



**Ohio Department of Transportation**

**District 11**

**HAS-250-00.81**

**PID 99427**

**Alternative Study**

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Kevin Kehres, PE  
Project Manager

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Erin Curtis, PE  
Transportation Project Engineer

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Robert Beasley, PE  
Structural Project Engineer

## Alternative Study

HAS- 250-00.81

Prepared for:

Ohio Department of Transportation  
District 11

Prepared by:

ARCADIS U.S., Inc.  
222 South Main Street  
Suite 300  
Akron  
Ohio 44308  
Tel 330 434 1995  
Fax 330 374 1095

Our Ref.:

TOHODT04.PE09

Date:

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## 1. Executive Summary

This project proposes to replace the Columbus and Ohio River Railroad (CUOH) bridge over US 250 with a bridge that meets current design standards for minimum horizontal and vertical clearances. The project goals and objectives are:

- Obtain required vertical and horizontal clearance at the US 250/CUOH separated grade intersection
- Maintain US 250 and CUOH traffic during construction

The intent of this alternative study is to evaluate three alternatives for replacing the bridge to determine a budgetary project cost. A structure type study was not completed for this study. Instead, a through-girder superstructure was utilized to develop an estimated cost for the new bridge.

The three alternatives below were evaluated by comparing key criteria. For each alternative, the existing alignments of US 250 and SR 151 will be maintained, while the alignment of the CUOH will be relocated north to accommodate offline construction of the new bridge. The alternatives focus on the profiles of US 250 and the CUOH.

- Alternate 1 – This alternative lowers the profile of US 250 while maintaining the existing profile of the CUOH
- Alternate 2 – This alternative raises the profile of the CUOH while maintaining the existing profile of US 250
- Alternate 3 – This alternative will provide a hybrid of Alternates 1 and 2, which lowers the profile of US 250 and raises the profile of the CUOH

We determined that all three alternatives meet the study goals and objectives for the project. None of the alternatives were deemed unfeasible based on the key criteria: Project costs, Right of Way Impacts, Constructability/MOT and Engineering Concerns. As a result, we recommend advancing all three alternatives for further analysis in an alternative evaluation report (AER). However, the proposed track alignment should be approved by CUOH prior to further project advancement. The Opinion of Probable Project Costs ranges from \$8,300,000 to \$10,200,000. Variables for MOT scheme, new track location and track outage duration make up the range variance.

## 2. Project Description

The project consists of replacing the existing Columbus and Ohio River Railroad (CUOH) bridge over US 250 (HAS-250-0081) and improvement of the US 250/ SR 151 intersection by providing turn lanes along US 250. The project is located in Harrison County, Ohio, approximately 6 miles east of the City of Uhrichsville. The area is rural and hilly in the vicinity of the project.

SR 151 tees into US 250 approximately 250 feet north of the railroad bridge crossing and continues northeasterly. Dempster Road (TR 403) also tees into US 250 approximately 450 feet south of the railroad bridge crossing and continues easterly.

This existing structure carries the CUOH over US 250. It is a ballasted deck, concrete encased rolled steel beam superstructure supported on concrete wall-type abutments with concrete piles. The bridge has a span length of 45 feet with a minimum vertical clearance of 14.2 feet and minimum lateral clearance of approximately 8 feet from edge of traveled way to abutment wall without barrier. Both clearance values are substandard based on current ODOT design standards. The bridge currently supports one track, but was designed to support two tracks. The bridge is located within a 2 degree horizontal curve along US 250.



US 250 is classified as a rural principal arterial with a design speed of 60-mph and a legal speed of 55-mph. Table 1 shows the design traffic data. The existing roadway consists of one 12-foot lane in each direction with a short southbound left turn lane onto SR 151 and 1-foot paved shoulders on each side. SR 151 is classified as a rural major collector with a design speed of 60-mph and a legal speed of 55-mph. The existing roadway consists of one 10-foot lane in each direction and 1-foot paved shoulders on each side. The horizontal and vertical alignments meet current design standards for both US 250 and SR 151 within the project area. However, the lane and shoulder widths (paved and graded) for SR 151 and the shoulder widths (paved and graded) for US 250 are substandard based on current ODOT design standards. The existing US 250/SR 151 intersection configuration meets current criteria for

intersection sight distance. However, an existing sign hampers the intersection sight line.

The CUOH is a short line freight railroad owned by Genesee & Wyoming, Inc. This line interchanges with CSXT, Norfolk Southern, Ohio Central Railroad, and Ohio Southern Railroad and extends primarily from Columbus to Steubenville. The project area is in-between CUOH milepost (MP) 86 and MP 87 within the Pan Handle Subdivision and carries approximately one freight train per day based on surrounding US DOT crossing inventory information. This line is classified as a Class III railroad with a design speed of 40 mph and an authorized track time table speed of 25 mph. The existing road bed consists of one track with an expanded ballast section to the north for future track. The existing horizontal alignment over the steel bridge consists of a super elevated two degree curve. The CUOH abides by CSXT Standards for track and structure design and construction. Existing track charts and valuation maps have been included in Appendix A.

The intent of this alternative study is to evaluate three alternatives for replacing the bridge to determine a budgetary project cost. Project costs and impacts to the adjacent properties and buildings, environmental resources, railroad and utilities will be evaluated.

The project goals and objectives are:

- Obtain required vertical and horizontal clearance at the US 250/CUOH separated grade intersection
- Maintain US250 and CUOH traffic during construction

## 2.1 Study Area

The study area map is shown in Figure 1. The study area is within a rural area, generally hilly east of US 250 and flat west of US 250. There is one residence located west of US 250 within the project limits. The rest of the property west of US 250 has been purchased by Blue Racer Midstream with plans to develop the area for oil and gas production. Plans are currently being developed for a cryogenic plant southwest of the bridge. Properties east of US 250 consist of a mix of residential and commercial property. A park and ride exists off of SR 151, just east of the intersection with US 250.



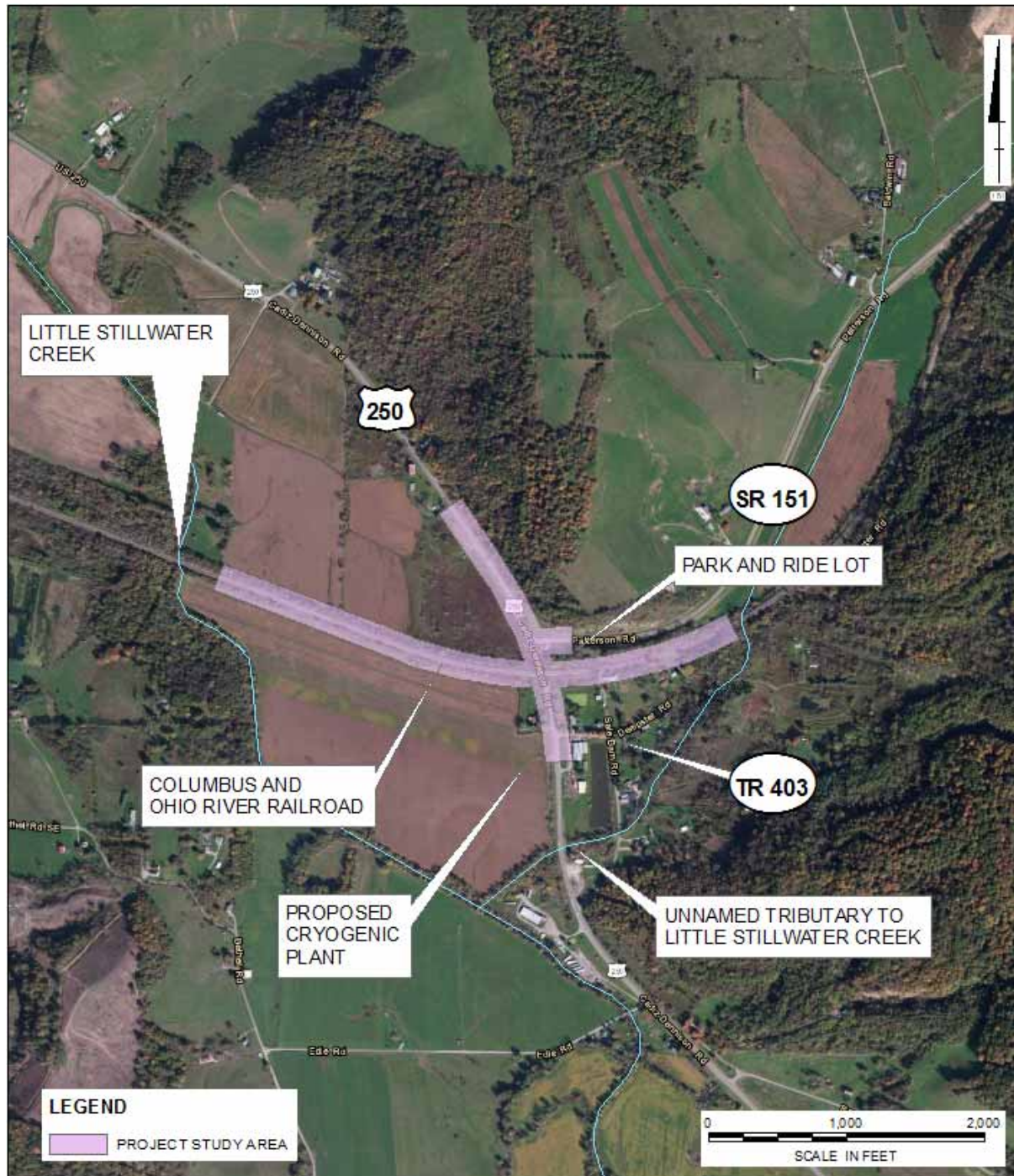


Figure 1 Study Area Map



**2.2 Traffic Data**

**Table 1 Design Traffic Data**

US 250 Design Designation	
Opening Year ADT (2017)	5,500
Design Year ADT (2037)	6,500
DHV	580
Directional Distribution	53%
Functional Classification	Rural Principal Arterial
Trucks (T24)	18%
Design Speed	60 mph
Legal Speed	55 mph

**2.3 Roadway Design**

The proposed roadway typical sections were developed based on current ODOT design criteria. The typical section for US 250 provides one 12-foot lane and an 8-foot paved shoulder in each direction with common grading. The proposed US 250/SR 151 intersection improvements provided by ODOT include the addition of a US 250 westbound right turn lane and lengthening of the US 250 eastbound left turn lane. Turn lanes are 12 feet in width. The graded shoulders on each side are 12 feet wide for foreslopes of greater than 6:1 and 13 feet for foreslopes that require a barrier. The existing horizontal alignment has a 2 degree curve in the vicinity of the bridge, requiring a superelevation rate of 0.051. Ditches are required in many areas due to the lowering of the profile and existing low lying topography. Intersection sight distance is sufficient for the proposed US 250/SR 151 intersection. However, proposed signs should be placed out of the intersection sight line. The minimum clearances required for the proposed bridge are 16.5 feet vertical and 8 feet lateral (edge of traveled way to face of concrete barrier).

The typical section for SR 151 provides for one 12-foot lane and a 4-foot paved shoulder in each direction with common grading. The graded shoulders on each side of SR 151 are 10 feet wide for foreslopes of greater than 6:1 and 8 feet wide for foreslopes of 6:1 or flatter.

See Appendix B sheets for proposed plans.

**2.4 Railway Design**

Based on our discussions with CUOH, CSXT Standards are to be utilized for track and structure design and construction. The proposed railroad typical section is based on CSXT standard roadbed section drawings. The typical section provides room for a

double mainline roadbed section width of 45 feet that consists of 15-foot track centers and 15-foot wide ballasted shoulders (measured from the centerline of the tracks). The subgrade is crowned and sloped 50:1 from the grade point centerline between track 1 and future track 2. Trapezoidal ditches are required in typical cut sections on both sides with a minimum depth of 2 feet. Typical fill sections are sloped 2:1. Proposed horizontal curves, vertical curves and spirals meet CSXT design standards for a 40-mph design speed for mainline tracks. However, since the section of track has an authorized speed of 25-mph, super elevation of the curves are based on the lower speed. Railroad traffic is not to be interrupted by the new construction. See Appendix B for proposed plans.

## 2.5 Bridge Design

Based on our discussions with CUOH, CSXT design criteria is to be utilized for bridge design. The proposed bridge transverse section, as outlined in CSXT's Public Project Information manual, accommodates two sets of tracks. A full structure type study is not included in this report. However a common railroad structure was selected to determine project costs, constructability and work limits. Construction of the new bridge shall minimize impacts to railroad traffic and operations. A vertical clearance of 16.5 feet over US 250 and a horizontal opening of approximately 72 feet with a minimum 8 feet lateral clearance from edge of traveled way to barrier are to be provided.

According to CSXT Public Project Information, the following bridge types are typically considered: 1) Multiple deck girders with steel deck plates; 2) Multiple deck girders with concrete deck slabs; and 3) Through plate girders with steel deck plates. To minimize the amount of track raising or roadway lowering, a through plate girder with steel deck plates is the best choice to determine project costs.

Wall-type abutments are used to minimize the span length and keep the superstructure depth to a minimum. Since a geotechnical investigation is not part of the scope of work, steel H-piles are assumed because they can be utilized as either end-bearing or friction type piles.

The steel members were preliminarily designed according to AREMA specifications. For the through girder, a 90-inch web was utilized. The floor beams are W36x210 rolled steel beams and are spaced at 3 feet. The rails, ties and ballast are supported on a steel plate spanning across the floor beams. Three rows of piles support each abutment with the front two rows battered. The wingwalls are placed parallel to US 250. A more efficient configuration of the wingwalls can be investigated during future studies.

Refer to Appendix B for Transverse Sections and Abutment Section.

The lowering of US 250 does not have a significant impact on the constructability of the bridge. However, the horizontal alignment of the railroad does considerably impact how the bridge is constructed. If the existing horizontal alignment of the railroad is required to be maintained, CSXT requirements provide two alternatives: construct detour tracks and build the new bridge in place or construct the superstructure adjacent to its final location and roll into place. Both of these options will increase the overall cost of the project. The increased cost is due to building a temporary structure and increased difficulty in maintaining railroad operations during construction.

### **3. Alternatives**

Three alternatives to replace the existing railroad bridge were investigated. The proposed alternatives were developed with LIDAR data, supplemented with field survey in the vicinity of the bridge. Each alternative includes the same improvement for the US 250/ SR 151 intersection. Per our scope, roadway plans were developed for Alternates 1 and 3 and railroad plans were developed for Alternates 2 and 3. (See Appendix B).

For all three alternatives, the track alignment is relocated north of the existing bridge, approximately 33 feet from the existing track 1 centerline alignment. This alignment permits construction of the proposed bridge offline and in its final location which minimizes impacts to train traffic. It also provides a 350-foot tangent section through the proposed structure that simplifies bridge construction.

#### **3.1 Alternate1 – Lower US 250**

Alternate 1 will lower US 250 while maintaining the existing profile of the CUOH.

##### **3.1.1 Roadway Design**

The vertical profile will be lowered approximately 4 feet in the vicinity of the bridge with reverse vertical curves meeting a 60-mph design speed. Approximately 556 feet of widening and resurfacing and 1,400 feet of full depth reconstruction is proposed for US 250. The magnitude of the US 250 profile lowering will not permit the area in the vicinity of the bridge to be drained by roadside ditches. Stormwater in the new sump will be collected by catch basins in the vicinity of the bridge and conveyed via storm sewer west along the CUOH tracks approximately 2,700 feet to outlet at Little Stillwater Creek. Providing positive drainage from the vicinity of the bridge is the

greatest concern for this alternative and may prove to be infeasible based on railroad concurrence and stream conditions. The actual stream elevation at the outlet proposed point was not surveyed for this study. Elevations were approximated from existing LIDAR data. The sump creates an additional concern for this alternative as the proposed profile is lower than the surrounding topography and may be prone to flooding.

SR 151 will require approximately 200 feet of full depth reconstruction to meet the lowered US 250 profile.

The proposed intersection sight distances for the US 250/SR 151 intersection meets current design criteria.

### 3.1.2 Railroad Design

Approximately 2,089 feet of CUOH track will be reconstructed. An extended roadbed will be designed north of the new and realigned track to accommodate a future second track.

### 3.1.3 Bridge Design

A structure type study was not completed for this study. Instead a through-girder superstructure was utilized to develop an estimated bridge cost.

The proposed structure will be located on a new horizontal alignment, north of the existing bridge. The alignment is relocated far enough to the north to allow for the construction of the new bridge superstructure and supporting substructure while the existing bridge maintains rail traffic. Although the existing bridge is wide enough for two tracks, there currently is no track on the north side of the bridge. Therefore, a portion of the northern part of the existing bridge can be removed to allow for construction of the new bridge and keep the alignment shift to a minimum. Temporary shoring, likely consisting of a tie-back wall, is necessary to separate the new construction from the rail traffic.

Most of the new bridge, including the entire abutment breastwall and northern wingwalls with foundation, will be constructed while rail traffic is maintained on the existing bridge. After rail traffic is moved to the new structure, construction of the southern wingwalls can be completed. Temporary shoring will be required to separate the wingwall construction from the rail traffic. Further study may determine that moving the track even further north may eliminate or minimize the need for temporary shoring and allow the entire bridge to be constructed in one phase.

#### 3.1.4 Roadway Maintenance of Traffic

Maintenance of US 250 and SR 151 traffic is complicated by the 4-foot cut in the vicinity of the bridge. Two possible MOT options are briefly described below:

**Signalized Closure** - Two-way traffic on US 250 and SR 151 may be maintained utilizing the signalized closure per ODOT Standard Construction Drawing MT-96.11. The roadway will be constructed part-width about the centerline of construction. During Phase 1, the proposed east side of the pavement will be constructed while traffic is maintained on the west side with the signalized closure. A sub phase will be used to switch traffic on SR 151 to construct both halves of the intersection. During Phase 2, traffic will be switched to the proposed pavement that was constructed in Phase 1 and traffic will be maintained on the east side of the road continuing the use of the signalized closure. One 11-foot lane with a 1-foot offset will be maintained for each Phase. The bridge will be constructed during Phases 1 and 2 with disruptions to vehicular traffic during demolition of the existing bridge, steel erection, delivery of materials, etc.

**Maintain Two Lanes of Traffic** – Two lanes of traffic will be maintained on US 250 and SR 151 for the majority of the construction duration with the use of temporary pavement. The phasing would be similar to that of the signalized closure. However, lane widths would be reduced to 10 feet with 1-foot offsets, and temporary sheeting and/or bracing would be required in the vicinity of the new and existing bridges. Also, the new bridge must be completed and existing bridge demolished during Phase 1.

#### 3.1.5 Railroad Maintenance of Traffic

Interference with railroad traffic will be minimized as the majority of work will be performed outside the foul zone of the existing track, identified as 25 feet from the track centerline. The majority of the embankment and subgrade construction for the relocated railroad track will be completed while the existing track is in service, eliminating possible delays. The new embankment will be benched into the existing, maintaining the integrity of the existing embankment. Both ends will be connected to the existing track and restored to service during a scheduled 72 hour weekend outage (curfew). Upon completion of the curfew, the existing track not realigned will be removed, and excavation and embankment work completed outside the foul zone of the new track.

Bridge construction will be performed concurrent with the embankment work.



A CUOH furnished flagger will be required on site during all phases of this construction, as equipment could have the potential to foul the existing track.

### **3.2 Alternate 2 – Raise CUOH Tracks**

Alternate 2 will raise the CUOH while maintaining the existing profile along US 250.

#### **3.2.1 Roadway Design**

The roadway horizontal layout of Alternate 2 is similar to Alternate 1. Approximately 1,918 feet of widening and resurfacing of US 250 and 150 feet of widening and resurfacing of SR 151 is proposed. No areas of full depth reconstruction are proposed as a pavement analysis has not yet been completed. Stormwater drainage will be achieved with roadside ditches, similar to the existing drainage pattern.

#### **3.2.2 Railroad Design**

Profile grades within a subdivision should not exceed the ruling (maximum) grade of the track within that subdivision. As the existing grade leading to the bridge is commensurate with the maximum grade for the subdivision, the profile slope cannot be increased to accommodate the increase elevation at the bridge. Tie-ins to the existing track must be made by extending the ruling grade to flatter track grade sections. The vertical profile of the CUOH track will be raised approximately 4 feet requiring the reconstruction of approximately 3,600 feet of track. The new track will be designed on the north side of a newly constructed roadbed, which will be extended to allow for future construction of a second track.

#### **3.2.3 Bridge Design**

Elements of the Alternate 2 bridge design are similar to Alternate 1. Refer to Section 3.1.3 for a discussion of the CUOH Railroad Bridge over US 250.

#### **3.2.4 Roadway Maintenance of Traffic**

Maintenance of US 250 and SR 151 traffic is easiest for this alternative because the existing pavement is anticipated to be salvaged. Two lanes of traffic will be maintained on US 250 and SR 151 for the majority of the construction duration similar to Alternate 1 (see Section 3.1.4). Lane widths would be 11 feet with 1.5-foot offsets.

### 3.2.5 Railroad Maintenance of Traffic

Elements of the Alternate 2 Railroad Maintenance of Traffic are similar to Alternate 1 (see Section 3.1.5).

## 3.3 Alternate 3 – Combination: Lower US 250/ Raise CUOH Tracks

Alternate 3 will lower US 250 and raise the CUOH tracks.

### 3.3.1 Roadway Design

The US 250 profile will be lowered approximately 1.5 feet, the maximum extent practicable while allowing for positive drainage south to the unnamed tributary of Little Stillwater Creek. Stormwater in the vicinity of the bridge will be collected by catch basins and conveyed via storm sewer south approximately 1,300 feet to outlet along US 250 to the unnamed tributary to Little Stillwater Creek. Approximately 868 feet of widening and resurfacing and 1,050 feet of full depth reconstruction is proposed for US 250.

SR 151 will require approximately 150 feet of full depth reconstruction to meet the lowered US 250 profile.

### 3.3.2 Railroad Design

Elements of Alternate 3 railroad design are similar to Alternate 2 (See Section 3.2.2), except that the vertical profile of the CUOH track will be raised approximately 2.6 feet requiring the reconstruction of approximately 3,100 feet of track.

### 3.3.3 Bridge Design

Elements of the Alternate 3 bridge design are similar to Alternate 1. Refer to Section 3.1.3 for a discussion of the CUOH Railroad Bridge over US 250.

### 3.3.4 Roadway Maintenance of Traffic

Maintenance of US 250 and SR 151 traffic for this alternative will be similar to Alternate 1 because of the 1.5-foot cut in the vicinity of the bridge. Traffic may be maintained with a signalized closure or two lanes of traffic may be maintained with temporary pavement (see Section 3.1.4).

### 3.3.5 Railroad Maintenance of Traffic

Elements of the Alternate 3 Railroad Maintenance of Traffic are similar to Alternate 1 (see Section 3.1.5).

## 4. Alternative Analysis

The purpose of the Alternative Analysis is to compare the alternatives using key criteria important to the project. The alternative(s) with the lowest total impacts that meet(s) the study goals and objectives may be considered for future design development.

### 4.1 Alternative Analysis Criteria

The key criteria used in the comparison were:

- Opinion of Probable Project Costs
- Right of Way Impacts
- Constructability/ MOT
- Engineering Concerns

Utility and environmental impacts were investigated and are discussed below, but are deemed to be similar for each alternative and not included in the comparison.

Discussion of the key criteria used in the comparison is provided below:

#### 4.1.1 Study Goals and Objectives

Alternatives were evaluated based on compliance with the study goals and objectives set for the project. This project proposes to replace the bridge and obtain required vertical and horizontal clearance at the US 250 / CUOH intersection. Additional project goals include maintaining US 250 and CUOH traffic during construction. For an alternative to be considered feasible the study goals and objectives must be met. Based on the conceptual design, each alternative meets study goals and objectives.

#### 4.1.2 Opinion of Probable Project Costs

Alternatives were evaluated based on estimated construction year costs for major items required to construct the project. An inflation factor using ODOT's FY 15-19

Business Plan Inflation Calculator is applied to the current day (2015) costs to project them out to the construction year (2017).

The proposed bridge cost is estimated to be \$3,168,000 for all three alternatives, which includes a 20% contingency. The cost is based on the new track alignment. If the railroad would require the bridge to be built on the existing track alignment, the cost would increase. The additional cost for a temporary bridge supporting a detour track or for a bridge constructed adjacent to the final location and slid into place is estimated to be approximately \$1,000,000.

Maintenance of Traffic costs for roadway and railway are based on the implementation of a signalized closure for the roadway and a 72-hour track curfew for the railway. Additional costs for maintaining two lanes of traffic for roadway and a 6-hour track outage for railway vary by alternative and are included in Appendix C

The cost estimate for each alternative has been provided in Appendix C.

#### 4.1.3 Right of Way Impacts

Alternatives were evaluated based on the expected impacts to existing properties. The impact is based on the acres of right-of-way needed for the roadway and railway, and the effects the impacts will have on the current properties.

#### 4.1.4 Constructability/MOT

Alternatives were evaluated based on the expected duration of construction, ease of construction and the ability to maintain traffic at all times for both roadway and rail facilities.

#### 4.1.5 Engineering Concerns

Alternatives were evaluated based on horizontal and vertical geometrics, drainage concerns and public perception. These items do not affect public safety directly but may provide features that are not optimal for a new design.

All three alternatives meet current ODOT design standards for roadway alignment, profile, cross section and bridge clearance. Alternatives 1 and 3 meet current ODOT design standards for superelevation. It is assumed that Alternative 2 will meet superelevation standards as well. However, as most of the profile was provided by LIDAR data and pavement cores were not taken at this phase, it is unknown if the existing pavement can be adjusted. For all three alternatives, a grade break meeting

ODOT design standards was designed between the northbound through and right turn lanes of US 250. The addition of this grade break allowed a reduction in the profile change to meet vertical clearance under the bridge.

#### **4.2 Utilities**

A cryogenic plant is proposed southwest of the bridge which will include construction of gas lines parallel to the road, just outside of the right-of-way. Any earth disturbance outside of the right of way in this area risks undermining or exposing the proposed gas lines if they are installed prior to the US 250 project. From preliminary plans, it appears that none of the alternatives will impact these gas lines.

Existing aerial power lines were identified crossing US 250 approximately 300 feet south and 600 feet north of the bridge. It is unknown at this time if there are buried utilities located along the roadway or railway.

#### **4.3 Environmental Assessment**

##### **4.3.1 Ecological and Other Resources**

A formal ecological study has not been completed at this phase. A literature review identified two streams located near the project area. Little Stillwater Creek crosses the CUOH RR approximately 2,800 feet west of the US 250 overpass. An unnamed tributary to Little Stillwater Creek crosses the CUOH RR approximately 1,500 feet east of the US 250 overpass and crosses US 250 approximately 1,300 feet south of the CUOH overpass. No wetlands were identified within the proposed project limits from a desktop review of the US Fish and Wildlife Service National Wetland Inventory. However, the area northwest of the bridge was identified as a potential area of concern as it is a low area in the surrounding terrain and very flat.

Based on a review of the National Flood Insurance Program mapping, the areas surrounding Little Stillwater Creek and the unnamed tributary to Little Stillwater Creek lie within Flood Zone A. None of the alternatives propose roadway or railway work within the limits of the Flood Zone or the ordinary high water mark for of the streams. However, Alternates 1 and 3 require a storm sewer system to drain the area surrounding the bridge and are proposed to outlet to Little Stillwater Creek and the unnamed tributary to Little Stillwater Creek, respectively. The proposed storm sewer work will likely require a USACE Section 404 Nationwide Permit and coordination with the local flood plain administrator.



A review of the available Ohio Environmental Protection Agency (OEPA) Source Water Assessment and Protection (SWAP) mapping by ARCADIS personnel indicated that no drinking water sources are located within the project study area. In addition, Harrison County does not have a sole source aquifer.

Harrison County is within the known range of the Federally-listed endangered Indiana Bat (*Myotis Sodalis*) and proposed as endangered Northern Long-eared Bat (*Myotis septentrionalis*). Identification of potential roost trees was not conducted at this stage.

#### 4.3.2 Environmental Site Assessment

An environmental site assessment has not been completed at this phase.

#### 4.3.3 Noise and Air Quality

A noise analysis has not been completed at this phase.

This project will not result in any meaningful changes in traffic volumes, vehicle mix, location of the existing facility or any other factor that would cause an increase in emissions impacts relative to the no-build alternative. As such, this project will generate minimal air quality impacts for Clean Air Act criteria pollutants and has not been linked with any special MSAT concerns. The project is within Harrison County which is in attainment for PM 2.5, CO and ozone.

#### 4.3.4 Environmental Justice

From review of the USEPA EJ View data, none of the proposed alternatives will have disproportionately high and adverse impacts on minority or low income populations. The block groups surrounding the project contain less than 40 percent minority and low income populations.

#### 4.3.5 Cultural Resources

From a desktop review of available data from the Ohio Historic Preservation Office, no historic properties or districts are located within the area of potential effect of the project.

#### 4.3.6 Section 4(f) and Section 6(f) Resources

The project is within the Muskingum Watershed Conservation District (MWCD), but located outside of land owned by the MWCD. Based on a literature review by ARCADIS, no national parks, state parks, local parks, wildlife areas or schools were found within the project area.

The table below summarizes the comparison of key criteria for each alternative.

**Table 2 Alternative Comparison Table**

Key Criteria	Alternate 1	Alternate 2	Alternate 3
<b>Opinion of Probable Project Cost</b>			
Roadway Cost	\$2,627,000 *	\$1,579,000 *	\$2,129,000 *
Structure Cost	\$3,168,000 *	\$3,168,000 *	\$3,168,000 *
Railroad Cost	\$2,291,000 *	\$3,475,000 *	\$2,768,000 *
Right of Way Cost	\$181,000	\$402,000	\$354,000
Total Cost	\$8,267,000	\$8,624,000	\$8,419,000
<b>Right of Way</b>			
Permanent R/W	0.34 ac.	0.24 ac.	0.34 ac.
Temporary R/W	0.24 ac.	0.18 ac.	0.20 ac.
Railroad R/W	1.04 ac.	3.36 ac.	2.90 ac.
Drainage Easement	1.23 ac.	-	-
<b>Roadway Maintenance of Traffic (US 250)</b>	<ul style="list-style-type: none"> <li>2-way Traffic with Signalized Closure or 2-lane Traffic Maintained with Temporary Pavement (Additional Cost)</li> </ul>	<ul style="list-style-type: none"> <li>2-way Traffic Maintained with Temporary Pavement</li> </ul>	<ul style="list-style-type: none"> <li>2-way Traffic with Signalized Closure or 2-lane Traffic Maintained with Temporary Pavement (Additional Cost)</li> </ul>
<b>Railroad Maintenance of Traffic</b>	<ul style="list-style-type: none"> <li>135 Day Estimated Impact Duration</li> <li>72-Hour Outage Preferred for Tie-Ins</li> </ul>	<ul style="list-style-type: none"> <li>150 Day Estimated Impact Duration</li> <li>72-Hour Outage Preferred for Tie-Ins</li> </ul>	<ul style="list-style-type: none"> <li>150 Day Estimated Impact Duration</li> <li>72-Hour Outage Preferred for Tie-Ins</li> </ul>
<b>Engineering Concerns</b>	<ul style="list-style-type: none"> <li>Possible geotechnical concerns due to 4' lowering of roadway below surrounding topography.</li> <li>Railroad design contingent on CUOH acceptance of new alignment.</li> <li>Storm sewer outlet may not be feasible.</li> <li>Storm Sewer Maintenance</li> <li>Potential for US 250 "sump area" to flood.</li> </ul>	<ul style="list-style-type: none"> <li>Railroad design contingent on CUOH acceptance of new alignment.</li> </ul>	<ul style="list-style-type: none"> <li>Possible geotechnical concerns due to 1.5' lowering of roadway.</li> <li>Railroad design contingent on CUOH acceptance of new alignment.</li> <li>Storm Sewer Maintenance</li> </ul>

\* See Section 4.1.2 for discussion on Project Costs and assumptions.

## 5. Conclusion

We determined that all three alternatives meet the study goals and objectives for the project. None of the alternatives were deemed unfeasible based on the key criteria: Project costs, Right of Way Impacts, Constructability/MOT and Engineering Concerns. As a result, it is recommended that all three alternatives be advanced for further analysis in an alternative evaluation report (AER).

The three alternatives are designed based on assumptions the CUOH will concur with the new track alignment. Replacing the bridge on the same track alignment may prove to be unfeasible based on cost of construction and duration of track outage required. We recommend obtaining CUOH approval prior to proceeding with further design.

The Opinion of Probable Project Costs ranges from \$8,300,000 to \$10,200,000. Variables for the MOT scheme, new track location, and track outage duration make up the range variance.



## **Appendix A**

Existing Railroad Information







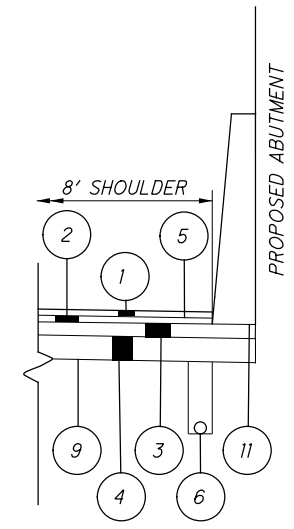
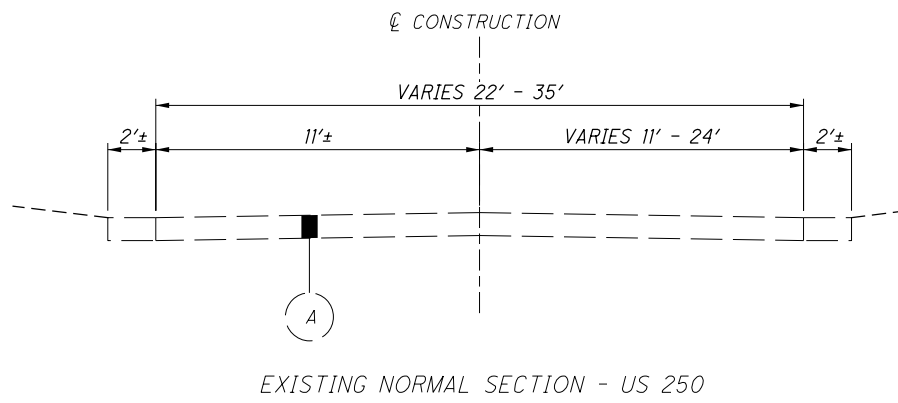


## **Appendix B**

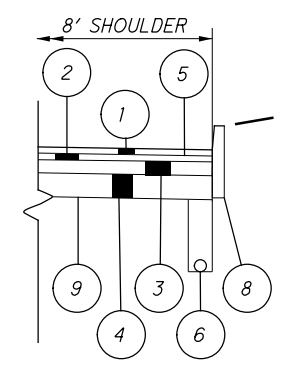
Plan Sheets

**LEGEND**

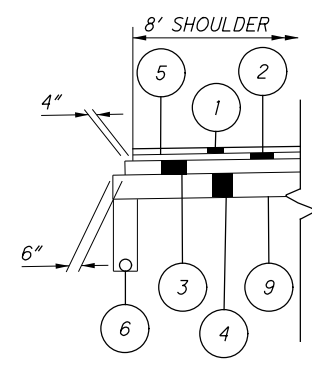
- ① ITEM 441 - 1.25" ASPHALT CONCRETE SURFACE COURSE, TYPE 1, PG70-22M
- ② ITEM 441 - 1.75" ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE 2, PG70-22M
- ③ ITEM 301 - ASPHALT CONCRETE BASE, PG64-22
- ④ ITEM 304 - 6" AGGREGATE BASE
- ⑤ ITEM 407 - TACK COAT FOR INTERMEDIATE COURSE
- ⑥ ITEM 605 - 6" BASE PIPE UNDERDRAINS
- ⑦ ITEM 606 - GUARDRAIL, TYPE MGS
- ⑧ ITEM 609 - CURB, TYPE 6
- ⑨ ITEM 204 - SUBGRADE COMPACTION
- ⑩ ITEM 659 - SEEDING AND MULCHING
- ⑪ ITEM 622 - CONCRETE BARRIER, SINGLE SLOPE, TYPE D
- Ⓐ EXISTING PAVEMENT



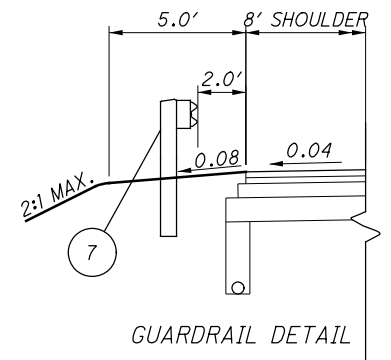
BARRIER DETAIL



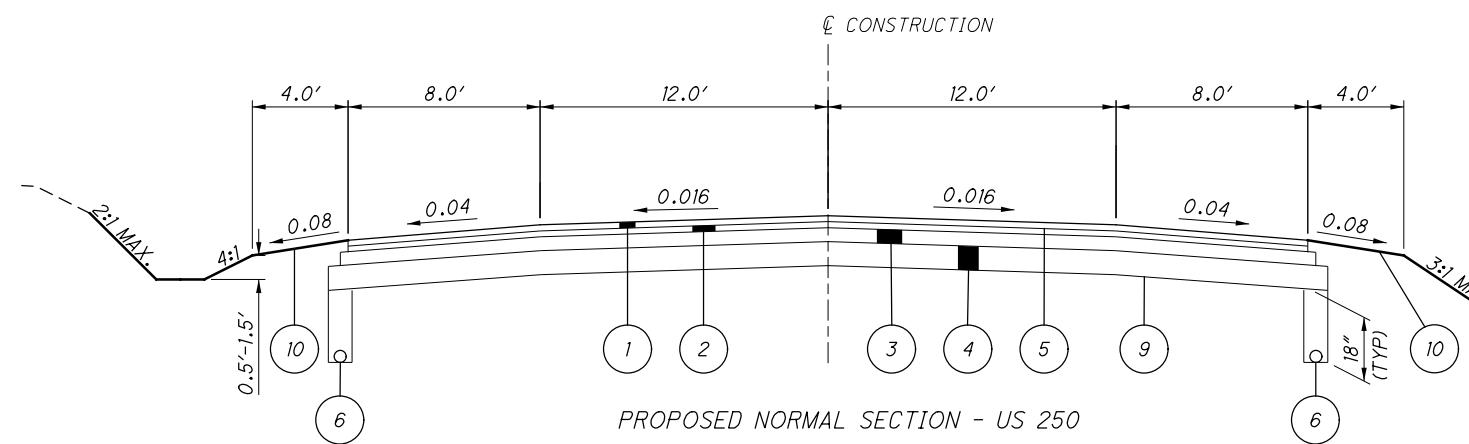
CURB DETAIL



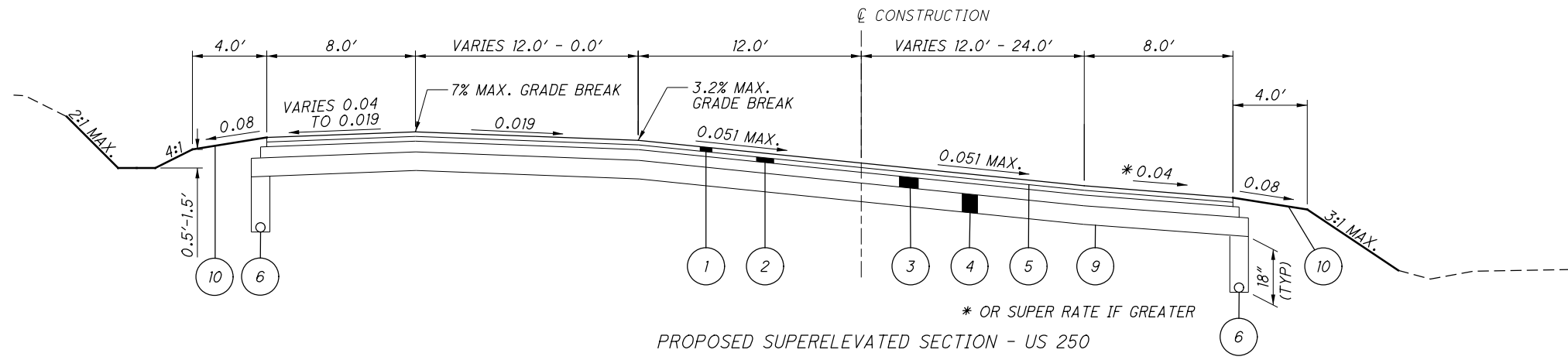
EDGE DETAIL



GUARDRAIL DETAIL



PROPOSED NORMAL SECTION - US 250

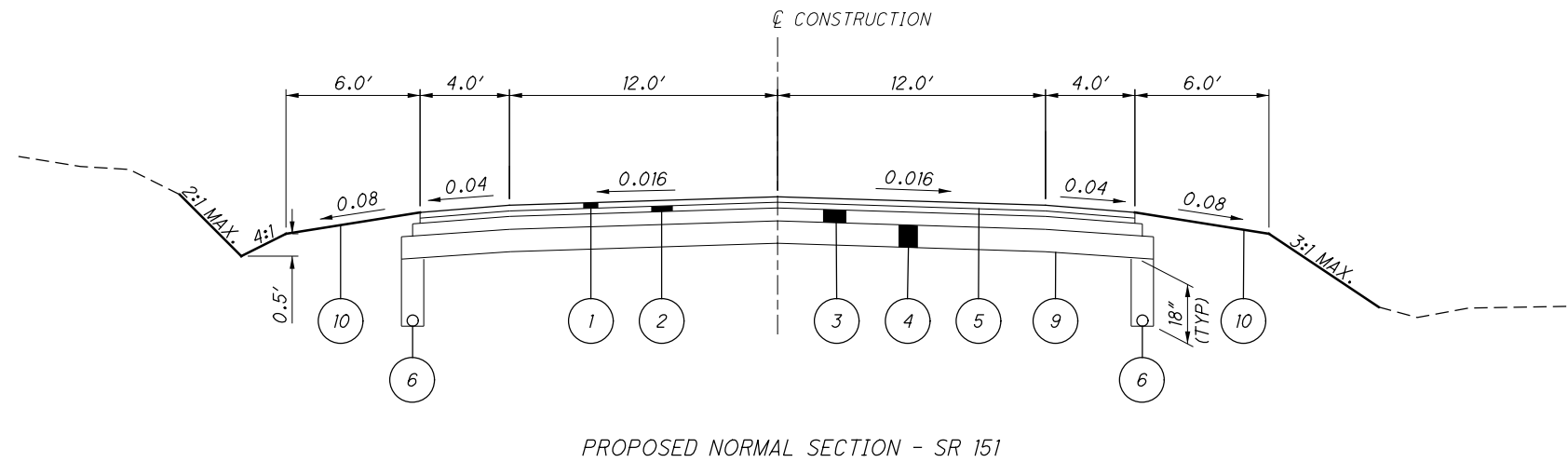
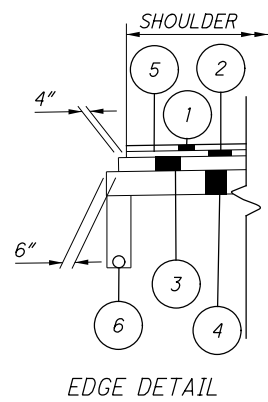
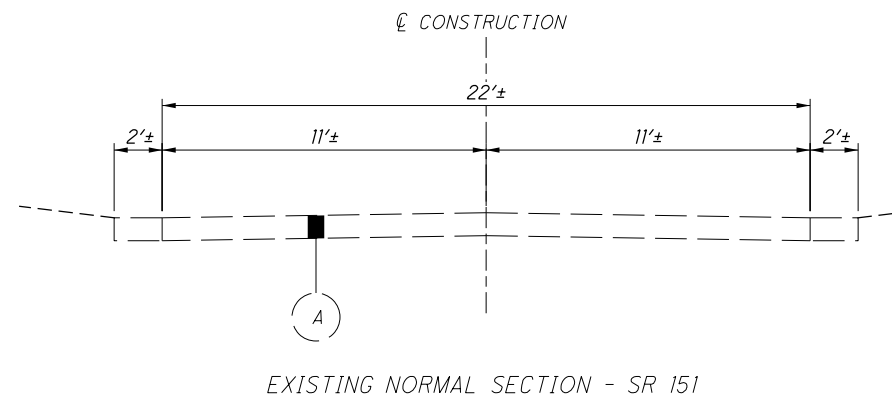


PROPOSED SUPERELEVATED SECTION - US 250

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LEGEND

- ① ITEM 441 - 1.25" ASPHALT CONCRETE SURFACE COURSE, TYPE 1, PG70-22M
- ② ITEM 441 - 1.75" ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE 2, PG70-22M
- ③ ITEM 301 - ASPHALT CONCRETE BASE, PG64-22
- ④ ITEM 304 - 6" AGGREGATE BASE
- ⑤ ITEM 407 - TACK COAT FOR INTERMEDIATE COURSE
- ⑥ ITEM 605 - 6" BASE PIPE UNDERDRAINS
- ⑦ ITEM 606 - GUARDRAIL, TYPE MGS
- ⑧ ITEM 609 - CURB, TYPE 6
- ⑨ ITEM 204 - SUBGRADE COMPACTION
- ⑩ ITEM 659 - SEEDING AND MULCHING
- ⑪ ITEM 622 - CONCRETE BARRIER, SINGLE SLOPE, TYPE D
- Ⓐ EXISTING PAVEMENT



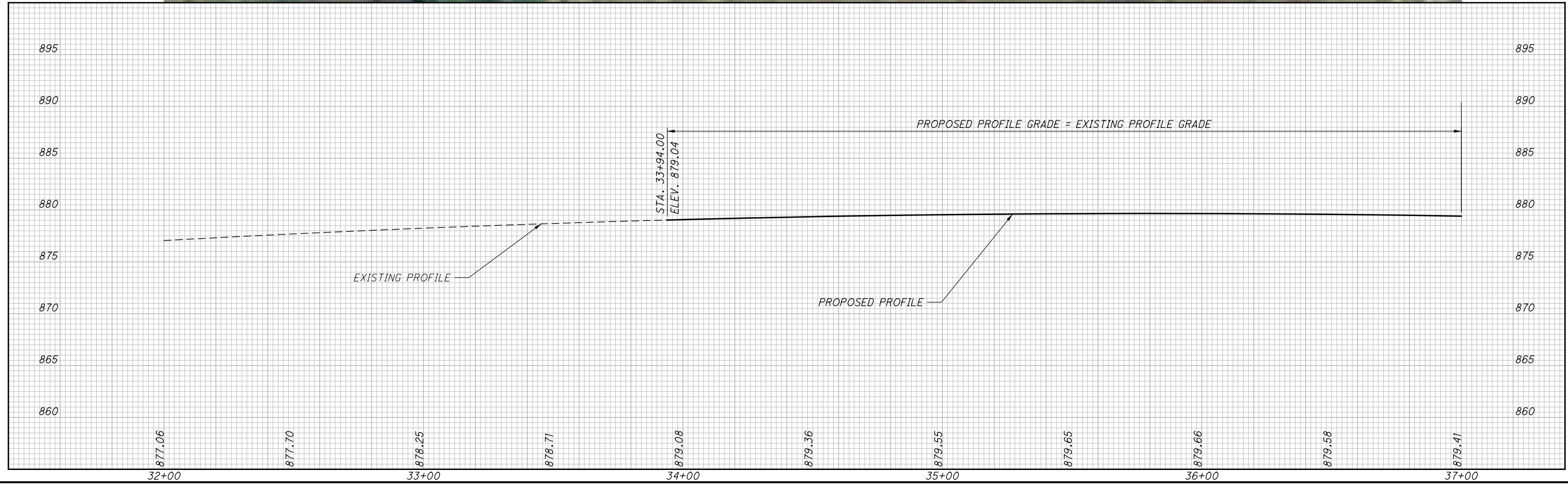
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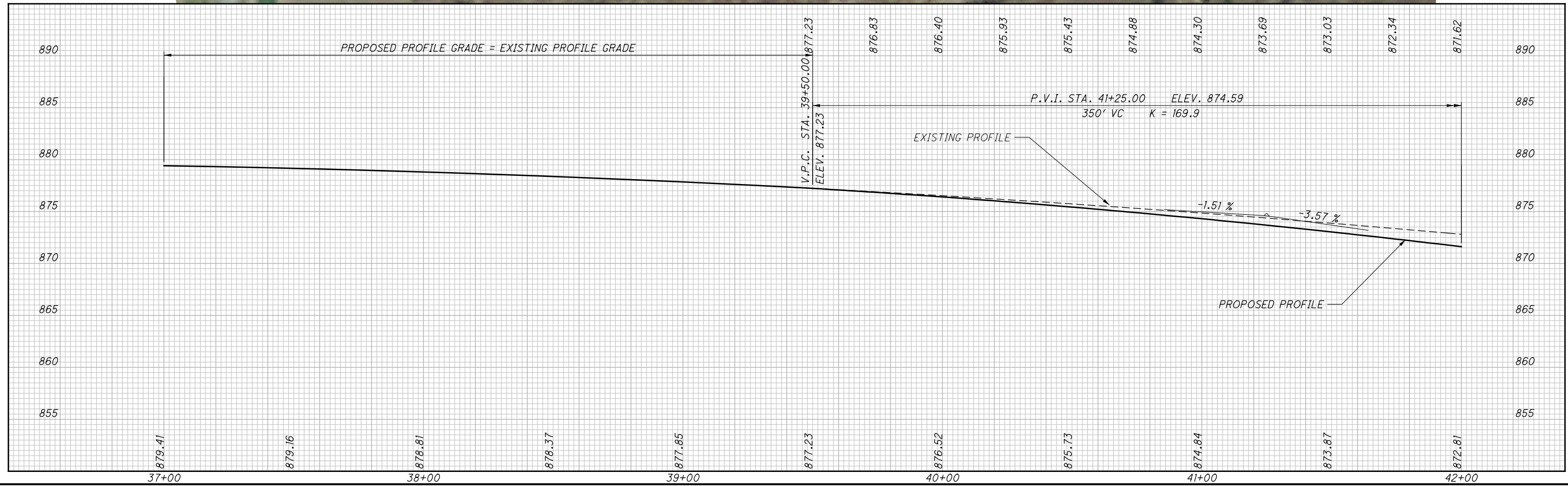
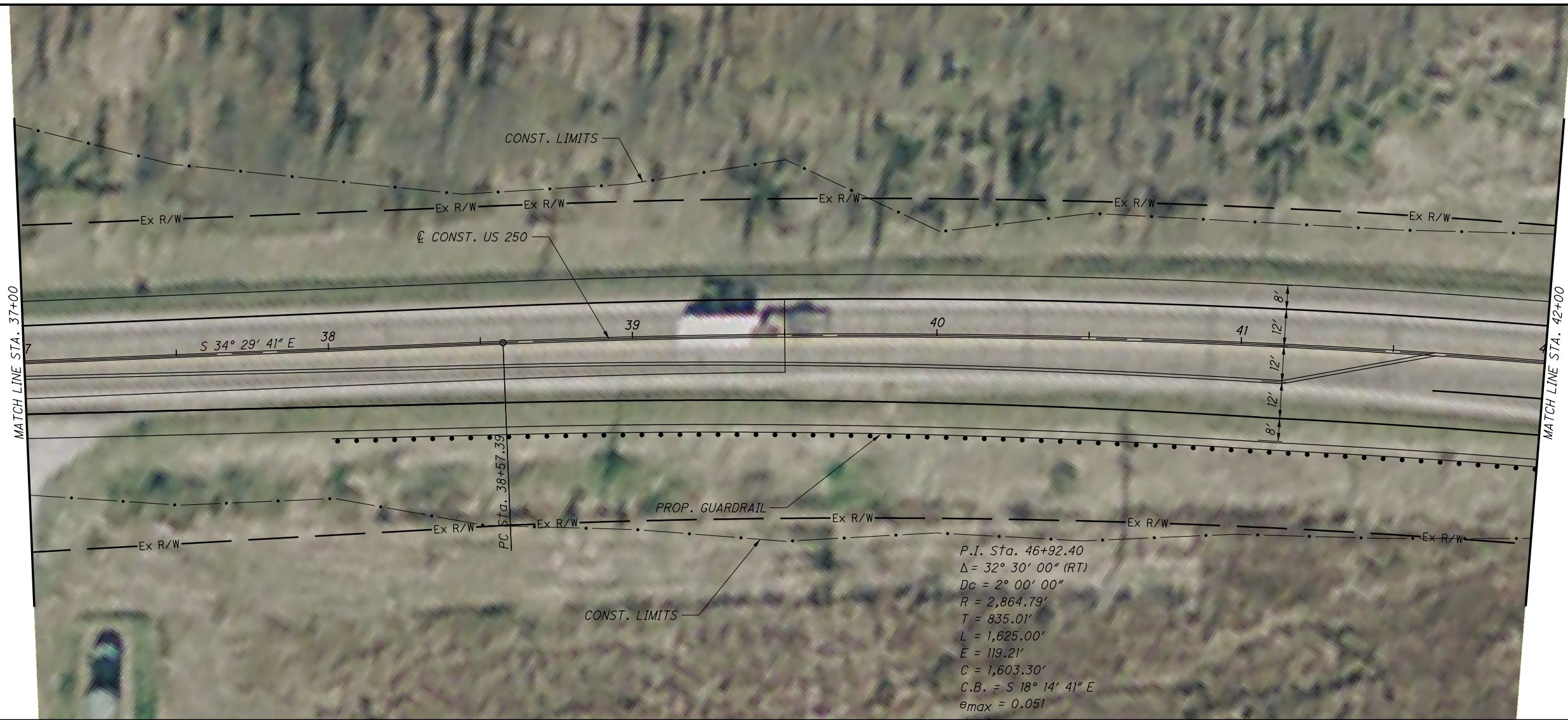


P.I. Sta. 46+92.40  
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 $Dc = 2^\circ 00' 00''$   
 $R = 2,864.79'$   
 $T = 835.01'$   
 $L = 1,625.00'$   
 $E = 119.21'$   
 $C = 1,603.30'$   
 $C.B. = S 18^\circ 14' 41'' E$   
 $e_{max} = 0.051$



CALCULATED EMC  
 CHECKED SMG  
**PLAN AND PROFILE - US 250**  
**ALTERNATE 1 - STA. 32+00 TO STA. 37+00**



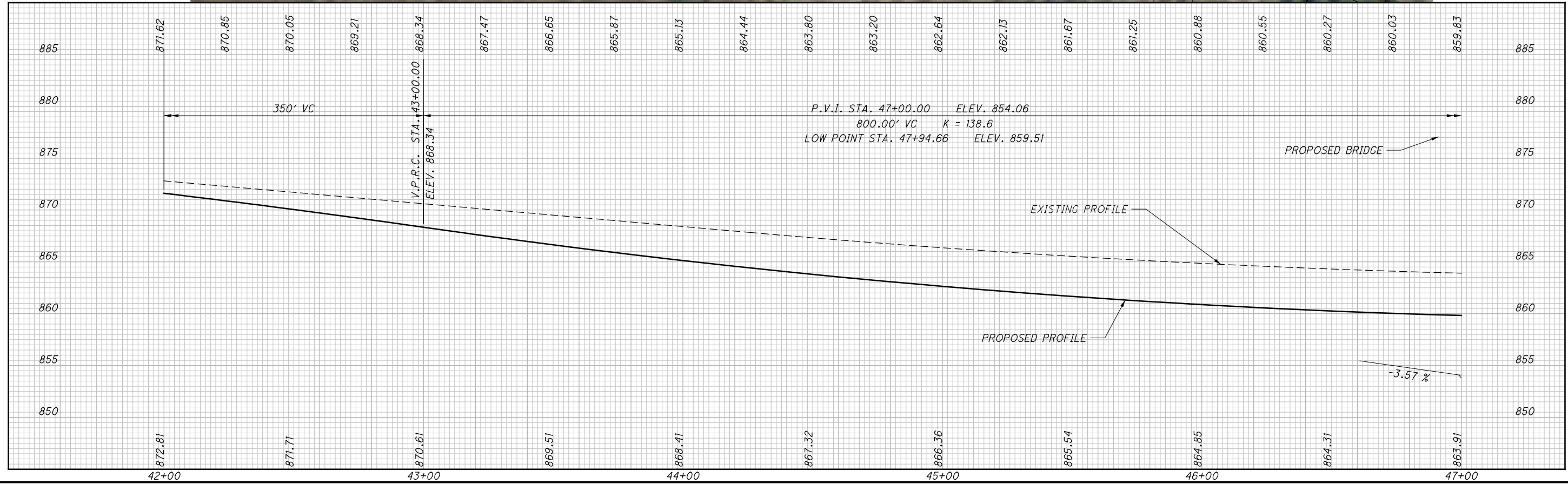


**PLAN AND PROFILE - US 250**  
**ALTERNATE 1 - STA. 37+00 TO STA. 42+00**

**HAS-250-00.81**



P.I. Sta. 46+92.40  
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 $T = 835.01'$   
 $L = 1,625.00'$   
 $E = 119.21'$   
 $C = 1,603.30'$   
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 $e_{max} = 0.051$

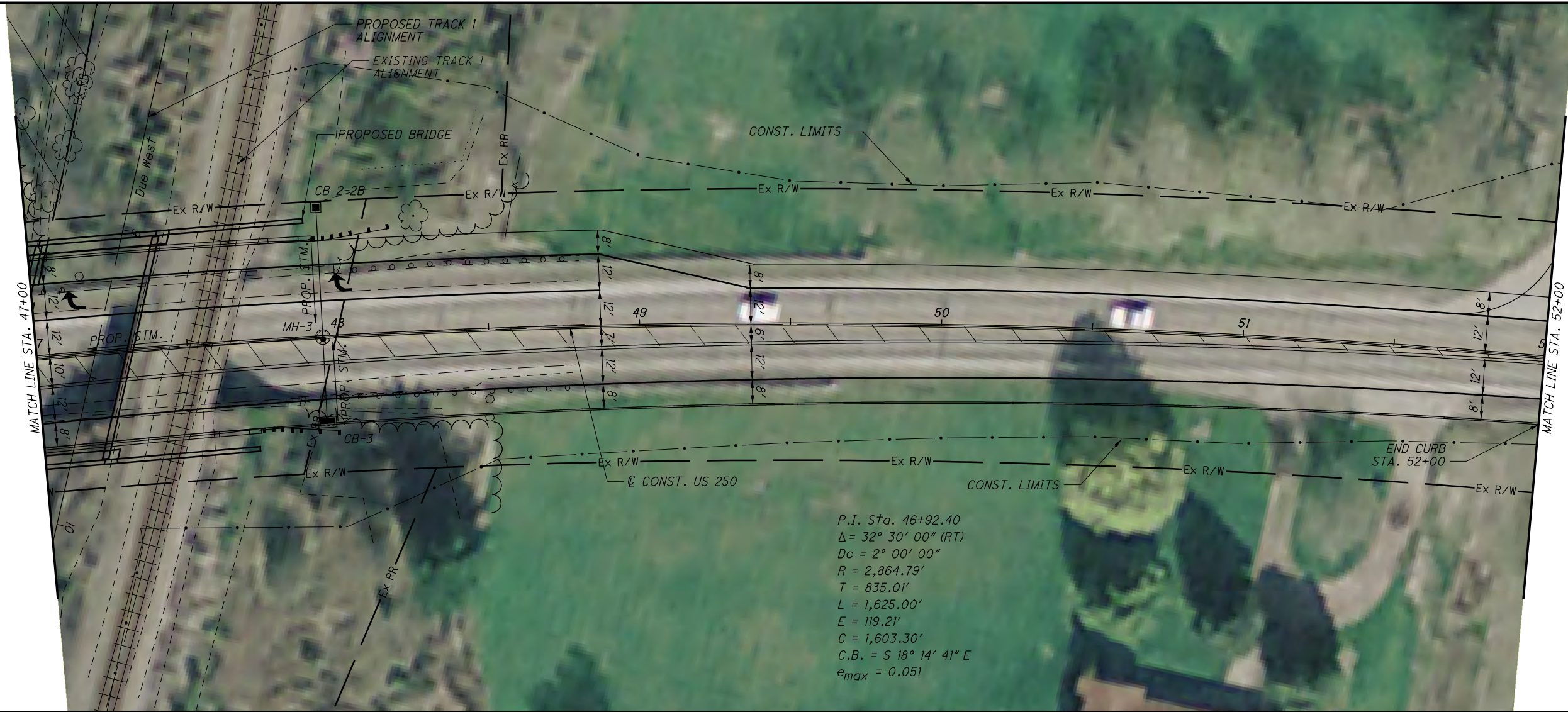


CALCULATED EMC CHECKED SMG

**PLAN AND PROFILE - US 250  
 ALTERNATE 1 - STA. 42+00 TO STA. 47+00**

**HAS-250-00.81**





P.I. Sta. 46+92.40  
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 $T = 835.01'$   
 $L = 1,625.00'$   
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 $C = 1,603.30'$   
 $C.B. = S 18^\circ 14' 41'' E$   
 $e_{max} = 0.051$



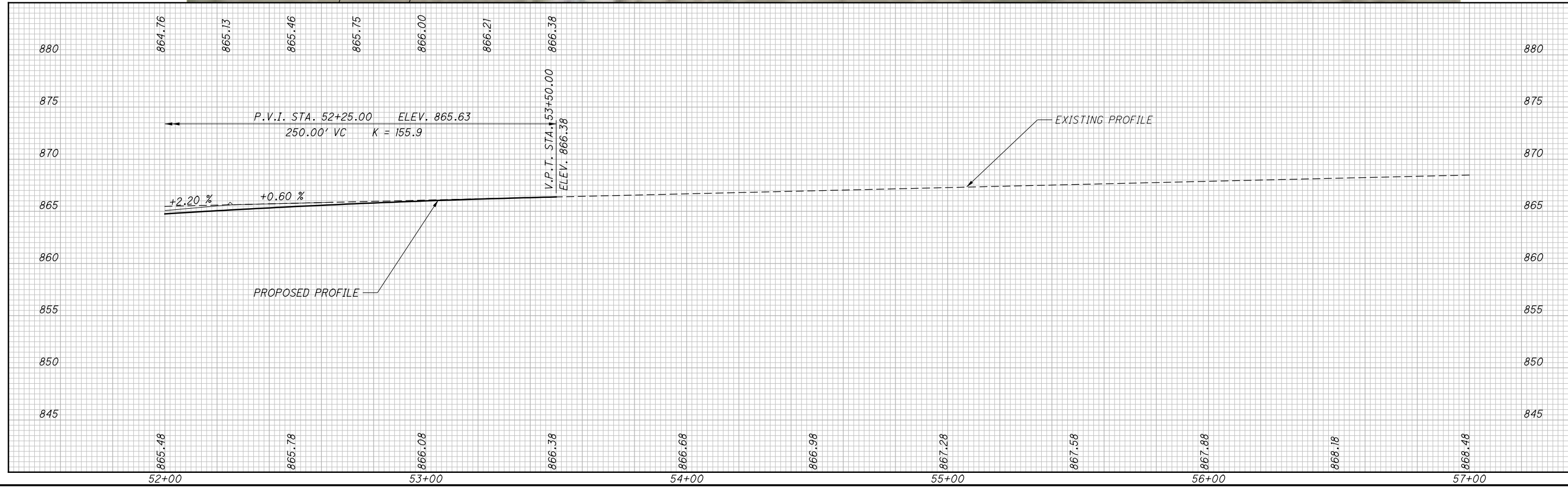
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 ALTERNATE 1 - STA. 47+00 TO STA. 52+00

HAS-250-00.81





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 $T = 835.01'$   
 $L = 1,625.00'$   
 $E = 119.21'$   
 $C = 1,603.30'$   
 $C.B. = S 18^\circ 14' 41'' E$   
 $e_{max} = 0.051$



CALCULATED EMC CHECKED SMG

0 20 40  
 10 HORIZONTAL SCALE IN FEET

PLAN AND PROFILE - US 250  
 ALTERNATE 1 - STA. 52+00 TO STA. 57+00

HAS-250-00.81

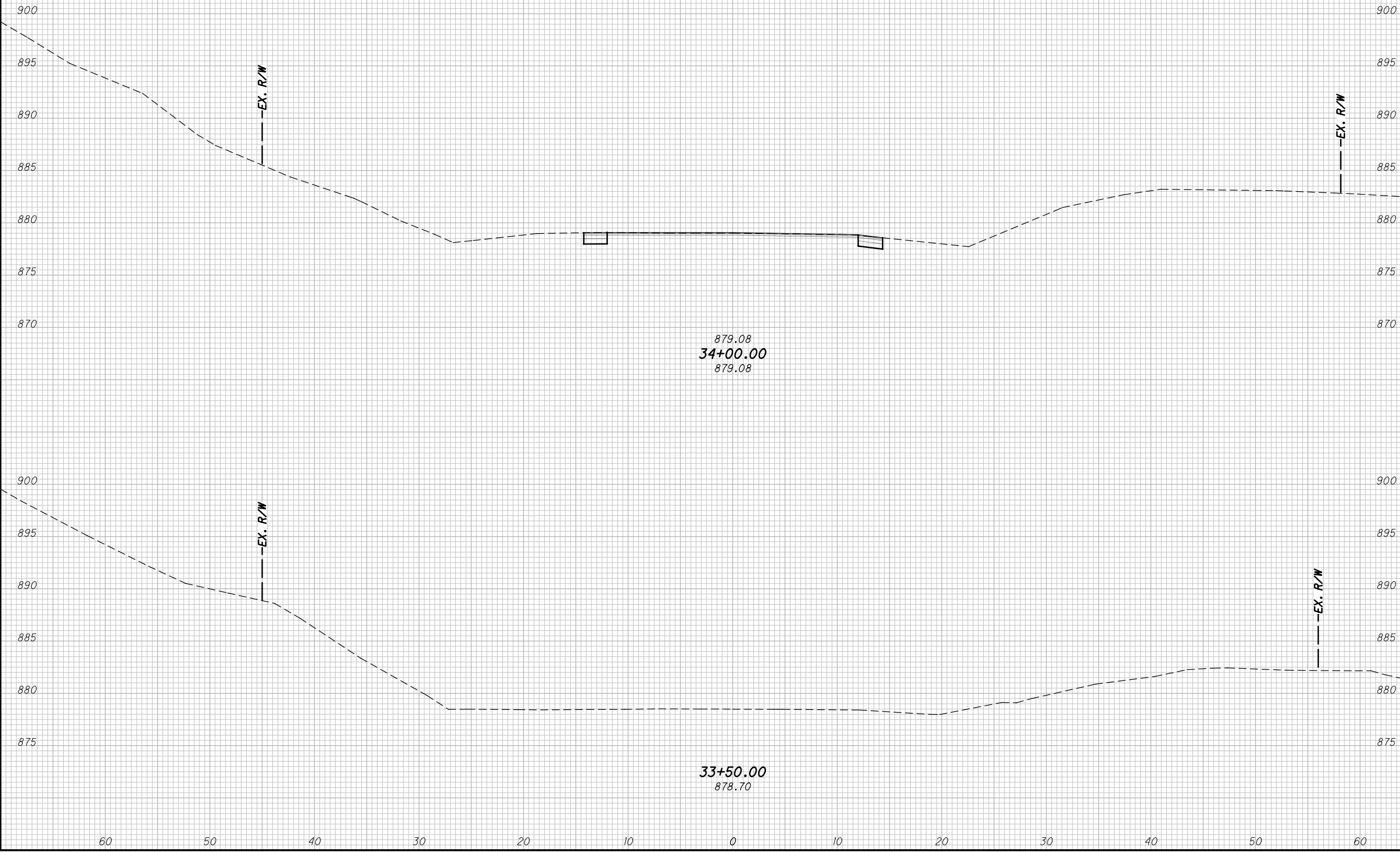
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SEEDING

END WIDTH	SO. YDS.

END AREA		VOLUME		CALCULATED	CHECKED
CUT	FILL	CUT	FILL	EMC	SMG



**CROSS SECTIONS - US 250**  
**ALTERNATE 1 - STA. 33+50 TO STA. 34+00**

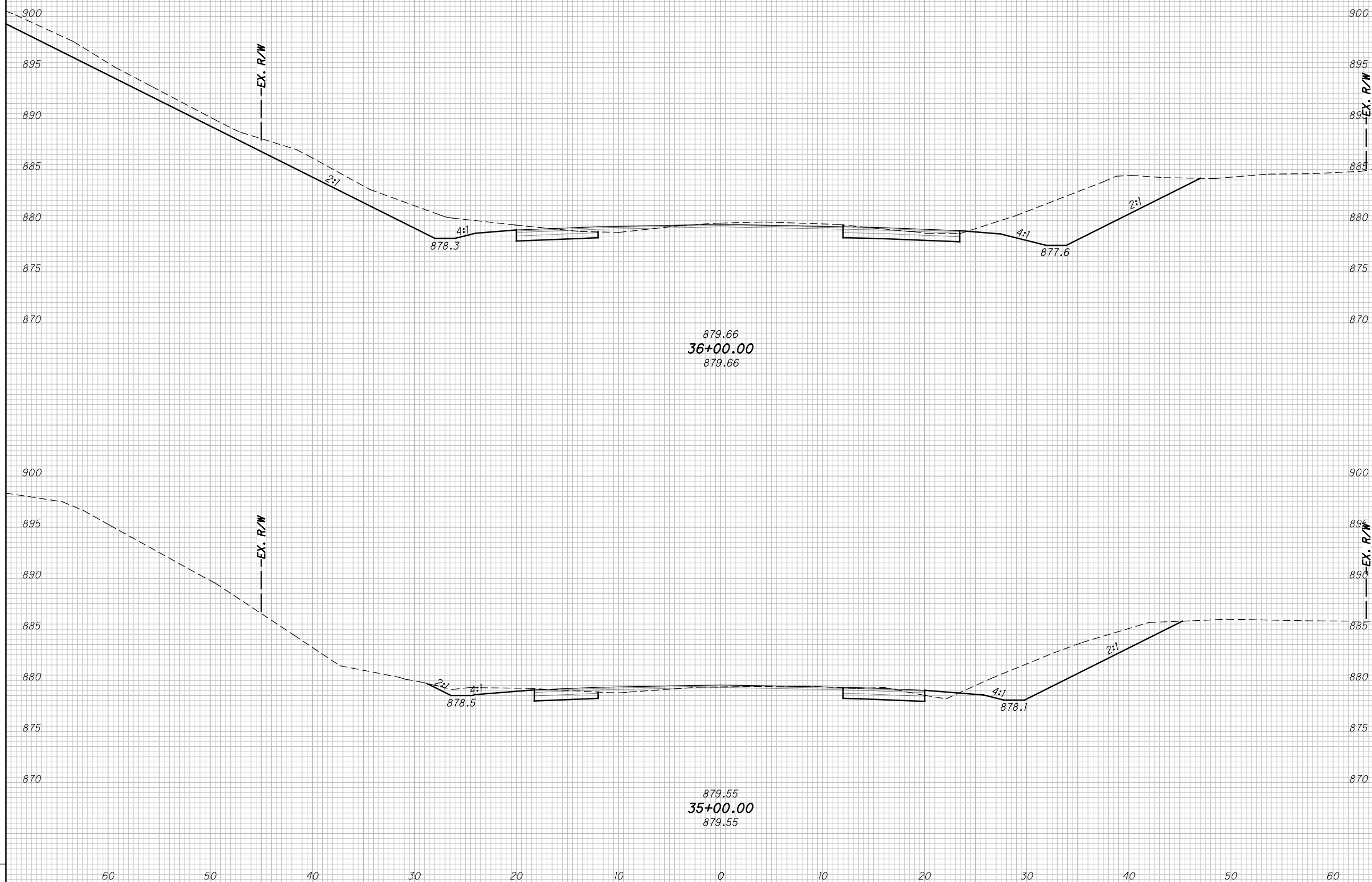
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SEEDING  
END SO.  
WIDTH YDS.

END AREA		VOLUME		CALCULATED	
CUT	FILL	CUT	FILL	EMC	CHECKED
					SMG



CROSS SECTIONS - US 250  
ALTERNATE 1 - STA. 35+00 TO STA. 36+00

HAS-250-00.81

10  
67

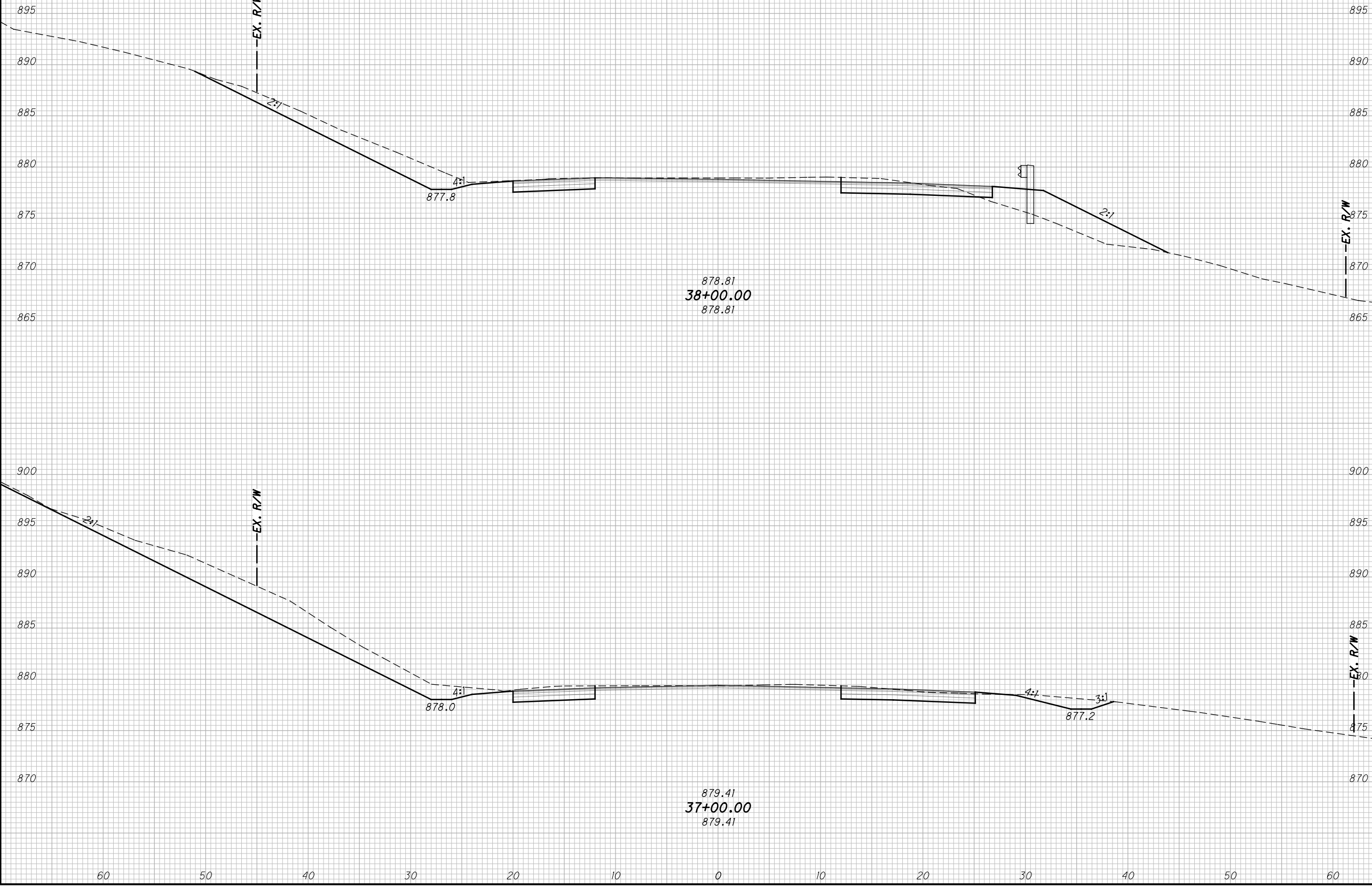


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SEEDING

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END AREA		VOLUME		CALCULATED	CHECKED
CUT	FILL	CUT	FILL	EMC	SMG



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**ALTERNATE 1 - STA. 37+00 TO STA. 38+00**

**HAS-250-00.81**

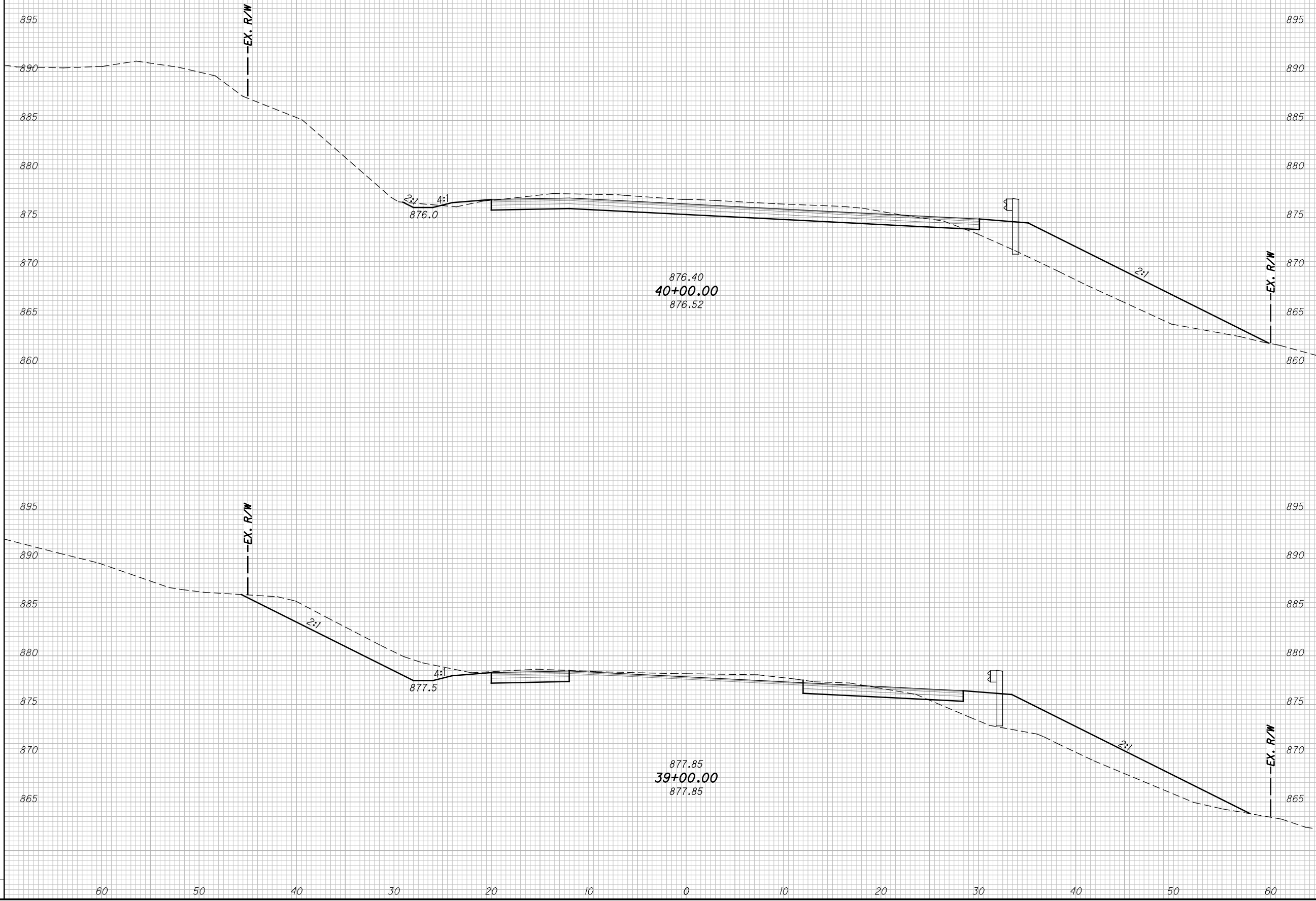
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END AREA		VOLUME		CALCULATED	CHECKED
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 ALTERNATE 1 - STA. 39+00 TO STA. 40+00**

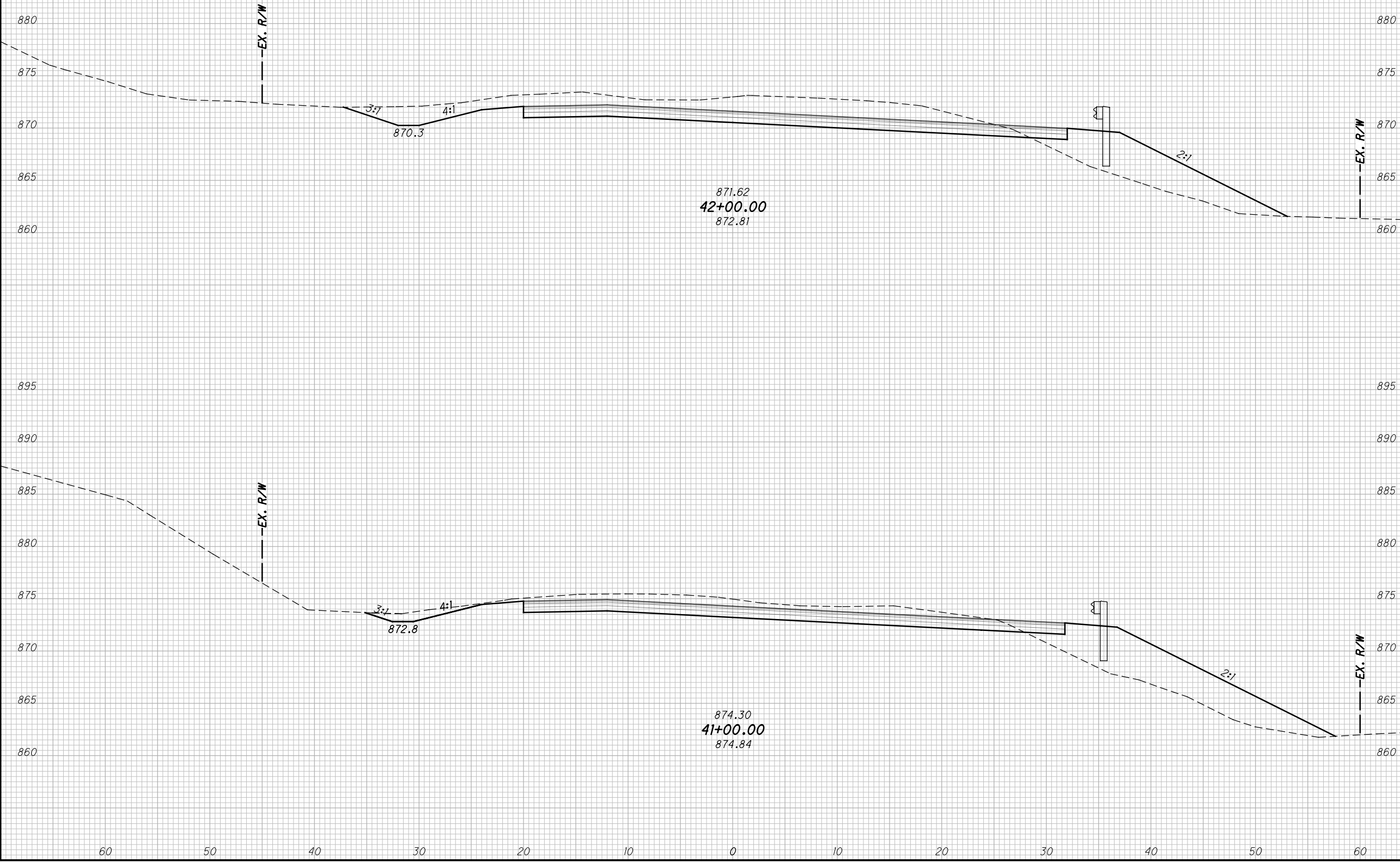
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SEEDING

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END AREA		VOLUME		CALCULATED	
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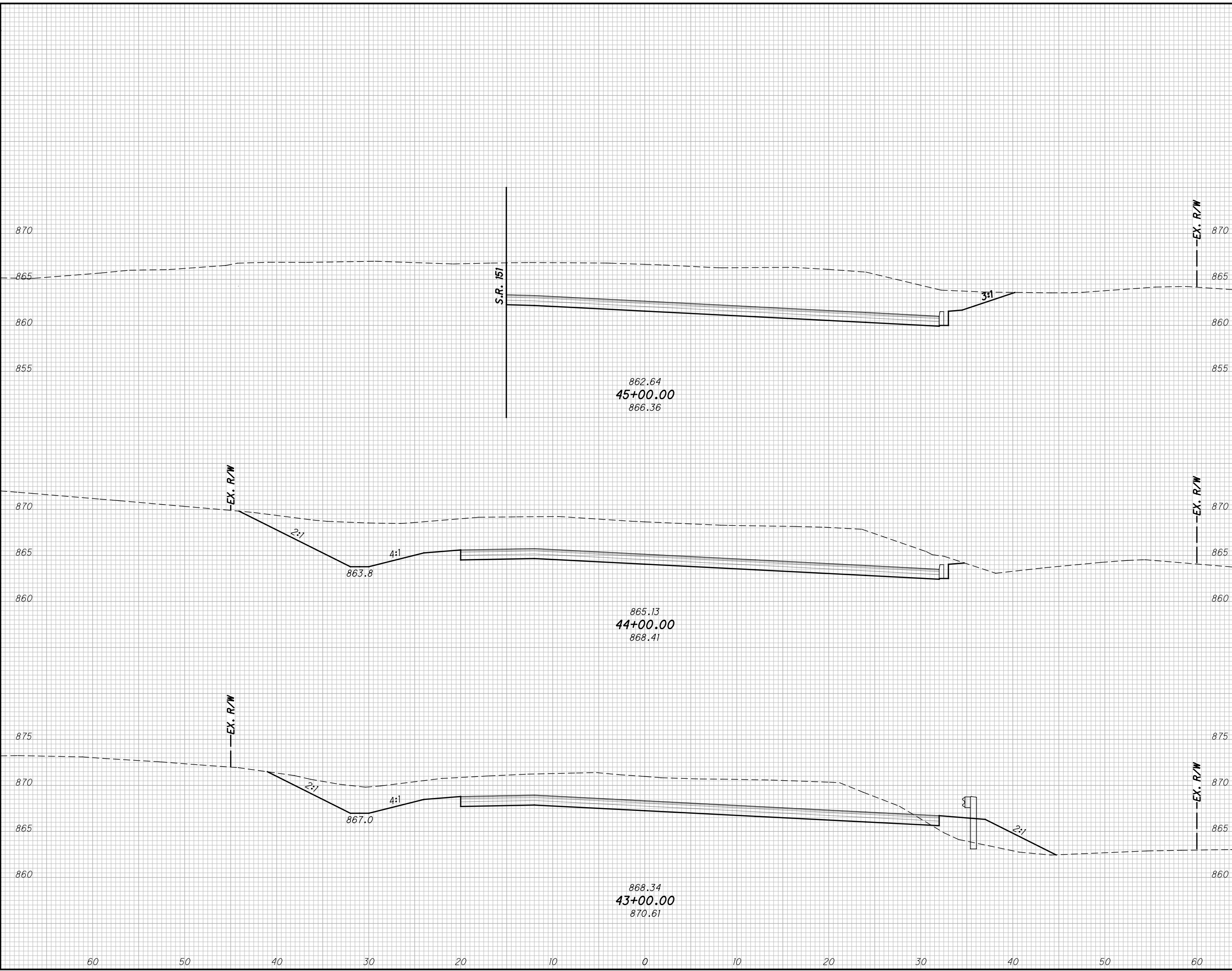
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**ALTERNATE 1 - STA. 41+00 TO STA. 42+00**

**HAS-250-00.81**

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SEEDING  
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WIDTH YDS.

END AREA		VOLUME		CALCULATED EMC	CHECKED SMG
CUT	FILL	CUT	FILL		



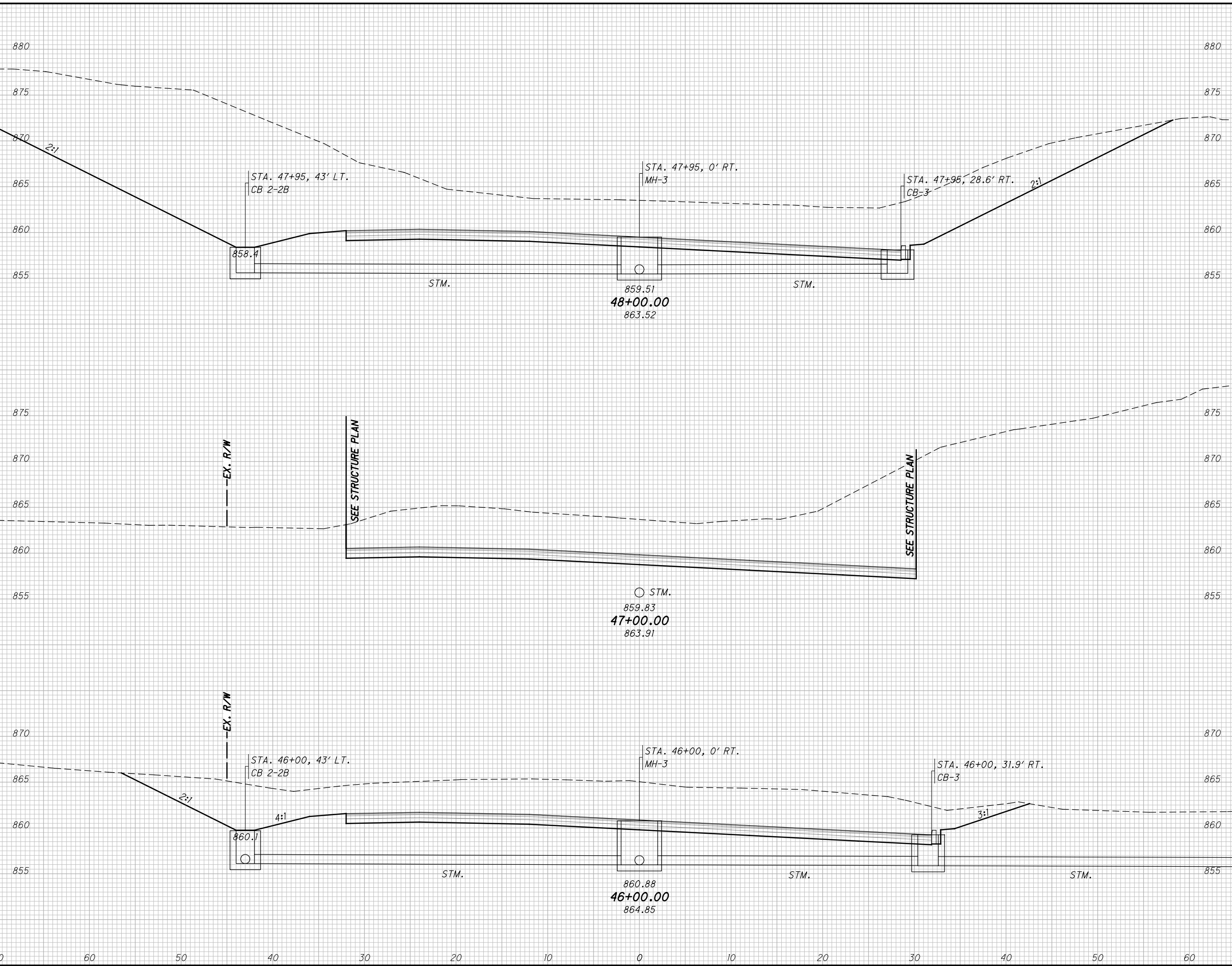
**CROSS SECTIONS - US 250  
ALTERNATE 1 - STA. 43+00 TO STA. 45+00**

**HAS-250-00.81**

14  
67

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40	
30	
20	
10	
0	
10	
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30	
40	
50	
60	



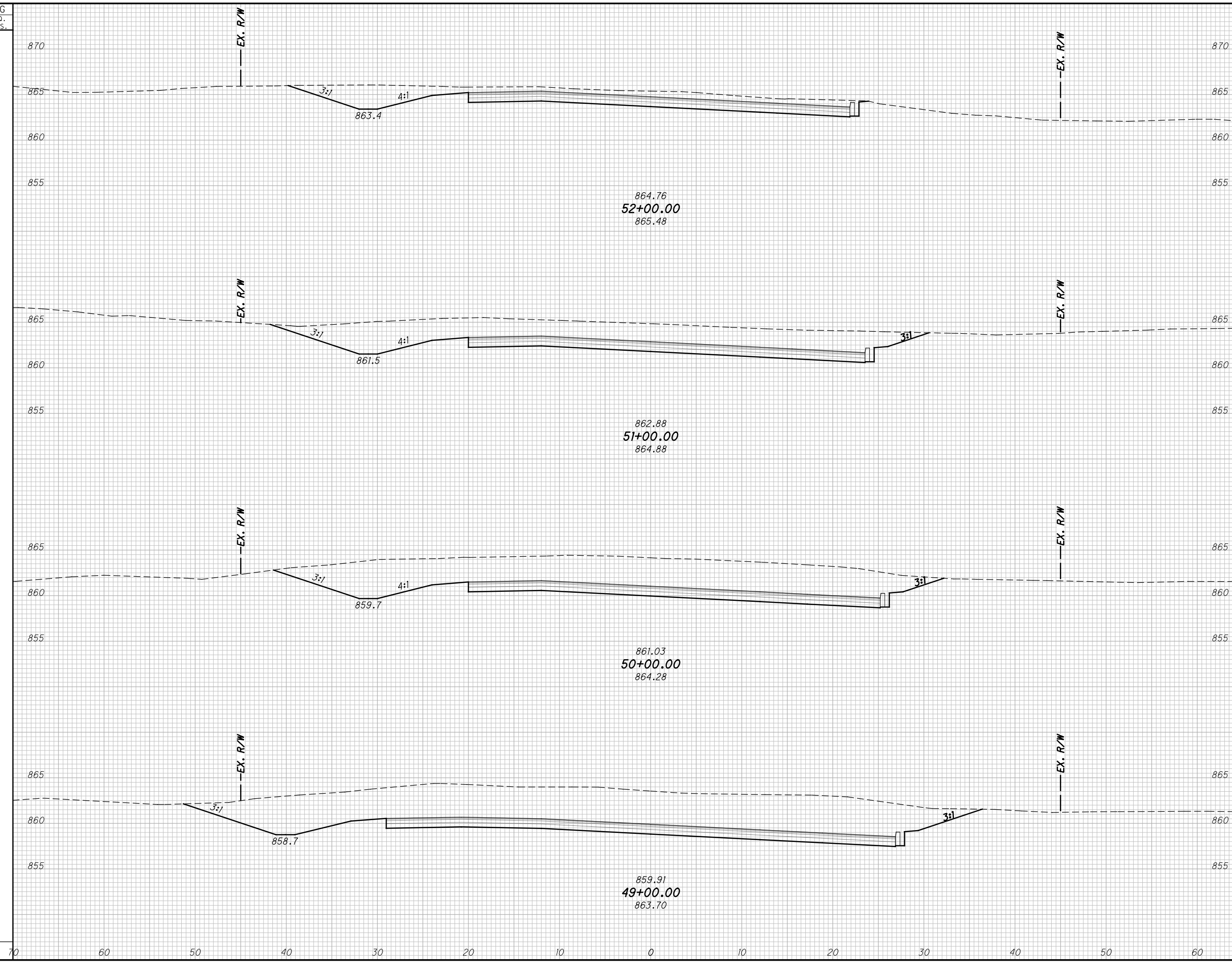
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CUT	FILL	CUT	FILL

**CROSS SECTIONS - US 250**  
**ALTERNATE 1 - STA. 46+00 TO STA. 48+00**  
**HAS-250-00.81**  
 CALCULATED EMC  
 CHECKED SMG  
 15  
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END AREA		VOLUME		CALCULATED	
CUT	FILL	CUT	FILL	EMC	SMG



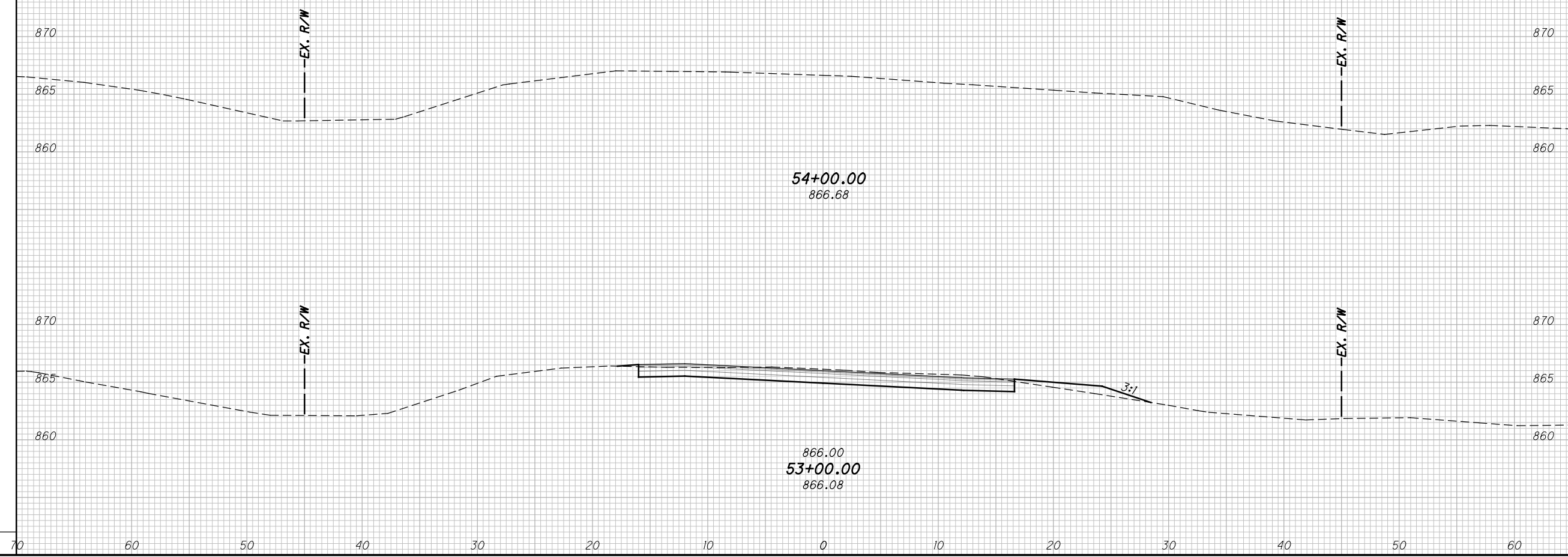
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ALTERNATE 1 - STA. 49+00 TO STA. 52+00**

**HAS-250-00.81**

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SEEDING	
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END AREA		VOLUME		CALCULATED EMC	CHECKED SMG
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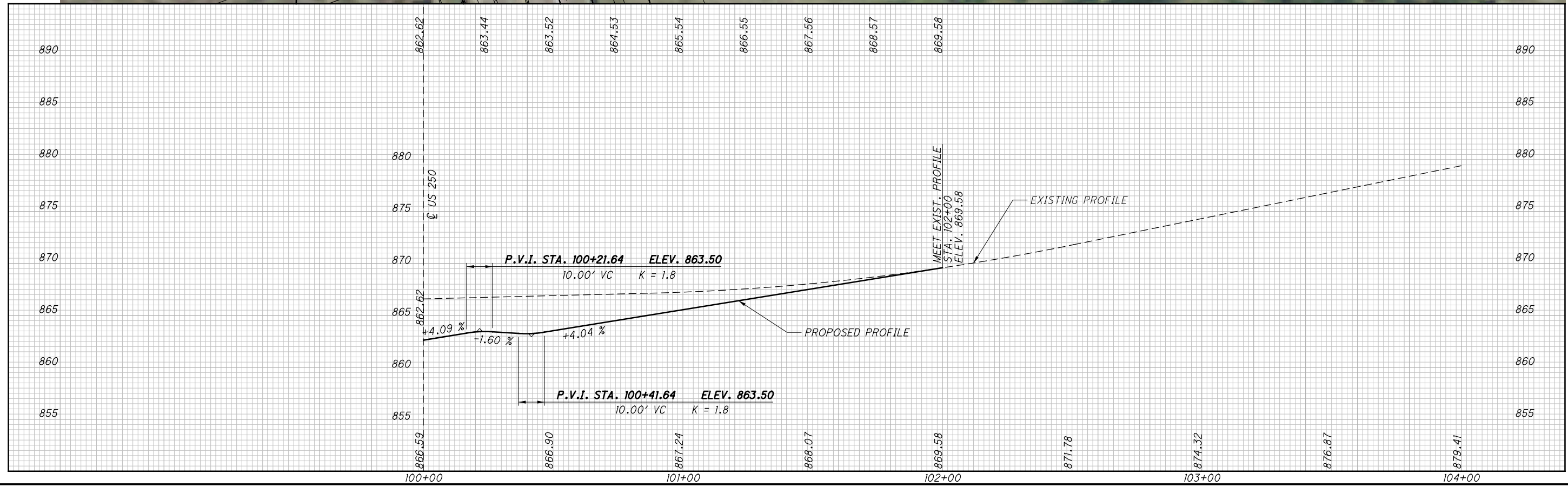
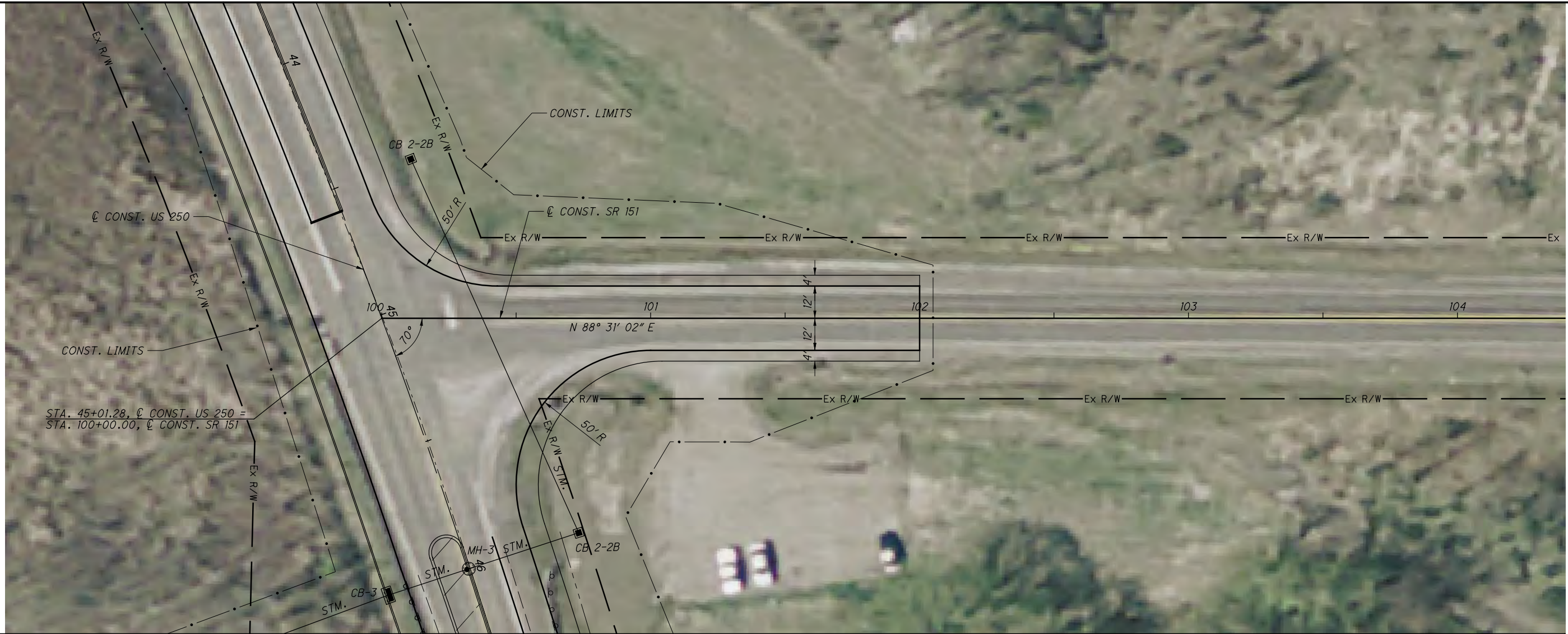


**CROSS SECTIONS - US 250  
ALTERNATE 1 - STA. 53+00 TO STA. 54+00**

**HAS-250-00.81**



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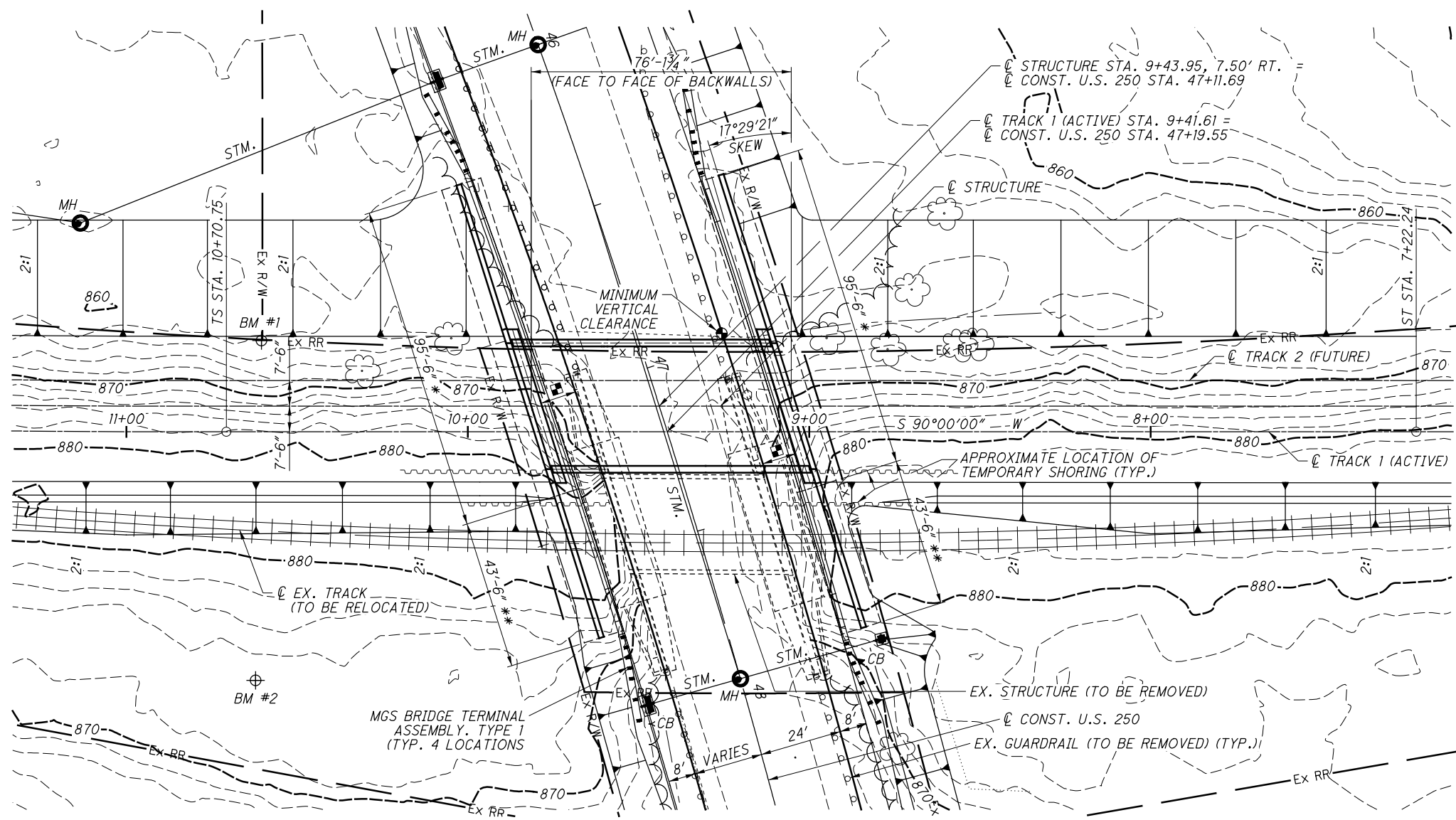


CALCULATED EMC CHECKED SMG  
**PLAN AND PROFILE - SR 151**  
**ALTERNATE 1 - STA. 100+00 TO STA. 104+00**

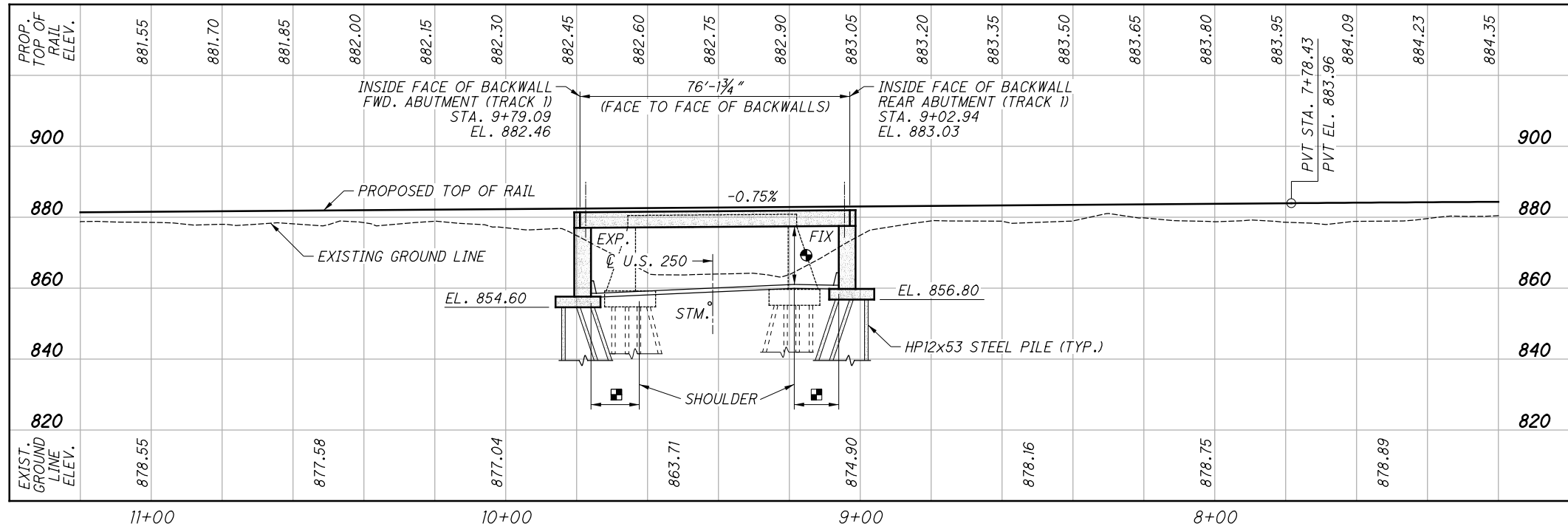
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 18  
 67



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**PLAN**



**PROFILE ALONG  $\hat{C}$  TRACK 1 (ACTIVE)**

**BENCHMARK DATA**

BM #1 STA. 10+60.47, ELEV. 862.49,  
 OFFSET 26.70' RT.  $\hat{C}$  PROP. TRACK 1 (ACTIVE)  
 BM #2 STA. 10+62.19, ELEV. 871.61,  
 OFFSET 72.81' LT.  $\hat{C}$  PROP. TRACK 1 (ACTIVE)

**NOTES**

EARTHWORK LIMITS SHOWN ARE APPROXIMATE. ACTUAL SLOPES SHALL CONFORM TO PLAN CROSS SECTIONS.

RAILROAD TRAFFIC (CUOH):  
 FREIGHT = 1 TIMES/DAY 40 MPH  
 PASSENGER = 0 TIMES/DAY 0 MPH

DESIGN TRAFFIC (U.S. 250):  
 2017 ADT = 5500 2017 ADTT = 990  
 2037 ADT = 6500 2037 ADTT = 1170  
 DIRECTIONAL DISTRIBUTION = 0.53%

**LEGEND/ABBREVIATIONS**

- \* - PHASE 1 CONSTRUCTION
- \*\* - PHASE 2 CONSTRUCTION
- CUOH - COLUMBUS AND OHIO RIVER RAILROAD

POINT OF MINIMUM VERTICAL CLEARANCE	
PROPOSED	REQUIRED
16'-6"	16'-6"

POINT OF MINIMUM HORIZONTAL CLEARANCE		
	PROPOSED	REQUIRED
REAR ABUTMENT	9.89'	9.67'
FWD. ABUTMENT	10.03'	9.67'

**EXISTING STRUCTURE**

TYPE: BALLASTED DECK CONCRETE ENCASED STEEL BEAM SUPERSTRUCTURE ON WALL TYPE ABUTMENTS ON CONCRETE PILES  
 SPANS: 45'-0"  $\pm$  C/C BEARINGS  
 LOADING: UNKNOWN  
 SKEW: 16° 59' 21" WRT TANGENT TO U.S. 250 @  $\hat{C}$  BRIDGE  
 ALIGNMENT: 2° CURVE RIGHT  
 STRUCTURAL FILE NUMBER: 3401472  
 DATE BUILT: 1941  
 DISPOSITION: FAIR

**PROPOSED STRUCTURE**

TYPE: BALLASTED DECK WELDED STEEL PLATE THROUGH GIRDER ON WALL TYPE ABUTMENTS ON PILES  
 SPANS: 73'-0" C/C BEARINGS  
 LOADING: COOPER E80 AND ALTERNATE LIVE LOAD; 6" ADDITIONAL BALLAST  
 SKEW: 17° 29' 21" R.F.  
 ALIGNMENT: TANGENT  
 COORDINATES: LATITUDE 40° 23' 24" N  
 LONGITUDE 81° 15' 42" W

DESIGN AGENCY: **ARCADIS**  
 ARCADIS U.S., Inc.  
 222 South Main Street, Suite 300 Akron, Ohio 44308  
 Tel: 330.434.8995 Fax: 330.374.1055 www.arcadis-us.com

DATE	2/2015
REVIEWED	FJG
DRAWN	MPB
DESIGNED	RBB
CHECKED	ETR

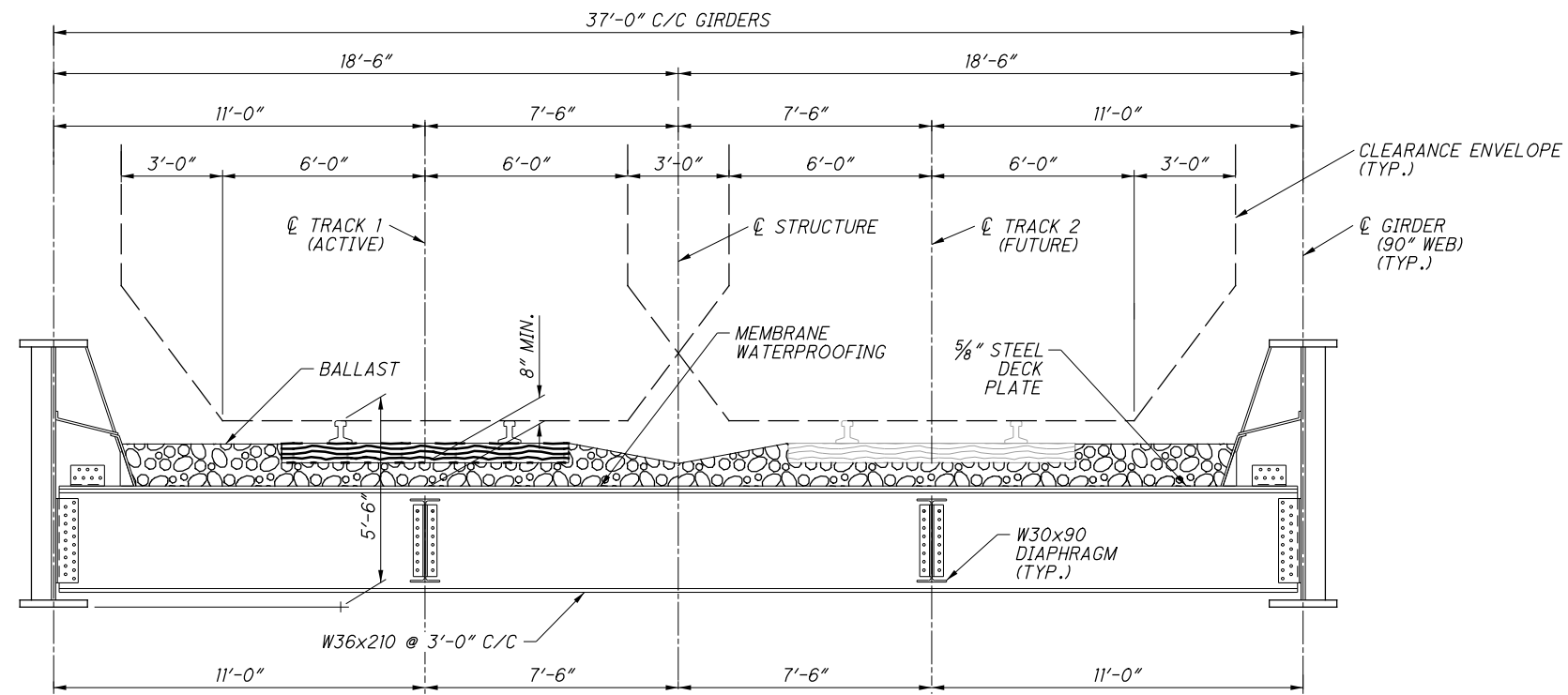
HARRISON COUNTY  
 U.S. 250  
 STA. 47+11.69

**ALTERNATE 1 - SITE PLAN**  
 BRIDGE NO. HAS-250-0081  
 CUOH RAILROAD OVER US ROUTE 250

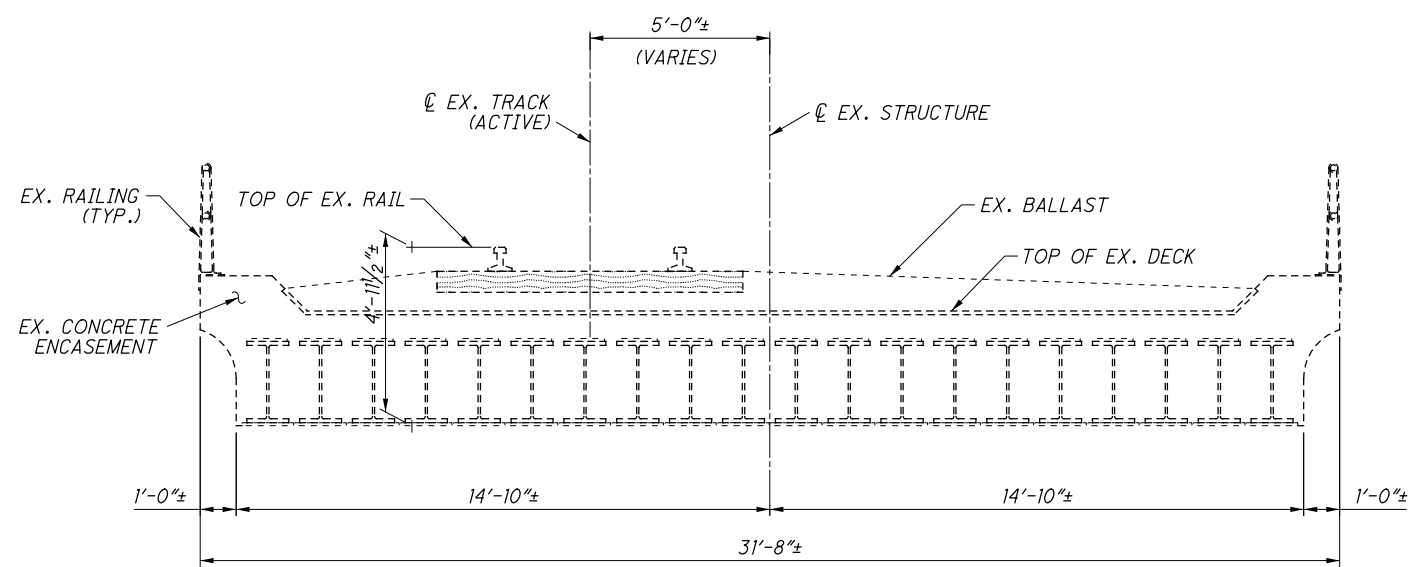
**HAS-250-00.81**  
 PID No. 99427

1 / 4  
 19 / 67

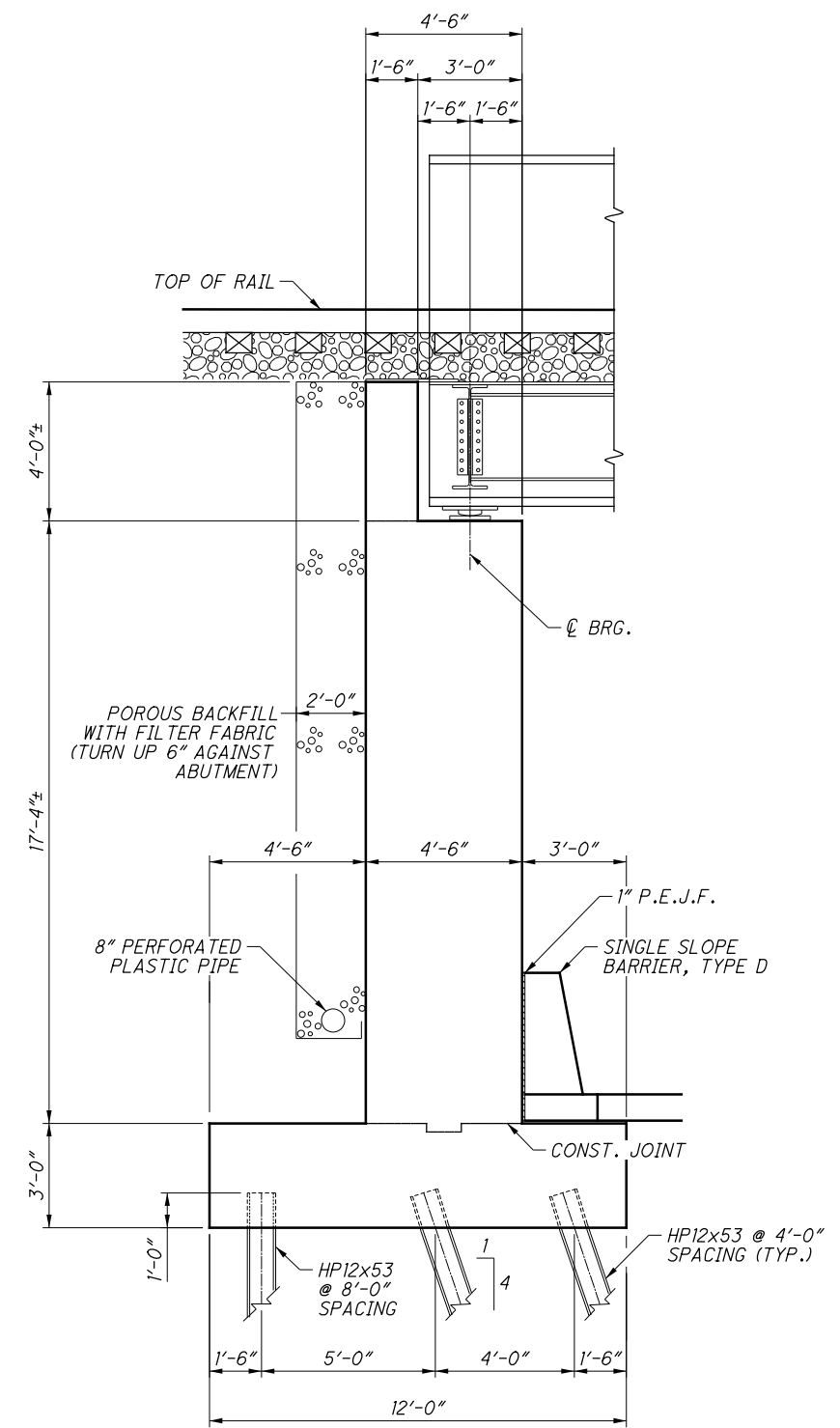
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**PROPOSED TYPICAL SECTION - 2 GIRDER**  
(LOOKING WEST)



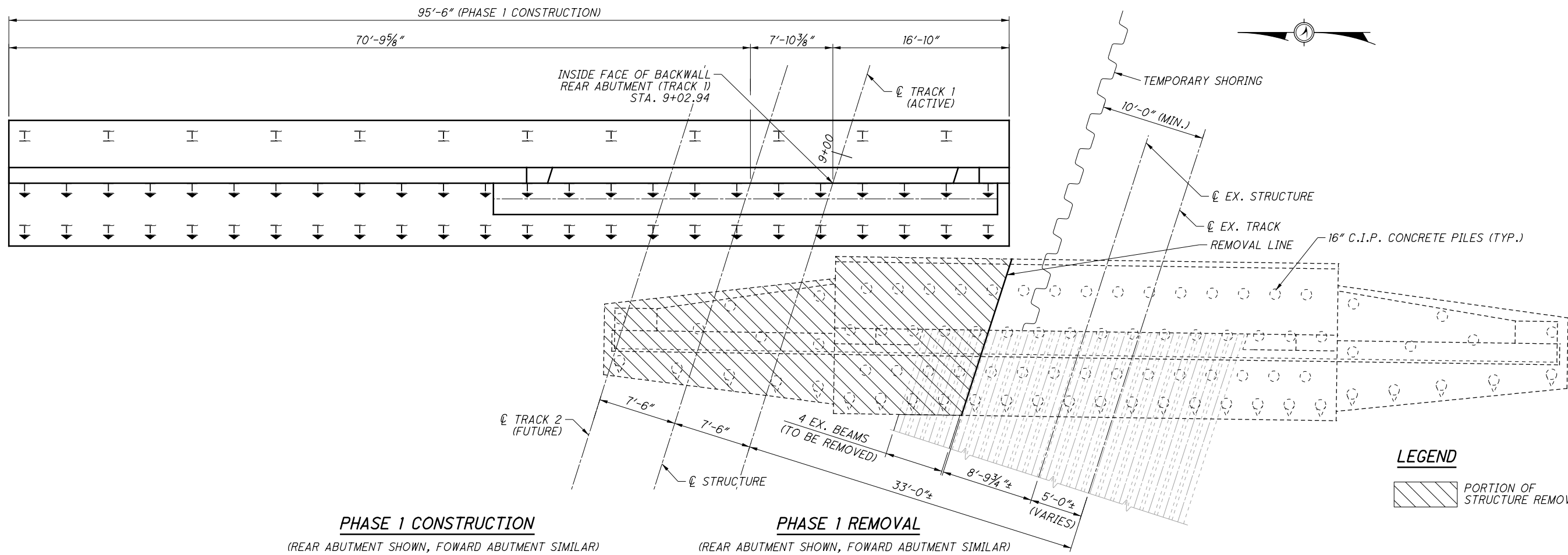
**EXISTING TYPICAL SECTION**  
(LOOKING WEST)



**ABUTMENT SECTION**  
(REAR ABUTMENT SHOWN, FORWARD ABUTMENT SIMILAR)

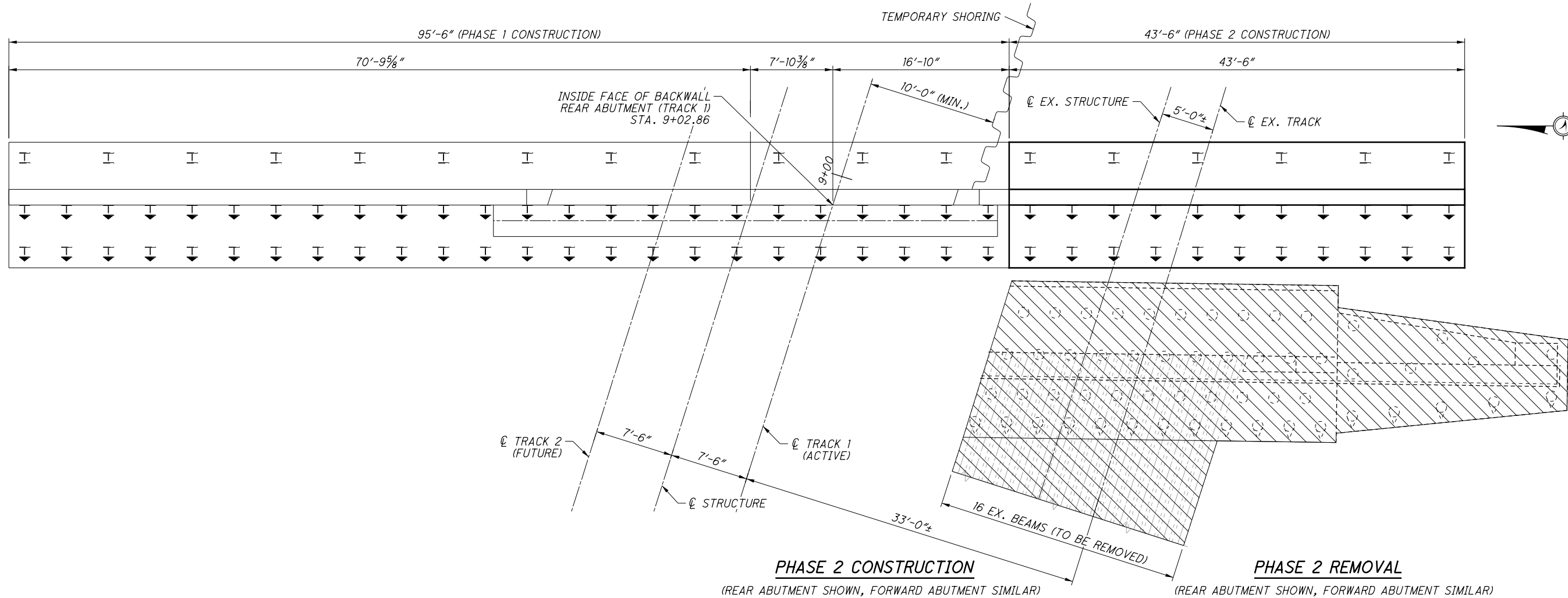
DESIGNED	RBB
CHECKED	ETR
DRAWN	MPB
REVISED	
REVIEWED	FJG
DATE	2/2015
STRUCTURE FILE NUMBER	
<b>TYPICAL SECTIONS</b> BRIDGE NO. HAS-250-0081 CUOH RAILROAD OVER STATE ROUTE 250	
<b>HAS-250-00.81</b> PID No. 99427	
2 / 4	
20 67	

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**PHASE 1 CONSTRUCTION**  
(REAR ABUTMENT SHOWN, FORWARD ABUTMENT SIMILAR)

**PHASE 1 REMOVAL**  
(REAR ABUTMENT SHOWN, FORWARD ABUTMENT SIMILAR)

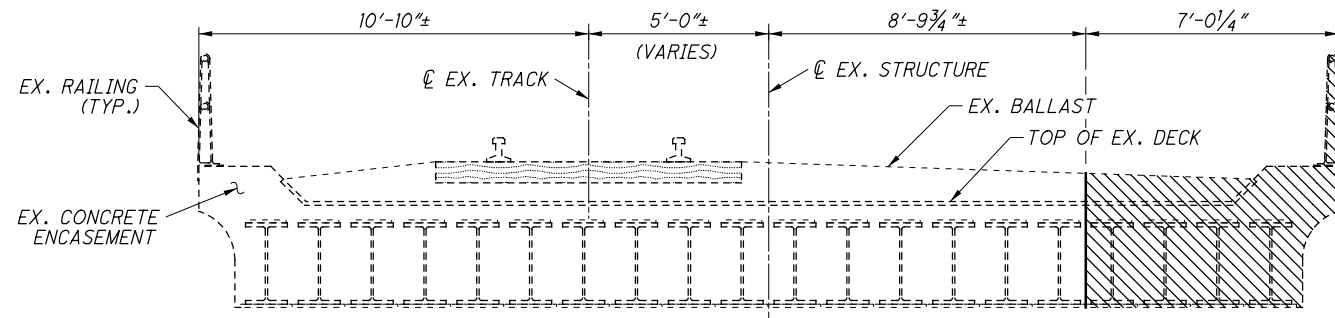


**PHASE 2 CONSTRUCTION**  
(REAR ABUTMENT SHOWN, FORWARD ABUTMENT SIMILAR)

**PHASE 2 REMOVAL**  
(REAR ABUTMENT SHOWN, FORWARD ABUTMENT SIMILAR)

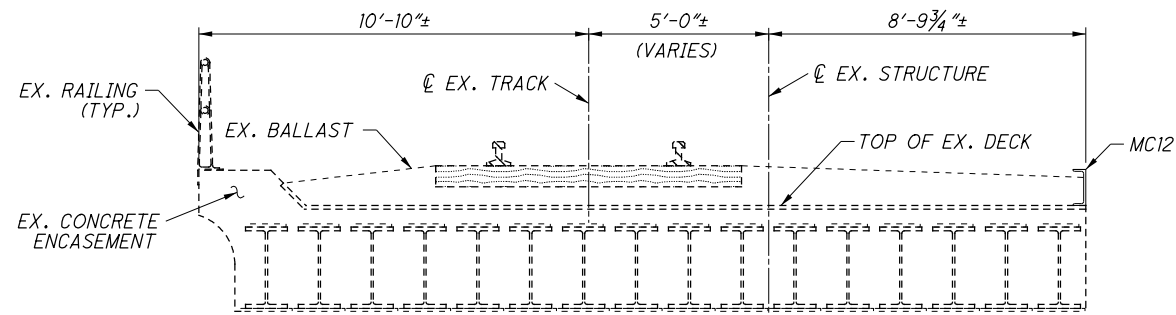
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CHECKED	ETR
DRAWN	MPB
REVISED	
REVIEWED	FJG
DATE	2/20/15
STRUCTURE FILE NUMBER	
<b>HAS-250-00.81</b> PID No. 99427	
SUBSTRUCTURE PHASE CONSTRUCTION DETAILS BRIDGE NO. HAS-250-0081 CUOH RAILROAD OVER STATE ROUTE 250	
3 / 4	
21 / 67	

G:\Project\TOHODT04\_PEO9\Drawings\structures\sheets\99427PC002.dgn 2/20/2015 12:06:27 PM ecurtis

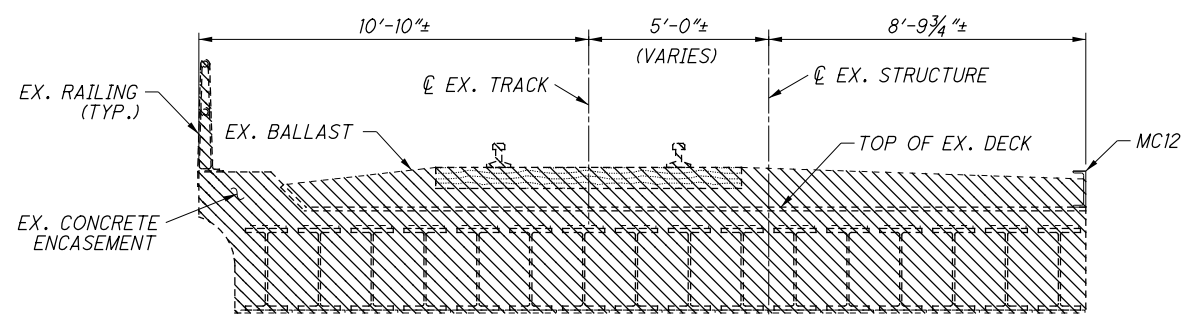
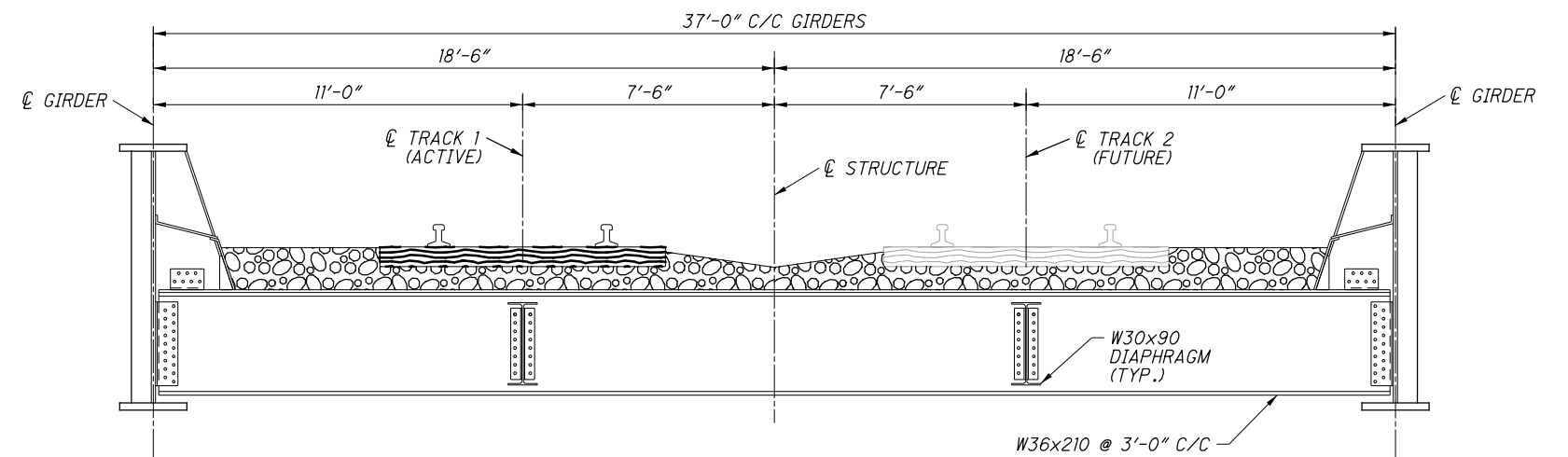


**PHASE 1 REMOVAL**  
(LOOKING WEST)

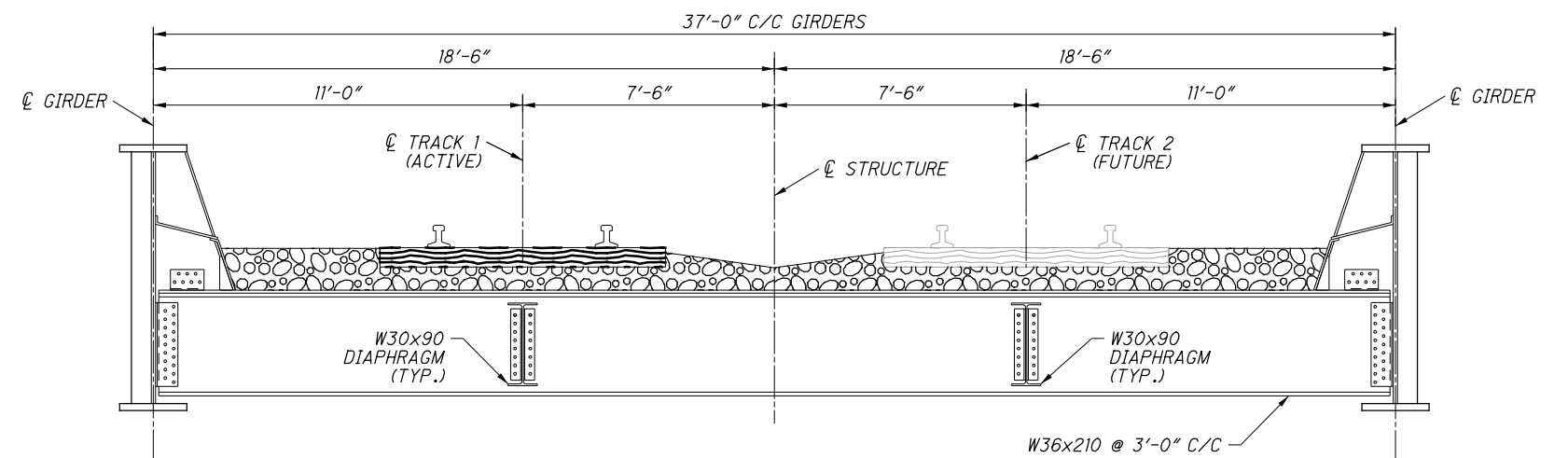
**LEGEND**



**PHASE 1 CONSTRUCTION**  
(LOOKING WEST)

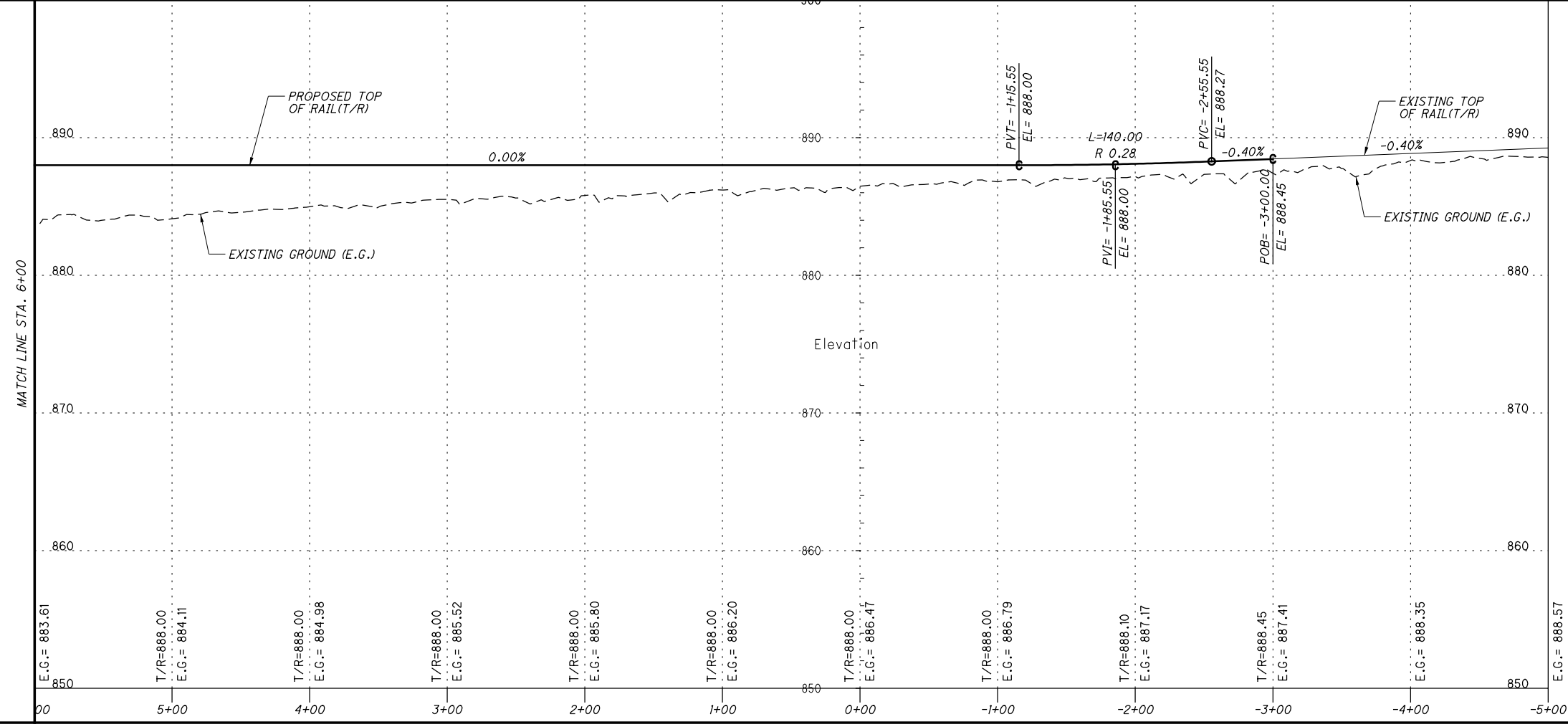


**PHASE 2 REMOVAL**  
(LOOKING WEST)



DESIGN AGENCY <b>ARCADIS</b> ARCADIS U.S., Inc. 222 South Main Street, Suite 300 Akron, Ohio 44308 Tel: 330.434.8995 Fax: 330.374.0995 www.arcadis-us.com	
DESIGNED RBB	DATE 2/2015
CHECKED ETR	REVIEWED FJG
STRUCTURE FILE NUMBER	
SUPERSTRUCTURE PHASE CONSTRUCTION DETAILS	
BRIDGE NO. HAS-250-0081	
CUOH RAILROAD OVER STATE ROUTE 250	
HAS-250-00.81	
PID No. 99427	
4 / 4	
22 / 67	





**TRACK 1 PLAN AND PROFILE**  
**ALTERNATE 2 - STA. -3+00 TO STA. 6+00**

**HAS-250-00.81**

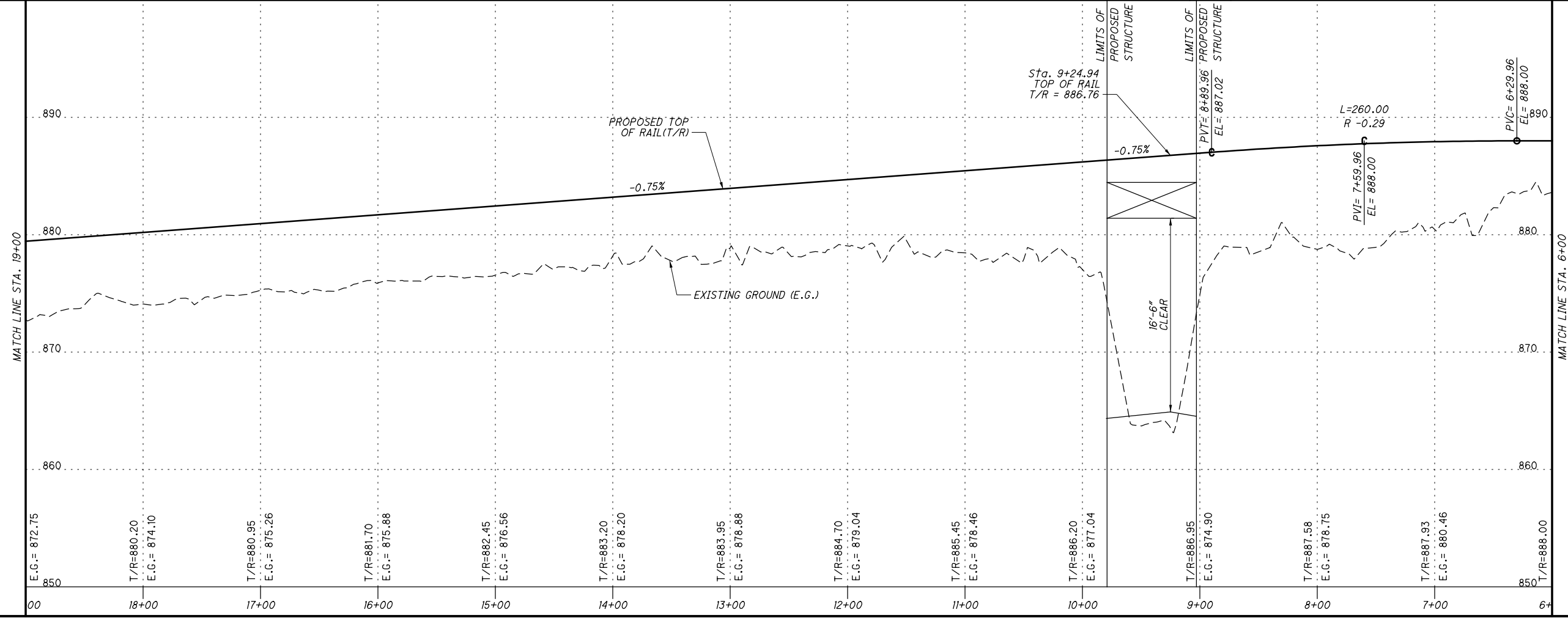


G:\Ira\TOHODT04\_ODOT HAS-250\TRAN\Sheet\99427GP302.dgn 2/19/2015 12:57:22 PM chawkins



NOTE:  
 PROPOSED TRACK 1 ROADBED WILL  
 TRANSITION FROM THE SOUTH SIDE OF  
 FUTURE TRACK TO THE NORTH SIDE  
 FROM STA. 13+00 TO STA. 15+00. SEE  
 TYPICAL SECTIONS AND CROSS SECTIONS.

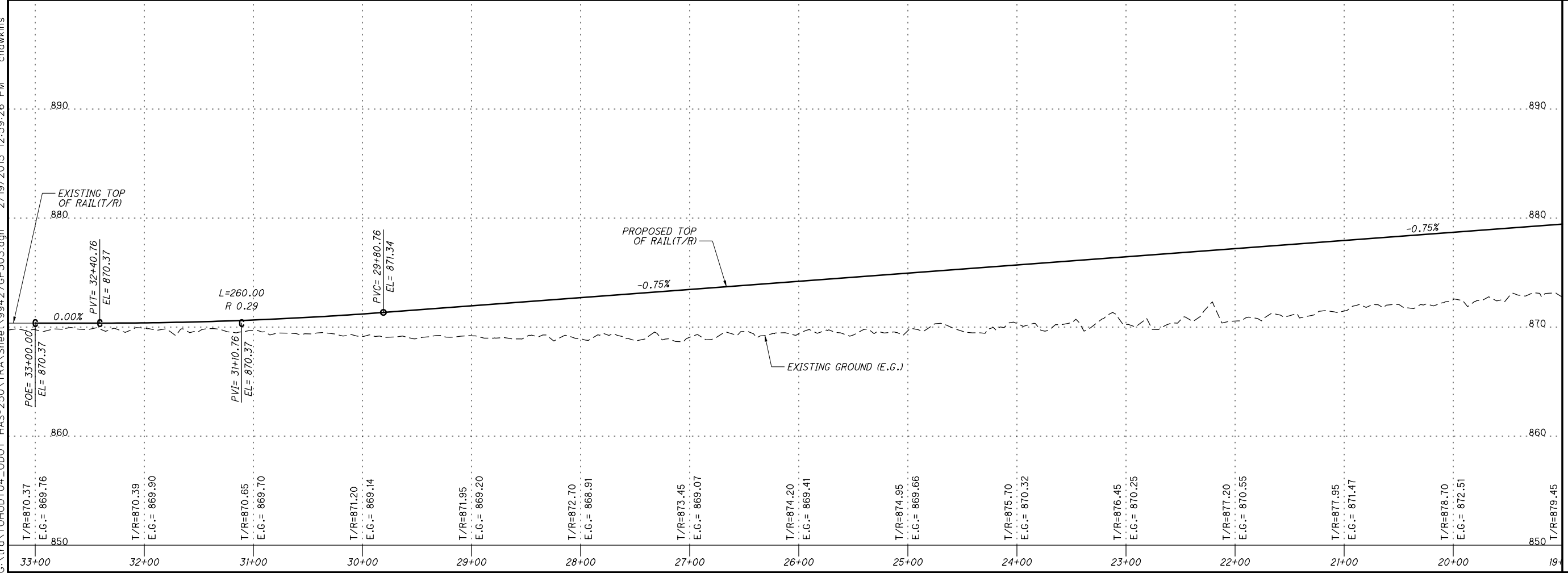
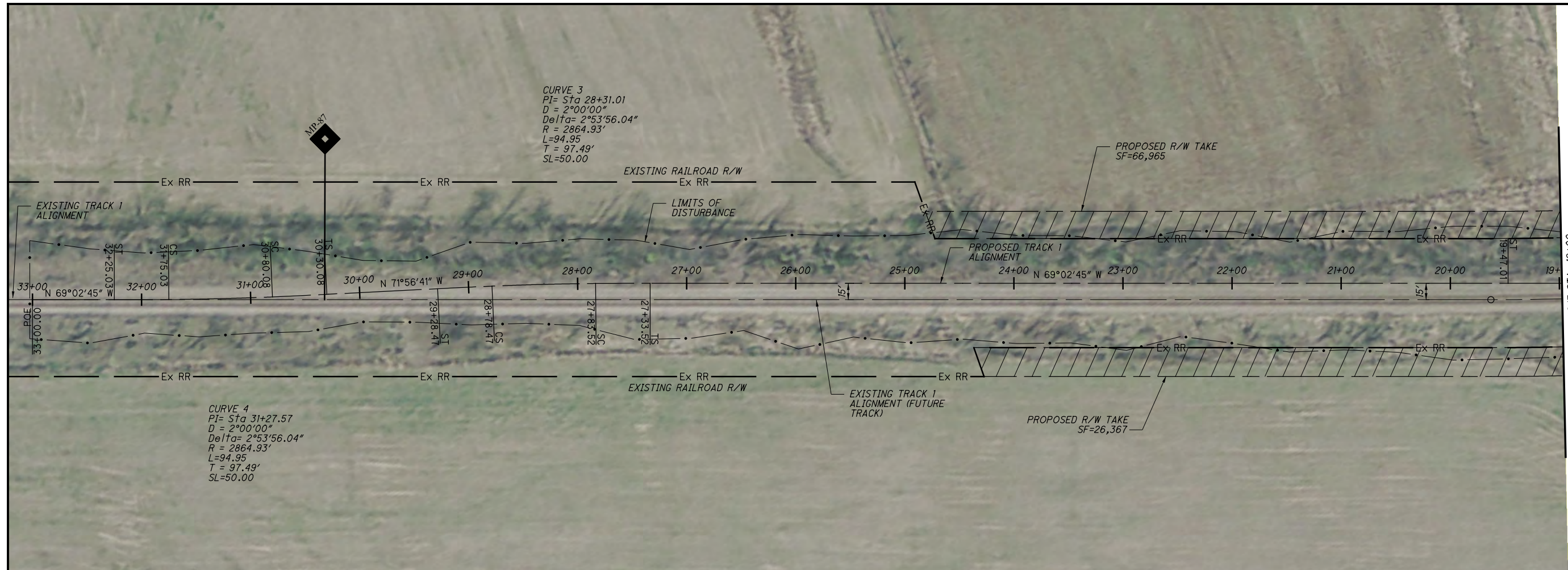
CURVE 2  
 PI= Sta 14+92.65  
 D = 2°30'00"  
 Delta = 20°57'15.36"  
 R = 2292.01'  
 L=758.24'  
 T = 463.87'  
 SL=80.00



TRACK 1 PLAN AND PROFILE  
 ALTERNATE 2 - STA. 6+00 TO STA. 19+00



G:\tra\TOHODT04\_ODOT\_HAS-250\TRA\Sheet\99427GP303.dgn 2/19/2015 12:59:26 PM chawkins

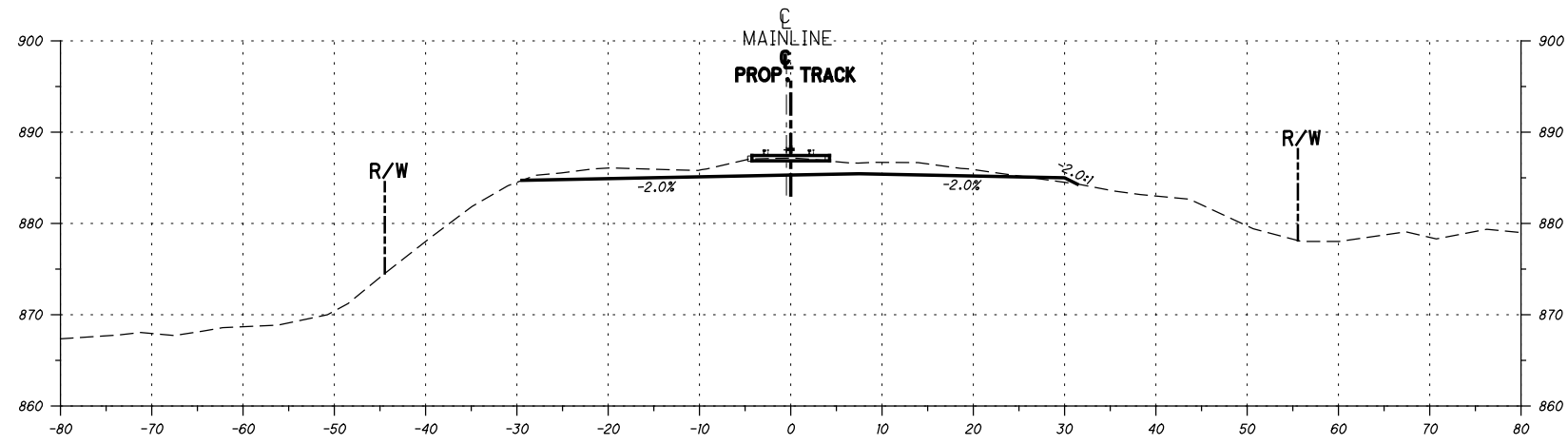


TRACK 1 PLAN AND PROFILE  
 ALTERNATE 2 - STA. 19+00 TO STA. 33+00

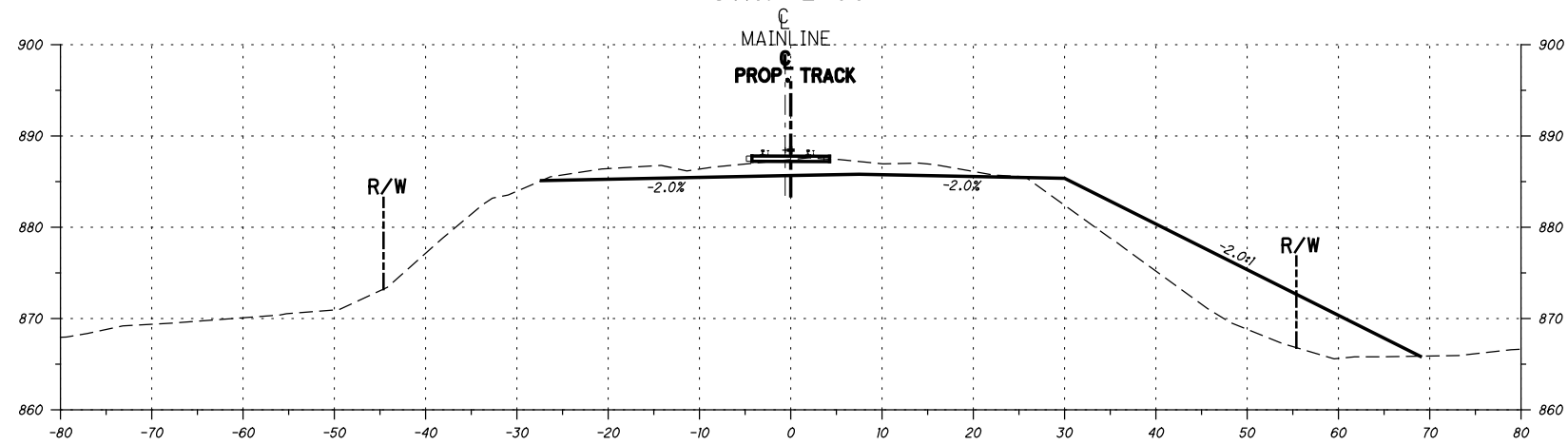
HAS-250-00.81

25  
67

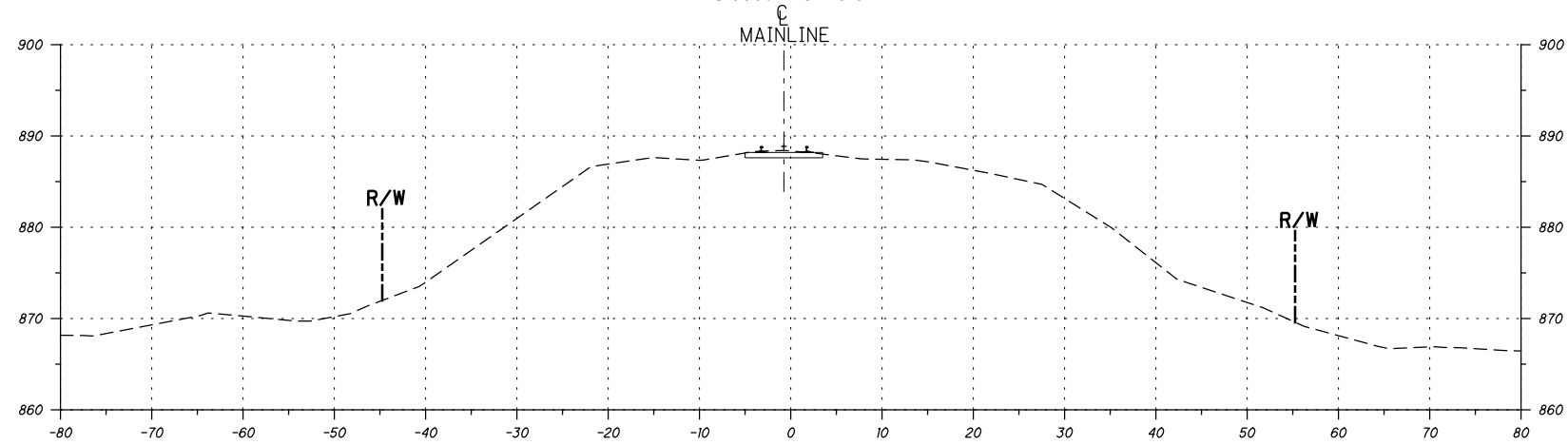
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STA. -2+00



STA. -3+00



STA. -4+00

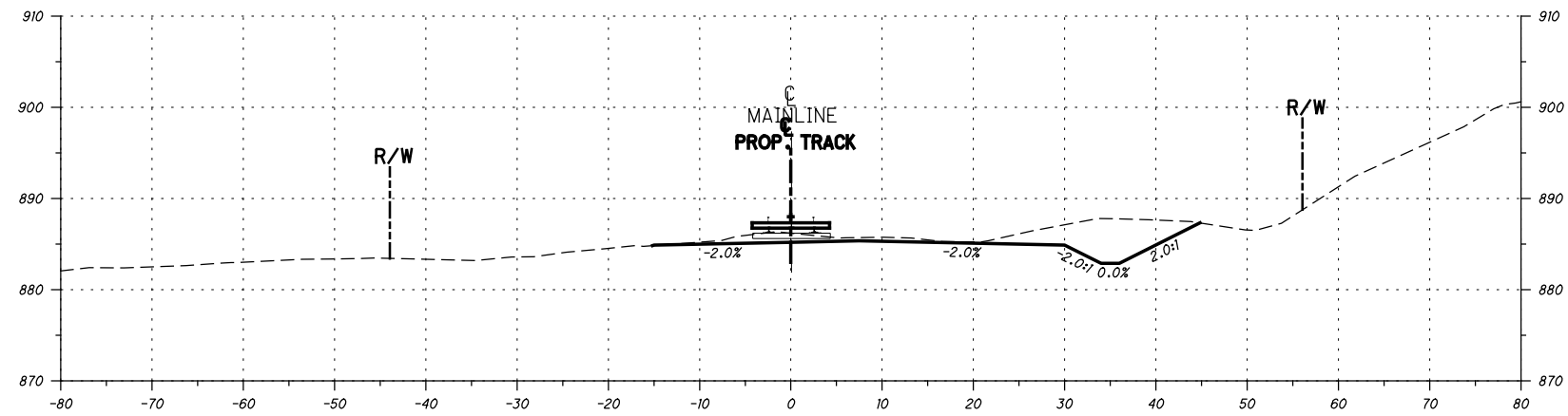
CALCULATED
CMH
CHECKED
JAB

TRACK 1 CROSS SECTIONS  
ALTERNATE 2 - STA. -4+00 TO STA. -2+00

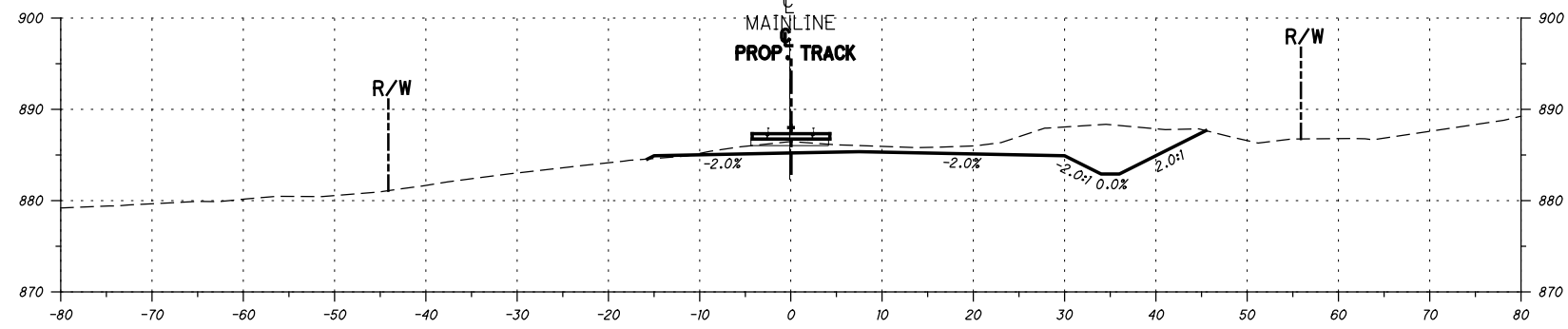
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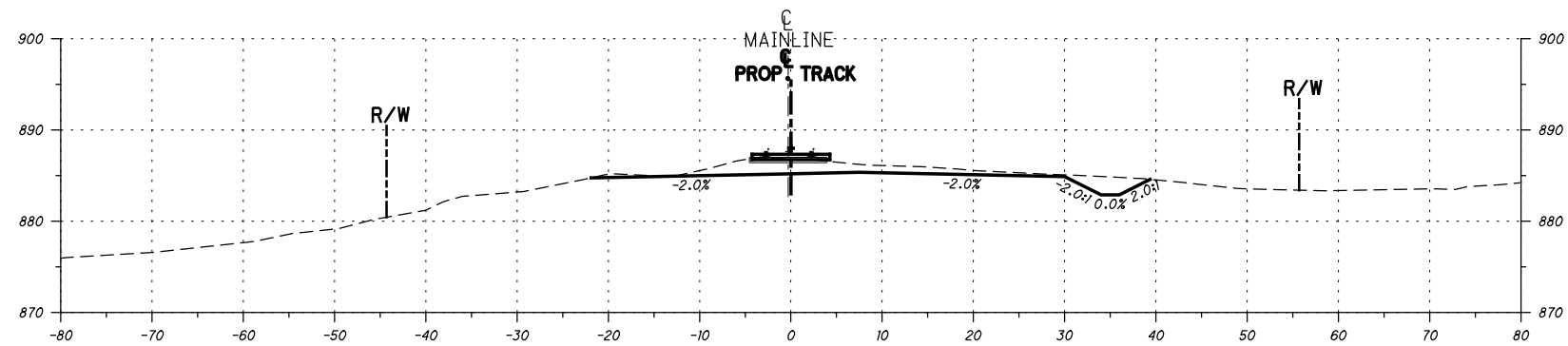
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STA. 1+00



STA. 0+00



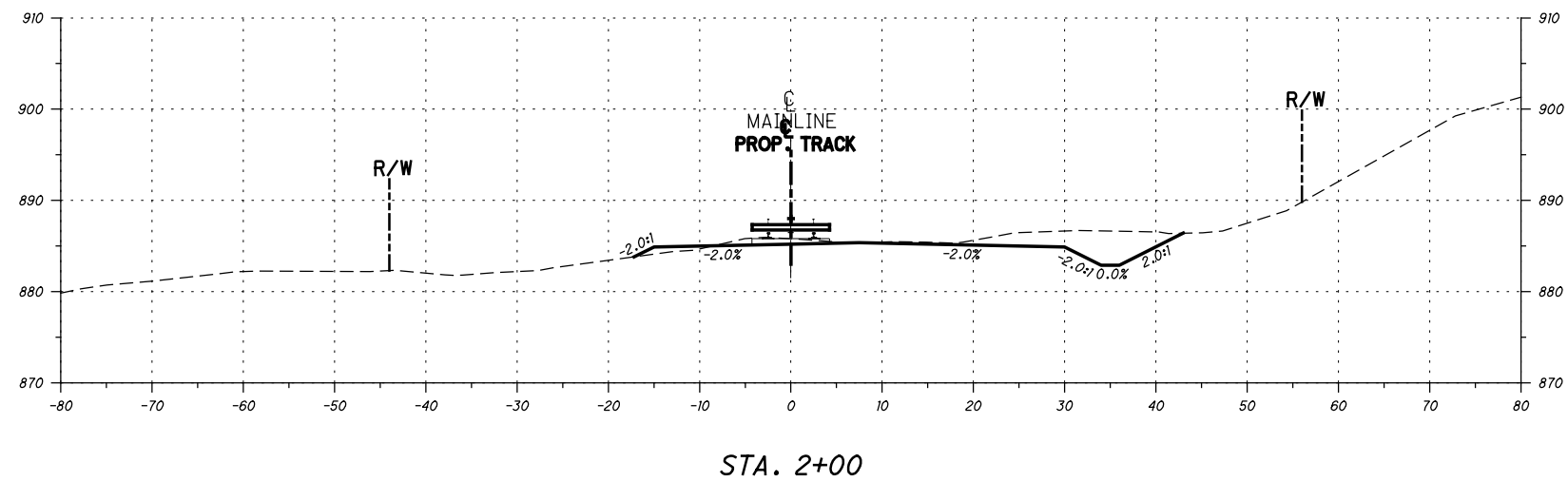
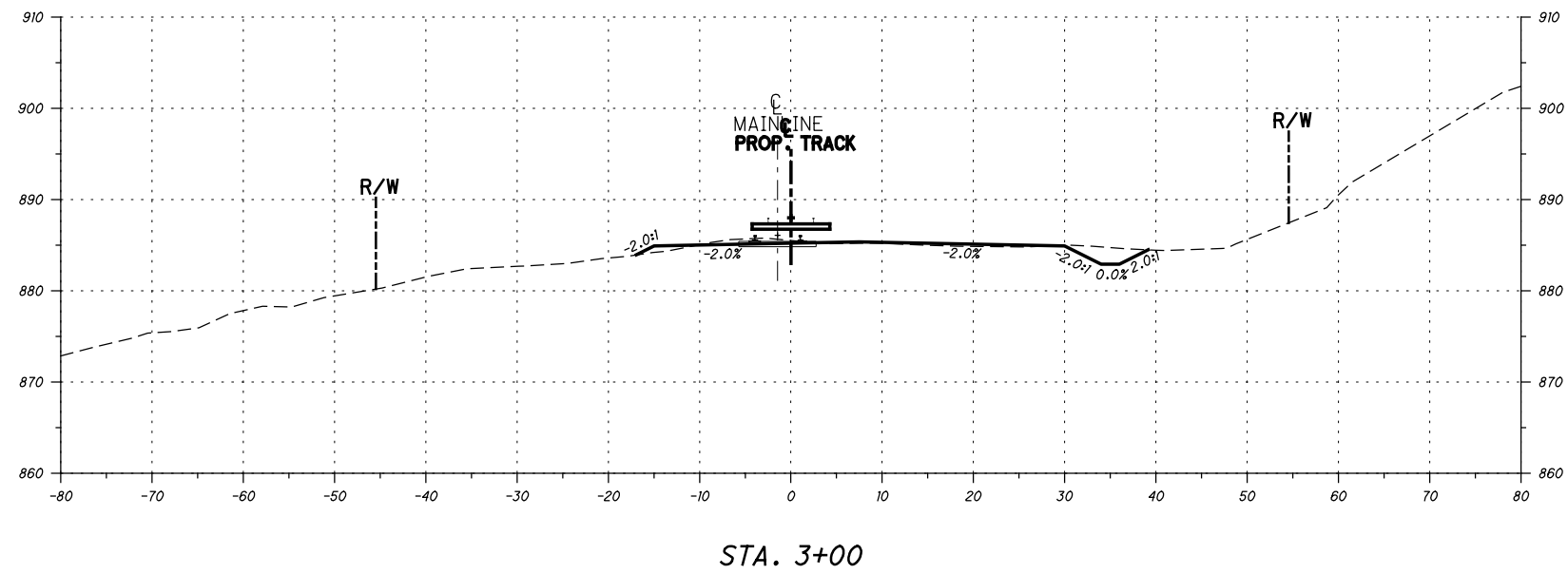
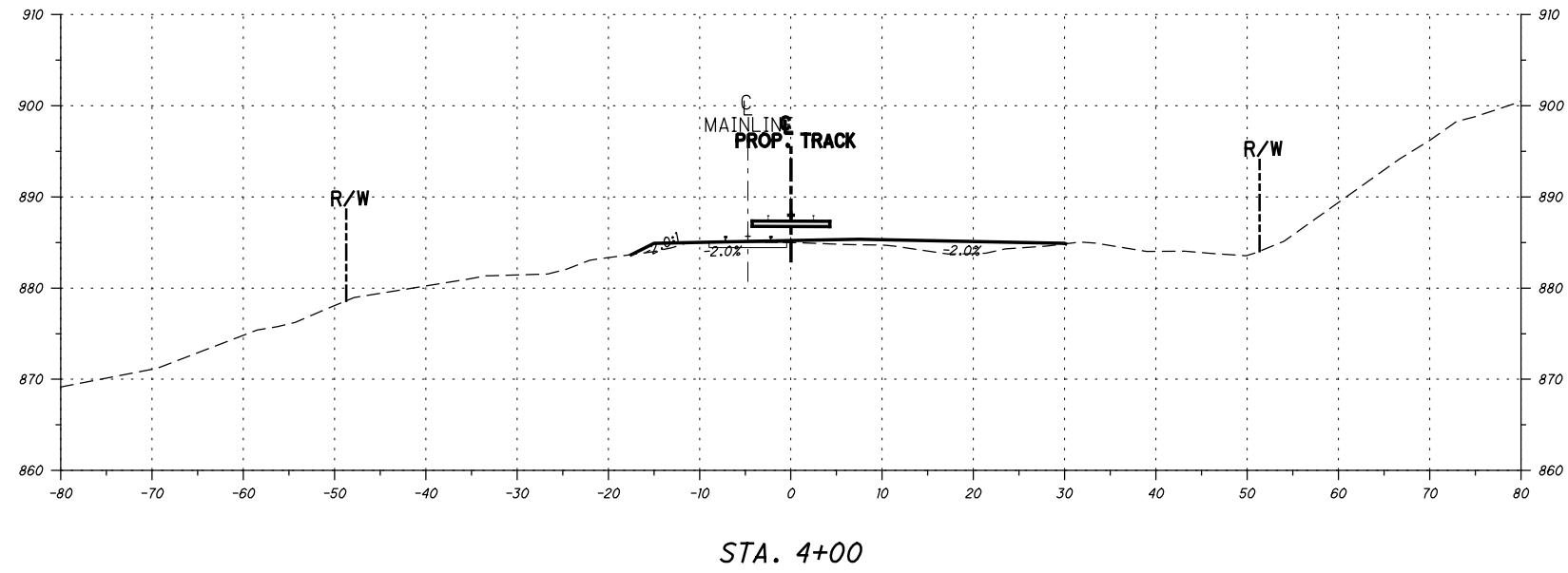
STA. -1+00

CALCULATED
CMH
CHECKED
JAB

TRACK 1 CROSS SECTIONS  
ALTERNATE 2 - STA. -1+00 TO STA. 1+00

HAS-250-00.81

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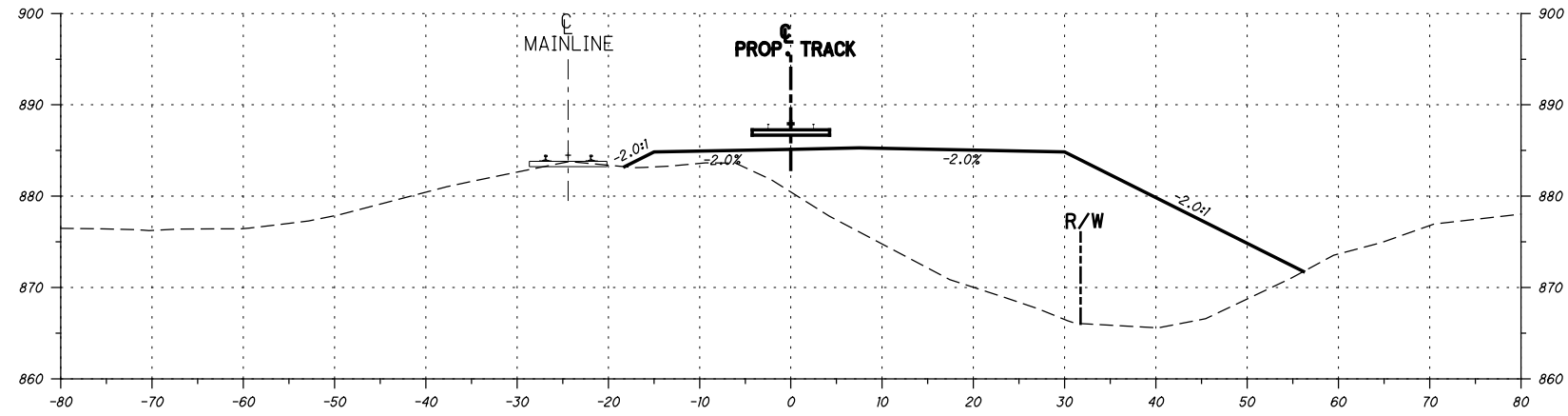


CALCULATED
CMH
CHECKED
JAB

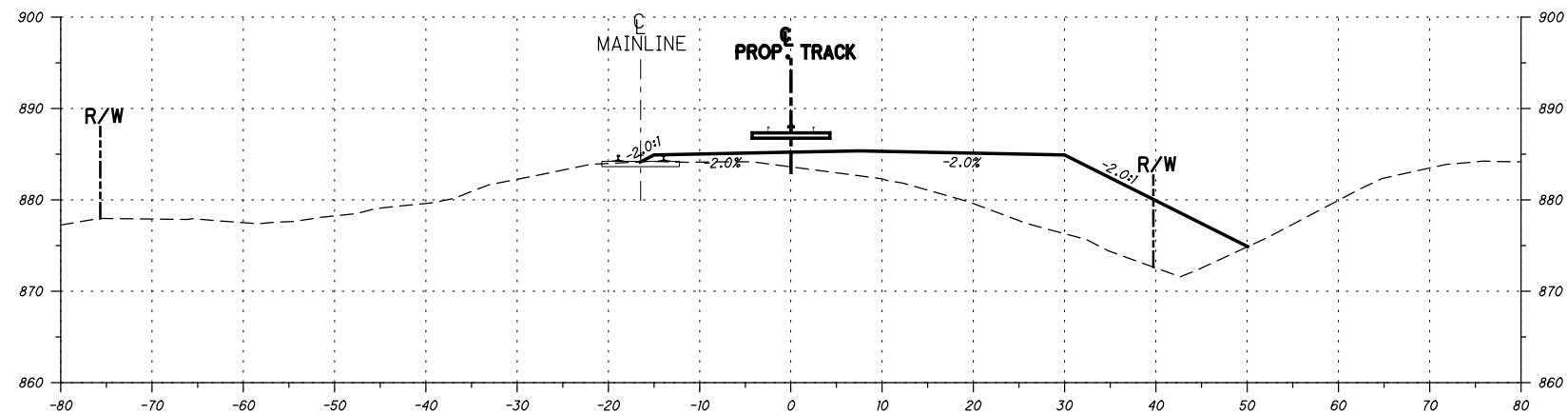
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ALTERNATE 2 - STA. 2+00 TO STA. 4+00

HAS-250-00.81

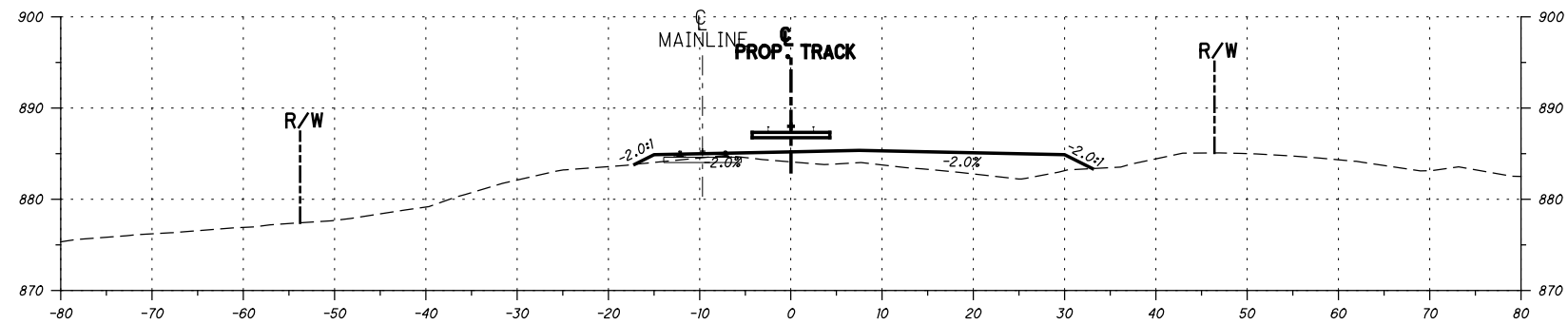
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STA. 7+00



STA. 6+00



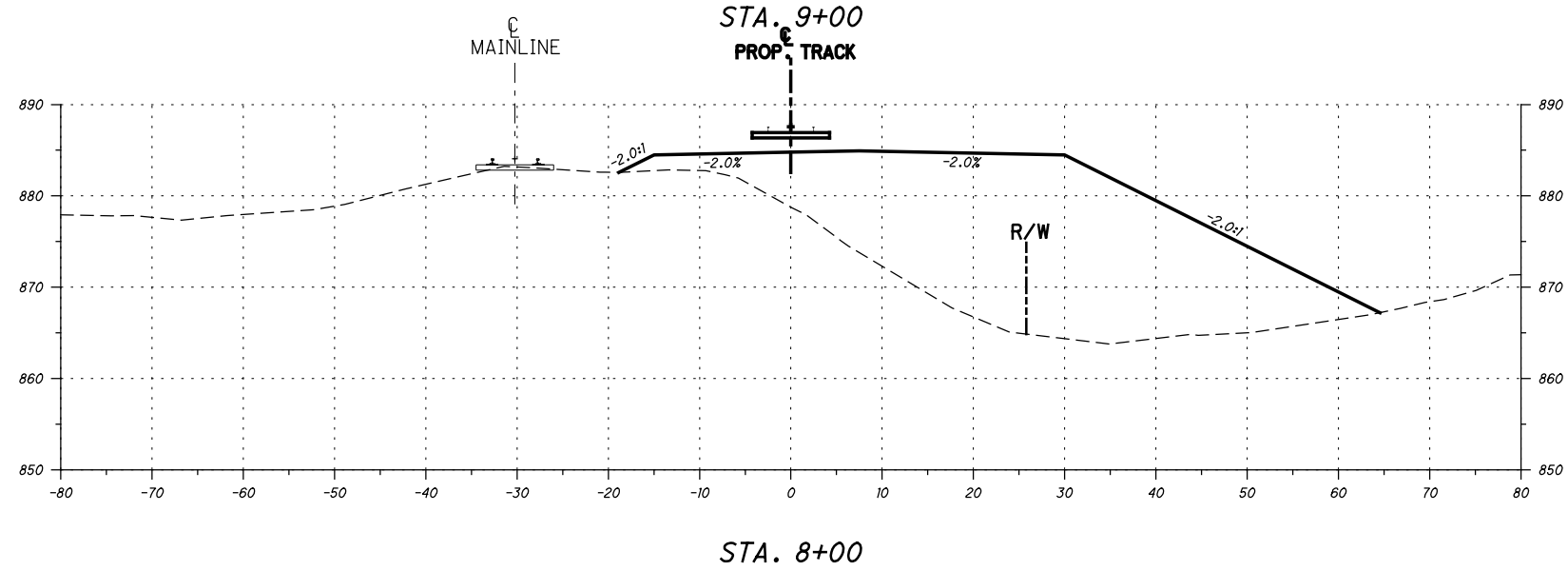
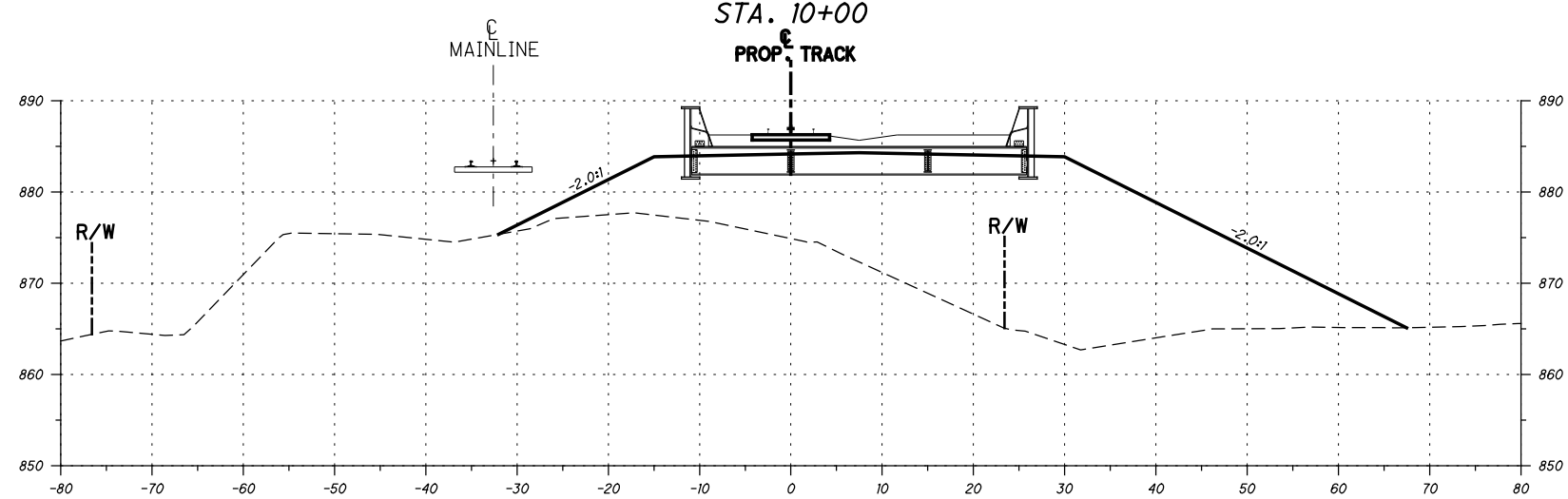
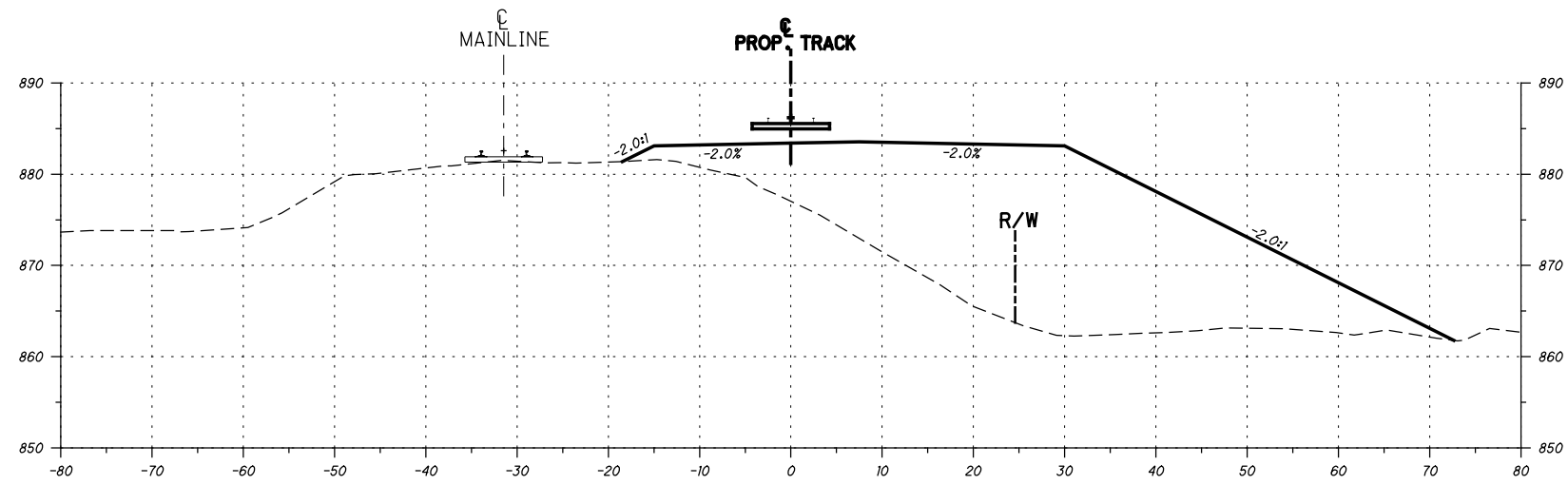
STA. 5+00

CALCULATED
CMH
CHECKED
JAB

TRACK 1 CROSS SECTIONS  
ALTERNATE 2 - STA. 5+00 TO STA. 7+00

HAS-250-00.81

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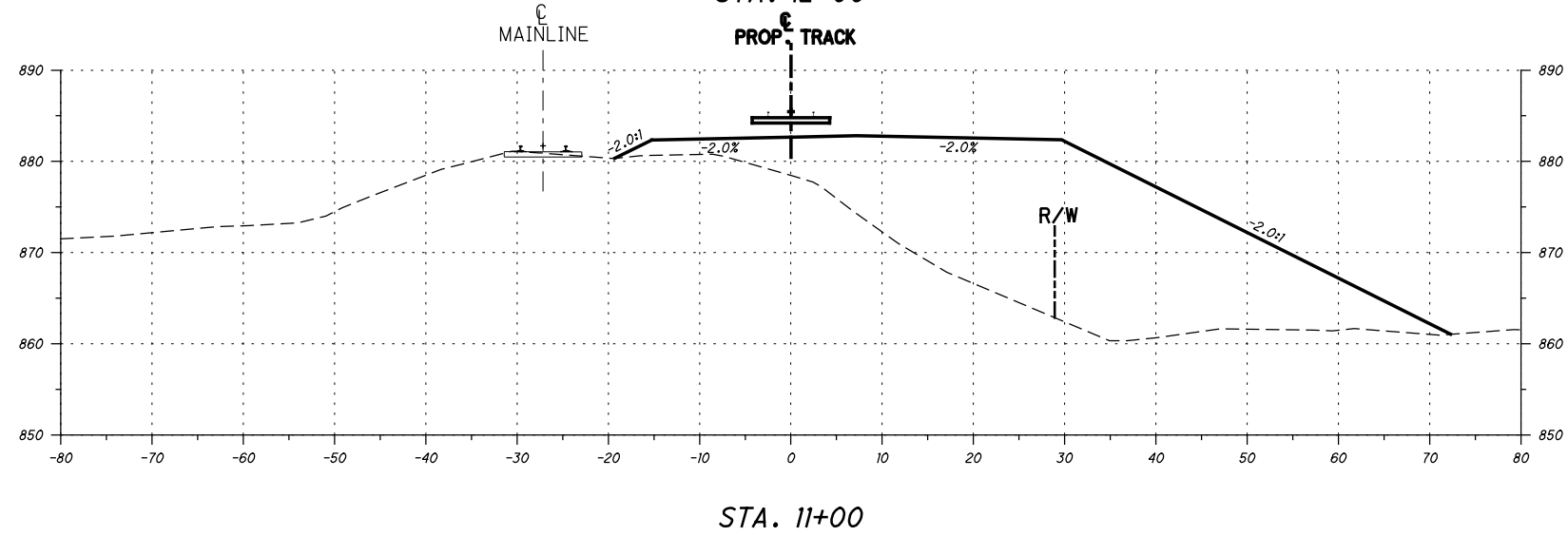
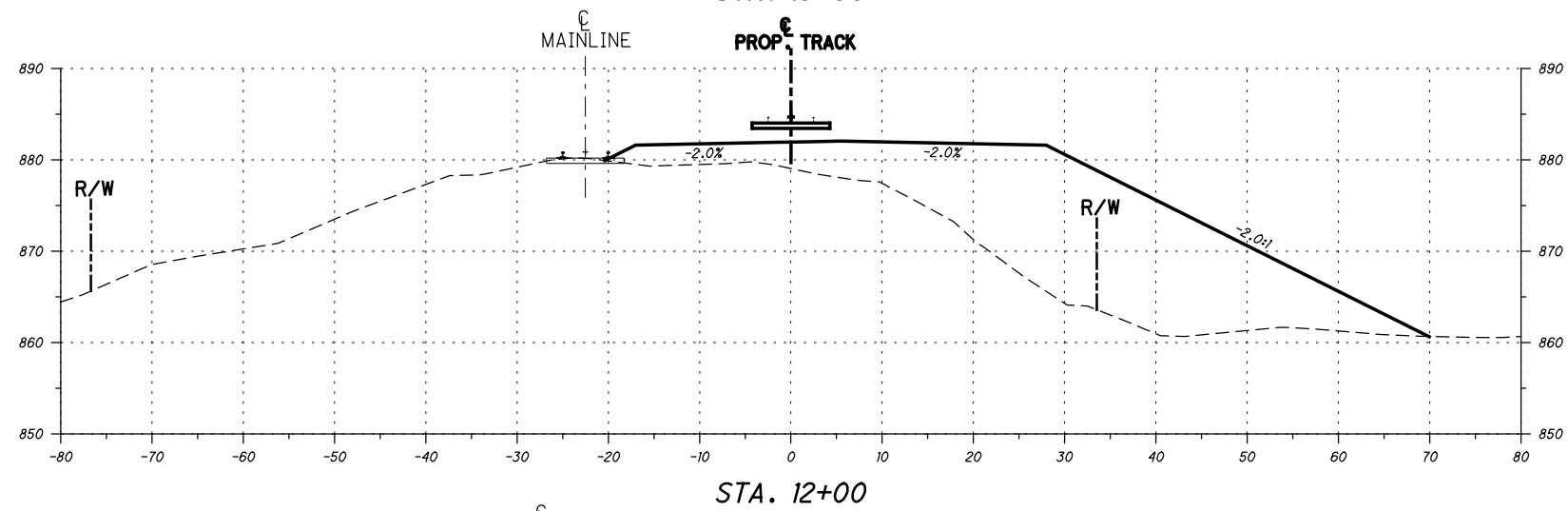
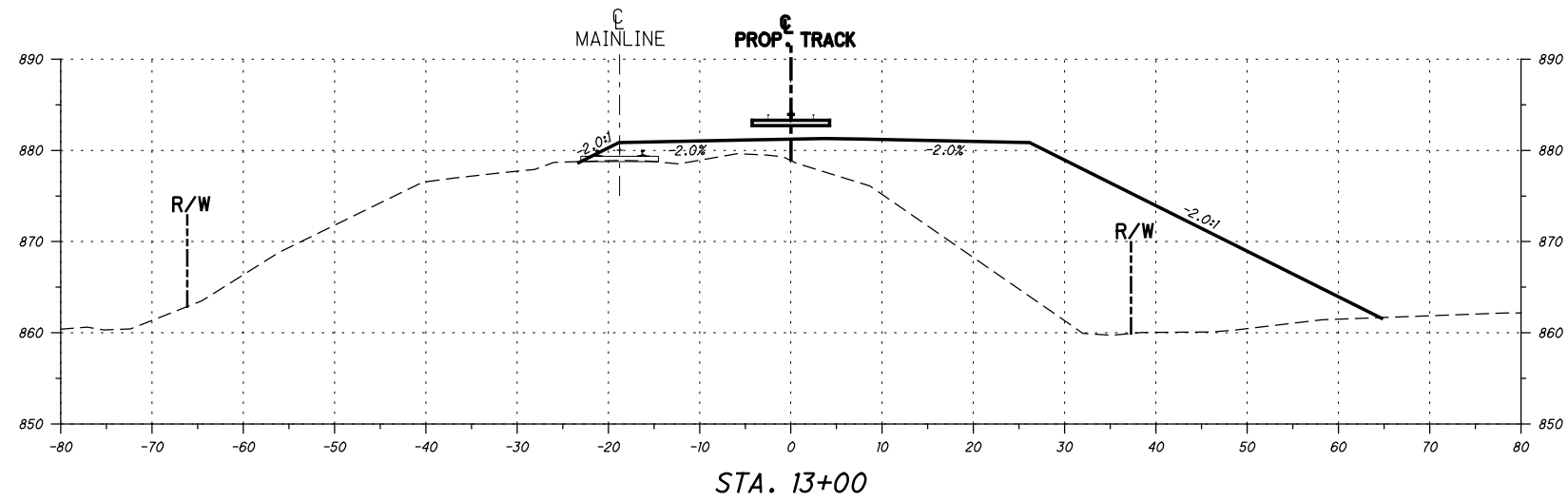
CALCULATED
CMH
CHECKED
JAB

TRACK 1 CROSS SECTIONS  
ALTERNATE 2 - STA. 8+00 TO STA. 10+00

HAS-250-00.81

30  
67

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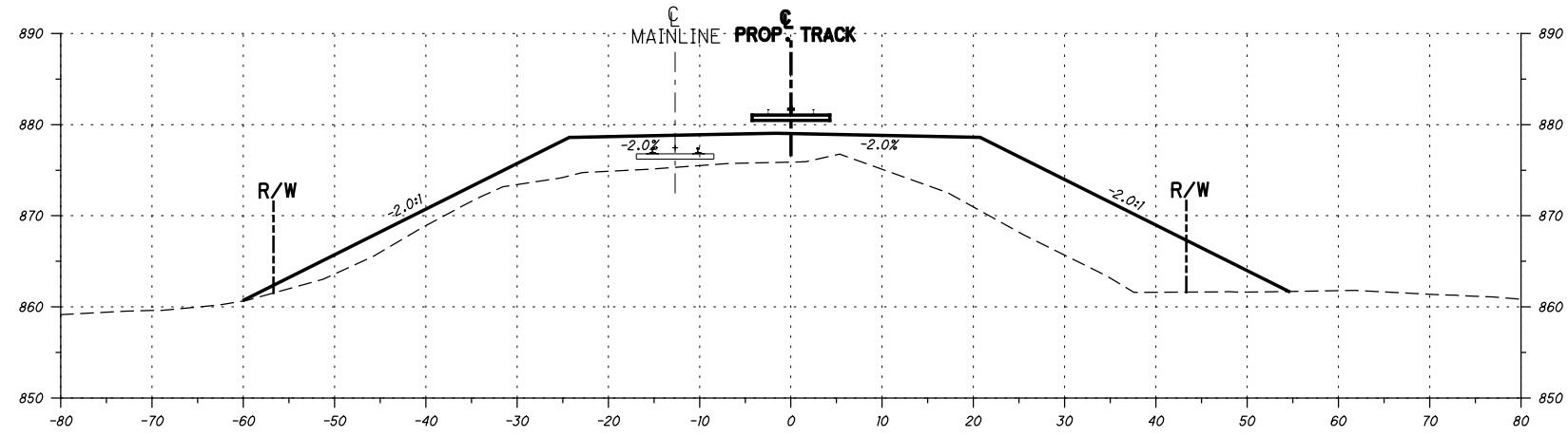


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CHECKED
JAB

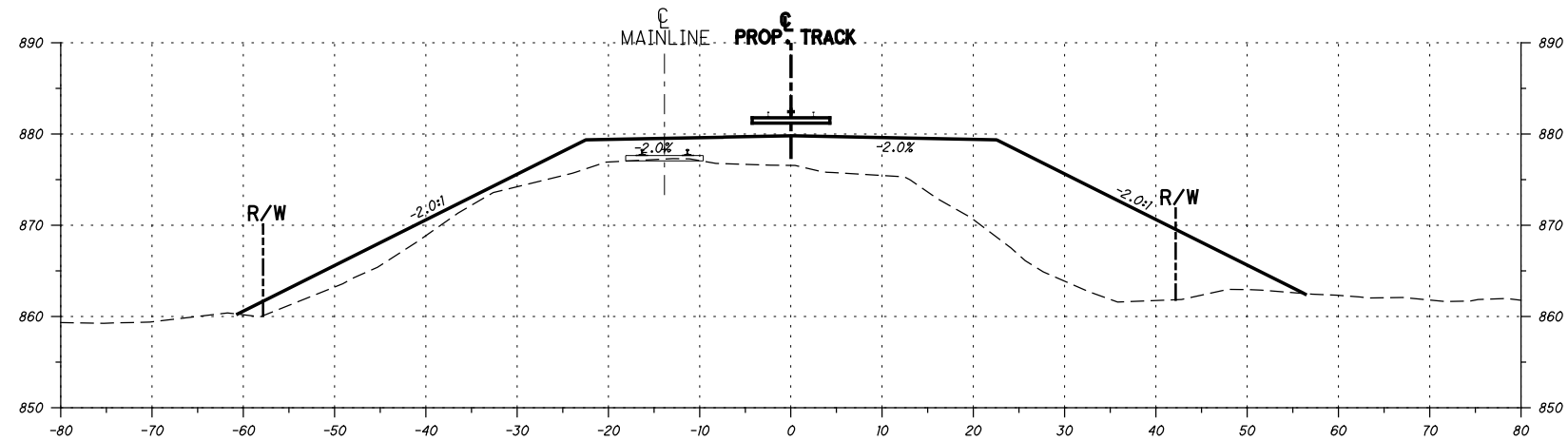
TRACK 1 CROSS SECTIONS  
ALTERNATE 2 - STA. 11+00 TO STA. 13+00

HAS-250-00.81

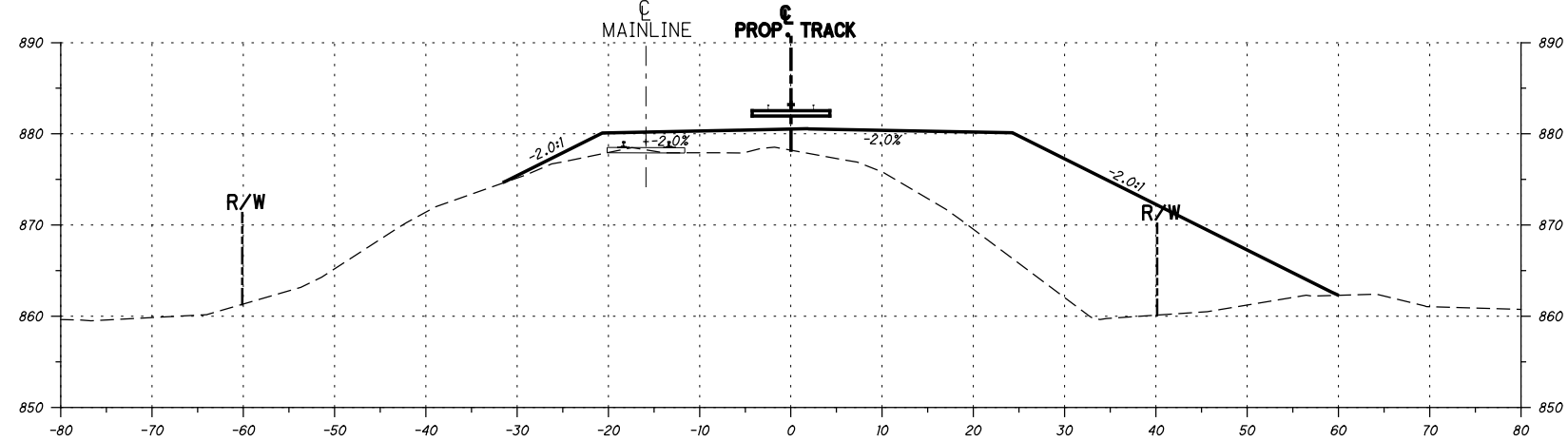
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STA. 16+00



STA. 15+00



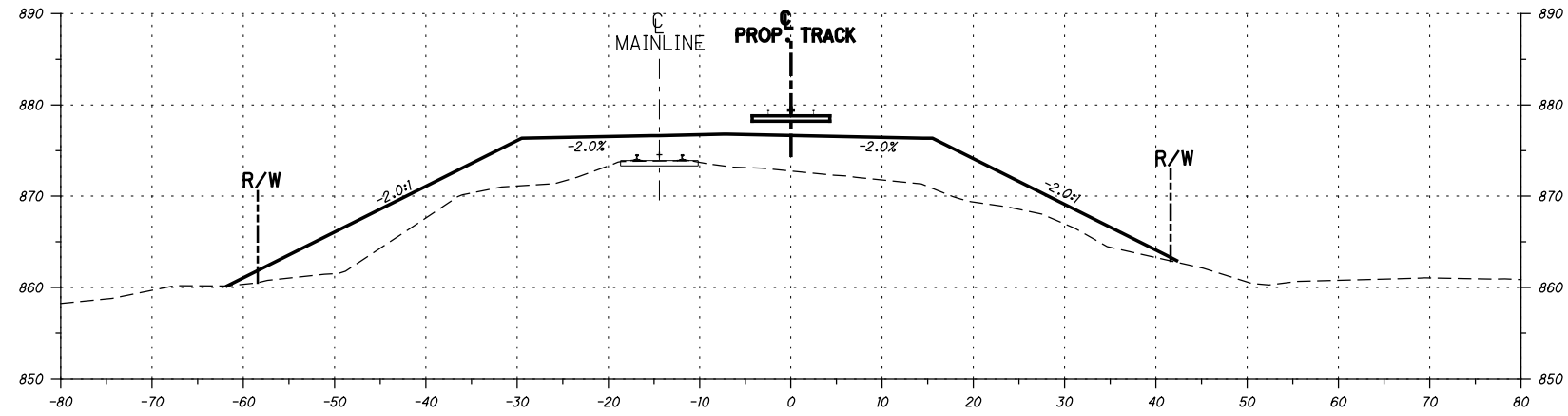
STA. 14+00

CALCULATED
CMH
CHECKED
JAB

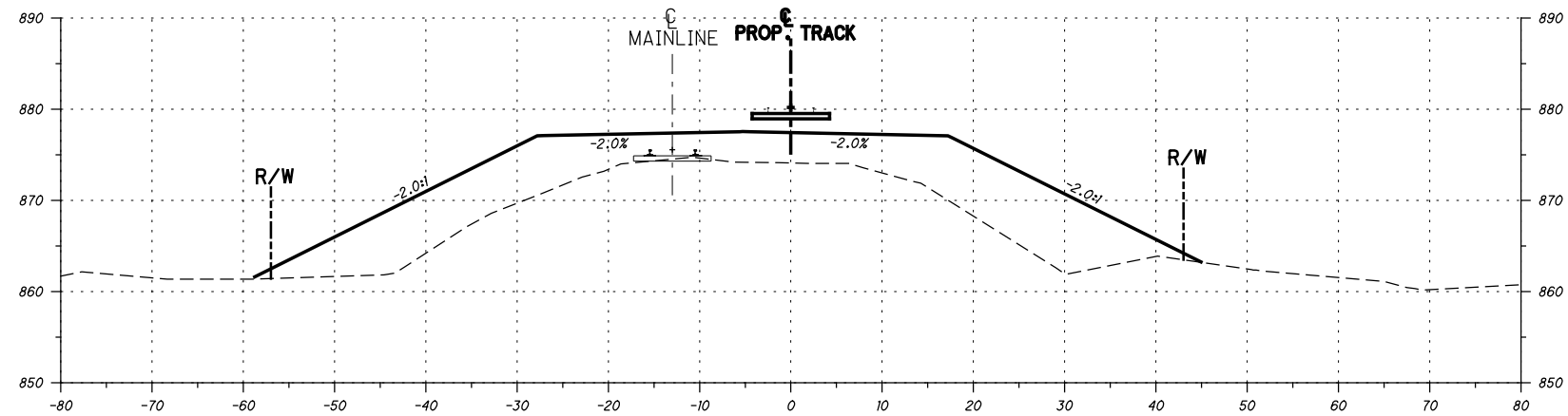
TRACK 1 CROSS SECTIONS  
ALTERNATE 2 - STA. 14+00 TO STA. 16+00

HAS-250-00.81

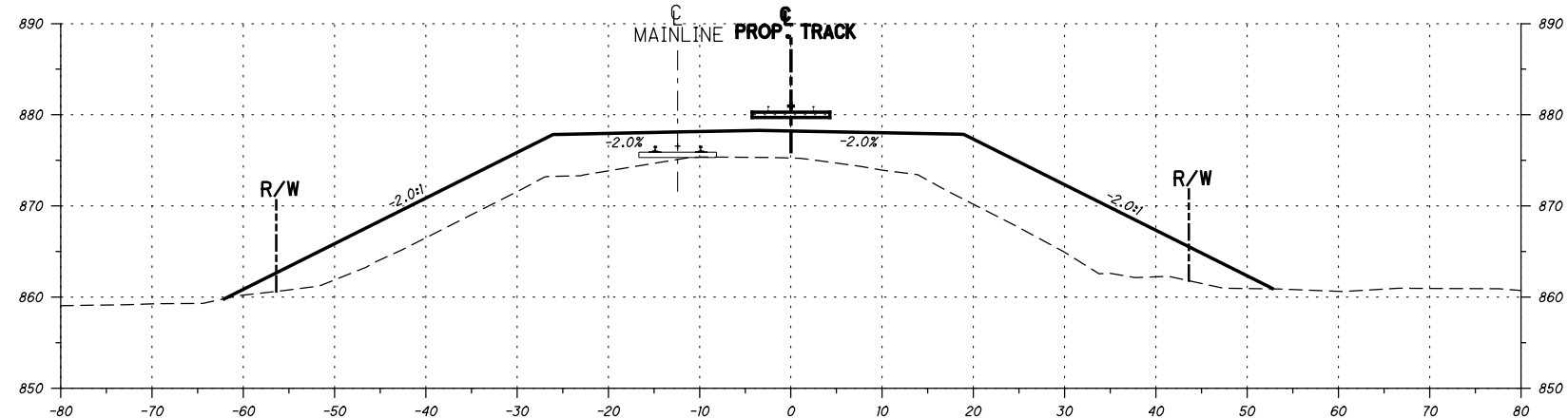
32  
67



STA. 19+00



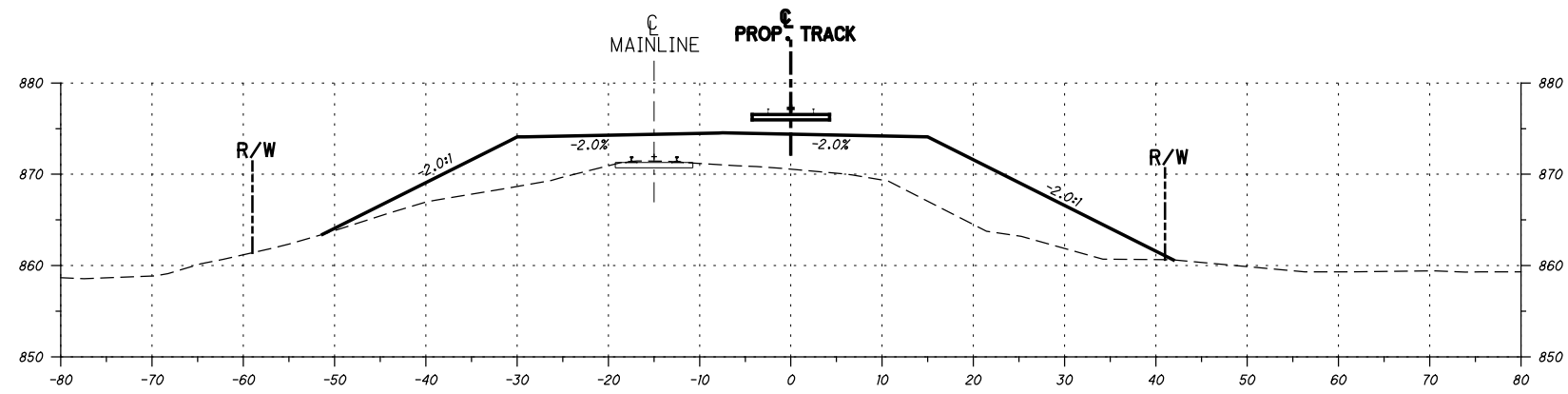
STA. 18+00



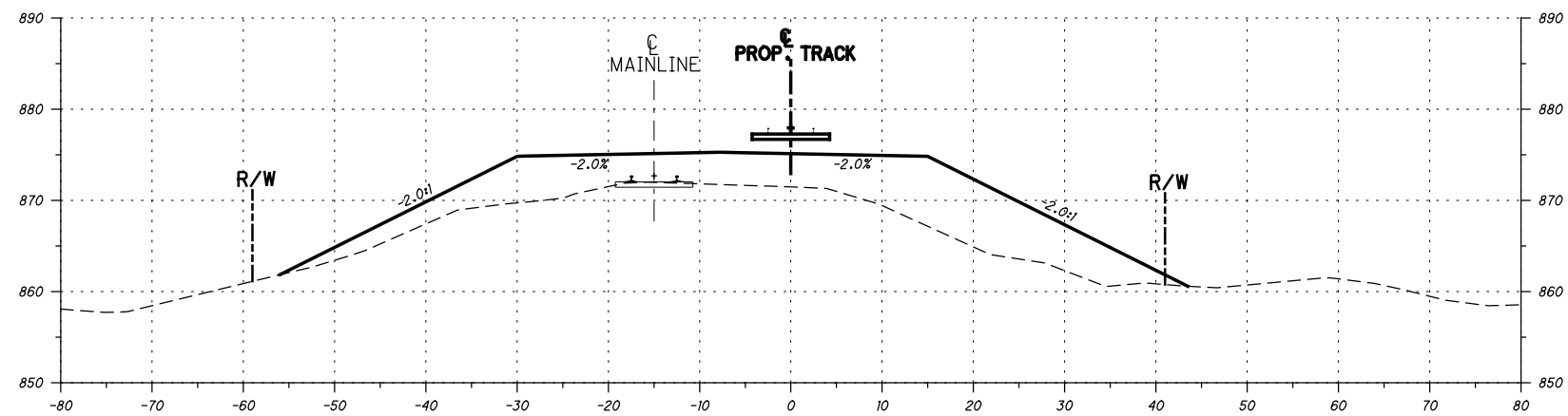
STA. 17+00



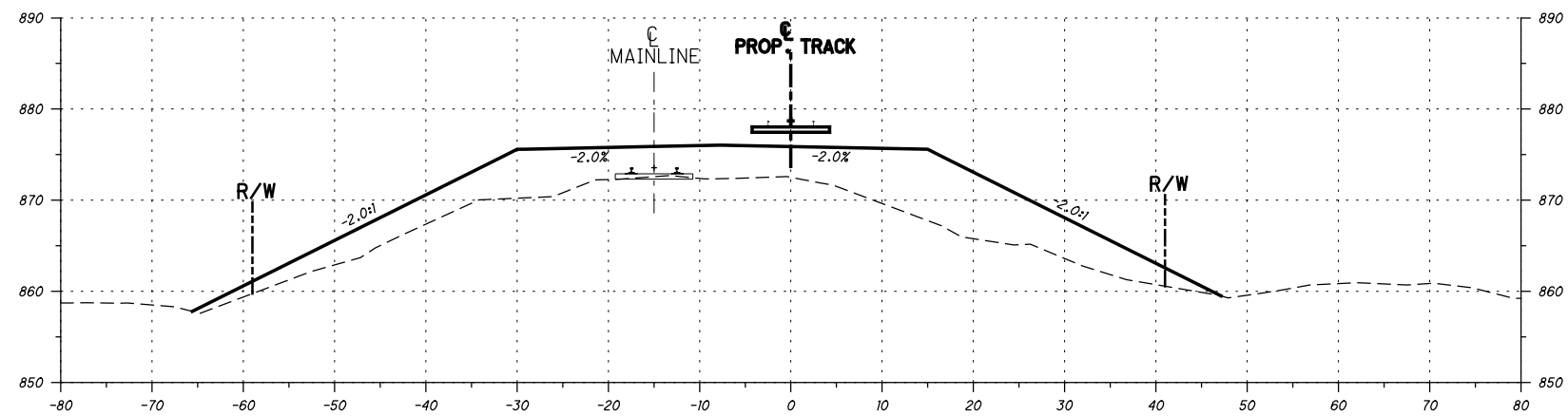
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STA. 22+00



STA. 21+00



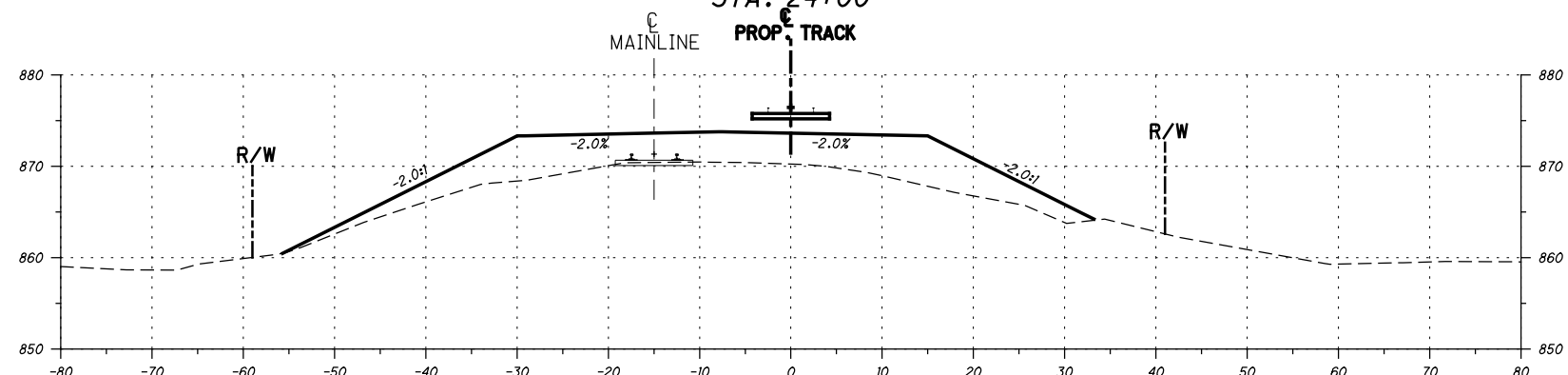
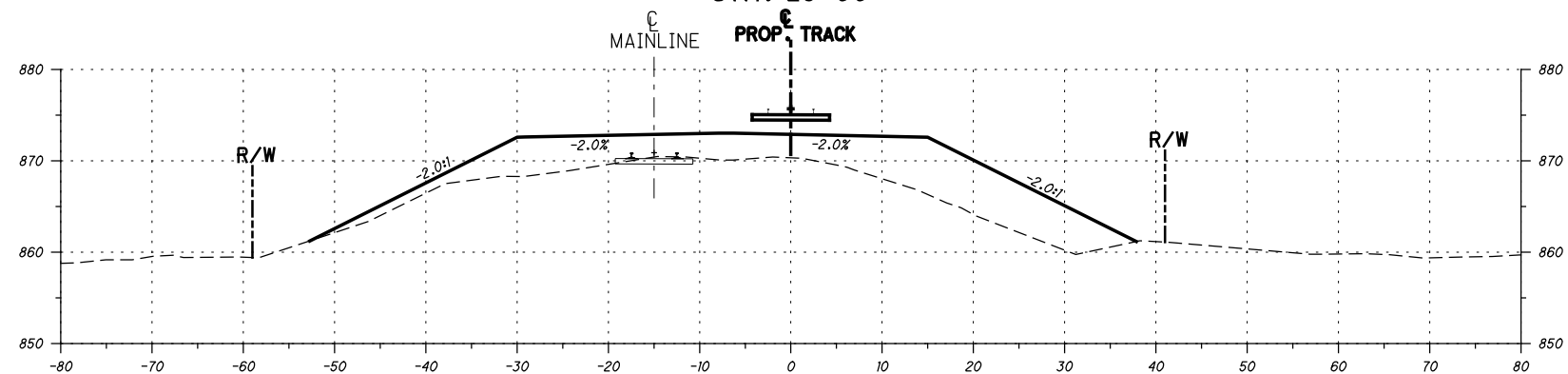
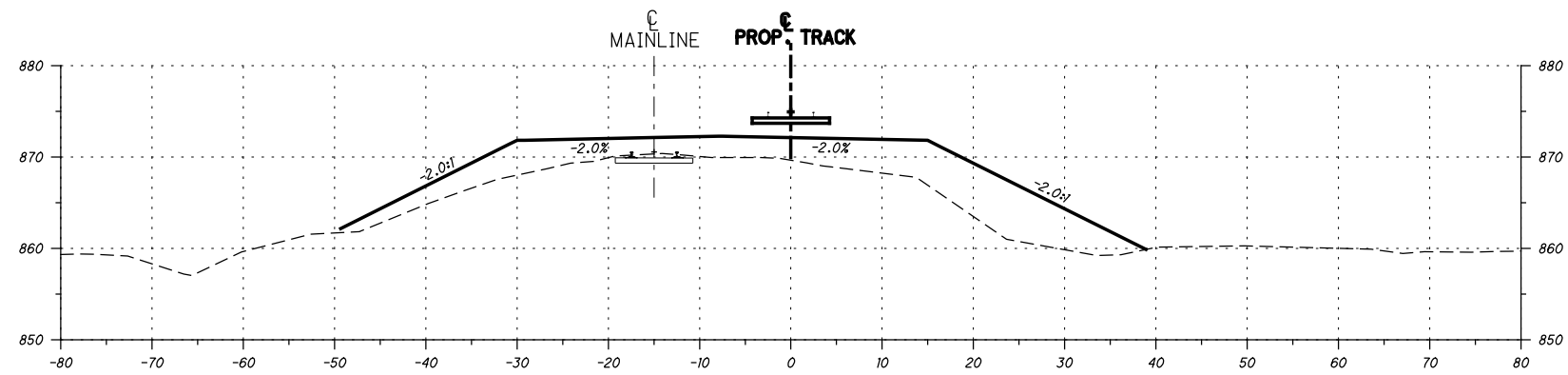
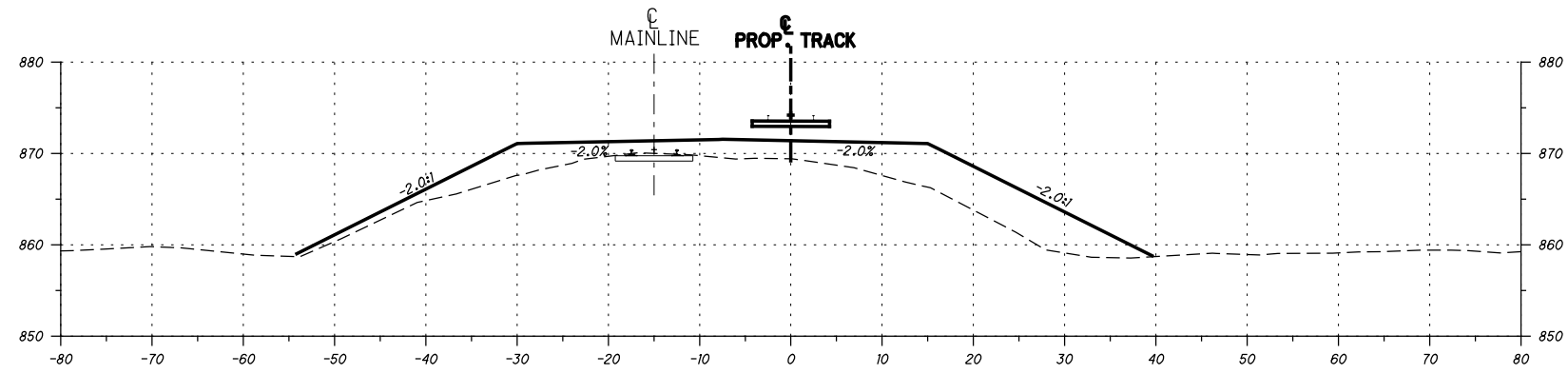
STA. 20+00

CALCULATED
CMH
CHECKED
JAB

TRACK 1 CROSS SECTIONS  
ALTERNATE 2 - STA. 20+00 TO STA. 22+00

HAS-250-00.81

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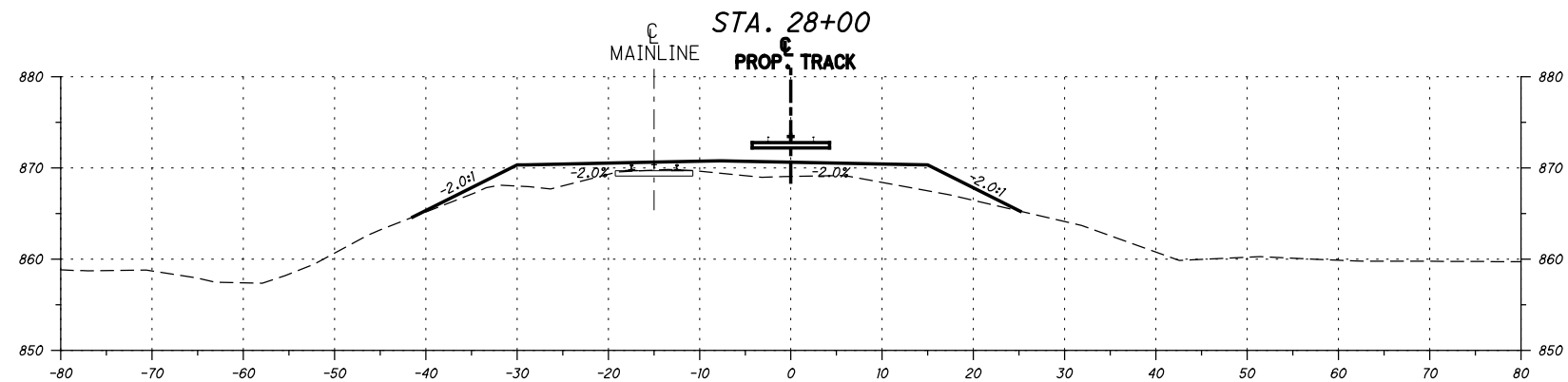
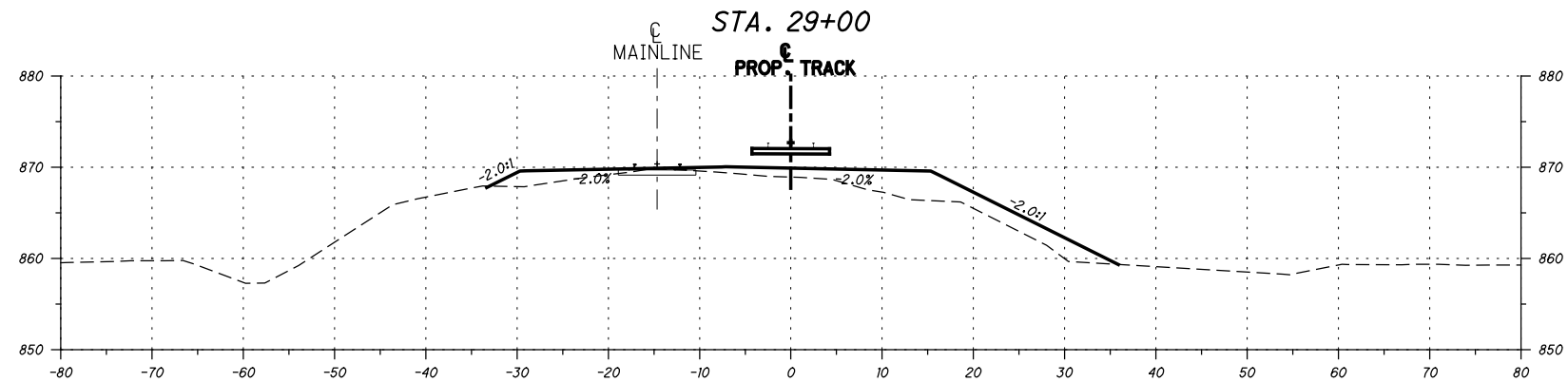
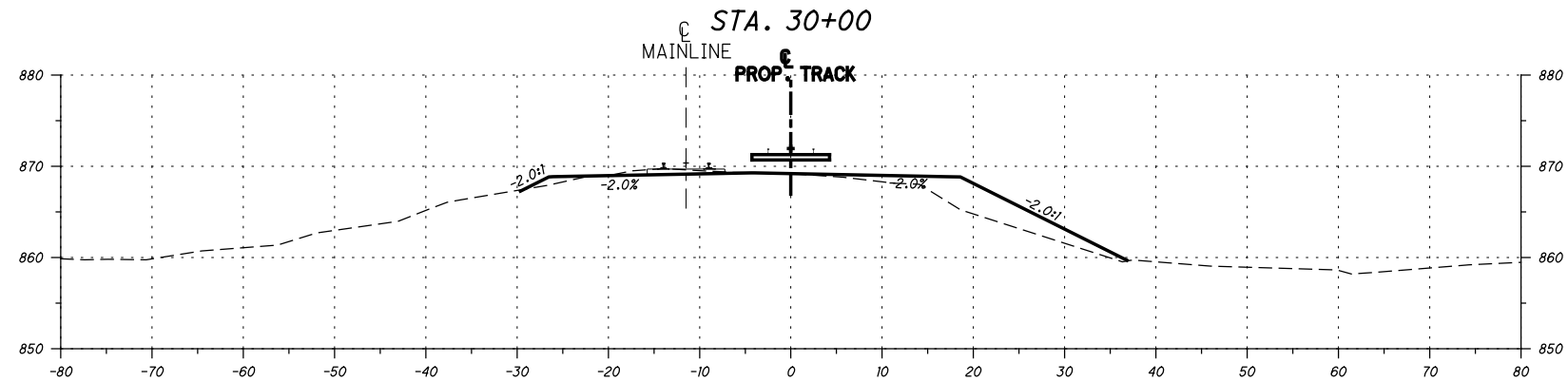
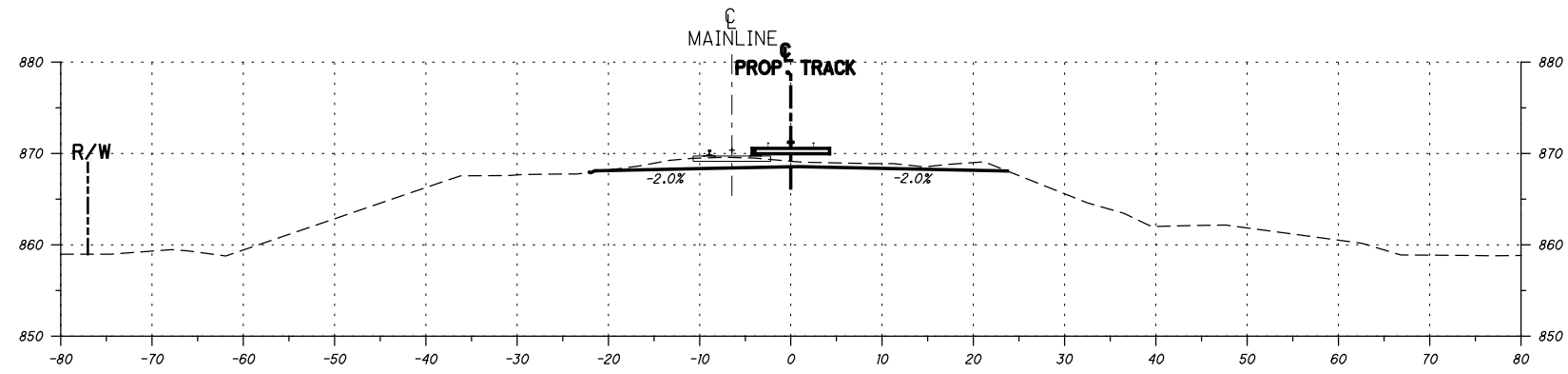


CALCULATED
CMH
CHECKED
JAB

TRACK 1 CROSS SECTIONS  
ALTERNATE 2 - STA. 23+00 TO STA. 26+00

HAS-250-00.81

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STA. 27+00

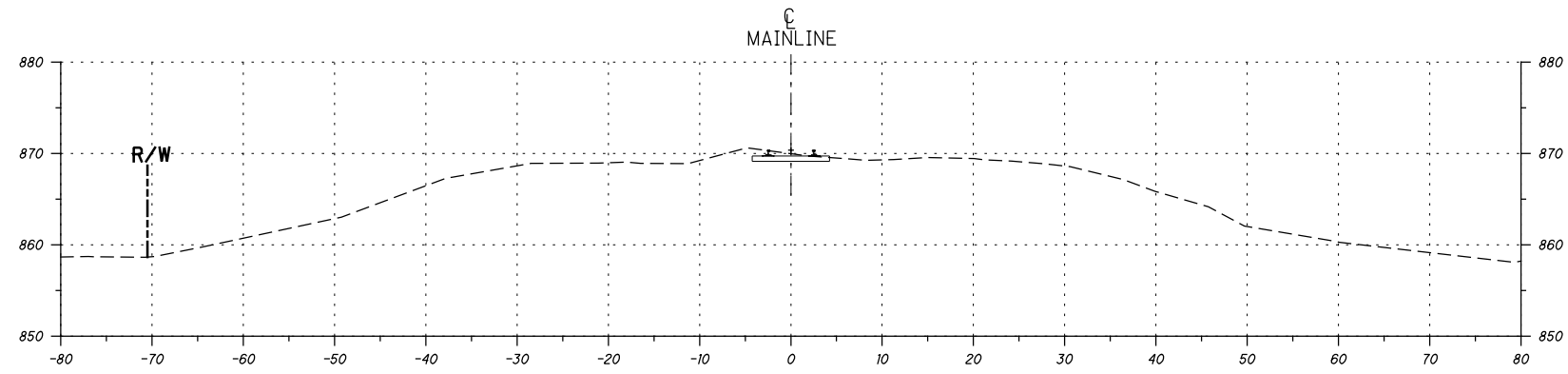
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CMH
CHECKED
JAB

TRACK 1 CROSS SECTIONS  
ALTERNATE 2 - STA. 27+00 TO STA. 30+00

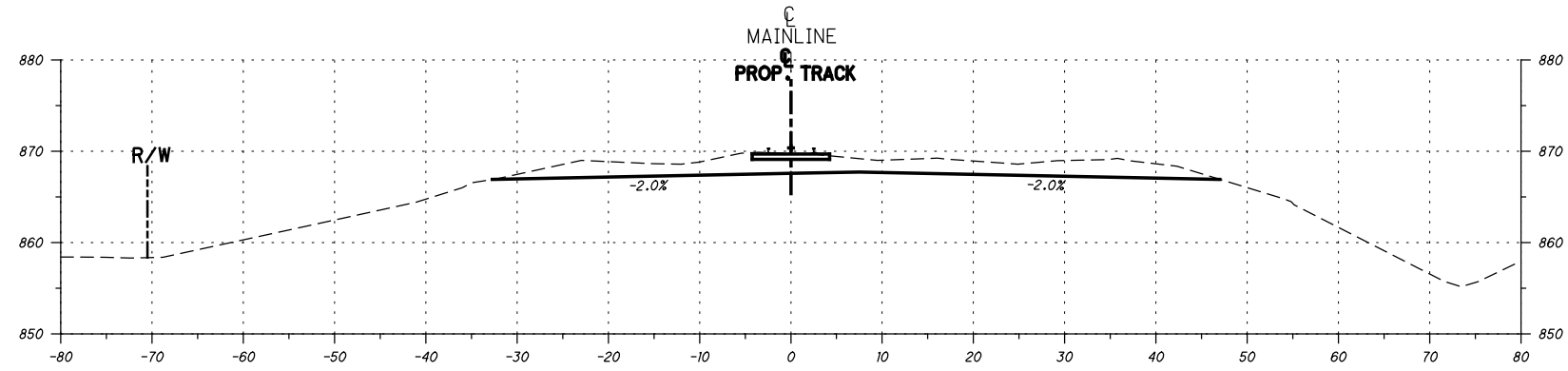
HAS-250-00.81

36  
67

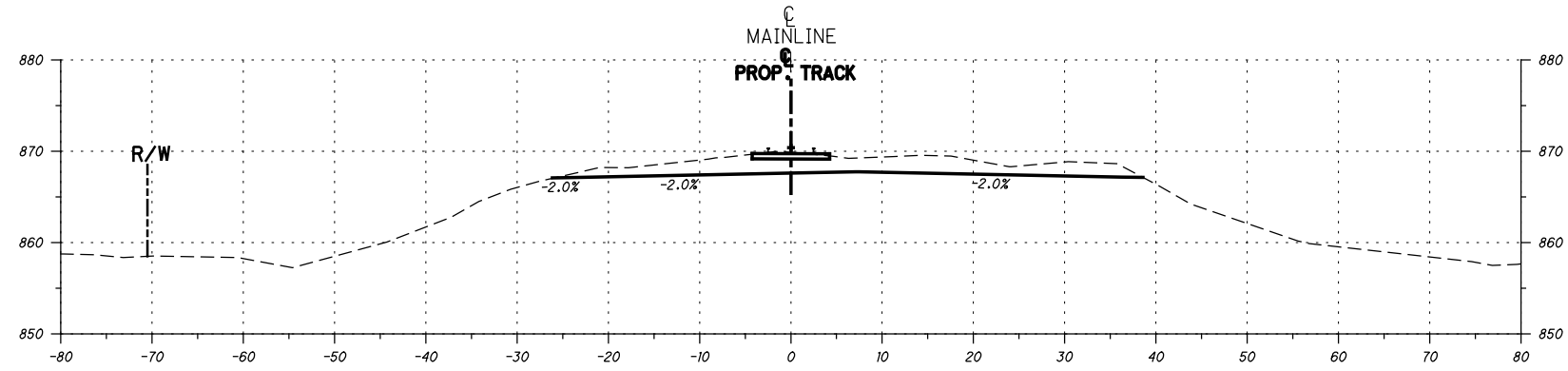
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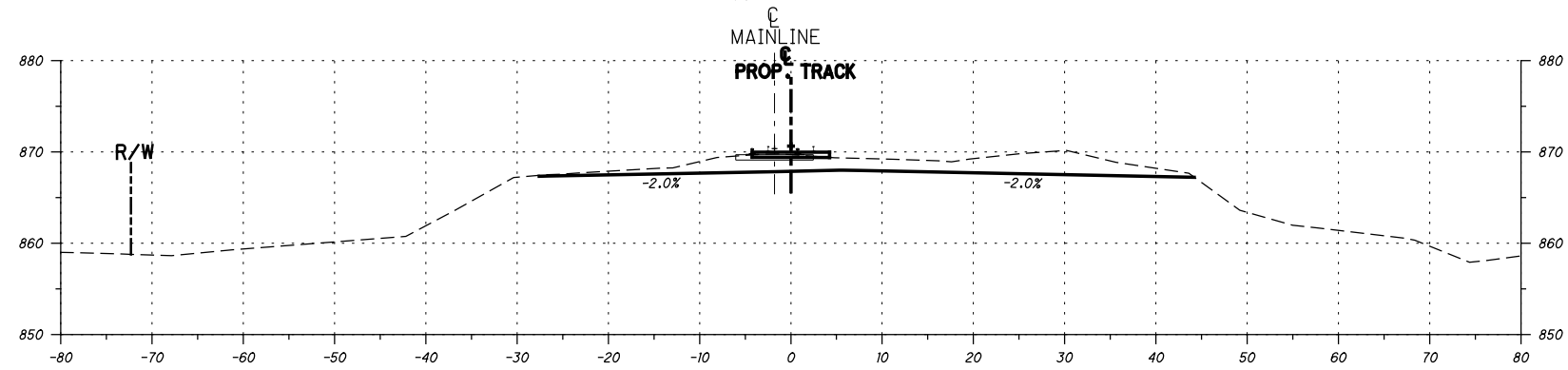
STA. 34+00



STA. 33+00



STA. 32+00



STA. 31+00

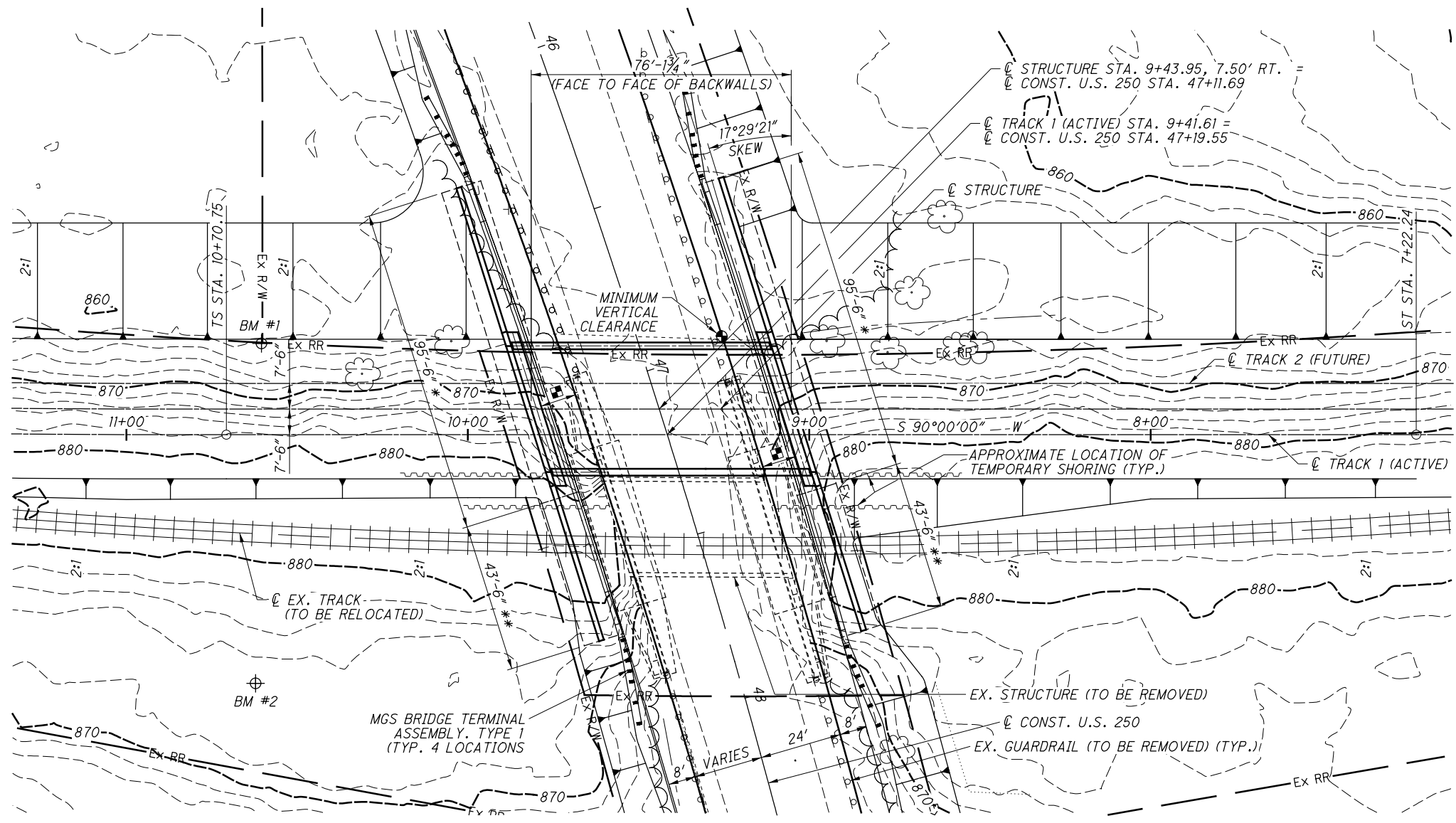
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CHECKED
JAB

TRACK 1 CROSS SECTIONS  
ALTERNATE 2 - STA. 31+00 TO STA. 34+00

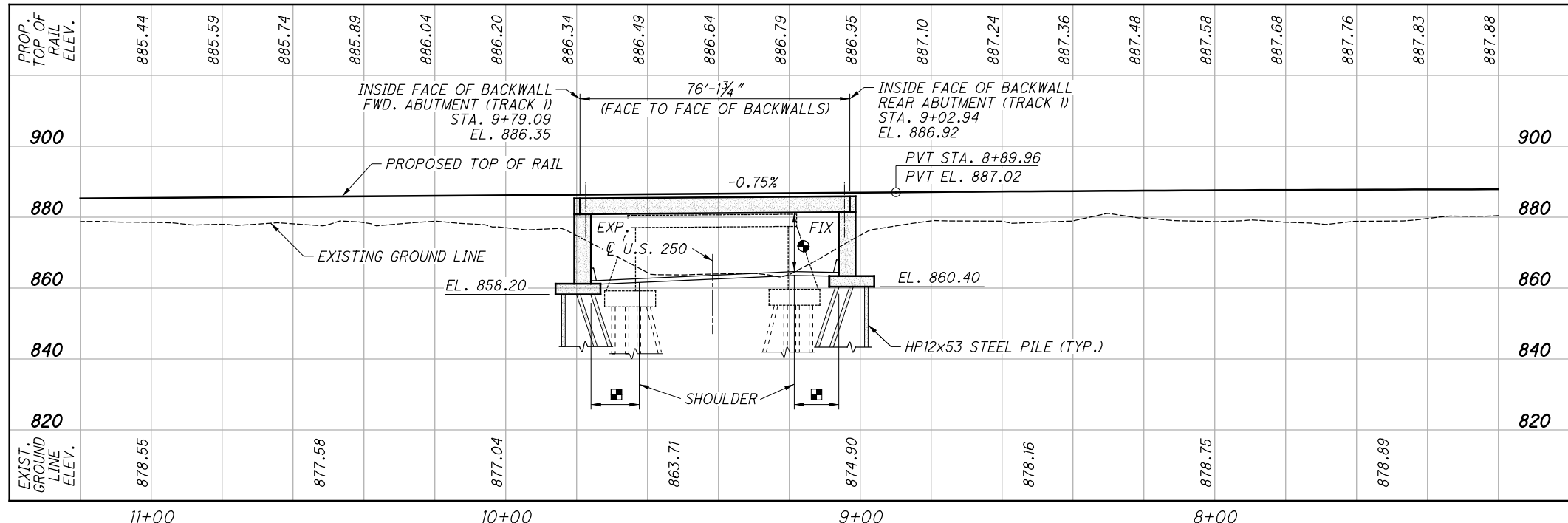
HAS-250-00.81

37  
67

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PLAN



PROFILE ALONG  $\hat{C}$  TRACK 1 (ACTIVE)

**BENCHMARK DATA**

BM #1 STA. 10+60.47, ELEV. 862.49,  
 OFFSET 26.70' RT.  $\hat{C}$  PROP. TRACK 1 (ACTIVE)  
 BM #2 STA. 10+62.19, ELEV. 871.61,  
 OFFSET 72.81' LT.  $\hat{C}$  PROP. TRACK 1 (ACTIVE)

**NOTES**

EARTHWORK LIMITS SHOWN ARE APPROXIMATE. ACTUAL SLOPES SHALL CONFORM TO PLAN CROSS SECTIONS.

RAILROAD TRAFFIC (CUOH):  
 FREIGHT = 1 TIMES/DAY 40 MPH  
 PASSENGER = 0 TIMES/DAY 0 MPH

DESIGN TRAFFIC (U.S. 250):  
 2017 ADT = 5500 2017 ADTT = 990  
 2037 ADT = 6500 2037 ADTT = 1170  
 DIRECTIONAL DISTRIBUTION = 0.53%

**LEGEND/ABBREVIATIONS**

- \* - PHASE 1 CONSTRUCTION
- \*\* - PHASE 2 CONSTRUCTION
- CUOH - COLUMBUS AND OHIO RIVER RAILROAD

POINT OF MINIMUM VERTICAL CLEARANCE	PROPOSED	REQUIRED
		16'-6"

POINT OF MINIMUM HORIZONTAL CLEARANCE	PROPOSED	REQUIRED
	REAR ABUTMENT	9.89'
FWD. ABUTMENT	10.03'	9.67'

**EXISTING STRUCTURE**

TYPE: BALLASTED DECK CONCRETE ENCASED STEEL BEAM SUPERSTRUCTURE ON WALL TYPE ABUTMENTS ON CONCRETE PILES  
 SPANS: 45'-0"± C/C BEARINGS  
 LOADING: UNKNOWN  
 SKEW: 16° 59' 21" WRT TANGENT TO U.S. 250 @  $\hat{C}$  BRIDGE  
 ALIGNMENT: 2° CURVE RIGHT  
 STRUCTURAL FILE NUMBER: 3401472  
 DATE BUILT: 1941  
 DISPOSITION: FAIR

**PROPOSED STRUCTURE**

TYPE: BALLASTED DECK WELDED STEEL PLATE THROUGH GIRDER ON WALL TYPE ABUTMENTS ON PILES  
 SPANS: 73'-0" C/C BEARINGS  
 LOADING: COOPER E80 AND ALTERNATE LIVE LOAD; 6" ADDITIONAL BALLAST  
 SKEW: 17° 29' 21" R.F.  
 ALIGNMENT: TANGENT  
 COORDINATES: LATITUDE 40° 23' 24" N  
 LONGITUDE 81° 15' 42" W

DESIGN AGENCY: **ARCADIS**  
 ARCADIS U.S., Inc.  
 222 South Main Street, Suite 300 Akron, Ohio 44308  
 Tel: 330.434.8995 Fax: 330.374.1055 www.arcadis-us.com

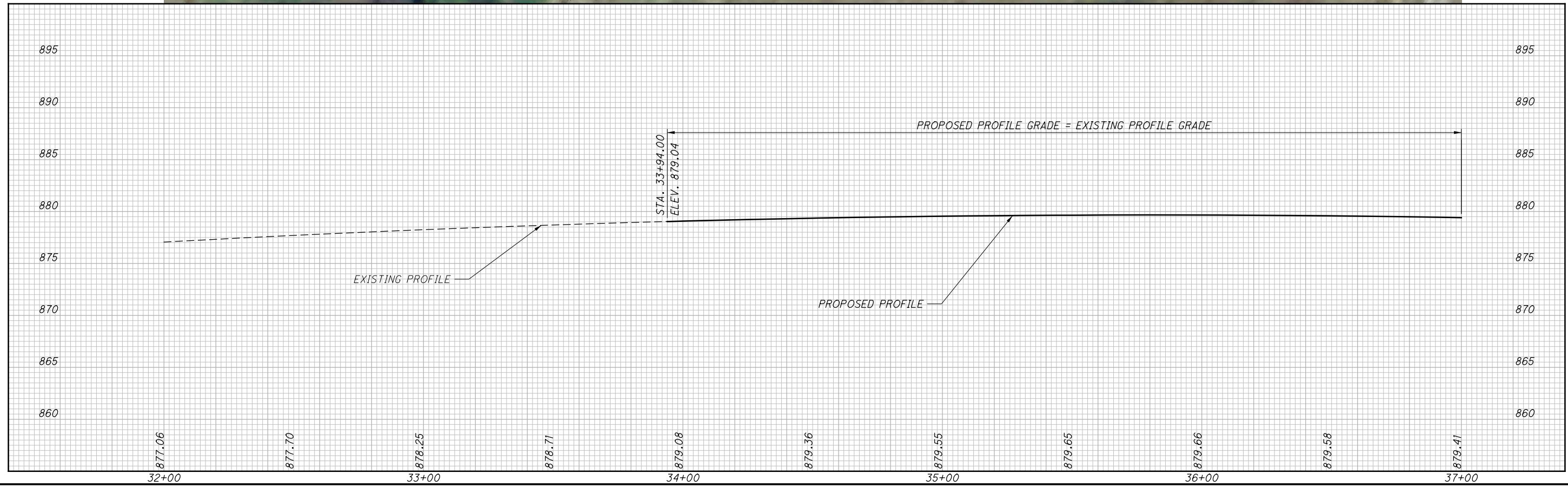
DATE	2/2015
REVIEWED	FJG
DRAWN	MPB
DESIGNED	RBB
CHECKED	ETR

HARRISON COUNTY  
 U.S. 250  
 STA. 47+11.69

**ALTERNATE 2 - SITE PLAN**  
 BRIDGE NO. HAS-250-0081  
 CUOH RAILROAD OVER U.S. ROUTE 250

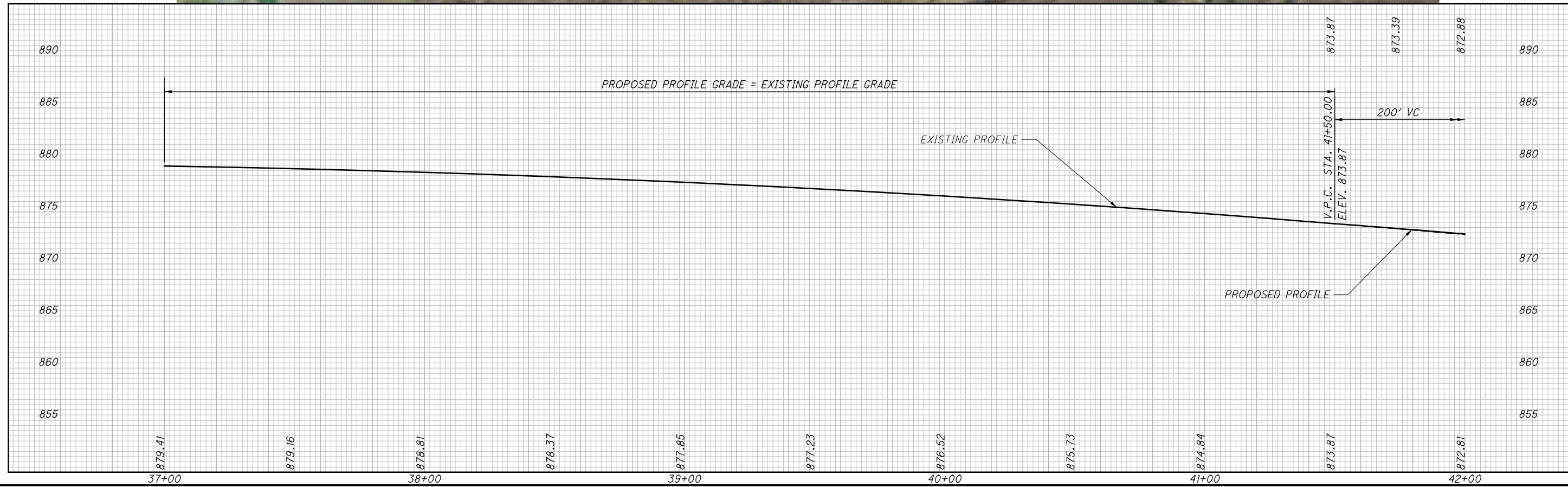
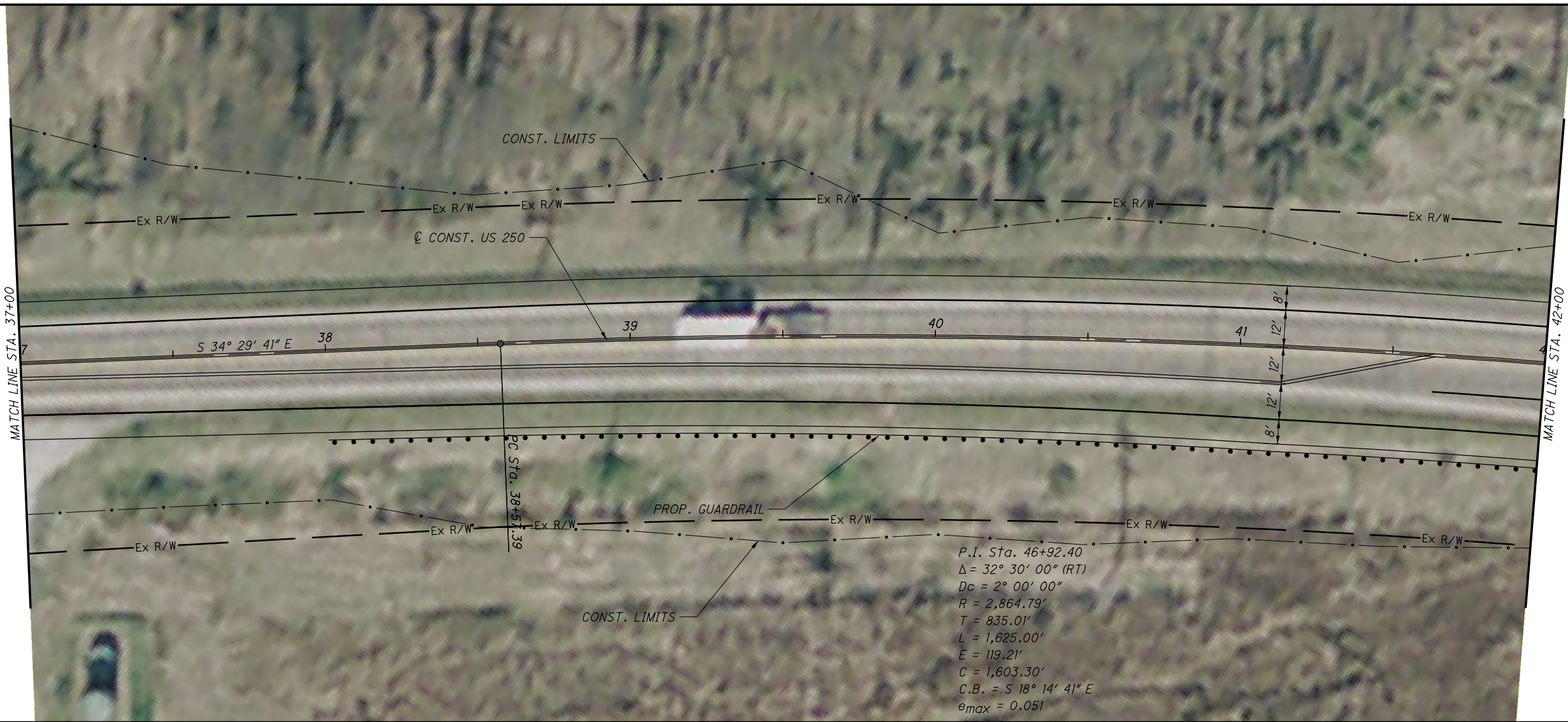
**HAS-250-00.81**  
 PID No. 99427

1 / 1  
 38 / 67



CALCULATED EMC  
 CHECKED SMG  
**PLAN AND PROFILE - US 250**  
**ALTERNATE 3 - STA. 32+00 TO STA. 37+00**





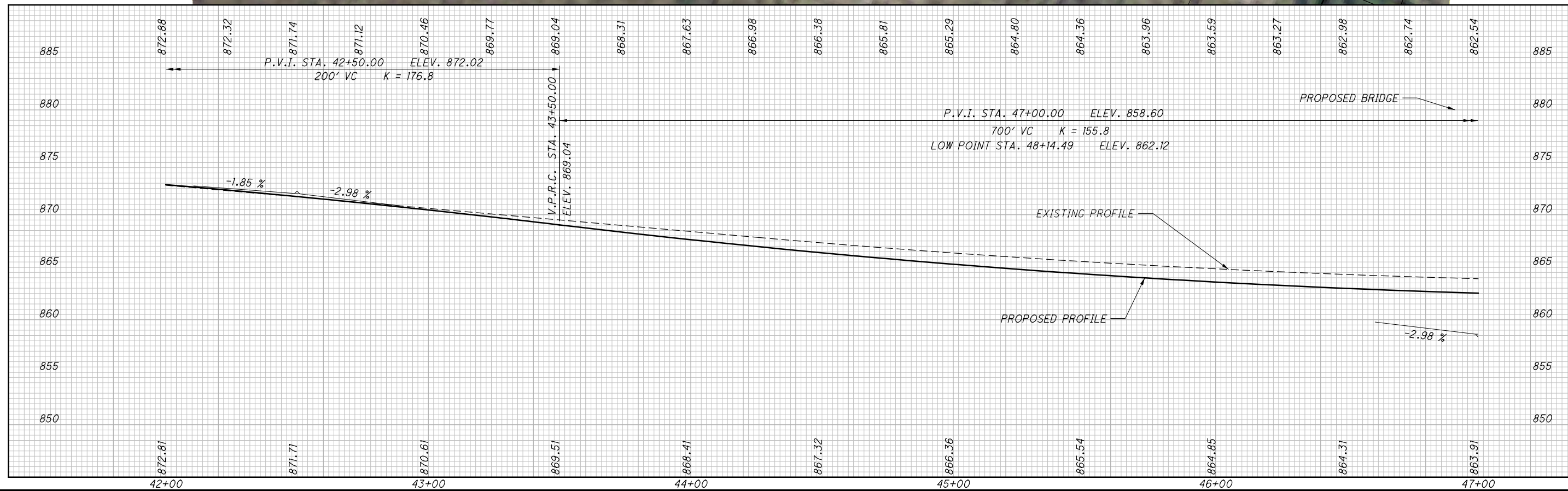
PLAN AND PROFILE - US 250  
ALTERNATE 3 - STA. 37+00 TO STA. 42+00

HAS-250-00.81



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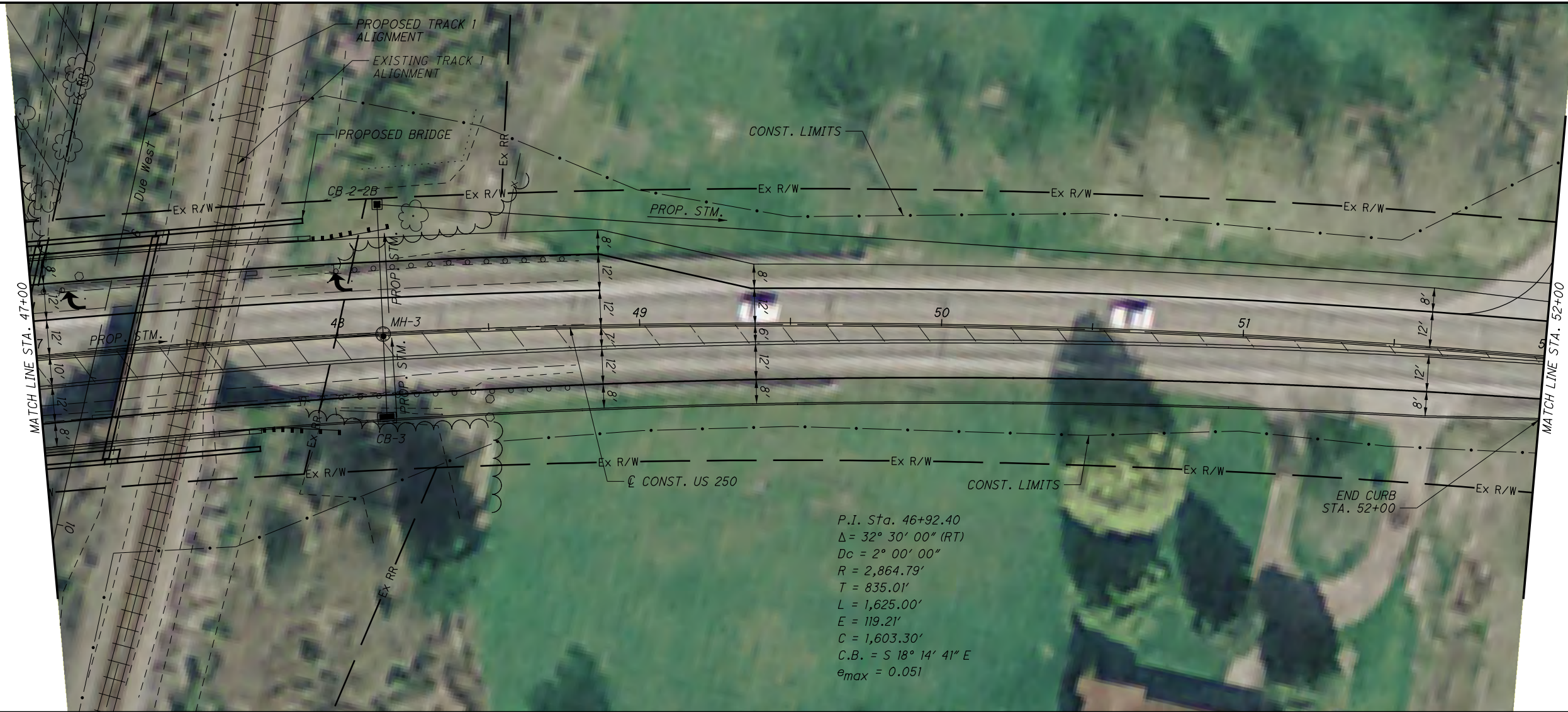
P.I. Sta. 46+92.40  
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 $D_c = 2^\circ 00' 00''$   
 $R = 2,864.79'$   
 $T = 835.01'$   
 $L = 1,625.00'$   
 $E = 119.21'$   
 $C = 1,603.30'$   
 $C.B. = S 18^\circ 14' 41'' E$   
 $e_{max} = 0.051$



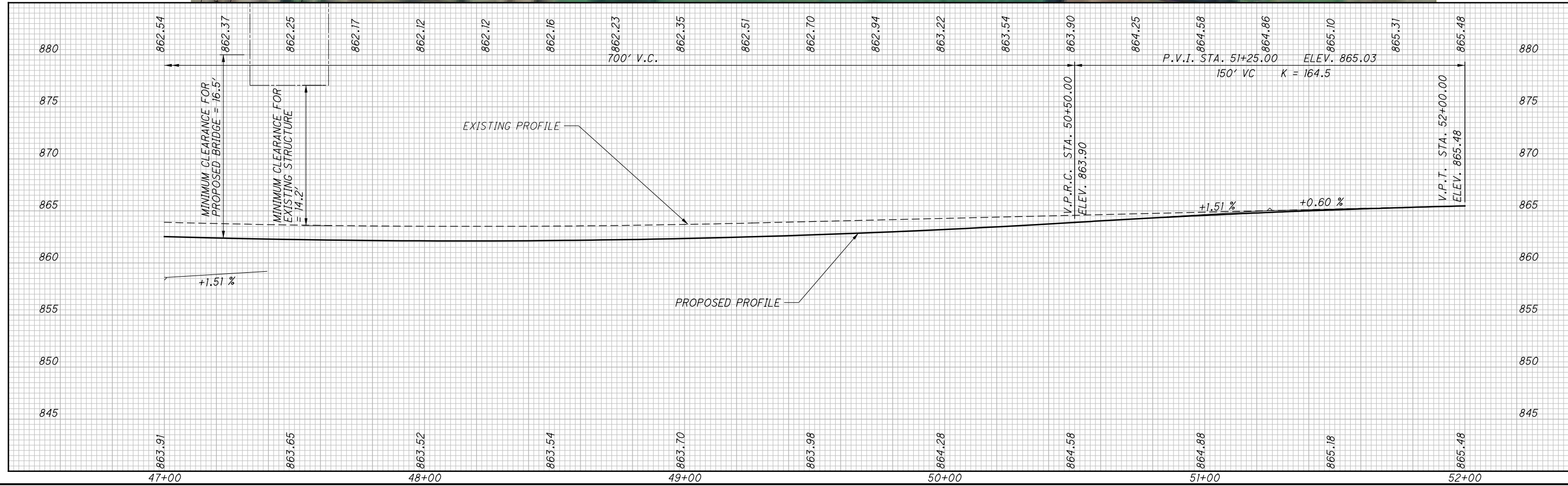
**PLAN AND PROFILE - US 250**  
**ALTERNATE 3 - STA. 42+00 TO STA. 47+00**

**HAS-250-00.81**





P.I. Sta. 46+92.40  
 $\Delta = 32^\circ 30' 00''$  (RT)  
 $Dc = 2^\circ 00' 00''$   
 $R = 2,864.79'$   
 $T = 835.01'$   
 $L = 1,625.00'$   
 $E = 119.21'$   
 $C = 1,603.30'$   
 $C.B. = S 18^\circ 14' 41'' E$   
 $e_{max} = 0.051$



PLAN AND PROFILE - US 250  
 ALTERNATE 3 - STA. 47+00 TO STA. 52+00



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P.I. Sta. 46+92.40  
 $\Delta = 32^\circ 30' 00''$  (RT)  
 $Dc = 2^\circ 00' 00''$   
 $R = 2,864.79'$   
 $T = 835.01'$   
 $L = 1,625.00'$   
 $E = 119.21'$   
 $C = 1,603.30'$   
 $C.B. = S 18^\circ 14' 41'' E$   
 $e_{max} = 0.051$



# PROPOSED STORM SEWER CONTINUES SOUTH APPROX. 770' ALONG US 250 TO OUTLET INTO AN UNNAMED TRIBUTARY TO LITTLE STILLWATER CREEK.



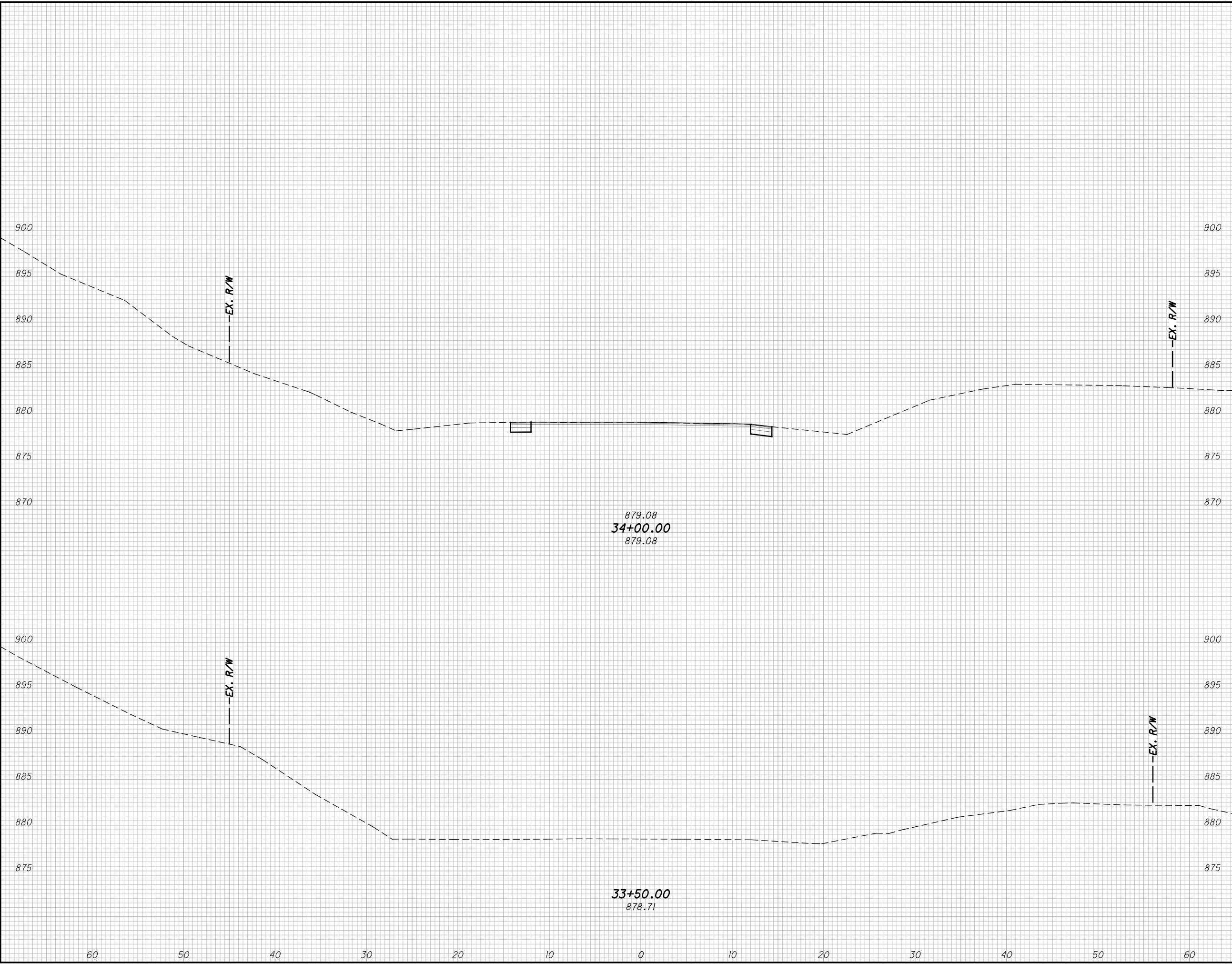
CALCULATED EMC CHECKED SMG  
**PLAN AND PROFILE - US 250**  
**ALTERNATE 3 - STA. 52+00 TO STA. 57+00**

**HAS-250-00.81**  
 43  
 67

G:\Project\TOHODT04.PE09\Drawing\roadway\99427\roadway\99427XS01C.dgn 2/20/2015 12:06:57 PM ecurtis

SEEDING

END WIDTH	SO. YDS.



END AREA		VOLUME	
CUT	FILL	CUT	FILL

CALCULATED	CHECKED
EMC	SMG

CROSS SECTIONS - US 250  
ALTERNATE 3 - STA. 33+50 TO STA. 34+00

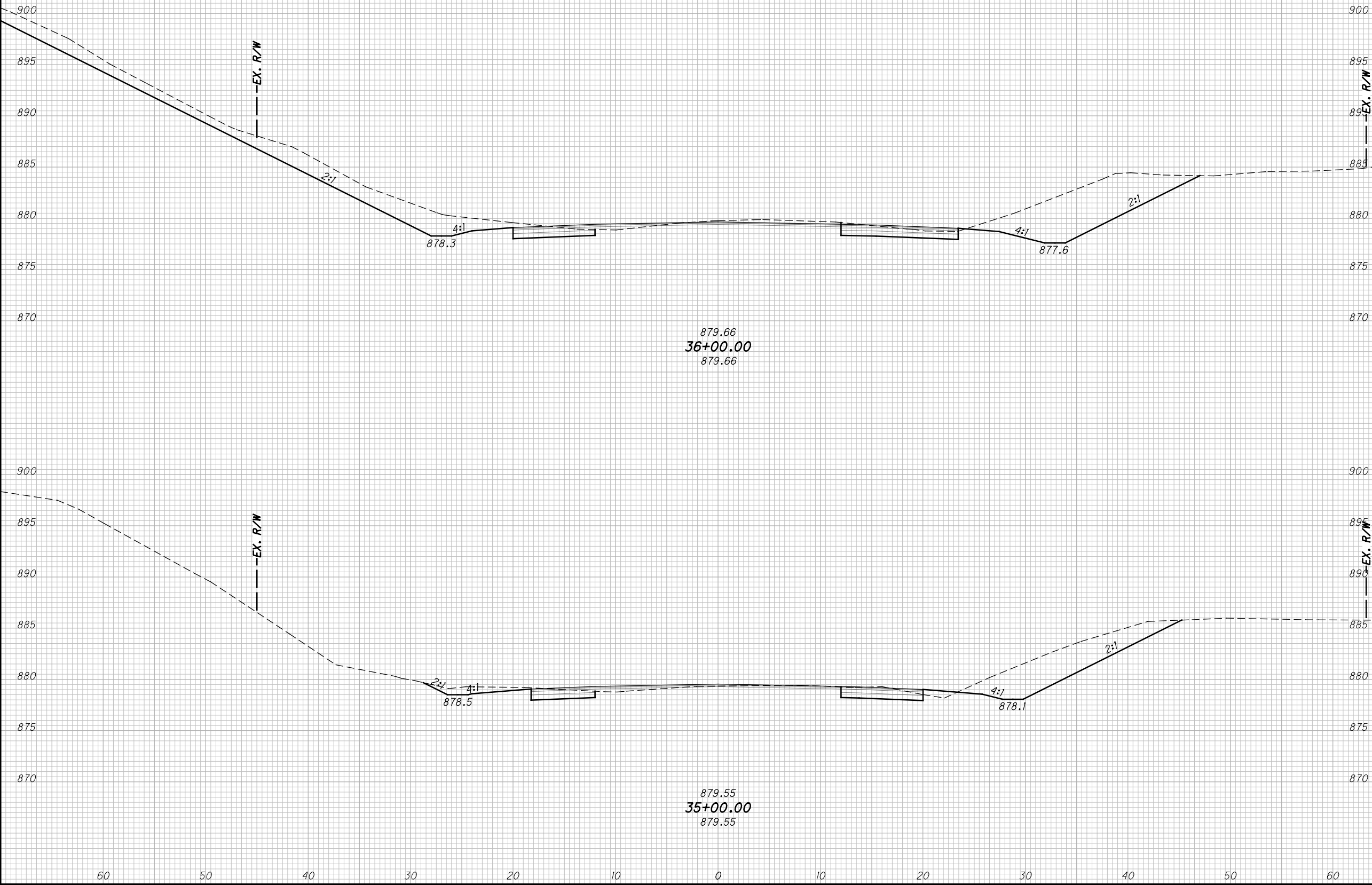
HAS-250-00.81

44  
67

G:\Project\TOHODT04.PE09\Drawing\roadway\99427\roadway\99427XS01C.dgn 2/20/2015 12:06:57 PM ecurtis

SEEDING  
END SO.  
WIDTH YDS.

END AREA		VOLUME		CALCULATED	
CUT	FILL	CUT	FILL	EMC	CHECKED
					SMG



CROSS SECTIONS - US 250  
ALTERNATE 3 - STA. 35+00 TO STA. 36+00

HAS-250-00.81

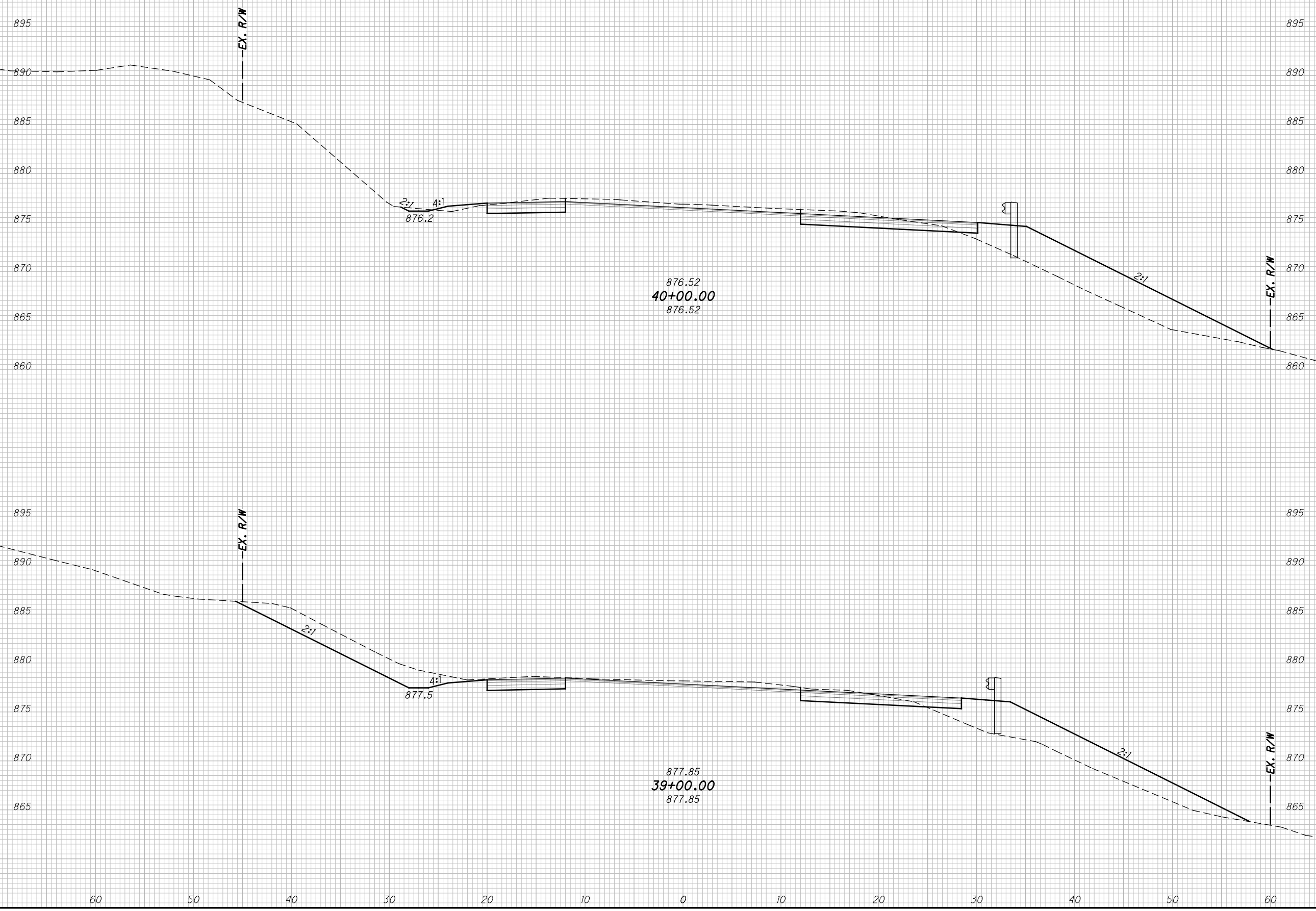
45  
67



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SEEDING	
END WIDTH	SO. YDS.

END AREA		VOLUME		CALCULATED	
CUT	FILL	CUT	FILL	EMC	CHECKED



CROSS SECTIONS - US 250  
ALTERNATE 3 - STA. 39+00 TO STA. 40+00

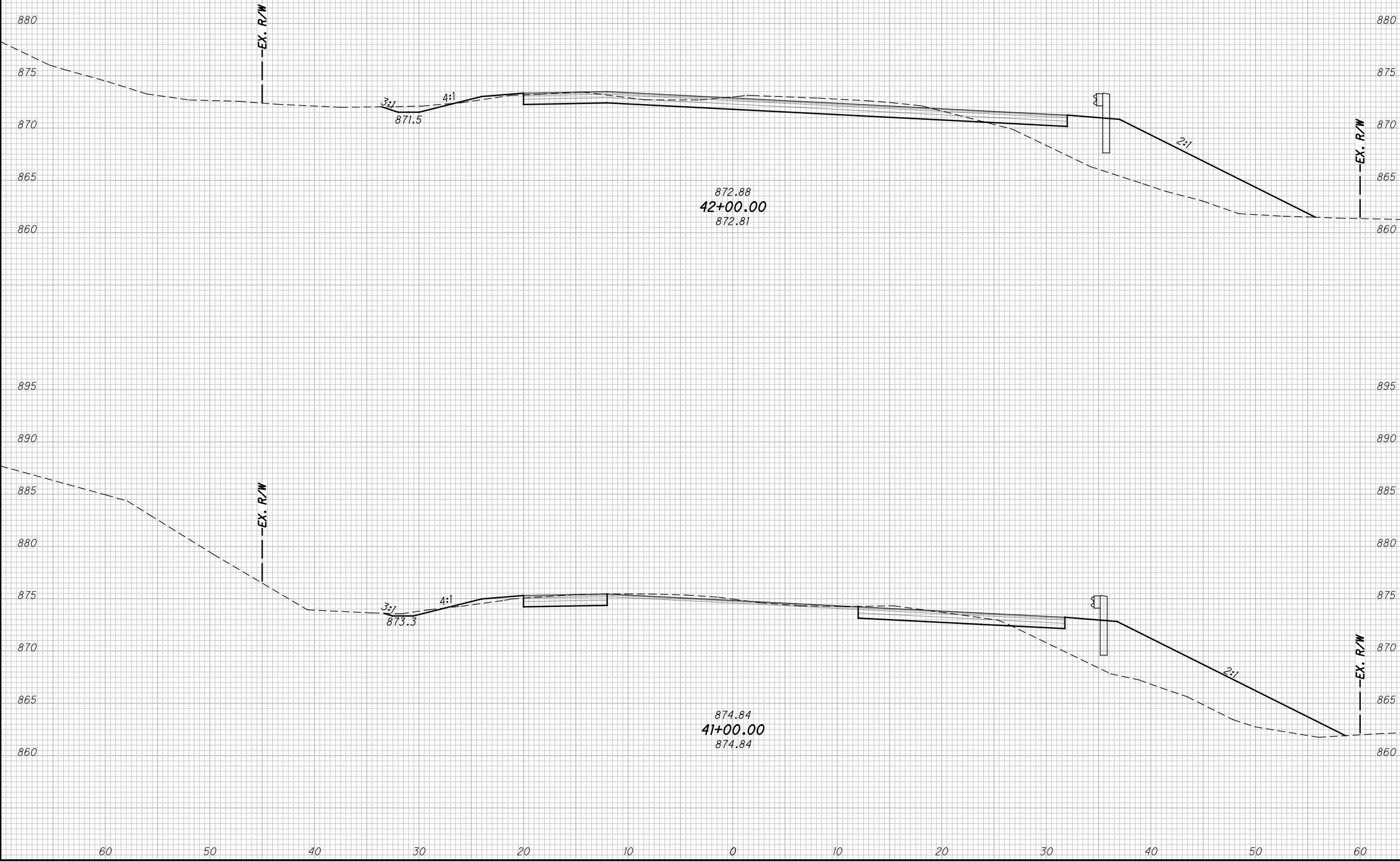
HAS-250-00.81

47  
67

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SEEDING  
END SO.  
WIDTH YDS.

END AREA		VOLUME		CALCULATED	
CUT	FILL	CUT	FILL	EMC	CHECKED
					SMG



CROSS SECTIONS - US 250  
ALTERNATE 3 - STA. 41+00 TO STA. 42+00

HAS-250-00.81

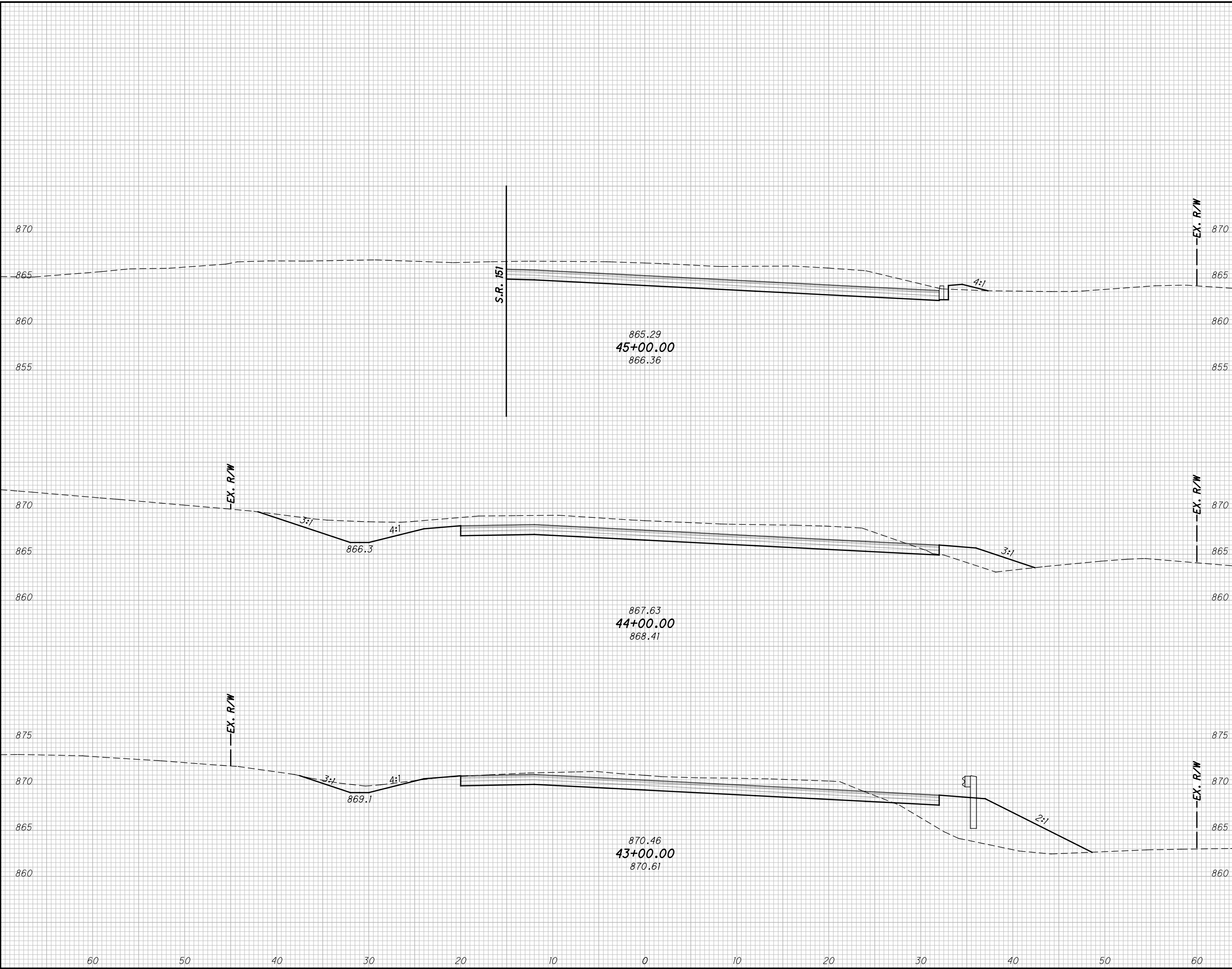
48  
67

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SEEDING

END WIDTH	SO. YDS.

END AREA		VOLUME		CALCULATED	CHECKED
CUT	FILL	CUT	FILL	EMC	SMG



**CROSS SECTIONS - US 250  
ALTERNATE 3 - STA. 43+00 TO STA. 45+00**

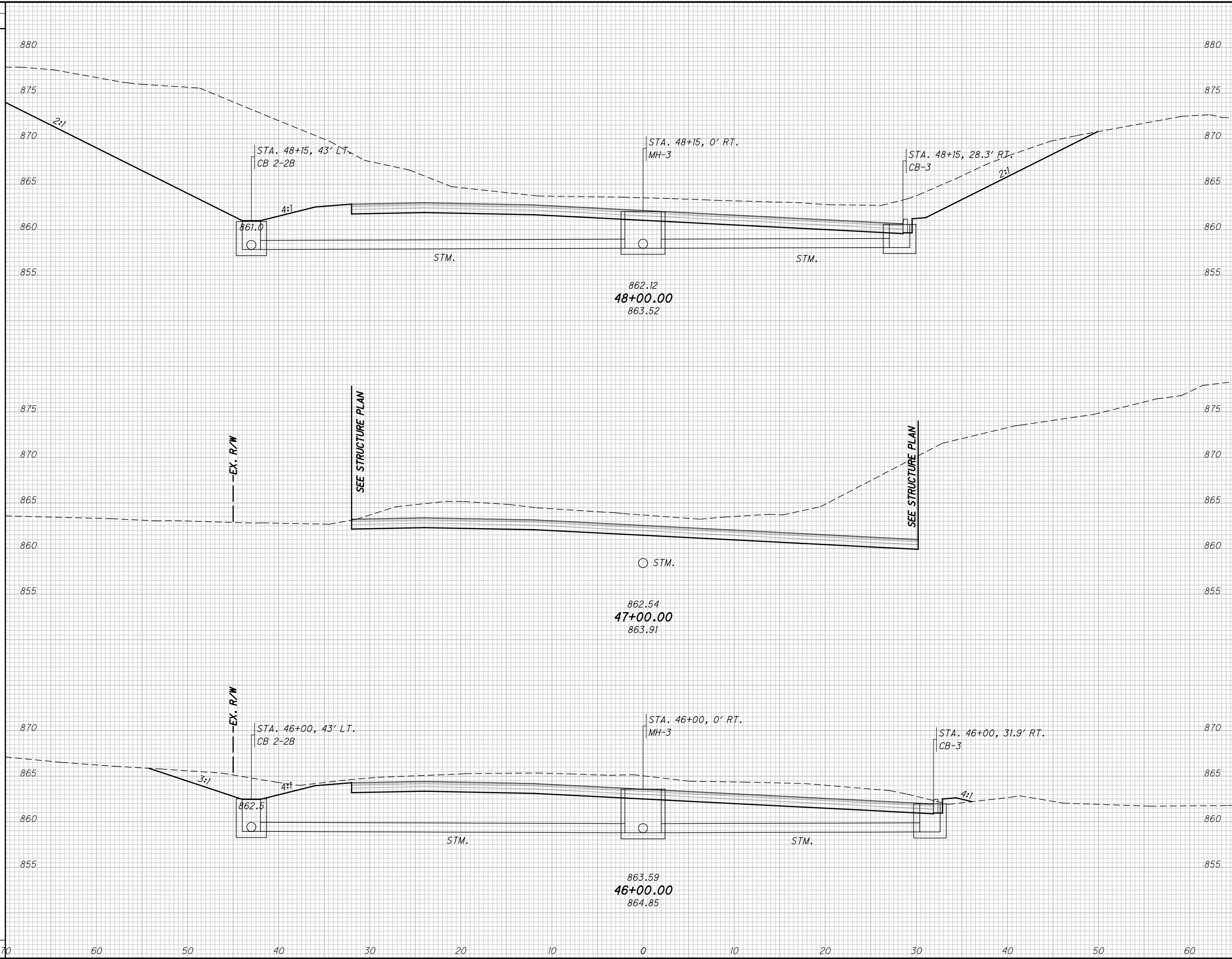
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SEEDING

END WIDTH	SO. YDS.
70	
60	
50	
40	
30	
20	
10	
0	
10	
20	
30	
40	
50	
60	



END AREA		VOLUME	
CUT	FILL	CUT	FILL

CALCULATED  
 EMC  
 CHECKED  
 SMG

**CROSS SECTIONS - US 250**  
**ALTERNATE 3 - STA. 46+00 TO STA. 48+00**

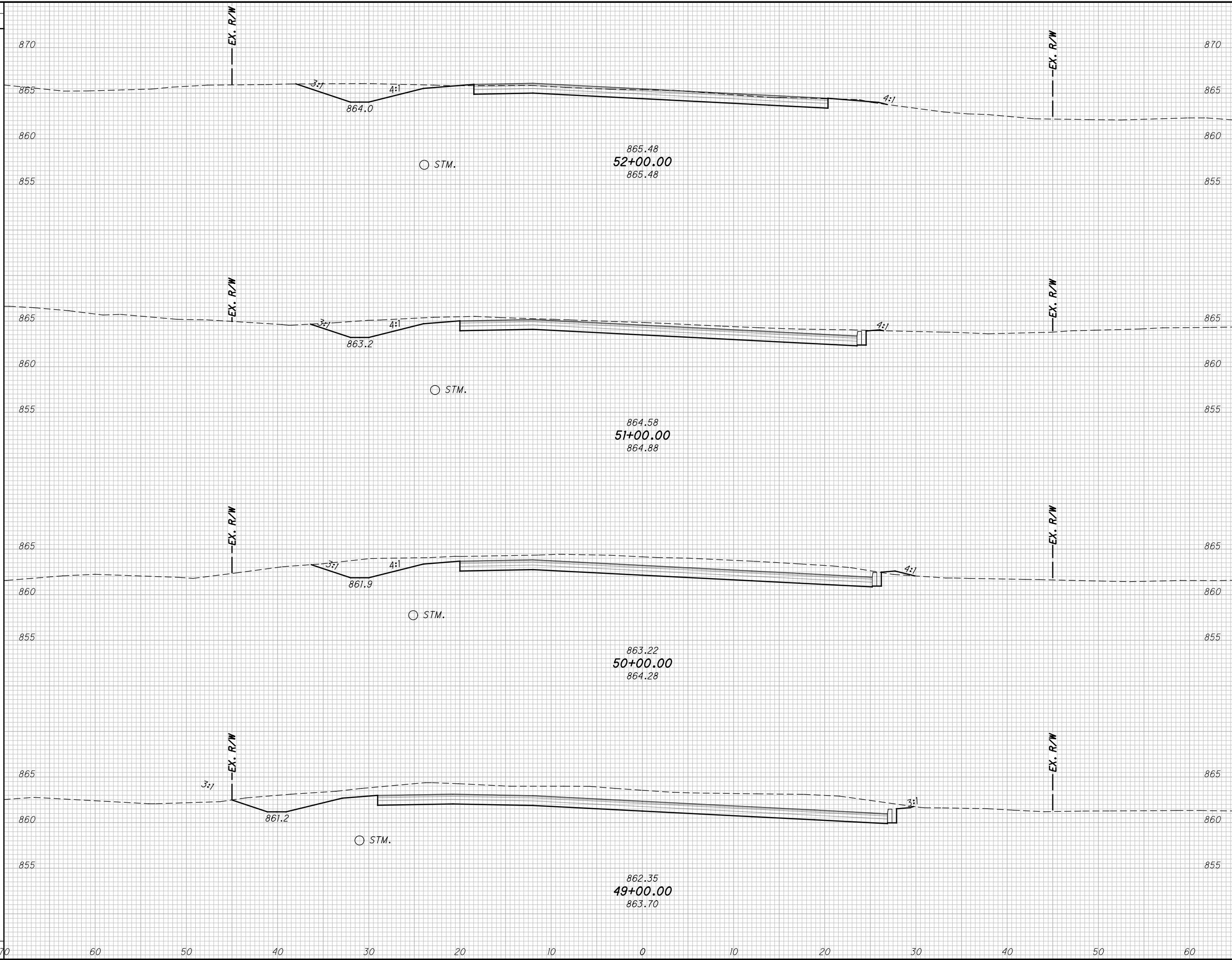
**HAS-250-00.81**

50  
 67

G:\Project\TOHODT04.PE09\Drawing\99427\roadway\sheets\99427XS01C.dgn 2/20/2015 12:06:59 PM ecurtis

SEEDING

END WIDTH	SO. YDS.
70	
60	
50	
40	
30	
20	
10	
0	
10	
20	
30	
40	
50	
60	



END AREA		VOLUME		CALCULATED EMC	CHECKED SMG
CUT	FILL	CUT	FILL		

CROSS SECTIONS - US 250  
ALTERNATE 3 - STA. 49+00 TO STA. 52+00

HAS-250-00.81

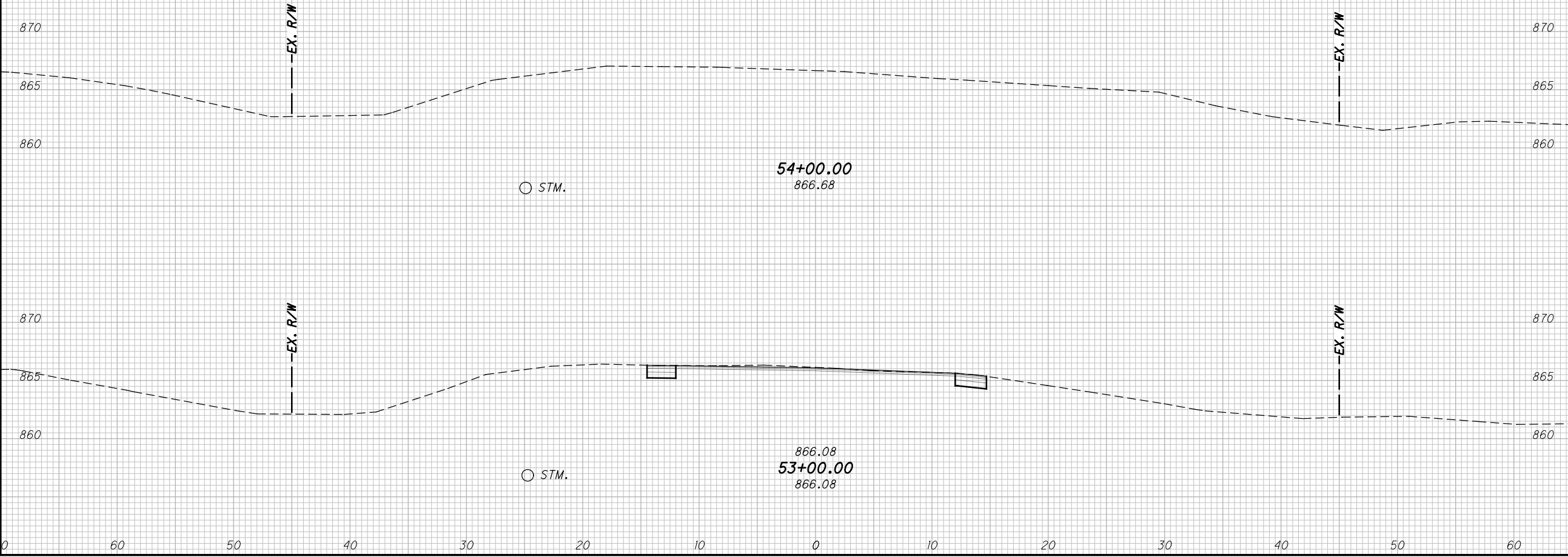
51  
67

G:\Project\TOHODT04.PE09\Drawing\99427\roadway\sheets\99427XS01C.dgn 2/20/2015 12:06:59 PM ecurtis

SEEDING  
END SO.  
WIDTH YDS.

END AREA  
CUT FILL  
VOLUME  
CUT FILL

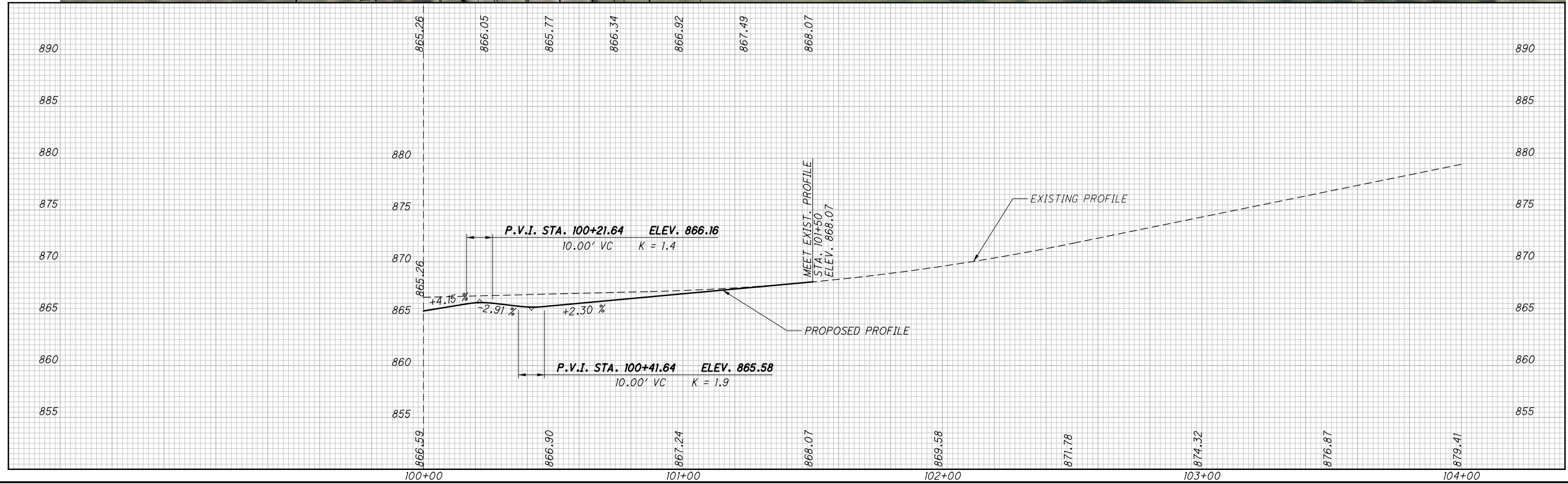
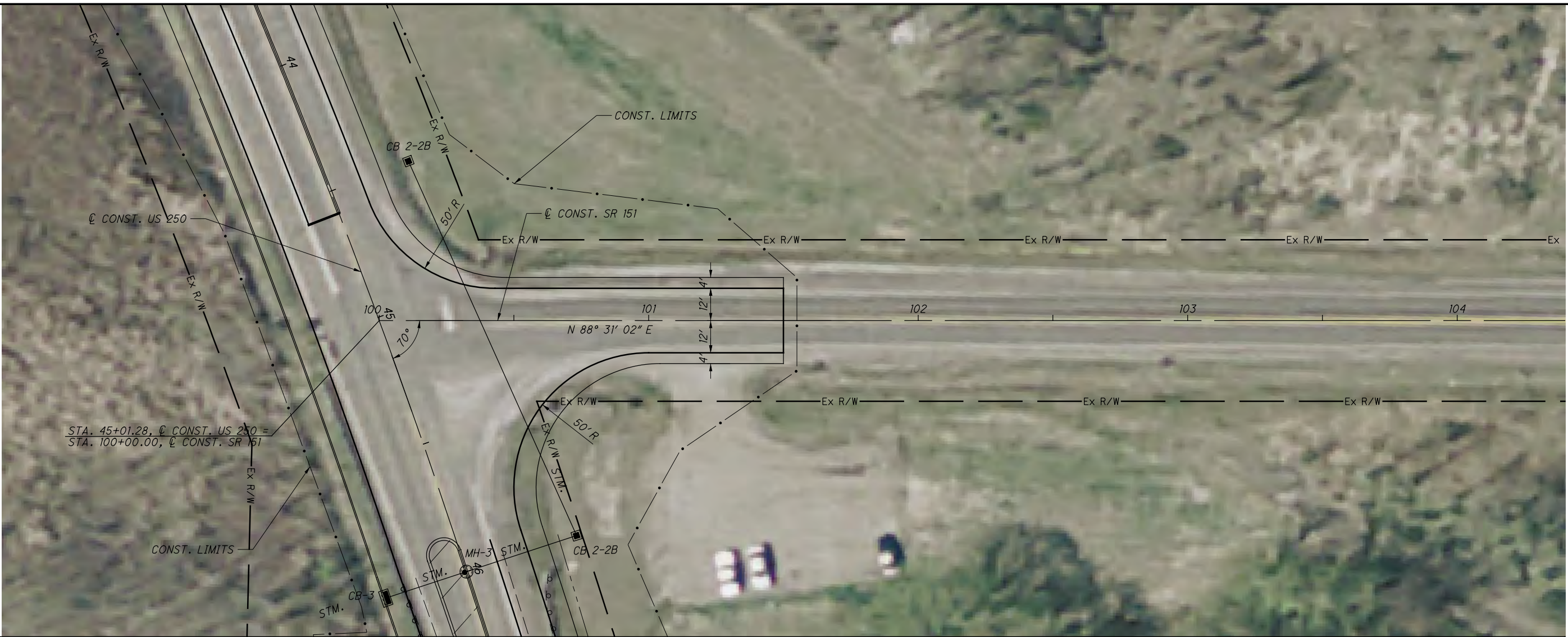
CALCULATED  
EMC  
CHECKED  
SMG



CROSS SECTIONS - US 250  
ALTERNATE 3 - STA. 53+00 TO STA. 54+00

HAS-250-00.81

52  
67



PLAN AND PROFILE - SR 151  
ALTERNATE 3 - STA. 100+00 TO STA. 104+00

HAS-250-00.81

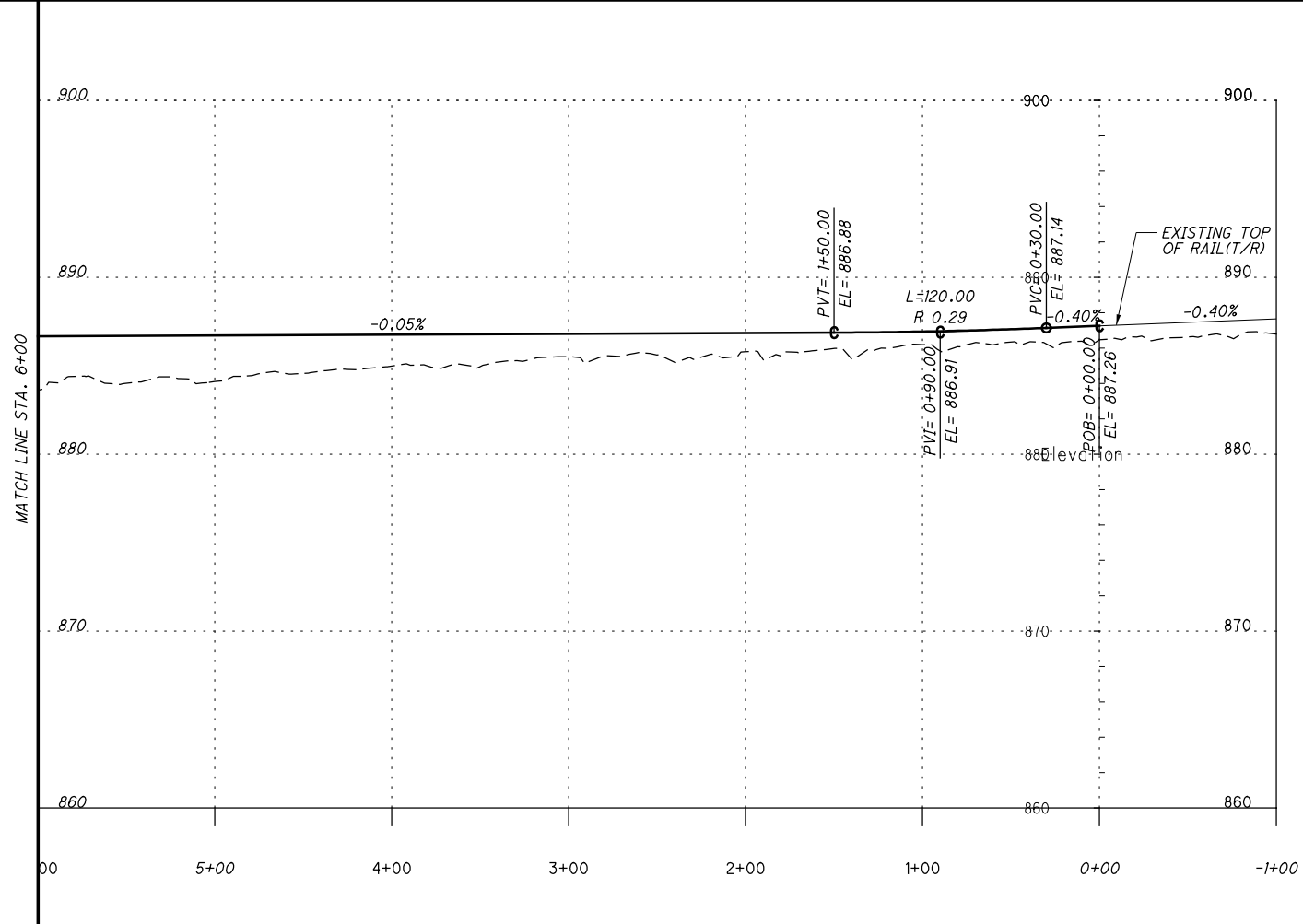




CALCULATED CMH  
 CHECKED JAB

**TRACK 1 PLAN AND PROFILE**  
**ALTERNATE 3 - STA. 0+00 TO STA. 6+00**

**HAS-250-00.81**

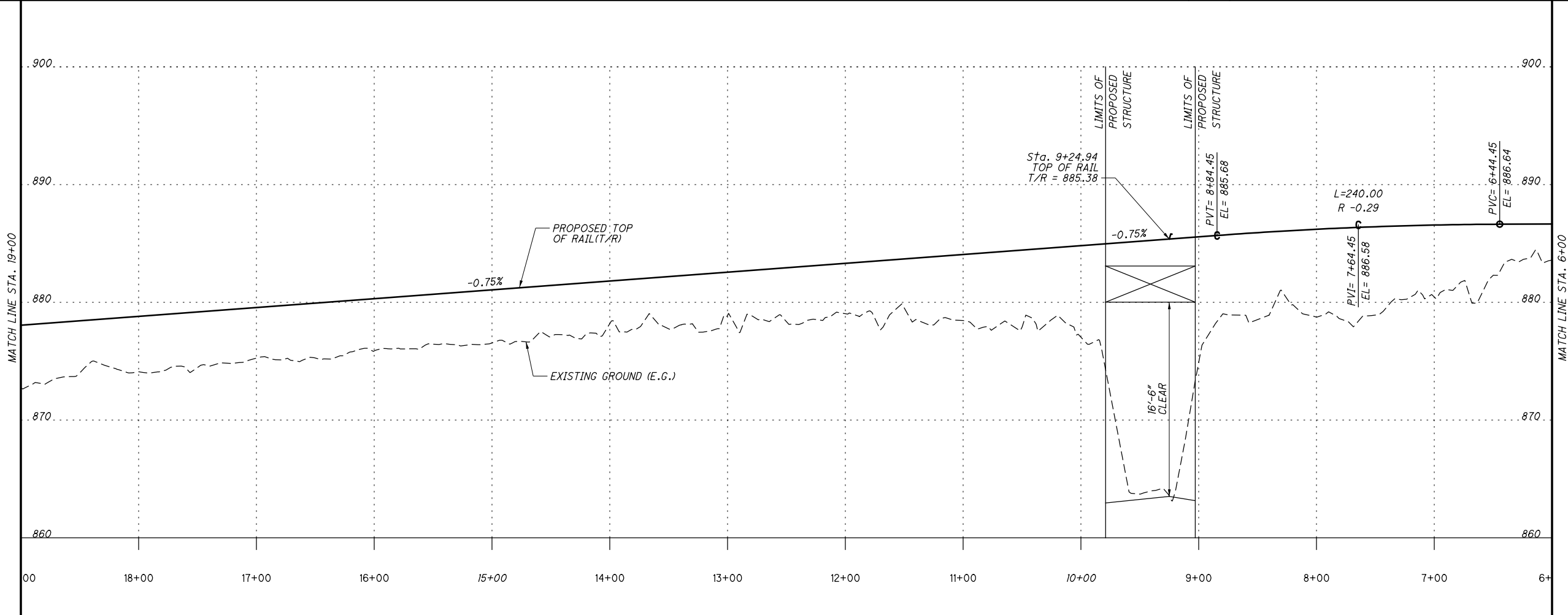






NOTE:  
PROPOSED TRACK 1 ROADBED WILL  
TRANSITION FROM THE SOUTH SIDE OF  
FUTURE TRACK TO THE NORTH SIDE  
FROM STA. 13+00 TO STA. 15+00. SEE  
TYPICAL SECTIONS AND CROSS SECTIONS.

CURVE 2  
PI= Sta 14+92.65  
D = 2°30'00"  
Delta = 20°57'15.36"  
R = 2292.01'  
L = 758.24'  
T = 463.87'  
SL = 80.00

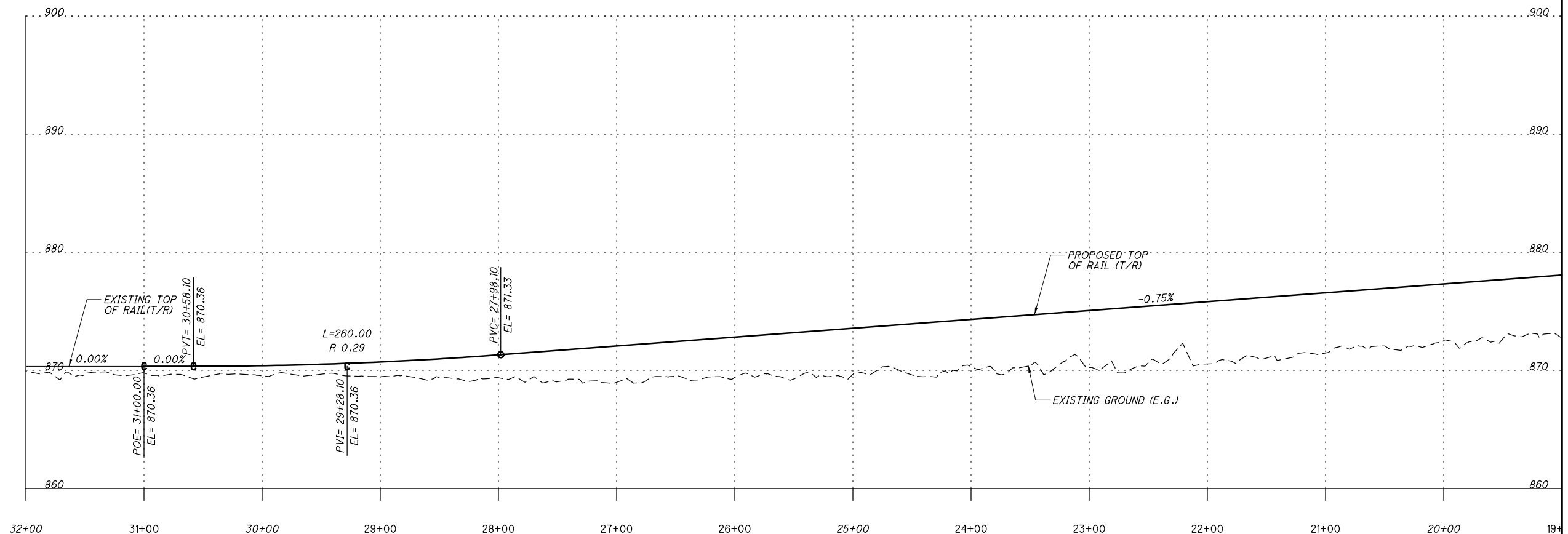
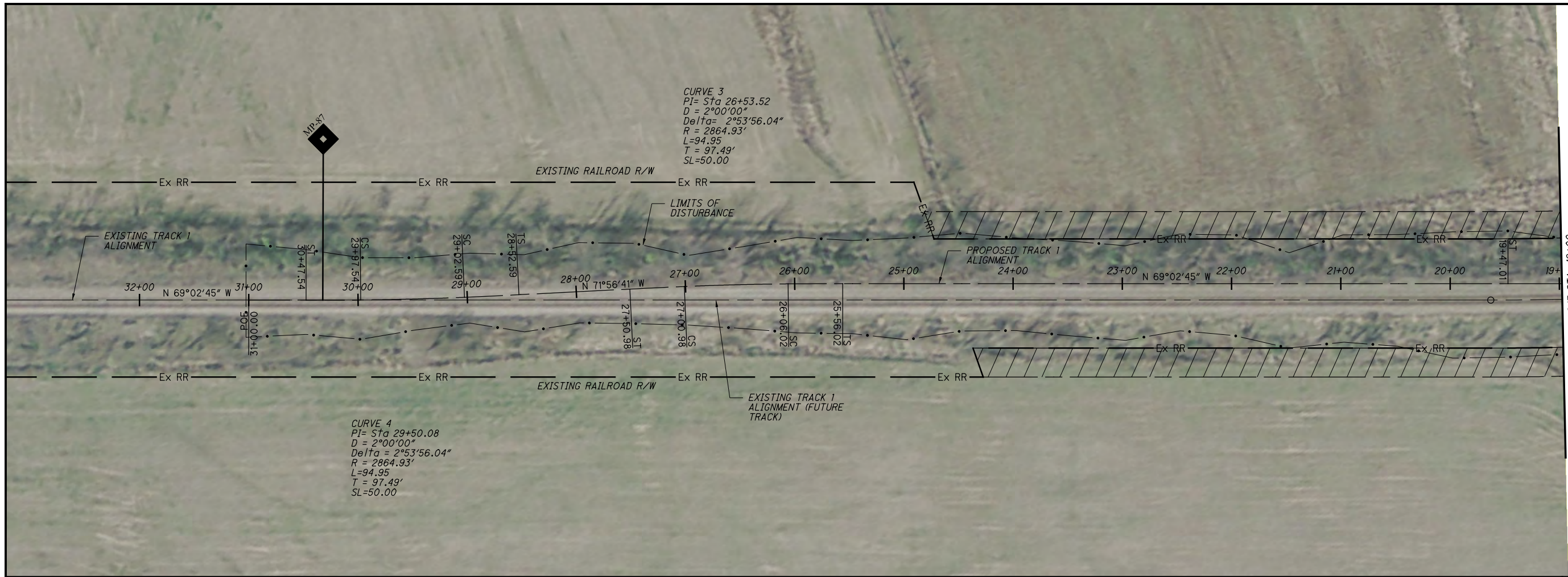


**TRACK 1 PLAN AND PROFILE**  
**ALTERNATE 3 - STA. 6+00 TO STA. 19+00**

**HAS-250-00.81**



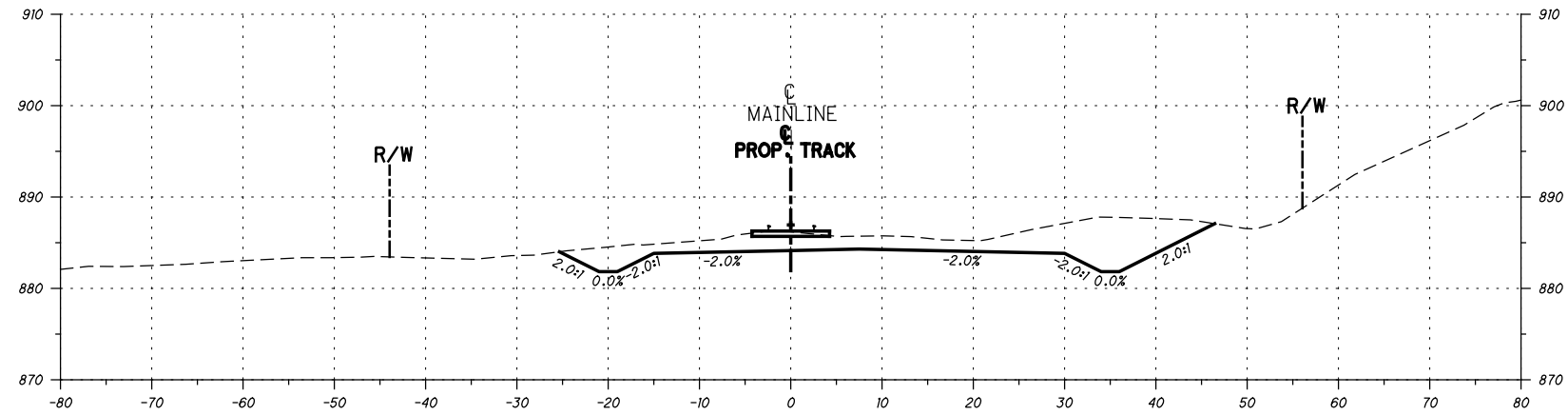
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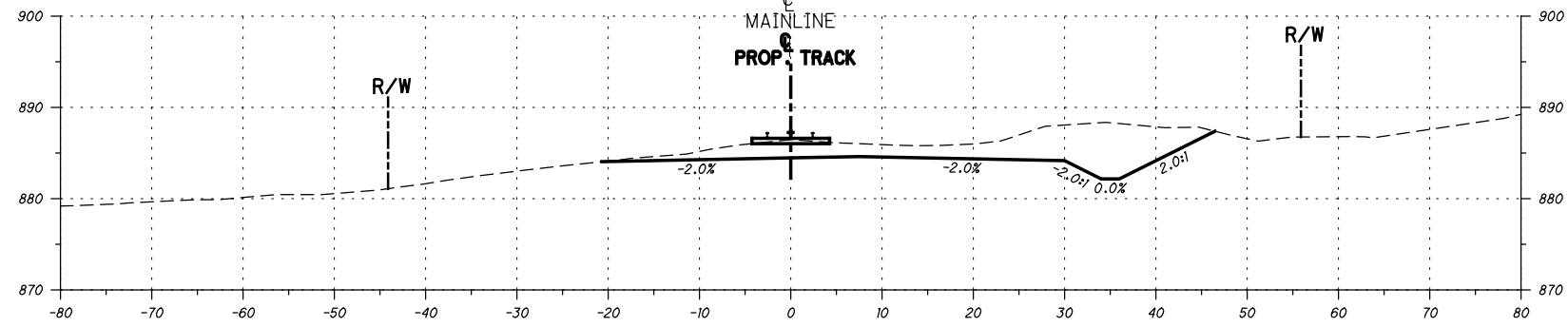
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**ALTERNATE 3 - STA. 19+00 TO STA. 31+00**

**HAS-250-00.81**

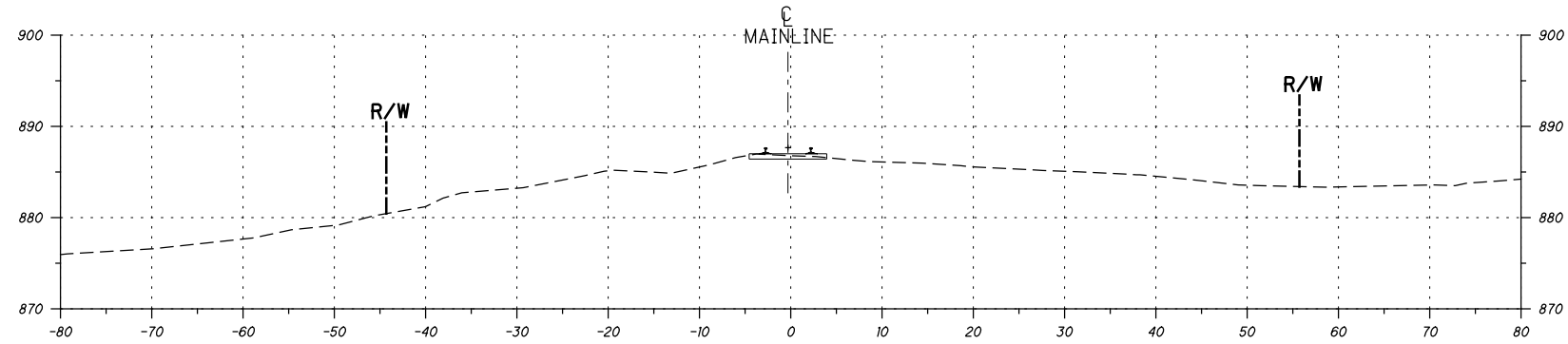
G:\tra\TOHODT04\_ODOT\_HAS-250\TRA\Sheet\99427X5401.dgn 2/19/2015 1:39:53 PM chawkins



STA. 1+00



STA. 0+00



STA. -1+00

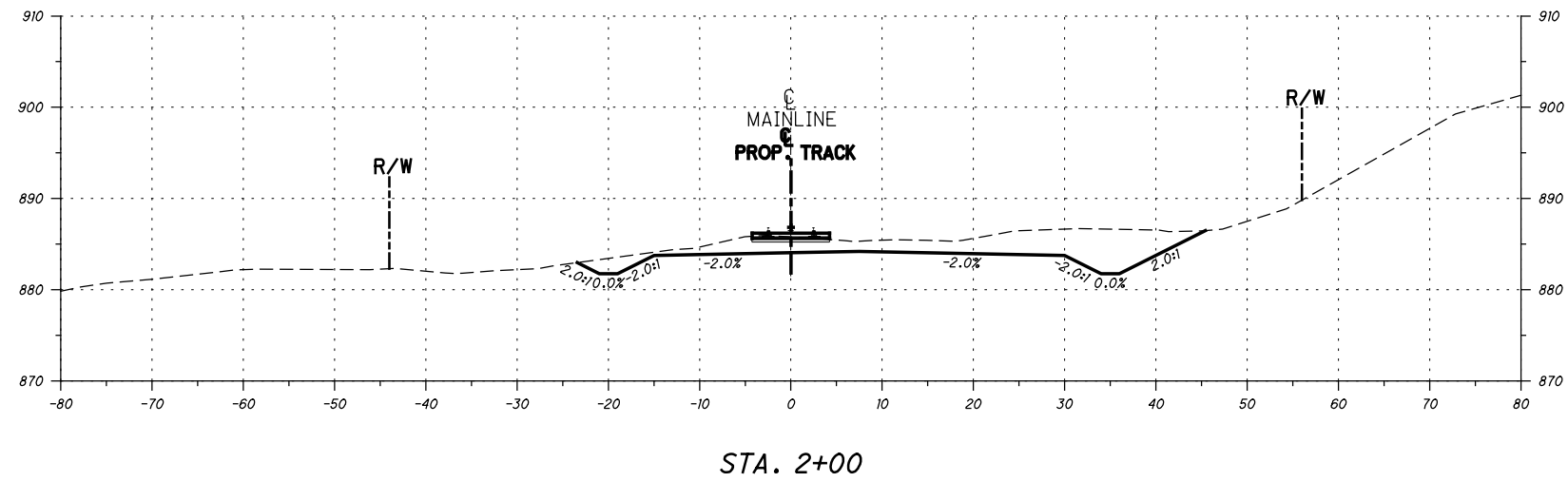
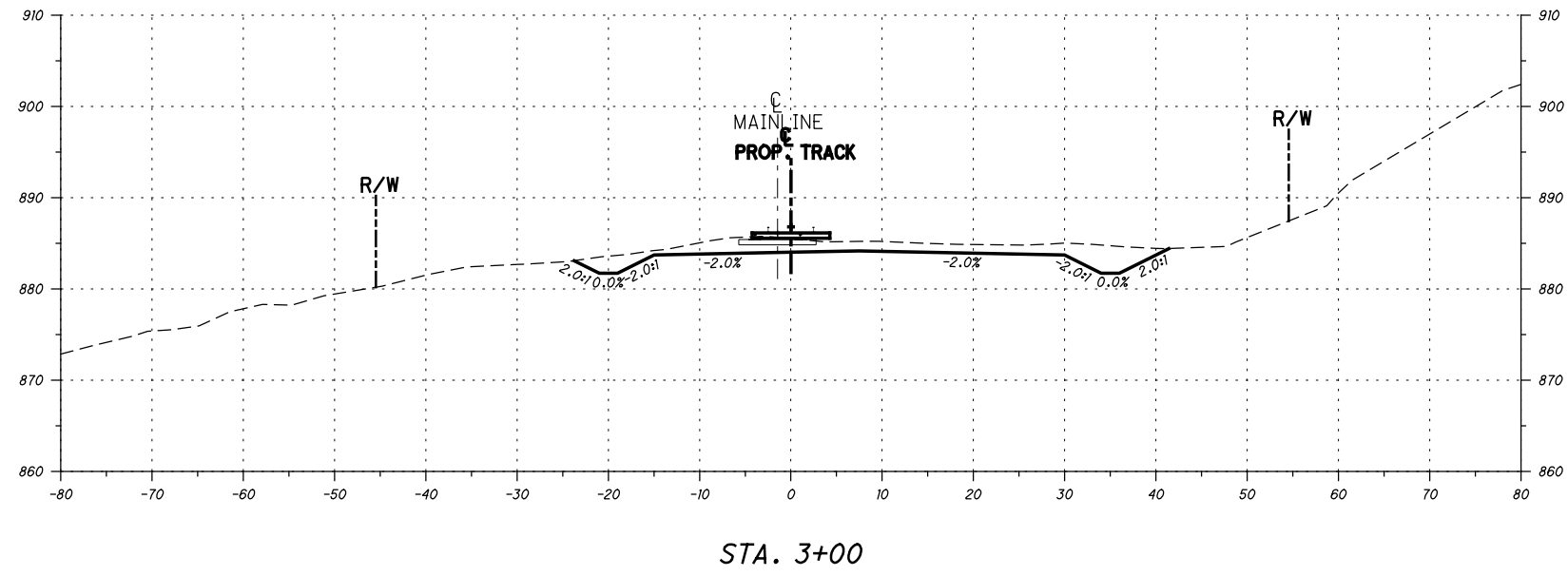
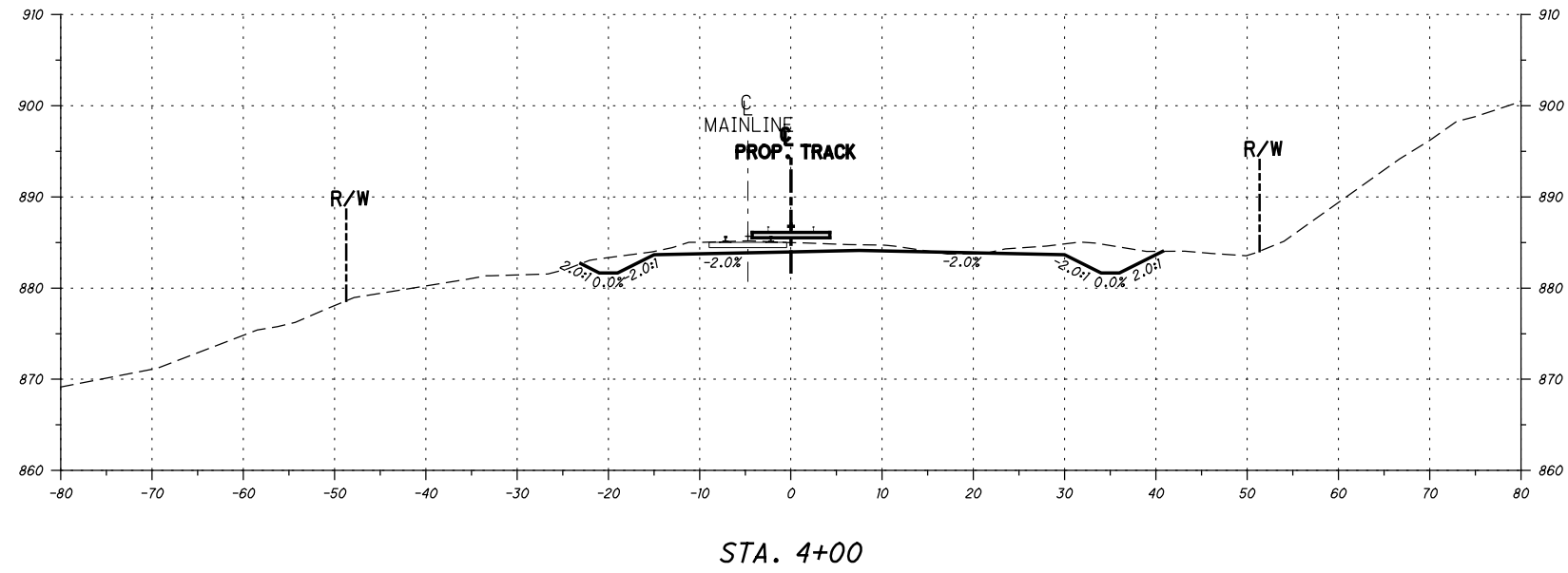
CALCULATED
CMH
CHECKED
JAB

TRACK 1 CROSS SECTIONS  
ALTERNATE 3 - STA. -1+00 TO STA. 1+00

HAS-250-00.81

57  
67

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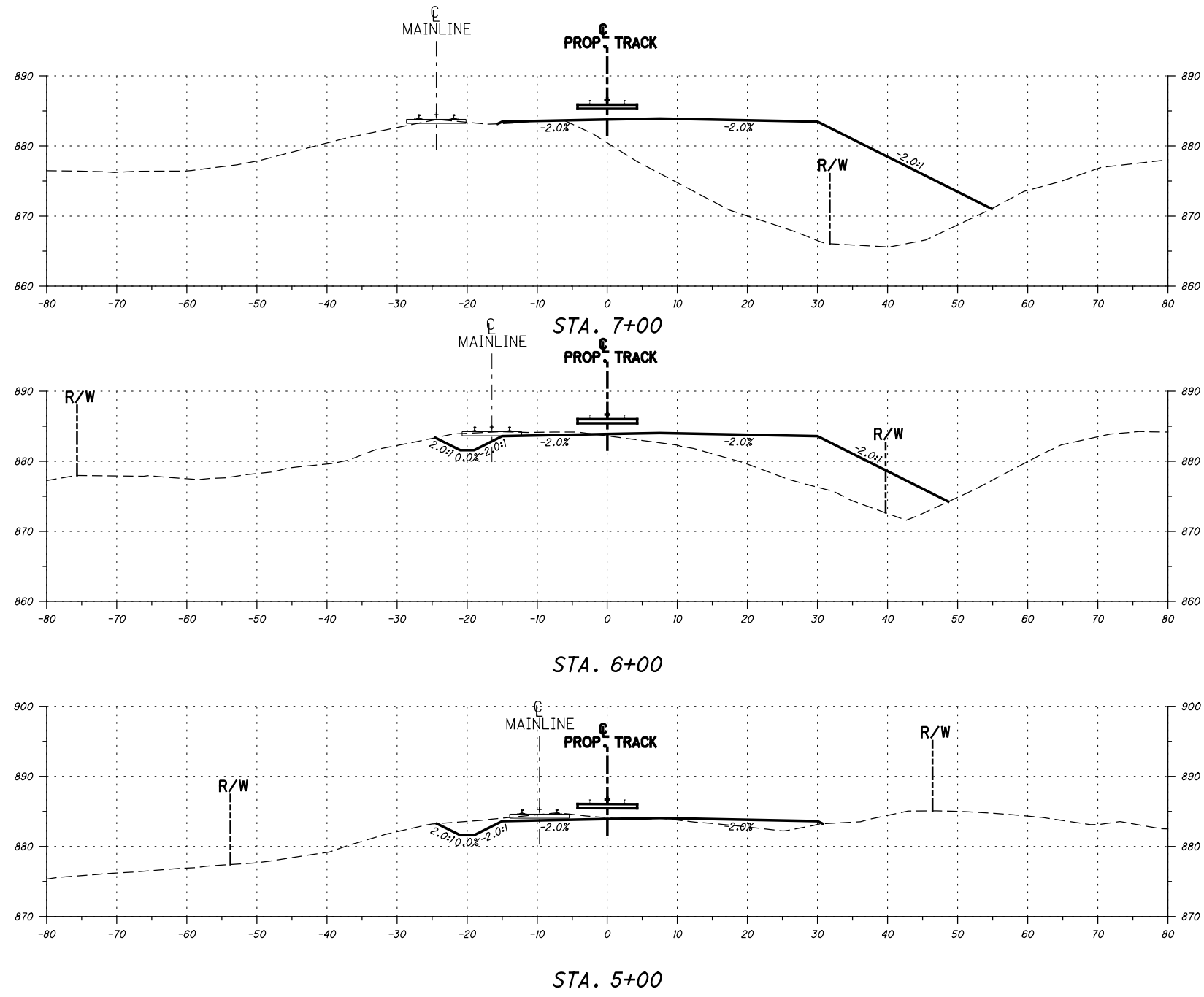


CALCULATED
CMH
CHECKED
JAB

TRACK 1 CROSS SECTIONS  
ALTERNATE 3 - STA. 2+00 TO STA. 4+00

HAS-250-00.81

G:\tra\TOHODT04\_ODOT\_HAS-250\TRA\Sheet\99427X5401.dgn 2/19/2015 1:40:37 PM chawkins



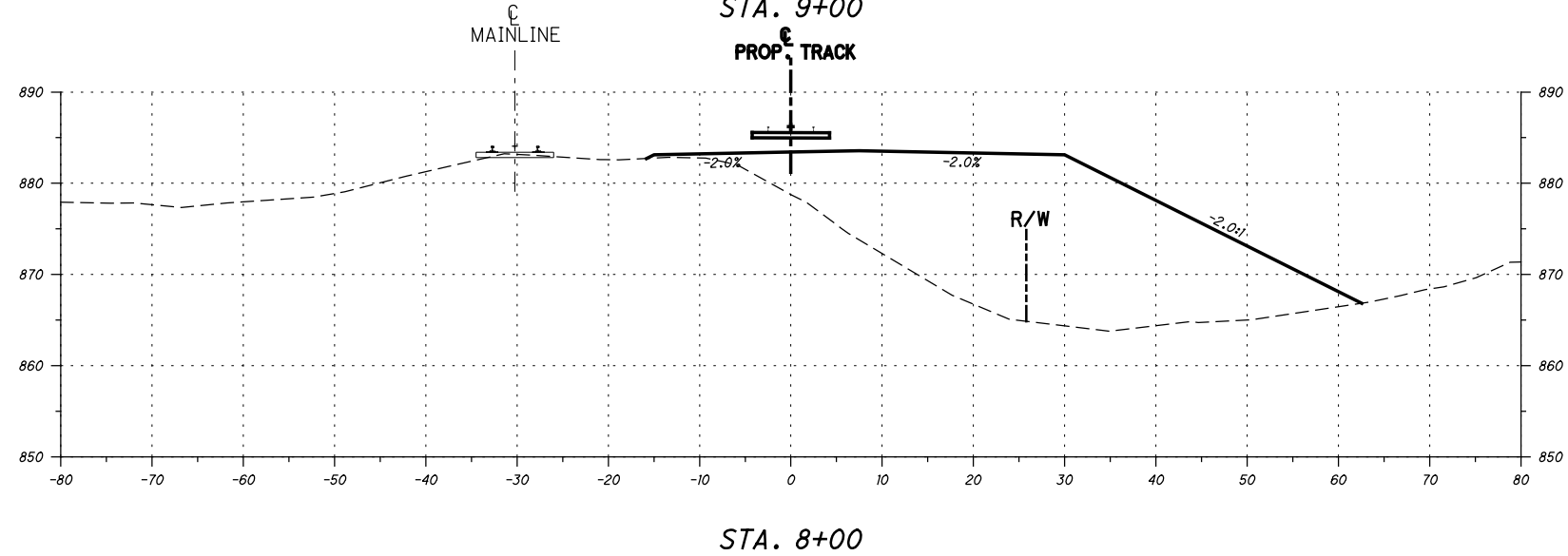
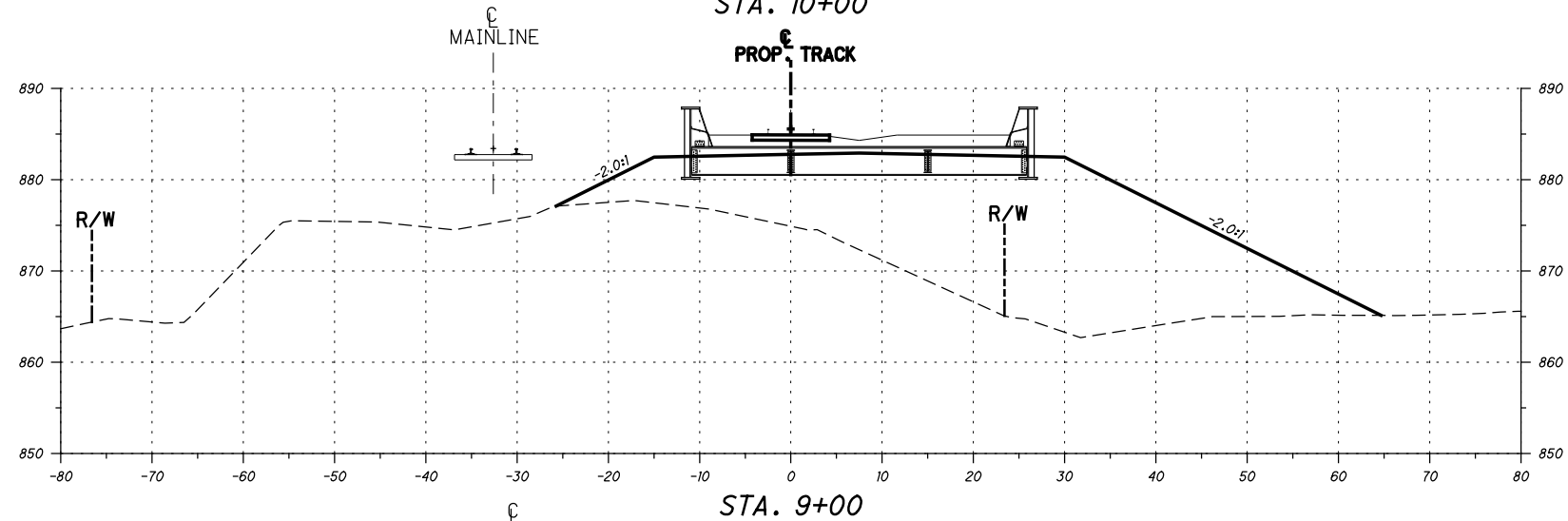
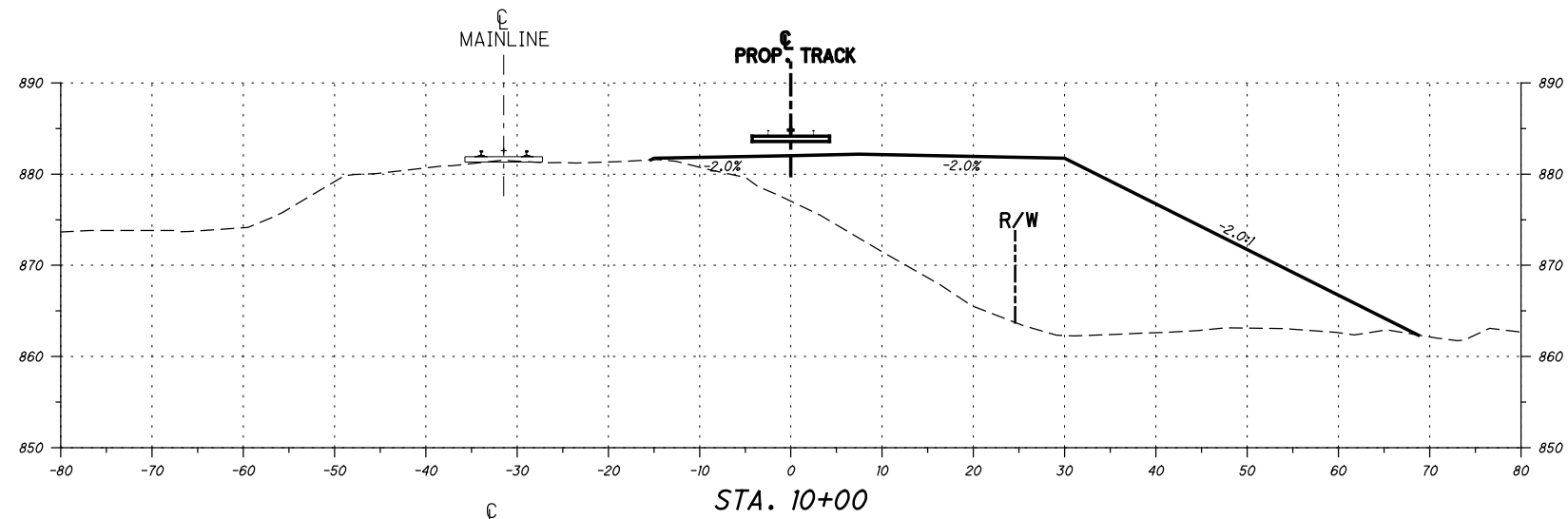
CALCULATED
CMH
CHECKED
JAB

**TRACK 1 CROSS SECTIONS**  
**ALTERNATE 3 - STA. 5+00 TO STA. 7+00**

**HAS-250-00.81**



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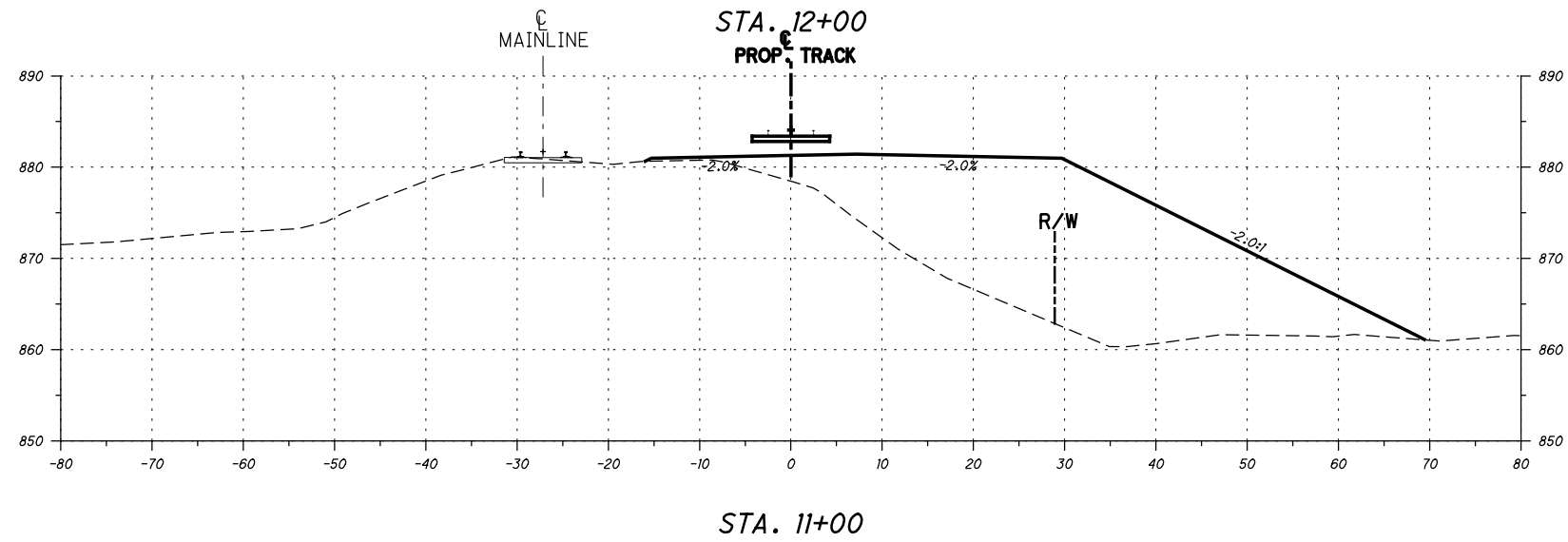
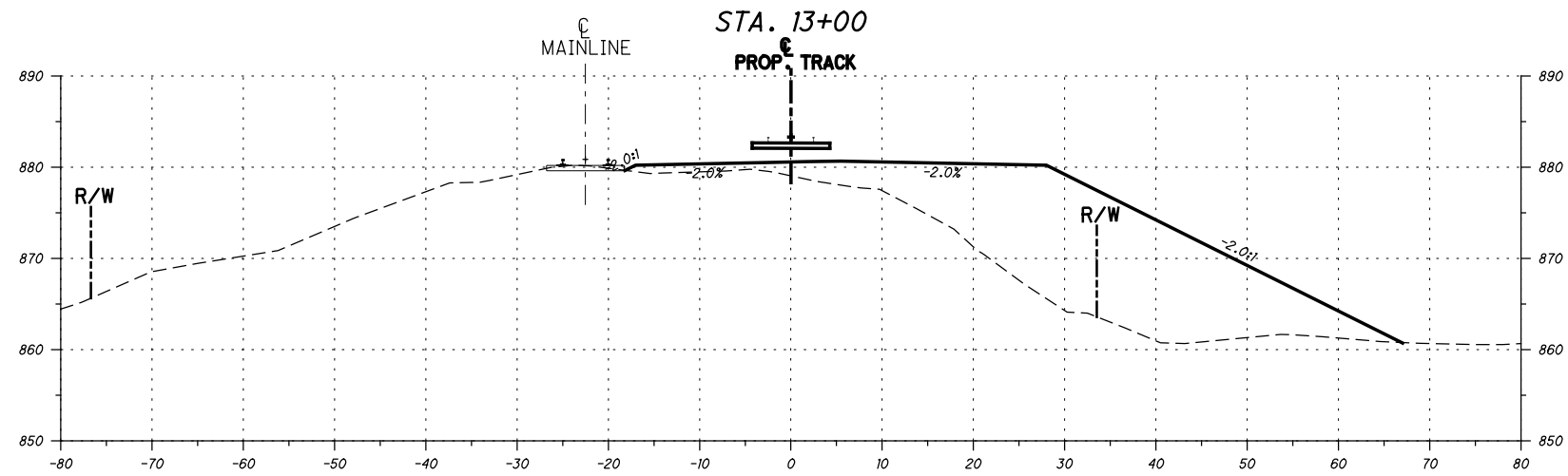
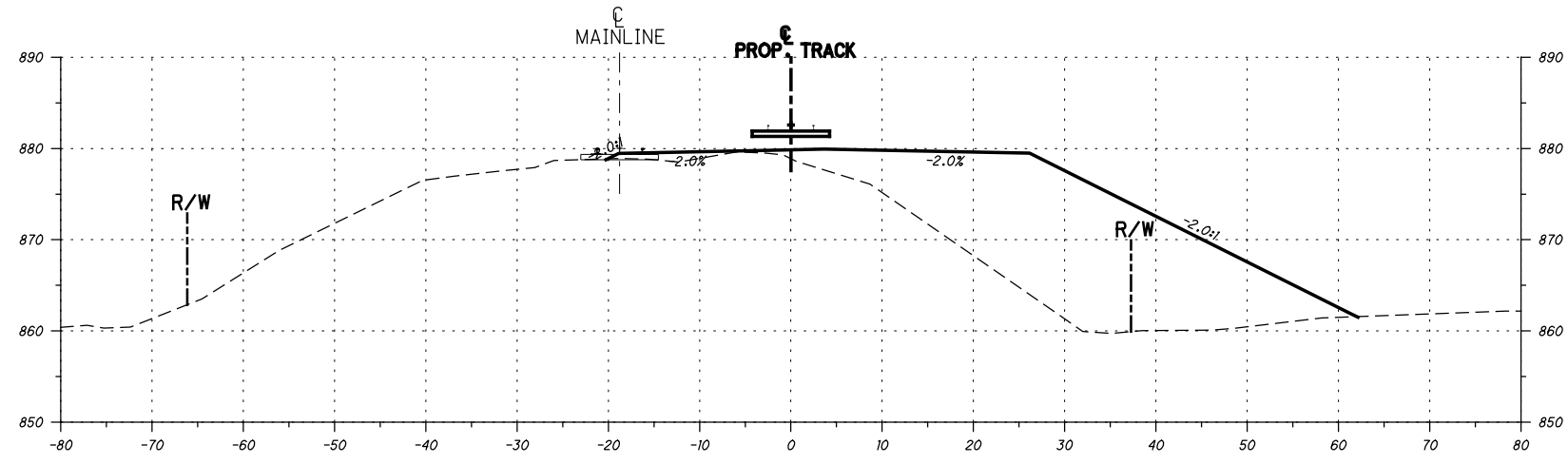


CALCULATED
CMH
CHECKED
JAB

TRACK 1 CROSS SECTIONS  
ALTERNATE 3 - STA. 8+00 TO STA. 10+00

HAS-250-00.81

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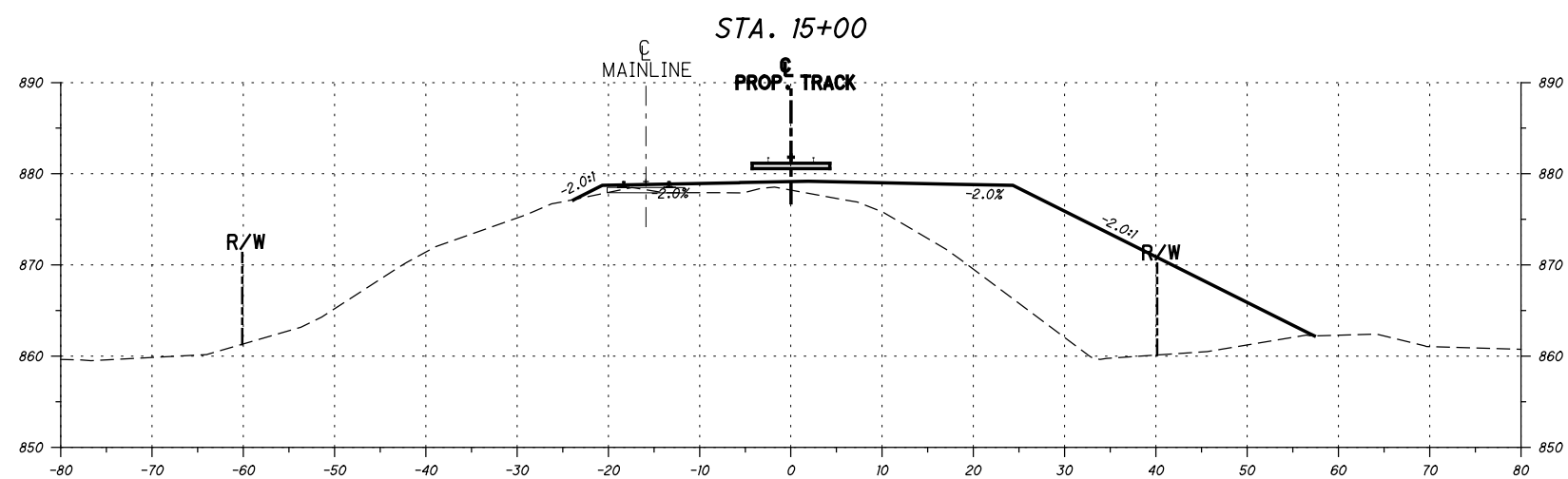
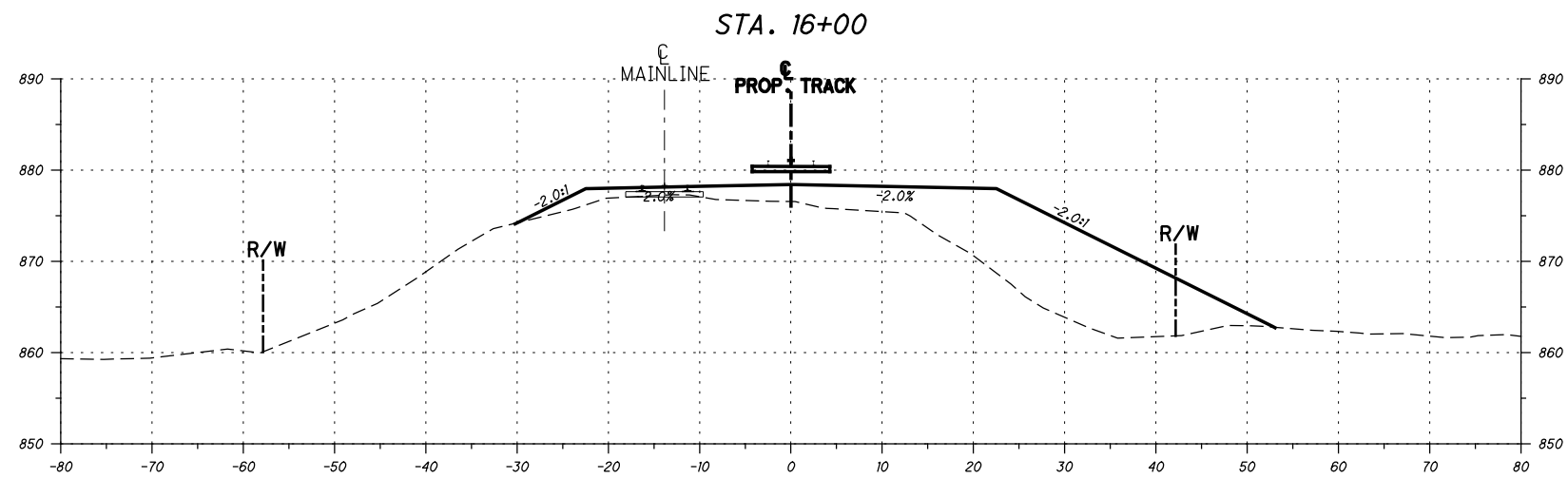
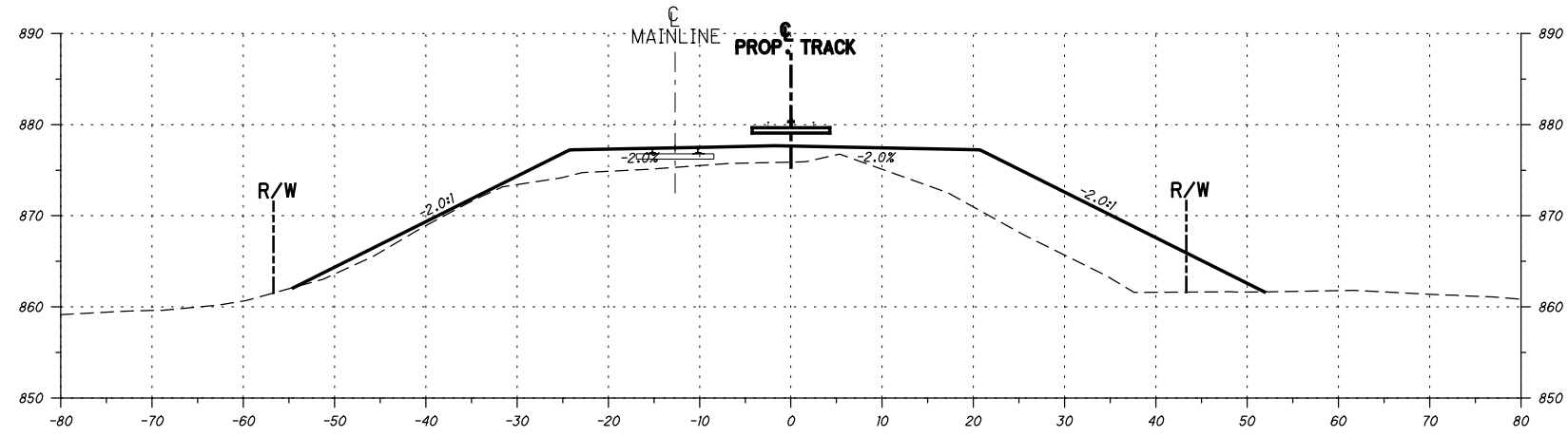
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CMH
CHECKED
JAB

TRACK 1 CROSS SECTIONS  
ALTERNATE 3 - STA. 11+00 TO STA. 13+00

HAS-250-00.81

61
67

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STA. 14+00

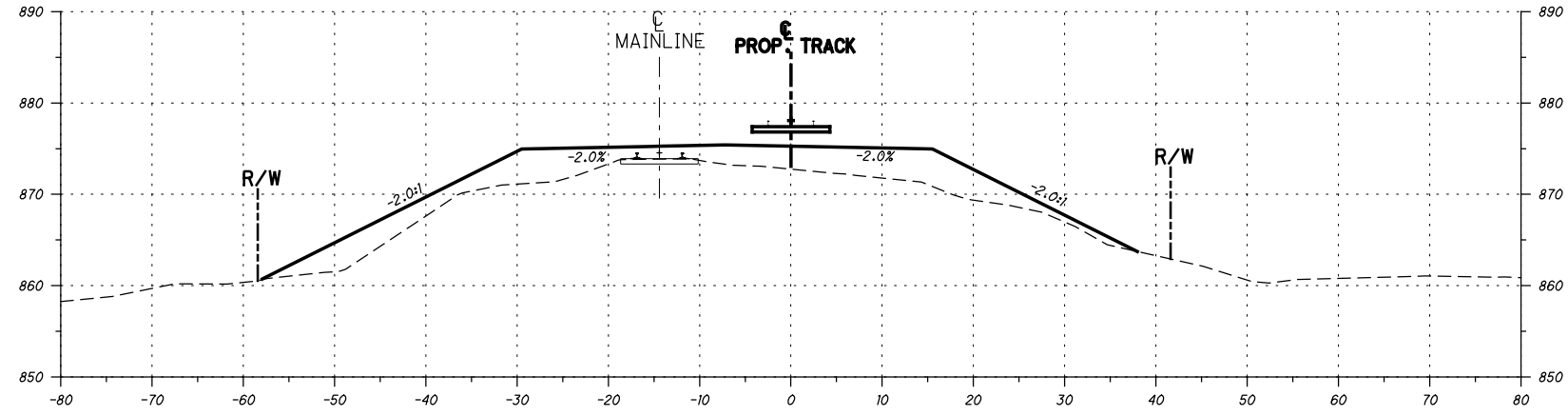
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CHECKED
JAB

TRACK 1 CROSS SECTIONS  
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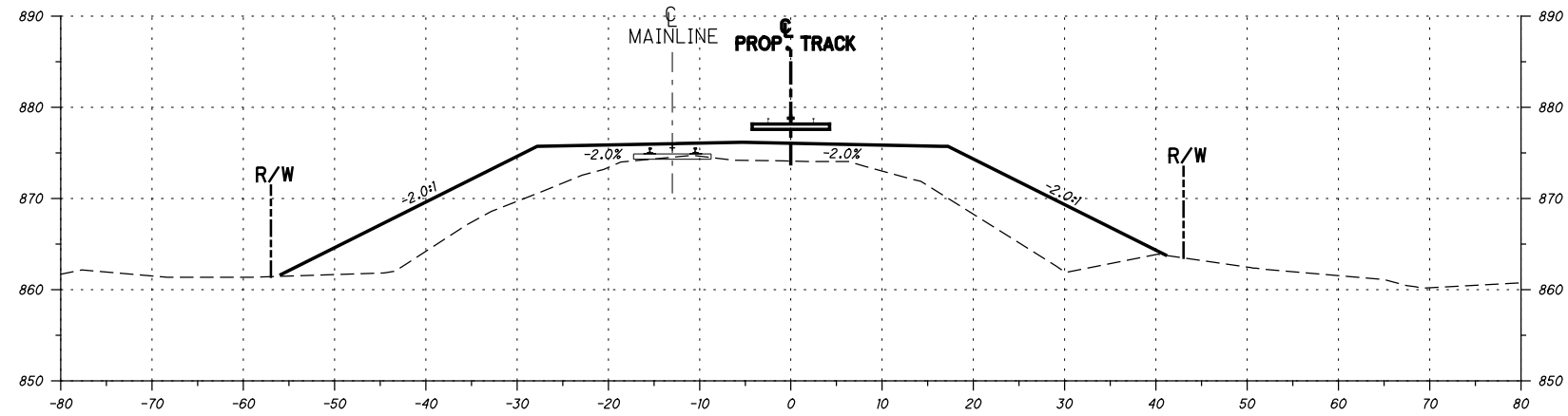
HAS-250-00.81

62  
67

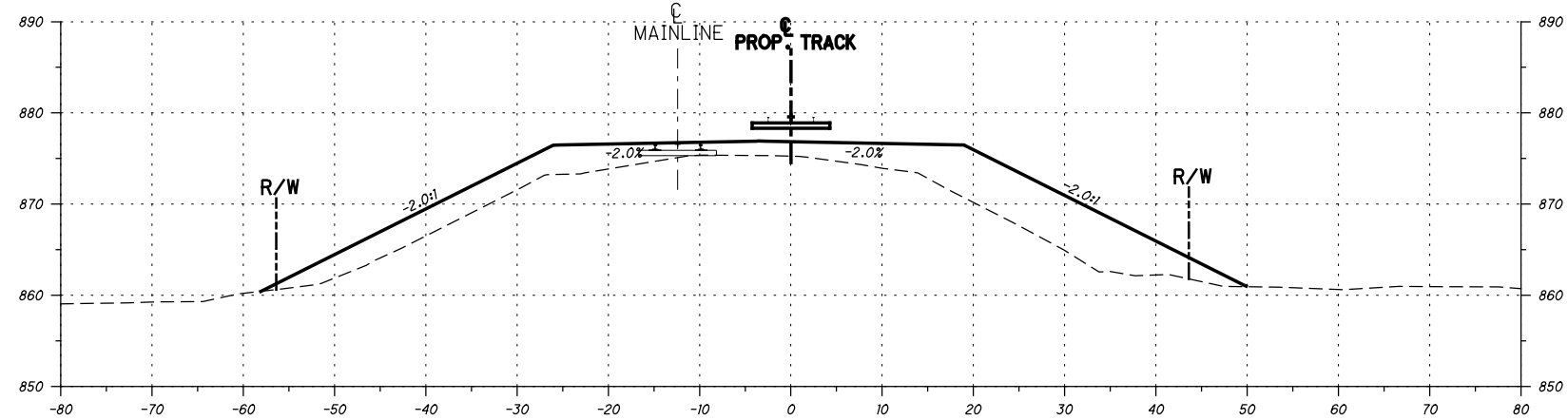
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STA. 19+00



STA. 18+00



STA. 17+00

CALCULATED
CMH
CHECKED
JAB

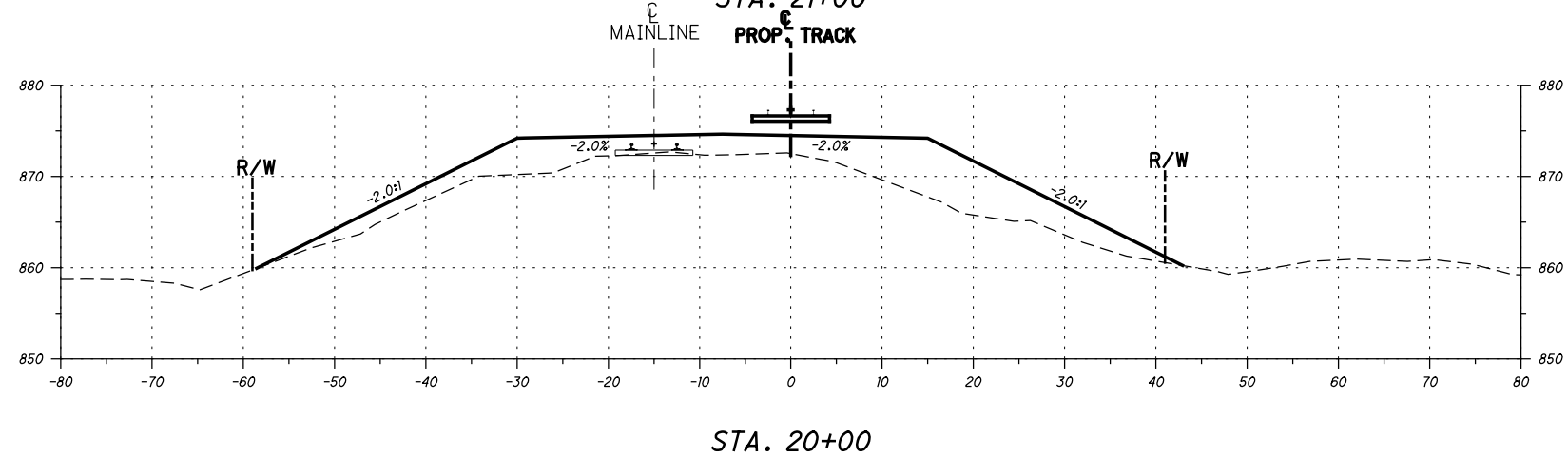
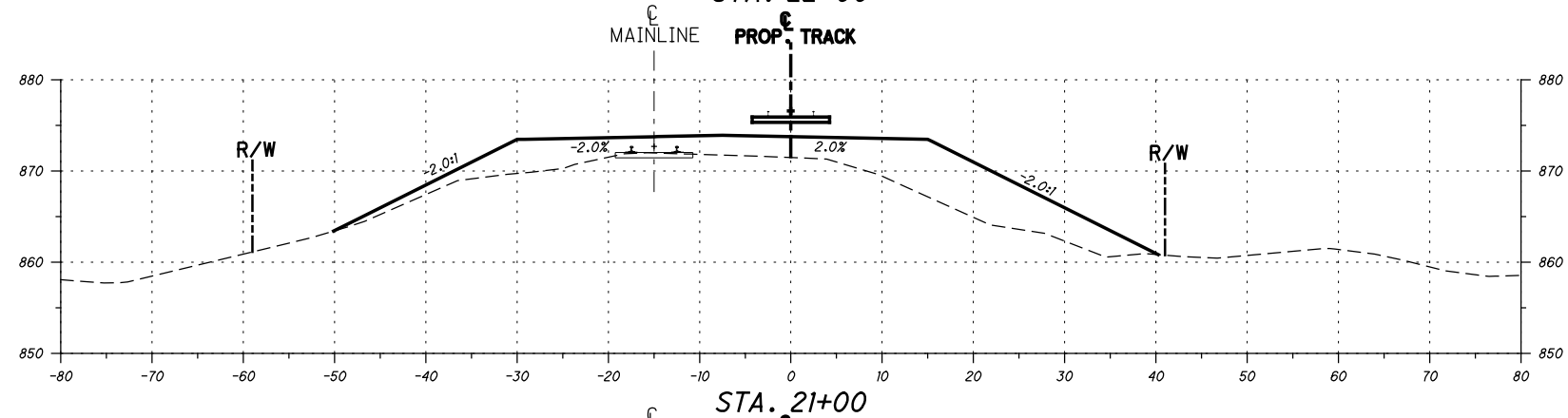
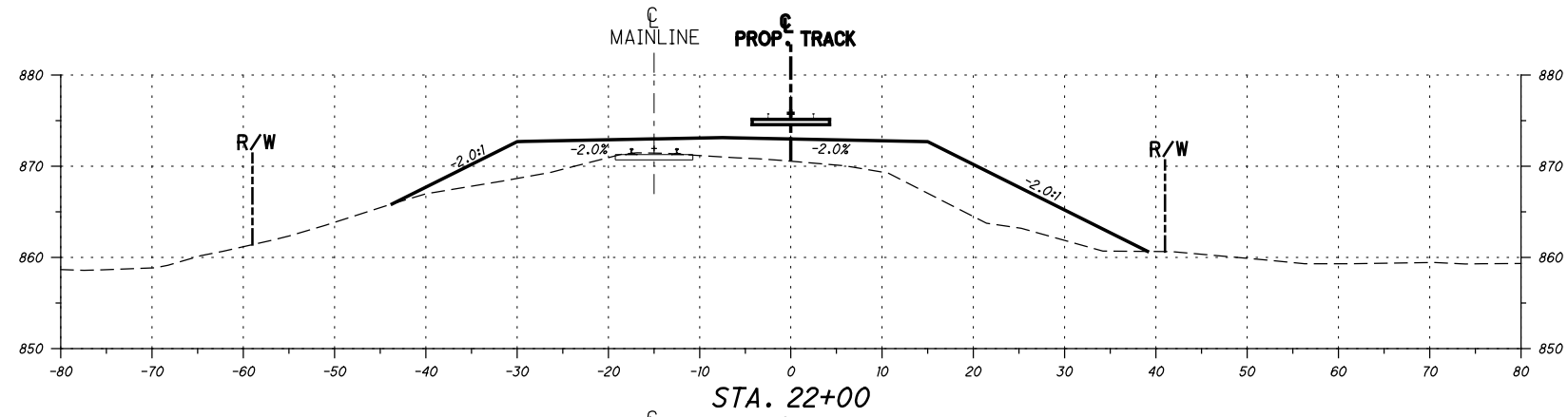
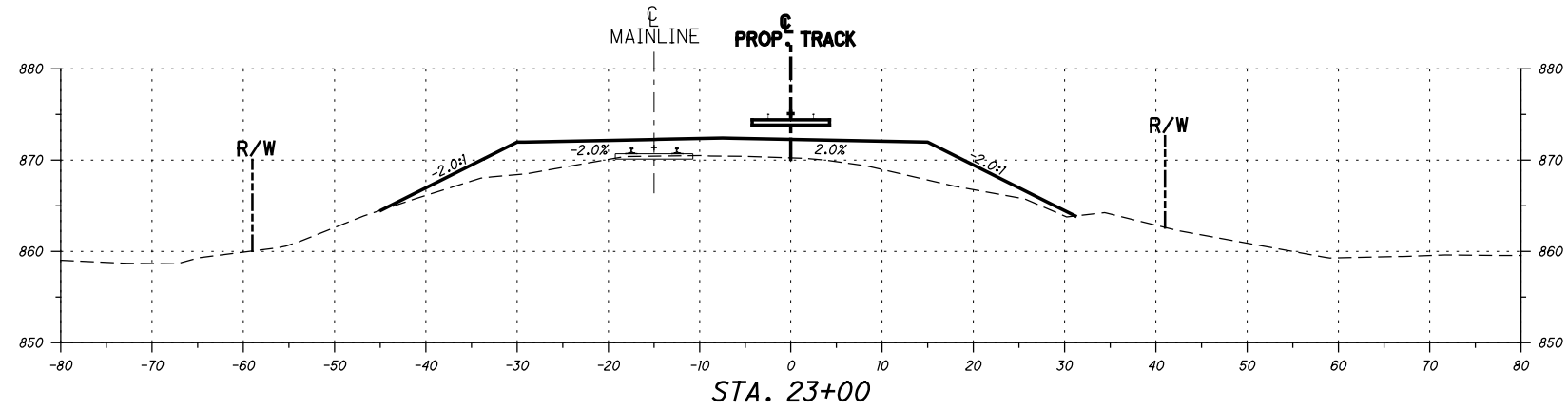
TRACK 1 CROSS SECTIONS  
ALTERNATE 3 - STA. 17+00 TO STA. 19+00

HAS-250-00.81

63  
67



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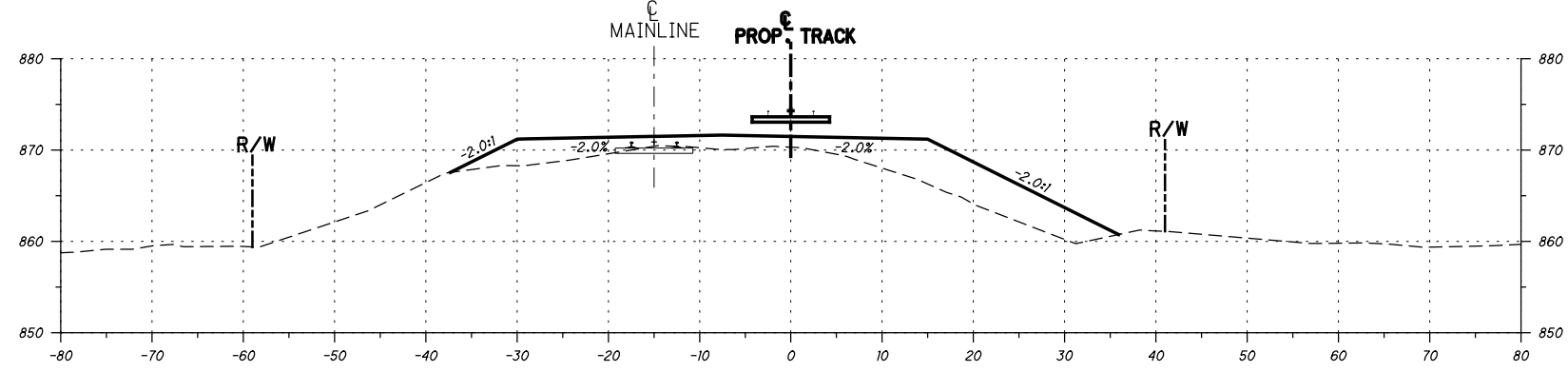
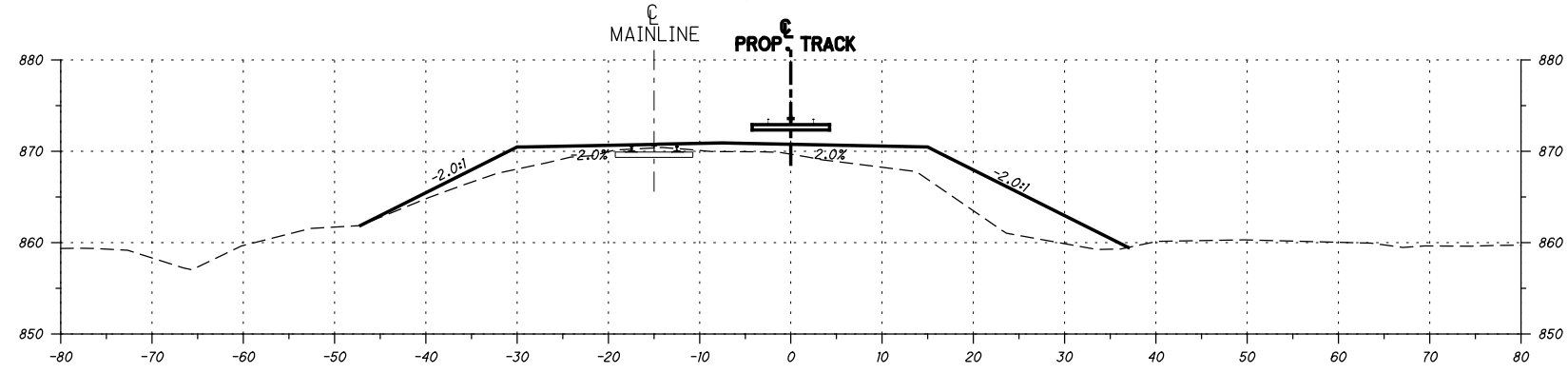
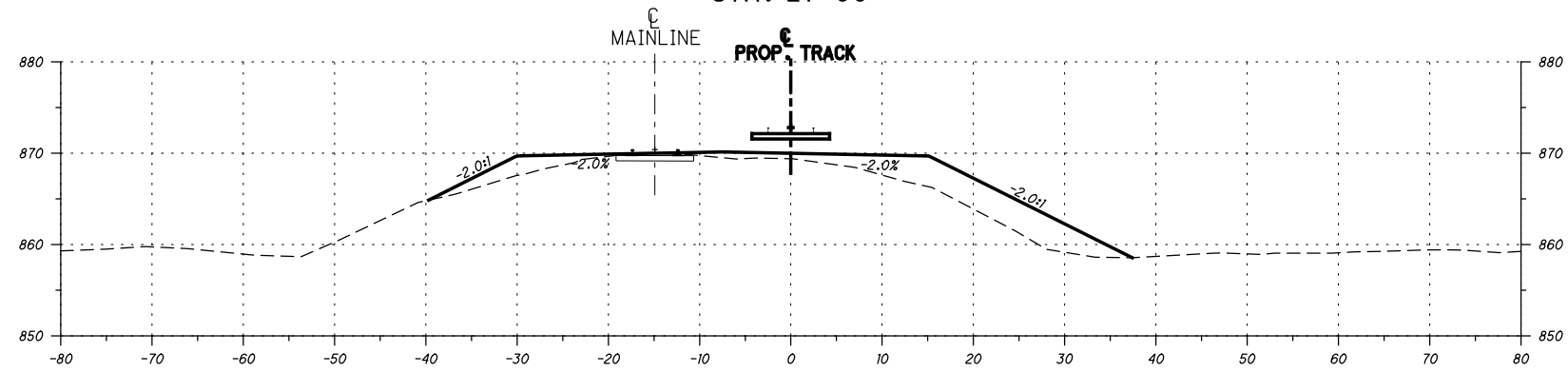
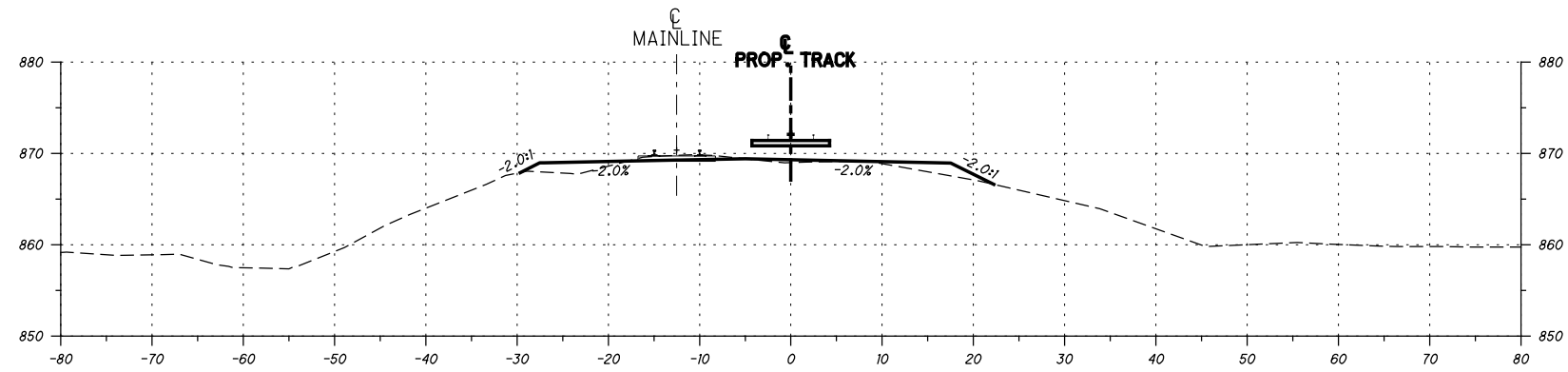


CALCULATED
CMH
CHECKED
JAB

TRACK 1 CROSS SECTIONS  
ALTERNATE 3 - STA. 20+00 TO STA. 23+00

HAS-250-00.81

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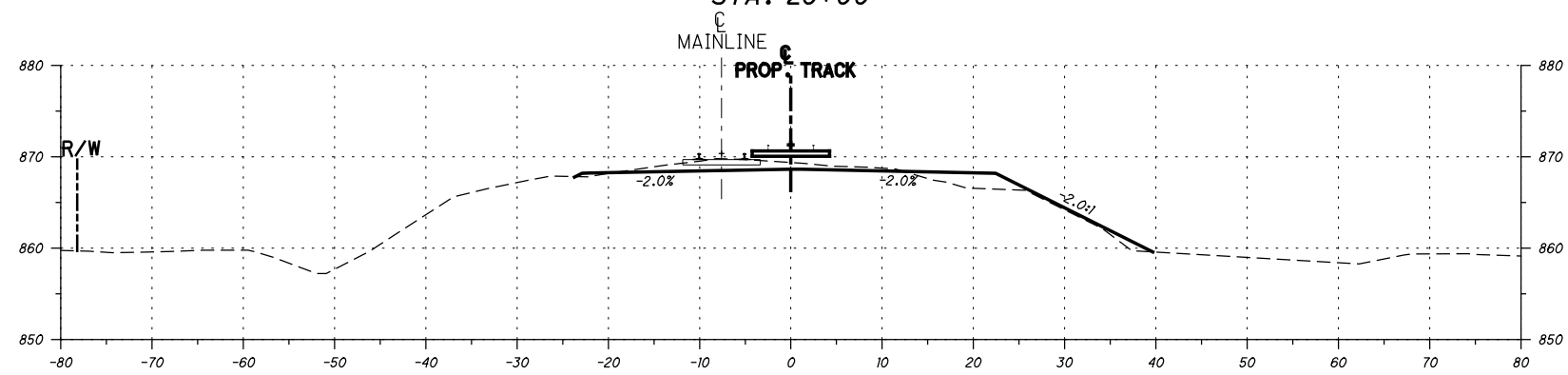
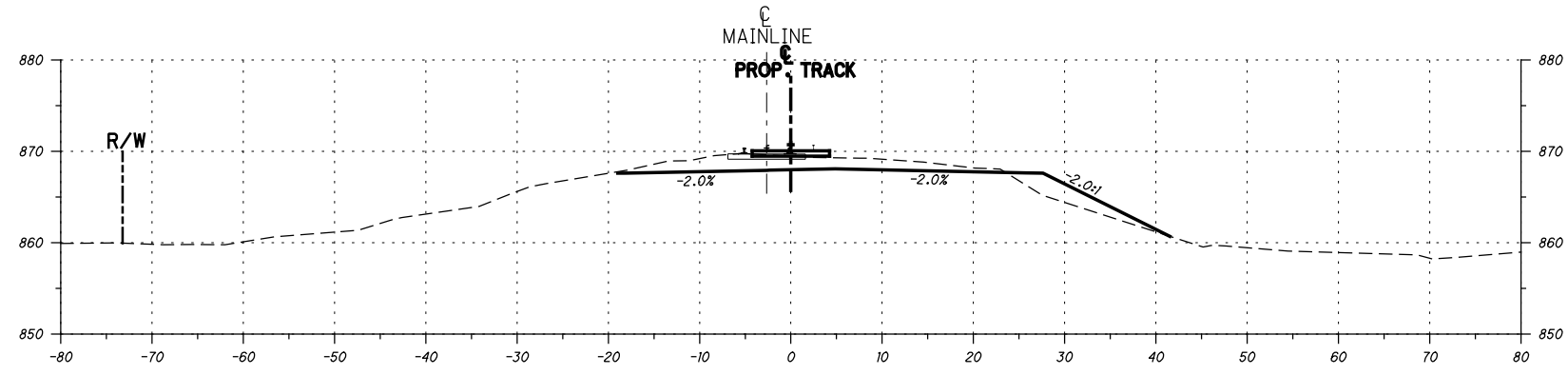
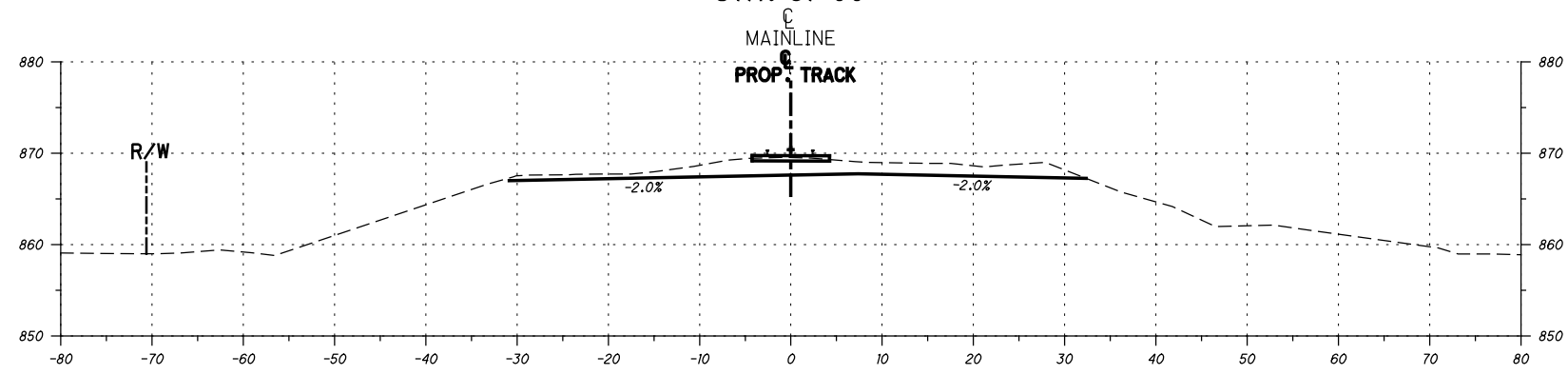
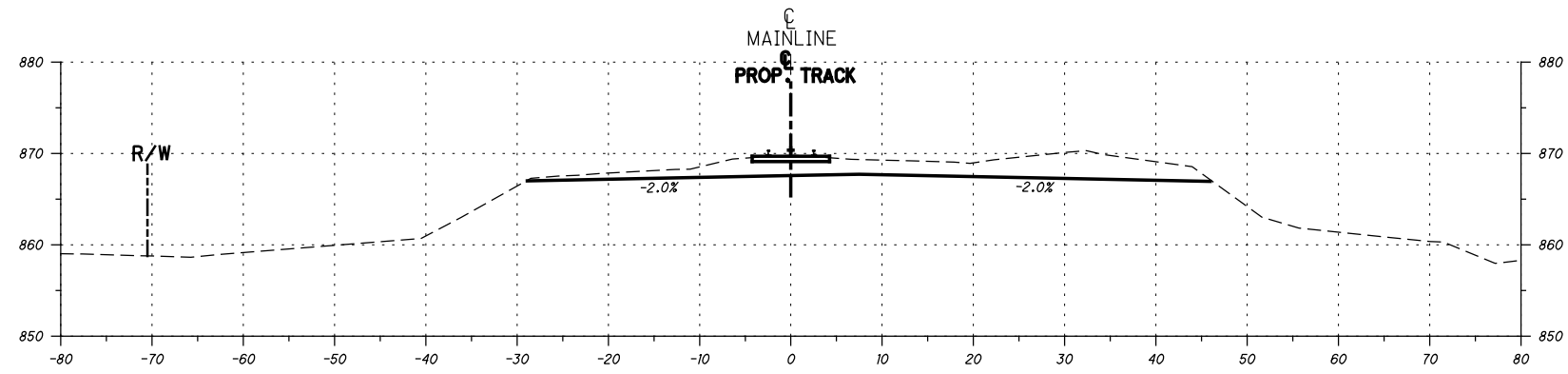


CALCULATED
CMH
CHECKED
JAB

TRACK 1 CROSS SECTIONS  
ALTERNATE 3 - STA. 24+00 TO STA. 27+00

HAS-250-00.81

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STA. 28+00

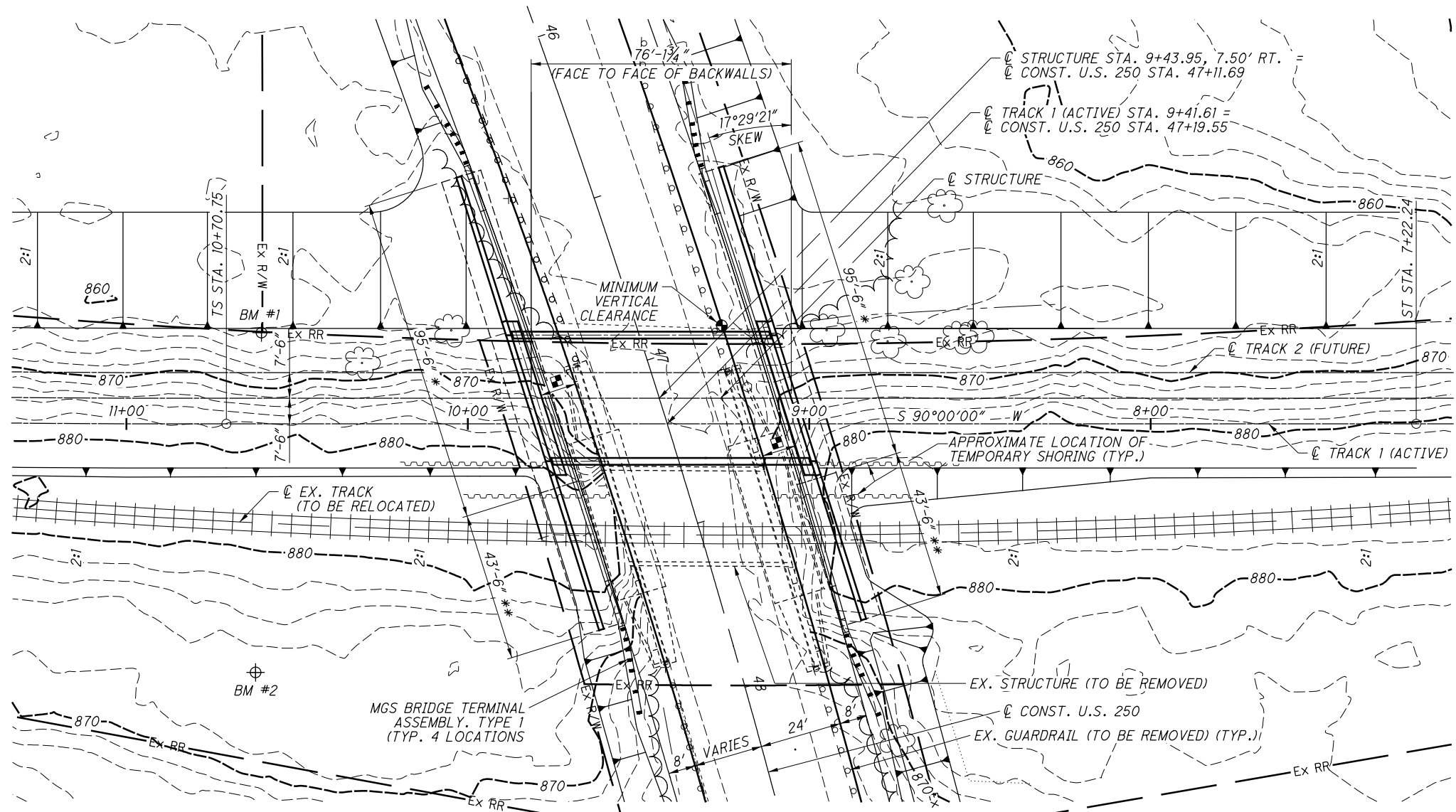
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CMH
CHECKED
JAB

TRACK 1 CROSS SECTIONS  
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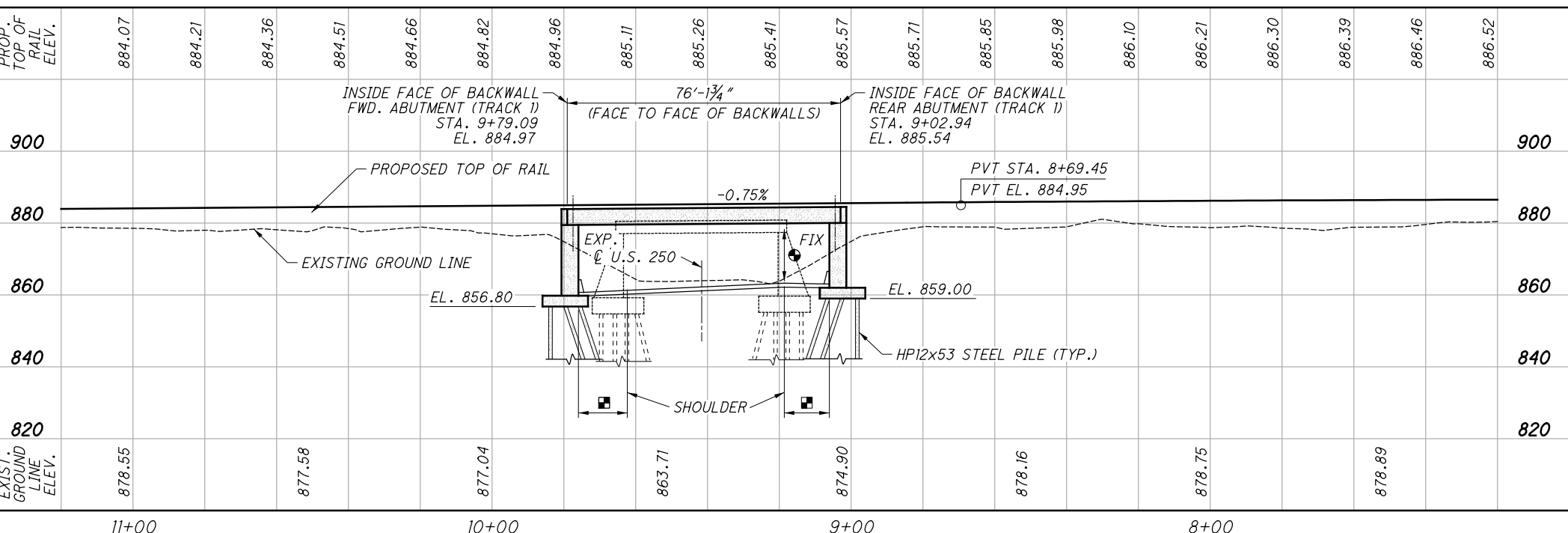
HAS-250-00.81

66  
67

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**PLAN**



**PROFILE ALONG  $\hat{C}$  TRACK 1 (ACTIVE)**

**BENCHMARK DATA**

BM #1 STA. 10+60.47, ELEV. 862.49,  
 OFFSET 26.70' RT.  $\hat{C}$  PROP. TRACK 1 (ACTIVE)  
 BM #2 STA. 10+62.19, ELEV. 871.61,  
 OFFSET 72.81' LT.  $\hat{C}$  PROP. TRACK 1 (ACTIVE)

**NOTES**

EARTHWORK LIMITS SHOWN ARE APPROXIMATE. ACTUAL SLOPES SHALL CONFORM TO PLAN CROSS SECTIONS.

RAILROAD TRAFFIC (CUOH):  
 FREIGHT = 1 TIMES/DAY 40 MPH  
 PASSENGER = 0 TIMES/DAY 0 MPH

DESIGN TRAFFIC (U.S. 250):  
 2017 ADT = 5500 2017 ADTT = 990  
 2037 ADT = 6500 2037 ADTT = 1170  
 DIRECTIONAL DISTRIBUTION = 0.53%

**LEGEND/ABBREVIATIONS**

- \* - PHASE 1 CONSTRUCTION
- \*\* - PHASE 2 CONSTRUCTION
- CUOH - COLUMBUS AND OHIO RIVER RAILROAD

POINT OF MINIMUM VERTICAL CLEARANCE	PROPOSED	REQUIRED
		16'-6"

POINT OF MINIMUM HORIZONTAL CLEARANCE	PROPOSED	REQUIRED
	REAR ABUTMENT	9.89'
FWD. ABUTMENT	10.03'	9.67'

**EXISTING STRUCTURE**

TYPE: BALLASTED DECK CONCRETE ENCASED STEEL BEAM SUPERSTRUCTURE ON WALL TYPE ABUTMENTS ON CONCRETE PILES  
 SPANS: 45'-0"± C/C BEARINGS  
 LOADING: UNKNOWN  
 SKEW: 16° 59' 21" WRT TANGENT TO U.S. 250 @  $\hat{C}$  BRIDGE  
 ALIGNMENT: 2° CURVE RIGHT  
 STRUCTURAL FILE NUMBER: 3401472  
 DATE BUILT: 1941  
 DISPOSITION: FAIR

**PROPOSED STRUCTURE**

TYPE: BALLASTED DECK WELDED STEEL PLATE THROUGH GIRDER ON WALL TYPE ABUTMENTS ON PILES  
 SPANS: 73'-0" C/C BEARINGS  
 LOADING: COOPER E80 AND ALTERNATE LIVE LOAD; 6" ADDITIONAL BALLAST  
 SKEW: 17° 29' 21" R.F.  
 ALIGNMENT: TANGENT  
 COORDINATES: LATITUDE 40° 23' 24" N  
 LONGITUDE 81° 15' 42" W

DESIGN AGENCY: **ARCADIS**  
 ARCADIS U.S., Inc.  
 222 South Main Street, Suite 300 Akron, Ohio 44308  
 Tel: 330.434.8995 Fax: 330.374.1055 www.arcadis-us.com

DATE: 2/20/15  
 REVIEWED: FJG  
 DRAWN: MPB  
 DESIGNED: RBB  
 CHECKED: ETR  
 HARRISON COUNTY  
 U.S. 250  
 STA. 47+11.69

**ALTERNATE 3 - SITE PLAN**  
 BRIDGE NO. HAS-250-0081  
 CUOH RAILROAD OVER U.S. ROUTE 250

**HAS-250-00.81**  
 PID No. 99427

1 / 1

67 / 67





## **Appendix C**

Project Cost Estimates

Alternate 1					
		Quantity	Unit Cost	2015 Total Cost	2017 Total Cost
<i>Roadway</i>					
	Full Depth Pavement	9910 SY	\$52/SY	\$515,320	\$559,122.20
	Resurfacing	1483 SY	\$21/SY	\$31,143	\$33,790
	Pavement Removed, Asphalt	4083 SY	\$5/SY	\$20,415	\$22,150
	Earthwork	19244 CY	\$9/CY	\$173,196	\$187,918
	Subgrade Treatment	4955 CY	\$40/CY	\$198,200	\$215,047
	6" Base Pipe Underdrain	4261 FT	\$10/FT	\$42,608	\$46,229
	Curb	800 FT	\$18/FT	\$14,400	\$15,624
	Guardrail	500 FT	\$20/FT	\$10,000	\$10,850
	Storm Sewer System				\$339,300
	Clearing and Grubbing				\$35,000
	Erosion Control				\$70,000
	Erosion Control Plan				\$15,000
	Seeding & Mulching	24980 SY	\$5/SY	\$124,900	\$135,517
	Post Construction Storm Water BMPs				\$10,000
	Signing & Pavement Marking	0.40 MI	\$66000/MILE	\$26,630	\$28,893
	MOT				\$130,900 ▲
	Field Office, Type C	18 MONTH	\$3400/MONTH	\$61,200	\$66,402
	Construction Layout Stakes				\$33,700
	Mobilization				\$200,000
	Performance Bond				\$33,700
<i>Roadway Subtotal</i>					\$2,189,143
<i>Roadway Subtotal with Contingency</i>					\$2,627,000
▲ Cost indicated is for signalized closure. For maintaining two lanes add \$475,000.					
<i>Bridge</i>					
	Structure Removed, Over 20 Foot, As Per Plan		LUMP	\$150,000	\$162,750
	Cofferdams and Excavation Bracing, As Per Plan		LUMP	\$125,000	\$135,625
	Unclassified Excavation	2486 CY	\$45/CY	\$111,870	\$121,379
	Pile Driving Equipment Mobilization		LUMP	\$15,000	\$16,275
	Sheet Piles HP 12x53, Furnished	10560 FT	\$30/FT	\$316,800	\$343,728
	Sheet Piles HP 12x53, Driven	9680 FT	\$12/FT	\$116,160	\$126,034

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OPINION OF PROBABLE PROJECT COST

\* - Assume 8.1% Inflation from 2015 to 2017

\*\* - Assume 20% Contingency Factor

Alternate 1					
	Epoxy Coated Reinforcing Steel	141750 POUND	\$1.05/POUND	\$148,838	\$161,489
	Class QC1 Concrete with QC/QA, Abutment Not Including Footing	563 CY	\$600/CY	\$337,800	\$366,513
	Class QC1 Concrete with QC/QA	382 CY	\$350/CY	\$133,700	\$145,065
	Special - Waterproofing, Misc.: Steel Deck Waterproofing	309 SY	\$50/SY	\$15,450	\$16,763
	Structural Steel Members, Level 6	427330 POUND	\$1.95/POUND	\$833,294	\$904,123
	Field Painting Structural Steel, Intermediate Coat	15740 SF	\$3/SF	\$47,220	\$51,234
	Field Painting Structural Steel	15740 SF	\$3/SF	\$39,350	\$42,695
	Bearing Device, Misc.: Bolster or Rocker	4 EACH	\$2500/EACH	\$10,000	\$10,850
	Railing, Aluminum	150 FT	\$65/FT	\$9,750	\$10,579
	Porous Backfill with Filter Fabric	298 CY	\$75/CY	\$22,350	\$24,250
				<i>Bridge Subtotal</i>	\$2,639,350
				<i>Bridge Subtotal with Contingency</i>	\$3,168,000 ▲▲
▲▲	Add \$1,000,000 to cost to maintain existing track location.				
Railroad					
	Trackwork				\$382,800
	Earthwork for Track				\$1,231,200
	CUOH Flagger				\$260,000
	Railroad Bond				\$17,200
	Railroad Protective Liability Insurance				\$17,200
				<i>Railroad Subtotal</i>	\$1,908,400
				<i>Railroad Subtotal with Contingency</i>	\$2,291,000 ★
★	Cost indicated is for a 72 hour closure. For construction with maximum 6 hour closures, add \$100,000.				
Right of Way					
	Temporary R/W	0.38 AC.	\$43600/AC.	\$16,568	\$17,976
	Permanent R/W	0.56 AC.	\$8700/AC.	\$4,872	\$5,286
	Railroad R/W	1.04 AC.	\$87100/AC.	\$90,584	\$98,284
	Drainage Easement	1.23 AC.	\$21800/AC.	\$26,814	\$29,093
				<i>Right of Way Subtotal</i>	\$150,639
				<i>Right of Way Subtotal with Contingency</i>	\$181,000
<b>Alternate 1 - Total Opinion of Probable Project Cost (2017) =</b>					<b>\$8,267,000</b>

Alternate 2					
		Quantity	Unit Cost	2013 Total Cost	2017 Total Cost
<b>Roadway</b>					
	Full Depth Pavement	5636 SY	\$52/SY	\$293,072	\$317,983
	Resurfacing	5390 SY	\$21/SY	\$113,190	\$122,811
	Pavement Removed, Asphalt	0 SY	\$5/SY	\$0	\$0
	Earthwork	7604 CY	\$9/CY	\$68,436	\$74,253
	Subgrade Treatment	2818 CY	\$40/CY	\$112,720	\$122,301
	6" Base Pipe Underdrain	4085 FT	\$10/FT	\$40,848	\$44,320
	Curb	0 FT	\$18/FT	\$0	\$0
	Guardrail	500 FT	\$20/FT	\$10,000	\$10,850
	Storm Sewer System				\$0
	Clearing and Grubbing				\$25,000
	Erosion Control				\$50,000
	Erosion Control Plan				\$15,000
	Seeding & Mulching	12630 SY	\$5/SY	\$63,150	\$68,518
	Post Construction Storm Water BMPs				\$10,000
	Signing & Pavement Marking	0.39 MI	\$66000/MILE	\$25,530	\$27,700
	MOT				\$105,800 ▲
	CField Office, Type B	18 MONTH	\$3400/MONTH	\$61,200	\$66,402
	Construction Layout Stakes				\$27,300
	Mobilization				\$200,000
	Performance Bond				\$27,300
<i>Roadway Subtotal</i>					\$1,315,538
<i>Roadway Subtotal with Contingency</i>					\$1,579,000
▲ Cost indicated is for signalized closure. For maintaining two lanes add \$50,000.					
<b>Bridge</b>					
	Structure Removed, Over 20 Foot, As Per Plan		LUMP	\$150,000	\$162,750
	Cofferdams and Excavation Bracing, As Per Plan		LUMP	\$125,000	\$135,625
	Unclassified Excavation	2486 CY	\$45/CY	\$111,870	\$121,379
	Pile Driving Equipment Mobilization		LUMP	\$15,000	\$16,275
	Sheet Piles HP 12x53, Furnished	10560 FT	\$30/FT	\$316,800	\$343,728
	Sheet Piles HP 12x53, Driven	9680 FT	\$12/FT	\$116,160	\$126,034

Alternate 2					
	Epoxy Coated Reinforcing Steel	141750 POUND	\$1.05/POUND	\$148,838	\$161,489
	Class QC1 Concrete with QC/QA, Abutment Not Including Footing	563 CY	\$600/CY	\$337,800	\$366,513
	Class QC1 Concrete with QC/QA	382 CY	\$350/CY	\$133,700	\$145,065
	Special - Waterproofing, Misc.: Steel Deck Waterproofing	309 SY	\$50/SY	\$15,450	\$16,763
	Structural Steel Members, Level 6	427330 POUND	\$1.95/POUND	\$833,294	\$904,123
	Field Painting Structural Steel, Intermediate Coat	15740 SF	\$3/SF	\$47,220	\$51,234
	Field Painting Structural Steel	15740 SF	\$3/SF	\$39,350	\$42,695
	Bearing Device, Misc.: Bolster or Rocker	4 EACH	\$2500/EACH	\$10,000	\$10,850
	Railing, Aluminum	150 FT	\$65/FT	\$9,750	\$10,579
	Porous Backfill with Filter Fabric	298 CY	\$75/CY	\$22,350	\$24,250
				<i>Bridge Subtotal</i>	\$2,639,350
				<i>Bridge Subtotal with Contingency</i>	\$3,168,000 ▲▲
	▲▲ Add \$1,000,000 to cost to maintain existing track location.				
Railroad					
	Trackwork				\$873,100
	Earthwork for Track				\$1,705,400
	CUOH Flagger				\$260,000
	Railroad Bond				\$28,300
	Railroad Protective Liability Insurance				\$28,300
				<i>Railroad Subtotal</i>	\$2,895,100
				<i>Railroad Subtotal with Contingency</i>	\$3,475,000 ★
	★ Cost indicated is for a 72 hour closure. For construction with maximum 6 hour closures, add \$250,000.				
Right of Way					
	Temporary R/W	0.29 AC.	\$43600/AC.	\$12,557	\$13,624
	Permanent R/W	0.38 AC.	\$8700/AC.	\$3,341	\$3,625
	Railroad R/W	3.36 AC.	\$87100/AC.	\$292,656	\$317,532
	Drainage Easement	0.00 AC.	\$21800/AC.	\$0	\$0
				<i>Right of Way Subtotal</i>	\$334,781
				<i>Right of Way Subtotal with Contingency</i>	\$402,000
	<b>Alternate 2 - Total Opinion of Probable Project Cost (2017) =</b>				<b>\$8,624,000</b>



Alternate 3					
		Quantity	Unit Cost	2013 Total Cost	2017 Total Cost
<b>Roadway</b>					
	Full Depth Pavement	8706 SY	\$52/SY	\$452,712	\$491,192.52
	Resurfacing	2315 SY	\$21/SY	\$48,615	\$52,747
	Pavement Removed, Asphalt	3049 SY	\$5/SY	\$15,245	\$16,541
	Earthwork	11804 CY	\$9/CY	\$106,236	\$115,266
	Subgrade Treatment	4353 CY	\$40/CY	\$174,120	\$188,920
	6" Base Pipe Underdrain	4085 FT	\$10/FT	\$40,848	\$44,320
	Curb	800 FT	\$18/FT	\$14,400	\$15,624
	Guardrail	500 FT	\$20/FT	\$10,000	\$10,850
	Storm Sewer System				\$172,700
	Clearing and Grubbing				\$28,000
	Erosion Control				\$55,000
	Erosion Control Plan				\$15,000
	Seeding & Mulching	15397 SY	\$5/SY	\$76,985	\$83,529
	Post Construction Storm Water BMPs				\$10,000
	Signing & Pavement Marking	0.39 MI	\$66000/MILE	\$25,530	\$27,700
	MOT				\$119,000 ▲
	Field Office, Type C	18 MONTH	\$3400/MONTH	\$61,200	\$66,402
	Construction Layout Stakes				\$30,600
	Mobilization				\$200,000
	Performance Bond				\$30,600
<i>Roadway Subtotal</i>					\$1,773,991
<i>Roadway Subtotal with Contingency</i>					\$2,129,000
▲ Cost indicated is for signalized closure. For maintaining two lanes add \$475,000.					
<b>Bridge</b>					
	Structure Removed, Over 20 Foot, As Per Plan		LUMP	\$150,000	\$162,750
	Cofferdams and Excavation Bracing, As Per Plan		LUMP	\$125,000	\$135,625
	Unclassified Excavation	2486 CY	\$45/CY	\$111,870	\$121,379
	Pile Driving Equipment Mobilization		LUMP	\$15,000	\$16,275
	Sheet Piles HP 12x53, Furnished	10560 FT	\$30/FT	\$316,800	\$343,728
	Sheet Piles HP 12x53, Driven	9680 FT	\$12/FT	\$116,160	\$126,034

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OPINION OF PROBABLE PROJECT COST

\* - Assume 8.1% Inflation from 2015 to 2017

\*\* - Assume 20% Contingency Factor

Alternate 3					
	Epoxy Coated Reinforcing Steel	141750 POUND	\$1.05/POUND	\$148,838	\$161,489
	Class QC1 Concrete with QC/QA, Abutment Not Including Footing	563 CY	\$600/CY	\$337,800	\$366,513
	Class QC1 Concrete with QC/QA	382 CY	\$350/CY	\$133,700	\$145,065
	Special - Waterproofing, Misc.: Steel Deck Waterproofing	309 SY	\$50/SY	\$15,450	\$16,763
	Structural Steel Members, Level 6	427330 POUND	\$1.95/POUND	\$833,294	\$904,123
	Field Painting Structural Steel, Intermediate Coat	15740 SF	\$3/SF	\$47,220	\$51,234
	Field Painting Structural Steel	15740 SF	\$3/SF	\$39,350	\$42,695
	Bearing Device, Misc.: Bolster or Rocker	4 EACH	\$2500/EACH	\$10,000	\$10,850
	Railing, Aluminum	150 FT	\$65/FT	\$9,750	\$10,579
	Porous Backfill with Filter Fabric	298 CY	\$75/CY	\$22,350	\$24,250
				<i>Bridge Subtotal</i>	\$2,639,350
				<i>Bridge Subtotal with Contingency</i>	\$3,168,000 ▲▲
	▲▲ Add \$1,000,000 to cost to maintain existing track location.				
Railroad					
	Trackwork				\$750,500
	Earthwork for Track				\$1,250,600
	CUOH Flagger				\$260,000
	Railroad Bond				\$22,500
	Railroad Protective Liability Insurance				\$22,500
				<i>Railroad Subtotal</i>	\$2,306,100
				<i>Railroad Subtotal with Contingency</i>	\$2,768,000 ★
	★ Cost indicated is for a 72 hour closure. For construction with maximum 6 hour closures, add \$250,000.				
Right of Way					
	Temporary R/W	0.32 AC.	\$43600/AC.	\$13,952	\$15,138
	Permanent R/W	0.54 AC.	\$8700/AC.	\$4,733	\$5,135
	Railroad R/W	2.90 AC.	\$87100/AC.	\$252,590	\$274,060
	Drainage Easement	0.00 AC.	\$21800/AC.	\$0	\$0
				<i>Right of Way Subtotal</i>	\$294,333
				<i>Right of Way Subtotal with Contingency</i>	\$354,000
	<b>Alternate 3 - Total Opinion of Probable Project Cost (2017) =</b>				<b>\$8,419,000</b>