

City of Bellevue

**East Link Light Rail B7/C9T to
NE 2nd Portal (B7 – Revised)
Alternative**

RP03 – Interim Analysis Report

215382/RP03

Review Draft 3 | May 2011

Draft

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Executive summary

Bellevue City Council has initiated the development of a concept design for an alternative to the B7 and C9T alternatives studied by Sound Transit in the DEIS and SDEIS for the East Link project. The objectives of the additional analysis are to improve performance, to reduce impacts, and to reduce costs, as compared with the Sound Transit B7 and C9T alternatives. The revisions to the B7 and C9T alternatives that Council requested be incorporated into the new alignment are identified in the Figure 1 below.

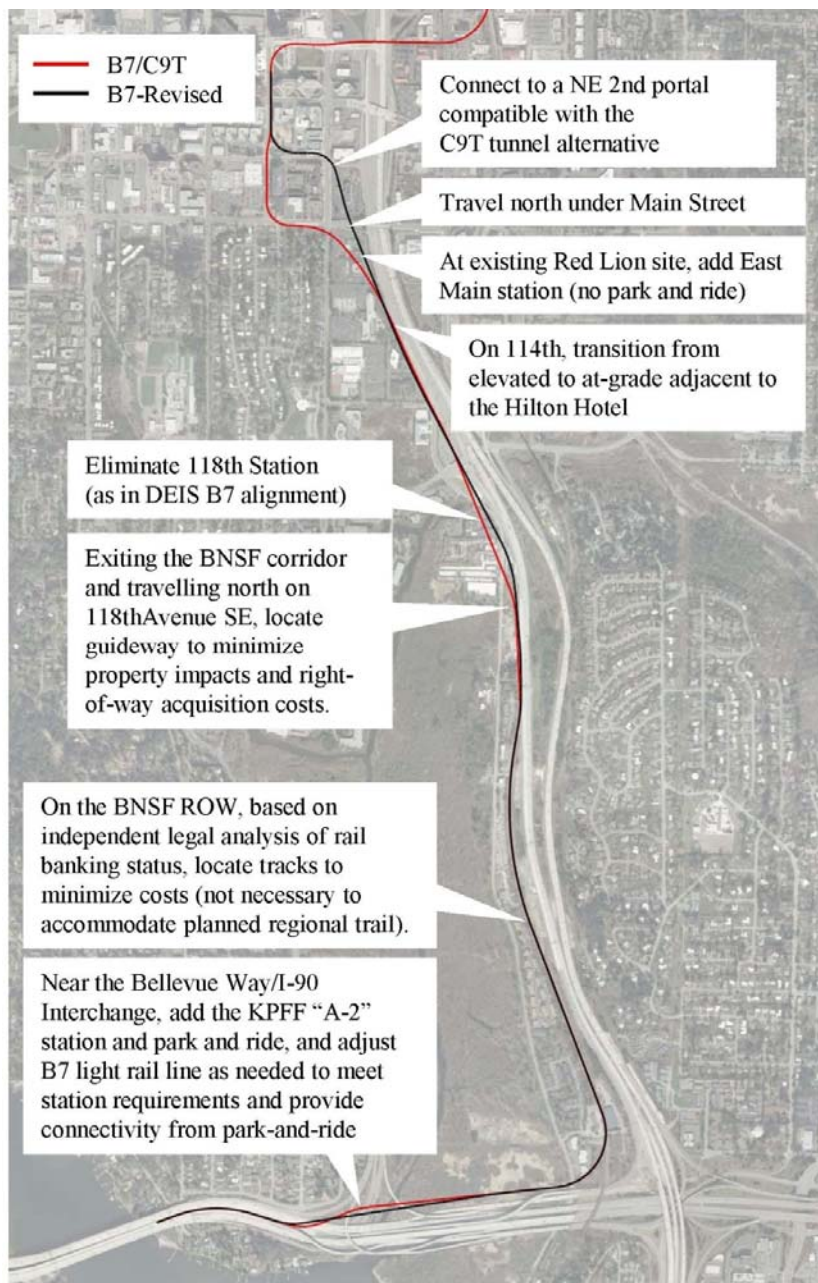


Figure 1 - B7-Revised revisions to B7 and C9T alternatives

The alignment for the alternative, the B7-Revised alternative, commences on the east side of the I-90 Lake Washington Bridge and follows the north side of I-90 to the I-405 where it turns north, parallel with the I-405. At NE 2nd Street the alignment turns west towards the proposed Bellevue Transit Center Station. The northern terminus of the study is at the south end of the proposed Bellevue Transit Center Station. A new station and park-and-ride will be located at the south end of Bellevue Way, and a second new station will be located near the Red Lion Hotel site.

The alternative has been developed to optimize ridership while minimizing construction costs, property impacts and environmental impacts.

Following an optimization meeting with City staff in which a number of options for each segment of the alignment were discussed and preferred options identified, a concept alignment, and station designs, were developed.

Two alignment options were developed for the BNSF corridor adjacent to the I-405, in which a future freight operator would either share the light rail tracks or establish a dedicate freight line in a prepared corridor alongside the light rail tracks.

The concept design was subject to an early environmental screening to allow an early assessment of the alternative and to provide early comparison with the Sound Transit B7 and C9T alternatives. This screening includes:

- Cost Estimate
- Right of Way and property impacts
- Ridership
- Transportation impacts at the A-2 Station
- Environmental/ecology impacts

The team reached out to stakeholders (Sound Transit, WSDOT, King County) to obtain base information along the corridor and relevant input on the development of the alternative.

A public involvement program was established and two well-attended public open houses were held to obtain community input and comment.

Key Findings

- The B7-Revised is a feasible alternative that improves ridership over the B7/C9T alternative but has a higher project cost. The alternative has similar property impacts and has a number of additional environmental impacts relative to the B7 and C9T alternatives. A summary of the early screening analysis is provided below.

Features	B7-Revised	B7/C9T
Estimated cost (millions, 2007 \$)	\$894.00	\$883.80
2030 Daily Ridership (project-wide)	50,500	49,000
Noise-impacted receptors - unmitigated (mitigated)	237 (0)	182 (0)
Residential displacements (number of housing units)	12	0
Business displacements (number of employees)	215	268
Full/partial property acquisitions	35	34
Wetlands/wetland buffer affected (acres)	1.8/0.8	2.1/1.0
Parks/Section 4(f) and 6(f) (acres before mitigation)	1.1	1.3

- The most substantial environmental differentiators of B7-Revised compared with B7/C9T are the following:
 - More wetland and park impacts associated with the A-2 Station and park-and-ride.
 - More pollutant-generating impervious surface related to A-2 Station and park-and-ride.
 - Change in visual quality overall at the A-2 Station and park-and-ride.
 - More disturbance of special-status fish species and good quality stream habitat in Sturtevant Creek.
- The A-2 Station requires a number of traffic mitigation measures at Bellevue Way:
 - Ramp access to station from east side of Bellevue Way.
 - Additional right-turn lane at north end of SE 30th Street.
 - Traffic signal to control the southbound and eastbound movements at the intersection of Bellevue Way and SE 30th Street.
 - Third lane on the southbound approach on Bellevue Way to SE 30th Street.
 - Pocket lane on Bellevue Way northbound south of station access.
 - Acceleration lane onto Bellevue Way northbound.
- The provision of a dedicated freight corridor in the BNSF corridor represents a similar cost to the shared track scheme and provides fewer restrictions on Sound Transit and the freight operator in operating in the corridor.
- The construction method and foundation scheme for the Mercer Slough crossing will require further work to develop a robust solution and to address WSDOTs concerns regarding risks to their existing I-90 facilities.

1 Introduction

1.1 Project description

The East Link project is an extension to Sound Transit's Link light rail system that will provide light rail service across Lake Washington, linking Seattle, Bellevue, and Redmond (Overlake).

For the segment of East Link between the Lake Washington crossing and downtown Bellevue, Sound Transit has developed the B7 alternative to a conceptual engineering level of design (approximately five percent design) as part of the Draft Environmental Impact Statement (DEIS) for the project which was issued in December 2008.

A Supplemental Draft EIS, which analyzes new alternatives developed since the DEIS, was published in November 2010. That supplemental document includes updated conceptual engineering for the Sound Transit B7 alternative and a C9T alternative that could connect B7 to a station at the Bellevue Transit Center. A Final EIS is expected in the summer of 2011.

At the September 13, 2010, Bellevue City Council Study Session, the council discussed the need for design variations and for additional analysis of revised East Link B7 and C9T alternatives. The objectives of the additional analysis would be to improve performance, to reduce impacts, and to reduce costs, as compared with the Sound Transit B7 and C9T alternatives. As a result of that discussion the council initiated the development of a modified B7 alternative ("B7-Revised"). The council directed City staff to develop an "apples-to-apples" comparison of the Sound Transit B7 and C9T alternatives with a B7-Revised alternative. ARUP were commissioned by the City to develop the B7-Revised alternative.

The B7-Revised alternative begins at the transition from East Link Segment A to Segment B at the east shore of Lake Washington and connects with a new elevated station (A-2 Station) over south Bellevue Way/I-90 ramps. The alignment continues east from the station along the north side of I-90 and turns north into the BNSF corridor with an at-grade profile. The alignment transitions to elevated as it leaves the BNSF corridor, crosses over SE 8th Street, and transitions back to at-grade prior to a new station (East Main Station) just south of Main Street on the current Red Lion Hotel site. The alignment crosses under Main Street and turns west on the current Sheraton Hotel site before entering a tunnel portal at NE 2nd Street. The B7-Revised alternative is approximately three miles long with a combination of at-grade, elevated, and open-cut sections.

1.2 Scope of report

1.2.1 The study

The scope of the study is to develop a concept alignment for the B7-Revised alternative, and a concept design for an associated station on South Bellevue Way, and to carry out environmental screening of the alternative with assessments of the following:

- Ridership
- Property and right-of-way (RoW) impacts
- Transportation and traffic impacts
- Visual impacts
- Noise impacts
- Environmental/ecology impacts
- Cost estimate
- Constructability

The scope also includes the development of a public involvement program comprising up to three open houses to engage the community in the study.

After commencement, the extent of the study was extended in two areas:

BNSF Corridor

In the BNSF corridor two options were developed and screened:

- Shared Track Option – This provides two light rail tracks that could be shared in the future with a freight operation. A regional trail was not considered in this option.
- Additional Freight Corridor Option – This option would provide an 18-foot corridor alongside the light rail tracks, in which a dedicated freight operation could be established in the future. As an interim use of the 18-foot future freight rail corridor, a regional trail could be established.

Extension to Bellevue Transit Center Station

To allow a comparison of the B7-Revised with the B7 and C9T alternatives the northern extent of the study area was extended to the south end of the Bellevue Transit Center station where the B7-Revised alignment ties in with the C9T alignment.

1.2.2 Report objectives

This report represents an interim analysis of the work carried out to date to assess the feasibility of the alternative and to provide the City of Bellevue with early

information to determine the viability of the alternative. The report summarizes the work completed to date. In particular, it presents the following information:

- A summary of the development of the alignment
- A summary of the planning of the A-2 Station
- A summary of the findings of early screening:
 - Cost estimate
 - Ridership
 - Environmental impacts
 - Property and RoW impacts
 - Noise impacts
 - Transportation and traffic impacts at the station location
- The finding of the study of options in the BNSF corridor
- Overview of stakeholder and public involvement in the study

1.3 “Apples-to-apples” comparison

Direction from the City Council is to develop a B7-Revised alternative that can be compared directly with the B7 and C9T alternatives developed by Sound Transit in the DEIS and SDEIS. To achieve this, the alignment uses Sound Transit’s design criteria and was screened using similar methodologies to Sound Transit’s. Sound Transit worked with the project team to run the ridership model and to provide input to, and review of, all aspects of the study.

Areas of the study for which the project team was directed to adopt a different approach to that adopted by Sound Transit are as follows:

Traffic modeling – The City directed the team to adopt the BKR model for traffic generation rather than the Puget Sound Regional Council model adopted by Sound Transit because the BKR Model has greater detail for the localized road network and traffic analysis zones. The BKR Model was used on both B7/C9T and B7-Revised alternatives to allow an “Apples to Apples” comparison between the two alternatives.

- BNSF Corridor – the City directed the team to develop two alternatives
 1. Shared tracks, in which future freight operations would share the light rail tracks
 2. Freight corridor, in which a freight corridor is provided alongside the light rail tracks to allow a dedicated freight line in the future

Option 1 does not provides a future trail through the corridor. Option 2 provides the space to allow a trail to be established alongside the light rail tracks.

1.4 Supporting documents

The concept design and early assessments, the comparison of options in the BNSF corridor, and reports on the open houses are presented in a series of technical memos and reports that should be referred to in conjunction with this report:

- Open House 1 Report (RP01)
- Open House 2 Report (RP02)
- Existing Information (TM01)
- Design Deviations (TM02)
- A-2 Station Concept (TM03)
- South Bellevue Traffic Impact Analysis (TM04)
- A-2 Station Cost Estimate (TM05)
- Early Concept Alignment (TM06)
- LRT Ridership (TM07)
- Right of Way (TM08)
- Noise Impact Assessment (TM09)
- Early Environmental Screening (TM10)
- Early Cost Estimate (TM11)
- Shared Track with Freight Rail (TM12)
- B7-Revised Optimization (TM13)
- BNSF Corridor: Additional Freight Corridor Option (TM14)

2 Alternative development

2.1 Council direction

Council direction for the development of the B7-Revised alternative is to identify the optimum location for an alignment utilizing the East Link DEIS B7 alignment and the C9T with a NE 2nd Street portal as a base, with the following modifications:

- Near the Bellevue Way/I-90 interchange, add the KPFF “A-2” Station and park-and-ride and adjust the B7 light rail line as needed to meet station requirements and to provide connectivity from park-and-ride
- On the BNSF RoW, based on independent legal analysis of rail banking status, locate tracks to minimize costs (not necessary to accommodate planned regional trail)
- Exiting the BNSF corridor and traveling north on 118th Avenue SE, locate the guideway to minimize property impacts and RoW costs
- Eliminate the 118th Avenue SE Station (as in the DEIS B7 alignment)
- Add East Main Station at the existing Red Lion site, (no park-and-ride)
- On 114th Avenue SE, transition from elevated to at-grade adjacent to the Hilton Hotel and travel north under Main Street to connect to a NE 2nd Street portal compatible with the C9T tunnel alternative

2.2 B7-Revised optimization

An early review of the B7 and C9T alternatives was completed and an Optimization Meeting held with the City’s staff to identify opportunities for improving the alternative and to discuss the constraints along the corridor. This review considered both the alignment and the A-2 Station.

2.2.1 Alignment

The alignment was discussed in five sections and the following recommendations made:

- 1 **South Bellevue Way/Station location:** A number of alignment alternatives were proposed to accommodate potential station locations and, for the A-2 Station, balance the proximity to the park-and-ride location with alignment criteria. The selected option seeks to minimize the length of the connection to the park-and-ride and to reduce the span of the viaduct over I-90.
- 2 **Mercer Slough Crossing:** The B7 alternative runs within a few feet of the I-90 structures across the slough. As such, the impact on the

wetland was identified in the DEIS as de minimis. To maintain this rating, the B7-Revised alignment should be similarly close.

- 3 **BNSF Corridor:** the alignment through the BNSF corridor, in accordance with Council direction, is to be largely at-grade and to be optimized to reduce earthworks and retaining structures.
- 4 **I-405 Viaduct:** From the BNSF corridor to the East Main Station, the alignment is to consider reductions of impacts on the STOR-House property and on the Greenbaum furniture store.
- 5 **East Main Station:** Alternatives that were discussed for the alignment in this area included an at-grade option with a grade crossing of Main Street, an elevated alternative over Main Street, and a depressed alignment beneath Main Street. The depressed option was selected for further study to accord with the Council's direction.

2.2.2 South Bellevue Station

An Alternative Location Analysis previously commissioned by the City identified the preferred location for a station at the south of Bellevue Way between 113th Avenue SE and Bellevue Way. This location was labeled as the A-2 Station location.

A number of alternative station and park-and-ride locations and layouts were reviewed at the Optimization Meeting:

1. **Relocate the station and the park-and-ride facilities to the intersection of SE 34th Street and 112th Avenue SE:** Although this relocation would reduce the walking distance from the park-and-ride to the station platform, it was rejected for the following reasons:
 - Traffic impacts along 113th Avenue SE and potentially through Enatai would be significant
 - The parking structure would potentially be more expensive to comply with zoning
 - The bridge over I-90 would have a longer span
2. **Split the park-and-ride facilities between a 118th Avenue SE and an A-2 Station:** This alternative would remove the proposed East Main Station and reduce the size and the impact of the A-2 Station. This option was rejected for the following reasons:
 - Poorer walk/bike access to 118th, as compared with East Main
 - Potentially increased construction cost as a result of developing two sites and two elevated stations
 - Full taking of Greenbaum furniture store and adjacent properties
 - Potential traffic issues at SE 8th Street interchange with I-405

3. Develop the A-2 Station concept at the 113th Avenue SE and South Bellevue Way location: This option was selected as the preferred option for the following reasons:

- Potentially lower construction costs
- Reduced impacts on 113th Avenue SE, as compared with the SE 34th Street option
- Less acquisition of commercial property

The key constraints and requirements to be addressed in the development of the station were agreed in the meeting:

- Locate the transit center on top of the structure to minimize the size of the building and to provide an open and accessible facility
- Minimize the height of the building to reduce visual impacts from 113th Avenue SE
- Avoid additional traffic on 113th Avenue SE

2.3 Concept design

The concept design developed for the alignment and the A-2 Station is based on the direction from council and the agreements made at the Optimization Meeting.

2.3.1 Early concept alignment

The development of the early concept alignment is described in the following eight sections (see Figure 1):

1. I-90 Medians

- The I-90 crossing is optimized to minimize the span of the crossing and to locate columns in the positions that were agreed between Sound Transit and WSDOT for the B7 alternative. The A-2 Station platform is above the I-90 on- and off-ramps.

2. A-2 Station/Park-and-Ride

- The alignment is adjusted to serve a center platform configuration.
- The alignment is optimized within constraints of the station track alignment criteria to reduce platform height.
- The station location will require additional safety measures to protect running traffic while construction work is completed overhead.

3. Mercer Slough Crossing

- The alignment is located close to the I-90 structures to minimize environmental impacts. East of the station, the alignment is lowered to reduce the height of the structure and reduce cost.

- The construction of the viaduct across Mercer Slough either uses a trestle, as proposed by Sound Transit for the B7 alternative, or an overhead gantry, which minimizes the impacts of construction on the wetland.
- WSDOT has expressed concern regarding the temporary and permanent impacts of construction of a new viaduct close (within 50 feet) to the existing I-90 bridges, which appear to have been damaged by movement of the peat in the slough. Further analysis will be required to finalize the foundation solution to avoid impacts to the existing I-90 structures.

4. BNSF Corridor

- Two options are considered in this section:
 - Shared tracks – Light rail tracks are provided. Provision is made to allow future freight to share these tracks.
 - Freight corridor – An 18-foot-wide corridor alongside the light rail tracks is provided to allow development of a dedicated future freight line.
- The vertical and horizontal alignments are optimized to minimize the extent of earthworks, retaining walls, and property impacts.

5. I-405 Viaduct

- The alignment at the STOR-House self-storage unit is located alongside the I-405, crossing the east side of the property. It avoids direct impact on the building and piers are placed to avoid impact on the building's access. The piers impact the I-405 gabion retaining wall, which will require stabilization and local replacement.
- Several options were considered to minimize impacts on the Greenbaum furniture store. However, the constraints of the I-405 masterplan, and the efficiencies gained through reducing the span of the skew crossings of 118th Avenue SE, combined to dictate an alignment that passes over the eastern edge of the building. Sound Transit's policy is not to cross over existing buildings, and therefore modifications of the building will be required to maintain the business in place.

6. Sturtevant Creek

- Both at-grade/retained fill and elevated options were considered in the area of the creek. The assessment presented to the City indicated significant cost savings associated with the at-grade option and indicated that impacts and permitting issues were similar. As a result, the City agreed to proceed with the at-grade option.

- The at-grade/retained fill alignment requires some relocation of streambed and environmental mitigation, and a short bridge across the stream to avoid extension of the I-405 culvert.

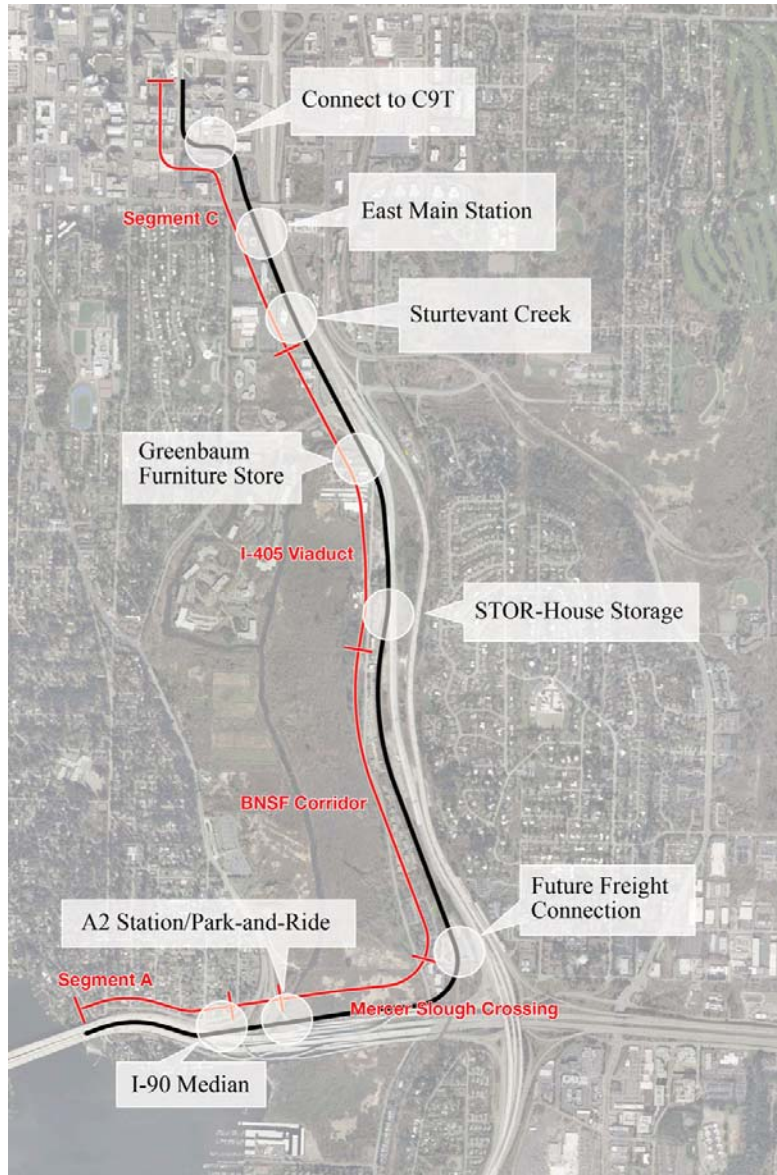


Figure 2 - B7-Revised alternative

7. East Main Station and Portal

- Locations considered for the East Main Station included the Red Lion Hotel and the Sheraton Hotel Site. Options were considered to avoid full takings of the hotels. However, alignment criteria that apply at station platforms and the constrained nature of the sites resulted in impacts to the buildings and would result in significant construction

impacts. Because the acquisitions of the hotels cannot be avoided if the station is located in this area, the alignment across the Red Lion and Sheraton Hotel Sites is selected to provide a direct alignment and to locate the portal for the cut-and-cover tunnel, at the corner of 112th Avenue NE and NE 2nd Street.

8. Link to Segment C

- The area of study is extended beyond the tunnel portal to tie into the C9T alignment at the proposed Bellevue Transit Center station.
- The vertical alignment is constrained on the west side of 112th Avenue NE by the minimum depth required to accommodate the tunnel structure, utilities and road construction. The vertical alignment has a 6% grade, climbing to meet the C9T alignment at the south end of the Bellevue Transit Center station.
- The cut-and-cover tunnel alignment is along the north side of NE 2nd Street and turns north along 110th Avenue NE to the Bellevue Transit Center station.

2.3.2 A-2 Station concept design

The elements of the A-2 Station program provided in this concept are similar to those adopted in the SDEIS for the B2M South Bellevue Station.

The following are the key elements of the station and of the park-and-ride:

- A five-level structure that includes a transit center and parking.
- A transit center on the top level (Level 5) with bus/van layover, bus/van bays, and kiss-and-ride facilities.
- Four levels of parking to accommodate up to 1,450 vehicles.
- A terraced parking structure, with a structure height above ground of less than 15 feet, to reduce visual impacts along 113th Avenue SE.
- A new road bridge over the I-90 ramps to tie into A-2 Station and 113th Avenue SE, without crossing Bellevue Way at-grade.
- A ramp on the east side of the facility to link to the Level 5 transit center.
- A pedestrian/bicycle path attached to the road bridge and a ramp to provide access from the east side of Bellevue Way. One dedicated entry/exit point at Level 4 from the east side ramp, one entry point at Level 3 on the north end of the facility that allows “right-in” movements only, and an exit point at Level 3 onto 113th Avenue SE.
- A partially signalized junction of SE 30th Street and Bellevue Way that controls the southbound Bellevue Way traffic and the eastbound SE 30th Street movements onto the I-90 on-ramps.
- An acceleration lane on Bellevue Way for northbound traffic leaving the parking facility.

- A pocket lane on Bellevue Way for northbound traffic entering the parking facility.
- Access to the Mercer Slough Park and to the boat ramp.

A visualization of the concept for the station is presented in Figure 3.



Figure 3- Visualization of A-2 Station concept looking south-east from above Bellevue Way towards I-90

2.4 BNSF corridor options

The BNSF corridor along I-405 is typically 100 feet wide, except at the south end where it reduces to 50 feet wide. When the corridor was abandoned, it became subject to a rail banking agreement that requires the corridor to be maintained so that rail services can use the corridor in the future and a trail can be accommodated in the interim.

Two options are considered through the BNSF corridor.

- **Shared tracks:** Two light-rail tracks are provided (to accommodate LRT in both directions), and future freight operations would use one of the light rail tracks. Although shared tracks such as this have been used on other systems, such use is relatively rare.

The need for temporal separation of light rail operations and freight operations on the track would impose significant operational constraints on both Sound Transit and on any future freight operator. Additional cost are applied to the typical light rail costs to provide infrastructure that will accommodate both operations, and future costs will be required to upgrade rail systems and rolling stock when the freight operation is implemented.

- **Light rail with freight corridor:** A corridor is established alongside the light rail tracks to allow a dedicated freight line to be established in the future.

An 18-foot corridor, typically with 27.5 feet between track centers is adopted for this option. The provision of this wider corridor allows light rail and freight to operate simultaneously but increases construction costs and impacts an additional property at the south end of the corridor where the RoW is narrower.

The 18-foot corridor is available for a trail prior to implementation of freight rail. However, a permanent trail along this corridor is not provided.

The two options are compared for cost, property impacts, environmental impacts and noise impacts in the relevant sub-sections of Section 3.

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3 Early environmental screening

3.1 Introduction

The early concept alignment and A-2 Station concept has been the subject of an initial screening to determine how it compares with the Sound Transit B7 and C9T alternatives. The purpose of the screening is to allow the City Council to determine whether the study should continue to the completion of a Concept Report. For an “apples-to-apples” comparison, the screening extends north of the portal at the junction of NE 2nd Street and 112th Avenue NE, to the proposed Bellevue Transit Center station where the alignment meets the Sound Transit C9T alignment.

The following are key areas of comparison for this initial assessment:

- Project Cost (construction and RoW costs)
- Ridership
- Environmental impacts (qualitative analysis)
- Property impacts
- Traffic impacts at the A-2 Station

Further screening will be completed for the final concept report:

- Final cost estimate
- Environmental/ecology (quantitative analysis)
- Transportation for full alignment
- Visual impacts
- Constructability

A summary of the findings from the early screening is presented in the following sections. The base option considered here is for the shared track option through the BNSF corridor. Where appropriate, a comparison between the shared track and the additional freight corridor option is provided under each section.

3.2 Cost estimate

The construction cost estimate was developed in accordance with the methods used by Sound Transit for the DEIS and the SDEIS and uses the same unit rates, lump sums, contingencies and soft costs. The RoW costs were developed by Sound Transit using the property impacts identified by the project team. This approach allows an “apples-to-apples” comparison between the alternatives.

For comparison purposes, the base construction costs and RoW costs, without unallocated contingency or soft costs, are presented for the B7-Revised alternative and for the B7/C9T alternative.

\$M 2007	Construction		RoW ¹	
	B7-Revised	ST B7/C9T	B7-Revised	ST B7/C9T
Segment B (excl. stations)	174.3	200.9	33.8	63.5
118th Avenue SE Station		63.6		27.5
A-2 Station	119.8		14.0	
Segment B Total	294.1	264.5	47.8	91.0
Segment C (to Bellevue Transit Center Station)	148.1	170.8	\$136.9	94.4
Total	442.1	435.3	184.7	185.3

Note 1: ST Estimate (2007 dollars)

Table 1 - Base construction costs and RoW costs (without unallocated contingency or soft costs)

The following are the preliminary findings of this analysis.

3.2.1 Construction cost

- The construction cost for the B7-Revised Segment B alignment excluding stations is 14% less than that of the Sound Transit B7 alternative. These cost differences are related to a narrower width in the BNSF corridor and an alternative construction techniques for the Mercer Slough crossing.
- The A-2 Station represents a significant cost as a result of the following:
 - The location of the rail platform above existing highway on- and off-ramps
 - The excavation required to place a parking structure largely below ground to minimize visual impacts to residences along 113th Avenue SE
 - The requirement to minimize additional traffic along 113th Avenue SE resulting in the need for a bus ramp on the east side of the station
 - The grade separation of Bellevue Way crossings for northbound movements off the I-90 off-ramps.
- The cost of the A-2 Station is significantly higher than the cost savings achieved by removing 118th Station.
- The B7-Revised alternative in Segment C comprises less viaduct and tunnel length than the C9T alternative, and this represents approximately \$22M savings in construction costs.

3.2.2 RoW cost

- The B7-Revised RoW costs in Segment B are lower than for B7 as a result of a reduction in full takings particularly relating to the 118th Avenue SE station and the STOR-House building
- The RoW costs in Segment C are significantly higher largely as a result of the additional acquisition of the Sheraton Hotel property
- While not part of the cost analysis, significant surplus property will remain following completion of construction in the Segment C.

The overall project cost for the B7-Revised alternatives and the cost for the B7 and C9T alternatives, including soft costs and contingency calculated in the same manner as Sound Transit, are presented below for Segment B and for the portion of Segment C that is south of the Bellevue Transit Center Station. These indicate a cost approximately 1% in excess of Sound Transit's B7 and C9T alternatives.

(millions, 2007 \$)	B7-Revised	ST B7/C9T	Delta
Segment B (excl. Stations)	311.1	384.5	(73.5)
118th Avenue SE Station		129.6	(129.6)
A-2 Station	204.0		204.0
Segment B Totals	515.10	\$514.10	0.9
Segment C Total (to Bellevue Transit Center Station)	378.9	369.7	9.2
Total	894.0	883.8	10.2

Table 2 - Overall project cost (including soft costs and contingency)

3.2.3 Additional costs

3.2.3.1 Bus operations

Maintenance and operational costs for the light rail are not considered in this analysis. However, the location of the A-2 Station increases travel times for bus service, which increases operating costs and the number of vehicles required to provide the service. The following are Sound Transit's estimates for this:

- Operating costs increases by \$750,000 to \$1,000,000 annually.
- Two additional buses are required to maintain headway on the service. The cost to procure the two vehicles is \$1.7m (2007\$). The lifespan of these vehicles is 12 years, so this capital expense is incurred every 12 years.

King County metro buses will also experience additional operational cost associated with this additional travel time. However, an estimate of these costs has not been provided.

3.2.3.2 Shared track costs

Within the BNSF corridor, the light rail tracks may be shared with a future rail operator. The civil engineering works, such as additional structural provisions and trackbed requirements, are incorporated as part of the light rail construction. Trackwork and systems equipment will be retrofitted when the freight rail is established. Such equipment includes the following:

- Turnouts north and south of the corridor
- Catenaries that can accommodate freight rail envelopes
- Integrated signaling and communication systems

These elements represent a potential future construction cost of approximately \$7m. It is also possible, dependent on the type of freight rolling stock that Sound Transit rolling stock will be need to be retrofitted with new pantographs.

3.2.4 Additional freight corridor option

The provision of a dedicated freight corridor alongside the light rail tracks would increase the required earthworks and retaining structures and would increase the RoW required. The estimated additional construction cost to the project is approximately \$4m. However, in comparing this with the shared track option, these costs are offset by the additional costs described above associated with accommodating two train types.

The incremental cost of providing a separate freight corridor is small compared with the operational restrictions that would be placed on the rail operators.

3.3 Ridership

Sound Transit undertook an assessment of the ridership for the B7-Revised alternative based on the input and review of the project team. The Sound Transit Ridership Model used is the same model used for the alternatives presented in the DEIS and SDEIS. For this study it is used to forecast ridership for B7-Revised and for a combined B7/C9T alternative not presented in the DEIS or SDEIS.

	B7-Revised	B7/C9T
Segment A	5,000	6,000
Segment B		
A-2 Station	4,500	
118th Station		1,500
South Bellevue Station		
SE 8 th		
Segment Total	4,500	1,500
Segment C		
East Main Station	2,500	3,000
Bellevue Transit Center Station	4,500	5,000
Hospital Station	1,000	1,000
Segment Total	8,000	9,000
Segment D	7,000	7,000
Segment E	3,500	3,500
Project-wide ridership	50,500	49,000

Source: B7-Revised and B7/C9T ridership from Sound Transit Ridership Model, 2011.

Table 3 - Year 2030 East Link LRT daily boardings

The ridership forecasts presented above indicate that the B7-Revised alternative achieves a higher ridership, as compared with B7/C9T, largely because of higher ridership at A-2 Station.

3.4 Environmental impacts

3.4.1 Environmental and ecology

To provide an initial comparison of the B7-Revised alternative with the B7 and C9T alternatives, a largely qualitative screening of the environmental/ecological issues is presented.

Feature	B7-Revised Impacts (relative to B7 and C9T)	
	Increased impact	Reduced impact
Ecosystems resources	<p>A-2 Station – Impact to additional 0.26 acres of wetland and 0.18 acres of wetland buffer at vehicle ramp. About 0.26 acres of additional shading from station platform.</p> <p>A-2 Station – Aquatic habitat: potential runoff during construction to Slough</p> <p>Sturtevant Creek – Greater impact to fish habitat and increased mitigation required</p>	<p>Mercer Slough – Proposed gantry construction would reduce construction impacts</p>
Water resources	<p>A-2 Station – Adds 4.1 acres of pollutant-generating impervious surface (PGIS)</p>	<p>Removal of 118th Station – Reduction is less than 2.9 acres – exact number not obtained from ST.</p>
Visual	<p>A-2 Station – Impact from 113th Avenue SE, including light spillover</p>	<p>Removal of 118th Station – reduces visual impacts</p> <p>East Main Station – placing station partly below grade reduces visual impacts</p>
Section 4(f) and 6(f)	<p>A-2 Station – Additional 0.26 acres of Mercer Slough Nature Park impacted by vehicle ramp</p>	

Table 4 - B7-Revised environmental ecological impacts (relative to B7/C9T)

3.4.2 Noise

To identify the noise impacts and the required mitigations for the alternative, independent noise monitoring was carried out to compare with and to supplement the monitoring carried out by Sound Transit. An independent noise model was developed in accordance with FTA guidelines and was used to predict noise levels along the route. These predictions were then used to identify mitigations that would be necessary.

The analysis shows 237 impacts compared with 182 for B7 and C9T. These are related to new areas of impacts not identified in the DEIS/SDEIS and to variations in the alignment increasing impacts. Some additional mitigation will be required and will reduce the mitigated impacts to zero.

3.4.3 Additional freight corridor option

The wider corridor proposed for the freight option represents no significant change in impacts to environmental resources.

At SE 32nd Street, the alignment is up to 25 feet closer to a business to the west of the corridor. This would increase the unmitigated impacts to the property but is unlikely to change the mitigation requirements proposed for the shared track option.

3.5 Property impacts and Right of Way

The alignment has been developed where possible, to reduce the impacts on existing property. A comparison of property impacts between the B7-Revised alternative and the B7 and C9T alternatives is provided below:

	B7-Revised (to Bellevue Transit Center)				B7/C9T (to Bellevue Transit Center)		
	Segment B		Segment C	Total	Segment B	Segment C	Total
	Excluding A-2 Station	A-2 Station					
Total Impacted Private Properties	8	13	14	35	17	17	34
Partial Acquisitions	7	0	3	10	9	8	17
Full Acquisitions	1	13	11	25	8	9	17
Business Relocations	1	0	8	9	6	8	14
No. Employees Displaced	15	0	200	215	180	88	268
Residential Relocations	0	12	0	12	0	0	0
Acres of Public Park Land Impacted	1.86 ac	0.47 ac	0 ac	2.33 ac	0.9 ac perm. 1.6 ac temp. [Mercer Slough Nature Park]	0.1 ac perm. 0.1 ac temp. [NE 2nd Place Pocket Park]	1.0 ac perm. 1.7 ac temp.
Acres of BNSF Corridor	8.42 ac	0	0	8.42 ac	8.42 ac	0	0

Table 5 - Table of property impacts

The key differences between the B7-Revised and B7/C9T alternatives are as follows:

- The property impacts of the B7-Revised alternative as categorized in the table above are similar to the B7 and C9T alternatives.
- Twelve additional residential properties would be acquired at the A-2 Station.

- Additional WSDOT RoW is required at the A-2 Station site
- The alignment is relocated to the east of the B7 alignment to avoid a full acquisition of the STOR-House storage unit north of the BNSF corridor.
- The alignment is moved to the east of the B7 alignment to reduce impact on the Greenbaum property. The new alignment crosses over the extreme east corner and will require some reconstruction to the property to satisfy Sound Transit requirements and access issues.
- The removal of the 118th Avenue SE station removes three commercial property acquisitions.
- Alignment criteria associated with the East Main Station require full acquisition of the Red Lion and Sheraton Hotels and the Azteca Restaurant.
- Properties along the north side of NE 2nd Street will be acquired. These acquisitions are partially offset by those required along Main Street for the C9T alternative.

3.6 Transportation and traffic impacts

At this interim stage in the project, traffic impacts are assessed only around A-2 Station for the B7-Revised alternative and the B7 and C9T alternatives. At the request of the City of Bellevue, traffic analysis was conducted using the Bellevue/Kirkland/Redmond (BKR) model (the DEIS/SDEIS traffic analyses used the Puget Sound Regional Council model). The year analysis adopted for the study was 2030 which is consistent with Sound Transit's analysis. Synchro was then applied to determine the level of service (LOS) at each of the three intersections studied around the A-2 Station.

Key traffic findings are as follows:

- Without traffic enhancements for the B7-Revised alternative, traffic from SE 30th Street onto the I-90 ramps would experience significant delays from heavy southbound Bellevue Way volumes in the PM peak period.
- Several traffic enhancements are recommended to improve traffic operations and to achieve City of Bellevue LOS standards once the A-2 Station becomes functional:
 - A ramp access from the east side of Bellevue Way into the station to avoid left turns on Bellevue Way
 - Partial signal at Bellevue Way / SE 30th Street for the southbound movements onto the I-90 on-ramps (the northbound movement from the I-90 off-ramps would be unaffected)
 - Second right-turn lane from SE 30th Street onto southbound Bellevue Way
 - Third southbound travel lane on Bellevue Way both north and south of the SE 30th Street intersection

- Right turn pocket on northbound Bellevue Way prior to the new road bridge over the I-90 ramps
- Acceleration lane in the northbound Bellevue Way direction north of the new road bridge over the I-90 ramps
- These improvements were discussed with WSDOT. Further analysis will be required to justify these improvements, particularly the signalization; however, no fatal flaw were identified at this stage.

The proposed traffic enhancements would achieve the following:

- The new partial signal at SE 30th Street and Bellevue Way would operate at LOS B. Southbound traffic on Bellevue Way would be delayed by an average of 16 seconds, whereas previously traffic operated at free-flow conditions in the PM peak.
- Travel time from SE 10th Street to SE 30th Street would increase by an average of 20 seconds
- Bus travel times for B7-Revised would be longer than those for B7/C9T. The longer travel times would increase operating costs and would require two additional buses to provide service. Northbound buses would experience a 3.5-minute increase in travel time, while southbound buses would experience a 2.5-minute increase in travel time.
- Neighborhood cut through traffic to A-2 Station through Enatai is not expected to be significant based on the modeling completed.

4 Stakeholder and community involvement

4.1 Sound Transit

Sound Transit is an important stakeholder in the development of the study. A cooperative relationship was established to facilitate an ‘Apples-to-Apples’ comparison between the B7-Revised alternative and the Sound Transit B7 and C9T alternatives. In particular Sound Transit:

- Provided base information including alignments files, design criteria and RoW and cost estimating approach
- Operated the ridership model
- Attended a number of meetings to discuss issues of ridership, cost estimating, RoW and A-2 Station and park-and-ride planning
- Reviewed draft technical memoranda and estimates
- Provided input to the A-2 transit center design to address the requirements of Sound Transit Express bus operations, and provided data on additional operational costs

4.2 King County Metro

King County operates a number of the buses that will serve the A-2 Station. A joint meeting with Sound Transit was held to discuss the planning of the transit center. The key elements of the discussion related to:

- Travel delays for bus services
- Layout of the transit center and park-and-ride

4.3 WSDOT

Much of the alignment runs alongside, through or over WSDOT property and facilities. Three meetings were held with WSDOT to discuss the alignment and the potential impacts to WSDOT property. The key elements of the discussion were:

- Traffic operations on Bellevue Way
- Construction of the A-2 Station over the I-90/Bellevue Way ramps
- Construction of the viaduct over the Mercer Slough and potential impacts to the existing I-90 structures
- Construction adjacent to the I-405 and potential impacts to the retaining wall adjacent to the STOR-House property
- Coordination with the I-405 masterplan.

4.4 Public involvement

Two public Open Houses were conducted to inform the community and to obtain community input on the study. The first Open House was held at City Hall on January 25, 2011. It attracted 185 attendees and generated over 220 comments. The Open House was held early in the study and presented the broad alignment. The public provided comments in several ways, including post-it notes on the plans/maps, on comment forms, and in subsequent correspondences such as email.

The second Open House was held at City Hall on March 8, 2011 and presented the early conceptual alignment and planning of the A-2 Station and the park-and-ride. A 15-minute presentation highlighted the key areas of the completed work. A total of 230 members of the public from various neighborhoods attended; over 210 comments were received.



Figure 4 - March 2011 Open House

5 Risk and opportunities

In developing the Early Concept Alignment, a number of risks and opportunities have been identified that may impact the project schedule or project costs.

5.1 Risks

A-2 Station – The construction of the A-2 Station above the Bellevue Way/I-90 ramps will require careful planning and liaison with WSDOT to agree closures etc. This could affect the project schedule.

Mercer Slough – The crossing of the Mercer Slough is challenging as a result of: the environmentally sensitive nature of the Slough; the poor foundation materials; the movement of the peat as documented by WSDOT; and WSDOT's concerns regarding protection of their existing I-90 structures. While two construction methods have been developed, further analysis will be required to define the appropriate solution and to satisfy WSDOT concerns. This could potentially delay the project and add construction cost.

Sturtevant Creek – The permitting issues associated with the relocation and mitigation of the creek bed could increase the project schedule and cost

5.2 Opportunities

The following adjustments to the alternative requested by Council could potentially reduce the cost of the project.

Opportunity	Impacts	Approximate Potential Cost Savings
Adjust I-405 Masterplan's location of 118th Avenue to allow alignment to avoid Greenbaum site	Negotiation with WSDOT required	Potential RoW savings \$1m
Remove East Main Station	Reduces ridership by approx. 1000 May allow improved alignment at Red Lion and reduce impacts on Sheraton Hotel	Station cost = ~ \$40m RoW (Sheraton) = ~\$20m
Use mechanically stabilized walls for retained fill	Reduced cost, but not "apples to apples" with ST	\$5m
Use corridor estimate approach for BNSF corridor	Not "apples-to-apples" with ST	\$10m
Assess residual value	Not "apples-to-apples" with ST	At 2 hotels and along NE 2nd Street ~ 50m

Table 6 - Potential opportunities

6 Preliminary findings

Preliminary findings are as follows:

The B7-Revised is a feasible alternative that improves ridership over the B7/C9T alternative but has a higher overall project cost. The alternative has similar property impacts and has a number of additional environmental impacts relative to the B7 and C9T alternatives. A summary of the early screening analysis is provided below.

Features	B7-Revised	B7/C9T
Estimated cost (millions, 2007 \$)	\$894.0	\$883.8
2030 Daily Ridership (project-wide)	50,500	49,000
Noise-impacted receptors - unmitigated (mitigated)	237 (0)	182 (0)
Residential displacements (number of housing units)	12	0
Business displacements (number of employees)	215	268
Full/partial property acquisitions	35	34
Wetlands/wetland buffer affected (acres)	1.8/0.8	2.1/1.0
Parks/Section 4(f) and 6(f) (acres before mitigation)	1.1	1.3

Table 7 - Summary of B7-Revised preliminary findings

- The most substantial environmental differentiators of B7-Revised compared with B7/C9T are the following:
 - More wetland and park impacts associated with the A-2 Station and park and ride
 - More pollutant-generating impervious surface related to A-2 Station and park-and-ride
 - Change in visual quality overall at the A-2 Station and park-and-ride
 - More disturbance of special-status fish species and good quality stream habitat in Sturtevant Creek
- The A-2 Station requires a number of mitigation measures at Bellevue Way:
 - Ramp access into station from east side of Bellevue Way
 - Additional right-turn lane at north end of SE 30th Street
 - Traffic signal to control the southbound and eastbound movements at the intersection of Bellevue Way and SE 30th Street
 - Third lane on the southbound approach on Bellevue Way to SE 30th Street

- Pocket lane on Bellevue Way northbound south of station access
- Acceleration lane onto Bellevue Way northbound
- The provision of a dedicated freight corridor in the BNSF corridor represents a similar cost to the shared track scheme and provides fewer restrictions on Sound Transit and the freight operator in operating in the corridor.
- The construction method for the Mercer Slough crossing will require further work to develop a robust solution and to address WSDOTs concerns regarding risk to their existing facilities.

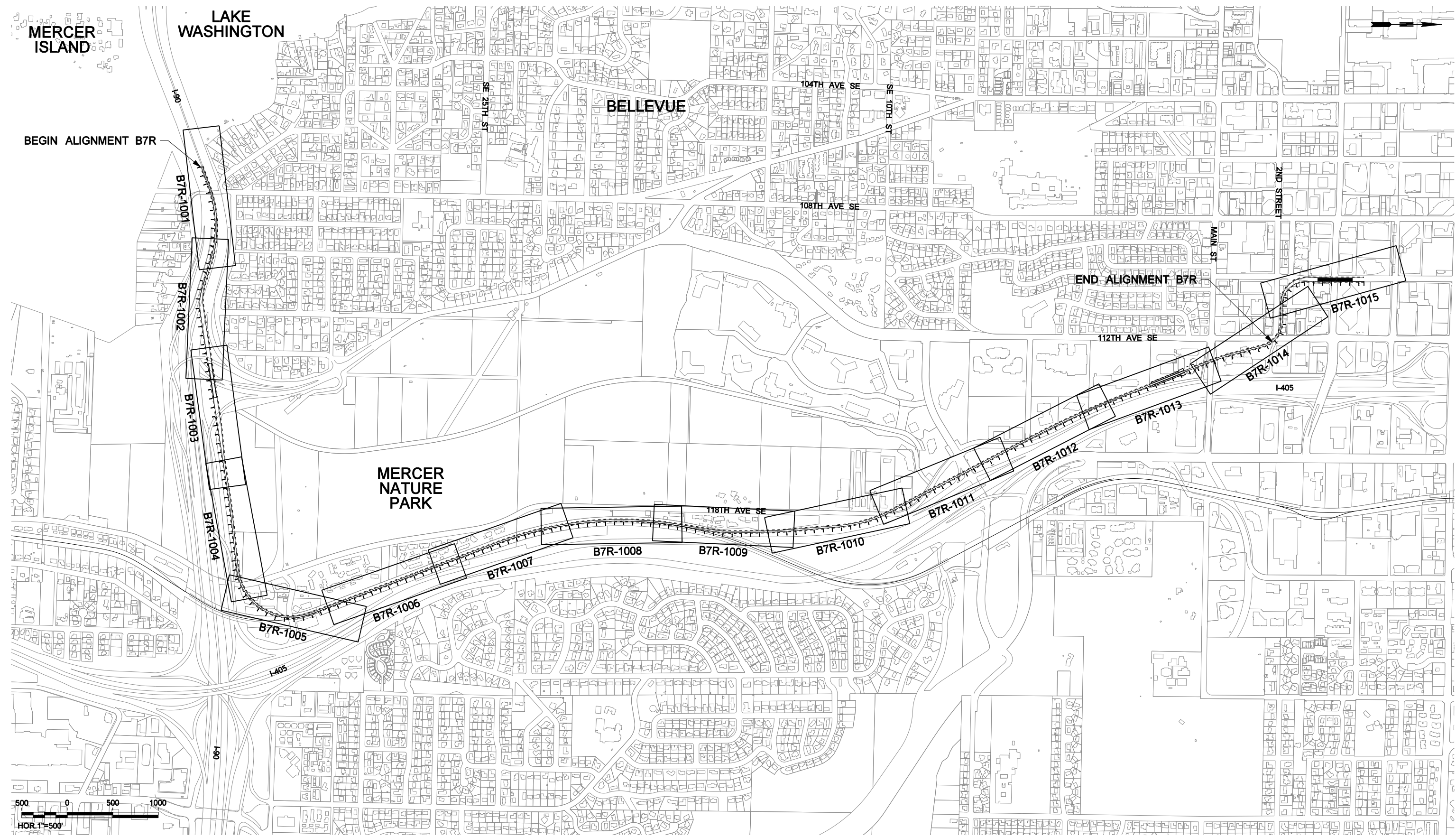
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Appendix A

Alignment drawings

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 CHECKED BY
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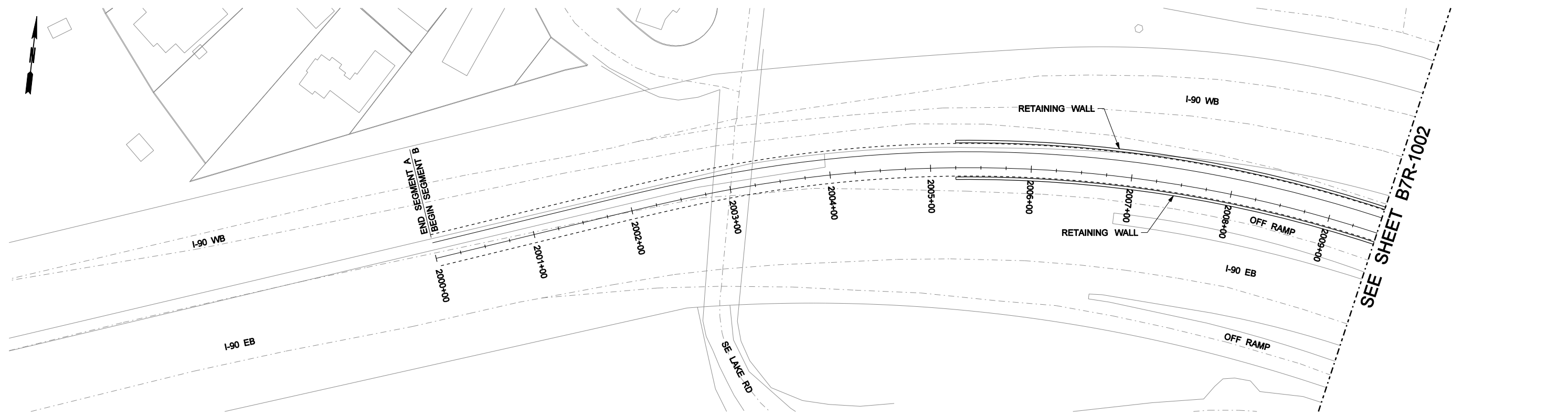
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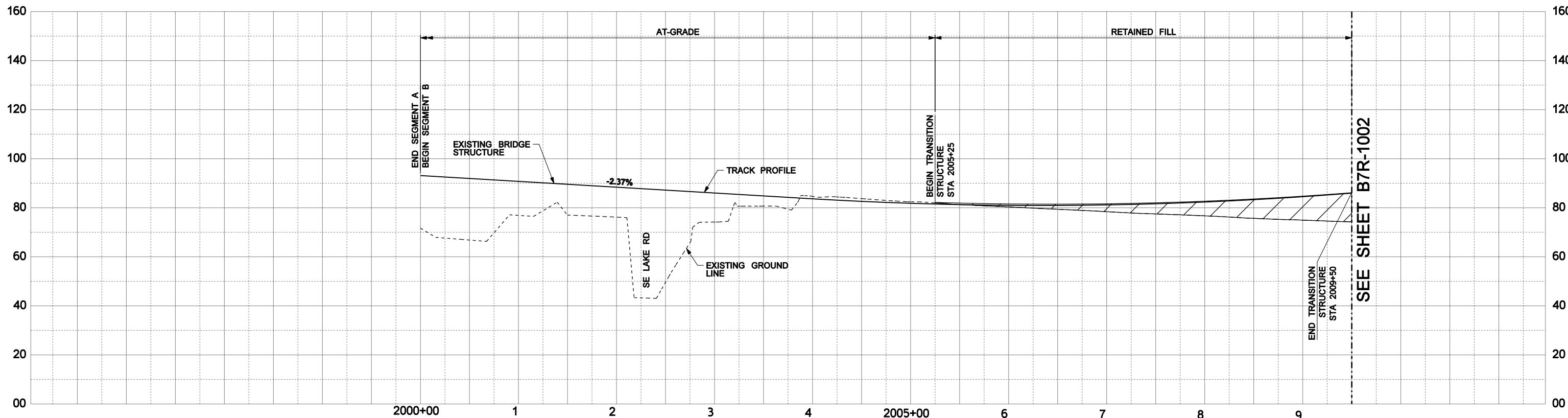
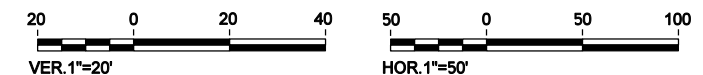
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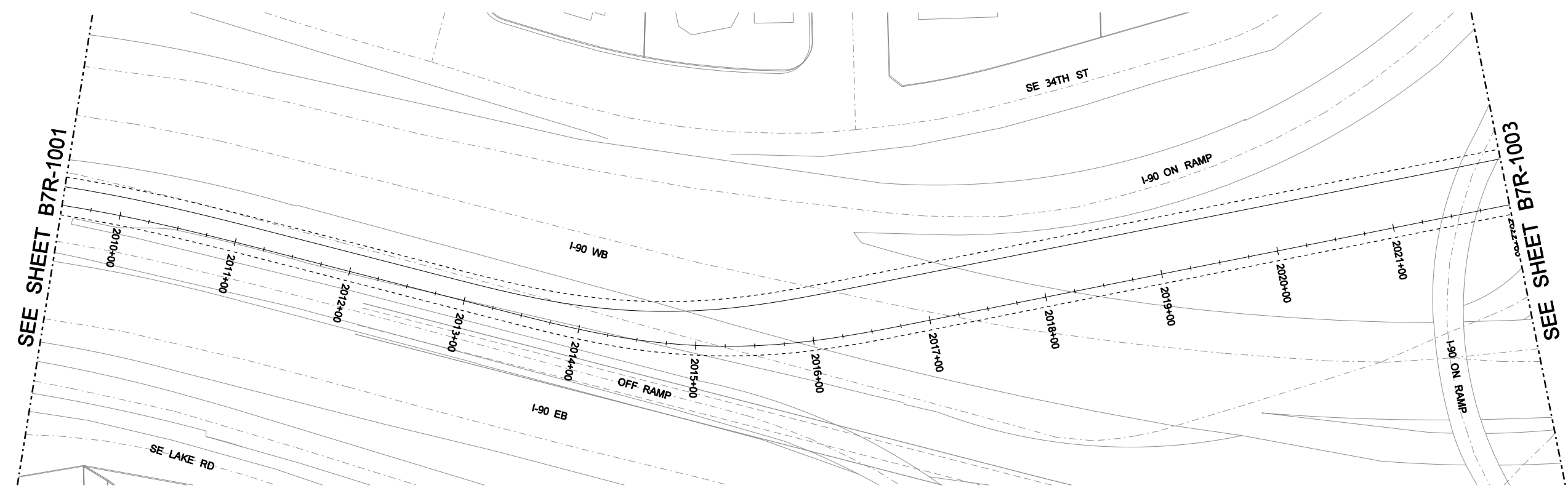


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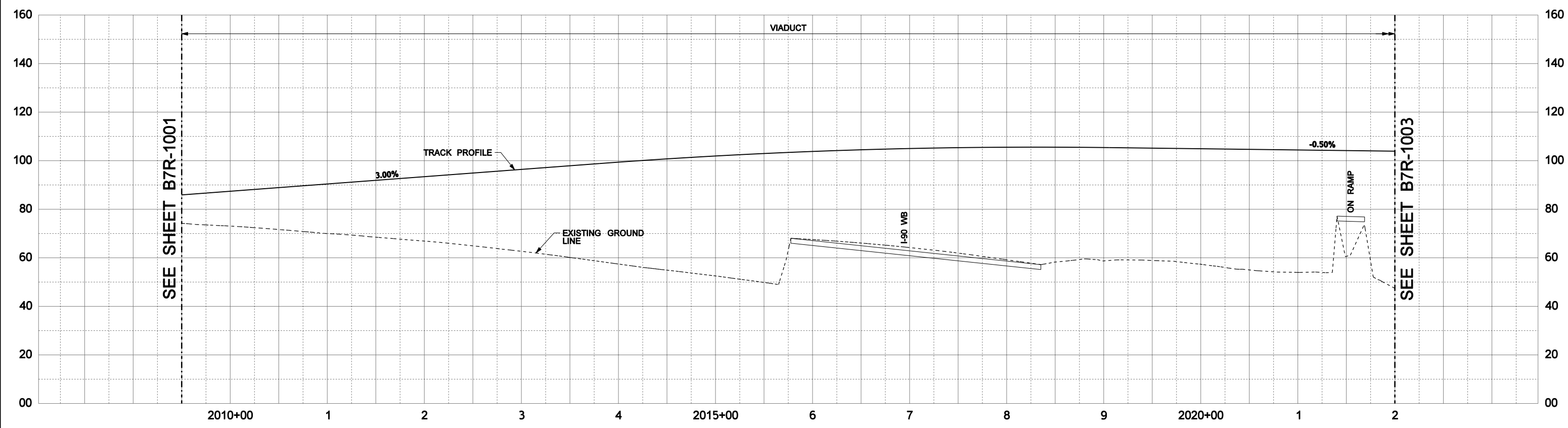
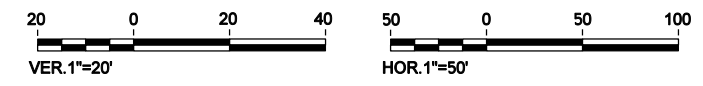
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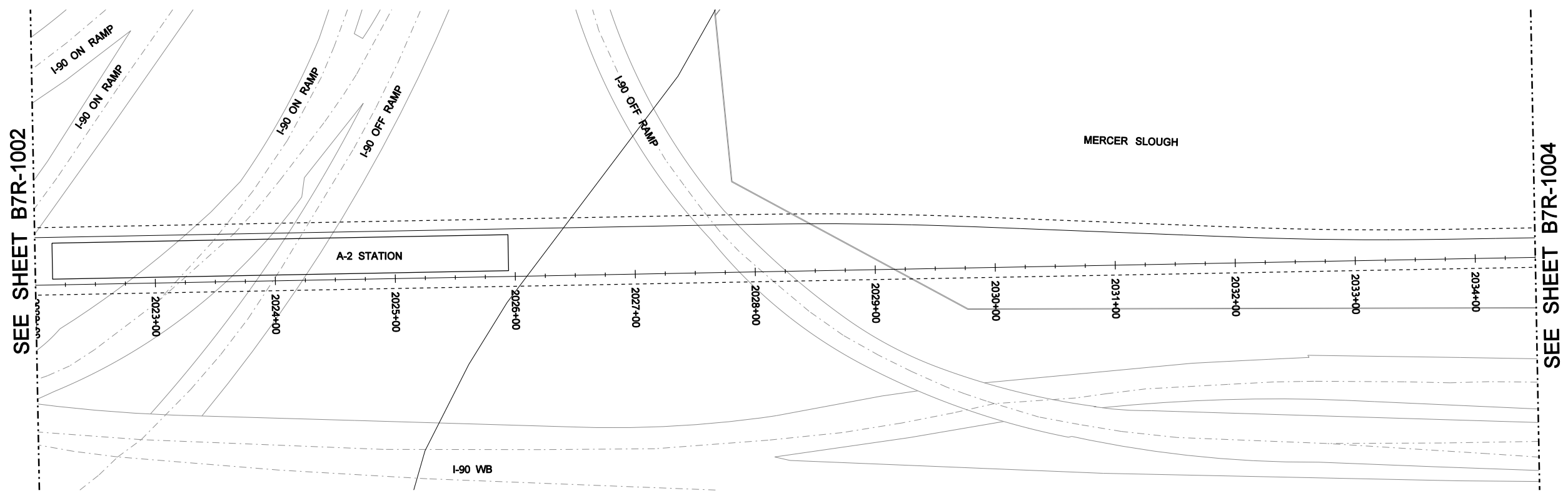
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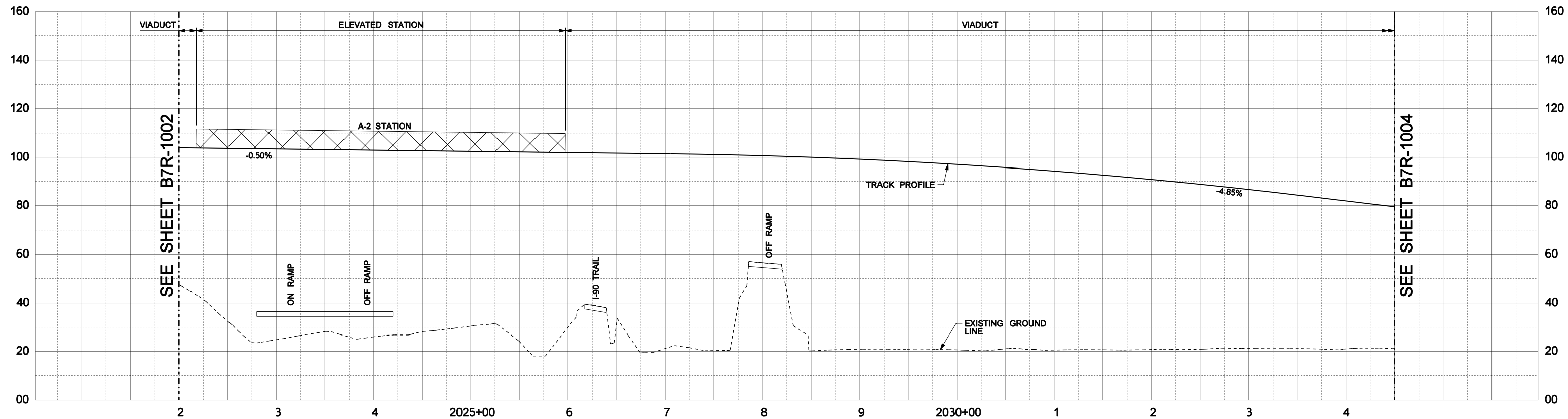
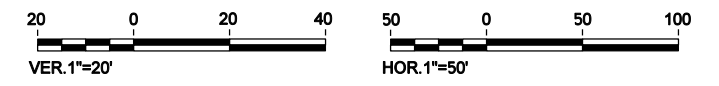


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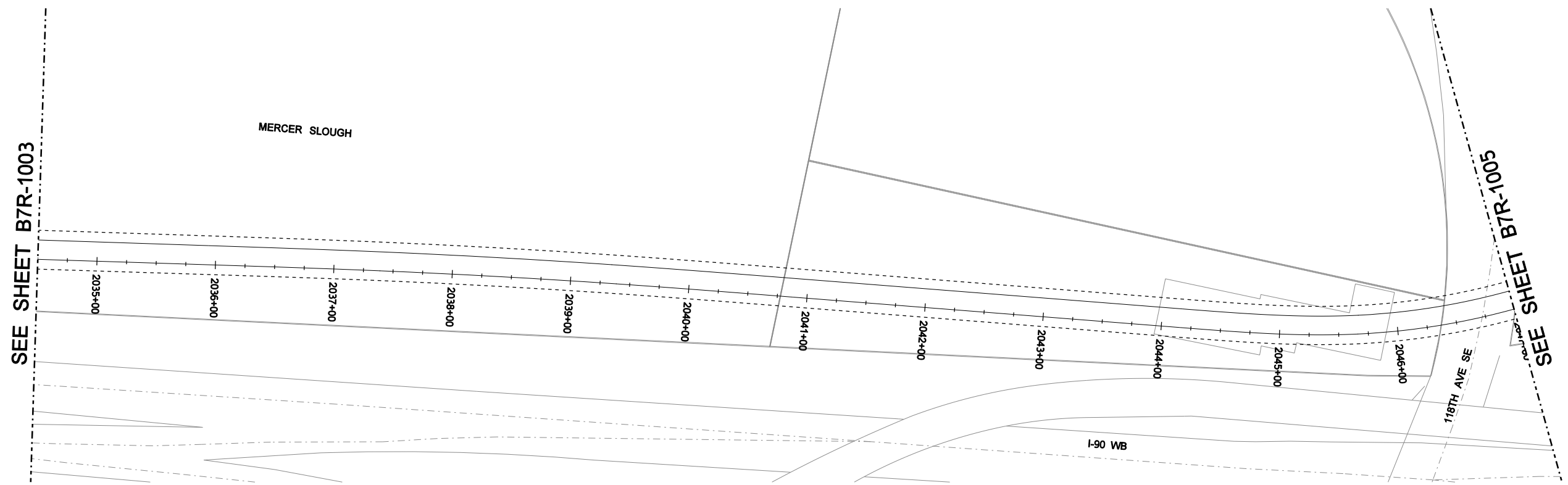
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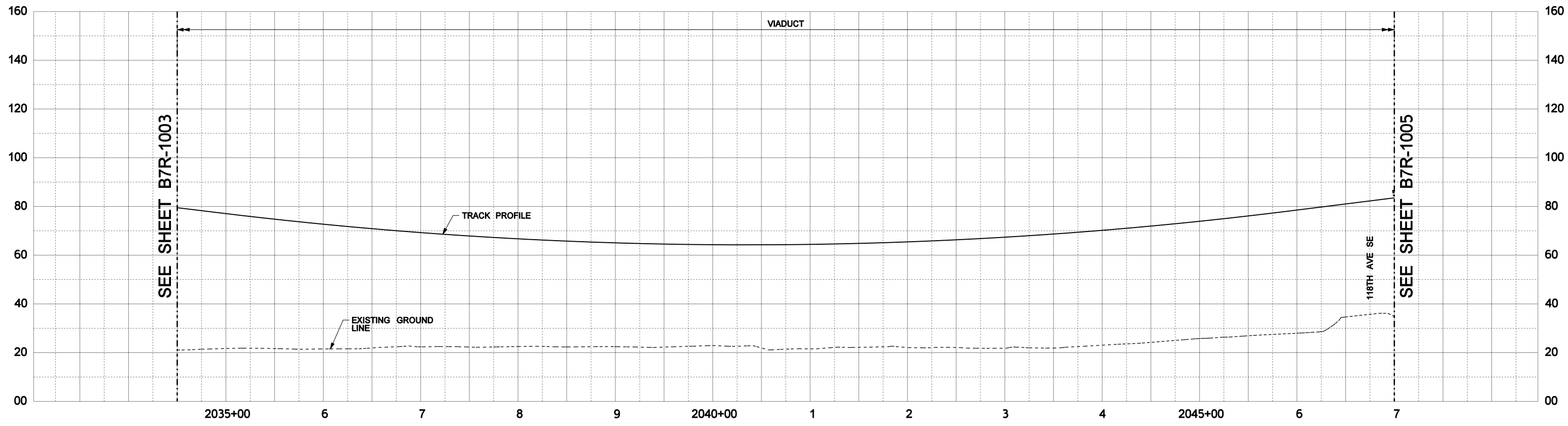
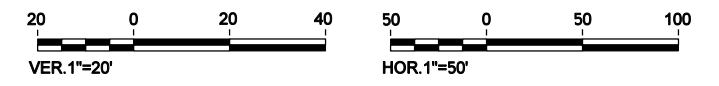
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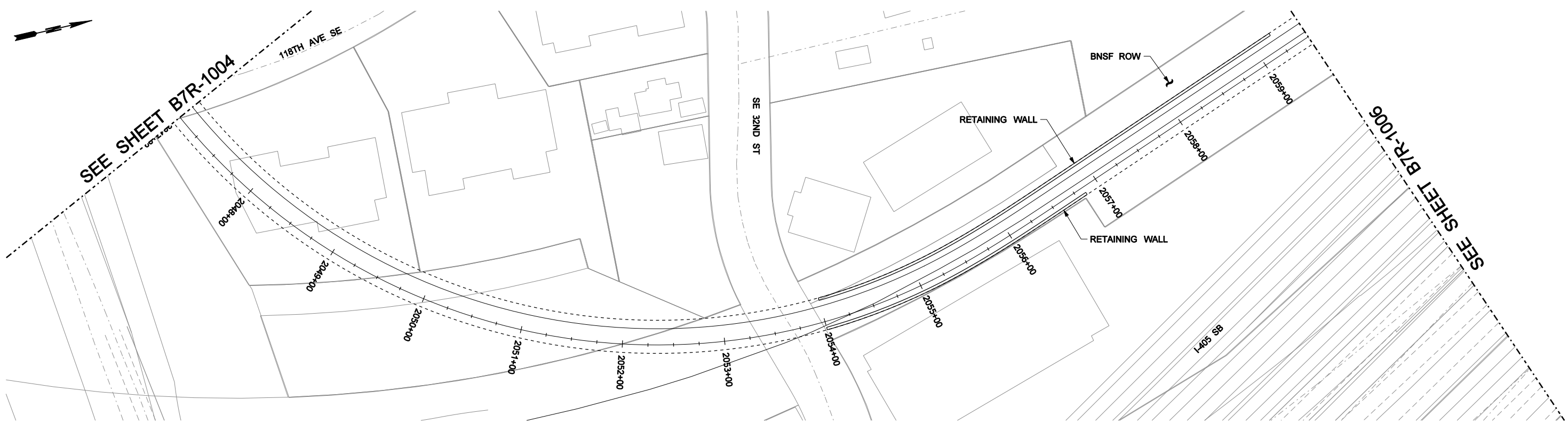
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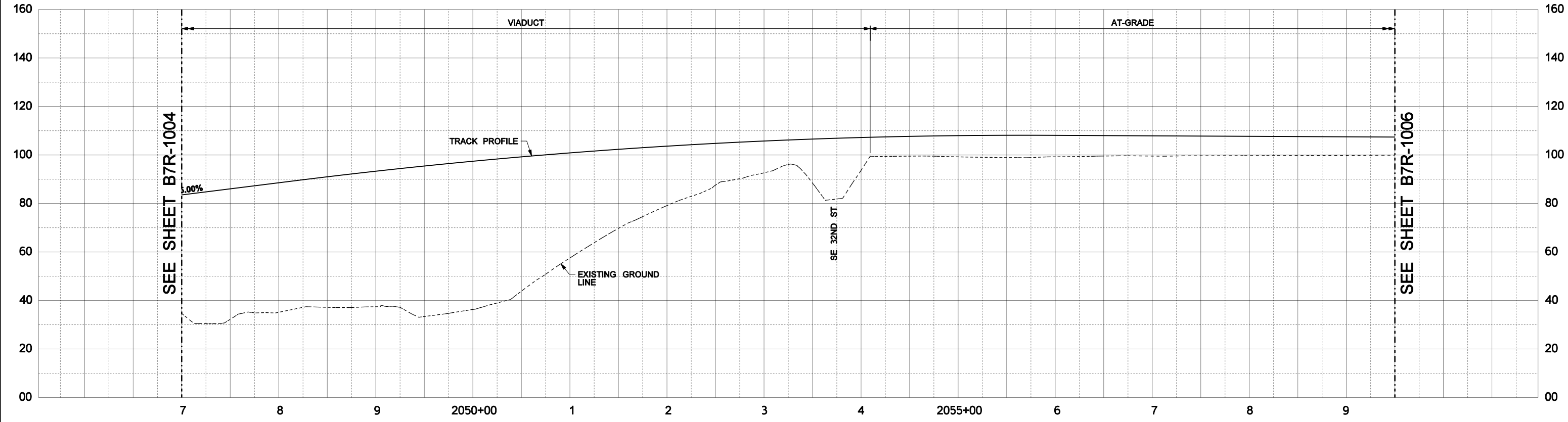
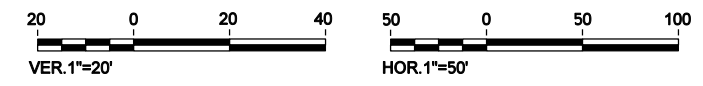


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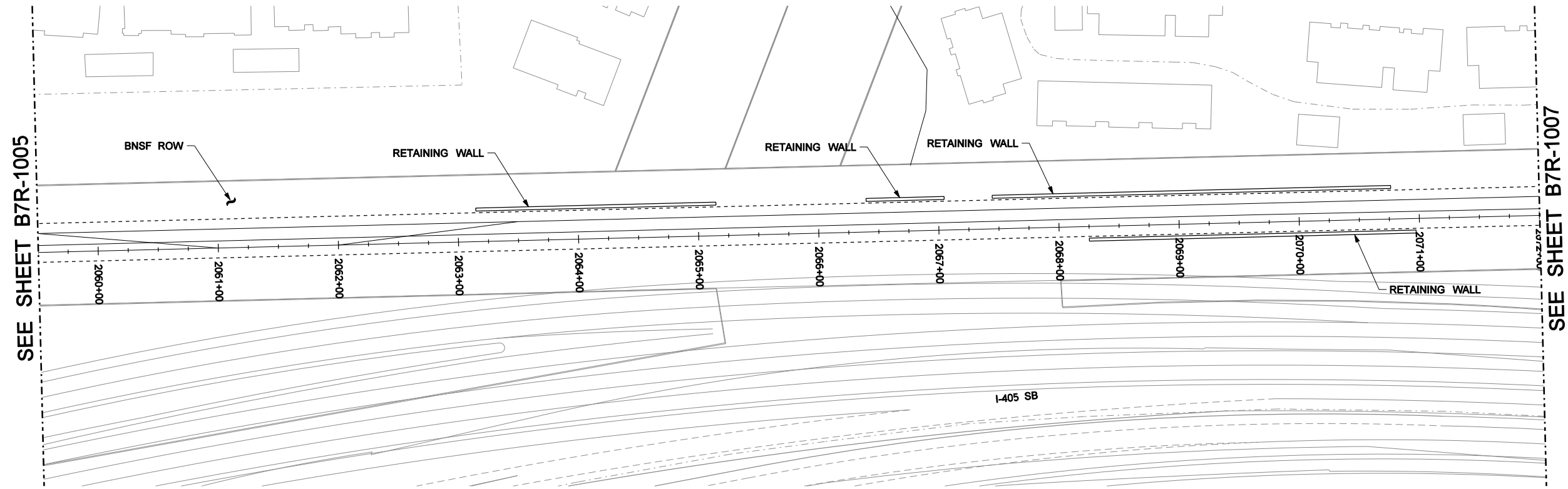
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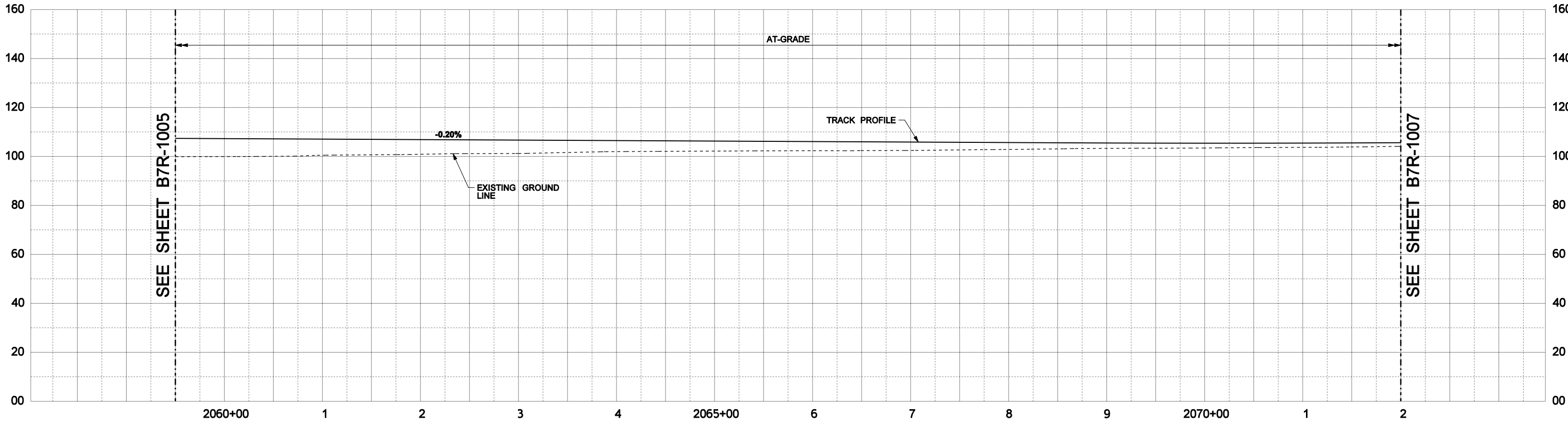
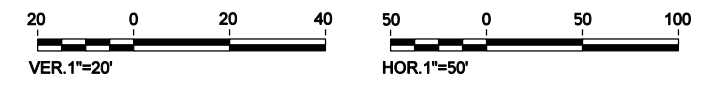
SUBMITTED	DATE	APPROVED	DATE
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EAST LINK LIGHT RAIL
 B7/C9T TO NE 2nd PORTAL
 (B7 REVISED) ALTERNATIVE
 TRACK PLAN & PROFILE
 STA. 2047+00 TO 2059+50

CONTRACT NO.	215382
DRAWING NO.	B7R-1005
SCALE	AS SHOWN
SHEET NO.	SHEET 6



PLAN



PROFILE

SEE SHEET B7R-1005

SEE SHEET B7R-1007

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REV	DATE	BY	CHK	APP	DESCRIPTION
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C	03/15/11	PT	NW	RP	EARLY CONCEPT ALIGNMENT SUBMITTAL
B	03/07/11	PT	NW	RP	REVISED 1% SUBMITTAL
A	02/16/11	PT	DH	RP	1% SUBMITTAL

DESIGNED BY T. NATWICK
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CHECKED BY D. HUNT
IN CHARGE R. PRUST
DATE 04/29/11

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1% SUBMITTAL

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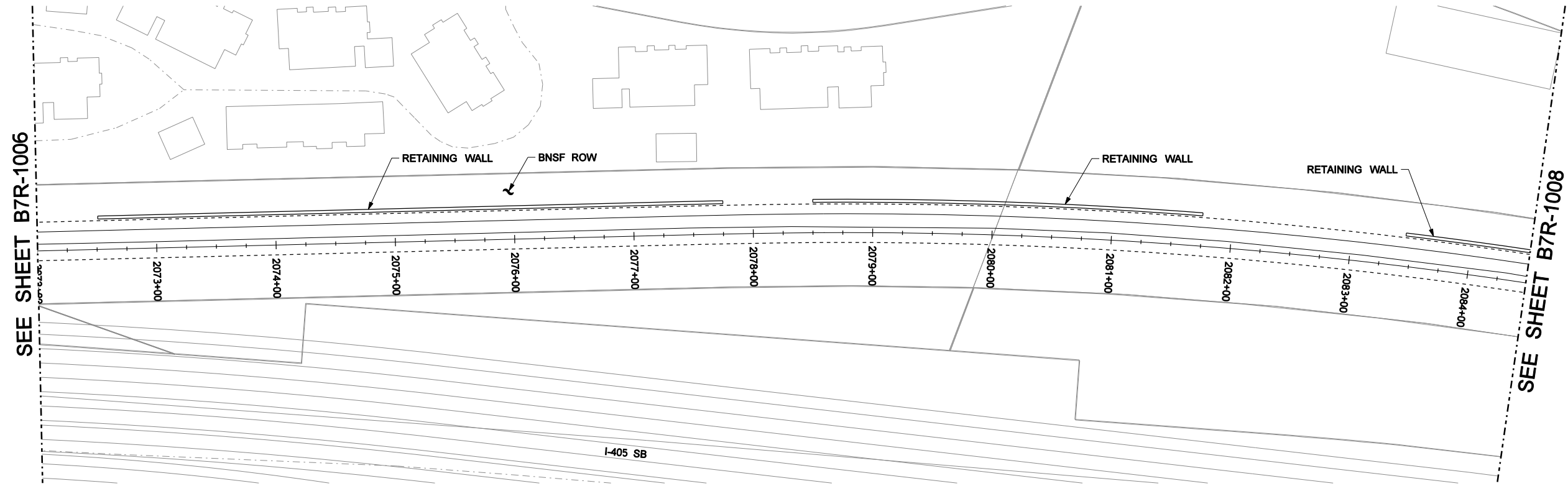
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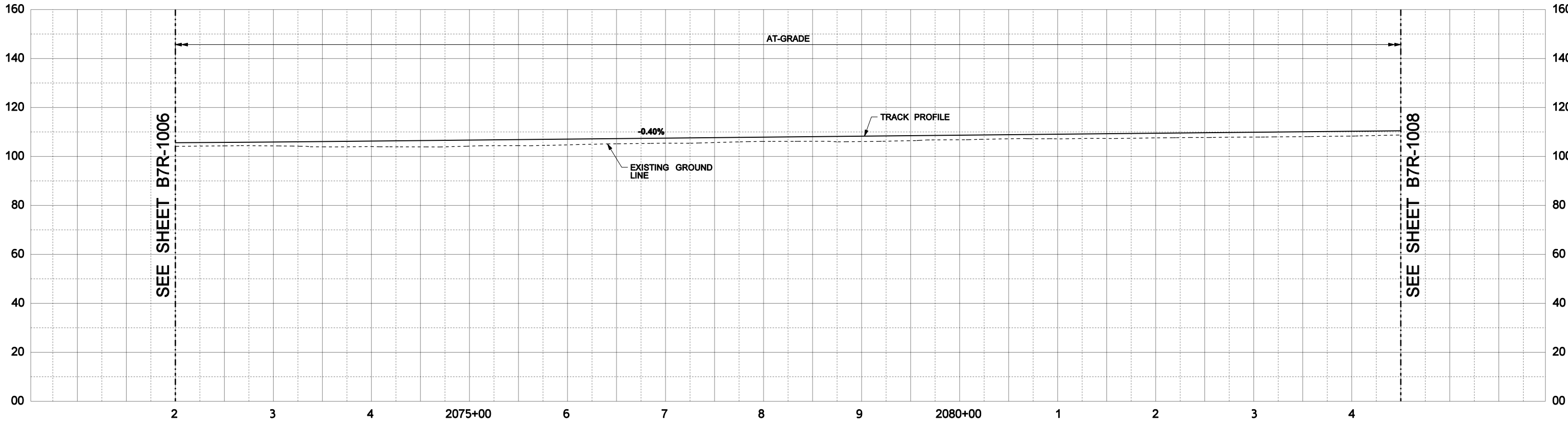
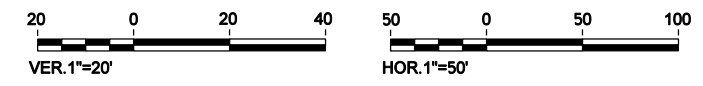
SUBMITTED	DATE	APPROVED	DATE
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EAST LINK LIGHT RAIL
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TRACK PLAN & PROFILE
STA. 2059+50 TO 2072+00

CONTRACT NO. 215382
DRAWING NO. B7R-1006
SCALE AS SHOWN
SHEET NO. SHEET 7



PLAN



PROFILE

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SEE SHEET B7R-1008

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C	03/15/11	PT	NW	RP	EARLY CONCEPT ALIGNMENT SUBMITTAL
B	03/07/11	PT	NW	RP	REVISED 1% SUBMITTAL
A	02/16/11	PT	DH	RP	1% SUBMITTAL

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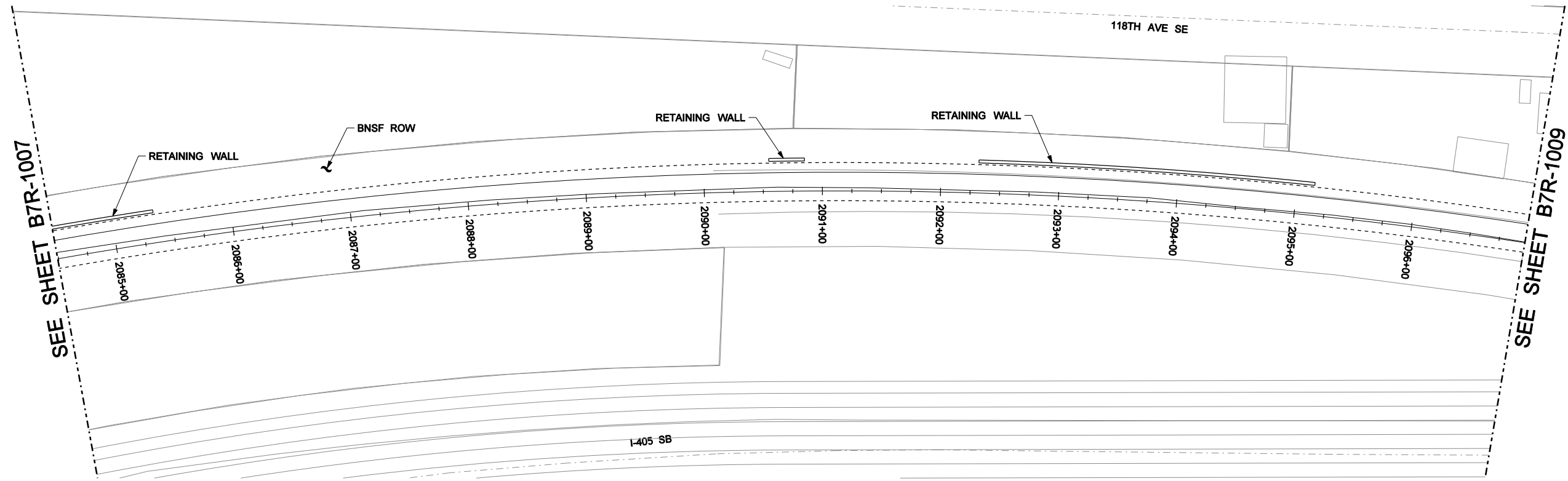
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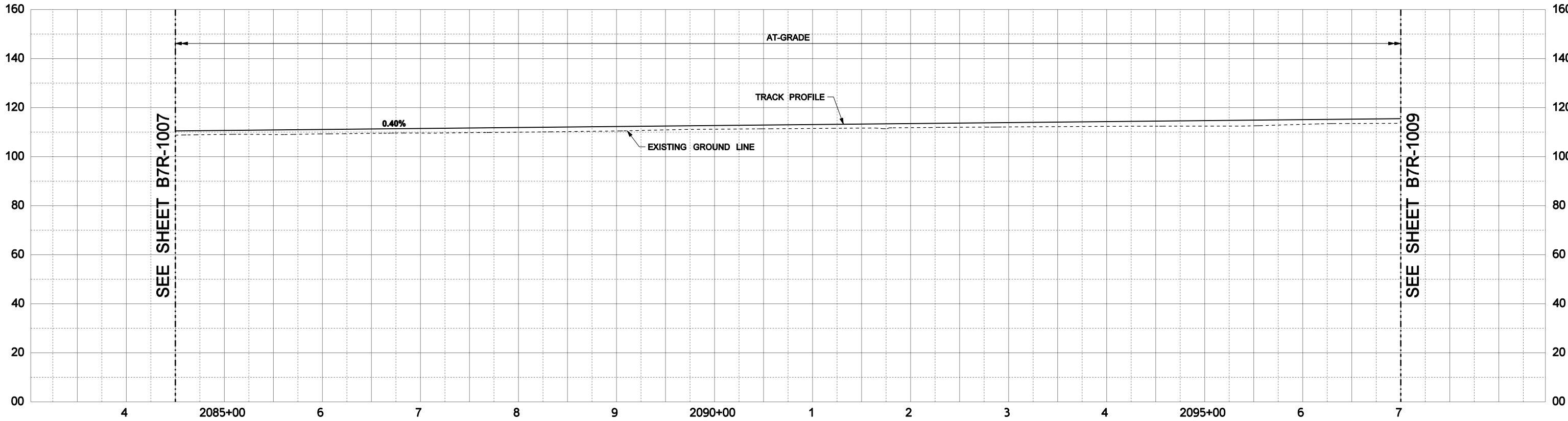
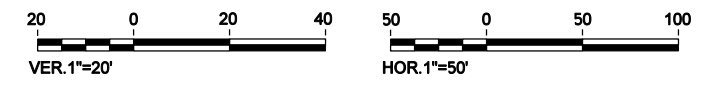
SUBMITTED	DATE	APPROVED	DATE
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EAST LINK LIGHT RAIL
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 (B7 REVISED) ALTERNATIVE
 TRACK PLAN & PROFILE
 STA. 2072+00 TO 2084+50

CONTRACT NO. 215382
DRAWING NO. B7R-1007
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SHEET NO. SHEET 8



PLAN



PROFILE

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C	03/15/11	PT	NW	RP	EARLY CONCEPT ALIGNMENT SUBMITTAL
B	03/07/11	PT	NW	RP	REVISED 1% SUBMITTAL
A	02/16/11	PT	DH	RP	1% SUBMITTAL

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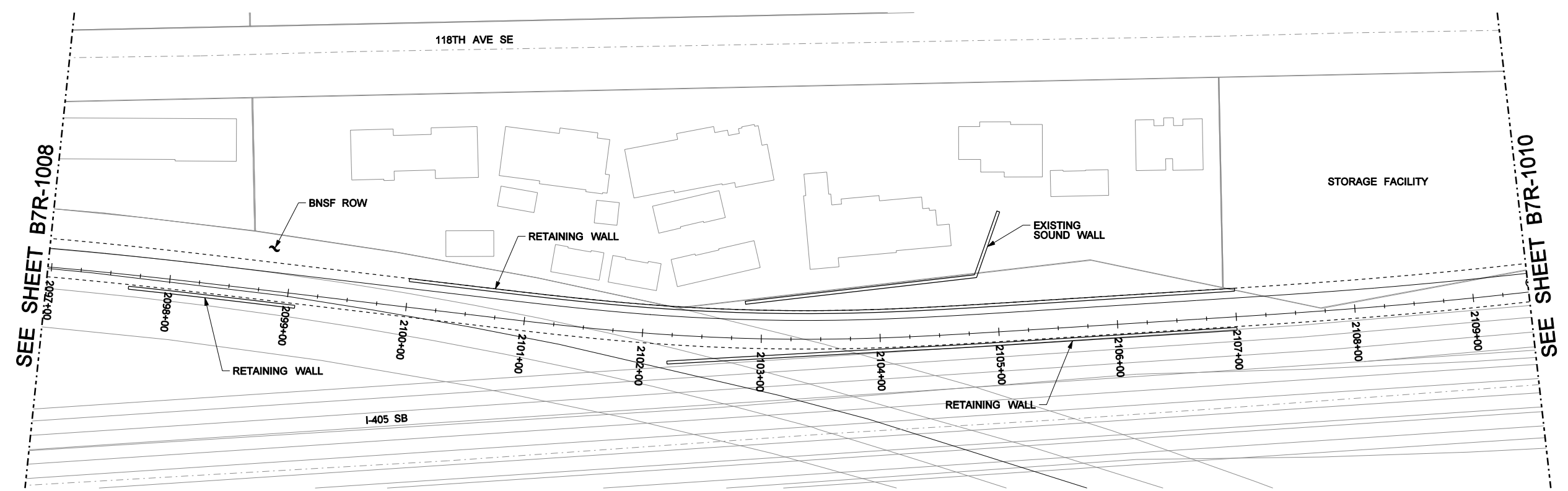
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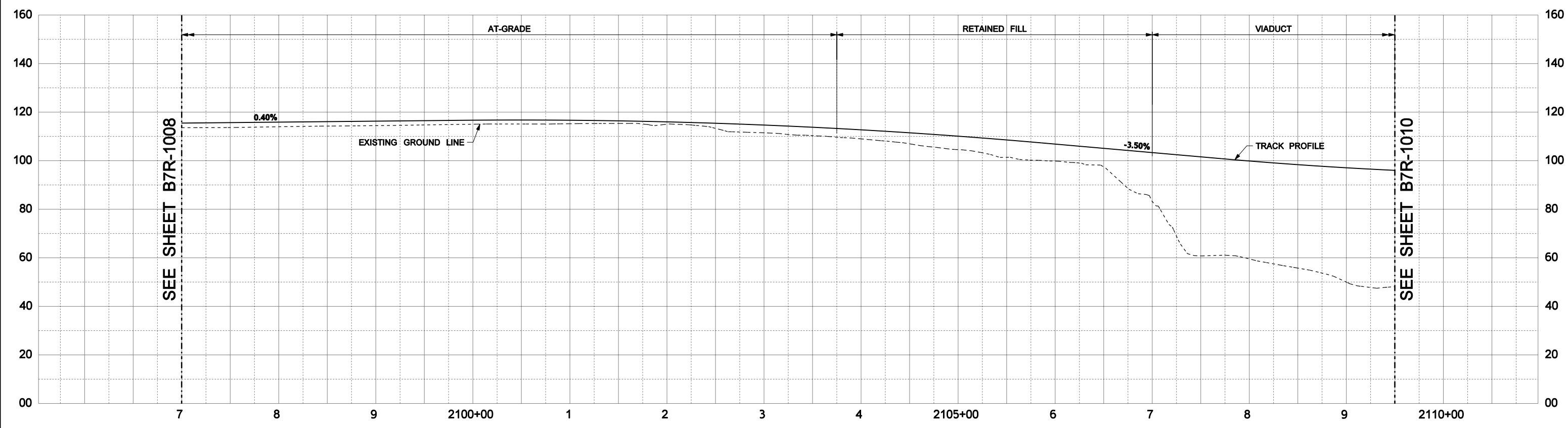
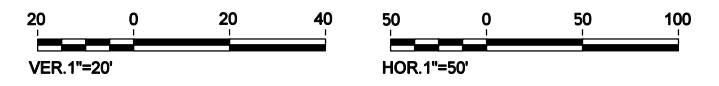


EAST LINK LIGHT RAIL
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 (B7 REVISED) ALTERNATIVE
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CONTRACT NO. 215382
DRAWING NO. B7R-1008
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PLAN



PROFILE

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SEE SHEET B7R-1010

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B	03/07/11	PT	NW	RP	REVISED 1% SUBMITTAL
A	02/16/11	PT	DH	RP	1% SUBMITTAL

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CHECKED BY D. HUNT
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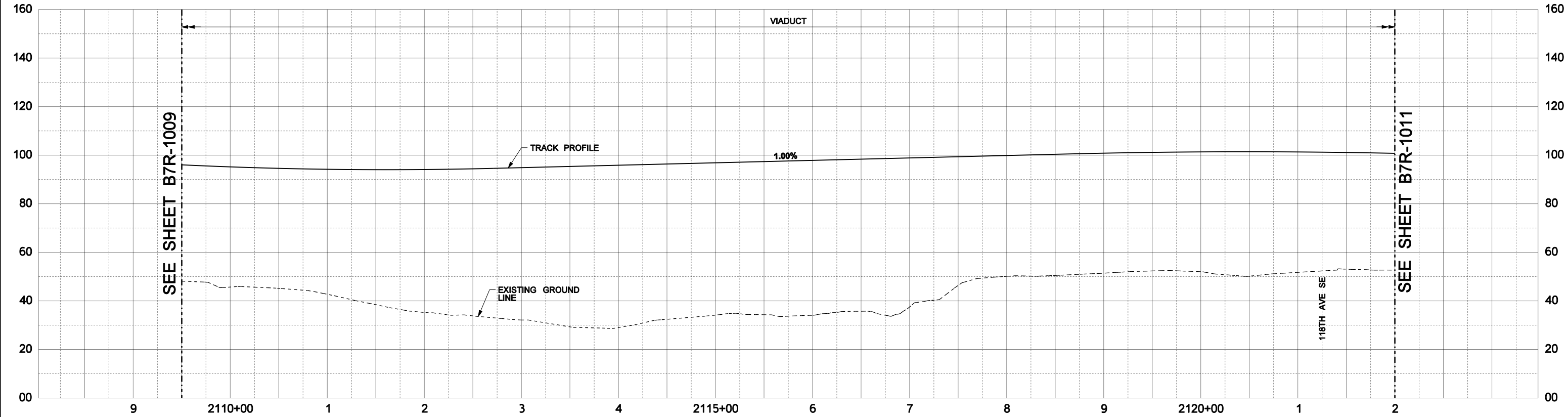
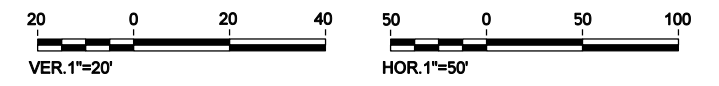


EAST LINK LIGHT RAIL
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TRACK PLAN & PROFILE
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DRAWING NO. B7R-1009
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SHEET NO. SHEET 10



PLAN



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B	03/07/11	PT	NW	RP	REVISED 1% SUBMITTAL
A	02/16/11	PT	DH	RP	1% SUBMITTAL

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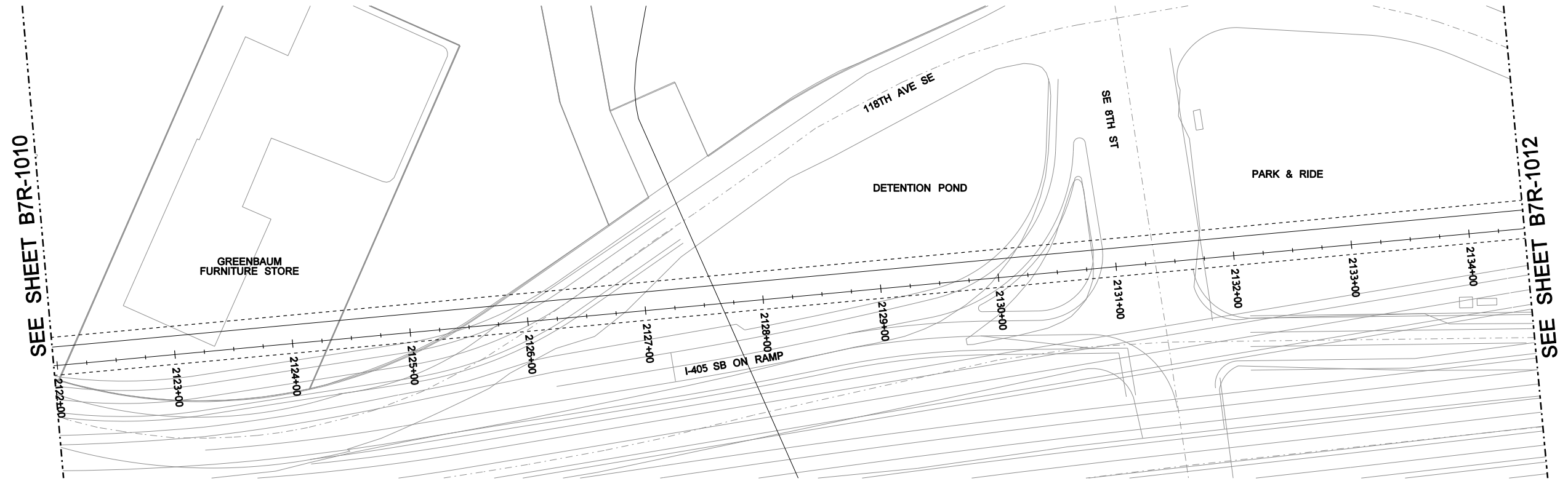
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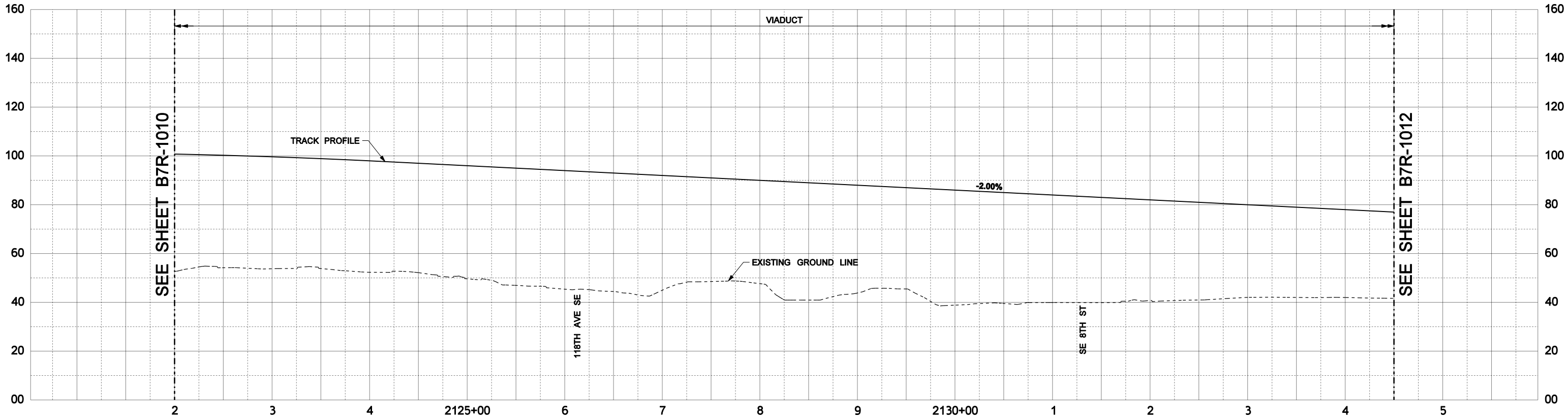
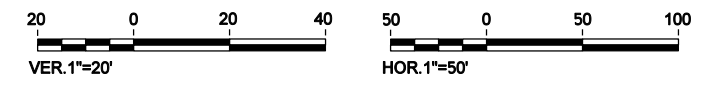
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 STA. 2109+50 TO 2122+00

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SHEET NO. SHEET 11

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B	03/07/11	PT	NW	RP	REVISED 1% SUBMITTAL
A	02/16/11	PT	DH	RP	1% SUBMITTAL

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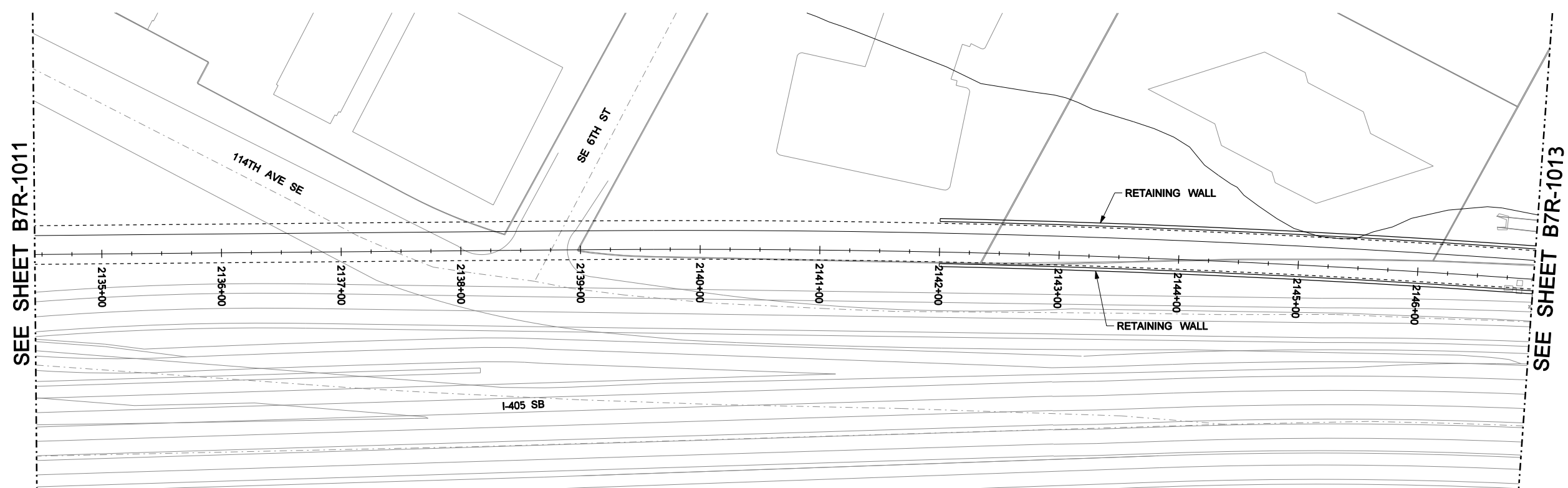
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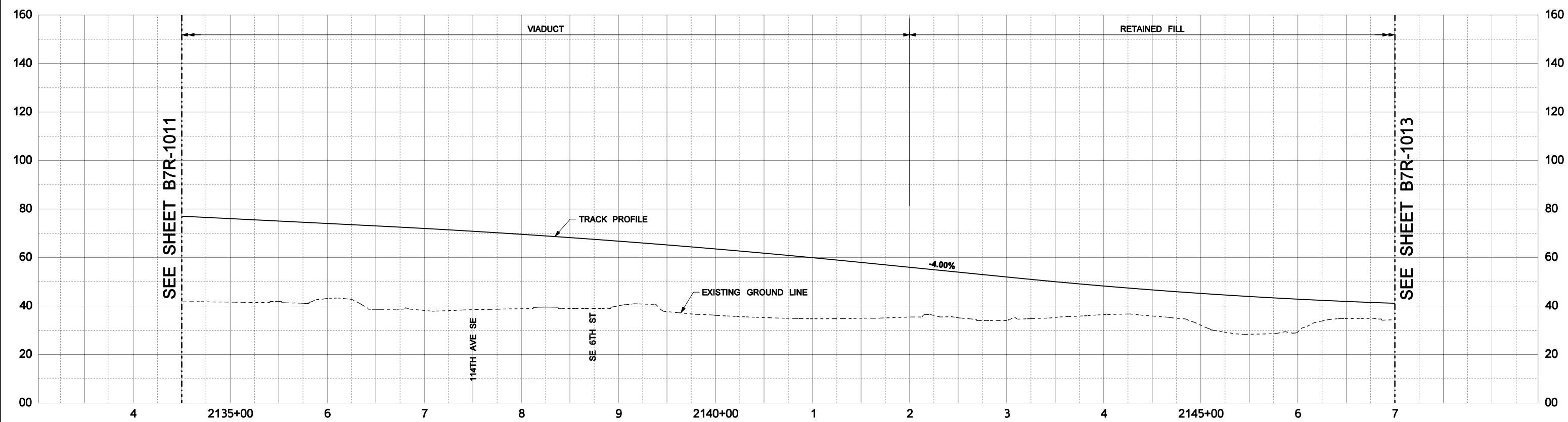
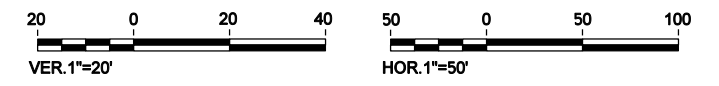
SUBMITTED	DATE	APPROVED	DATE
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SHEET NO. SHEET 12



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B	03/07/11	PT	NW	RP	REVISED 1% SUBMITTAL
A	02/16/11	PT	DH	RP	1% SUBMITTAL

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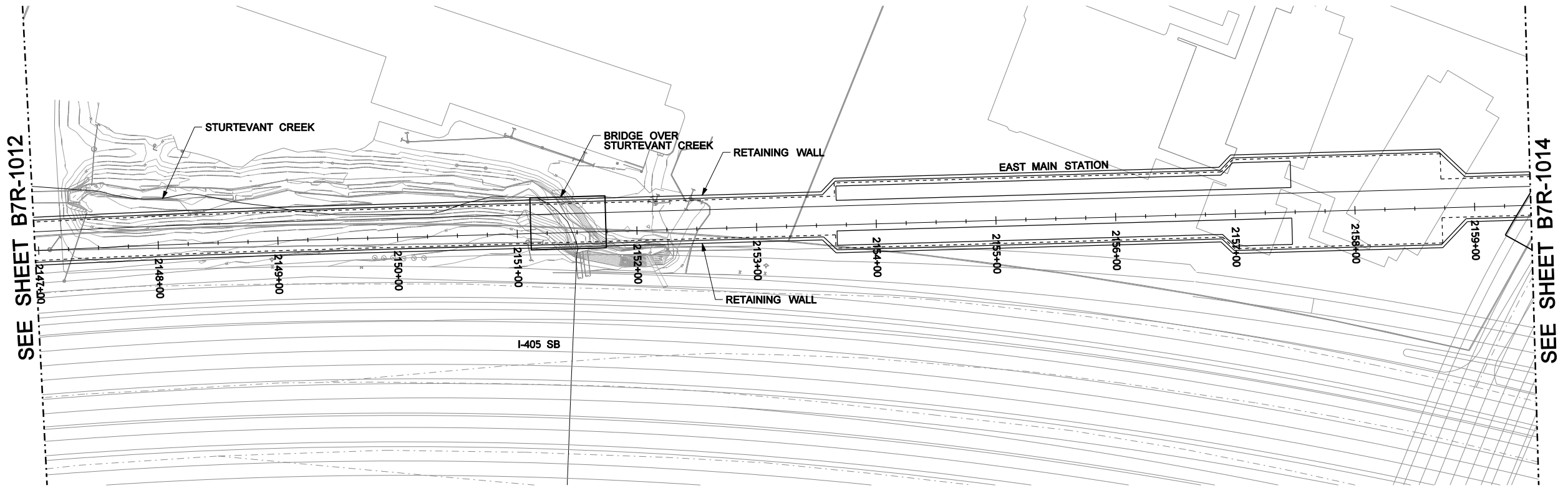
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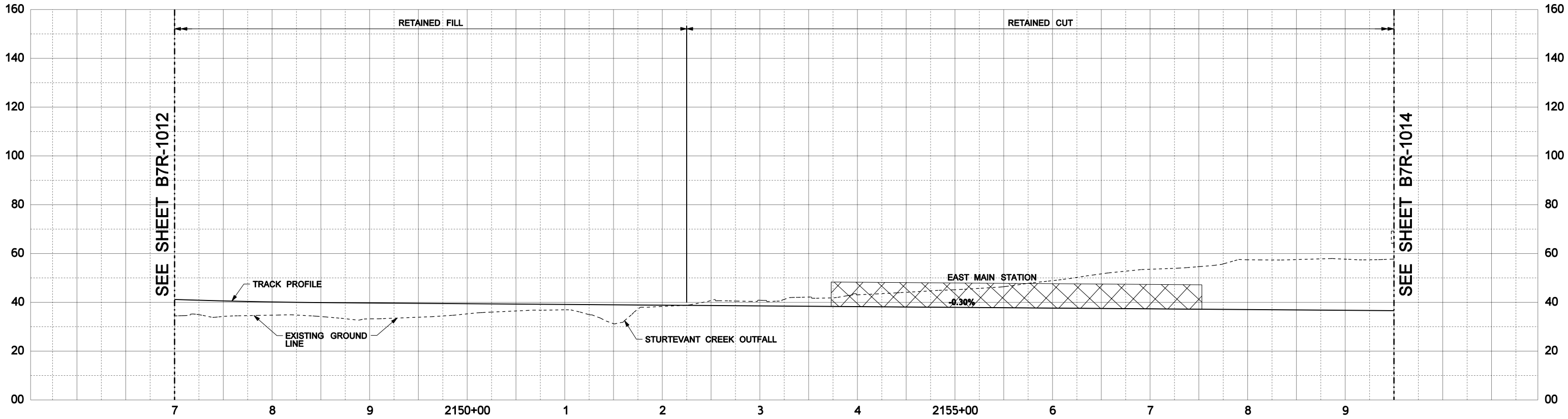
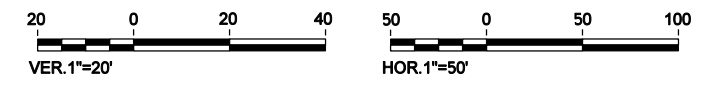


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 STA. 2134+50 TO 2147+00

CONTRACT NO. 215382
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SCALE AS SHOWN
SHEET NO. SHEET 13



PLAN



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B	03/07/11	PT	NW	RP	REVISED 1% SUBMITTAL
A	02/16/11	PT	DH	RP	1% SUBMITTAL

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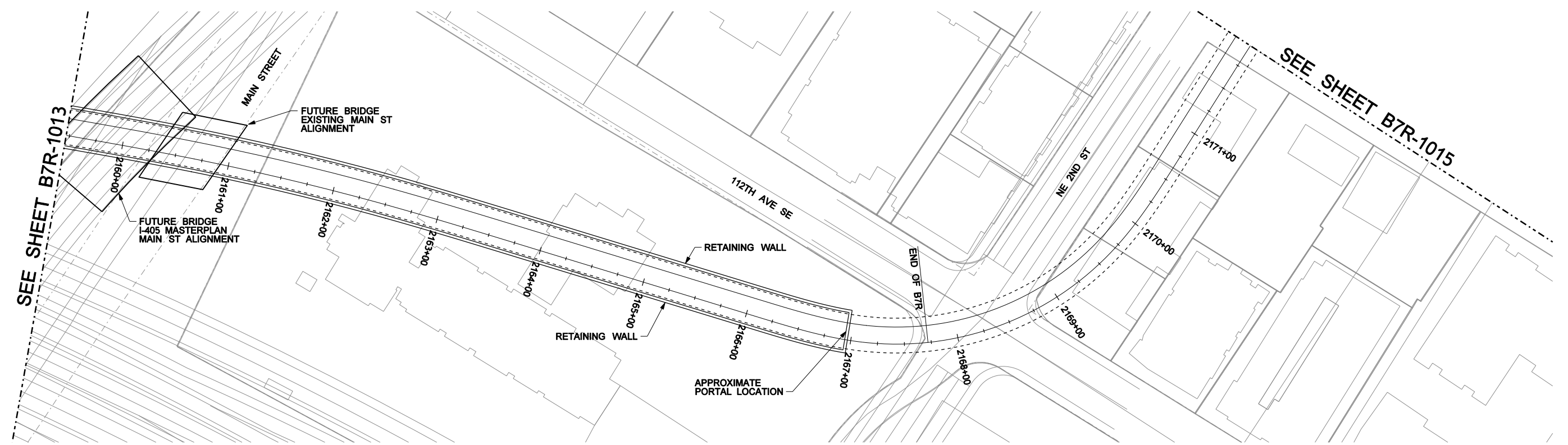
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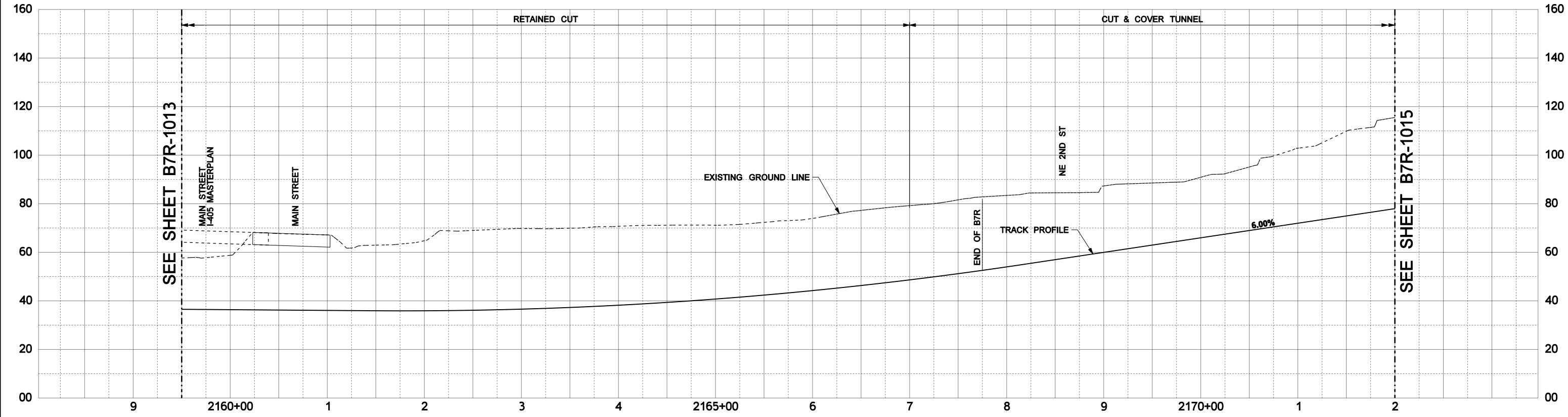
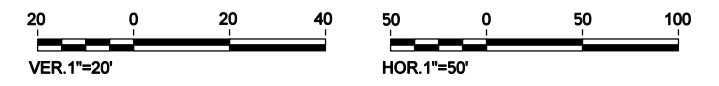
SUBMITTED	DATE	APPROVED	DATE
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EAST LINK LIGHT RAIL
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STA. 2147+00 TO 2159+50

CONTRACT NO. 215382
DRAWING NO. B7R-1013
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SHEET NO. SHEET 14



PLAN



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B	03/07/11	PT	NW	RP	REVISED 1% SUBMITTAL
A	02/16/11	PT	DH	RP	1% SUBMITTAL

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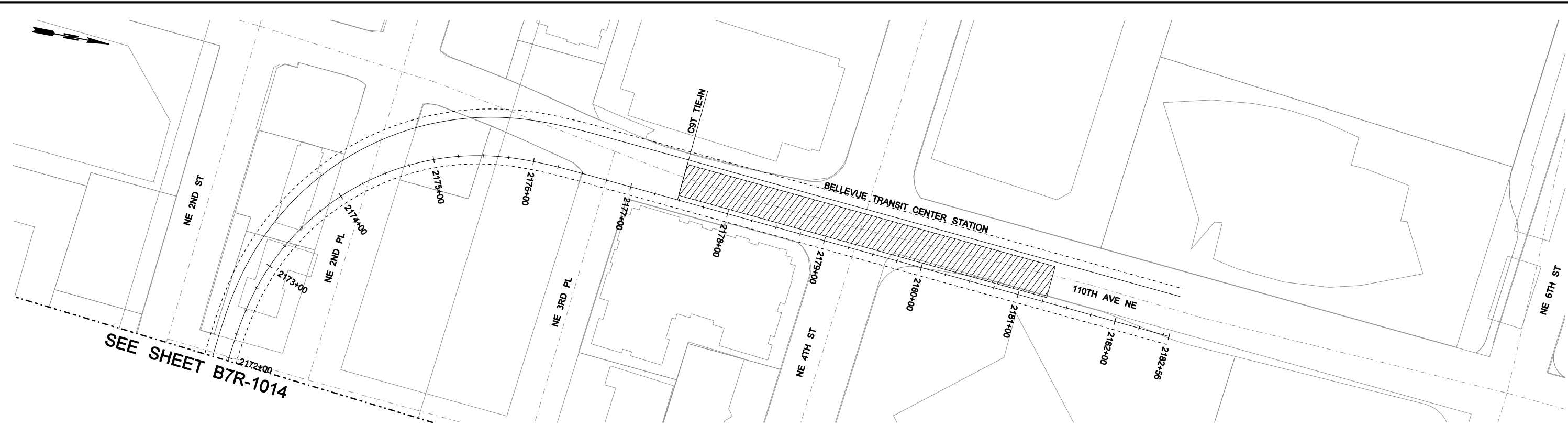
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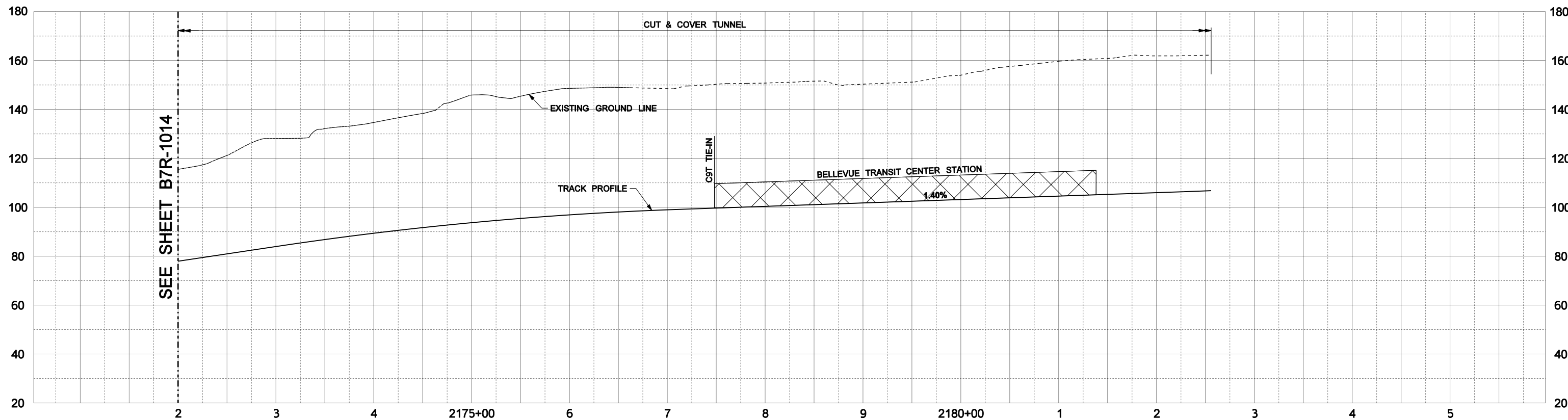
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STA. 2159+50 TO 2172+00

CONTRACT NO. 215382
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SHEET NO. SHEET 15

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B	03/07/11	PT	NW	RP	REVISED 1% SUBMITTAL
A	02/16/11	PT	DH	RP	1% SUBMITTAL

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 STA. 2172+00 TO 2184+74.07

CONTRACT NO. 215382
DRAWING NO. B7R-1015
SCALE AS SHOWN
SHEET NO. SHEET 16