*IMP)}$ = 806 CFS (SAY 810)

Q_{50}= 632 (DA)$^{0.7039}$ 10$^{(0.0037*IMP)}$ = 830 CFS

Q_{100}= 753 (DA)$^{0.6683}$ 10$^{(0.0024*IMP)}$ = 863 CFS (SAY 860)

Q_{500}= 1045 (DA)$^{0.6160}$ = 932 CFS (SAY 930)

DA = 0.87 SQ. MI; % IMP = 45 (FUTURE)

NOTE 1: D USED IN HW/D IS EFFECTIVE OPENING RISE OF THE MAIN BARREL ACCOUNTING FOR BURIED DEPTH

NOTE 2: DESIGN CRITERIA LOWERED TO A SMALLER FREEBOARD BASED UPON NEED TO MAINTAIN TRAFFIC WITH A SINGLE BARREL WEEKEND CLOSURE

SCALE 1" = 50' H 1"= 10' V

PI = 58+80.00
EL = 294.17'
VC = 140'
VC = 150'
DS = 50 mph

EXISTING GRADE
NATURAL GROUND UPSTREAM
NATURAL GROUND DOWNSTREAM
100-YR W.S.EL. = 291.3'
50-YR W.S.EL. = 291.1'
(-)0.570%
EXISTING CULVERT 2 @ 72" RCP (TO BE REMOVED)
℄ STA 57+68 -L-
GRADE POINT ELEV=293.93'
SKEW = 90°
1 @ 132" WSP
(BURIED 1.0')
PROPOSED GRADE
-L- (+)0.500%
ESTIMATED NORMAL W.S.EL. = 281.9' (OCT 2025)
BURIED 1.0' W/ 1.0' SILLS & BAFFLES

SCALE 1" = 50' H 1"= 10' V

CULVERT PROFILE

℄ STA 57+68 -L-
GRADE POINT ELEV=293.93'
SKEW = 90°
1 @ 132" WSP
(BURIED 1.0')
3:1 NORMAL TO ROAD AND CULVERT
2:1 NORMAL TO ROAD AND CULVERT
100-YR W.S.EL. = 291.3'
50-YR W.S.EL. = 291.1'
NORMAL W.S.EL. = 281.9' (OCT 2025)
TOP OF BANK (RIGHT)
TOP OF BANK (LEFT)
FLOW
PROPOSED CHANNEL GRADING APPROX SLOPE = 1%
1' SILLS/BAFFLES AT INLET, OUTLET, AND 23' SPACING THROUGHOUT CULVERT (SILLS INSET 2.0' INTO FACE)
INV @ ℄ = 278.25'
0.018 ft/ft
EXISTING CULVERT 2 @ 72" RCP (TO BE REMOVED)
EXISTING CHANNEL THALWEG

PLAN VIEW

LAND USE: WOODED
TO EVANS RD SR 3084
HANNEL IMPROVEMENTS W/ CL-I RIPRAP ON BANKS AND EMBEDDED 1.5 FT INTO CHANNEL (STRUCTURES PAY ITEM) EST. 95 TONS CL-I EST. 155 SY GFD SEE INLET CHANNEL IMPROVEMENTS DETAIL
-L- AVIATION PKWY SR 1002
SPECIAL BASE DITCH
EXISTING CULVERT (TO BE REMOVED)
LAND USE: WOODED
FLOODBENCHING W/ CL-I RIPRAP ON BANKS AND EMBEDDED 1.5 FT INTO CHANNEL (STRUCTURES PAY ITEM) EST. 170 TONS CL-I EST. 310 SY GFD SEE OUTLET CHANNEL IMPROVEMENTS DETAIL
℄ STA 57+68 -L-
1 @ 132" WSP
(BURIED 1.0') W/
1.0' SILLS & BAFFLES
SKEW = 90°
UNAMED TRIBUTARY TO CRABTREE CREEK
TO CHAPEL HILL RD NC-54
LAND USE: WOODED
58+00
57+00

DETAIL 01
NOT TO SCALE
SINGLE BARREL CULVERT
LOW FLOW
CHANNEL AND SILLS

*NOTES:
1) NOTHE MATERIAL BETWEEN SILL/BAFFLES WILL BACKFILL NATURALLY AND IS NOT REQUIRED.
2) SILL/BAFFLES ARE TO BE LEFT LARGE CAST IN PLACE CONCRETE SILL/BAFFLES
3) TOP OF LOW FLOW SILL/BAFFLES SHOULD MATCH STREAM BED ELEVATION FOR LOW FLOW CHANNEL OF STREAM. (THALWEG)
4) DO NOT SET ELEVATION OF HIGH SILL/BAFFLES ABOVE BANK FULL.
5) NUMBER OF SILL/BAFFLES DETERMINED BY THE ENGINEER (UNLESS OTHERWISE NOTED ON PLANS)

11.0' 1.0' FILLET INLET AND OUTLET
SILL/BAFFLE
SILL/BAFFLE
BANK FULL
LOW FLOW SILL/BAFFLES REQUIRED ON BARREL
NUMBER OF BAFFLES EQUAL TO BARREL DIAMETER
SILL/BAFFLE DOWNSTREAM SILL
PLAN VIEW

NCDOT PERFORMANCE TABLE

	10-YEAR	25-YEAR	50-YEAR	100-YEAR	500-YEAR
NATURAL	284.4	284.5	284.6	284.6	284.8
EXISTING	292.2	292.3	292.3	292.4	292.5
PROPOSED	290.4	290.9	291.1	291.3	291.9

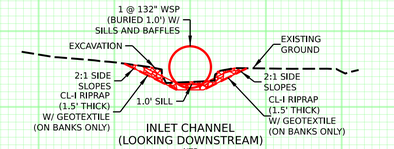
HY-8 CALCULATIONS

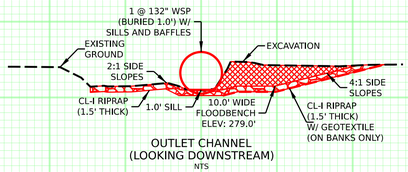
QUANTITY ESTIMATE

CLASS-I RIPRAP	160 TONS
GEOTEXTILE	280 S.Y.

CONSTRUCTION SEQUENCING:

1. REMOVE EXISTING SOUTHERN BARREL
2. INSTALL PROPOSED WSP BARREL
3. EXTEND WSP, REROUTE FLOW
4. REMOVE REMAINING EXISTING BARREL (SEE TRANSPORTATION MANAGEMENT PLAN FOR FULL CULVERT PHASING)





NO UPSTREAM OR DOWNSTREAM STRUCTURES THAT WERE IN PLACE AT THE TIME THAT THIS PROJECT WAS DESIGNED WILL BE ADVERSELY IMPACTED BY THIS PROJECT

SOIL TYPE: CLAY LOAM

* Statement is valid only for hydraulic performance evaluated per NCDOT criteria.
No determination is made regarding volumestorage based calculations or using results of an unsteady HEC-RAS model.

Docusign Envelope ID: 5A1E24C7-E13D-8702-8260-F8B6B23EE23E

NCDOT ACCEPTANCE

CULVERT SURVEY & HYDRAULIC DESIGN REPORT

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
HYDRAULICS UNIT
RALEIGH, NC

1 OF 1

State Proj Reference No U-5811 WBS Proj No 44384.1.1 Proj Station 113+30 -L-

County WAKE Bridge over STIRRUP IRON CREEK Struc Inv No 910C05

On Highway SR 1002 (AVIATION PKWY) between SR 3084 (EVANS RD) and I-40

Recommended Structure 2 @ 9' X 14' RCBC W/ 6" BEVELED HEADWALL

Recommended Width of Roadway 92' SHLD. PT. TO SHLD. PT. Skew 90°

Recommended Location is (AL) Upstream of, Downstream of) Existing Crossing AT

Latitude 35.84289 Longitude -78.80407

Statewide Tier ☐ Regional Tier ☒ Sub-Regional Tier ☐

Bench Mark is BM9 -L- STA. 114+87.33.20; BM TIE NAIL IN 15" OAK

Northing 762018 Easting 2058089 Elevation 280.39 ft Datum NAVD88

Temporary Crossing NO TEMPORARY CROSSING REQUIRED. OFFSITE DETOUR.



Designed by JORDAN BENDL, P.E.

Assisted by ETHAN BRAY, E.I.

Date 8/28/2026

NORTH CAROLINA PROFESSIONAL SEAL 052428 ENGINEER JORDAN BENDL

Kimley»Horn

KHA Project No.: 011036302
Date Printed: 8/28/2026

Reviewed by Date

SITE DATA

Drainage Area 25.2 SQ MI [1] Source STREAMSTATS

River Basin NEUSE Character REGION 1 - PIEDMONT; URBAN

Stream Classification (e.g., Trout, High Quality Water) C;NSW

Data on Existing Structure 1 @ 15' X 14' RCBC W/ WINGED WALLS; 79LF ALONG CENTERLINE OF CULVERT

Total Waterway Opening 210 ft²

Debris Potential: Low ☐ Moderate ☒ High ☐ Waterway Opening Below 100-yr WS Elev 210 ft²

Data on Structures Up and Down Stream UPSTREAM: CONFLUENCE WITH BRIER CREEK
DOWNSTREAM: LAKE CRABTREE

Gage Station No 0208725090 [1] Period of Records 2024-07-11 - 8/28/2026

Max Discharge N/A cfs Date N/A Frequency N/A

Historical Flood Information:

Date N/A Elev N/A ft Est Freq N/A yr Source JACOB NICHOLSON BRIDGE MAINTENANCE ENGINEER (DIVISION 5) Period of Knowledge 1.5 yrs

Date Elev ft Est Freq yr Source Period of Knowledge yrs

Date Elev ft Est Freq yr Source Period of Knowledge yrs

Allowable HW Elev 284.8 (500-YR CORRECTED EFFECTIVE W.S.EL.) (SEE NOTE 2) ft Normal Water Surface Elev 275.1 ft

Manning's n: Left OB 0.09 Channel 0.032 Right OB 0.09 Source EFFECTIVE MODEL / AERIAL AND FIELD VERIFIED

Flood Study / Status FIS REPORT 37183CV000E DETAILED STUDY (DATED 7/19/2022) (MAP #: 3720075600K) (PANEL #: 0756)

Flood Study 100-yr Discharge 2634 cfs WS Elev: With Floodway 284.1 ft Without Floodway 284.1 ft River Station 3424

DESIGN DATA

Hydrological Method EFFECTIVE FLOOD INSURANCE STUDY (FIS) #3718CV000E

Hydraulic Design Method HEC-RAS 6.4.1 (U-511_Stirrup_Iron_Crk_SR_1002)

Design Tailwater: Q_{10} 6.4 ft Q_{25} 6.5 ft Q_{50} 6.7 ft Q_{100} 6.8 ft Q_{500} 7.0 ft (SEE NOTE 5)

INLET INVERT ELEVATION = 266.8, OUTLET INVERT ELEVATION = 266.4

SIZE & TYPE: 2@9'X14' RCBC | STATION 3436 APPROXIMATELY 24 FEET UPSTREAM OF CULVERT

FREQUENCY	Q (cfs)	INLET CONTROL			OUTLET CONTROL		REMARKS
		HW/D [1]	HW	WSEL	HW	WSEL	
10-YEAR	1511	0.69	9.7	276.5	9.5	276.3	INLET
25-YEAR	1953	0.82	11.5	278.3	11.3	278.1	INLET
50-YEAR	2283	0.91	12.7	279.5	12.5	279.3	INLET
100-YEAR	2634	1.00	14.0	280.8	13.8	280.6	INLET
500-YEAR	3588	1.24	17.3	284.1	16.9	283.7	INLET

Total Proposed Waterway Opening 252 sf

Outlet Velocity (V_{10}) 11.9 fps Natural Channel Velocity (V_{10}) 5.7 fps

Required Outlet Protection NONE PROPOSED

State Floodway Compliance Type SFC TYPE B (MAX WSEL DECREASE OF 2.73' @ RS 3436)

INFORMATION TO BE SHOWN ON PLANS

HYDRAULIC DATA

DESIGN DISCHARGE	= 2283 C.F.S.
FREQUENCY OF DESIGN FLOOD	= 50 YRS.
DESIGN HIGH WATER ELEVATION	= 279.5
DRAINAGE AREA	= 25.2 SQ. MI.
BASIC DISCHARGE (Q100)	= 2634 C.F.S.
BASIC HIGH WATER ELEVATION	= 280.8

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE	= 4000 C.F.S.
FREQUENCY OF OVERTOPPING FLOOD	= >500 YRS.
OVERTOPPING FLOOD ELEVATION	= 285.3*

* OVERTOPPING WILL OCCUR FROM STA 89+55.81 TO STA 111+18.26 DUE TO NEARLY CONSTANT ROADWAY CREST ELEV.

WS EL. Taken @ River Station 3436

ADDITIONAL INFORMATION AND COMPUTATIONS

USGS REGRESSION EQUATIONS — FEMA DISCHARGES

SIR-2014-5030 (REGION 1)

Q_{10}= 381 (DA)$^{0.7538}$ 10$^{(0.0078*MAP)}$ = 4380 CFS (USE FEMA) — Q_{10}= 1511 CFS

Q_{25}= 518 (DA)$^{0.7752}$ 10$^{(0.0053*MAP)}$ = 5270 CFS (USE FEMA) — Q_{25}= 1953 CFS

Q_{50}= 632 (DA)$^{0.7939}$ 10$^{(0.0037*MAP)}$ = 5910 CFS (USE FEMA) — Q_{50}= 2283 CFS

Q_{100}= 753 (DA)$^{0.8083}$ 10$^{(0.0024*MAP)}$ = 6490 CFS (USE FEMA) — Q_{100}= 2634 CFS

Q_{500}= 1045 (DA)$^{0.8160}$ = 7880 CFS (USE FEMA) — Q_{500}= 3588 CFS

DA = 25.2 SQ. MI; % IMP = 30 (FUTURE)

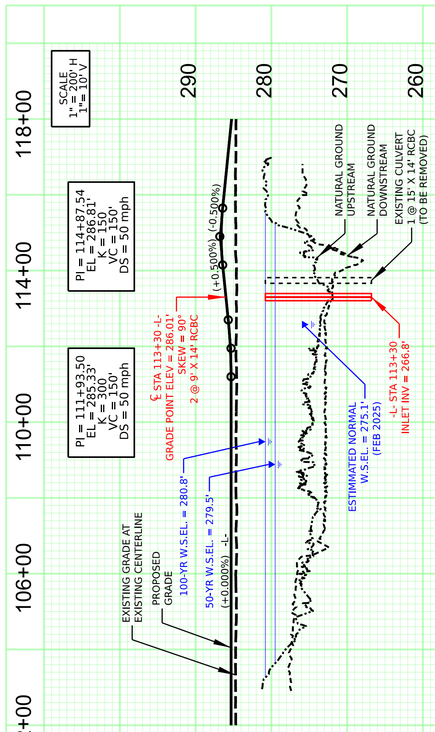
NOTE 1: THE DRAINAGE AREA OF THE CULVERT IS 25.2 SQ MI PER STREAMSTATS, WHICH INCLUDES BOTH STIRRUP IRON CREEK AND BRIER CREEK. THE FIS REPORTS A DRAINAGE AREA OF 12.21 FOR ONLY STIRRUP IRON CREEK; HOWEVER, THE FIS REPORT USES PEAK FLOWS FROM A SEPARATE HEC-HMS STUDY

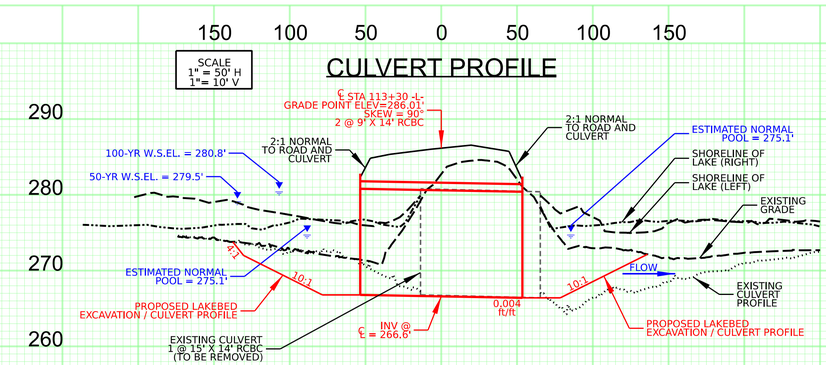
NOTE 2: EMAIL FROM CHARLES R SMITH (01/17/2025) - USE FEMA FLOW RATES AS DESIGN FLOW RATES INSTEAD OF NCDOT'S USGS REGRESSION FLOW RATES DUE TO FEMA UTILIZING HEC-HMS HYDROLOGY, ACHIEVE "NO-RISE" FOR 500-YR STORM

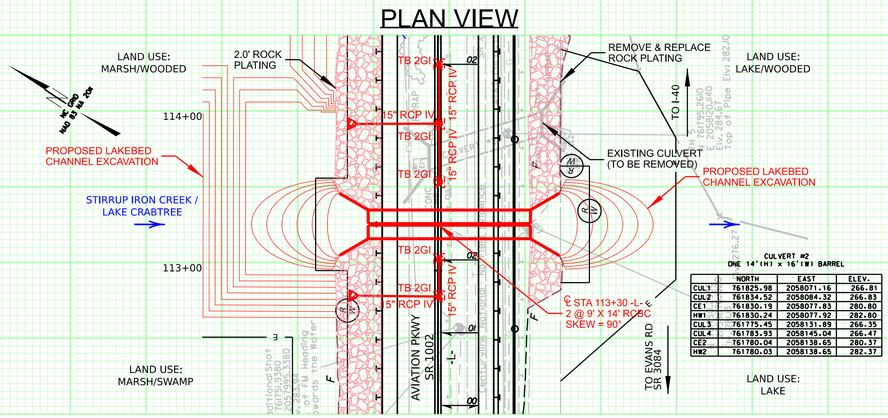
NOTE 3: D USED IN HW/D IS EFFECTIVE OPENING RISE OF THE MAIN BARREL

NOTE 4: GAGE ONLY RECORDS WATER SURFACE ELEVATION

NOTE 5: EFFECTIVE FEMA HEC-RAS MODEL DOES NOT ACCOUNT FOR BACKWATER EFFECTS OF LAKE CRABTREE







NCDOT PERFORMANCE TABLE

	10-YEAR	25-YEAR	50-YEAR	100-YEAR	500-YEAR
NATURAL	273.9	274.2	274.3	274.4	274.6
EXISTING	278.4	280.5	282.0	283.5	284.8
PROPOSED	276.5	278.3	279.5	280.8	284.1

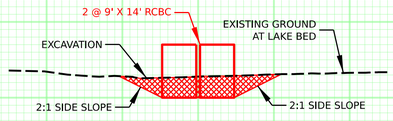
SECTION 3436
24 FEET FROM UPSTREAM FACE OF CULVERT

QUANTITY ESTIMATE
EXCAVATION 1200 C.Y.

FEMA PERFORMANCE TABLE

	100-YEAR
DUPLICATE EFFECTIVE	284.14
CORRECTED EFFECTIVE	283.54
REVISED	280.81

SECTION 3436
24 FEET FROM UPSTREAM FACE OF CULVERT
(DUPLICATE TAKEN FROM XS-3424)



INLET & OUTLET CHANNEL
(LOOKING DOWNSTREAM)
NTS

NO UPSTREAM OR DOWNSTREAM STRUCTURES THAT WERE IN PLACE AT THE TIME THAT THIS PROJECT WAS DESIGNED WILL BE ADVERSELY IMPACTED BY THIS PROJECT*

SOIL TYPE: SILTED LAKEBED

* Statement is valid only for hydraulic performance evaluated per NCDOT criteria using the effective HEC-RAS model. No determination is made regarding volume/storage based calculations or accounting for backwater effects from Lake Crabtree.

Appendix F

Erosion Control Plans

PROJECT: U-5811

TIP No. U-5811

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-5811	EC-1	

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
44384.1.1		P.E.
44384.2.1		R/W
44384.3.1		CONST.

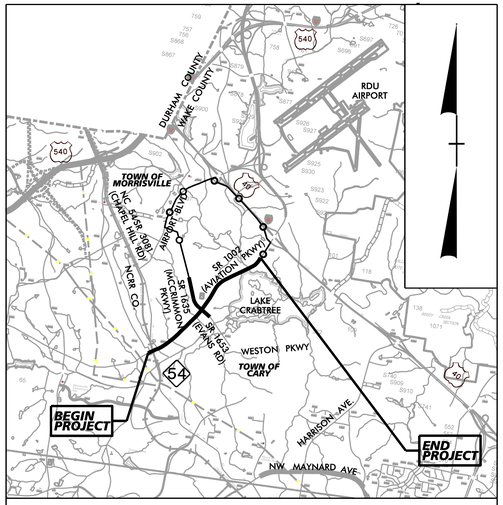
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

PLAN FOR PROPOSED
HIGHWAY EROSION CONTROL

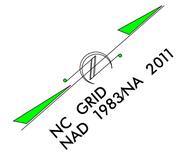
WAKE COUNTY

LOCATION: *SR 1002 (AVIATION PARKWAY), WIDENING FROM NC 54 TO I-40*

TYPE OF WORK: *GRADING, PAVING, DRAINAGE, CULVERTS, WIDENING, SIGNALS*

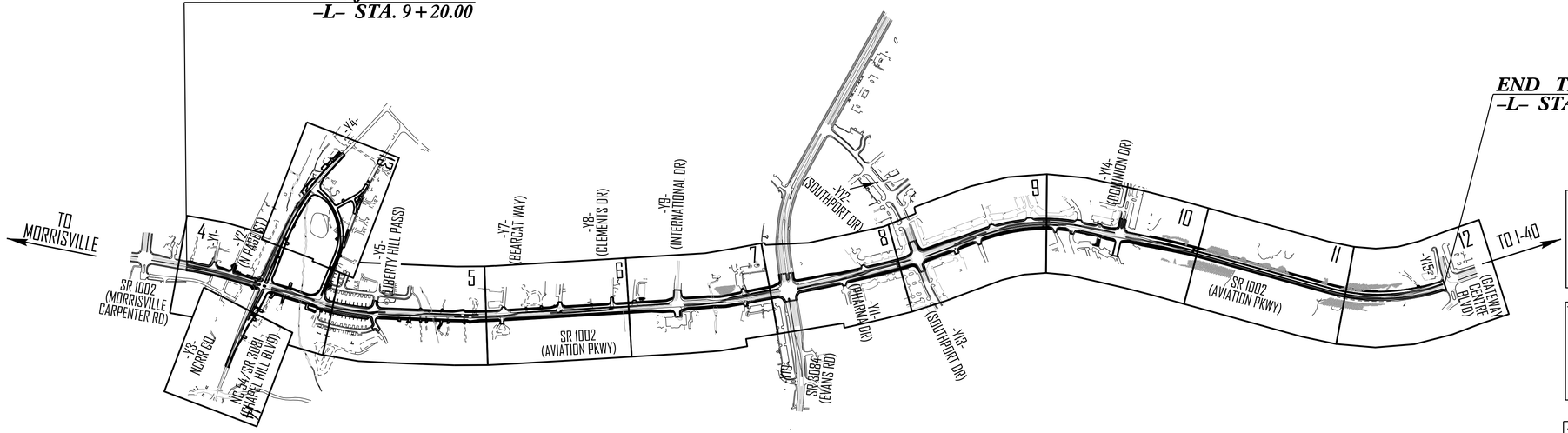


VICINITY MAP (NTS)



BEGIN TIP PROJECT U-5811
-L- STA. 9+20.00

END TIP PROJECT U-5811
-L- STA. 126+11.00



THIS PROJECT CONTAINS EROSION CONTROL PLANS FOR CLEARING AND GRUBBING PHASE OF CONSTRUCTION.

THIS PROJECT HAS BEEN DESIGNED TO SENSITIVE WATERSHED STANDARDS.

ENVIRONMENTALLY SENSITIVE AREA(S) EXIST ON THIS PROJECT

Refer To E. C. Special Provisions for Special Considerations.

GRAPHIC SCALE

50 25 0 50 100

PLANS

THESE EROSION AND SEDIMENT CONTROL PLANS COMPLY WITH THE REGULATIONS SET FORTH BY THE NCG-010000 GENERAL STORMWATER CONSTRUCTION PERMIT ISSUED BY THE NORTH CAROLINA DEPARTMENT OF ENVIRONMENTAL QUALITY DIVISION OF ENERGY, MINERAL, AND LAND RESOURCES.

Kimley»Horn ©2025

Prepared in the Office of:

Kimley-Horn

421 Fayetteville Street, Suite 600

Raleigh, NC 27601

Designed by:

JUSTIN ROSE — 4389

NAME — *LEVEL III CERTIFICATION NO.*

Roadway Standard Drawings

The "Roadway Standard Drawings"- Roadway Design Unit - N. C. Department of Transportation - Raleigh, N. C., dated January 2024 and the latest revision thereto are applicable to this project and by reference hereby are considered a part of these plans.

$$$$$$USERNAME$$$$$$

11/14/23

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

EROSION & SEDIMENT CONTROL LEGEND

Std. #	Description	Symbol
1605.01	Temporary Silt Fence	
1606.01	Special Sediment Control Fence	
1622.01	Temporary Berms and Slope Drains	
1630.02	Silt Basin Type B	
1630.03	Temporary Silt Ditch	TSD
1630.04	Stilling Basin	
1630.05	Temporary Diversion	TD
1630.06	Special Stilling Basin	
1630.07	Skimmer Basin	
1630.08	Tiered Skimmer Basin	
1630.09	Earthen Dam with Skimmer	
	Infiltration Basin	
	Rock Inlet Sediment Trap:	
1632.01	Type A	A
1632.02	Type B	B
1632.03	Type C	C

Std. #	Description	Symbol
1633.01	Temporary Rock Silt Check Type A	
1633.02	Temporary Rock Silt Check Type B	
1633.03	Temporary Rock Silt Check Type A with Excelsior Matting and Flocculant	
1634.01	Temporary Rock Sediment Dam Type A	
1634.02	Temporary Rock Sediment Dam Type B	
1635.01	Rock Pipe Inlet Sediment Trap Type A	A
1635.02	Rock Pipe Inlet Sediment Trap Type B	B
1636.01	Excelsior Wattle Check	
1636.01	Excelsior Wattle Check with Flocculant	
1636.01	Coir Fiber Wattle Check	
1636.01	Coir Fiber Wattle Check with Flocculant	
1636.02	Silt Fence Excelsior Wattle Break	EW
	Silt Fence Coir Fiber Wattle Break	CFW
1636.03	Excelsior Wattle Barrier	EW EW EW
1636.03	Coir Fiber Wattle Barrier	CFW CFW CFW

U-5811

EC -02

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
WAKE COUNTY



ROADWAY DESIGN UNIT

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PREPARED BY

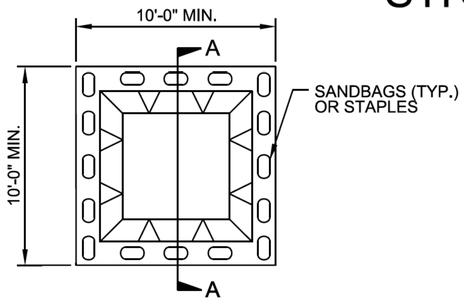
Kimley»Horn

NC LICENSE #P-0102
421 FAYETTEVILLE STREET, SUITE 600
RALEIGH, NORTH CAROLINA 27601
PHONE (919) 677-2000

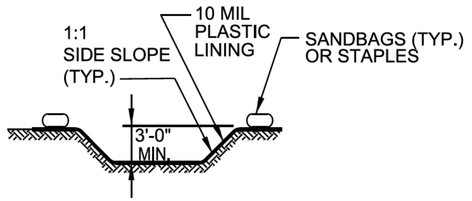
REVISIONS

11/14/23

ONSITE CONCRETE WASHOUT STRUCTURE WITH LINER



PLAN



SECTION A-A



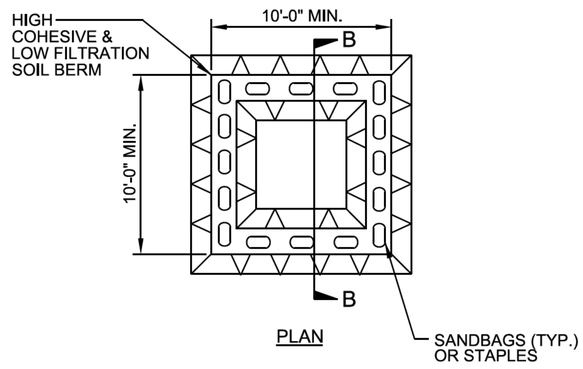
NOTES:
1. ACTUAL LOCATION DETERMINED IN FIELD

2. THE CONCRETE WASHOUT STRUCTURES SHALL BE MAINTAINED WHEN THE LIQUID AND/OR SOLID REACHES 75% OF THE STRUCTURES CAPACITY TO PROVIDE ADEQUATE HOLDING CAPACITY WITH A MINIMUM 12 INCHES OF FREEBOARD.

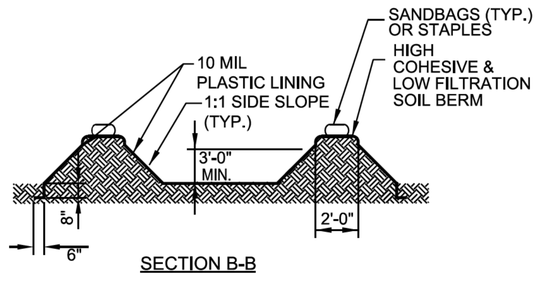
3.CONCRETE WASHOUT STRUCTURE NEEDS TO BE CLEARLY MARKED WITH SIGNAGE NOTING DEVICE.

BELOW GRADE WASHOUT STRUCTURE

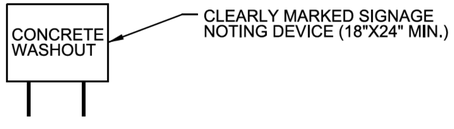
NOT TO SCALE



PLAN



SECTION B-B



NOTES:
1. ACTUAL LOCATION DETERMINED IN FIELD

2. THE CONCRETE WASHOUT STRUCTURES SHALL BE MAINTAINED WHEN THE LIQUID AND/OR SOLID REACHES 75% OF THE STRUCTURES CAPACITY TO PROVIDE ADEQUATE HOLDING CAPACITY WITH A MINIMUM 12 INCHES OF FREEBOARD.

3.CONCRETE WASHOUT STRUCTURE NEEDS TO BE CLEARLY MARKED WITH SIGNAGE NOTING DEVICE.

ABOVE GRADE WASHOUT STRUCTURE

NOT TO SCALE

U-5811

EC -02A

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
WAKE COUNTY

ROADWAY DESIGN UNIT

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PREPARED BY

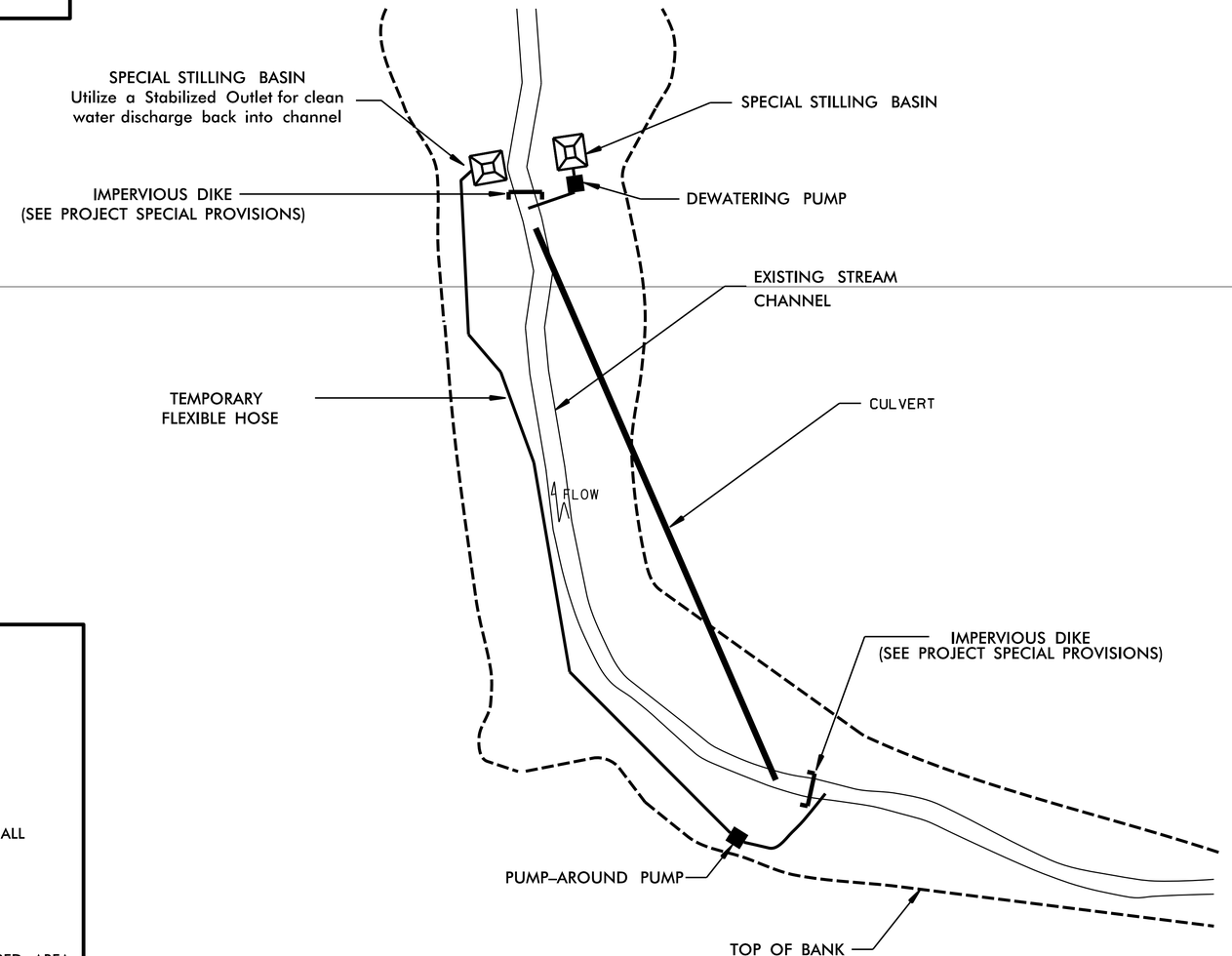
Kimley»Horn

REVISIONS

5/26/20

EXAMPLE OF PUMP–AROUND OPERATION

NOTES:
1) All excavation shall be performed in only dry or isolated areas of the work zone.
2) Impervious dikes are to be used to isolate work from stream flow when necessary.
3) Maintenance of stream flow operations shall be incidental to the work. This includes polyethylene sheeting, diversion pipes, pumps and hoses.
4) Pumps and hoses shall be of sufficient size to dewater the work area.



SEQUENCE OF CONSTRUCTION FOR TYPICAL WORK AREA

1. INSTALL SPECIAL STILLING BASIN.
2. INSTALL UPSTREAM PUMP AND TEMPORARY FLEXIBLE HOSE.
3. PLACE UPSTREAM IMPERVIOUS DIKE AND BEGIN PUMPING OPERATIONS FOR STREAM DIVERSION.
4. PLACE DOWNSTREAM IMPERVIOUS DIKE AND PUMPING APPARATUS. DEWATER ENTRAPPED AREA. AREA TO BE DEWATERED SHALL BE EQUAL TO ONE DAY'S WORK.
5. EXCAVATE ANY ACCUMULATED SILT AND DEWATER BEFORE REMOVAL OF IMPERVIOUS DIKES. REMOVE IMPERVIOUS DIKES, PUMPS, AND TEMPORARY FLEXIBLE HOSE. (DOWNSTREAM IMPERVIOUS DIKES FIRST).
6. REMOVE SPECIAL STILLING BASIN(S) AND BACKFILL. STABILIZE DISTURBED AREA WITH SEED AND MULCH.

U-5811
EC-02B

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
WAKE COUNTY



ROADWAY DESIGN UNIT

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PREPARED BY

Kimley»Horn

NC LICENSE #F-1102
421 FAYETTEVILLE STREET, SUITE 600
RALEIGH, NORTH CAROLINA 27601
PHONE: (919) 677-2000

REVISIONS

11/14/23

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

SOIL STABILIZATION SUMMARY SHEET

MATTING FOR EROSION CONTROL

CONST SHEET NO.	LINE	FROM STATION	TO STATION	SIDE	ESTIMATE (SY)
MATERIAL: STRAW					
SLOPES:					
8	-L-	69+50	70+00	LT	100
9	-L-	85+00	86+50	RT	535
11	-L-	103+00	116+00	LT	6030
13	-Y4-	17+00	17+50	LT	140
			SUBTOTAL		6805
DITCHES					
4	-L-	9+88	11+18	LT	100
4	-L-	11+92	13+07	LT	95
4	-Y4-	25+60	26+00	RT	60
5	-L-	35+25	35+65	LT	35
6	-L-	39+00	40+53	LT	120
6	-L-	40+88	41+30	LT	35
6	-L-	44+11	46+25	LT	330
6	-L-	46+75	48+10	LT	175
7	-L-	49+02	49+50	LT	60
7	-L-	50+60	51+25	LT	75
7	-L-	55+35	57+50	LT	245
7	-Y8-	11+01	11+40	LT	70
7/8	-L-	61+12	63+24	LT	165
8	-L-	66+25	69+00	LT	175
10	-L-	93+70	95+00	RT	110
10	-Y14-	12+68	13+50	RT	65
10	-L-	96+40	98+00	LT	110
10	-L-	96+61	98+75	RT	165

MATTING FOR EROSION CONTROL

CONST SHEET NO.	LINE	FROM STATION	TO STATION	SIDE	ESTIMATE (SY)
12	-L-	119+50	124+25	LT	845
13	-Y16-	10+58	13+75	LT	245
13	-Y16-	12+13	12+40	RT	25
13	-Y16-	12+75	13+10	RT	30
13	-Y17-	10+64	10+96	LT	25
13	-LP1-	11+10	12+30	LT	95
13	-LP1-	13+05	16+05	LT	300
13	-Y4-	10+70	13+99	LT	335
			SUBTOTAL		4090
MATERIAL: EXCELSIOR					
6	-DWY2-	10+39	10+89	LT	80
			SUBTOTAL		80
	SUBTOTAL EXCELSIOR MATTING				80
	SUBTOTAL STRAW MATTING				4090
	SUBTOTAL SLOPES				6805
	MISCELLANEOUS MATTING TO BE INSTALLED AS DIRECTED BY THE ENGINEER				5000
				TOTAL	15975
				SAY	20000

U-5811

EC -03

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
WAKE COUNTY



ROADWAY DESIGN UNIT

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PREPARED BY

Kimley»Horn

NC LICENSE #F-0102
421 FAYETTEVILLE STREET, SUITE 600
RALEIGH, NORTH CAROLINA 27601
PHONE: (919) 677-2000

REVISIONS

11/14/23

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

SOIL STABILIZATION TIMEFRAMES

SITE DESCRIPTION	STABILIZATION TIME	TIMEFRAME EXCEPTIONS
PERIMETER DIKES, SWALES, DITCHES AND SLOPES	7 DAYS	NONE
HIGH QUALITY WATER (HQW) ZONES	7 DAYS	NONE
SLOPES STEEPER THAN 3:1	7 DAYS	IF SLOPES ARE 10' OR LESS IN LENGTH AND ARE NOT STEEPER THAN 2:1, 14 DAYS ARE ALLOWED.
SLOPES 3:1 TO 4:1	14 DAYS	7 DAYS FOR SLOPES GREATER THAN 50' IN LENGTH WITH SLOPES STEEPER THAN 4:1. 7 DAYS FOR PERIMETER DIKES, SWALES, DITCHES PERIMETER SLOPES, AND HQW ZONES
ALL OTHER AREAS WITH SLOPES FLATTER THAN 4:1	14 DAYS	7 DAYS FOR PERIMETER DIKES, SWALES, DITCHES PERIMETER SLOPES, AND HQW ZONES

U-5811
EC-03A
NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
WAKE COUNTY
ROADWAY DESIGN UNIT
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PREPARED BY
Kimley»Horn
REVISIONS

11/14/23

ENVIRONMENTALLY SENSITIVE AREA
SEE PROJECT SPECIAL PROVISIONS

NOTE:
PLACE TEMPORARY ROCK SEDIMENT DAMS TYPE - B AND TEMPORARY ROCK SILT CHECKS TYPE - A AT DRAINAGE OUTLETS.

UTILIZE FABRIC INSERT INLET PROTECTION DEVICE IN LIEU OF ROCK INLET SEDIMENT TRAP TYPE C WHERE WATER MAY POND ON THE ROADWAY IN AREAS WHERE LIVE TRAFFIC IS PRESENT, AS DIRECTED BY THE ENGINEER

CLEARING AND GRUBBING
EROSION CONTROL FOR
CONSTRUCTION SHEET 4

MATCH LINE -Y4- STA 21+00.00 SEE SHEET CONST. 13

MATCH LINE -LP1- STA 18+50.00
SEE SHEET CONST. 13

MATCH LINE -L- STA 22+00.00 SEE SHEET CONST. 5

MATCH LINE -Y4- STA 27+50.00 SEE SHEET CONST. 14

68 x 34 x 3
1.5 inch Skimmer
with 1.375 inch
Orifice Diameter
8 ft. weir
ID 4.1

66 x 33 x 3
1.5 inch Skimmer
with 1.250 inch
Orifice Diameter
8 ft. weir
ID 4.2

36 x 18 x 3
1.5 inch Skimmer
with 0.625 inch
Orifice Diameter
4 ft. weir
ID 4.3

50 x 25 x 3
1.5 inch Skimmer
with 1.0 inch
Orifice Diameter
5 ft. weir
ID 4.4

INSTALL DRIVEWAY PIPE DURING CLEARING & GRUBBING PHASE

SPECIAL V DITCH
SEE SHEET 2D-1/DETAIL 1

SPECIAL V DITCH
SEE SHEET 2D-1/DETAIL 2

SPECIAL V DITCH
SEE SHEET 2D-1/DETAIL 24

OUTFALL ANALYSIS 4.2

U-5811

EC-04 | CONST.4

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
WAKE COUNTY

ROADWAY DESIGN UNIT

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PREPARED BY

Kimley»Horn

NC LICENSE #F-0102
421 FAYETTEVILLE STREET, SUITE 600
RALEIGH, NORTH CAROLINA 27601
PHONE: (919) 677-2000

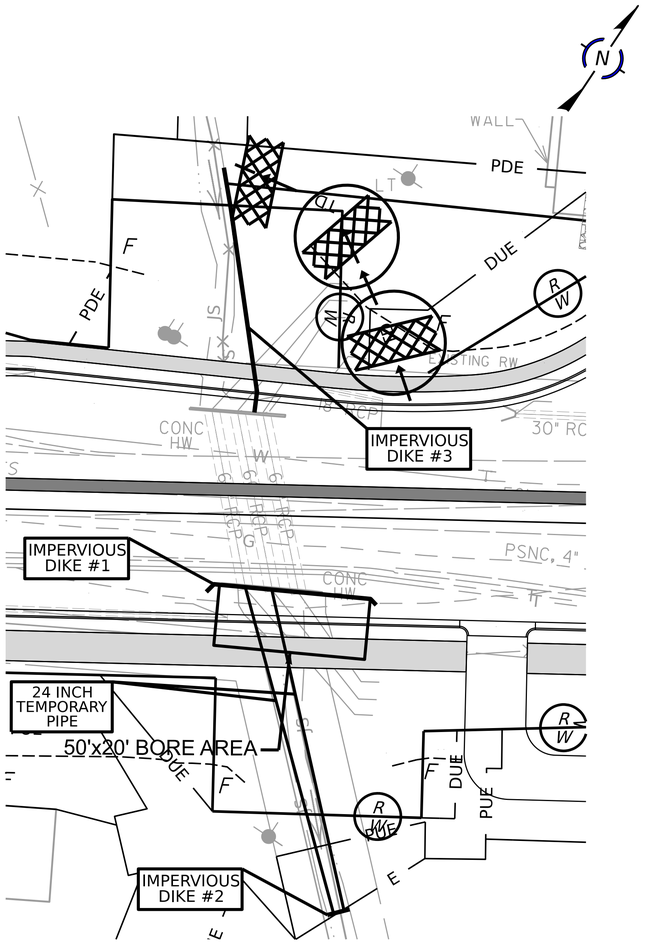
REVISIONS

11/14/23

CULVERT CONSTRUCTION SEQUENCE STA. 19+96 –L–

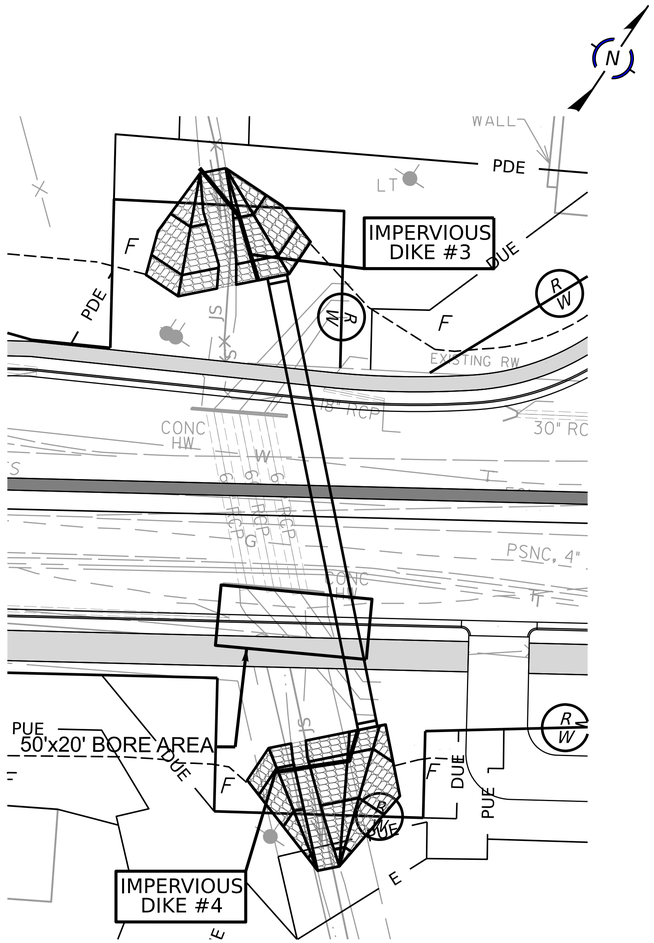
PHASE I

1.) UTILIZE SPECIAL STILLING BASIN(S) DURING CONSTRUCTION AS NEEDED TO DEWATER WORK SITE. (TYP.)
2.) CONSTRUCT TEMPORARY DIVERSION AND IMPERVIOUS DIKE 1, 2, &3 TO ENSURE DRY WORK AREA FOR JACK AND BORED WSP. INSTALL TWO 24" TEMPORARY PIPES BETWEEN IMPERVIOUS DIKES 1&2 TO MAINTAIN FLOW.
3.) CONSTRUCT EASTERN BARREL OF 78" WSP VIA TRENCHLESS INSTALLATION (~65') UNDER EXISTING ROADWAY, THEN OPEN CUT AT DOWNSTREAM END (~50'). COMPLETE DOWNSTREAM CHANNEL IMPROVEMENTS AND UPSTREAM LEFT BANK IMPROVEMENTS IN DRY WORK AREA FOR DIVERTING FLOW INTO PROPOSED EASTERN BARREL. UTILIZE PUMP AROUND OPERATION AS NEEDED.
4.) REFERENCE TRAFFIC CONTROL PLANS FOR ADDITIONAL DETAIL REGARDING TRAFFIC MANAGEMENT.



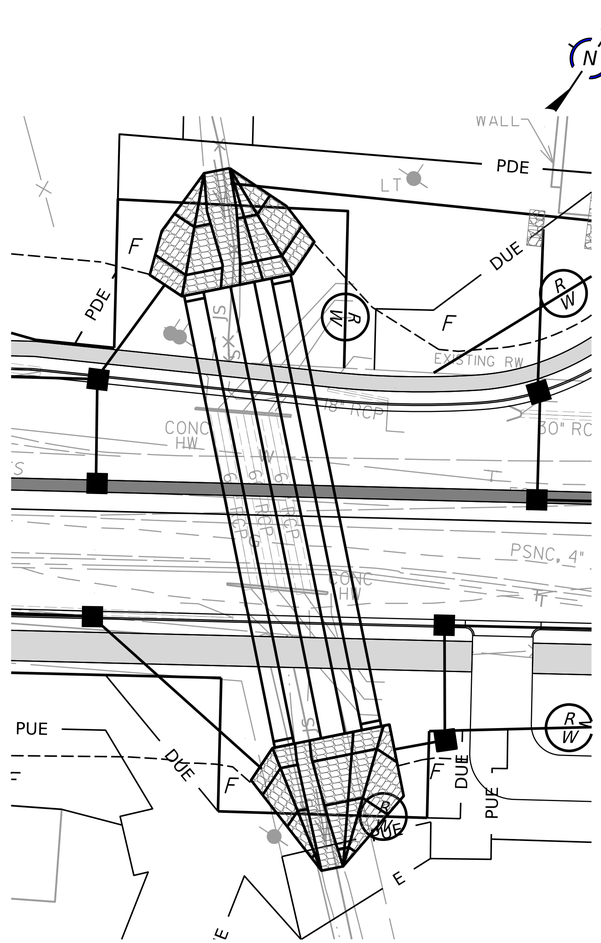
PHASE II

1.) REMOVE IMPERVIOUS DIKES 1 & 2 AND 2@24" TEMPORARY PIPES, ADJUST IMPERVIOUS DIKE 3, AND CONSTRUCT IMPERVIOUS DIKE 4, DIVERTING FLOW INTO THE EASTERN 78" WSP.
2.) REMOVE EXISTING 3@60" RCP.
2.) CONSTRUCT REMAINING 2 WSP BARRELS (1@96", 1@78") AND UPSTREAM CHANNEL IMPROVEMENTS, UTILIZING PUMP AROUND AS NEEDED.
3.) REFERENCE TRAFFIC CONTROL PLANS FOR ADDITIONAL DETAIL REGARDING TRAFFIC MANAGEMENT.



PHASE III

1.) REMOVE IMPERVIOUS DIKES 3 AND 4.
2.) REMOVE SPECIAL STILLING BASIN.
3.) STABILIZE DISTURBED AREA AND REMOVE ALL EROSION AND SEDIMENT CONTROL DEVICES AS DIRECTED.
4.) FINISH ROADWAY AND DRAINAGE CONSTRUCTION.
5.) REFERENCE TRAFFIC CONTROL PLANS FOR ADDITIONAL DETAIL REGARDING TRAFFIC MANAGEMENT.



U-5811
EC-4A | CONST.4

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
WAKE COUNTY

ROADWAY DESIGN UNIT

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PREPARED BY
Kimley»Horn
NC LICENSE #P-1121
421 FAYETTEVILLE STREET, SUITE 600
RALEIGH, NORTH CAROLINA 27601
PHONE: (919) 677-2000

REVISIONS

11/14/23

NOTE:
PLACE TEMPORARY ROCK SEDIMENT DAMS TYPE - B AND TEMPORARY ROCK SILT CHECKS TYPE - A AT DRAINAGE OUTLETS.

ENVIRONMENTALLY SENSITIVE AREA
SEE PROJECT SPECIAL PROVISIONS

UTILIZE FABRIC INSERT INLET PROTECTION DEVICE IN LIEU OF ROCK INLET SEDIMENT TRAP TYPE C WHERE WATER MAY POND ON THE ROADWAY IN AREAS WHERE LIVE TRAFFIC IS PRESENT, AS DIRECTED BY THE ENGINEER

CLEARING AND GRUBBING
EROSION CONTROL FOR
CONSTRUCTION SHEET 5

142 x 71 x 3
3.0 inch Skimmer
with 2.750 inch
Orifice Diameter
38 ft. weir
ID 5.1

30 x 15 x 3
1.5 inch Skimmer
with 0.50 inch
Orifice Diameter
4 ft. weir
ID 5.2

MATCH LINE -L- STA 22+00.00 SEE SHEET CONST. 5

MATCH LINE -L- STA 36+00.00 SEE SHEET CONST. 6

U-5811
EC-05 | CONST.5

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
WAKE COUNTY

ROADWAY DESIGN UNIT

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PREPARED BY
Kimley»Horn

REVISIONS

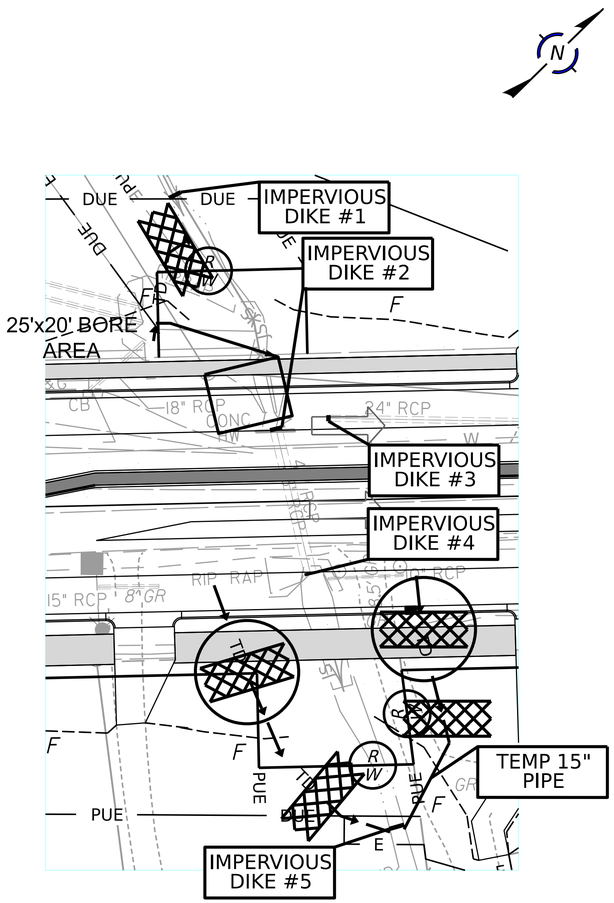
$$$-USER NAME-$$$ - $$$-DATE-$$$

11/14/23

CULVERT CONSTRUCTION SEQUENCE STA. 32+06 –L–

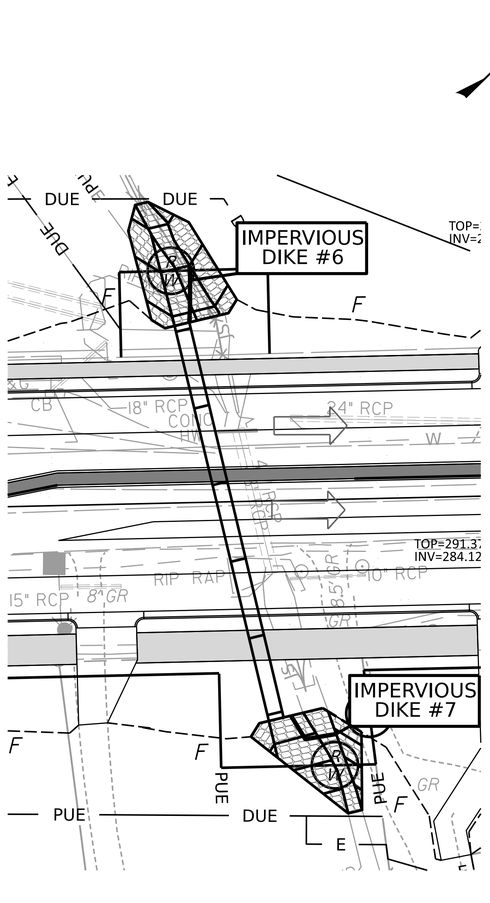
PHASE I

1.) UTILIZE SPECIAL STILLING BASIN(S) DURING CONSTRUCTION AS NEEDED TO DEWATER WORK SITE. (TYP.)
2.) CONSTRUCT IMPERVIOUS DIKE 1, 2, & 3 AND PUMP AROUND OPERATION BETWEEN IMPERVIOUS DIKES 1&2 AND 3&2. CONSTRUCT TEMPORARY DIVERSION ALONG SOUTHERN EDGE OF WORK AREA TO ENSURE DRY WORK AREA. UTILIZE PUMP AROUND AS NEEDED.
3.) CONSTRUCT IMPERVIOUS DIKES 4&5 AND PUMP AROUND OPERATION AT THE DOWNSTREAM END, AS WELL AS TEMPORARY DIVERSIONS TO DIVERT EXISTING DITCHES AROUND WORK AREA.
4.) CONSTRUCT SOUTHERN BARREL OF 2@60" WSP VIA TRENCHLESS INSTALLATION (~50') UNDER EXISTING ROADWAY, THEN OPEN CUT AT DOWNSTREAM END (~50') AND CHANNEL IMPROVEMENTS.
5.) REFERENCE TRAFFIC CONTROL PLANS FOR ADDITIONAL DETAIL REGARDING TRAFFIC MANAGEMENT.



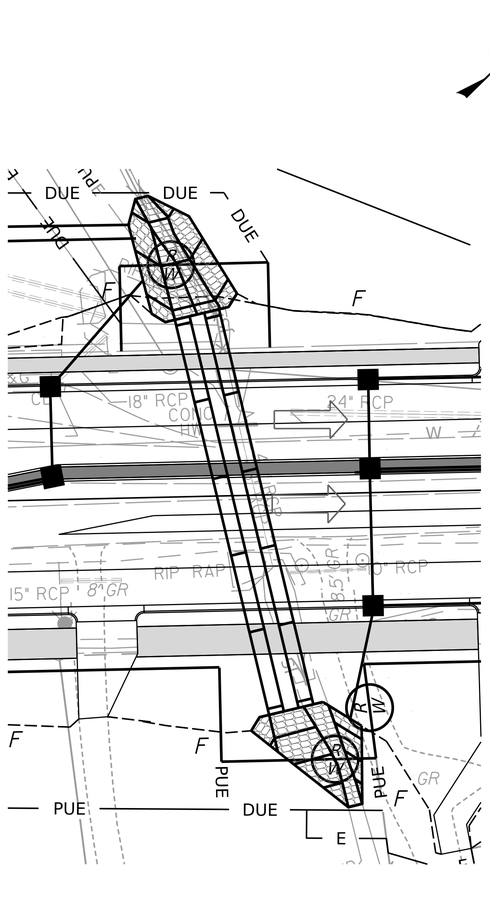
PHASE II

1.) CONSTRUCT IMPERVIOUS DIKES 6&7 DIVERTING FLOW INTO THE SOUTHERN BARREL OF 2@60" WSP AND REMOVE IMPERVIOUS DIKES AND PUMP AROUND OPERATIONS FROM PHASE 1.
2.) CONSTRUCT NORTHERN BARREL OF 2@60" WSP VIA TRENCHLESS INSTALLATION UNDER EXISTING ROADWAY AND OPEN CUT AT DOWNSTREAM END. EXISTING 48" WILL BE INCIDENTALLY BORED FOR REMOVAL.
3.) REFERENCE TRAFFIC CONTROL PLANS FOR ADDITIONAL DETAIL REGARDING TRAFFIC MANAGEMENT.



PHASE III

1.) REMOVE IMPERVIOUS DIKES 6&7.
2.) REMOVE SPECIAL STILLING BASIN.
3.) STABILIZE DISTURBED AREA AND REMOVE ALL EROSION AND SEDIMENT CONTROL DEVICES AS DIRECTED.
4.) FINISH ROADWAY AND DRAINAGE CONSTRUCTION.
5.) REFERENCE TRAFFIC CONTROL PLANS FOR ADDITIONAL DETAIL REGARDING TRAFFIC MANAGEMENT.



U-5811
EC-5A | CONST.5
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
WAKE COUNTY
ROADWAY DESIGN UNIT
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PREPARED BY
Kimley»Horn
REVISIONS

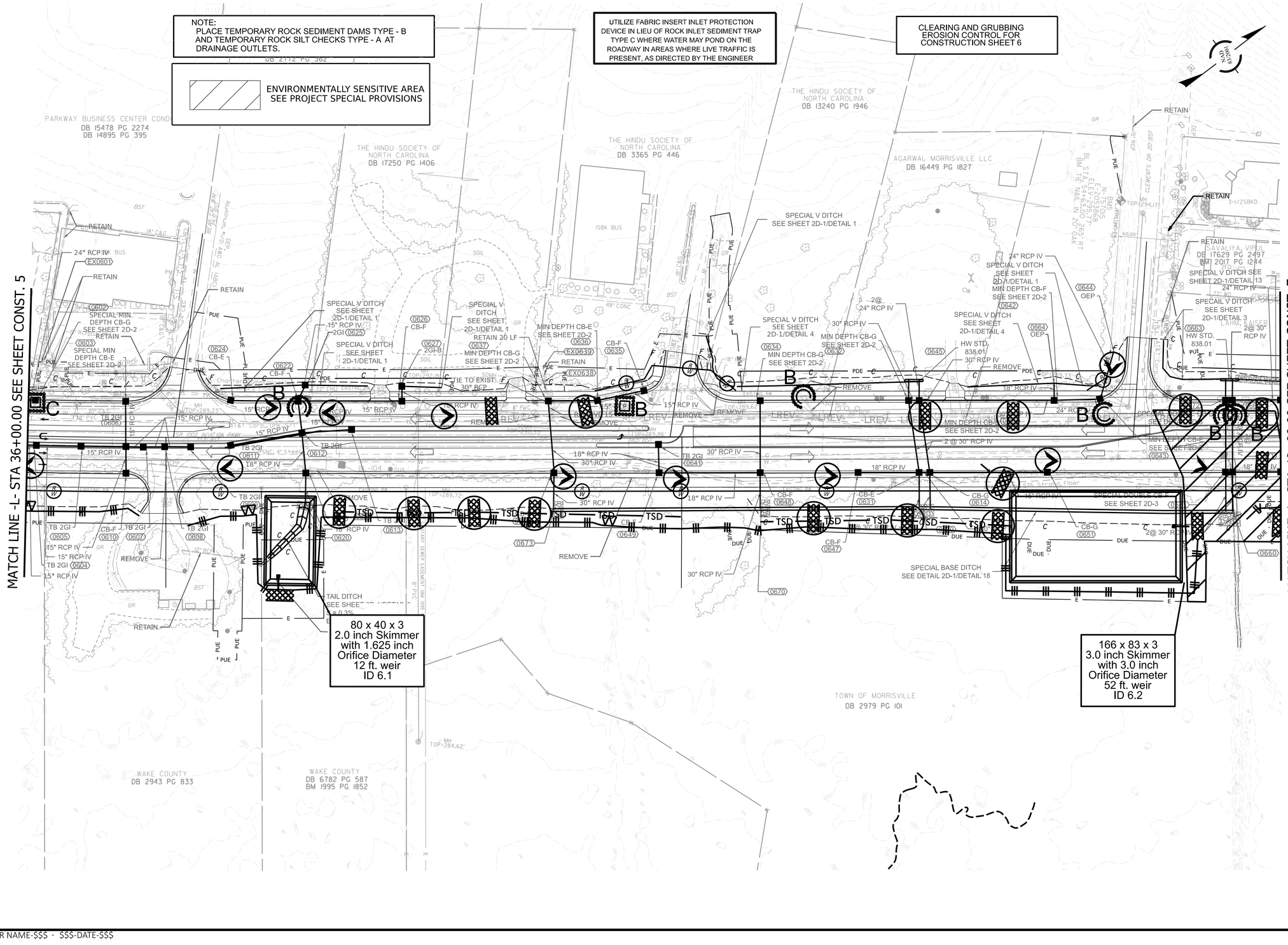
11/14/23

NOTE:
PLACE TEMPORARY ROCK SEDIMENT DAMS TYPE - B AND TEMPORARY ROCK SILT CHECKS TYPE - A AT DRAINAGE OUTLETS.

ENVIRONMENTALLY SENSITIVE AREA
SEE PROJECT SPECIAL PROVISIONS

UTILIZE FABRIC INSERT INLET PROTECTION DEVICE IN LIEU OF ROCK INLET SEDIMENT TRAP TYPE C WHERE WATER MAY POND ON THE ROADWAY IN AREAS WHERE LIVE TRAFFIC IS PRESENT, AS DIRECTED BY THE ENGINEER

CLEARING AND GRUBBING EROSION CONTROL FOR CONSTRUCTION SHEET 6



U-5811
EC-06 | CONST.6

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
WAKE COUNTY

ROADWAY DESIGN UNIT

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PREPARED BY
Kimley»Horn

REVISIONS

$$$-USER NAME-$$$ - $$$-DATE-$$$

11/14/23

NOTE:
PLACE TEMPORARY ROCK SEDIMENT DAMS TYPE - B AND TEMPORARY ROCK SILT CHECKS TYPE - A AT DRAINAGE OUTLETS.

ENVIRONMENTALLY SENSITIVE AREA
SEE PROJECT SPECIAL PROVISIONS

UTILIZE FABRIC INSERT INLET PROTECTION DEVICE IN LIEU OF ROCK INLET SEDIMENT TRAP TYPE C WHERE WATER MAY POND ON THE ROADWAY IN AREAS WHERE LIVE TRAFFIC IS PRESENT, AS DIRECTED BY THE ENGINEER

CLEARING AND GRUBBING
EROSION CONTROL FOR
CONSTRUCTION SHEET 7

MATCH LINE -L- STA 49+00.00 SEE SHEET CONST. 6

MATCH LINE -L- STA 62+00.00 SEE SHEET CONST. 8

50 x 25 x 3
1.5 inch Skimmer
with 1.0 inch
Orifice Diameter
5 ft. weir
ID 7.1

34 x 17 x 3
1.5 inch Skimmer
with 0.625 inch
Orifice Diameter
4 ft. weir
ID 7.2

60 x 30 x 3
1.5 inch Skimmer
with 1.25 inch
Orifice Diameter
7 ft. weir
ID 7.3

120 x 60 x 3
2.5 inch Skimmer
with 2.250 inch
Orifice Diameter
27 ft. weir
ID 7.4

PATEL, R
DB 1716
BM 201

SAW
DB 17629 PG 2497
BM 2017 PG 1244

LAHM, KAISER
DB 17408 PG 401
BM 2017 PG 1244

CEDAR FOOD
DB 18103 PG 2264
BUSINESS PARK
BM 1999 PG 1305

NEXPOINT AVIATION DST
DB 19104 PG 2130
BM 2019 PG 703

TOWN OF MORRISVILLE
DB 2979 PG 101

WAKE COUNTY
DB 3006 PG 246

RK POINTE AT LAKE CRABTREE DST
DB 17483 PG 2582
BM 2016 PG 1026

RIPRAP AT DITCH
EST. 50 TONS CL-B RIP RAP
EST. 125 SY GFD

SPECIAL V DITCH
SEE SHEET
2D-1/DETAIL 3

SPECIAL MIN DEPTH CB-F
SEE SHEET 2D-2

SPECIAL MIN DEPTH CB-E
SEE SHEET 2D-2

CHANNEL IMPROVEMENTS W/
CL-I RIPRAP ON BANKS
(STRUCTURES PAY ITEM)
EST. 95 TONS CL-I
EST. 155 SY GFD
SEE SHEET 2D-6

SPECIAL BASE DITCH
SEE SHEET 2D-1/DETAIL 19

RIPRAP AT OUTLET
EST. 11 TONS CL-B RIPRAP
EST. 28 SY GFD

COLLAR AND
EXTEND 13 LF

FILL AND ABANDON

SPECIAL BASE DITCH
SEE SHEET
2D-1/DETAIL 14
RIPRAP IN DITCH
EST. 175 TONS
CL-B RIPRAP
EST. 375 SY GFD

RIPRAP IN OUTLET
EST. 11 TONS
CL-B RIPRAP
EST. 28 SY GFD

RETAIN
MIN DEPTH CB-F
SEE SHEET 2D-2

MIN DEPTH CB-E
SEE SHEET 2D-2

TIE TO EXIST
12" RCP

RIPRAP AT OUTLET
EST. 3 TONS CL-B RIPRAP
EST. 10 SY GFD

REVISIONS

U-5811
EC-07 | CONST.7

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
WAKE COUNTY

ROADWAY DESIGN UNIT

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PREPARED BY
Kimley»Horn

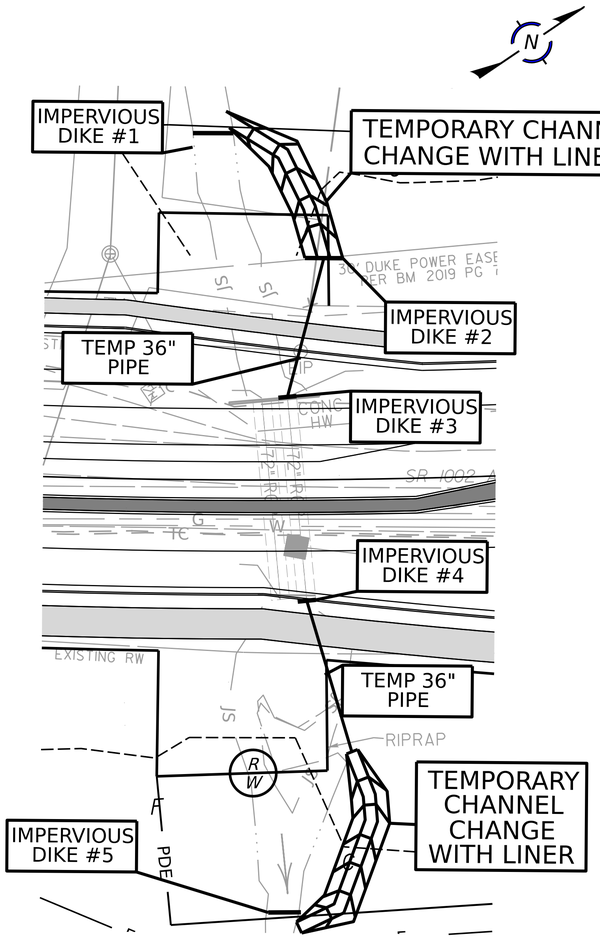
NC LICENSE #F-0102
421 FAYETTEVILLE STREET, SUITE 600
RALEIGH, NORTH CAROLINA 27601
PHONE: (919) 677-2000

11/14/23

CULVERT CONSTRUCTION SEQUENCE STA. 57+68 –L–

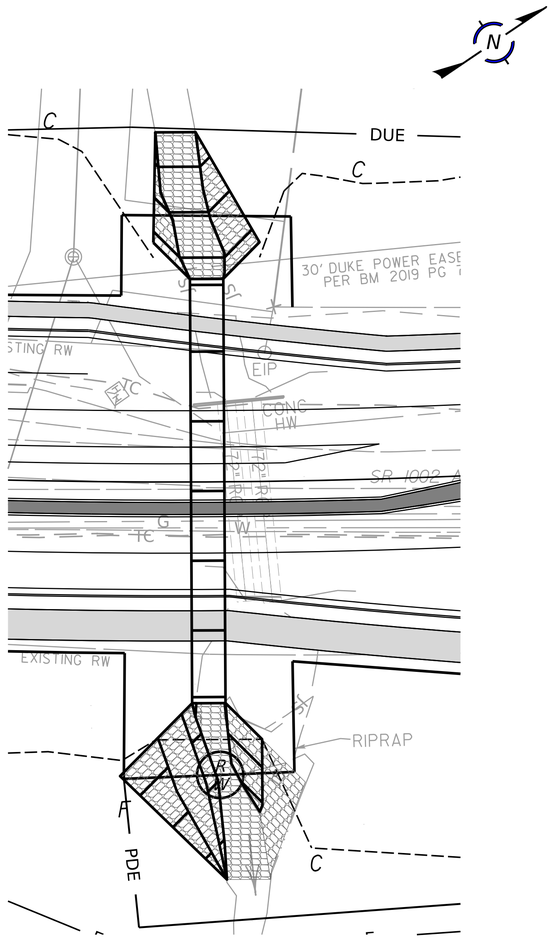
PHASE I

1.) UTILIZE SPECIAL STILLING BASIN(S) DURING CONSTRUCTION AS NEEDED TO DEWATER WORK SITE. (TYP.)
2.) CONSTRUCT IMPERVIOUS DIKE 1,2,3,4 & 5 AND TEMPORARY CHANNEL CHANGE w/LINER. INSTALL A TEMPORARY 36" PIPE BETWEEN IMPERVIOUS DIKES 2&3 AND IMPERVIOUS DIKES 4&5.
3.) REMOVE SOUTHERN BARREL OF EXISTING 2@72" RCP AND CONSTRUCT 132" WSP AND CHANNEL IMPROVEMENTS.
4.) REFERENCE TRAFFIC CONTROL PLANS FOR ADDITIONAL DETAIL REGARDING TRAFFIC MANAGEMENT.



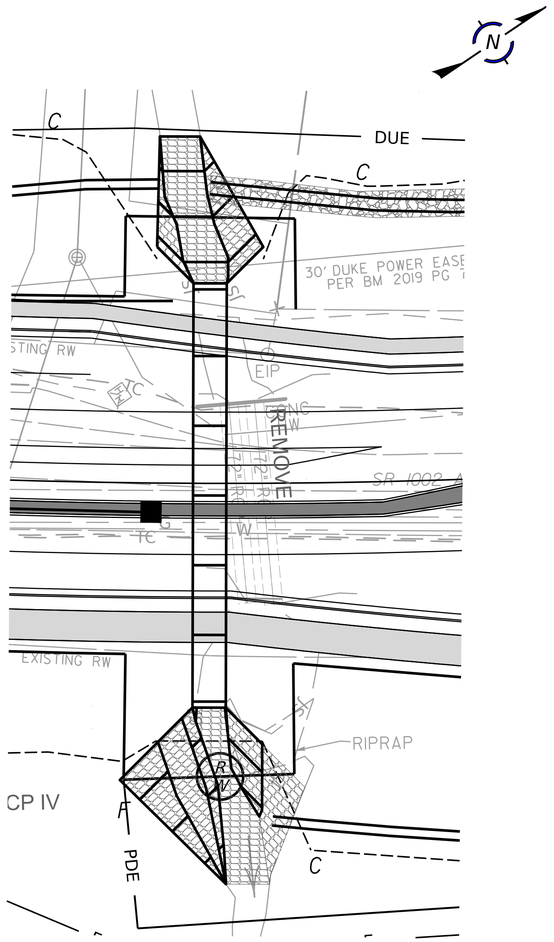
PHASE II

1.) REMOVE IMPERVIOUS DIKES 1,2,3,4, & 5 AND TEMPORARY PIPES. REMOVE TEMPORARY CHANNEL CHANGE.
2.) ESTABLISH FLOW THROUGH 132" WSP.
3.) REMOVE NORTHERN BARREL OF 2@72" RCP. UTILIZE PUMP AROUND AS NEEDED TO ENSURE DRY WORK AREA.
4.) REFERENCE TRAFFIC CONTROL PLANS FOR ADDITIONAL DETAIL REGARDING TRAFFIC MANAGEMENT.



PHASE III

1.) REMOVE SPECIAL STILLING BASIN.
2.) STABILIZE DISTURBED AREA AND REMOVE ALL EROSION AND SEDIMENT CONTROL DEVICES AS DIRECTED.
3.) FINISH ROADWAY AND DRAINAGE CONSTRUCTION.
4.) REFERENCE TRAFFIC CONTROL PLANS FOR ADDITIONAL DETAIL REGARDING TRAFFIC MANAGEMENT.



U-5811
EC-7A | CONST.7

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
WAKE COUNTY

ROADWAY DESIGN UNIT

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PREPARED BY
Kimley»Horn

REVISIONS

11/14/23

NOTE:
PLACE TEMPORARY ROCK SEDIMENT DAMS TYPE - B AND TEMPORARY ROCK SILT CHECKS TYPE - A AT DRAINAGE OUTLETS.

UTILIZE FABRIC INSERT INLET PROTECTION DEVICE IN LIEU OF ROCK INLET SEDIMENT TRAP TYPE C WHERE WATER MAY POND ON THE ROADWAY IN AREAS WHERE LIVE TRAFFIC IS PRESENT, AS DIRECTED BY THE ENGINEER

CLEARING AND GRUBBING EROSION CONTROL FOR CONSTRUCTION SHEET 8

72 x 36 x 3
1.5 inch Skimmer
with 1.375 inch
Orifice Diameter
10 ft. weir
ID 8.1

MATCH LINE -L- STA 62+00.00 SEE SHEET CONST. 7

MATCH LINE -L- STA 74+00.00 SEE SHEET CONST. 9

NEXPOINT AVIATION-DST
DB 19104 PG 2130
BM 2019 PG 703

SBP OFFICE OWNER L.P LIMITED PARTNERSHIP
DB 18208 PG 876
MB 1995 PG 1372

SBP OFFICE OWNER L.P LIMITED PARTNERSHIP
DB 18208 PG 876
BM 1998 PG 1680

OUTFALL ANALYSIS 8.1

-REV-

REVISIONS

U-5811
EC-08 | CONST.8

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
WAKE COUNTY

ROADWAY DESIGN UNIT

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PREPARED BY
Kimley»Horn

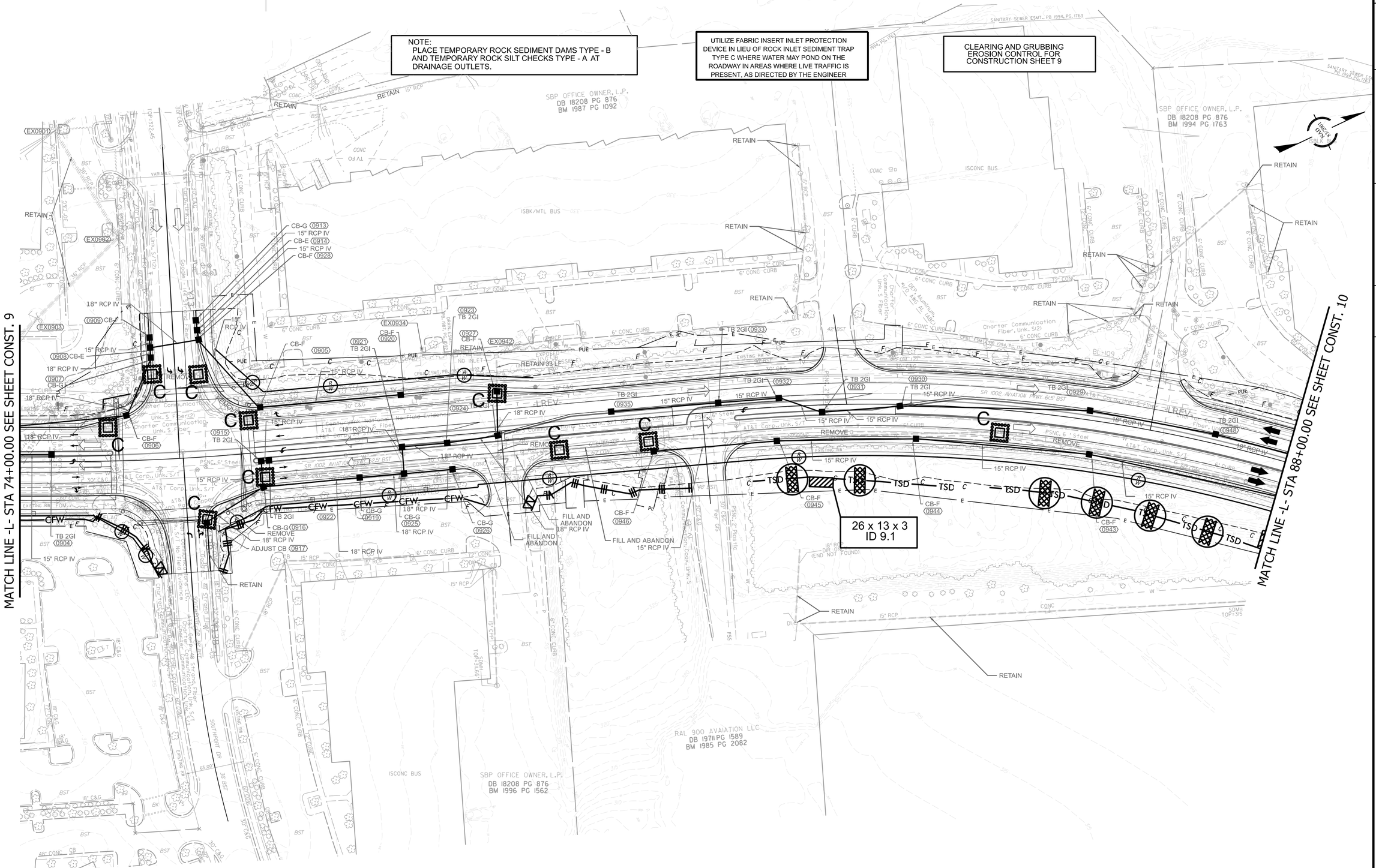
NC LICENSE #F-0102
421 FAYETTEVILLE STREET, SUITE 600
RALEIGH, NORTH CAROLINA 27601
PHONE: (919) 677-2000

11/14/23

NOTE:
PLACE TEMPORARY ROCK SEDIMENT DAMS TYPE - B AND TEMPORARY ROCK SILT CHECKS TYPE - A AT DRAINAGE OUTLETS.

UTILIZE FABRIC INSERT INLET PROTECTION DEVICE IN LIEU OF ROCK INLET SEDIMENT TRAP TYPE C WHERE WATER MAY POND ON THE ROADWAY IN AREAS WHERE LIVE TRAFFIC IS PRESENT, AS DIRECTED BY THE ENGINEER

CLEARING AND GRUBBING EROSION CONTROL FOR CONSTRUCTION SHEET 9



U-5811
EC-09 | CONST.9

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
WAKE COUNTY

ROADWAY DESIGN UNIT

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PREPARED BY
Kimley»Horn
NC LICENSE #P-0102
421 FAYETTEVILLE STREET, SUITE 600
RALEIGH, NORTH CAROLINA 27601
PHONE: (919) 677-2000

REVISIONS

$$$-USER NAME-$$$ - $$$-DATE-$$$

11/14/23

NOTE:
PLACE TEMPORARY ROCK SEDIMENT DAMS TYPE - B AND TEMPORARY ROCK SILT CHECKS TYPE - A AT DRAINAGE OUTLETS.

UTILIZE FABRIC INSERT INLET PROTECTION DEVICE IN LIEU OF ROCK INLET SEDIMENT TRAP TYPE C WHERE WATER MAY POND ON THE ROADWAY IN AREAS WHERE LIVE TRAFFIC IS PRESENT, AS DIRECTED BY THE ENGINEER

CLEARING AND GRUBBING EROSION CONTROL FOR CONSTRUCTION SHEET 10

MATCH LINE -L- STA 88+00.00 SEE SHEET CONST. 9

MATCH LINE -L- STA 102+00.00 SEE SHEET CONST. 11

U-5811

EC-10 | CONST.10

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
WAKE COUNTY

ROADWAY DESIGN UNIT

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PREPARED BY

Kimley»Horn

REVISIONS

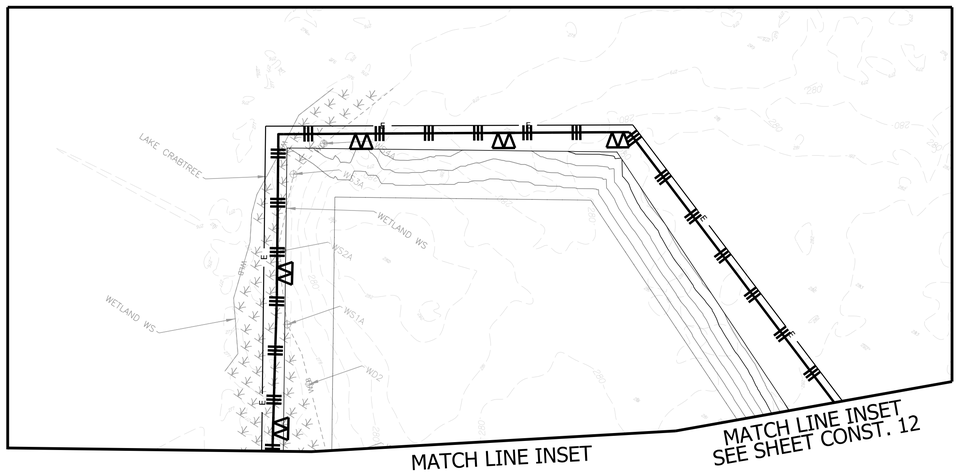
$$$-USER NAME-$$$ - $$$-DATE-$$$

11/14/23

NOTE:
PLACE TEMPORARY ROCK SEDIMENT DAMS TYPE - B AND TEMPORARY ROCK SILT CHECKS TYPE - A AT DRAINAGE OUTLETS.

UTILIZE FABRIC INSERT INLET PROTECTION DEVICE IN LIEU OF ROCK INLET SEDIMENT TRAP TYPE C WHERE WATER MAY POND ON THE ROADWAY IN AREAS WHERE LIVE TRAFFIC IS PRESENT, AS DIRECTED BY THE ENGINEER

CLEARING AND GRUBBING EROSION CONTROL FOR CONSTRUCTION SHEET 11



MATCH LINE -L- STA 102+00.00 SEE SHEET CONST. 10

MATCH LINE -L- STA 116+00.00 SEE SHEET CONST. 12

MATCH LINE INSET
SEE THIS SHEET

CRABTREE CREEK WATERSHED PROJECT
BM 1975 VOL.1PG 80
276.0 CONTOUR

WAKE COUNTY
DB 3006 PG 246

FLOATING TURBIDITY CURTAIN

RIPRAP AT OUTLET
EST. 1 TON CL-B
EST. 5 SY GFD

26 x 13 x 3
1.5 inch Skimmer
with 0.375 inch
Orifice Diameter
4 ft. weir
ID 11.1

15" RCP IV

TB 2GI

2@9'X14' RCBC
SEE SHEET 2D-6/DETAIL 4
FOR INLET AND OUTLET
CHANNEL IMPROVEMENTS

BM9
N-762018
E-2058089
ELEV-280.39'
BM9 TO 15506-2
S08°33'20.6"E DIST 189.36'
BM TIE NAIL IN 15" OAK

TH 5
N 761795.2610
E 2058120.1140
Elv. 284.67
Top of Pipe Elv: 282.10

LAKE CRABTREE

CRABTREE CREEK WATERSHED PROJECT
BM 1975 VOL.1PG 80
276.0 CONTOUR

REVISIONS

U-5811
EC-11 | CONST.11

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
WAKE COUNTY

ROADWAY DESIGN UNIT

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PREPARED BY
Kimley»Horn

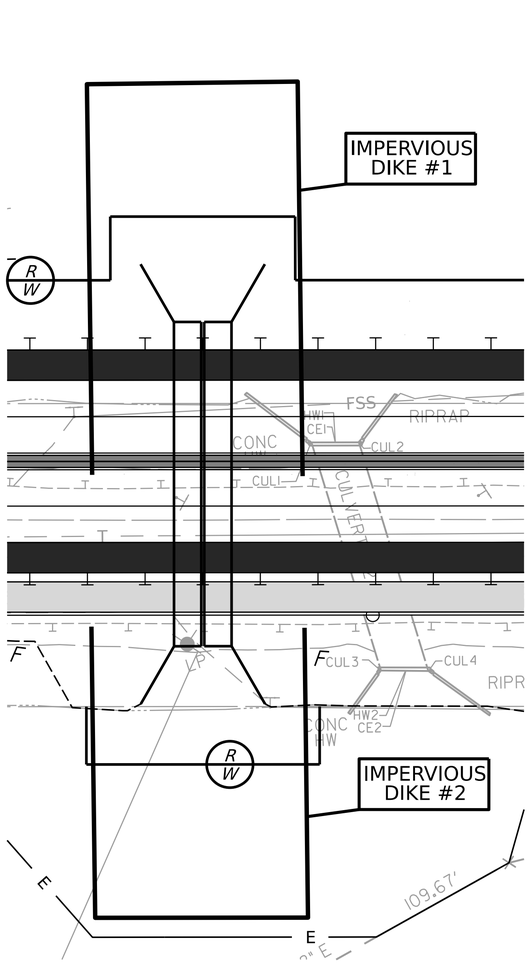
$$$-USER NAME-$$$ - $$$-DATE-$$$

11/14/23

CULVERT CONSTRUCTION SEQUENCE STA. 113+30 –L–

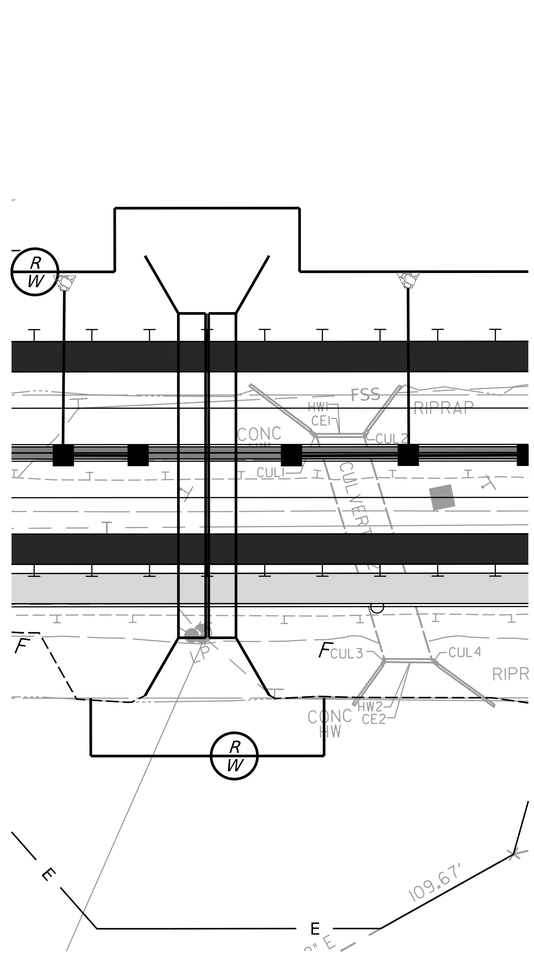
PHASE I

1.) UTILIZE SPECIAL STILLING BASIN(S) DURING CONSTRUCTION AS NEEDED TO DEWATER WORK SITE. (TYP.)
2.) CONSTRUCT IMPERVIOUS DIKE 1 & 2 TO ENSURE DRY WORK AREA.
3.) CONSTRUCT 16'X14' RCBC.
4.) REFERENCE TRAFFIC CONTROL PLANS FOR ADDITIONAL DETAIL REGARDING TRAFFIC MANAGEMENT.



PHASE II

1.) REMOVE IMPERVIOUS DIKES 1 & 2.
2.) REMOVE SPECIAL STILLING BASIN
3.) STABILIZE DISTURBED AREA AND REMOVE ALL EROSION AND SEDIMENT CONTROL DEVICES AS DIRECTED.
4.) FINISH ROADWAY AND DRAINAGE CONSTRUCTION.
5.) REFERENCE TRAFFIC CONTROL PLANS FOR ADDITIONAL DETAIL REGARDING TRAFFIC MANAGEMENT.



U-5811
EC-11A | CONST.11

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
WAKE COUNTY

ROADWAY DESIGN UNIT

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PREPARED BY
Kimley»Horn
NC LICENSE #P-0102
421 FAYETTEVILLE STREET, SUITE 600
RALEIGH, NORTH CAROLINA 27601
PHONE: (919) 677-2000

REVISIONS

11/14/23

NOTE:
PLACE TEMPORARY ROCK SEDIMENT DAMS TYPE - B AND TEMPORARY ROCK SILT CHECKS TYPE - A AT DRAINAGE OUTLETS.

UTILIZE FABRIC INSERT INLET PROTECTION DEVICE IN LIEU OF ROCK INLET SEDIMENT TRAP TYPE C WHERE WATER MAY POND ON THE ROADWAY IN AREAS WHERE LIVE TRAFFIC IS PRESENT, AS DIRECTED BY THE ENGINEER

CLEARING AND GRUBBING EROSION CONTROL FOR CONSTRUCTION SHEET 12

MATCH LINE INSET SEE CONST. 11

MATCH LINE -L- STA 116+00.00 SEE SHEET CONST. 11

60 x 30 x 3
1.5 inch Skimmer
with 1.25 inch
Orifice Diameter
7 ft. weir
ID 12.1

SPECIAL BASE DITCH SEE SHEET 2D-1/DETAIL 16

RIPRAP AT OUTLET
EST. 2 TON CL-B
EST. 7 SY GFD

RIPRAP AT OUTLET
EST. 2 TONS CL-B
EST. 7 SY GFD

SPECIAL BASE DITCH SEE SHEET 2D-1/DETAIL 15

CRABTREE CREEK WATERSHED PROJECT
BM 1975 VOL.1PG 80
284.9 CONTOUR

LARZ CARY LLC
DB 10135 PG 1554
BM 1985 PG 1989
BM 1987 PG 863

CPVF IV 2100 GATEWAY LLC
DB 19059 PG 160
BM 2000 PG 1746

RALEIGH DURHAM INTERNATIONAL
DB 3565 PG 231
BM 1999 PG 392

VELOCITY ENTERING WETLAND (DITCH CALCS) -L- STA 119+50 LT	
BASE WIDTH	3.00 FT
SIDE SLOPES	4:1
I	5.80 IN./HR.
Q	16.84 CF.S
VELOCITY	7.97 F.P.S
SLOPE	0.004 FT/FT
LINING TYPE	GRASS

U-5811

EC-12	CONST.12

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
WAKE COUNTY

ROADWAY DESIGN UNIT

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PREPARED BY

Kimley»Horn

NC LICENSE #P-0102
421 FAYETTEVILLE STREET, SUITE 600
RALEIGH, NORTH CAROLINA 27601
PHONE: (919) 677-2000

REVISIONS

$$$-USER NAME-$$$ - $$$-DATE-$$$

NOTE:
PLACE TEMPORARY ROCK SEDIMENT DAMS TYPE - B AND TEMPORARY ROCK SILT CHECKS TYPE - A AT DRAINAGE OUTLETS.

ENVIRONMENTALLY SENSITIVE AREA
SEE PROJECT SPECIAL PROVISIONS

UTILIZE FABRIC INSERT INLET PROTECTION DEVICE IN LIEU OF ROCK INLET SEDIMENT TRAP TYPE C WHERE WATER MAY POND ON THE ROADWAY IN AREAS WHERE LIVE TRAFFIC IS PRESENT, AS DIRECTED BY THE ENGINEER

CLEARING AND GRUBBING
EROSION CONTROL FOR
CONSTRUCTION SHEET 13

58 x 29 x 3
1.5 inch Skimmer
with 1.25 inch
Orifice Diameter
6 ft. weir
ID 13.1

MATCH LINE -LP1- STA 18+50.00 SEE SHEET CONST. 4

MATCH LINE -Y4- STA 21+00.00 SEE SHEET CONST. 4

U-5811

EC-13 | CONST.13

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
WAKE COUNTY

ROADWAY DESIGN UNIT

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PREPARED BY

Kimley»Horn

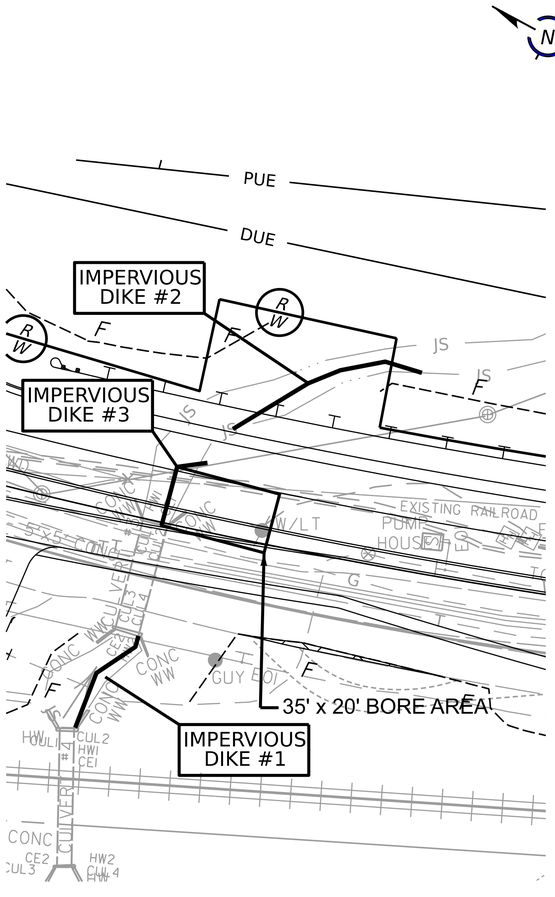
REVISIONS

11/14/23

CULVERT CONSTRUCTION SEQUENCE STA. 16+41 –Y4–

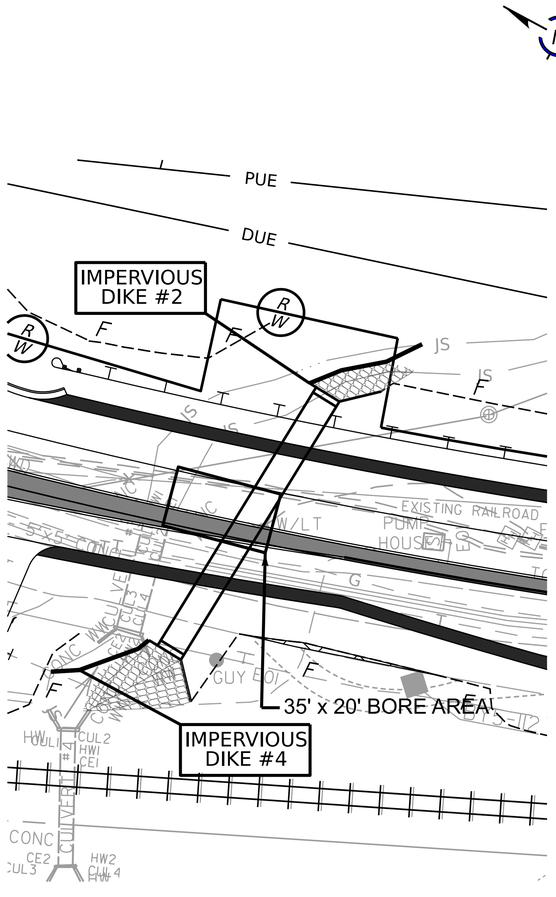
PHASE I

1.) UTILIZE SPECIAL STILLING BASIN(S) DURING CONSTRUCTION AS NEEDED TO DEWATER WORK SITE. (TYP.)
2.) CONSTRUCT IMPERVIOUS DIKE 1,2, &3 TO ENSURE DRY WORK AREA FOR JACK AND BORED WSP. REMOVE PORTION OF EXISTING HWs AS NECCESARY TO INSTALL IMPERVIOUS DIKES 1 AND 3.
3.) CONSTRUCT SOUTHERN BARREL OF 2@108" WSP VIA TRENCHLESS INSTALLATION (~48') UNDER EXISTING ROADWAY, THEN OPEN CUT AT DOWNSTREAM END (~40') AND RIGHT BANK CHANNEL IMPROVEMENTS WITHIN DEWATERED AREA.
4.) REFERENCE TRAFFIC CONTROL PLANS FOR ADDITIONAL DETAIL REGARDING TRAFFIC MANAGEMENT.



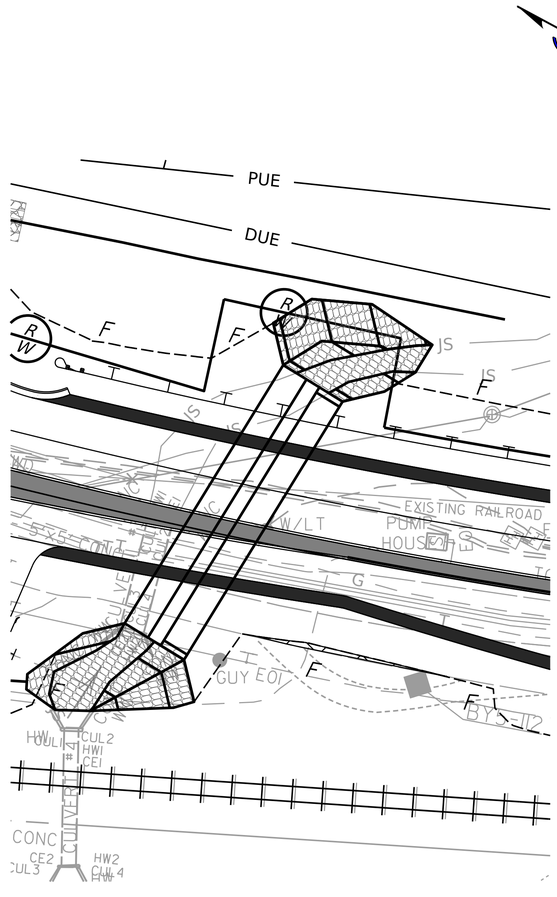
PHASE II

1.) REMOVE IMPERVIOUS DIKES 1 & 3 AND ADJUST IMPERVIOUS DIKE 2. CONSTRUCT IMPERVIOUS DIKE 4, DIVERTING FLOW INTO THE SOUTHERN BARREL OF 2@108" WSP.
2.) CONSTRUCT NORTHERN BARREL OF 2@108" WSP VIA TRENCHLESS AND OPEN CUT METHODS.
3.) CONSTRUCT REMAINING CHANNEL IMPROVEMENTS, UTILIZING PUMP AROUND AS NEEDED.



PHASE III

1.) REMOVE IMPERVIOUS DIKES 2 AND 4.
2.) REMOVE SPECIAL STILLING BASIN.
3.) STABILIZE DISTURBED AREA AND REMOVE ALL EROSION AND SEDIMENT CONTROL DEVICES AS DIRECTED.
4.) FINISH ROADWAY AND DRAINAGE CONSTRUCTION.
5.) REFERENCE TRAFFIC CONTROL PLANS FOR ADDITIONAL DETAIL REGARDING TRAFFIC MANAGEMENT.



U-5811
EC-13A | CONST.13

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
WAKE COUNTY

ROADWAY DESIGN UNIT

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

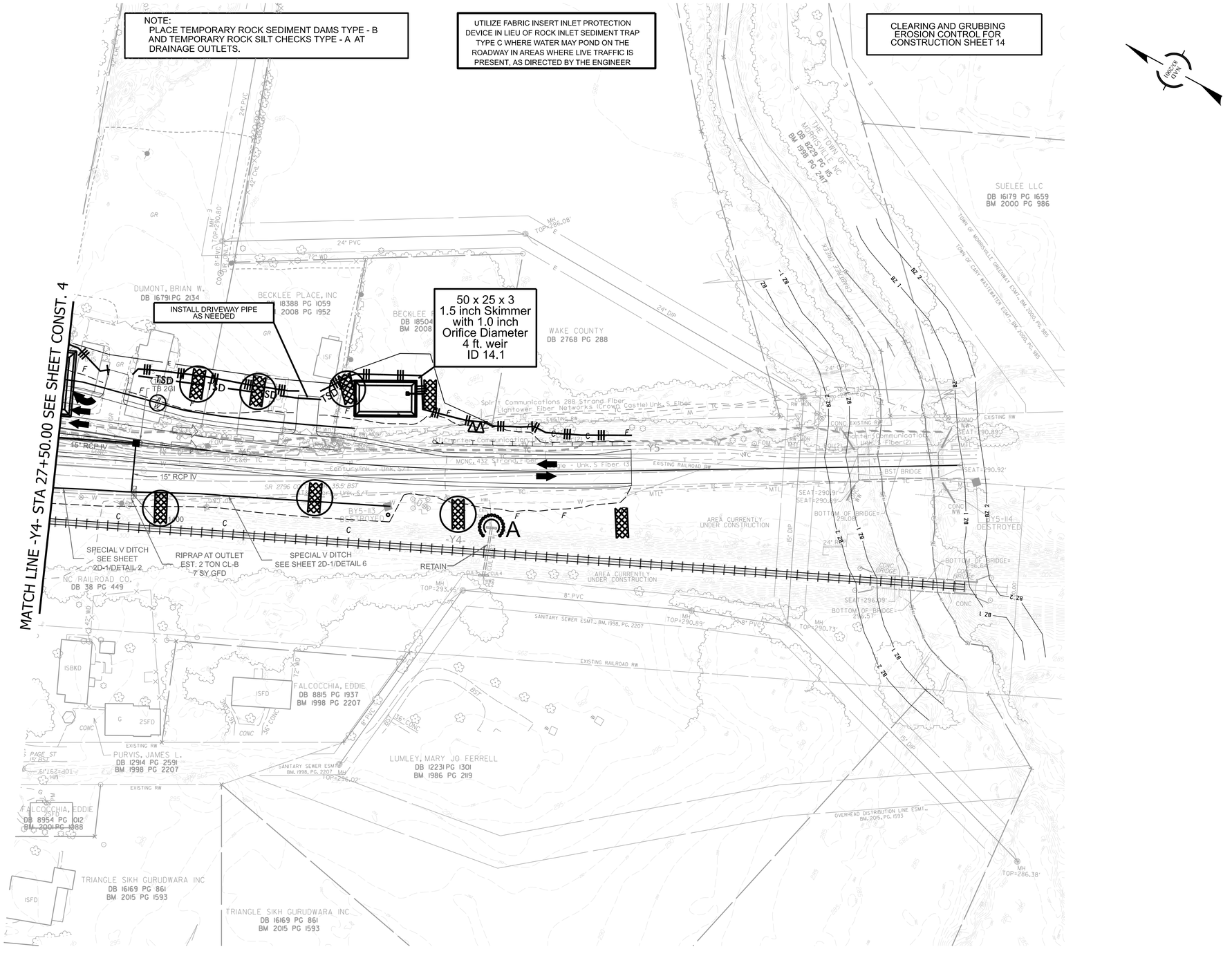
PREPARED BY
Kimley»Horn
NC LICENSE #F-0102
421 FAYETTEVILLE STREET, SUITE 600
RALEIGH, NORTH CAROLINA 27601
PHONE: (919) 677-2000

REVISIONS

NOTE:
PLACE TEMPORARY ROCK SEDIMENT DAMS TYPE - B AND TEMPORARY ROCK SILT CHECKS TYPE - A AT DRAINAGE OUTLETS.

UTILIZE FABRIC INSERT INLET PROTECTION DEVICE IN LIEU OF ROCK INLET SEDIMENT TRAP TYPE C WHERE WATER MAY POND ON THE ROADWAY IN AREAS WHERE LIVE TRAFFIC IS PRESENT, AS DIRECTED BY THE ENGINEER

CLEARING AND GRUBBING EROSION CONTROL FOR CONSTRUCTION SHEET 14



U-5811

EC-14 | CONST.14

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
WAKE COUNTY

ROADWAY DESIGN UNIT

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PREPARED BY

Kimley»Horn

REVISIONS

5/26/20

UTILIZE FABRIC INSERT INLET PROTECTION DEVICE IN LIEU OF ROCK INLET SEDIMENT TRAP TYPE C WHERE WATER MAY POND ON THE ROADWAY IN AREAS WHERE LIVE TRAFFIC IS PRESENT, AS DIRECTED BY THE ENGINEER

NAD 83/2001

MATCH LINE -Y4- STA 21+00.00 SEE SHEET CONST. 13

MATCH LINE -LP1- STA 18+50.00 SEE SHEET CONST. 13

MATCH LINE -L- STA 23+00.00 SEE SHEET CONST. 5

MATCH LINE -Y4- STA 27+50.00 SEE SHEET CONST. 14

68 x 34 x 3 1.5 inch Skimmer with 1.375 inch Orifice Diameter 8 ft. weir ID 4.1

66 x 33 x 3 1.5 inch Skimmer with 1.250 inch Orifice Diameter 8 ft. weir ID 4.2

SPECIAL V DITCH SEE SHEET 2D-1/DETAIL 1

SPECIAL V DITCH SEE SHEET 2D-1/DETAIL 2

SPECIAL V DITCH SEE SHEET 2D-1/DETAIL 24

SPECIAL V DITCH SEE SHEET 2D-1/DETAIL 32

WIDENING W/ CL-I RIPRAP ON BANKS AND EMBEDDED 1.5 FT INTO CHANNEL (STRUCTURES PAY ITEM) EST. 120 TONS CL-I EST. 195 SY GFD SEE SHEET 2D-6

FLOODBENCHING W/ CL-I RIPRAP ON BANKS (STRUCTURES PAY ITEM) EST. 120 TONS CL-I EST. 190 SY GFD SEE SHEET 2D-6

RIPRAP AT OUTLET EST. 2 TON CL-B EST. 7 SY GRD

RIPRAP AT OUTLET EST. 35 SY GEO

U-5811

EC-15 | CONST.4

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION WAKE COUNTY

ROADWAY DESIGN UNIT

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PREPARED BY

Kimley»Horn

REVISIONS

5/26/20

UTILIZE FABRIC INSERT INLET PROTECTION DEVICE IN LIEU OF ROCK INLET SEDIMENT TRAP TYPE C WHERE WATER MAY POND ON THE ROADWAY IN AREAS WHERE LIVE TRAFFIC IS PRESENT, AS DIRECTED BY THE ENGINEER

142 x 71 x 3
3.0 inch Skimmer
with 2.750 inch
Orifice Diameter
38 ft. weir
ID 5.1

2 @ 60" WSP - APPROX. 50 LF
INSTALLED TRENCHLESSLY

MATCH LINE -L- STA 23+00.00 SEE SHEET CONST. 4

MATCH LINE -L- STA 37+00.00 SEE SHEET CONST. 6

CAMPBELL, KATRINA SMITH
DB 16216 PG 1903
BM 2014 PG 1746

BOLISETTY, PHANI K.
DB 16332 PG 99
BM 2014 PG 1746

COTTON PLACE HOMEOWNERS ASSOCIATION
DB 17723 PG 936
BM 2014 PG 1746

PEDAMALLU, VENKATA BHASKARA SANDE
DB 16447 PG 129
BM 2014 PG 1226

VOBBILICHETTY, VINAY BABU
DB 15992 PG 2154
BM 2014 PG 1226

KRISHNA, JAGADEESH R
DB 16550 PG 1711
BM 2014 PG 1226

ADLAKHA, VIVEK
DB 16648 PG 110
BM 2014 PG 1746

MAA PROPERTIES, LLC
DB 18389 PG 1002
BM 2014 PG 1746

LAUGHLIN, MITCHELL V.
DB 16301 PG 1434
BM 2014 PG 1746

ALBERTI, ALEX
DB 16505 PG 438
BM 2014 PG 1746

DB 16533 PG 921
BM 2014 PG 1745

DB 16655 PG 939
BM 2014 PG 1226

DB 15855 PG 1325
BM 2014 PG 1226

COTTEN PLACE HOA, INC.
DB 15855 PG 1325
BM 2014 PG 1226

KG & SON LLC
DB 12690 PG 275

SHAH, MAHENDRA
DB 12228 PG 1

KG & SON LLC
DB 12690 PG 271

XIE, JIAHUA
DB 11480 PG 1467

WONG, RAYMOND WAI-TAT
DB 14949 PG 1638

COTTEN PLACE HOA, INC.
DB 16256 PG 1752
BM 2014 PG 1745
BM 2015 PG 1901

GODWIN, BETTY H.
DB 7376 PG 359

GODWIN, BETTY H.
DB 1948 PG 306

COVALT, DONALD G
DB 1820 PG 462

EUPHORIA INVESTMENTS LLC
DB 15881 PG 1802

7408 RIDGEFIELD LLC
DB 15904 PG 2728

SENGUPTA, ARIJEET & SENGUPTA, LINA
DB 17760 PG 1648
BM 2014 PG 1745

KASTURI, VELLORE & JAIN, SUNIL
DB 18264 PG 2443
BM 2014 PG 1745

SRINIVASAN, PRADEEP & SHANKARAN, PRABHA
DB 19105 PG 2692
BM 2014 PG 1745

CHAVAN, KULDIP S.
DB 16476 PG 545
BM 2014 PG 1745

CHEN, DAVID H.
DB 16419 PG 40
BM 2015 PG 1901

WAKE COUNTY
DB 3051 PG 274
BM 1982 PG 836

BM4
N-755142
E-2052964
ELEV-287.57'
BL STA. 34+44.00 242' RT
BM TIE NAIL IN 32" OAK

U-5811
EC-16 | CONST.5

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
WAKE COUNTY

ROADWAY DESIGN UNIT

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PREPARED BY
Kimley»Horn

REVISIONS

5/26/20

UTILIZE FABRIC INSERT INLET PROTECTION DEVICE IN LIEU OF ROCK INLET SEDIMENT TRAP TYPE C WHERE WATER MAY POND ON THE ROADWAY IN AREAS WHERE LIVE TRAFFIC IS PRESENT, AS DIRECTED BY THE ENGINEER

NAD 83/2001

MATCH LINE -L- STA 37+00.00 SEE SHEET CONST. 5

MATCH LINE -L- STA 50+00.00 SEE SHEET CONST. 7

47 SAULS, BILLY HARRELL AND SAULS, WILMA M. DB 2772 PG 362

45 PARKWAY BUSINESS CENTER CONDOMINIUM DB 15478 PG 2274 DB 14895 PG 395

49 THE HINDU SOCIETY OF NORTH CAROLINA DB 17250 PG 1406

51 THE HINDU SOCIETY OF NORTH CAROLINA DB 3365 PG 446

52 THE HINDU SOCIETY OF NORTH CAROLINA DB 13240 PG 1946

53 AGARWAL MORRISVILLE LLC DB 16449 PG 1827

54 SAVALIYA, VIPUL DB 17629 PG 2497 BM 2017 PG 1244

50 TOWN OF MORRISVILLE DB 2979 PG 101

46 WAKE COUNTY DB 2943 PG 833

48 WAKE COUNTY DB 6782 PG 587 BM 1995 PG 1852

80 x 40 x 3
2.0 inch Skimmer
with 1.625 inch
Orifice Diameter
12 ft. weir
ID 6.1

166 x 83 x 3
3.0 inch Skimmer
with 3.0 inch
Orifice Diameter
52 ft. weir
ID 6.2

RIPRAP AT OUTLET
EST. 5 TONS CL-B
EST. 14 SY GFD
TAIL DITCH
SEE SHEET 2D-1/DETAIL 9
S = 0.3%

RIP RAP AT OUTLET
EST. 8 TONS CL-B RIP RAP
EST. 21 SY GFD

RIP RAP AT OUTLET
EST. 15 TONS CL-B RIP RAP
EST. 37 SY GFD
SPECIAL BASE DITCH
SEE DETAIL 2D-1/DETAIL 18

U-5811
EC-16 | CONST.6

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
WAKE COUNTY

ROADWAY DESIGN UNIT

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PREPARED BY
Kimley»Horn
NC LICENSE #P1312
421 FAYETTEVILLE STREET, SUITE 600
RALEIGH, NORTH CAROLINA 27601
PHONE: (919) 677-2000

REVISIONS

5/26/20

UTILIZE FABRIC INSERT INLET PROTECTION DEVICE IN LIEU OF ROCK INLET SEDIMENT TRAP TYPE C WHERE WATER MAY POND ON THE ROADWAY IN AREAS WHERE LIVE TRAFFIC IS PRESENT, AS DIRECTED BY THE ENGINEER

NAD 83/2001

MATCH LINE -L- STA 50+00.00 SEE SHEET CONST. 6

MATCH LINE -L- STA 63+00.00 SEE SHEET CONST. 8

55 ROSE NC IILLC
DB 14264 PG 1897
BM 1984 PG 1296

PATEL, RAKESHKUMAR
DB 17160 PG 1221
BM 2017 PG 1245

SAVALIYA, VIPUL
DB 17629 PG 2497
BM 2017 PG 1244

LAHM, KAISER
DB 17408 PG 401
BM 2017 PG 1244

56 CEDAR FOR BUSINESS PARK
DB 18103 PG 2264
BM 1999 PG 1305

58 NEXPOINT AVIATION DST
DB 19104 PG 2130
BM 2019 PG 703

50 TOWN OF MORRISVILLE
DB 2979 PG 101

57 WAKE COUNTY
DB 3006 PG 246

59 RK POINTE AT LAKE CRABTREE DST
DB 17483 PG 2582
BM 2016 PG 1026

RIPRAP AT DITCH
EST. 50 TONS CL-B RIP RAP
EST. 125 SY GFD

SPECIAL MIN DEPTH CB-F
SEE SHEET 2D-2

SPECIAL MIN DEPTH CB-E
SEE SHEET 2D-2

SPECIAL V DITCH
SEE SHEET
2D-1/DETAIL 3

ADJUST CB

1 @ 132" WSP
CHANNEL IMPROVEMENTS W/
CL-I RIPRAP ON BANKS
(STRUCTURES PAY ITEM)
EST. 95 TONS CL-I
EST. 155 SY GFD
SEE SHEET 2D-6

SPECIAL BASE DITCH
SEE SHEET 2D-1/DETAIL 19

SPECIAL BASE DITCH
SEE SHEET
2D-1/DETAIL 14
RIPRAP IN DITCH
EST. 175 TONS
CL-B RIPRAP
EST. 375 SY GFD

RIPRAP IN OUTLET
EST. 11 TONS
CL-B RIPRAP
EST. 28 SY GFD

RIPRAP AT OUTLET
EST. 11 TONS CL-B RIPRAP
EST. 28 SY GFD

COLLAR AND
EXTEND 13 LF

FILL AND ABANDON

SPECIAL V DITCH
SEE SHEET 2D-1/DETAIL 1

RETAIN
MIN DEPTH CB-F
SEE SHEET 2D-2

MIN DEPTH CB-G
SEE SHEET 2D-2

TIE TO EXIST
12" RCP

15" RCP IV
CONV DI TO JB W/TB MH

RIPRAP AT OUTLET
EST. 3 TONS CL-B RIPRAP
EST. 10 SY GFD

RETAIN SYSTEM

REMOVE SYSTEM

50 x 25 x 3
1.5 inch Skimmer
with 1.0 inch
Orifice Diameter
5 ft. weir
ID 7.1

34 x 17 x 3
1.5 inch Skimmer
with 0.625 inch
Orifice Diameter
4 ft. weir
ID 7.2

60 x 30 x 3
1.5 inch Skimmer
with 1.25 inch
Orifice Diameter
7 ft. weir
ID 7.3

U-5811
EC-17 | CONST.7

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
WAKE COUNTY

ROADWAY DESIGN UNIT

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PREPARED BY

Kimley»Horn

NC LICENSE #P1312
421 FAYETTEVILLE STREET, SUITE 600
RALEIGH, NORTH CAROLINA 27601
PHONE: (919) 677-2000

REVISIONS

5/26/20

UTILIZE FABRIC INSERT INLET PROTECTION DEVICE IN LIEU OF ROCK INLET SEDIMENT TRAP TYPE C WHERE WATER MAY POND ON THE ROADWAY IN AREAS WHERE LIVE TRAFFIC IS PRESENT, AS DIRECTED BY THE ENGINEER

MATCH LINE -L STA 63+00.00 SEE SHEET CONST. 7

MATCH LINE -L STA 75+00.00 SEE SHEET CONST. 9

NAD 83/2001

58

59

60

61

62

NEXPOINT AVIATION DST
DB 19104 PG 2130
BM 2019 PG 703

SBP OFFICE OWNER L.P LIMITED PARTNERSHIP
DB 18208 PG 876
MB 2019 PG 703

SBP OFFICE OWNER L.P LIMITED PARTNERSHIP
DB 18208 PG 876
BM 1998 PG 1680

SBP OFFICE OWNER L.P LIMITED PARTNERSHIP
DB 18208 PG 876
MB 1995 PG 1372

TIE TO EXIST 24" RCP
SPECIAL BERM DITCH
SEE SHEET 2D-1/DETAIL 22
SPECIAL BERM DITCH
SEE SHEET 2D-1/DETAIL 21
RIPRAP IN DITCH
EST. 15 TONS CL-1 RIPRAP
EST. 45 SY GFD
SPECIAL BERM DITCH
SEE SHEET 2D-1/DETAIL 20
RETAIN 127 LF
OTCB
TIE TO EXIST 36" RCP
ADJUST DI
POSSIBLE U/G JB
US811-E DESTROYED
-LREV-
ISBK BUS
ISCONC BUS

U-5811
EC-18 | CONST.8

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
WAKE COUNTY

ROADWAY DESIGN UNIT

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PREPARED BY

Kimley»Horn

REVISIONS

5/26/20

UTILIZE FABRIC INSERT INLET PROTECTION DEVICE IN LIEU OF ROCK INLET SEDIMENT TRAP TYPE C WHERE WATER MAY POND ON THE ROADWAY IN AREAS WHERE LIVE TRAFFIC IS PRESENT, AS DIRECTED BY THE ENGINEER

MATCH LINE -L- STA 75+00.00 SEE SHEET CONST. 8

MATCH LINE -L- STA 89+00.00 SEE SHEET CONST. 10

64 SBP OFFICE OWNER, L.P. DB 18208 PG 876 BM 1987 PG 1092

66 SBP OFFICE OWNER, L.P. DB 18208 PG 876 BM 1994 PG 1763

62

60

63 SBP OFFICE OWNER, L.P. DB 18208 PG 876 BM 1996 PG 1562

65 RAL 900 AVIATION LLC DB 19711 PG 1589 BM 1985 PG 2082

SANITARY SEWER ESMT., PB 1994, PG. 1763

DRAIN ESMT., PB 1994, PG. 1763

SANITARY SEWER ESMT., PB 1994, PG. 1763

SR 1002 AVIATION PKWY 61.5' BST

SOUTHPORT DR

ISBK/MTL BUS

ISCONC BUS

RETAIN

RETAIN 93 LF

REMOVE

ADJUST CB (0917)

FILL AND ABANDON

FILL AND ABANDON 18" RCP IV

FILL AND ABANDON 15" RCP IV

CB-G (0913) 15" RCP IV

CB-E (0914) 15" RCP IV

CB-F (0928)

CB-G (0916) REMOVE 18" RCP IV

CB-G (0926)

CB-F (0945)

CB-F (0944)

CB-F (0943)

CB-F (0946)

TB 2GI (0904)

TB 2GI (0915)

TB 2GI (0923)

TB 2GI (0927)

TB 2GI (0930)

TB 2GI (0931)

TB 2GI (0933)

TB 2GI (0948)

CB-G (0922)

CB-G (0919)

CB-G (0925)

CB-F (0905)

CB-F (0906)

CB-F (0907)

CB-E (0908)

CB-F (0909)

CB-F (0920)

CB-F (0921)

CB-F (0932)

CB-F (0935)

CB-F (0929)

CB-F (0948)

EX0901

EX0902

EX0903

EX0904

EX0934

EX0942

NAD 83/2001

U-5811

EC-19 | CONST.9

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION WAKE COUNTY

ROADWAY DESIGN UNIT

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PREPARED BY

Kimley»Horn

NC LICENSE #P1312
421 FAYETTEVILLE STREET, SUITE 600
RALEIGH, NORTH CAROLINA 27601
PHONE: (919) 677-2000

REVISIONS

5/26/20

UTILIZE FABRIC INSERT INLET PROTECTION DEVICE IN LIEU OF ROCK INLET SEDIMENT TRAP TYPE C WHERE WATER MAY POND ON THE ROADWAY IN AREAS WHERE LIVE TRAFFIC IS PRESENT, AS DIRECTED BY THE ENGINEER

NAD 83/2001

MATCH LINE -L- STA 89+00.00 SEE SHEET CONST. 9

MATCH LINE -L- STA 103+00.00 SEE SHEET CONST. 11

BM8
N=760989
E=2056423
ELEV=292.95'
BL STA: 102+06.00 296' LT
BM TIE NAIL IN 18" OAK

AVIATION PARKWAY ASSOCIATES
DB 5770 PG 622
BM 1992 PG 1223

FRANK R ANDERSON
REALTY & INVESTMENT CO
DB 11332 PG 2146
BM 1987 PG 1362

CRABTREE CREEK
WATERSHED PROJECT
BM 1975 VOL. 1 PG 80
284.9 CONTOUR

BAPS RALEIGH LLC
DB 12915 PG 463
BM 2017 PG 649

WILLIAMS, DAVID SR ETAL
DB 18527 PG 451

CRABTREE CREEK
WATERSHED PROJECT
BM 1975 VOL. 1 PG 80
276.0 CONTOUR

RETAIN
RETAIN 62 LF
REMOVE 33 LF
REMOVE
RETAIN 165 LF 18" RCP
EX1041
TIE TO EXIST 18" RCP
24" RCP IV
JB w/MH
SPECIAL V DITCH SEE SHEET 2D-1/DETAIL 1
SPECIAL V DITCH SEE SHEET 2D-1/DETAIL 5
SPECIAL MIN DEPTH CB-G SEE SHEET 2D-2
SPECIAL MIN DEPTH CB-E SEE SHEET 2D-2
SPECIAL BASE DITCH SEE SHEET 2D-1/DETAIL 17
SPECIAL BASE DITCH SEE SHEET 2D-1/DETAIL 23
RIP RAP AT DITCH EST. 300 TONS CL-B RIP RAP EST. 750 SY GFD
RIPRAP PAD AT OUTLET EST. 15 TONS CL-1 RIPRAP EST. 30 SY GFD
RIPRAP AT OUTLET EST. 1 TON CL-B EST. 5 SY GRD
RIP RAP AT OUTLET EST. 2 TONS CL-B RIP RAP EST. 7 SY GFD
ENDWALL STD. 838.01
CB-E FILL AND ABANDON
SEE SHEET 2D-2

REVISIONS

U-5811
EC-20 | CONST.10

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
WAKE COUNTY

ROADWAY DESIGN UNIT

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PREPARED BY

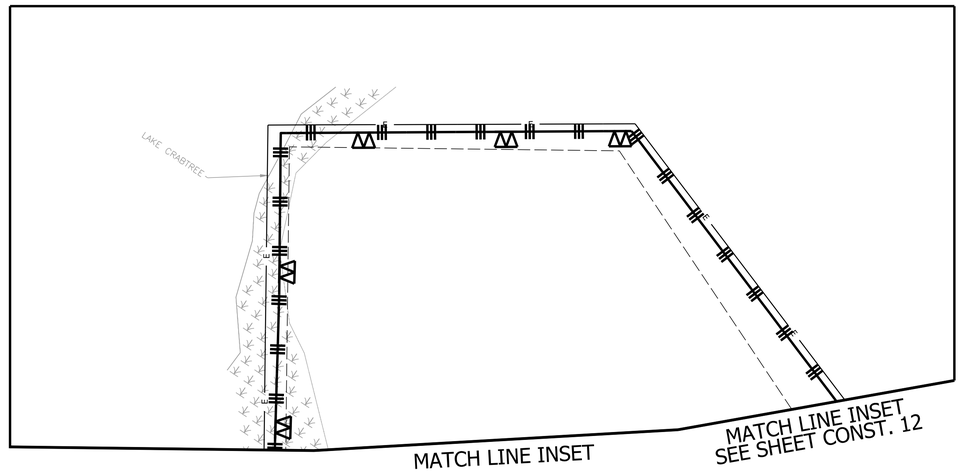
Kimley»Horn

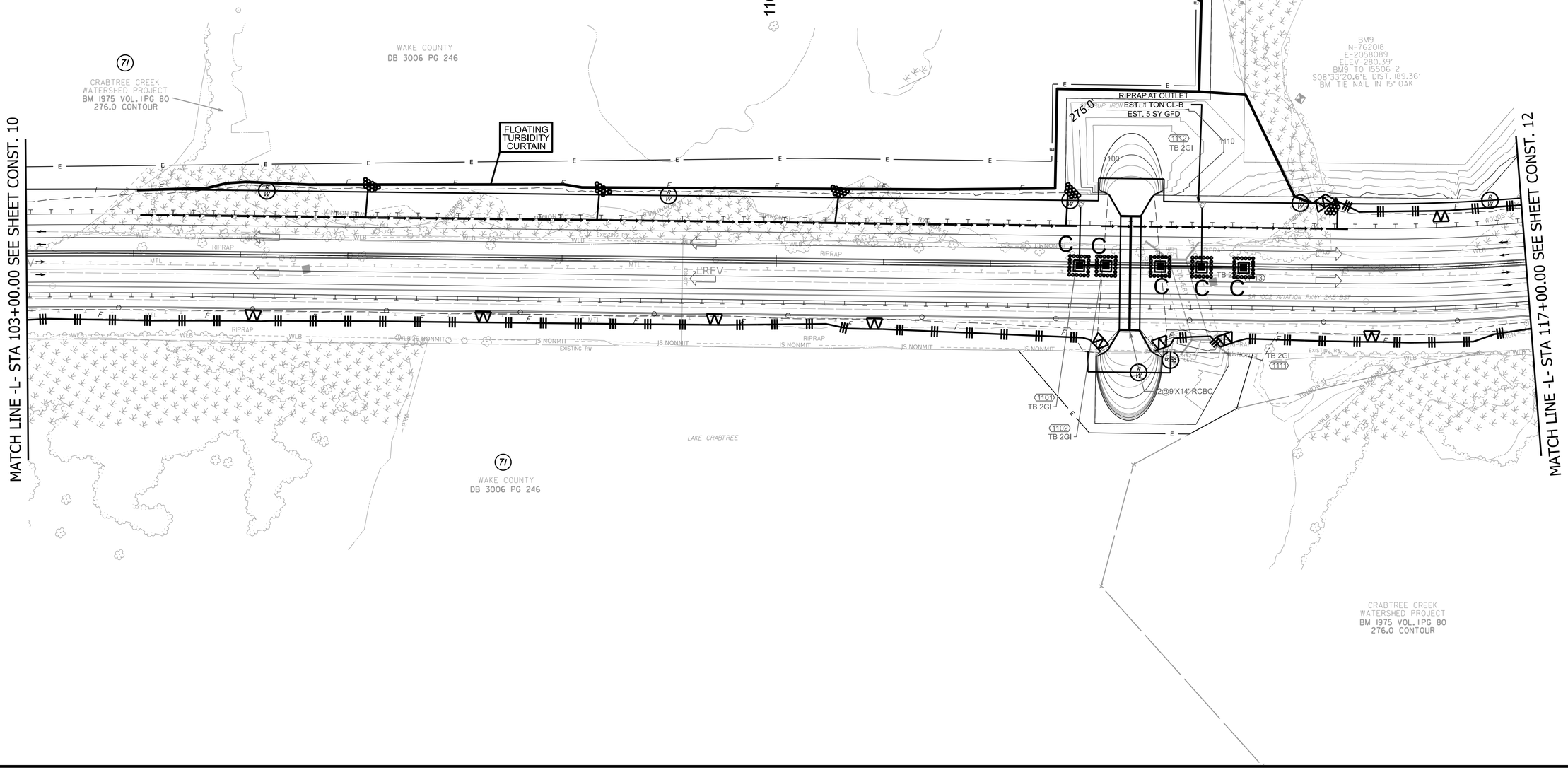
NC LICENSE #P0102
421 FAYETTEVILLE STREET, SUITE 600
RALEIGH, NORTH CAROLINA 27601
PHONE: (919) 677-2000

5/26/20

UTILIZE FABRIC INSERT INLET PROTECTION DEVICE IN LIEU OF ROCK INLET SEDIMENT TRAP TYPE C WHERE WATER MAY POND ON THE ROADWAY IN AREAS WHERE LIVE TRAFFIC IS PRESENT, AS DIRECTED BY THE ENGINEER

Place Matting for Erosion Control on Slope as Work Allows. SEE SHEET EC-03





U-5811
EC-21 | CONST.11

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
WAKE COUNTY

ROADWAY DESIGN UNIT

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PREPARED BY

Kimley»Horn

REVISIONS

5/26/20

MATCH LINE INSET
SEE CONST. 11

71

CRABTREE CREEK
WATERSHED PROJECT
BM 1975 VOL.1PG 80
284.9 CONTOUR

120

280.0'

280.0'

MATCH LINE -L- STA 117+00.00 SEE SHEET CONST. 11

72

LARZ CARY LLC
DB 10135 PG 1554
BM 1985 PG 1989
BM 1987 PG 863

UTILIZE FABRIC INSERT INLET PROTECTION DEVICE IN LIEU OF ROCK INLET SEDIMENT TRAP TYPE C WHERE WATER MAY POND ON THE ROADWAY IN AREAS WHERE LIVE TRAFFIC IS PRESENT, AS DIRECTED BY THE ENGINEER

NAD 83/2001

2100 GATEWAY CENTRE LLC
DB 19059 PG 160
BM 2000 PG 1746

20' UTILITY EASEMENT BM 2000 PG 1746

130

3SBKBUS

2SBKBUS

BST

-Y15A-

-Y15B-

-LREV-

-L-

1211
TB 2GI

CB-F 1206

RIPRAP AT OUTLET
EST. 2 TONS CL-B
EST. 7 SY GFD

1221
1201 15" RCP IV

CB-F 1203

CB-F 1207

1220 RIP RAP

TB 2GI
1209

TB 2GI
1210

TB 2GI
1212

TB 2GI
1205

REMOVE

RETAIN SYSTEM

INDETERMINATE CONNECTION

SR 1002 AVIATION PKWY BST VARIES

WOODS

FOOTPATH

WETLAND WS

CRABTREE CREEK
WATERSHED PROJECT
BM 1975 VOL.1PG 80
276.0 CONTOUR

RALEIGH DURHAM INTERNATIONAL
DB 3565 PG 231
BM 1999 PG 392

CRABTREE CREEK
WATERSHED PROJECT
BM 1975 VOL.1PG 80
284.9 CONTOUR

15

U-5811
EC-22 | CONST.12

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
WAKE COUNTY

ROADWAY DESIGN UNIT

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PREPARED BY

Kimley»Horn

REVISIONS

5/26/20

UTILIZE FABRIC INSERT INLET PROTECTION DEVICE IN LIEU OF ROCK INLET SEDIMENT TRAP TYPE C WHERE WATER MAY POND ON THE ROADWAY IN AREAS WHERE LIVE TRAFFIC IS PRESENT, AS DIRECTED BY THE ENGINEER

58 x 29 x 3
1.5 inch Skimmer
with 1.25 inch
Orifice Diameter
6 ft. weir
ID 13.1

MATCH LINE -LP1- STA 18+50.00 SEE SHEET CONST. 4

MATCH LINE -Y4- STA 21+00.00 SEE SHEET CONST. 4

NAD 83/2001

U-5811
EC-23 | CONST.13

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
WAKE COUNTY

ROADWAY DESIGN UNIT

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PREPARED BY

Kimley»Horn

REVISIONS

5/26/20

UTILIZE FABRIC INSERT INLET PROTECTION DEVICE IN LIEU OF ROCK INLET SEDIMENT TRAP TYPE C WHERE WATER MAY POND ON THE ROADWAY IN AREAS WHERE LIVE TRAFFIC IS PRESENT, AS DIRECTED BY THE ENGINEER

NAD 83/2001

50 x 25 x 3
1.5 inch Skimmer
with 1.0 inch
Orifice Diameter
4 ft. weir
ID 14.1

INSTALL DRIVEWAY PIPE AS NEEDED

MATCH LINE -Y4- STA 27+50.00 SEE SHEET CONST. 4

SPECIAL V DITCH SEE SHEET 2D-1/DETAIL 2

RIPRAP AT OUTLET EST. 2 TON CL-B 7 SY GFD

SPECIAL V DITCH SEE SHEET 2D-1/DETAIL 6

RETAIN

DUMONT, BRIAN W.
DB 16791PG 2134

BECKLEE PLACE, INC
DB 18388 PG 1059
BM 2008 PG 1952

WAKE COUNTY
DB 2768 PG 288

THE TOWN OF MORRISVILLE INC
DB 8229 PG 15
BM 1998 PG 2417

SUELEE LLC
DB 16179 PG 1659
BM 2000 PG 986

TOWN OF MORRISVILLE GREENWAY ESMT., BM. 2000, PG. 985

TOWN OF CARY WASTEWATER ESMT., BM. 2000, PG. 985

NC RAILROAD CO.
DB 38 PG 449

FALCOCCHIA, EDDIE
DB 8815 PG 1937
BM 1998 PG 2207

PURVIS, JAMES L.
DB 12914 PG 2591
BM 1998 PG 2207

FALCOCCHIA, EDDIE
DB 8954 PG 1012
BM 2001 PG 1088

TRIANGLE SIKH GURUDWARA INC
DB 16169 PG 861
BM 2015 PG 1593

LUMLEY, MARY JO FERRELL
DB 12231 PG 1301
BM 1986 PG 2119

SANITARY SEWER ESMT., BM. 1998, PG. 2207

OVERHEAD DISTRIBUTION LINE ESMT., BM. 2015, PG. 1593

AREA CURRENTLY UNDER CONSTRUCTION

BST/ BRIDGE

SEAT=290.89'

SEAT=290.92'

BOTTOM OF BRIDGE=291.08

BOTTOM OF BRIDGE=296.64

SEAT=296.09'

BOTTOM OF BRIDGE=296.57

BY5-113 DESTROYED

BY5-114 DESTROYED

U-5811
EC-24 | CONST.14

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
WAKE COUNTY

ROADWAY DESIGN UNIT

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PREPARED BY

Kimley»Horn

NC LICENSE #P-0102
421 FAYETTEVILLE STREET, SUITE 600
RALEIGH, NORTH CAROLINA 27601
PHONE: (919) 677-2000

REVISIONS

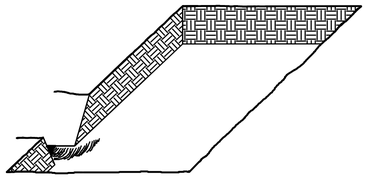
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-5811	RF-1	
STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION	

PLANTING DETAILS

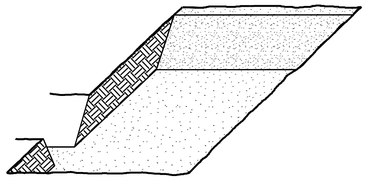
SEEDLING / LINER BAREROOT PLANTING DETAIL

HEALING IN

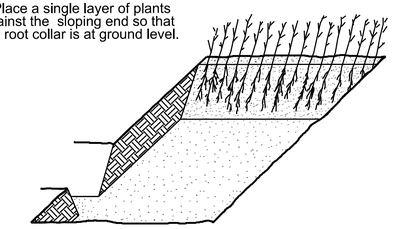
1. Locate a healing-in site in a shady, well protected area.
2. Excavate a flat bottom trench 12 inches deep and provide drainage.



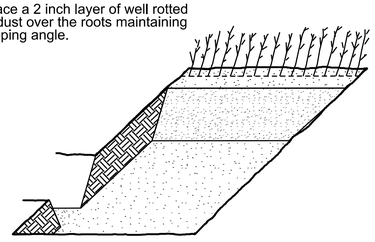
3. Backfill the trench with 2 inches well rotted sawdust. Place a 2 inch layer of well rotted sawdust at a sloping angle at one end of the trench.



4. Place a single layer of plants against the sloping end so that the root collar is at ground level.

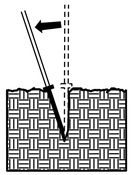


5. Place a 2 inch layer of well rotted sawdust over the roots maintaining a sloping angle.

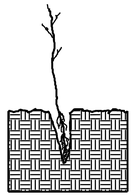


6. Repeat layers of plants and sawdust as necessary and water thoroughly.

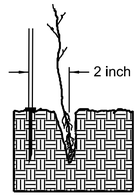
DIBBLE PLANTING METHOD
USING THE KBC PLANTING BAR



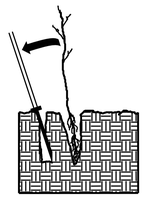
1. Insert planting bar as shown and pull handle toward planter.



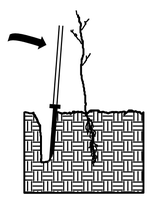
2. Remove planting bar and place seedling at correct depth.



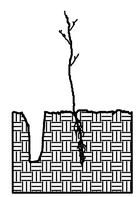
3. Insert planting bar 2 inches toward planter from seedling.



4. Pull handle of bar toward planter, firming soil at bottom.



5. Push handle forward firming soil at top.



6. Leave compaction hole open. Water thoroughly.

PLANTING NOTES:

PLANTING BAG
During planting, seedlings shall be kept in a moist canvas bag or similar container to prevent the root systems from drying.



KBC PLANTING BAR
Planting bar shall have a blade with a triangular cross section, and shall be 12 inches long, 4 inches wide and 1 inch thick at center.



ROOT PRUNING
All seedlings shall be root pruned, if necessary, so that no roots extend more than 10 inches below the root collar.

REFORESTATION

☐ TREE REFORESTATION SHALL BE PLANTED 6 FT. TO 10 FT. ON CENTER, RANDOM SPACING, AVERAGING 8 FT. ON CENTER, APPROXIMATELY 680 PLANTS PER ACRE.

REFORESTATION

MIXTURE, TYPE, SIZE, AND FURNISH SHALL CONFORM TO THE FOLLOWING:

34% LIRIODENDRON TULIPIFERA	TULIP POPLAR	12 in - 18 in BR
33% PLATANUS OCCIDENTALIS	AMERICAN SYCAMORE	12 in - 18 in BR
33% BETULA NIGRA	RIVER BIRCH	12 in - 18 in BR

REFORESTATION DETAIL SHEET

N.C.D.O.T. - ROADSIDE ENVIRONMENTAL UNIT

Appendix G

Grading and Revegetation Plans

01/16/24

TIP PROJECT: U-5811

CONTRACT:

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

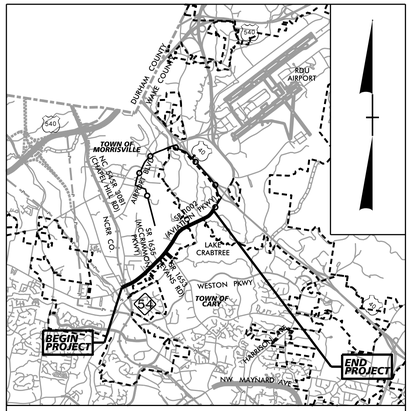
WAKE COUNTY

LOCATION: *SR 1002 (AVIATION PARKWAY), WIDENING FROM NC 54 TO I-40*

GRADING AND REVEGETATION PLAN

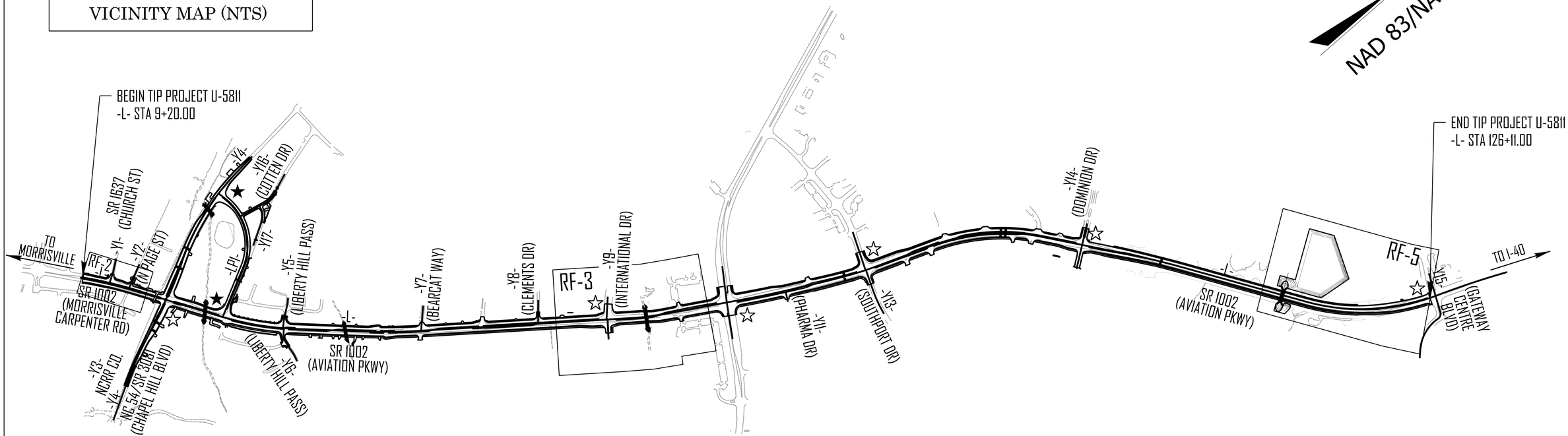
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-5811	RF-1	

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
44384.1.1		P.E.
44384.2.1		R/W
44384.3.1		CONST.



VICINITY MAP (NTS)

NAD 83/NA 2011



THIS PROJECT IS WITHIN THE MUNICIPAL BOUNDARIES OF TOWN OF CARY AND TOWN OF MORRISVILLE.
CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD II.

THIS IS A PARTIAL CONTROLLED ACCESS PROJECT WITH ACCESS BEING LIMITED TO POINTS SHOWN ON THE PLANS.

★ PROPOSED TRAFFIC SIGNAL
☆ EXISTING TRAFFIC SIGNAL TO BE MODIFIED

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

GRAPHIC SCALES

50 25 0 50 100
PLANS

50 25 0 50 100
PROFILE (HORIZONTAL)

5 2,5 0 5 10
PROFILE (VERTICAL)

DESIGN DATA

ADT 2029 = 32800
ADT 2049 = 43200
K = 8 %
D = 60 %
T = 7 % *
V = 50 MPH
* TTST = 2%
* DUAL = 5%
FUNCTIONAL CLASS = MINOR ARTERIAL
REGIONAL TIER

PROJECT LENGTH

LENGTH OF ROADWAY TIP PROJECT U-5811 = 2.214 MILES

LENGTH OF STRUCTURE TIP PROJECT U-5811 = 0.000 MILE

TOTAL LENGTH OF TIP PROJECT U-5811 = 2.214 MILES

2024 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: NOVEMBER 20, 2026

LETTING DATE: JULY 17, 2029

EVERETT LOVING, P.E.
PROJECT ENGINEER

DAVID HURSEY, P.E.
PROJECT DESIGN ENGINEER

JOEL PERLIN, PMP
NCDOT PROJECT MANAGER

HYDRAULICS ENGINEER

SIGNATURE: _____ *P.E.*

ROADWAY DESIGN ENGINEER

SIGNATURE: _____ *P.E.*

STATE OF NORTH CAROLINA • DEPARTMENT OF TRANSPORTATION •

11/14/23

U-5811

RF-2

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
WAKE COUNTY

ROADWAY DESIGN UNIT

ROADWAY DESIGN ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

HYDRAULICS ENGINEER

INCOMPLETE PLANS DO NOT USE FOR CONSTRUCTION

PREPARED BY

Kimley»Horn

NC LICENSE #F-0102
421 FAYETTEVILLE STREET, SUITE 600
RALEIGH, NORTH CAROLINA 27601
PHONE: (919) 677-2000

REVISIONS

NAD 83/2001

-L- SR 1002
(MORRISVILLE CARPENTER RD)

SR 1637 (CHURCH STREET) -Y1-

Y2 (PAGE STREET)

(4) RB: SEE TABLE BELOW

(9) VO: SEE TABLE BELOW

REMOVE

RETAIN EXISTING CANOPY

16' CONC MONO

BEGIN TIP PROJECT U-5811
BEGIN CONSTRUCTION
-L- Sta. 9+20.00

TREE & SHRUB SCHEDULE

SYMBOL	CODE	BOTANICAL NAME	COMMON NAME	SIZE	HEIGHT	QTY
	RB	Acer Rubrum 'October Glory'	Red Maple	B&B	12FT	4
	VO	Viburnum odoratissimum 'Coppertop'	Coppertop Sweet Viburnum	7GAL	3FT	9

11/14/23

1 @ 132" WSP
CHANNEL IMPROVEMENTS W/
CL-I RIPRAP ON BANKS
(STRUCTURES PAY ITEM)
EST. 95 TONS CL-I
EST. 155 SY GFD
SEE SHEET 2D-6/DETAIL 3

FLOODBENCHING W/
CL-I RIPRAP ON BANKS AND
EMBEDDED 1.5 FT INTO CHANNEL
(STRUCTURES PAY ITEM)
EST. 170 TONS CL-I
EST. 310 SY GFD
SEE SHEET 2D-6/DETAIL 3

NAD 83/2001

55 ROSE NC II LLC
DB 14264 PG 1897
BM 1984 PG 1296

56 CEDAR FORK BUSINESS PARK LLC
DB 18103 PG 2264
BM 1999 PG 1305

58 NEXPOINT AVIATION DST
DB 19104 PG 2130
BM 2019 PG 703

50 TOWN OF MORRISVILLE
DB 2979 PG 101

57 WAKE COUNTY
DB 3006 PG 246

59 RK POINTE AT LAKE CRABTREE DST
DB 17483 PG 2582
BM 2016 PG 1026

PATEL, RAKESHKUMAR
DB 17160 PG 1221
BM 2017 PG 1245

SAVALIYA, VIPUL
DB 17629 PG 2497
BM 2017 PG 1244

FARM-KAISER
DB 17408 PG 20
BM 2017 PG 1244

U-5811
RF-3

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
WAKE COUNTY

ROADWAY DESIGN UNIT

ROADWAY DESIGN ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

HYDRAULICS ENGINEER

INCOMPLETE PLANS DO NOT USE FOR CONSTRUCTION

PREPARED BY

Kimley»Horn

NC LICENSE #F-0102
421 FAYETTEVILLE STREET, SUITE 600
RALEIGH, NORTH CAROLINA 27601
PHONE: (919) 677-2000

REVISIONS

$$$-USER_NAME-$$$ $$$-DATE-$$$

11/14/23

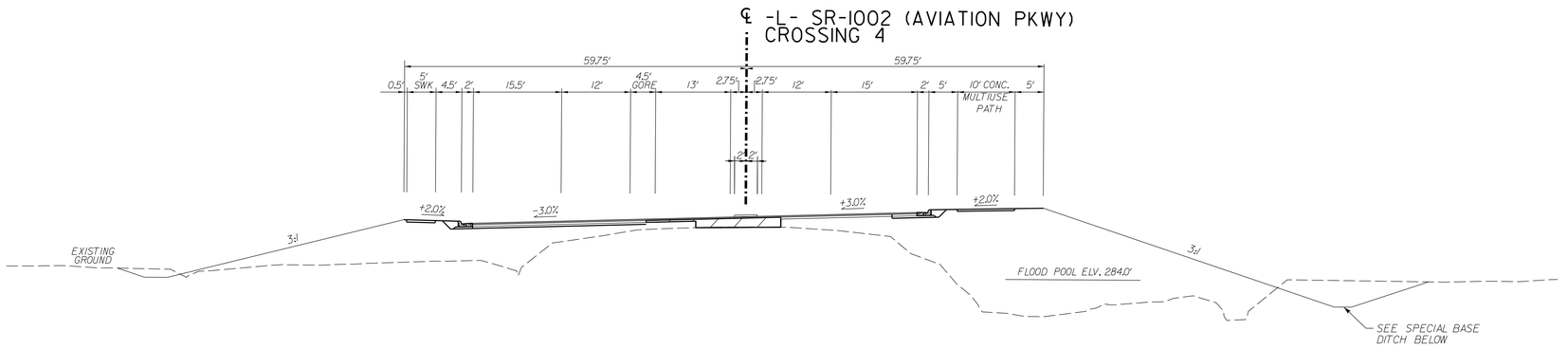
CROSSING 4 IMPACTS AND MITIGATION

	FILL IMPACTS FROM ROADWAY WIDENING		
MITIGATION ZONE	WITHIN EXISTING ROW	OUTSIDE EXISTING ROW	TOTAL
FLOOD POOL	140 C.Y.	370 C.Y.	510 C.Y.

EXCAVATION FROM SPECIAL DITCH	EXCAVATION FROM 132" WSP	TOTAL EXCAVATION
340 C.Y.	240 C.Y.	580 C.Y.

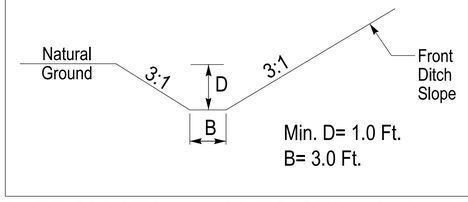
NOTES:
1. ALL INFORMATION ON THIS SHEET IS IN VERTICAL DATUM = NAVD88 / HORIZONTAL DATUM = NAD83 (2011)
2. MITIGATION ZONES ARE HORIZONTALLY BOUND BY THE 1975 WAKE COUNTY CRABTREE CREEK WATERSHED EASEMENT LIMITS (PROJECT BIM 1975 VOL.PG 80)
3. THE 1975 WAKE COUNTY CRABTREE CREEK WATERSHED EASEMENTS WERE DEFINED IN THE NAVD 29 DATUM. IN ORDER TO CALCULATE IMPACTS USING NAVD 88 DATUM, THESE ELEVATIONS WERE ADJUSTED 0.9 FEET LOWER AS SHOWN IN THE ABOVE TABLE.
4. EXCAVATION VOLUMES WERE CALCULATED USING NCDOT SURVEYS THAT INCLUDED UNDERWATER ELEVATIONS. LIDAR WAS USED FOR AREAS OUTSIDE OF THESE SURVEY LIMITS.

TYPICAL SECTION



TYPICAL SECTION A–A

SPECIAL BASE DITCH
(Not to Scale)



-L- FROM STA. 57+88 TO STA. 59+87 RT

U-5811
RF-4

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
WAKE COUNTY

ROADWAY DESIGN UNIT

ROADWAY DESIGN ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR CONSTRUCTION

PREPARED BY

Kimley»Horn

NC LICENSE #F-0102
421 FAYETTEVILLE STREET, SUITE 600
RALEIGH, NORTH CAROLINA 27601
PHONE: (919) 677-2000

REVISIONS

11/14/23

LEGEND

- LOWER BANK PLANTING (NATIVE SEED (EAST))
- UPPER BANK PLANTING (NATIVE SEE (EAST) & TYPE 1 REFORESTATION)
- UPLAND PLANTING (NATIVE SEED (EAST) & TYPE 2 REFORESTATION)

114+03.30
605.77' LT
EL.=MATCH EXIST

32' (4:1 MAX SLOPE)

114+35.30
573.76' LT
EL.=276.0'

116+63.52
602.83' LT
EL.=MATCH EXIST

116+35.44
571.94' LT
EL.=276.0'

MATCH EXISTING ELEVATION

MATCH EXISTING ELEVATION 280.0'

118+47.85
263.87' LT
EL.=276.0'

118+93.55
254.49' LT
EL.=MATCH EXIST

END TIP PROJECT U-5811
END CONSTRUCTION
-L- Sta. 126+11.00

CRABTREE CREEK WATERSHED PROJECT
BM 1975 VOL. 1PG 80
284.9 CONTOUR

LARZ CARY LLC
DB 10135 PG 1554
BM 1985 PG 1989
BM 1987 PG 863

D

C

B

112+69.03
155.01' LT
EL.=MATCH EXIST

114+03.26
155.00' LT
EL.=MATCH EXIST

BM9
N=762018
E=2058089
ELEV=280.39'
BM9 TO I5506-2
S08°33'20.6'E DIST. 189.36'
BM TIE NAIL IN 15" OAK

114+35.26
97.51' LT
EL.=276.0'

116+47.53
94.32' LT
EL.=276.0'

32' (4:1 MAX SLOPE)

MATCH EXISTING ELEVATION 280.0'

112+69.03
66.81' LT
EL.=MATCH EXIST

113+09.97
65.05' LT
EL.=277.0'
TIE TO PROP HEADWALL

113+52.43
65.51' LT
EL.=274.0'
TIE TO PROP HEADWALL

MATCH EXISTING ELEVATION

114+91.03
65.47' LT
MATCH EX. EL.=280.0'

116+61.96
62.46' LT
EL.=MATCH EXIST

113+65.14
60.07' RT
MATCH EX. EL.=282.0'

112+99.21
85.40' RT
MATCH EX. EL.=277.0'
TIE TO PROP HEADWALL

114+25.50
60.78' RT
MATCH EX. EL.=281.79'

114+23.50
92.37' RT
EL.=MATCH EXIST

113+61.69
85.41' RT
MATCH EX. EL.=277.0'
TIE TO PROP HEADWALL

112+99.21
147.98' RT
EL.=MATCH EXIST

113+93.54
147.98' RT
EL.=MATCH EXIST

209'X14' RCBC

REVISIONS

U-5811

RF-5

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
WAKE COUNTY

ROADWAY DESIGN UNIT

ROADWAY DESIGN ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR CONSTRUCTION

PREPARED BY

Kimley»Horn

NC LICENSE #1,232
421 FAYETTEVILLE STREET, SUITE 600
RALEIGH, NORTH CAROLINA 27601
PHONE: (919) 677-2000

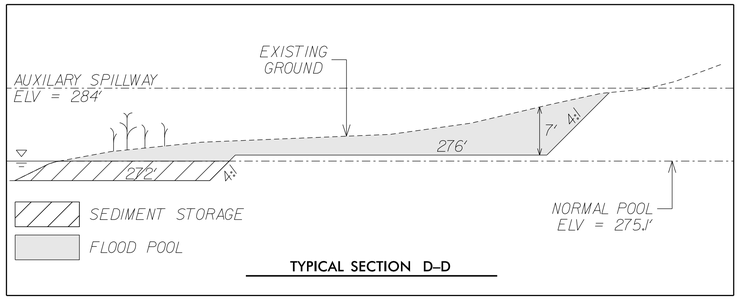
11/14/23

CAUSEWAY WIDENING IMPACTS AND MITIGATION

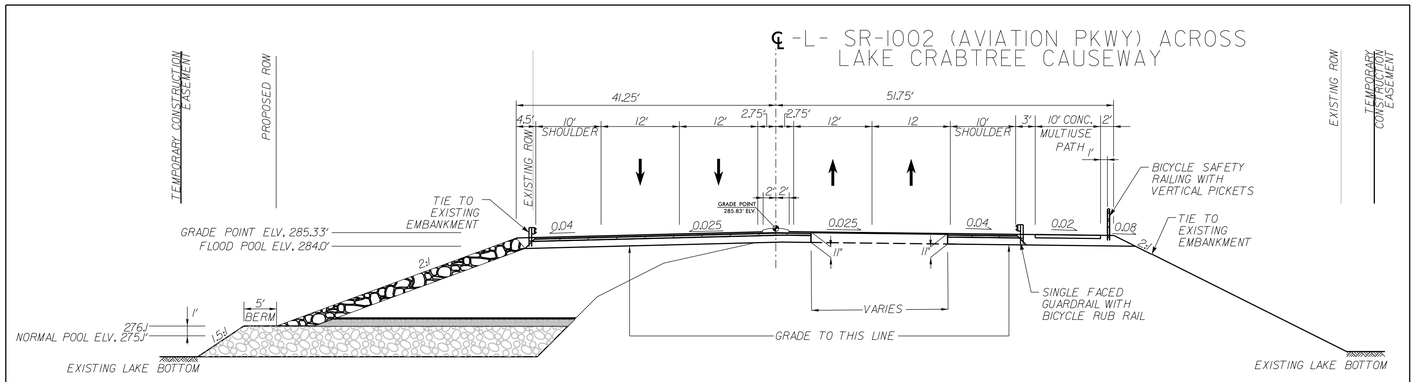
		IMPACTS FROM CAUSEWAY WIDENING			MITIGATION VOLUME (C.Y.)
MITIGATION ZONE	TOP OF ZONE ELEVATION (NAVD 88)	WITHIN EXISTING ROW	OUTSIDE EXISTING ROW	TOTAL	DESIGN EXCAVATION (% OVER REQ.)
FLOOD POOL	284.0'	8,800 C.Y.	13,100 C.Y.	22,000 C.Y.	23,300 (6%)
SEDIMENT STORAGE	275.1'	-100 C.Y.	900 C.Y.	1,000 C.Y.	2,000 (100%)

NOTES:
1. ALL INFORMATION ON THIS SHEET IS IN VERTICAL DATUM = NAVD88 / HORIZONTAL DATUM = NAD83 (2011)
2. MITIGATION ZONES ARE HORIZONTALLY BOUND BY THE 1975 WAKE COUNTY CRABTREE CREEK WATERSHED EASEMENT LIMITS (PROJECT BIM 1975 VOL.PG 80)
3. THE 1975 WAKE COUNTY CRABTREE CREEK WATERSHED EASEMENTS WERE DEFINED IN THE NAVD 29 DATUM. IN ORDER TO CALCULATE IMPACTS USING NAVD 88 DATUM, THESE ELEVATIONS WERE ADJUSTED 0.9 FEET LOWER AS SHOWN IN THE ABOVE TABLE.
4. EXCAVATION VOLUMES WERE CALCULATED USING NCDOT SURVEYS THAT INCLUDED UNDERWATER ELEVATIONS. LIDAR WAS USED FOR AREAS OUTSIDE OF THESE SURVEY LIMITS.

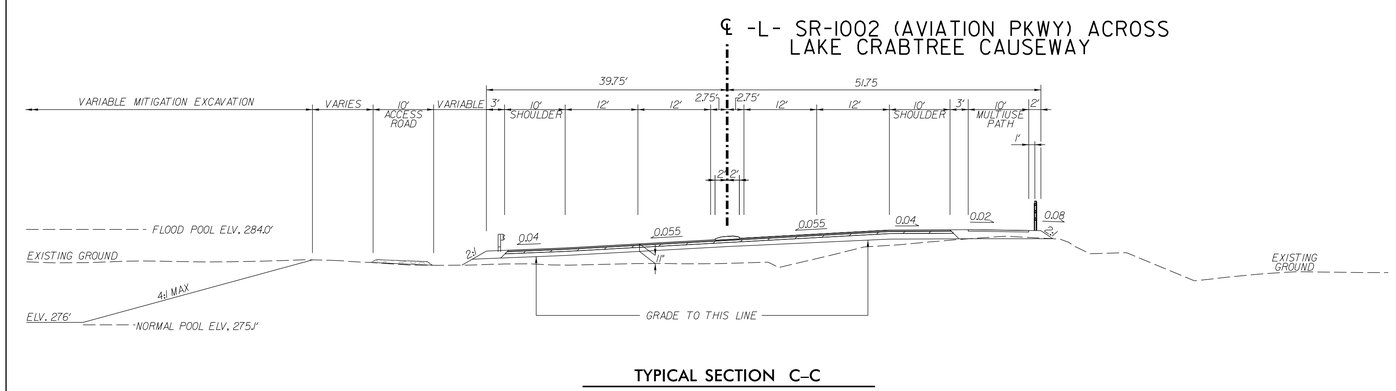
TYPICAL SECTIONS



TYPICAL SECTION D–D



TYPICAL SECTION B–B



TYPICAL SECTION C–C

U-5811
RF-6

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
WAKE COUNTY

ROADWAY DESIGN UNIT

ROADWAY DESIGN ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR CONSTRUCTION

PREPARED BY

Kimley»Horn

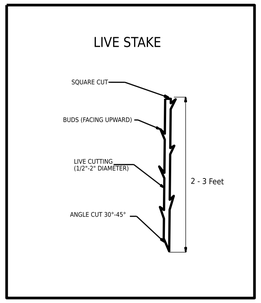
NC LICENSE #F-0102
421 FAYETTEVILLE STREET, SUITE 600
RALEIGH, NORTH CAROLINA 27601
PHONE: (919) 677-2000

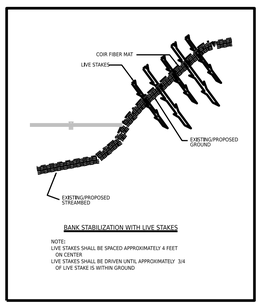
REVISIONS

11/14/23

PLANTING DETAILS

LIVE STAKES PLANTING DETAIL



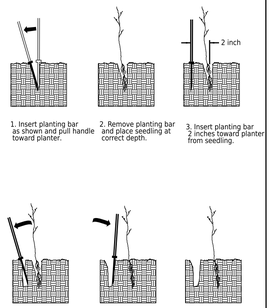


BANK STABILIZATION WITH LIVE STAKES

NOTE:
LIVE STAKES SHALL BE SPACED APPROXIMATELY 4 FEET ON CENTER
LIVE STAKES SHALL BE DRIVEN UNTIL APPROXIMATELY 3/4 OF LIVE STAKE IS WITHIN GROUND

BAREROOT PLANTING DETAIL

DIBBLE PLANTING METHOD
USING THE KBC PLANTING BAR



1. Insert planting bar as shown and pull handle toward planter.
2. Remove planting bar and place seedling at correct depth.
3. Insert planting bar 2 inches toward planter from seedling.
4. Pull handle of bar toward planter, firming soil at bottom.
5. Push handle forward firming soil at top.
6. Leave compaction hole open. Water thoroughly.

PLANTING NOTES:

PLANTING BAG
During planting, seedlings shall be kept in a moist canvas bag or similar container to prevent the root systems from drying.



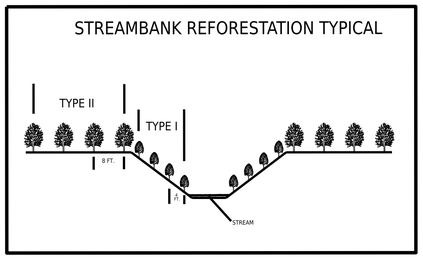
KBC PLANTING BAR
Planting bar shall have a blade with a triangular cross section, and shall be 12 inches long, 4 inches wide and 1 inch thick at center.



ROOT PRUNING
All seedlings shall be root pruned, if necessary, so that no roots extend more than 10 inches below the root collar.

- ☐ TYPE 1 STREAMBANK REFORESTATION SHALL BE PLANTED 3 FT. TO 5 FT. ON CENTER, RANDOM SPACING, AVERAGING 4 FT. ON CENTER, APPROXIMATELY 2724 PLANTS PER ACRE.
- ☐ TYPE 2 STREAMBANK REFORESTATION SHALL BE PLANTED 6 FT. TO 10 FT. ON CENTER, RANDOM SPACING, AVERAGING 8 FT. ON CENTER, APPROXIMATELY 680 PLANTS PER ACRE.
- ☐ NOTE: TYPE 1 AND TYPE 2 STREAMBANK REFORESTATION SHALL BE PAID FOR AS "STREAMBANK REFORESTATION"

STREAMBANK REFORESTATION TYPICAL

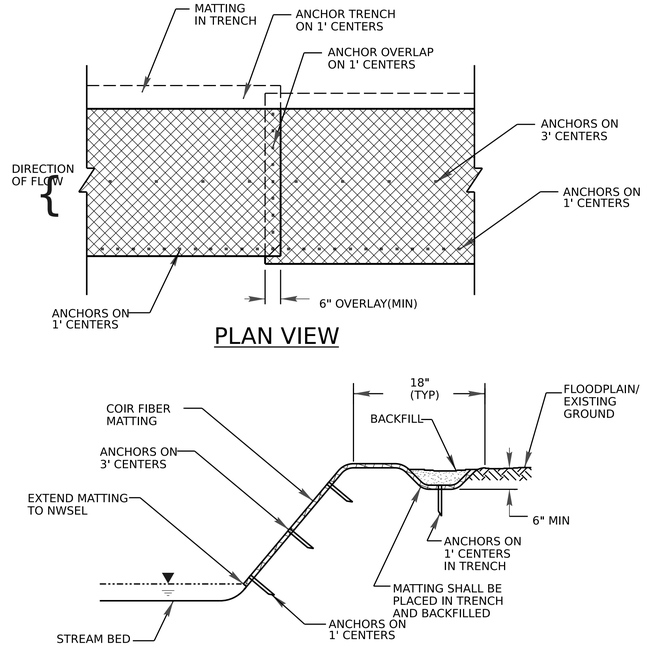


STREAMBANK REFORESTATION
MIXTURE, TYPE, SIZE, AND FURNISH SHALL CONFORM TO THE FOLLOWING:

TYPE 1		
50% SALIX NIGRA	BLACK WILLOW	2 ft - 3 ft LIVE STAKES
50% CORNUS AMOMUM	SILKY DOGWOOD	2 ft - 3 ft LIVE STAKES
TYPE 2		
25% LIRIODENDRON TULIPIFERA	TULIP POPLAR	12 in - 18 in BR
25% PLATANUS OCCIDENTALIS	SYCAMORE	12 in - 18 in BR
25% PRUNUS SEROTINA	BLACK CHERRY	12 in - 18 in BR
25% BETULA NIGRA	RIVER BIRCH	12 in - 18 in BR

☐ SEE PLAN SHEETS FOR AREAS TO BE PLANTED

STREAMBANK REFORESTATION DETAIL SHEET 1 OF 2
N.C.D.O.T. - ROADSIDE ENVIRONMENTAL UNIT

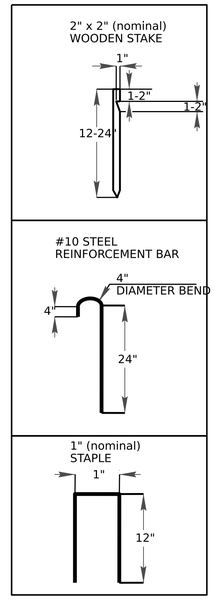


PLAN VIEW

TYPICAL CROSS SECTION

COIR FIBER MATTING DETAIL

NOT TO SCALE



ANCHOR OPTIONS

STREAMBANK REFORESTATION DETAIL SHEET 2 OF 2
N.C.D.O.T. - ROADSIDE ENVIRONMENTAL UNIT

U-5811
RF-7

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
WAKE COUNTY



ROADWAY DESIGN UNIT

ROADWAY DESIGN ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR CONSTRUCTION

PREPARED BY

Kimley»Horn

NC LICENSE #P-1312
421 FAYETTEVILLE STREET, SUITE 600
RALEIGH, NORTH CAROLINA 27601
PHONE: (919) 677-2000

REVISIONS