CENTRAL LINK LIGHT RAIL TRANSIT PROJECT

2012 SEPA ADDENDUM TO THE

FINAL SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT

NORTH LINK

MARCH 2012

SOUNDTRANSIT

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REGIONAL TRANSIT AUTHORITY

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March 16, 2012

Dear Recipient:

Sound Transit has prepared this State Environmental Policy Act (SEPA) Addendum for the North Link Light Rail Project, which is developing light rail from the University of Washington Station to Northgate in Seattle. This addendum is an update to the North Link Final Supplemental Environmental Impact Statement (Final SEIS) issued in April 2006 and the Central Link Light Rail Transit Project Final Environmental Impact Statement (EIS) issued in November 1999. The addendum describes proposed design refinements and evaluates changes in potential impacts due to these refinements.

The primary North Link project changes are refinements to the horizontal alignment, an extension of the bored tunnel portion of the alignment and associated location of the north portal, modification of the noise mitigation measures, and revisions in construction staging areas and operations. These refinements are proposed to improve operations, lower costs, improve construction efficiencies, and reduce overall environmental impacts. This addendum also addresses new environmental information as a result of additional field studies of wetlands and historic properties.

Copies of the addendum are available for review at Sound Transit offices, many public libraries, and on the Sound Transit website at www.soundtransit.org. For further information about this Addendum or to request a copy, please contact Lauren Swift, Environmental Planner, 401 S. Jackson St., Seattle WA 98104-2826, or 206.398.5000 TTY: 206.398.5410.

Sincerely,

James Irish
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Central Puget Sound Regional Transit Authority (Sound Transit)

Central Link Project: North Link 2012 SEPA Addendum

To

North Link Final Supplemental Environmental Impact Statement (2006)

Prepared Pursuant to the State Environmental Policy Act, Chapter 43.21C RCW and WAC 197-11-625

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Acronyms

DAHP	Washington State Department of Archaeology and Historic Preservation
FTA	Federal Transit Administration
I-5	Interstate 5
NEPA	National Environmental Policy Act
ROD	Record of Decision
SEIS	Supplemental Environmental Impact Statement
SEPA	State Environmental Policy Act
SHPO	Washington State Historic Preservation Officer
WSDOT	Washington State Department of Transportation

Purpose of this Addendum

This addendum describes the proposed design refinements to the North Link Light Rail Project (North Link), which is developing light rail from the University of Washington Station near Husky Stadium to Northgate in Seattle, Washington. In April 2006, the *North Link Final Supplemental Environmental Impact Statement* (Final SEIS) was issued by Sound Transit and the Federal Transit Administration (FTA) pursuant to the National Environmental Policy Act (NEPA) and the State Environmental Policy Act (SEPA). The Final SEIS evaluated a No-Build Alternative and several "build" alternatives including the Preferred Alternative that was selected by the Sound Transit Board as the alternative to be built for the project. FTA issued a Record of Decision (ROD) for the project in June 2006. Figure 1 shows Sound Transit's existing light rail system and its planned extensions, including the section known as North Link.

In the course of the final design process for the North Link project, Sound Transit has refined some project features between the University of Washington and Northgate stations (see Figure 2). These design refinements are proposed to improve operations, lower costs, improve construction efficiencies, and reduce overall environmental impacts. They include refinements to the horizontal alignment, an extension of the bored tunnel portion of the alignment and associated location of the tunnel's north portal, refinements in the noise mitigation measures, and revisions in construction staging areas and operations. Design plans and profiles are provided in Attachment A.

This SEPA addendum addresses these changes to the project and provides new project-related environmental information. It does not substantially change the analysis of significant impacts and alternatives in existing environmental documents. Sound Transit has prepared this addendum in order to provide an updated description of refinements made to the North Link alignment in the course of final design, and to evaluate how these project refinements affect the impact analyses contained in the North Link Final SEIS and other environmental documentation for the North Link project. The addendum also addresses new environmental information as a result of additional field studies of wetlands and historic properties.

Findings

The analyses contained in this addendum indicate that the proposed design refinements would reduce overall effects from construction, such as disruption to neighborhoods and truck traffic, compared to the design evaluated in the Final SEIS. Noise mitigation modifications in the Northgate area would address changes in noise impacts. There is a minor increase in wetland impacts due to identification of additional wetlands. These impacts would be mitigated. Other environmental impacts would be similar to those described in the Final SEIS; no new significant adverse environmental impacts would result.

Next Steps

The Sound Transit Board will be asked to approve revising the project with the proposed design modifications, which would amend the definition of the project that Sound Transit advances through final design and construction. The agency will continue to coordinate with the City of Seattle, other stakeholders, and the neighborhoods surrounding the Brooklyn, Roosevelt, and Northgate stations.

Project Background

The North Link project is the northern segment of the Central Link light rail program. Following issuance of the 1999 Final EIS for the Central Link light rail project (Sound Transit and FTA 1999), Sound Transit initiated the North Link project, which reconsidered the alternatives between downtown Seattle, Capitol Hill, the University District, and Northgate. After publishing the 2003 North Link Draft SEIS and 2004 Modified Montlake Route Addendum and considering public comments, the Sound Transit Board identified a revised Preferred Alternative for North Link in July 2005.

Sound Transit and FTA analyzed the Preferred Alternative and, in April 2006, issued the North Link Final SEIS (Sound Transit and FTA 2006). In June 2006, FTA issued its ROD for North Link, which acknowledged the completion of the environmental review process under NEPA. Figure 1 shows the project and its connection to the open elements of the Link light rail system. The southern portion of the North Link alignment, from downtown Seattle to the University of Washington Station, is now under construction as University Link. From the University of Washington Station, the remaining portion of the North Link alignment would continue north in a tunnel and reach the Brooklyn Station under Brooklyn Avenue NE south of NE 45th Street. Continuing north in a tunnel, the route would reach the Roosevelt Station just west of 12th Avenue NE between NE 65th Street and NE 67th Street. From the Roosevelt Station, the tunnel continues northwest to a portal location immediately north of the Lake City Way interchange with I-5, then continue on the surface, in tunnels, and elevated along the east side of I-5 to the elevated Northgate Station east of 1st Avenue NE, spanning NE 103rd Street adjacent to the Northgate Transit Center.

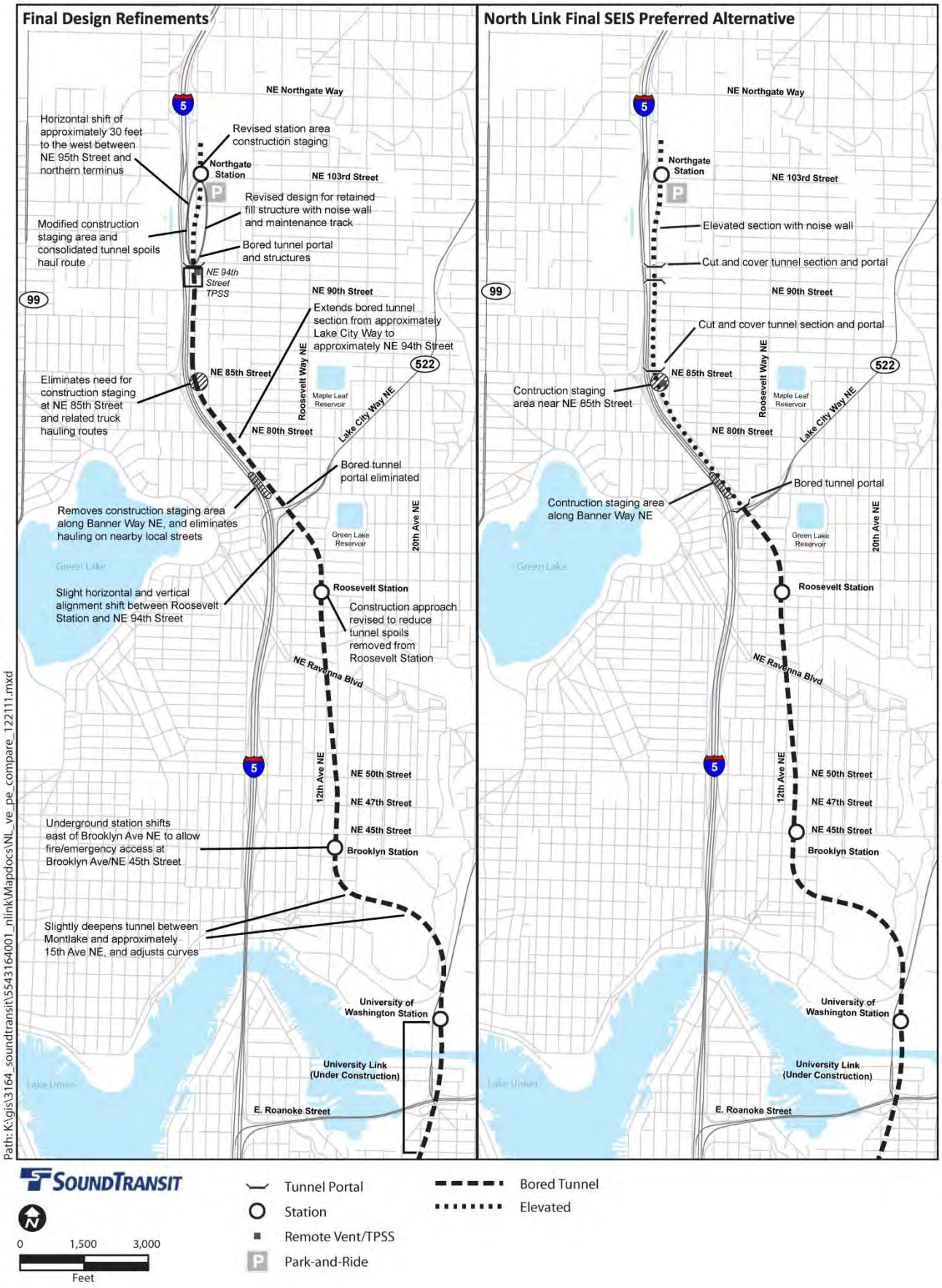
Project Refinements

Sound Transit has revised the design and refined its construction approach in two areas of the North Link project. Figure 2 shows the areas with modifications and updates, compared to the project reviewed in the 2006 North Link Final SEIS. Sound Transit also has new environmental information indicating the presence of additional small wetlands in an area near the north end of the project and has conducted additional surveys of historic properties.

Sound Transit developed the design refinements considering factors such as construction efficiency, including minimizing construction impacts to neighborhoods and buildings, reducing construction risk, and achieving an overall reduction in environmental effects. Sound Transit also considered ways to reduce temporary impacts of construction to the operations of Interstate 5 (I-5), improve construction and operations efficiency, achieve cost and schedule savings, and avoid conflicts with utilities.

Figure 1 Sound Transit Existing and Proposed Light Rail System

Figure 2 North Link Final Design Features Compared to 2006 Final SEIS Preferred Alternative



The key elements of the design refinements include:

1. **Extending the bored tunnel to a portal structure located between NE 92nd Street and NE 94th Street.** The alignment would remain in a bored tunnel until it reaches a surface portal at NE 94th Street between I-5 and 1st Avenue NE. Ventilation systems and a traction power substation would be located at this portal. The Final SEIS bored tunnel portal was near NE Banner Place/NE 75th Street, north of Lake City Way/I-5. The new bored tunnel portal at NE 94th Street near I-5 is near where the Final SEIS Preferred Alternative had a cut-and-cover tunnel portal. The alignment transitions from the bored tunnel to a retained fill section, then transitions to an elevated structure, but it occupies the same area between I-5 and 1st Avenue NE as assumed in the Final SEIS.

   By extending the bored tunnel section to north of NE 94th Street, the project would replace nearly a mile of retained cut, cut-and-cover, and at-grade track with twin bore tunnels. A minor horizontal shift would also allow the tunnel to be generally aligned below Banner Way NE and then under ramps and I-5 right of way from Lake City Way to NE 92nd Street. These refinements avoid a series of cut-and-cover tunnel and retained cut sections along the eastern side of the I-5 right of way. They also avoid modifications to I-5 ramps and overcrossing structures in this area. The revised tunnel section approaching the new bored tunnel portal near NE 94th Street would be about 10 feet deeper than it was with the cut-and-cover portal assumed in the 2006 Final SEIS.

   The guideway immediately north of the portal would also begin as a retained cut, with the track profile approximately 10 feet lower, before transitioning to a retained fill structure, and then rising to the same elevation as assumed in the Final SEIS to cross over 1st Avenue NE near NE 100th Street. While the light rail alignment remains in the same location as in the Final SEIS, the retained fill structure would be wider to accommodate a maintenance track, switches, and a noise wall.

2. **Revised construction approach and staging activities.** With the bored tunnel extended to the north, the project eliminates several construction and staging areas along Banner Way NE north of NE 75th Street. The areas no longer needed include previous sections with retaining walls or cut sections, and cut-and-cover structures adjacent to the east side of I-5. The major areas where construction would have occurred were the original bored tunnel portal at Banner Way and near a previous cut-and-cover portal and staging area at NE 85th Street. The previous cut-and-cover tunnel portal at NE 94th Street, where the new bored tunnel portal would now be located, was assumed to be a staging area in the North Link Final SEIS, but it was not the primary tunnel spoils removal location for the tunnel section north of the Roosevelt Station. This area would now be used for staging for the revised tunnel portal and would include activities related to tunnel construction and spoils removal. The area would also require nighttime construction. However, the extension of the tunnel would eliminate the need for closures and restrictions on streets and freeway ramps between Lake City Way and NE 92nd Street, including around NE Banner Way, and would allow more direct routes for construction trucking to and from I-5. The revision would also allow for greater efficiencies in tunnel boring construction and contracting, with the potential to shorten the overall duration of tunnel construction for North Link.

3. **Refinements in the bored tunnel vertical and horizontal alignment.** To improve operations, Sound Transit redesigned horizontal and vertical curves within the tunnel section to accommodate a maximum design speed of 55 miles per hour (mph), where practical. The horizontal curves were also flattened (radius increased) to reduce future

maintenance needs and minimize potential impacts related to vibration and rail wear. The adjustments shift parts of the bored tunnel alignment between the University of Washington Station, the Brooklyn Station, and the Roosevelt Station.

4. **Refinement of noise mitigation elements north of the relocated north portal.** The design for noise mitigation south of Northgate has been revised as a result of updated noise analysis and the guideway design revisions discussed above. The refinements revised heights for noise walls including a section rising 16 to 23 feet high along the east side of the tracks.

5. **Modified tail tracks from the Northgate Station.** To reduce impacts to private property and to better facilitate a future extension to the north, the design includes realigned tail tracks north of the station, with the tail tracks extending the same distance to the north, but curving westward to terminate over public right of way at 1st Avenue NE, rather than over Northgate Mall property.

6. **Refinements to the Brooklyn Station design and construction area.** The station is located at Brooklyn Avenue NE between NE 45th and NE 43rd Streets in the University District. The station would remain at the same general site as indicated in the Final SEIS, but its platform and the cut-and-cover box would shift underground about 30 feet to the east so that it is no longer constructed entirely underneath Brooklyn Avenue NE. Figure 3 illustrates the Final SEIS Preferred Alternative station plan and Figure 4 shows the Final Design station plan. The construction area for the Final Design station plan has a smaller footprint. The changes to the construction area would allow sidewalk access along NE 45th Street and provide for emergency and pedestrian access to the University of Washington Tower (formerly Safeco Tower) via the west side of Brooklyn Avenue NE. The station box is now shorter (by nearly 140 feet) and wider (by nearly 30 feet). The updated design locates both station entrances on the east side of Brooklyn Avenue NE, instead of having one of the entrances on the south side of NE 45th Street in a plaza adjacent to the University of Washington Tower. The station north entrance would be mid-block between NE 45th and NE 43rd Streets just south of the Neptune Theatre. The south entrance is largely unchanged, remaining on the north side of NE 43rd Street, east of Brooklyn Avenue NE.

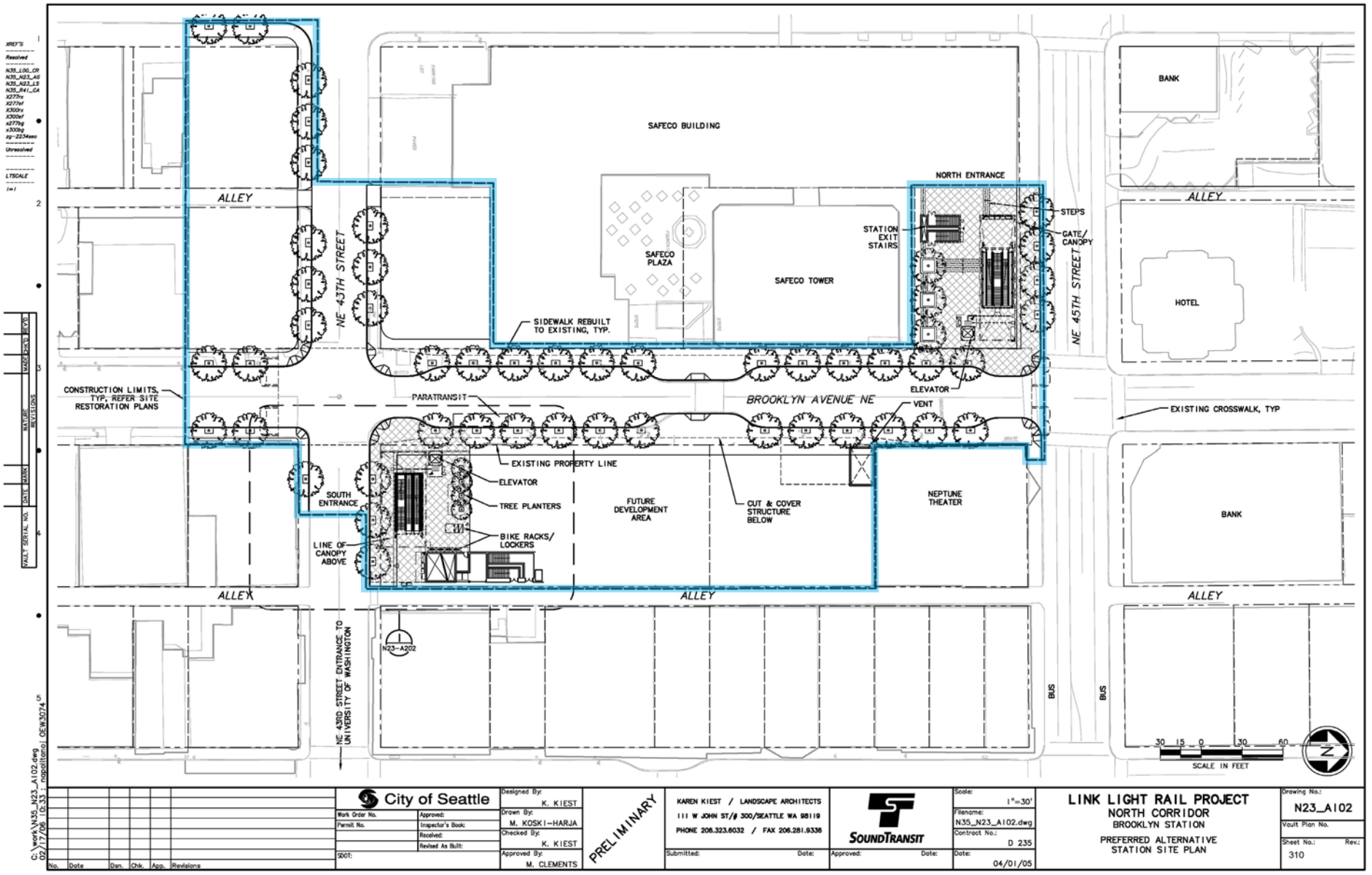
   The shift in the station alignment and design slightly modifies the construction staging area at the Brooklyn Station. The modified staging area is approximately the same size and location as in the Final SEIS, but the cut-and-cover construction has shifted south and southeast, consistent with the shift of the station. Construction staging would not use the southwest corner of NE 45th Street and Brooklyn Avenue NE (University of Washington Tower Plaza), and would no longer be adjacent to the University Manor building's west side but would remain to the north of the building extending slightly farther east along NE 43rd Street east of Brooklyn Avenue NE.

   The modified layout of the Brooklyn Station maintains the tunnel alignment in the same vicinity as the previous alignment, but it requires some adjustments in the approach to and from the station. This results in a horizontal shift ranging up to 30 feet approaching the station.

In addition to the design refinements noted above, some elements of the existing environment have changed since the release of the Final SEIS. These changes are noted below to provide context for the revised analyses in this addendum:

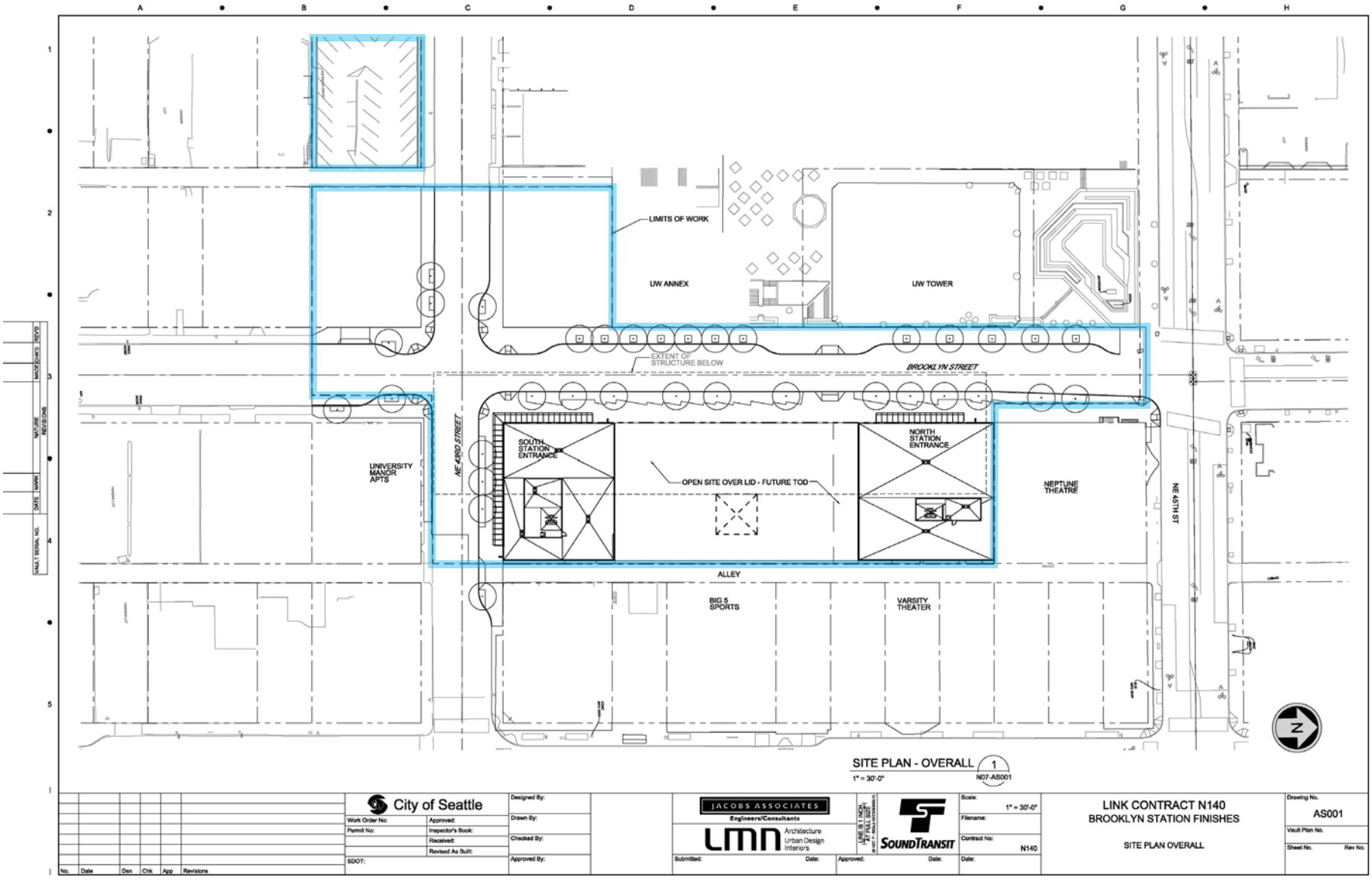
1. The Washington State Department of Transportation (WSDOT) has constructed a traffic noise wall along the east side of I-5 between NE 85th Street and NE 92nd Street. The noise wall was designed to be modified during North Link construction, if necessary, and replaced when construction is complete. The updated analysis of noise impacts incorporates existing noise conditions with the new traffic noise wall.
2. Sound Transit is now operating its Link light rail service between downtown Seattle and Sea-Tac Airport and has conducted direct measurements of noise levels on its current system. These measurements allow the project to model future noise levels using the vehicles planned to operate on North Link.
3. The eastern half of the south parking lot at Northgate Mall (the area south of NE 103rd Street and east of 3rd Avenue NE) has been replaced by the Thornton Place development. This mixed-use development features residential, retail, structured parking, and theater uses, as well as a stormwater treatment open-space facility that supported daylighting a portion of Thornton Creek. North of NE 103rd Street and the transit center, the Northgate Mall has built a parking structure. To help meet the demand for parking for the Northgate Transit Center, King County Metro now leases space from both the Northgate Mall (280 spaces) and Thornton Place (350 spaces), providing about 1,500 park-and-ride spaces for transit users, compared to the 960 spaces provided at the time of the Final SEIS. Long-term land use and travel trends in the Northgate area suggest that the relative demand for park-and-ride facilities will decrease over time because infill development in the Northgate area will generate a greater percentage of riders who use buses, bicycle, or walk to Northgate Station, instead of driving personal vehicles and parking nearby. The North Link project is maintaining its commitment to replace permanently displaced park-and-ride spaces.
4. The project has updated information on the presence of wetlands in areas adjacent to I-5, incorporating more recent wetland delineations performed by WSDOT and including two additional wetlands identified by Sound Transit during final design.

Figure 3. Brooklyn Station Plan – 2006 Final SEIS



Limits of construction staging and work areas

Figure 4. Brooklyn Station Plan – Final Design



Limits of construction staging and work areas

Changes in Environmental Effects and Mitigation

The proposed design refinements would not change the primary characteristics of the light rail project along the route evaluated in the 2006 North Link Final SEIS. Impacts for many of the elements of the environment discussed in the Final SEIS would remain unchanged or be reduced as summarized in Table 1.

Table 1 Summary of Changes in Effects Compared to the Final SEIS

Element of the Environment	Change in Effects
Transportation	The changes in station design are primarily minor alignment or layout shifts and would not affect traffic levels along the alignment or at stations.
Land Use and Economics	No changes in effects.
Acquisitions, Displacements, and Relocations	No changes in effects.
Neighborhoods and Populations	Permanent impacts for neighborhoods and social resources would be the same or lower in all areas. Changes to construction impacts for neighborhoods are discussed below in the construction section.
Environmental Justice	No changes in effects to minority and low-income populations.
Visual Resources and Aesthetics	South of Northgate, the revised light rail structure and noise walls would remain near or below the height of existing visual elements along the I-5 freeway. The retaining wall north of the tunnel portal would involve a larger scale visual feature than the elevated structure in the Final SEIS Preferred Alternative, and is closer to viewers from the residences to the east of 1st Avenue NE. Impacts would remain moderate, as discussed in the Final SEIS, assuming the incorporation of design treatments, replanted trees, or vegetation that could help soften the scale of the structures, and buffer or screen views of the new structures. Other visual impacts south of the new portal would be less than in the Final SEIS because light rail would be in a tunnel rather than on the surface, with less tree and vegetation removal.
Air Quality	No changes in effects.
Noise and Vibration	As in the Final SEIS, noise impacts would occur near Northgate, requiring mitigation. Noise walls would reduce most noise levels to below FTA's moderate impact criteria. However, some residential units may also require residential sound insulation as mitigation.
Ecosystems	Trees and vegetation removal would be reduced between Lake City Way NE and NE 92nd Street. From the updated information on additional wetland areas at Northgate, wetland impacts are now expected to total 0.3 acre; however, some of these impacts would be temporary.
Water Resources	Impacts would be reduced because nearly 1 mile of surface construction that would have removed existing vegetation has been eliminated.
Energy	No changes in effects.
Geology and Soils	No changes in effects.
Hazardous Materials	No changes in effects.
Electromagnetic Fields	No changes in effects.
Public Services	No changes in effects.
Utilities	The avoidance of surface or shallow tunnel construction near or along surface streets south of NE 92nd Street reduces the potential to encounter smaller utilities.

Table 1 Summary of Changes in Effects Compared to the Final SEIS

Element of the Environment	Change in Effects
Historic and Archaeological Sites	Sound Transit and FTA prepared documentation to determine the eligibility of buildings over and adjacent to the tunnel, where very slight levels of settlement could occur during tunneling. Nine of the buildings were previously determined eligible for listing in the National Register of Historic Places, and three additional properties have been determined eligible for the Register. The State Historic Preservation Officer (SHPO) at the Washington State Department of Archaeology and Historic Preservation concurred that no adverse effect for historic resources are anticipated.
Parklands and Recreation	Temporary effects on Rainbow Point Park would be avoided.
Construction	The construction activities and impacts remain similar to or lower than those described in the Final SEIS in most locations. The construction impacts would be reduced in areas between NE 92nd Street and Lake City Way because surface-level construction in this area as described in the Final SEIS has been eliminated. However, more of the construction activities would be focused on the revised north tunnel portal area. The neighborhood between approximately NE 92nd Street and NE 95th Street and bounded by NE 1st Street on the west side would experience a higher intensity of construction activities for a longer duration. However, the Final SEIS previously identified high impacts for this neighborhood. The construction area for the Brooklyn Station would have a smaller footprint, would maintain more pedestrian access, and better emergency access.
Secondary and Cumulative Effects	No changes in effects.

The following areas do not require additional detailed discussion in this addendum because there would not be a change in effects:

- Land Use and Economics
- Acquisitions, Displacements, and Relocations (Housing, Populations, and Employment)
- Environmental Justice
- Air Quality
- Energy
- Geology and Soils
- Hazardous Materials
- Electromagnetic Fields
- Public Services
- Secondary and Cumulative Effects

Additional information about potential impacts and mitigation measures associated with the proposed design refinements are provided for the following elements of the environment:

- Transportation
- Neighborhoods and Populations (Social Resources)
- Visual Resources and Aesthetics
- Noise and Vibration
- Ecosystems
- Water Resources

- Utilities
- Historic and Archaeological Resources
- Parklands and Recreation
- Construction

TRANSPORTATION

Long-term Traffic Impacts

The changes in station design are primarily minor alignment or layout shifts and would not affect traffic levels along the alignment or at stations. Potential changes in parking supply (discussed below) are also expected to be within the levels assumed in the Final SEIS. Furthermore, no changes in the configurations of local streets or highways have been made since publication of the Final SEIS. A review of recent traffic volumes near the proposed Northgate Station found volumes were growing less rapidly than the growth in trips anticipated through 2015 in the Final SEIS, even though there have been more properties developed near the Northgate Station, including newly added park-and-ride spaces serving the transit center. Therefore, no new long-term transportation impacts are expected to result from the design changes.

Long-term Parking Impacts

The impacts to parking would be lower than stated in the Final SEIS, and the same mitigation commitments to address displaced spaces would be provided.

Since publication of the Final SEIS, new structured parking has been constructed by the Thornton Place development and at Northgate Mall. King County Metro now leases spaces from both the Northgate Mall (280 spaces) and Thornton Place (350 spaces), providing about 1,500 park-and-ride spaces for transit users, compared to the approximately 1,000 spaces as described in the Final SEIS.

The revised design would affect an estimated 120 current park-and-ride spaces, which is lower than the Final SEIS estimates (166 to 306 spaces). The project will still replace park-and-ride spaces on a one-to-one basis. As in the Final SEIS, a new parking structure could provide replacement spaces. Construction on Northgate Mall property and other retail properties to the south could still result in 64 spaces being removed, and compensation would be provided as described in the Final SEIS.

Current long-term land use and travel trends in the Northgate area suggest that the relative demand for park-and-ride facilities will decrease over time as infill development in the Northgate area generates a greater percentage of riders who use transit, bicycle, or walk to Northgate Station instead of driving personal vehicles and parking nearby. These factors, in combination with the improved transit service provided by North Link and additional park-and-ride spaces being provided for transit use, are expected to result in a sufficient supply of park-and-ride capacity to meet projected demand. The Final SEIS also anticipated few potential impacts if capacity is exceeded because unrestricted parking is not available within the Northgate area, and City of Seattle policies do not encourage high levels of park-and-ride supply. Other planned transit and park-and-ride improvements to the north are also now in place (such as the Mountlake Terrace park-and-ride) or under development (such as the North Corridor Transit Project), which would further reduce long-term demand for parking at the Northgate Station.

NEIGHBORHOODS AND POPULATIONS (SOCIAL RESOURCES)

Permanent impacts for neighborhoods and social resources would be the same as or lower than stated in the Final SEIS. The revised tunnel portal and structure at NE 94th Street alters the level of visual and noise impacts to an adjacent neighborhood compared to the Final SEIS, but the impacts can be mitigated. Areas to the south of the portal would have fewer noise and visual impacts because light rail would no longer be at surface level, and would no longer affect existing noise or visual conditions in the adjacent neighborhoods. Further details are provided in the visual resources and noise and vibration discussions below.

VISUAL RESOURCES AND AESTHETICS

Overall, the visual and aesthetic impacts of the project with the design refinements would be similar to or lower than the effects discussed in the Final SEIS.

In the Final SEIS, the Northgate Station was elevated on the east side of 1st Avenue NE and the tail tracks extended to the north. South of the Northgate Station the project crossed 1st Avenue NE to continue in an elevated alignment that transitioned to retained fill to NE 95th Street. The alignment then became a retained cut south of NE 95th Street, transitioned into a cut-and-cover tunnel near NE 92nd Street, and continued in retained cut and cut-and-cover tunnel sections to the bored tunnel's portal near NE 75th Street. In the Final SEIS, approximately 4- foot high noise walls were proposed along the east side of the elevated sections from NE 95th Street north to mitigate noise impacts.

Under the proposed project refinements north of the Northgate Station, the elevated tail tracks would move west along 1st Avenue NE instead of being entirely over surface parking areas. The affected area has largely transportation, parking, and commercial uses nearby, and visual impacts would be low.

From the Northgate Station south, the guideway crosses on an elevated structure over 1st Avenue NE, transitions to a retained fill structure, and then on to a retained cut leading to the tunnel portal at NE 94th Street. The tracks throughout this section remain at approximately the same elevation with the proposed project refinements as described for the Preferred Alternative in the Final SEIS.

The revised design and additional analysis has identified the need for noise walls along the elevated guideway south along the retaining walls to the portal (see Attachment B, Cross Sections A through F). Retaining walls rise from ground level just north of NE 95th Street up to approximately 23 feet before transitioning to an elevated guideway. The noise walls on the retained fill section are 16 feet high at the lowest point of the retaining wall near NE 95th Street. They decrease to 8 feet at the highest point of the retaining wall near NE 100th Street. Throughout this area, the retaining wall is below the elevation of I-5.

At NE 95th Street where the tracks are near grade level and the proposed noise wall would be 16 feet high, there is an option to provide noise walls up to 23 feet high (see Noise and Vibration section). Continuing south toward the portal, the retained cut section would have noise walls 16 feet high transitioning down to 4 feet high at the portal. While short range views of I-5 would be altered for some areas immediately to the east, trees and other physical features west of I-5 limit the existing long range views available at this elevation.

The retained fill structure would be larger in scale than the elevated guideway previously proposed in this area, but it would still be located along a hillside that currently rises to the west of 1st Avenue NE adjacent to I-5 and the highest sections of the combined retaining and noise wall would be located near parking and commercial areas. It is otherwise in the same location

and would be a similar height as the elevated guideway evaluated in the Final SEIS. The retained fill structure would occupy an area that today is a vegetated shoulder area sloping downward, east of the freeway. As with the elevated structure with noise walls that was previously evaluated, it would not affect most long-range residential views from the east. The revised structure and its noise walls would remain near the height of existing visual elements related to the I-5 freeway.

Overall, impacts would remain moderate with the mitigation measures previously identified in the Final SEIS, which include exploring opportunities to plant trees or vegetation west of 1st Avenue NE to buffer or screen views of the new structure, and designing walls to incorporate aesthetic elements.

Replacing the cut-and-cover and surface alignment between Lake City Way and NE 94th Street with a bored tunnel would reduce visual changes because vegetation would no longer be removed in this area. A single parcel near NE 94th Street may be used for a power substation building and the visual features of this structure would be the same as the power substation buildings described in the Final SEIS near NE 85th Street.

The Brooklyn Station design modifications would not notably change the long-term visual conditions for the station area, compared to the station evaluated in the Final SEIS.

NOISE AND VIBRATION

Noise impacts with the final design refinements would be similar to the levels described in the Final SEIS and would require mitigation. Noise walls would reduce most noise levels to below FTA's moderate impact criteria. However, some residential units may also require residential sound insulation as supplemental mitigation (Jacobs Associates and Michael Minor & Associates 2012).

An updated noise analysis for the design revisions from Northgate to the relocated tunnel portal identified noise impacts at up to 33 single- and multi-family residences in the area between NE 94th Street and NE 96th Street (see Attachment B for a summary). Before mitigation, all of the impacts are at the moderate level using FTA's criteria.

Mitigation for the noise impacts includes noise walls along the east side of the trackway. Noise walls would begin along the light rail tracks from the tunnel portal and continue along the retained cut-and-fill section to the elevated structure and would range from 4 up to 16 feet in height.

Noise at some upper-floor residential units may not be mitigated by noise walls alone; therefore, residual impacts would remain. These buildings would be candidates for building sound insulation, which would reduce noise levels to acceptable levels for interior spaces. The use of taller noise walls up to 23 feet high near these receptors would fully mitigate the impact and eliminate the need for sound insulation.

Ground-Borne Noise

There would be no increase in impacts from ground-borne noise after mitigation. Attachment B provides further details on anticipated impacts. Ground-borne noise levels at 140 to 150 locations would exceed the FTA criteria, but special resilient track fasteners would be used to reduce ground-borne noise levels to below the criteria.

Vibration

Vibration levels would not exceed the applicable criteria at any sensitive receptor along the North Link alignment. Standard track fasteners would avoid impacts throughout the alignment,

but the special track fasteners needed to reduce ground-borne noise would result in an even further reduction in vibration levels.

Based on an updated vibration analysis conducted for the final design (Wilson Ihrig & Associates 2011, 2012), the realignment of the North Link tunnels under the University of Washington campus would produce small changes in the predicted levels for several buildings, but the predicted levels with mitigation (including floating slabs) are lower than the levels required by the University of Washington for its most sensitive buildings. Consistent with the Final SEIS analysis, vibration levels would be slightly increased and still exceed the University's requested levels at a few of its less sensitive buildings, but would be below FTA criteria.

ECOSYSTEMS

The design modifications would place approximately one additional mile of track in a bored tunnel, reducing vegetation removal north of Lake City Way compared to the previously proposed alignment in the Final SEIS.

There are no design changes affecting ecosystems north of the revised tunnel section. However, Sound Transit has additional information on wetland areas that are located adjacent to I-5 (see Attachment C). Further site investigations in 2010 and 2011 revealed the presence of additional wetlands in the vicinity of the project area. Two wetlands (wetlands E and F) were identified on the south end of the Northgate Station project site. An additional two wetlands (wetlands 1 and 2) occur farther south along the rail alignment within ditches along the east side of I-5, south of NE 92nd Street (Jacobs Associates and ESA 2011).

With the revised design and updated information on additional wetland areas, wetland impacts are now expected to total approximately 0.3 acre; however, some of these impacts would be temporary. The revised estimate is conservative and assumes an impact wherever the project encounters a wetland, even if fill is not involved. Even if the design is not modified, additional impacts to wetlands would be present with the Preferred Alternative due to the newly identified wetland areas. Similar mitigation requirements, including restoration or compensation, would apply. The extent and location of mitigation would be determined through the Clean Water Act permitting processes in consultation with the City of Seattle, the Washington State Department of Ecology, and the U.S. Army Corps of Engineers, and would remain consistent with the mitigation ratios identified in the Final SEIS.

Although new species have been added for protection under the Endangered Species Act and critical habitat areas have been designated in the region, the changes in project design would not have a change in effects on endangered species.

WATER RESOURCES

Eliminating nearly 1 mile of surface area construction within existing vegetated areas would reduce water resource impacts compared to the Final SEIS estimates.

Reducing the extent of surface guideway reduces the amount of new impervious surfaces and vegetation removal compared to the levels predicted in the Final SEIS. In addition, the design refinement for a retained fill section at the north portal, rather than a longer elevated section, would further reduce the creation of new impervious areas compared to the Final SEIS.

UTILITIES

There is a minor revision in the grade and location of the tunnel relative to a large diameter (72 inches) sewer along Ravenna Boulevard, which was also avoided by the Preferred Alternative in the Final SEIS.

At the Brooklyn Station, the shift for the cut-and-cover box simplifies utility relocation activities and connections, particularly for utilities serving the University of Washington Tower.

HISTORIC AND ARCHAEOLOGICAL RESOURCES

There would be no change in the long-term effects of the project on historic and archaeological resources.

PARKLANDS AND RECREATION

The proposed design refinements no longer include a tunnel portal near Rainbow Point Park; therefore, impacts would no longer occur. There would be no other changes in effects compared to the design evaluated in the Final SEIS.

CONSTRUCTION IMPACTS

The types of construction activities and impacts remain similar to or lower than those described in the Final SEIS in most locations. The overall construction impacts would be reduced because the revised design eliminates surface-level construction activities in much of the affected section. Constructing a bored tunnel for a longer distance reduces the soil disturbance and vegetation removal associated with retained cut sections. With the revised bored tunnel portal located farther north, the project would no longer need the construction staging areas along Banner Way NE north of NE 75th Street, nor at NE 85th Street. With the north portal at NE 94th Street, much of the construction would be in a single area, rather than the two additional locations with the former portal on Banner Way and the former cut-and-cover portal at NE 85th Street. This reconfiguration reduces the need for a number of haul routes on neighborhood arterial streets because the new north portal location has more direct access to I-5.

Under the refined design, tunnel boring machines can be launched south from the revised north portal site at NE 94th Street to the Roosevelt Station site. This revision allows spoils for the segment of tunnel between the north portal and the Roosevelt Station to be retrieved from the north portal site, reducing the spoils removal from the Roosevelt Station site and the duration and extent of truck trips to and from the Roosevelt Station. The site allows the option of using two boring machines, which provides more opportunities to expedite construction and reduce the duration of construction activities, although this would also increase the daily truck trips required at the site.

The Brooklyn Station would have a slightly revised footprint for its cut-and-cover construction and nearby staging, but it remains in the same general location as previously defined. It extends up to 30 feet farther to the east at NE 43rd Street, but is shorter than in the Final SEIS and does not extend as far south along Brooklyn Avenue NE. It also allows the northwest portion of Brooklyn Avenue NE to remain open for pedestrian and emergency access, and it removes the need to occupy a portion of the plaza at the University of Washington Tower. Impacts to properties in the surrounding area remain similar to those identified in the Final SEIS. The Final SEIS noted construction could last for 4 to 7 years in the Brooklyn, Roosevelt, and Northgate station areas. The Final SEIS identified impacts such as noise, vibration, dust, traffic, restricted access, and visual effects for immediately adjacent properties.

Mitigation commitments are unchanged, including construction mitigation plans, coordination with the City of Seattle and property owners, compliance with City permit requirements, and public outreach and communications support during construction.

Traffic and Parking

During construction, Brooklyn Avenue NE would be closed from just south of NE 43rd Street up to NE 45th Street. These restrictions would be similar to those identified in the Final SEIS. However, an emergency access lane would be provided on Brooklyn Avenue NE in front of the University of Washington Tower. Access to the University Manor apartments would be maintained but vehicular and pedestrian movements around the property would be restricted. These restrictions would be similar or less than the restrictions that were identified for the Preferred Alternative. Both the Preferred Alternative and the revised design require the closure of Brooklyn Avenue NE and NE 43rd Street at Brooklyn Avenue NE. NE 43rd Street would be closed to vehicles along the north side of the University Manor apartments but pedestrian access on the sidewalk to the building's entrance would be maintained, and vehicular access to the alley east of the building would also remain open.

Construction staging and spoils removal activities would be shifted from several construction staging areas along Banner Way NE north of NE 75th Street to the portal at NE 94th Street in the area immediately adjacent to I-5. Spoils removal between the Roosevelt Station site and the portal would be conducted from the portal at NE 94th Street, requiring 16 to 32 segment delivery truck trips per day and 12 to 24 truck haul round trips per hour on 1st Avenue NE accessing I-5 at NE Northgate Way. The additional truck trips are not expected to substantially degrade intersection levels of service if the heaviest trucking levels are focused on low traffic volume times, such as during the middle of the day, late night, and early morning. Traffic delays and queues could still occur at the 1st Avenue NE/NE Northgate Way and NE 107th Street/I-5 northbound ramps/1st Avenue NE intersections if high numbers of truck haul trips are made during the PM peak hour, particularly for turn movements onto the I-5 ramps.

For the areas south of NE 92nd Street to NE Banner Way, no street and freeway ramp closures and restrictions are anticipated during the construction period, and truck hauling on local streets would be reduced.

Haul routes using local streets would still be needed for the Roosevelt and Brooklyn station construction activities, but the extended bored tunnel spoils removal at the relocated portal would reduce spoils removal at the Roosevelt Station site.

Sound Transit will develop detailed construction traffic plans in coordination with the City of Seattle, WSDOT, and King County Metro, and high volumes of truck traffic would be scheduled to avoid periods of high traffic volumes to the extent practical. Construction traffic impacts south of NE 92nd Street would decrease with the proposed changes.

The proposed design refinements would eliminate parking impacts potentially resulting from construction worker parking on residential streets near the Banner Way NE or NE 85th Street staging areas, but could increase the potential need for parking along 1st Avenue NE. However, the northern staging area also provides more potential room for staging, including temporary parking areas that could be located to the north.

Neighborhoods and Populations

With the Preferred Alternative in the Final EIS, the areas along Banner Way NE north of NE 75th Street and at NE 85th Street would have experienced construction impacts from the adjacent staging areas. Major construction activities were also previously identified near 1st Avenue NE, including construction staging that would last for several years. In the final design, there would be a reduction in construction activities adjacent to the neighborhoods south of NE 92nd Street, including fewer haul routes and construction staging areas near residential areas.

Compared to the Final SEIS, construction activities would be lengthier and more intensive along 1st Avenue NE between NE 92nd Street and NE 95th Street. The construction activities would affect nearby residential uses in this three-block area. North of NE 95th Street, where the street transitions to an arterial and commercial uses begin, construction traffic levels would be high (up to 24 trucks per hour), rather than the moderate level that the Final SEIS estimated; this is largely due to the addition of spoils hauling from that location. Construction and hauling activities would also likely occur overnight, rather than daytime only, as discussed in the Final SEIS. The neighborhoods surrounding the Brooklyn and Northgate stations and the neighborhood to the east of the north portal would still experience effects from construction over a multi-year period, as described in the Final SEIS. The modified construction staging area for the Brooklyn Station would help reduce construction noise impacts to properties to the north.

Noise and Vibration

Construction noise at the Roosevelt Station would likely be reduced in duration due to the shifting of the removal of tunnel spoils north of the Roosevelt Station to the tunnel portal. The Roosevelt Station would not have major changes in the proposed construction activities or nighttime noise levels compared to the Final SEIS.

The revised design for the Brooklyn Station moves construction areas away from several noise sensitive receptors north of the station, helping to reduce noise levels and increase the effectiveness of planned mitigation such noise-reducing construction barriers. The station site remains adjacent to the University Manor apartment building, which was among the properties projected to experience high noise levels during construction. The slight shift in the station design and construction area does not notably alter unmitigated noise levels at the University Manor; as a result, mitigation is still needed. As described in the Final SEIS, a noise variance would be obtained from the City of Seattle for nighttime construction at the Brooklyn Station. The variance is expected to include all of the mitigation measures previously identified in the Final SEIS.

At the north tunnel portal, projected unmitigated noise daytime levels remain within the range identified in the Final SEIS. However, nighttime construction would likely be needed to stage bored tunnel construction at NE 94th Street, which would exceed City of Seattle construction noise limits. Sound Transit would need a variance from the City for nighttime construction, which would include mitigation to reduce noise. Anticipated mitigation includes a perimeter noise wall. This wall, along with other best management practices for controlling construction noise impacts, would help further reduce noise levels to meet the likely requirements of the City of Seattle's noise variance.

Historic and Archaeological Resources

The design refinements would not change the location of the alignment relative to areas with a high probability for containing archaeological resources. There would be no change in archaeological effects or areas affected by surface or near-surface construction.

No adverse effects to historic resources are anticipated, and there would be no change in properties required for acquisition or demolition. Sound Transit has identified approximately 26 historic-era properties within the Area of Potential Effect revised to include properties over and adjacent to the tunnels that could experience very slight to slight settlement due to tunnel construction below or adjacent to the buildings. Some buildings were outside of previously surveyed areas; therefore, Sound Transit and FTA prepared documentation to determine the eligibility of these buildings for placement in the National Register of Historic Places. Nine of the

affected buildings were previously determined eligible for listing, and three additional properties have been determined eligible for the Register.

As stated in the Final SEIS under geological mitigation, measures to prevent or minimize settlement effects could include ground protection, soil modification, and structural supports, where necessary, and pre-construction surveys and construction monitoring. For historic properties, any damage that may occur would be minor and aesthetic and would be repaired according to the Secretary of Interior standards. No adverse effects to historic resources are anticipated. The SHPO concurred with this determination in a letter dated January 26, 2012.

The construction work area for the Brooklyn Station has moved farther from the University Manor apartment building and would now be on the north side and west sides of the sidewalk adjacent to the building. The tunnels would partially run under the building, but the settlement impacts would not be increased. The construction impacts identified in the Final SEIS are anticipated. These include increased truck traffic near the Brooklyn Station construction area, noise, and detours for both vehicles and pedestrians due to the street closures. Mitigation will include the measures identified in the Final SEIS, and Sound Transit is coordinating with the building owner to minimize construction period impacts to the building's occupants.

Conclusion

The analyses contained in this addendum indicates that the revised design and construction approach and changes in elements of the existing environment do not substantially change the analysis of impacts in the Final SEIS for the Preferred Alternative, and the mitigation measures would be consistent with those previously identified. The design refinements would have similar or reduced overall environmental effects compared to those identified in the Final SEIS for the Preferred Alternative.

References

Jacobs Associates and ESA. 2011. North Link Final Design Draft Wetland Report. Prepared for Sound Transit. November 2011.

Jacobs Associates and Michael Minor and Associates. 2012. North Link Final Design Task 820: Design of Noise Mitigation for At Grade and Elevated Guideways. Prepared for Sound Transit. January 2012.

Sound Transit and FTA. 1999. Final Environmental Impact Statement. Central Link Light Rail Transit Project. Central Puget Sound Regional Transit Authority and U.S. Department of Transportation, Federal Transit Administration. November 18, 1999.

Sound Transit and FTA. 2006. North Link Final Supplemental Environmental Impact Statement. Central Link Light Rail Transit Project. Central Puget Sound Regional Transit Authority and U.S. Department of Transportation, Federal Transit Administration. April 7, 2006.

Wilson Ihrig & Associates. 2011. North Link Final Design Task 830.2: N120 Subway Groundborne Noise and Vibration Analysis between University of Washington Station and Roosevelt Station. Memorandum dated December 20, 2011 to Salah Al-Tamimi and Tracy Reed from Derek Watry, James T. Nelson, and Dan Adams.

Wilson Ihrig & Associates. 2012. North Link Final Design Task 830.2: N130 Subway Groundborne Noise and Vibration Analysis between Roosevelt Station and Northgate. Memorandum dated January 12, 2012 to Salah Al-Tamimi and Tracy Reed from Derek Watry, James T. Nelson, and Dan Adams.

Attachment A
Design Plans and Profiles

Attachment A – Design Drawings

2011 Final Design Drawings

LINK Contract N120

LINK Contract N130

LINK Contact N160

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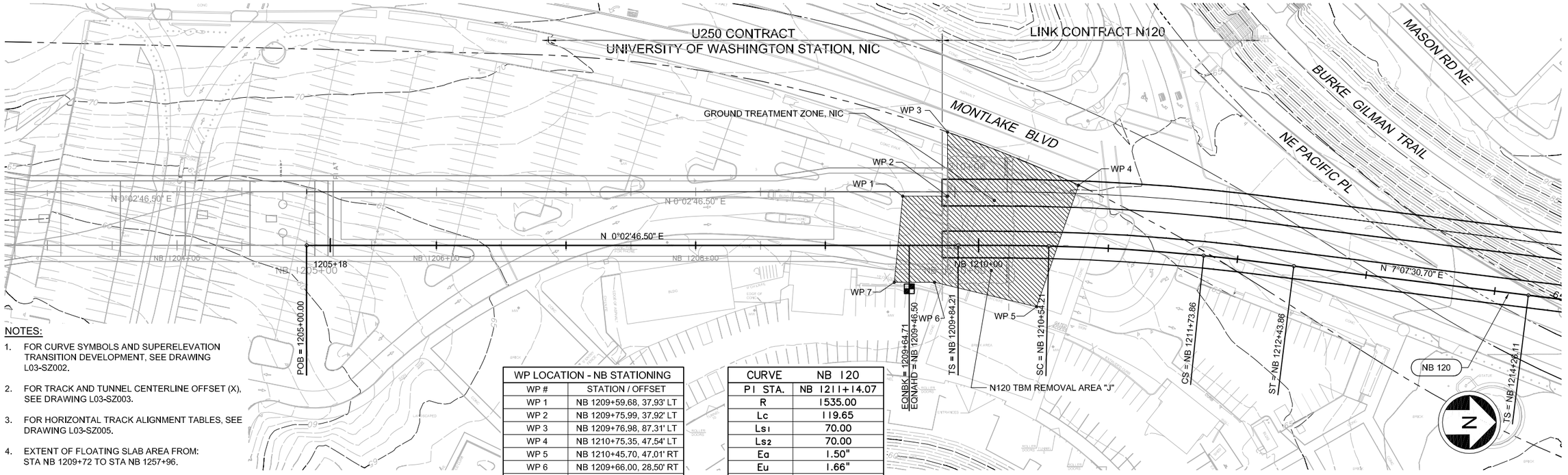

NOTES:

1. FOR CURVE SYMBOLS AND SUPERELEVATION TRANSITION DEVELOPMENT, SEE DRAWING L03-SZ002.
2. FOR TRACK AND TUNNEL CENTERLINE OFFSET (X), SEE DRAWING L03-SZ003.
3. FOR HORIZONTAL TRACK ALIGNMENT TABLES, SEE DRAWING L03-SZ005.
4. EXTENT OF FLOATING SLAB AREA FROM: STA NB 1209+72 TO STA NB 1257+96.
5. EXTENT OF DIRECT FIXATION TRACK AREA FROM: STA NB 1262+00 TO STA NB 1317+28.

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WP #	STATION / OFFSET
WP 1	NB 1209+59.68, 37.93' LT
WP 2	NB 1209+75.99, 37.92' LT
WP 3	NB 1209+76.98, 87.31' LT
WP 4	NB 1210+75.35, 47.54' LT
WP 5	NB 1210+45.70, 47.01' RT
WP 6	NB 1209+66.00, 28.50' RT
WP 7	NB 1209+53.17, 28.50' RT

CURVE	NB 120
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Ls2	70.00
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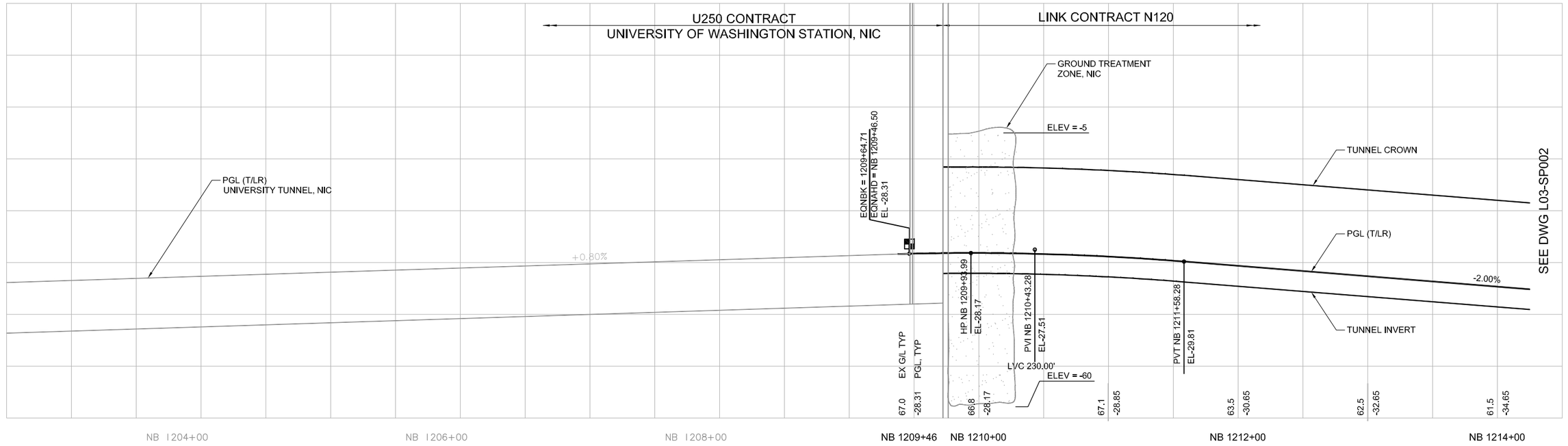
Eu	1.66"
V	35 MPH



No.	Date	Dsn	Chk	App	Revisions

City of Seattle

Work Order No:	Approved:
Permit No:	Inspector's Book:
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Designed By: S. NJOLOMA
Drawn By: A. BYERS
Checked By: A. MENCKE
Approved By: A. MENCKE

ANDREW S. MENCKE, STATE OF WASHINGTON, 23847, REGISTERED PROFESSIONAL ENGINEER

60% SUBMITTAL

JACOBS ASSOCIATES
Engineers/Consultants
BOLIMA DRAFTING & DESIGN INC.

Submitted:	Date:	Approved:	Date:
I. LAMB	07/01/11	S. AL-TAMIMI	07/01/11

LINE IS 1 INCH AT FULL SIZE (IF NOT 1" - SCALE ACCORDINGLY)

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Contract No: N120
Date: 07/01/11

LINK CONTRACT N120
TUNNELS & SHAFTS ROOSEVELT TO UWS

TUNNEL STRUCTURE
PLAN AND PROFILE
STA NB 1209+72 TO STA NB 1214+00

Drawing No. L03-SP001
Vault Plan No.
Sheet No. 47
Rev No. 0
Attachment A-1

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NOTES:

1. FOR CURVE SYMBOLS AND SUPERELEVATION TRANSITION DEVELOPMENT, SEE DRAWING L03-SZ002.
2. FOR TRACK AND TUNNEL CENTERLINE OFFSET (X), SEE DRAWING L03-SZ003.
3. FOR HORIZONTAL TRACK ALIGNMENT TABLES, SEE DRAWING L03-SZ005.

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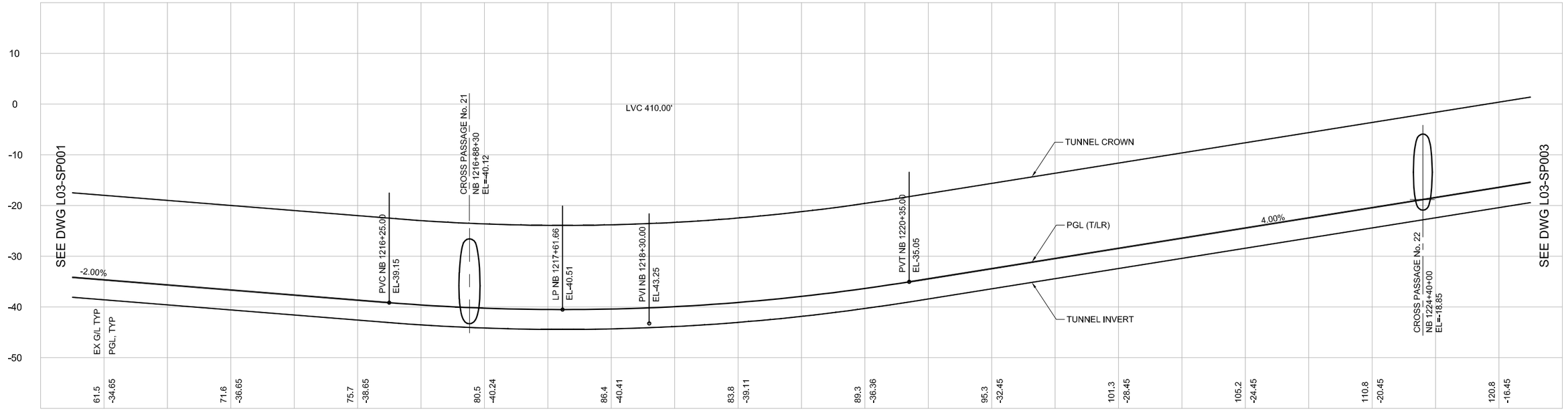

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City of Seattle

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Approved By: A. MENCKE

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BOLIMA DRAFTING & DESIGN INC.

Submitted: I. LAMB Date: 07/01/11
Approved: S. AL-TAMIMI Date: 07/01/11

LINE IS 1 INCH AT FULL SIZE (IF NOT 1" - SCALE ACCORDINGLY)

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Date: 07/01/11

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TUNNELS & SHAFTS ROOSEVELT TO UWS

TUNNEL STRUCTURE
PLAN AND PROFILE
STA NB 1214+00 TO STA NB 1225+00

Drawing No. L03-SP002
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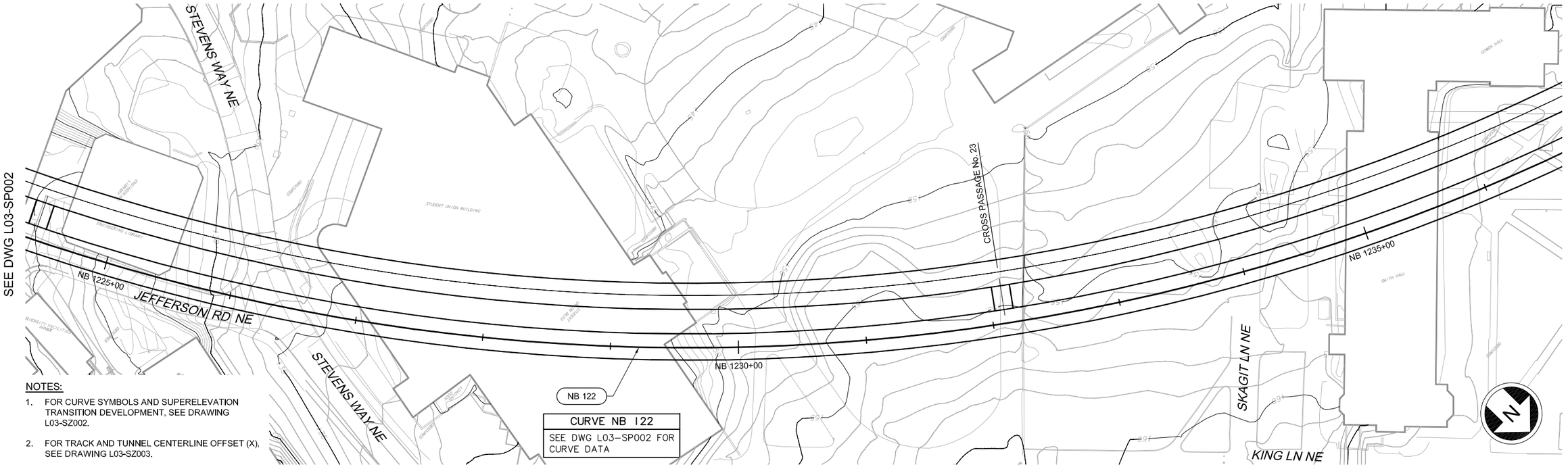

NOTES:

1. FOR CURVE SYMBOLS AND SUPERELEVATION TRANSITION DEVELOPMENT, SEE DRAWING L03-SZ002.
2. FOR TRACK AND TUNNEL CENTERLINE OFFSET (X), SEE DRAWING L03-SZ003.
3. FOR HORIZONTAL TRACK ALIGNMENT TABLES, SEE DRAWING L03-SZ005.

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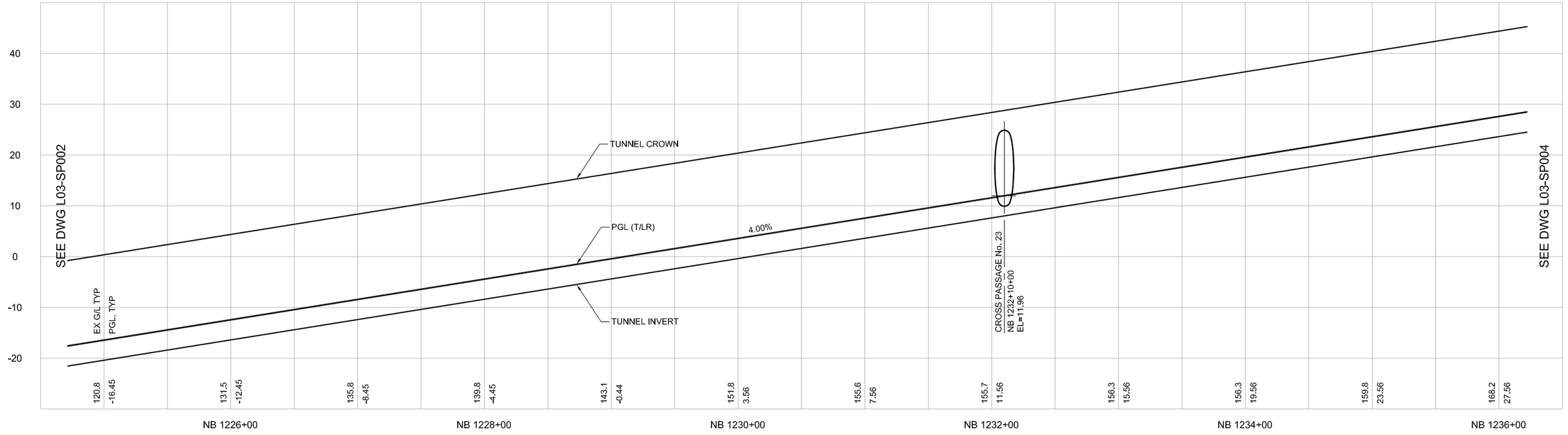

No.	Date	Dsn	Chk	App	Revisions

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Designed By:	S. NJOLOMA
Drawn By:	A. BYERS
Checked By:	A. MENCKE
Approved By:	A. MENCKE

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BOLIMA DRAFTING & DESIGN INC.

Submitted:	Date:	Approved:	Date:
I. LAMB	07/01/11	S. AL-TAMIMI	07/01/11

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Date:	07/01/11

LINK CONTRACT N120
TUNNELS & SHAFTS ROOSEVELT TO UWS

TUNNEL STRUCTURE
PLAN AND PROFILE
STA NB1225+00 TO STA NB 1236+00

Drawing No.	L03-SP003
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Sheet No.	49
Rev No.	0
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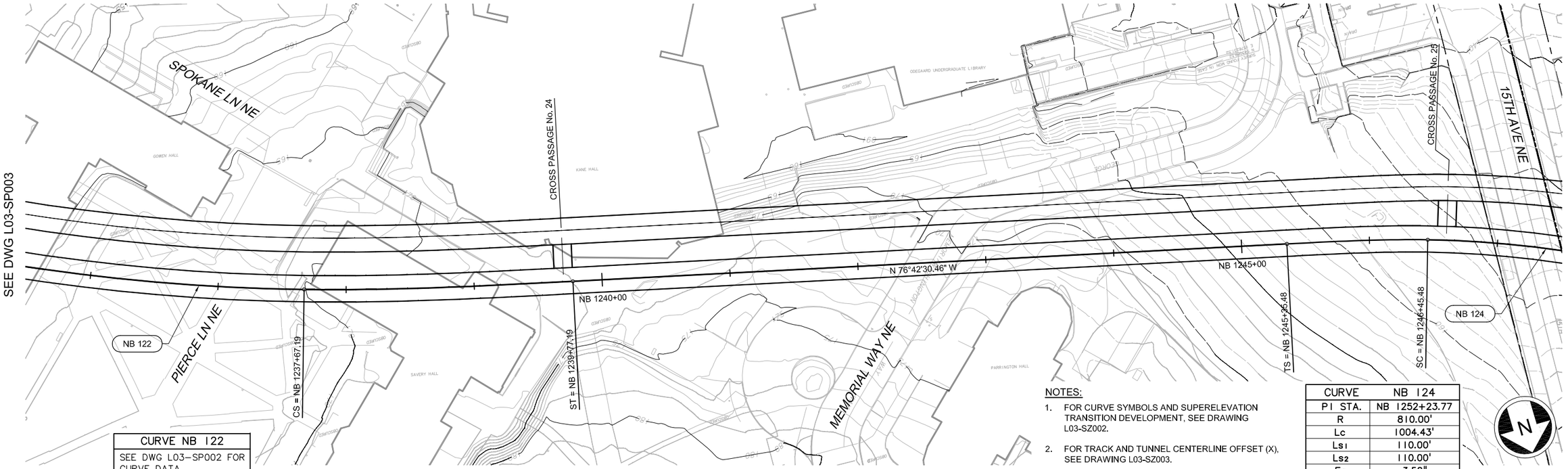

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2. FOR TRACK AND TUNNEL CENTERLINE OFFSET (X), SEE DRAWING L03-SZ003.
3. FOR HORIZONTAL TRACK ALIGNMENT TABLES, SEE DRAWING L03-SZ005.

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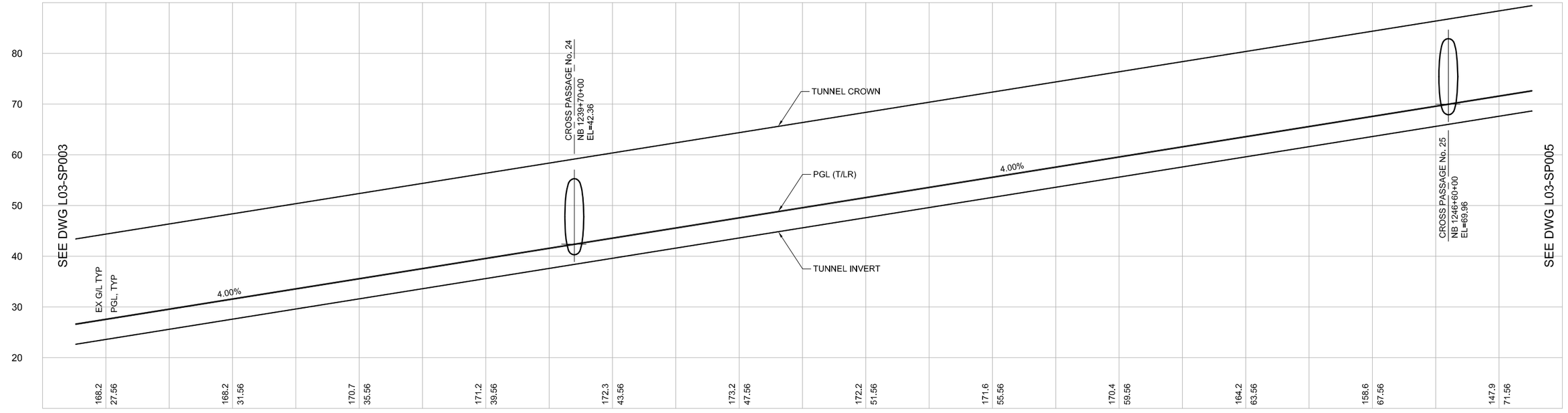

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City of Seattle

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	Revised As Built:
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Designed By:	S. NJOLOMA
Drawn By:	A. BYERS
Checked By:	A. MENCKE
Approved By:	A. MENCKE

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BOLIMA DRAFTING & DESIGN INC.

Submitted:	Date:	Approved:	Date:
I. LAMB	07/01/11	S. AL-TAMIMI	07/01/11

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LINK CONTRACT N120
TUNNELS & SHAFTS ROOSEVELT TO UWS

TUNNEL STRUCTURE
PLAN AND PROFILE
STA NB 1236+00 TO STA NB 1247+00

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Rev No.	0

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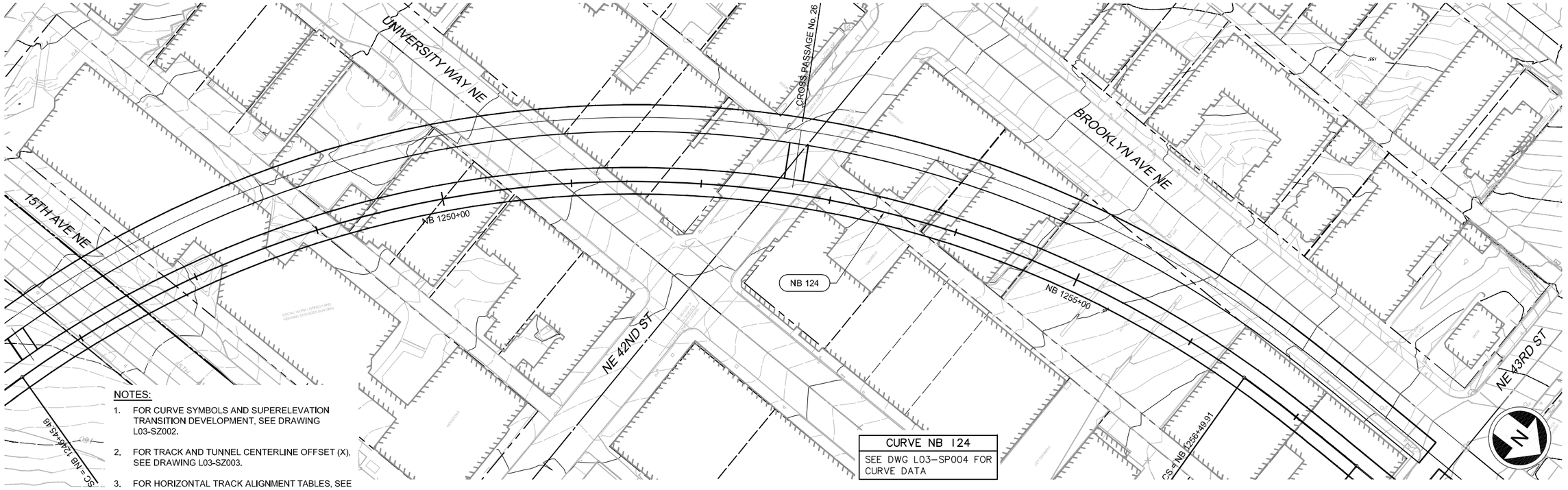

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2. FOR TRACK AND TUNNEL CENTERLINE OFFSET (X), SEE DRAWING L03-SZ003.
3. FOR HORIZONTAL TRACK ALIGNMENT TABLES, SEE DRAWING L03-SZ005.

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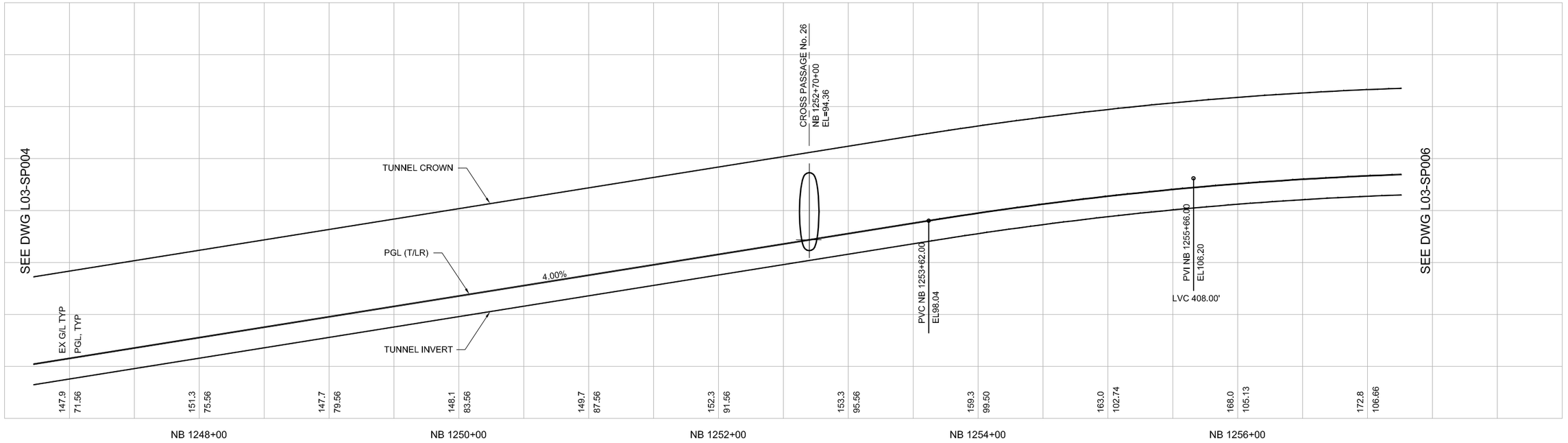

No.	Date	Dsn	Chk	App	Revisions

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	Revised As Built:
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Designed By:	S. NJOLOMA
Drawn By:	A. BYERS
Checked By:	A. MENCKE
Approved By:	A. MENCKE

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LINK CONTRACT N120
TUNNELS & SHAFTS ROOSEVELT TO UWS

TUNNEL STRUCTURE
PLAN AND PROFILE
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Attachment A-5

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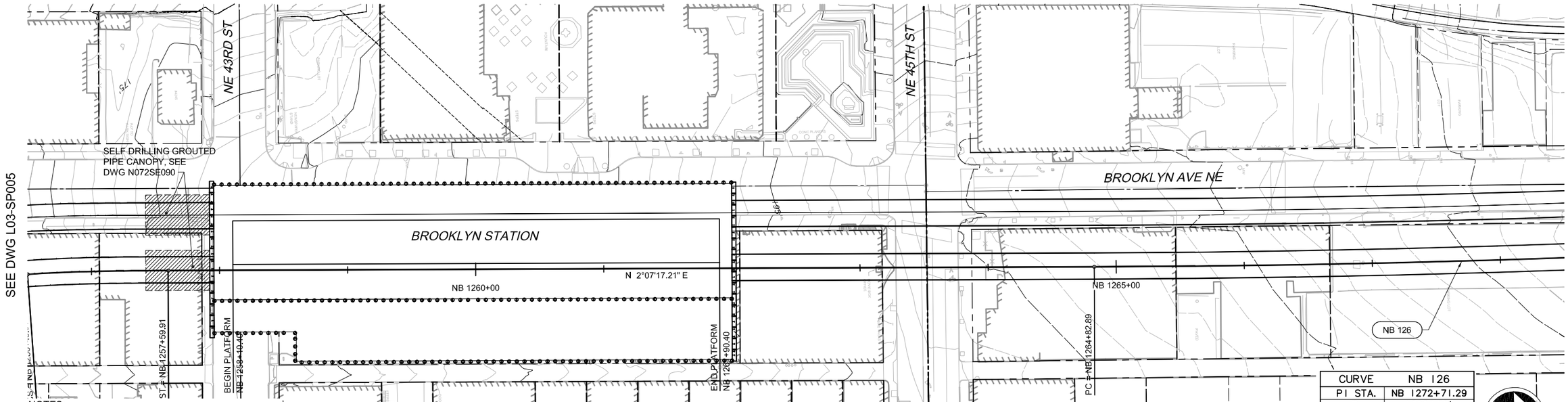
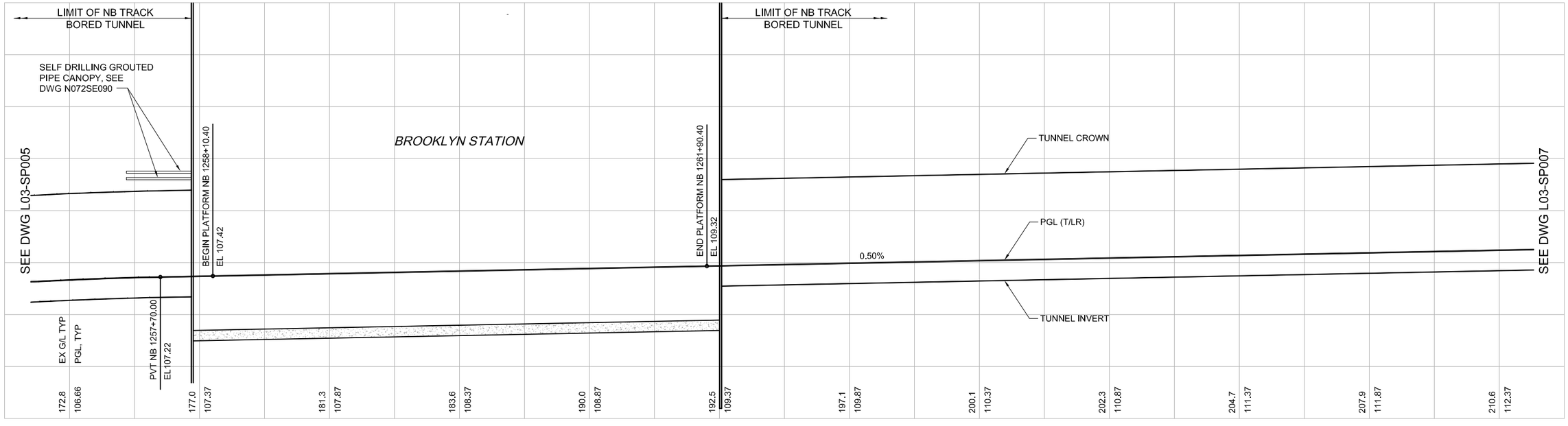


CURVE	NB 126
PI STA.	NB 1272+71.29
R	12000.00'
Lc	1574.54'
Ls1	0
Ls2	0
Es	0
Eu	1.00"
V	55 MPH

NOTES:

1. FOR CURVE SYMBOLS AND SUPERELEVATION TRANSITION DEVELOPMENT, SEE DRAWING L03-SZ002.
2. FOR TRACK AND TUNNEL CENTERLINE OFFSET (X), SEE DRAWING L03-SZ003.
3. FOR HORIZONTAL TRACK ALIGNMENT TABLES, SEE DRAWING L03-SZ005.



No.	Date	Dsn	Chk	App	Revisions

City of Seattle

Work Order No:	Approved:
Permit No:	Inspector's Book:
	Received:
	Revised As Built:
SDOT:	

Designed By: S. NJOLOMA
Drawn By: A. BYERS
Checked By: A. MENCKE
Approved By: A. MENCKE

ANDREW S. MENCKE — STATE OF WASHINGTON — 43847 — REGISTERED PROFESSIONAL ENGINEER

60% SUBMITTAL

JACOBS ASSOCIATES
Engineers/Consultants
BOLIMA DRAFTING & DESIGN INC.

Submitted: I. LAMB Date: 07/01/11
Approved: S. AL-TAMIMI Date: 07/01/11

LINE IS 1 INCH AT FULL SIZE (IF NOT 1" - SCALE ACCORDINGLY)

SOUNDTRANSIT

Scale: 1"=40'
Filename: N20_L03_SP006.dwg
Contract No: N120
Date: 07/01/11

LINK CONTRACT N120
TUNNELS & SHAFTS ROOSEVELT TO UWS

TUNNEL STRUCTURE
PLAN AND PROFILE
STA NB 1257+00 TO STA NB 1268+00

Drawing No. L03-SP006
Vault Plan No.
Sheet No. 52 Rev No. 0
Attachment A-6

VAULT SERIAL NO. | DATE | MARK | REVISIONS | MADE | CHK'D | REV'D

6/29/2011 11:39:59 AM C:\WORK_NORTHLINK\N120\N20\ L03_SP006.DWG BOLIMAF

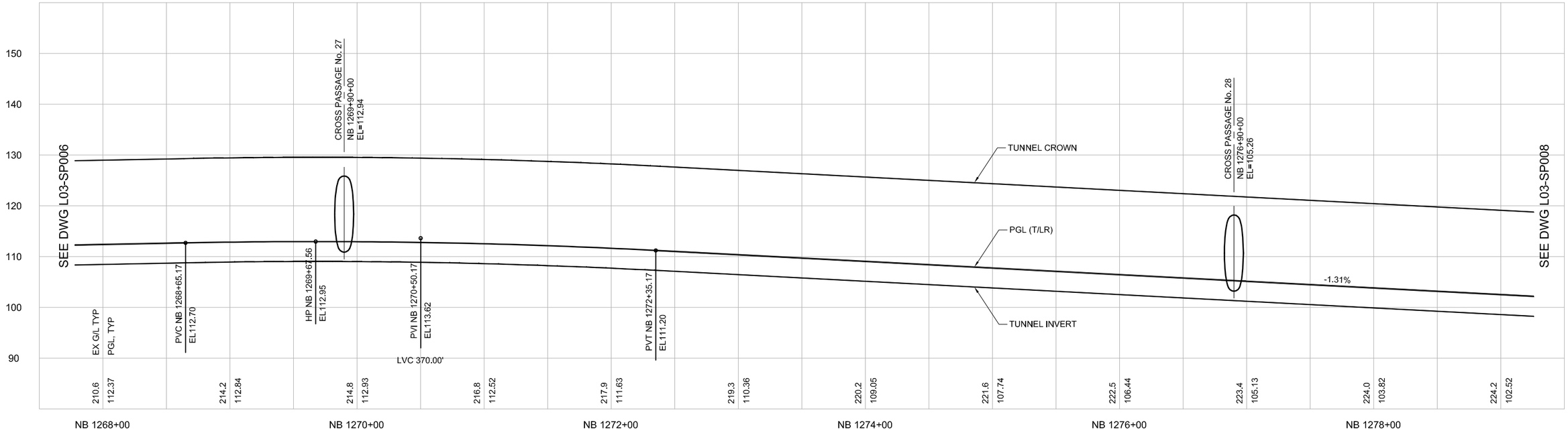
DWG INFO:

LTSCALE:
1=1

XREFs:
-Attach:
-Overlay:
N20_L03_SP
N20_L03_SV
N80_L10_KA
REG-AM2
SUB-60SEA
X277cn
X277rx
X277sf
X300cn
X300rx
X300sf
Z6-2234SEA
Zg-g20020
-Unresolved:

NOTES:

1. FOR CURVE SYMBOLS AND SUPERELEVATION TRANSITION DEVELOPMENT, SEE DRAWING L03-SZ002.
2. FOR TRACK AND TUNNEL CENTERLINE OFFSET (X), SEE DRAWING L03-SZ003.
3. FOR HORIZONTAL TRACK ALIGNMENT TABLES, SEE DRAWING L03-SZ005.



No.	Date	Dsn	Chk	App	Revisions

City of Seattle

Work Order No:	Approved:
Permit No:	Inspector's Book:
	Received:
	Revised As Built:
SDOT:	

Designed By:	S. NJOLOMA
Drawn By:	A. BYERS
Checked By:	A. MENCKE
Approved By:	A. MENCKE

ANDREW S. MENCKE — STATE OF WASHINGTON — 43847 — REGISTERED PROFESSIONAL ENGINEER

60% SUBMITTAL

JACOBS ASSOCIATES
Engineers/Consultants
BOLIMA DRAFTING & DESIGN INC.

Submitted:	Date:	Approved:	Date:
I. LAMB	07/01/11	S. AL-TAMIMI	07/01/11

LINE IS 1 INCH AT FULL SIZE (IF NOT 1" - SCALE ACCORDINGLY)

SOUNDTRANSIT

Scale:	1"=40'
Filename:	N20_L03_SP007.dwg
Contract No:	N120
Date:	07/01/11

LINK CONTRACT N120
TUNNELS & SHAFTS ROOSEVELT TO UWS

TUNNEL STRUCTURE
PLAN AND PROFILE
STA NB 1268+00 TO STA NB 1279+00

Drawing No.	L03-SP007
Vault Plan No.	
Sheet No.	53
Rev No.	0

Attachment A-7

VAULT SERIAL NO.	DATE	MARK	REVISIONS

6/29/2011 11:40:23 AM C:\WORK\...NORTHLINK\N120\N20_L03_SP007.DWG BOLIMAF

DWG INFO:

LTSCALE:
1=1

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-Attach:
-Overlay:
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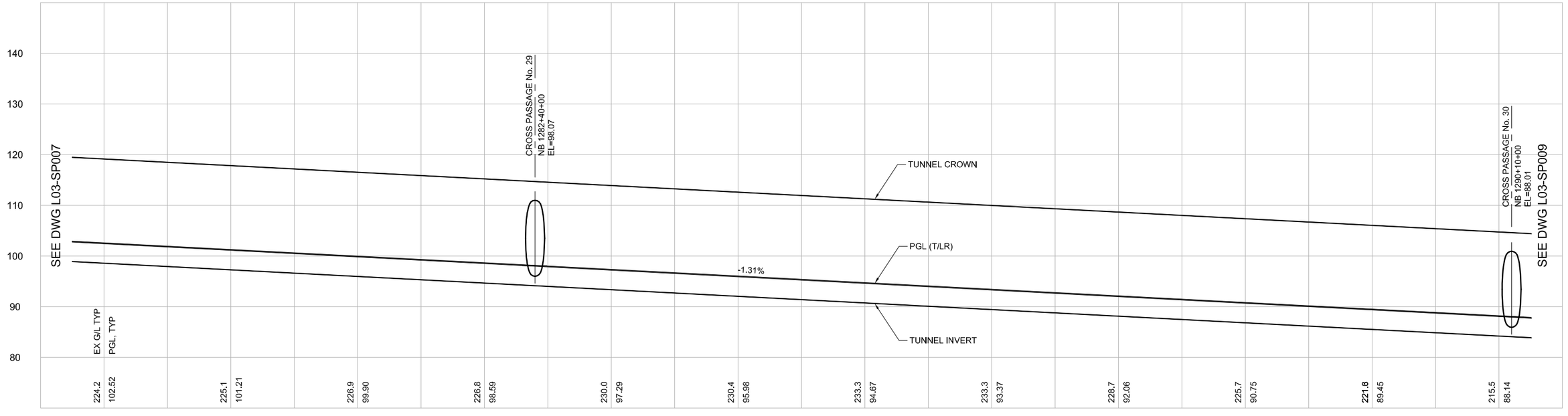
N20_L03_SV
N80_L10_KA
REG-AM2
SUB-60SEA
X275cn
X275rx
X275sf
X277cn
X277rx
X277sf
ZG-3234SEA
Zg-g20020
-Unresolved:

NOTES:

1. FOR CURVE SYMBOLS AND SUPERELEVATION TRANSITION DEVELOPMENT, SEE DRAWING L03-SZ002.
2. FOR TRACK AND TUNNEL CENTERLINE OFFSET (X), SEE DRAWING L03-SZ003.
3. FOR HORIZONTAL TRACK ALIGNMENT TABLES, SEE DRAWING L03-SZ005.

CURVE NB 126
SEE DWG L03-SP006 FOR CURVE DATA



No.	Date	Dsn	Chk	App	Revisions

City of Seattle

Work Order No:	Approved:
Permit No:	Inspector's Book:
	Received:
	Revised As Built:
SDOT:	

Designed By: S. NJOLOMA
Drawn By: A. BYERS
Checked By: A. MENCKE
Approved By: A. MENCKE

ANDREW S. MENCKE, STATE OF WASHINGTON, 43847, REGISTERED PROFESSIONAL ENGINEER

60% SUBMITTAL

JACOBS ASSOCIATES
Engineers/Consultants
BOLIMA DRAFTING & DESIGN INC.

Submitted: I. LAMB Date: 07/01/11
Approved: S. AL-TAMIMI Date: 07/01/11

LINE IS 1 INCH AT FULL SIZE (IF NOT 1" - SCALE ACCORDINGLY)

SOUNDTRANSIT

Scale: 1"=40'
Filename: N20_L03_SP008.dwg
Contract No: N120
Date: 07/01/11

LINK CONTRACT N120
TUNNELS & SHAFTS ROOSEVELT TO UWS

TUNNEL STRUCTURE
PLAN AND PROFILE
STA NB 1279+00 TO STA NB 1290+00

Drawing No. L03-SP008
Vault Plan No.
Sheet No. 54 Rev No. 0
Attachment A-8

VAULT SERIAL NO. | DATE | MARK | REVISIONS | MATURE | MADE | CHK'D | REV'D

6/29/2011 11:40:47 AM BOLIMAF
C:\WORK\...NORTHLINK\N120\N20_L03_SP008.DWG

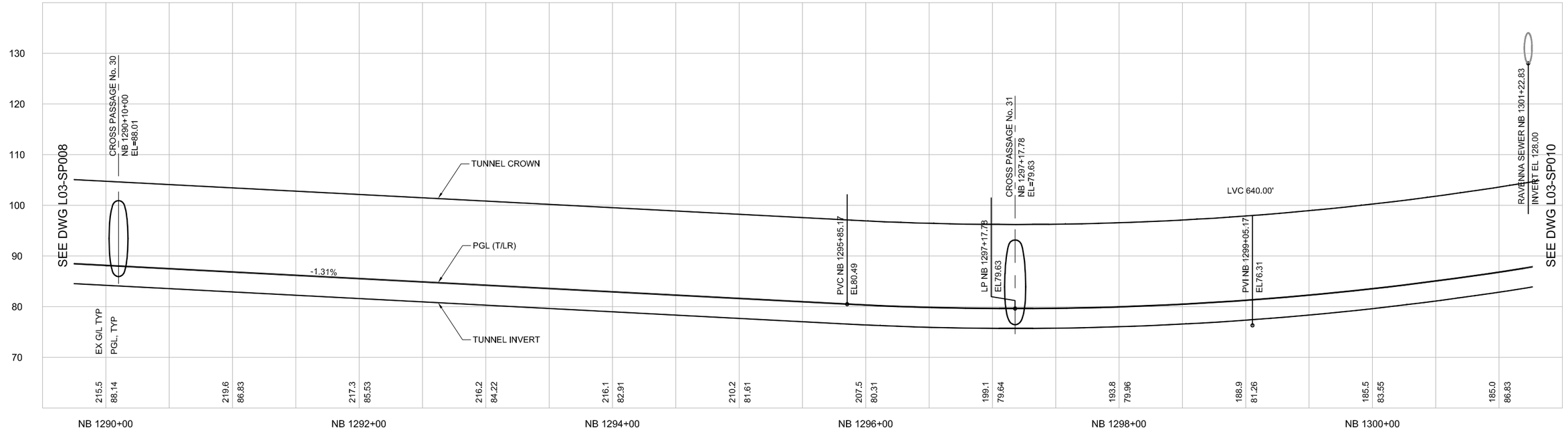
DWG INFO:

LTSCALE:
1=1

XREFs:
-Attach:
-Overlay:
N20_L03_SP
N20_L03_SV
N80_L10_KA
REG-AM2
SUB-60SEA
X275cn
X275rx
X275sf
X277cn
X277rx
X277sf
Zo-2234SEA
Zg-g20020
-Unresolved:

NOTES:

1. FOR CURVE SYMBOLS AND SUPERELEVATION TRANSITION DEVELOPMENT, SEE DRAWING L03-SZ002.
2. FOR TRACK AND TUNNEL CENTERLINE OFFSET (X), SEE DRAWING L03-SZ003.
3. FOR HORIZONTAL TRACK ALIGNMENT TABLES, SEE DRAWING L03-SZ005.



No.	Date	Dsn	Chk	App	Revisions

City of Seattle

Work Order No:	Approved:
Permit No:	Inspector's Book:
	Received:
	Revised As Built:
SDOT:	

Designed By: S. NJOLOMA
Drawn By: A. BYERS
Checked By: A. MENCKE
Approved By: A. MENCKE

ANDREW S. MENCKE — STATE OF WASHINGTON — 43847 — REGISTERED PROFESSIONAL ENGINEER

60% SUBMITTAL

JACOBS ASSOCIATES
Engineers/Consultants
BOLIMA DRAFTING & DESIGN INC.

Submitted: I. LAMB Date: 07/01/11
Approved: S. AL-TAMIMI Date: 07/01/11

LINE IS 1 INCH AT FULL SIZE (IF NOT 1" - SCALE ACCORDINGLY)

SOUNDTRANSIT

Scale: 1"=40'
Filename: N20_L03_SP009.dwg
Contract No: N120
Date: 07/01/11

LINK CONTRACT N120
TUNNELS & SHAFTS ROOSEVELT TO UWS

TUNNEL STRUCTURE
PLAN AND PROFILE
STA NB 1290+00 TO STA NB 1301+00

Drawing No. L03-SP009
Vault Plan No.
Sheet No. 55 Rev No. 0
Attachment A-9

VAULT SERIAL NO. | DATE | MARK | REVISIONS | MADE | CHKD | REVD

6/29/2011 11:41:12 AM C:\WORK_NORTHLINK\N120\N20_L03_SP009.DWG BOLIMAF

DWG INFO:

LTSCALE:
1=1

XREFs:
-Attach:
-Overlay:
N20_L03_SP
N20_L03_SV
N80_L10_KA
REG-AM2
SUB-60SEA
X275cn
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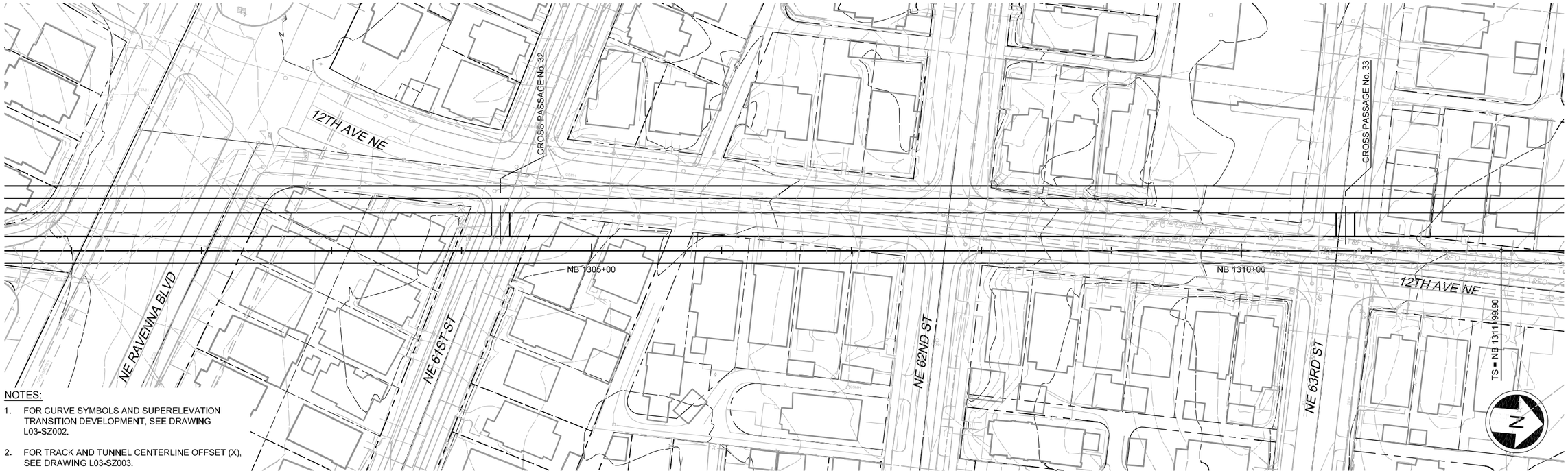
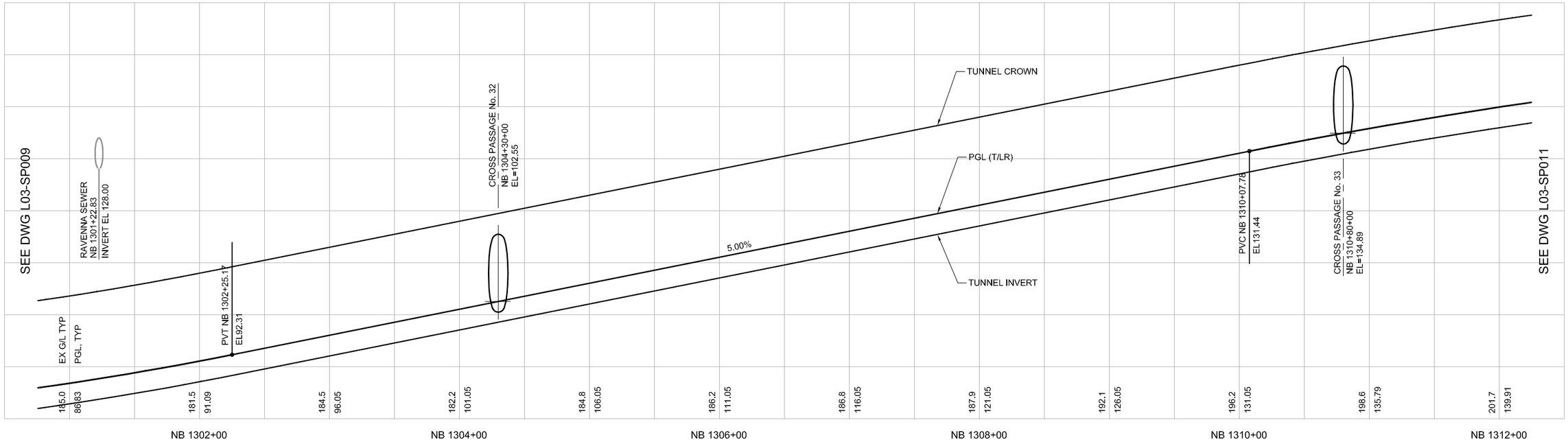
Zg-g20020
-Unresolved:



NOTES:

1. FOR CURVE SYMBOLS AND SUPERELEVATION TRANSITION DEVELOPMENT, SEE DRAWING L03-SZ002.
2. FOR TRACK AND TUNNEL CENTERLINE OFFSET (X), SEE DRAWING L03-SZ003.
3. FOR HORIZONTAL TRACK ALIGNMENT TABLES, SEE DRAWING L03-SZ005.



No.	Date	Dsn	Chk	App	Revisions

City of Seattle

Work Order No:	Approved:
Permit No:	Inspector's Book:
	Received:
	Revised As Built:
SDOT:	

Designed By:	S. NJOLOMA
Drawn By:	A. BYERS
Checked By:	A. MENCKE
Approved By:	A. MENCKE

ANDREW S. MENCKE — STATE OF WASHINGTON — 43847 — REGISTERED PROFESSIONAL ENGINEER

60% SUBMITTAL

JACOBS ASSOCIATES
Engineers/Consultants
BOLIMA DRAFTING & DESIGN INC.

Submitted:	Date:	Approved:	Date:
I. LAMB	07/01/11	S. AL-TAMIMI	07/01/11

LINE IS 1 INCH AT FULL SIZE (IF NOT 1" - SCALE ACCORDINGLY)

SOUNDTRANSIT

Scale:	1"=40'
Filename:	N20_L03_SP010.dwg
Contract No:	N120
Date:	07/01/11

LINK CONTRACT N120
TUNNELS & SHAFTS ROOSEVELT TO UWS

TUNNEL STRUCTURE
PLAN AND PROFILE
STA NB 1301+00 TO STA NB 1312+00

Drawing No.	L03-SP010
Vault Plan No.	
Sheet No.	56
Rev No.	0

Attachment A-10

VAULT SERIAL NO. | DATE | MARK | REVISIONS | MADE | CHK'D | REV'D

6/29/2011 11:41:36 AM BOLIMAF
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DWG INFO:

LTSCALE:
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-Overlay:
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SUB-80SEA
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X265rx
X265sf
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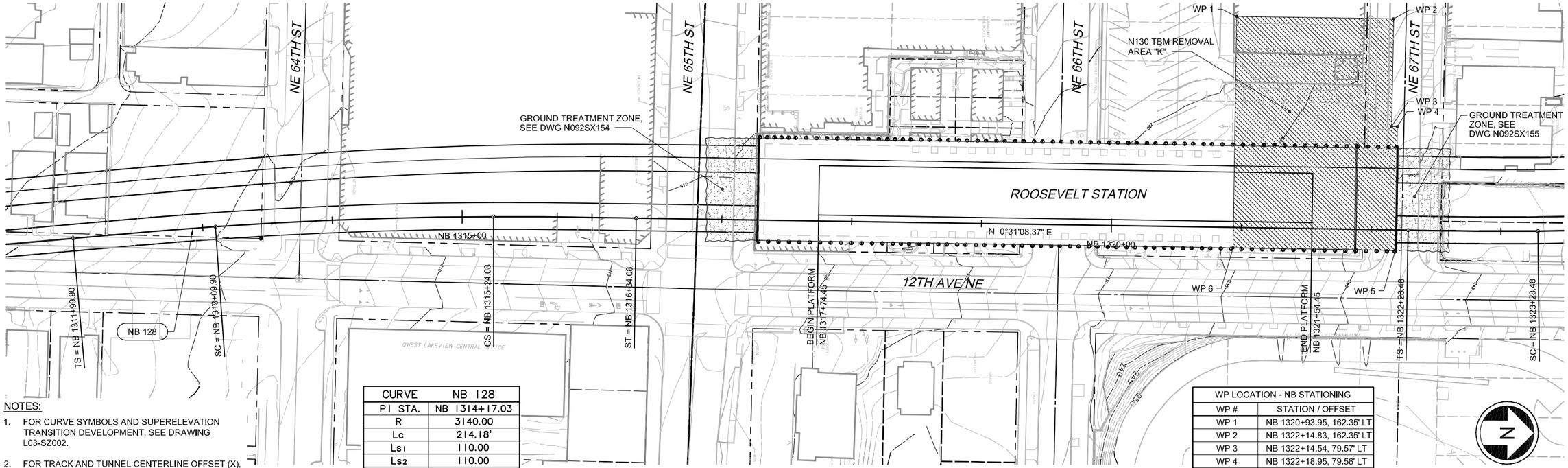
X275rx
X275sf
ZG-2234SEA
Zg-g20020
-Unresolved:

SEE DWG L03-SP010



CURVE	NB 128
PI STA.	NB 1314+17.03
R	3140.00
Lc	214.18'
Ls1	110.00
Ls2	110.00
Eq	2.00"
Eu	1.81"
V	55 MPH

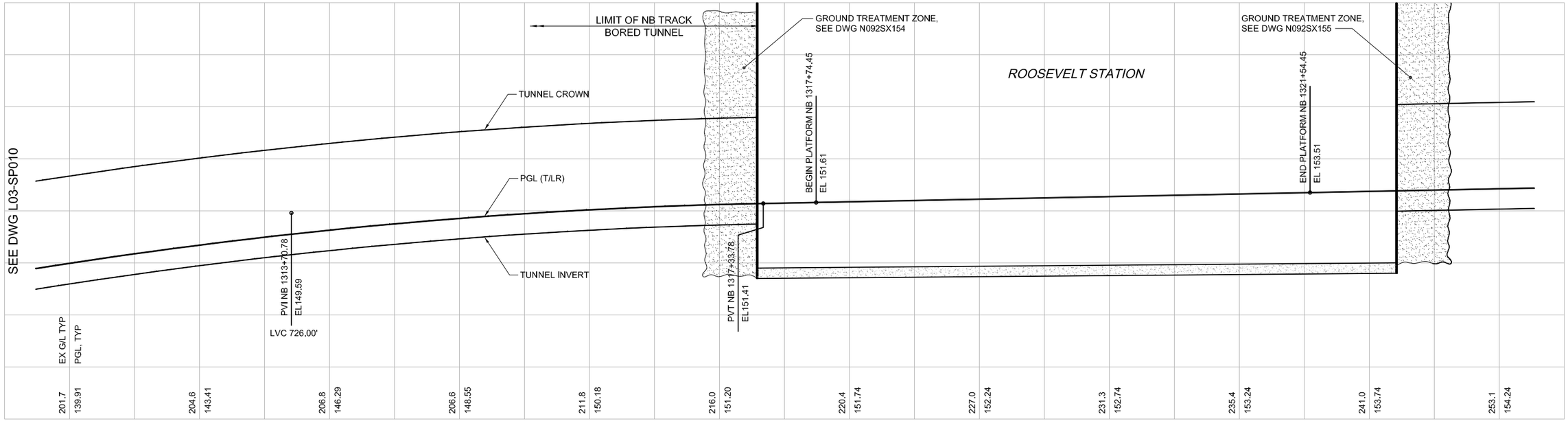
NOTES:

1. FOR CURVE SYMBOLS AND SUPERELEVATION TRANSITION DEVELOPMENT, SEE DRAWING L03-SZ002.
2. FOR TRACK AND TUNNEL CENTERLINE OFFSET (X), SEE DRAWING L03-SZ003.
3. FOR HORIZONTAL TRACK ALIGNMENT TABLES, SEE DRAWING L03-SZ005.

WP LOCATION - NB STATIONING	
WP #	STATION / OFFSET
WP 1	NB 1320+93.95, 162.35' LT
WP 2	NB 1322+14.83, 162.35' LT
WP 3	NB 1322+14.54, 79.57' LT
WP 4	NB 1322+18.95, 79.56' LT
WP 5	NB 1322+18.95, 15.65' RT
WP 6	NB 1320+93.95, 15.65' RT

LINK CONTRACT N120 | LINK CONTRACT N130

SEE DWG L03-SP010



No.	Date	Dsn	Chk	App	Revisions

City of Seattle

Work Order No:	Approved:
Permit No:	Inspector's Book:
	Received:
	Revised As Built:
SDOT:	

Designed By: S. NJOLOMA
Drawn By: A. BYERS
Checked By: A. MENCKE
Approved By: A. MENCKE

ANDREW S. MENCKE, STATE OF WASHINGTON, 43847, REGISTERED PROFESSIONAL ENGINEER

60% SUBMITTAL

JACOBS ASSOCIATES
Engineers/Consultants
BOLIMA DRAFTING & DESIGN INC.

LINE IS 1 INCH AT FULL SIZE (IF NOT 1" - SCALE ACCORDINGLY)

SOUNDTRANSIT

Submitted:	Date:	Approved:	Date:
I. LAMB	07/01/11	S. AL-TAMIMI	07/01/11

Scale: 1"=40'
Filename: N20_L03_SP011.dwg
Contract No: N120
Date: 07/01/11

LINK CONTRACT N120
TUNNELS & SHAFTS ROOSEVELT TO UWS

TUNNEL STRUCTURE
PLAN AND PROFILE
STA NB 1312+00 TO STA NB 1322+62

Drawing No. L03-SP011
Vault Plan No.
Sheet No. 57
Rev No. 0
Attachment A-11

VAULT SERIAL NO. | DATE | MARK | REVISIONS | MADE | CHK'D | REV'D

6/29/2011 11:42:03 AM
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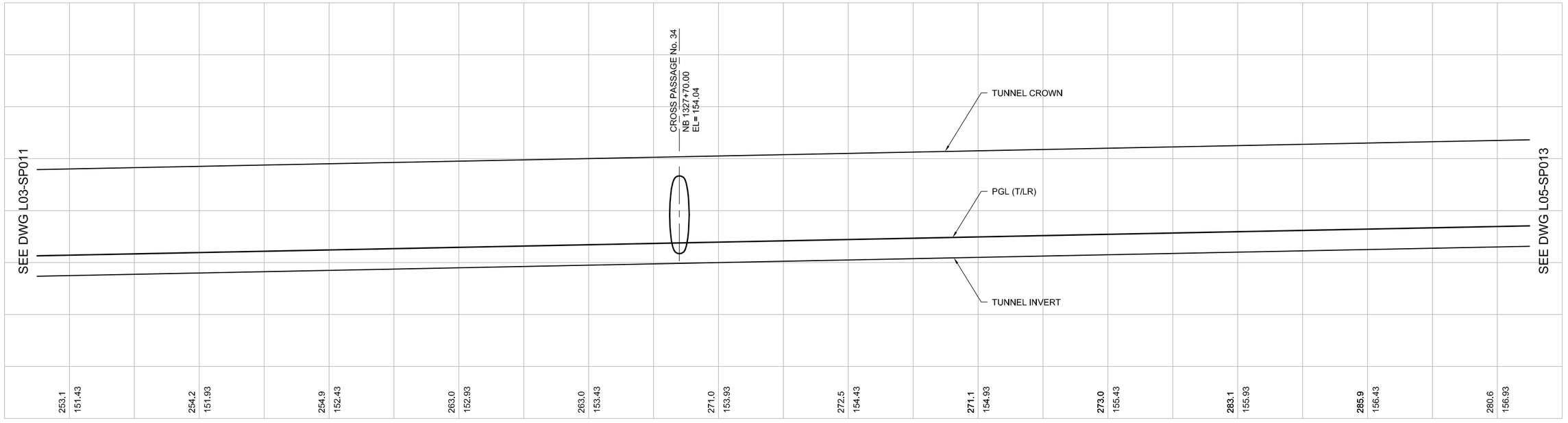
BOLIMAF



DWG INFO:

LTSCALE:
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-Overlay:
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REG-AM2
SUB-60SEA
St_Names_North
X265cn
X265rx
X265sf
ZG-2234SEA
Zg-g20020
-Unresolved:

No.	Date	Dsn	Chk	App	Revisions

City of Seattle

Work Order No:	Approved:
Permit No:	Inspector's Book:
	Received:
	Revised As Built:
SDOT:	

Designed By: S. NJOLOMA
Drawn By: A. BYERS
Checked By: A. MENCKE
Approved By: A. MENCKE

ANDREW S. MENCKE — STATE OF WASHINGTON — 23847 — REGISTERED PROFESSIONAL ENGINEER

60% SUBMITTAL

JACOBS ASSOCIATES
Engineers/Consultants
BOLIMA DRAFTING & DESIGN INC.

Submitted: I. LAMB Date: 01/13/12
Approved: S. AL-TAMIMI Date: 01/13/12

LINE IS 1 INCH AT FULL SIZE (IF NOT 1" SCALE ACCORDINGLY)

SOUNDTRANSIT

Scale: 1"=40'
Filename: N30_L05_SP012.dwg
Contract No: N130
Date:

LINK CONTRACT N130
TUNNELS - NORTH PORTAL TO ROOSEVELT

TUNNEL STRUCTURE
PLAN AND PROFILE
STA NB 1322+62 TO STA NB 1334+00

Drawing No. L05-SP012
Vault Plan No.
Sheet No. Rev No. 0
Attachment A-12

VAULT SERIAL NO. | DATE | MARK | NATURE OF REVISIONS | MADE | CHK'D | REV'D

12/15/2011 8:55:41 AM BYERSA
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DWG INFO:

LTSCALE:
1=1

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-Overlay:
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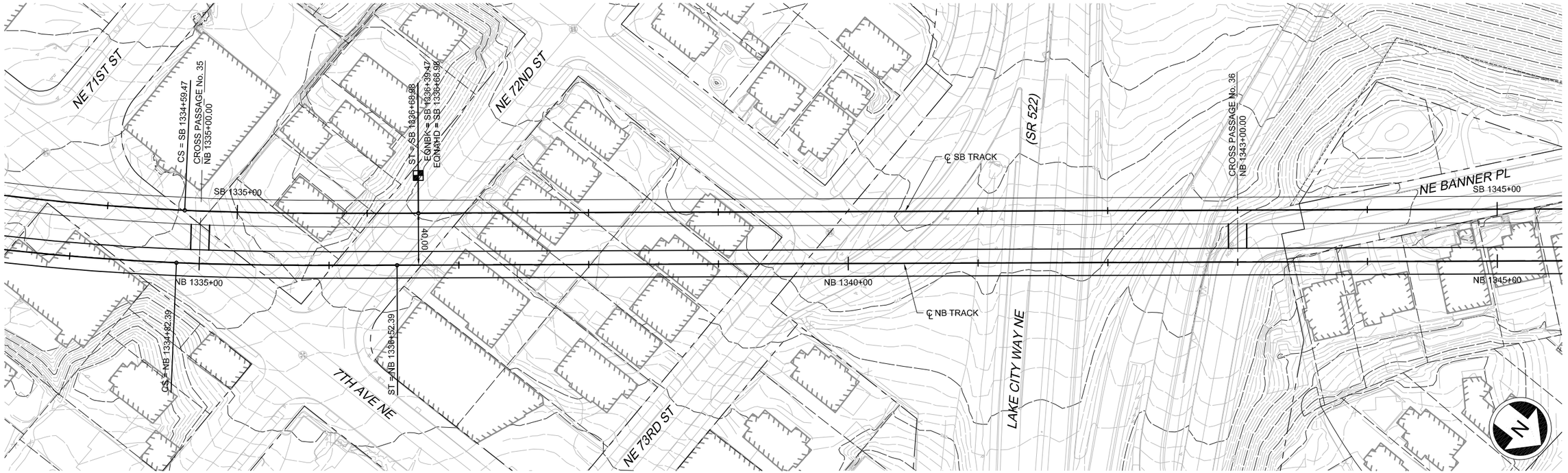

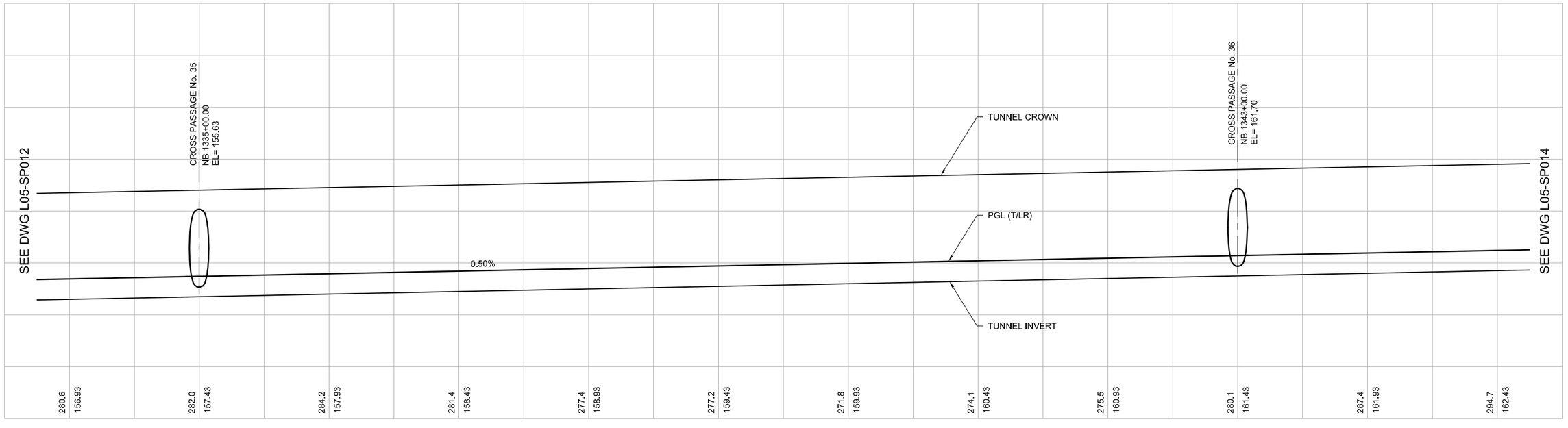

No.	Date	Dsn	Chk	App	Revisions

City of Seattle

Work Order No:	Approved:
Permit No:	Inspector's Book:
	Received:
	Revised As Built:
SDOT:	

Designed By: S. NJOLOMA
Drawn By: A. BYERS
Checked By: A. MENCKE
Approved By: A. MENCKE

ANDREW S. MENCKE — STATE OF WASHINGTON — 23847 — REGISTERED PROFESSIONAL ENGINEER

60% SUBMITTAL

JACOBS ASSOCIATES
Engineers/Consultants
BOLIMA DRAFTING & DESIGN INC.

Submitted: I. LAMB Date: 01/13/12
Approved: S. AL-TAMIMI Date: 01/13/12

LINE IS 1 INCH AT FULL SIZE (IF NOT 1", SCALE ACCORDINGLY)

SOUNDTRANSIT

Scale: 1"=40'
Filename: N30_L05_SP013.dwg
Contract No: N130
Date:

LINK CONTRACT N130
TUNNELS - NORTH PORTAL TO ROOSEVELT

TUNNEL STRUCTURE
PLAN AND PROFILE
STA NB 1334+00 TO STA NB 1345+00

Drawing No. L05-SP013
Vault Plan No.
Sheet No. Rev No. 0
Attachment A-13

VAULT SERIAL NO. | DATE | MARK | NATURE OF REVISIONS | MADE | CHK'D | REV'D

12/15/2011 8:56:14 AM BYERSA
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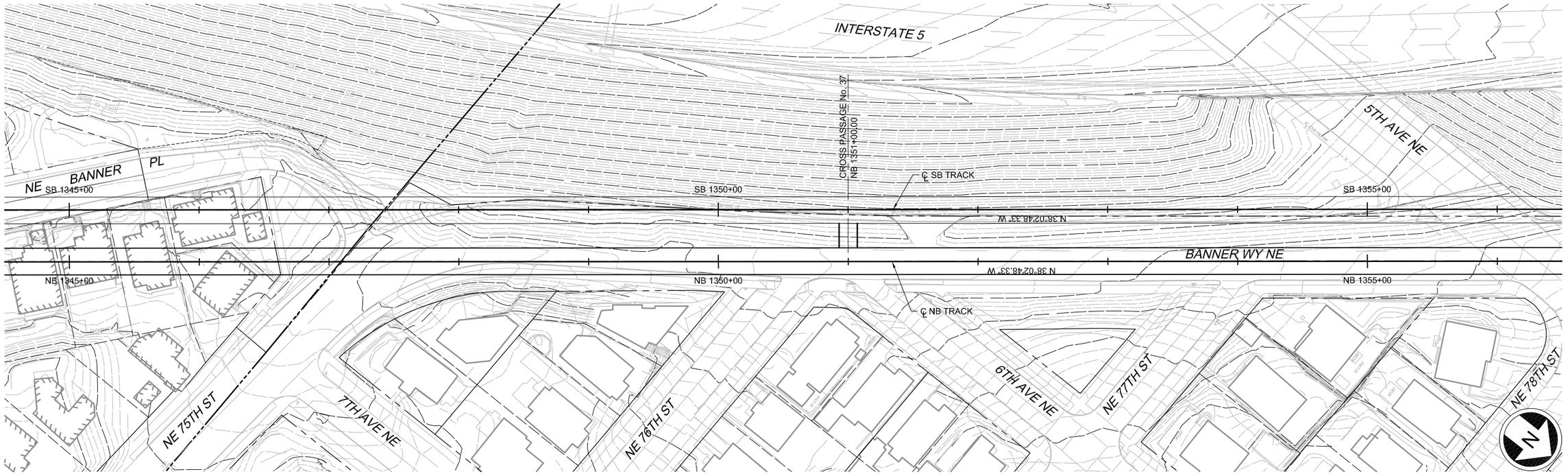

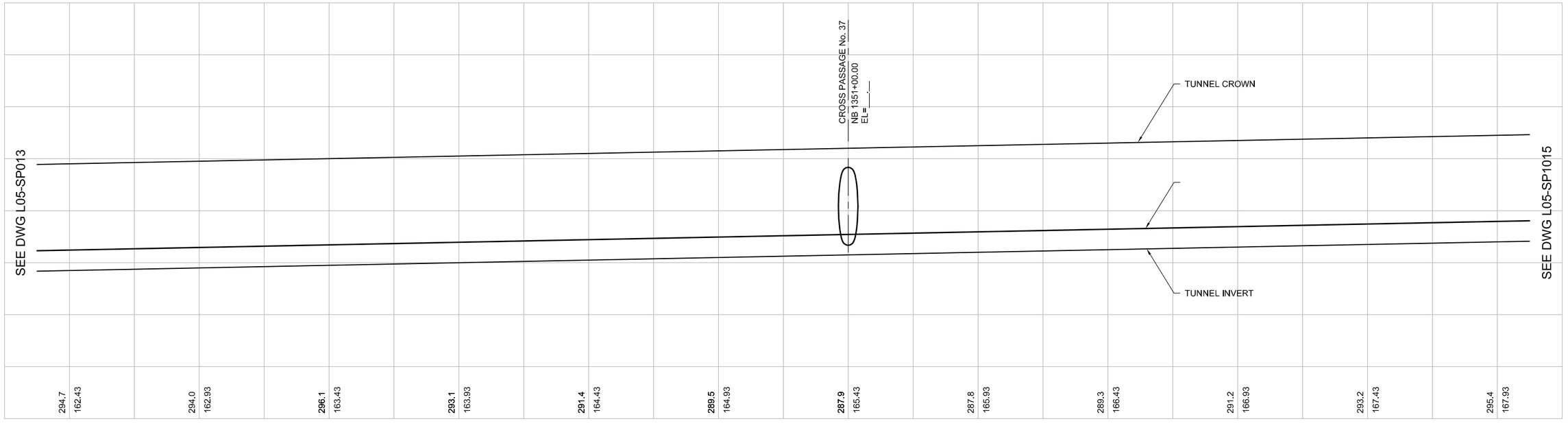

DWG INFO:

LTSCALE:
1=1

XREFs:
-Attach:
-Overlay:
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N20_L03_SV
N80_L10_KA
REG-AM2
SUB-60SEA
X263cn
X263rx
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X264cn
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X264sf
X265cn
X265rx
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ZG-2234SEA
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No.	Date	Dsn	Chk	App	Revisions
1		MATURE	MADE	CHK'D	REV'D
2		MARK	DATE		
3					
4					
5					

VAULT SERIAL NO.

12/15/2011 8:56:49 AM BYERSA
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City of Seattle

Work Order No:	Approved:
Permit No:	Inspector's Book:
	Received:
	Revised As Built:
SDOT:	

Designed By:	S. NJOLOMA
Drawn By:	A. BYERS
Checked By:	A. MENCKE
Approved By:	A. MENCKE

ANDREW S. MENCKE — STATE OF WASHINGTON — 23847 — REGISTERED PROFESSIONAL ENGINEER

60% SUBMITTAL

JACOBS ASSOCIATES
Engineers/Consultants
BOLIMA DRAFTING & DESIGN INC.

Submitted:	Date:	Approved:	Date:
I. LAMB	01/13/12	S. AL-TAMIMI	01/13/12

LINE IS 1 INCH AT FULL SIZE (IF NOT 1" SCALE ACCORDINGLY)

SOUNDTRANSIT

Scale:	1"=40'
Filename:	N30_L05_SP014.dwg
Contract No:	N130
Date:	

LINK CONTRACT N130
TUNNELS - NORTH PORTAL TO ROOSEVELT

TUNNEL STRUCTURE
PLAN AND PROFILE
STA NB 1345+00 TO STA NB 1356+00

Drawing No.	L05-SP014
Vault Plan No.	
Sheet No.	Rev No. 0

Attachment A-14

DWG INFO:

LTSCALE:
1=1

XREFs:
-Attach:
-Overlay:
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N20_L03_SV
N80_L10_KA
REG-AM2
SUB-60SEA
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X264sf
ZG-223SEA
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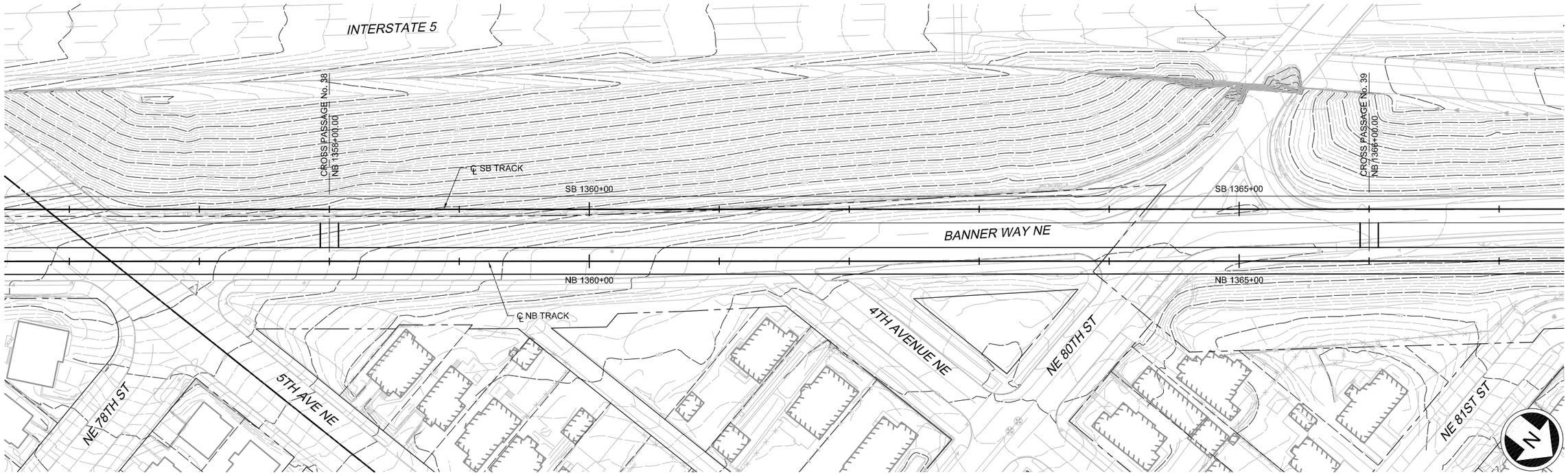

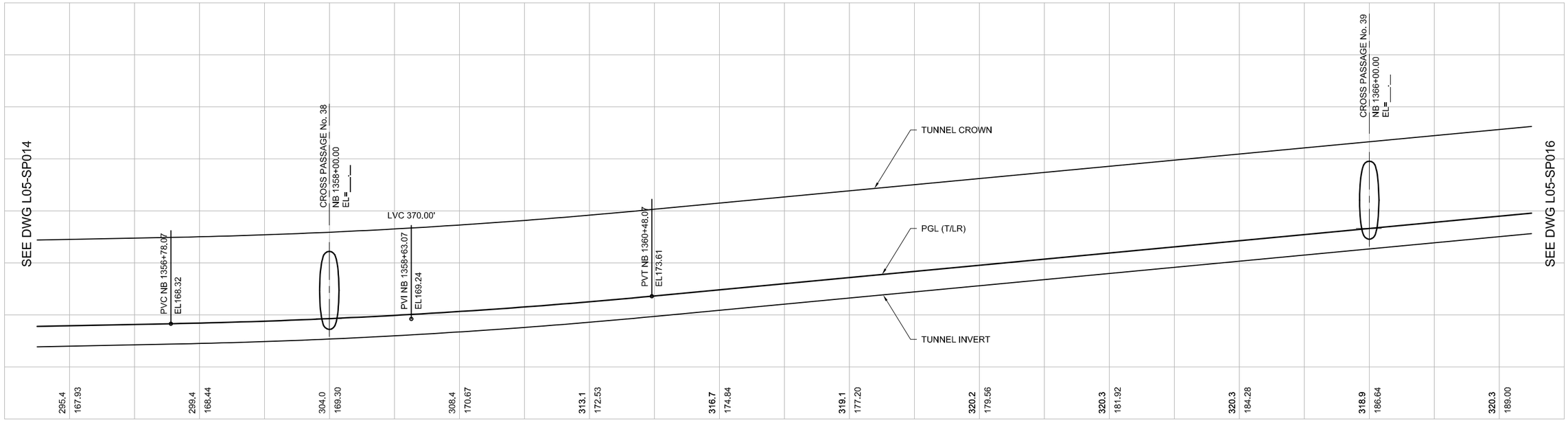

No.	Date	Dsn	Chk	App	Revisions

City of Seattle

Work Order No:	Approved:
Permit No:	Inspector's Book:
	Received:
	Revised As Built:
SDOT:	

Designed By:	S. NJOLOMA
Drawn By:	A. BYERS
Checked By:	A. MENCKE
Approved By:	A. MENCKE

ANDREW S. MENCKE — STATE OF WASHINGTON — 23847 — REGISTERED PROFESSIONAL ENGINEER

60% SUBMITTAL

JACOBS ASSOCIATES
Engineers/Consultants
BOLIMA DRAFTING & DESIGN INC.

Submitted:	Date:	Approved:	Date:
I. LAMB	01/13/12	S. AL-TAMIMI	01/13/12

LINE IS 1 INCH AT FULL SIZE (IF NOT 1" - SCALE ACCORDINGLY)

SOUNDTRANSIT

Scale:	1"=40'
Filename:	N30_L05_SP015.dwg
Contract No:	N130
Date:	

LINK CONTRACT N130
TUNNELS - NORTH PORTAL TO ROOSEVELT

TUNNEL STRUCTURE
PLAN AND PROFILE
STA NB 1356+00 TO STA NB 1367+00

Drawing No.	L05-SP015
Vault Plan No.	
Sheet No.	Rev No. 0

Attachment A-15

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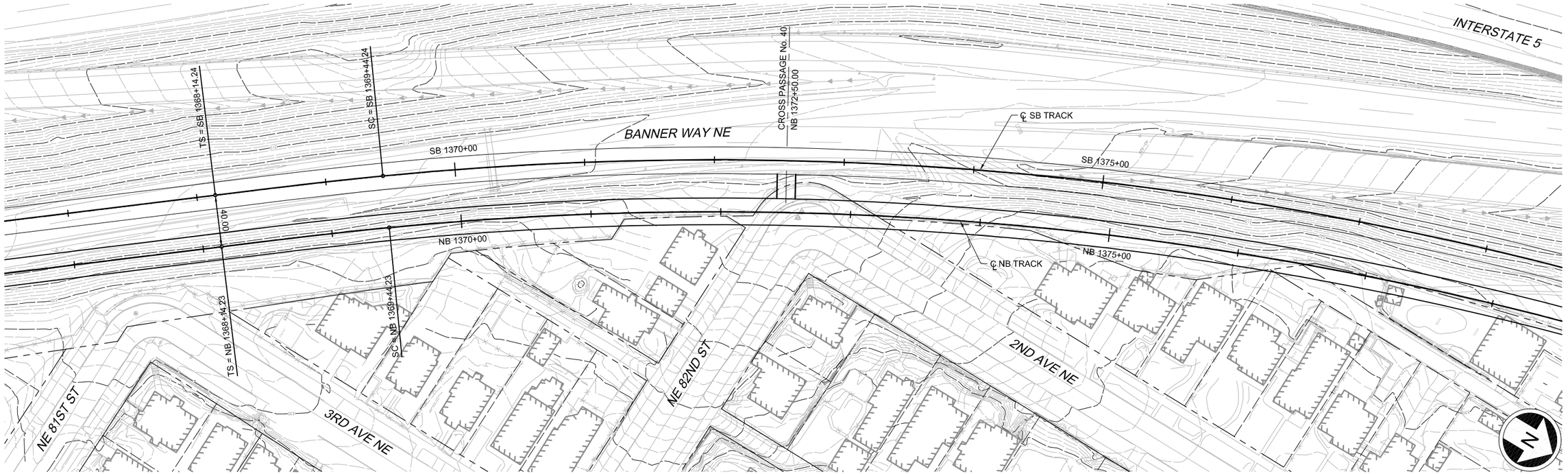

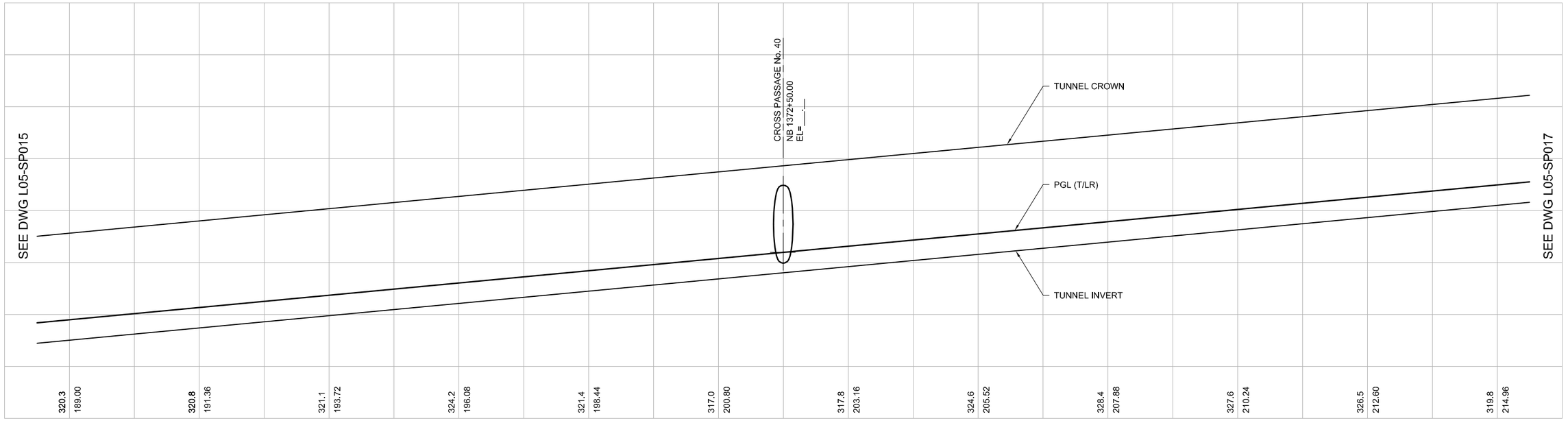

No.	Date	Dsn	Chk	App	Revisions

City of Seattle

Work Order No:	Approved:
Permit No:	Inspector's Book:
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Designed By:	S. NJOLOMA
Drawn By:	A. BYERS
Checked By:	A. MENCKE
Approved By:	A. MENCKE

ANDREW S. MENCKE — STATE OF WASHINGTON — 23847 — REGISTERED PROFESSIONAL ENGINEER

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JACOBS ASSOCIATES
Engineers/Consultants
BOLIMA DRAFTING & DESIGN INC.

Submitted:	Date:	Approved:	Date:
I. LAMB	01/13/12	S. AL-TAMIMI	01/13/12

LINE IS 1 INCH AT FULL SIZE (IF NOT 1" - SCALE ACCORDINGLY)

SOUNDTRANSIT

Scale:	1"=40'
Filename:	N30_L05_SP016.dwg
Contract No:	N130
Date:	

LINK CONTRACT N130
TUNNELS - NORTH PORTAL TO ROOSEVELT

TUNNEL STRUCTURE
PLAN AND PROFILE
STA NB 1367+00 TO STA NB 1378+00

Drawing No.	L05-SP016
Vault Plan No.	
Sheet No.	Rev No. 0

Attachment A-16

REV'D	CHK'D	MADE	MARK	DATE	NATURE OF REVISIONS

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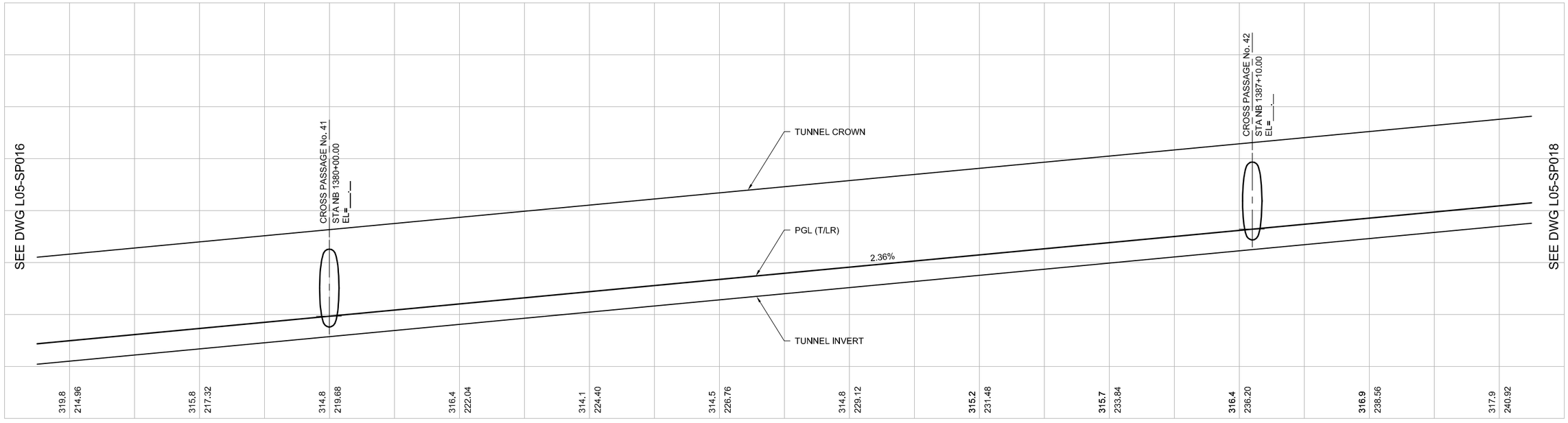

VAULT SERIAL NO.	DATE	MARK	NATURE
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No.	Date	Dsn	Chk	App	Revisions	MADE	CHK'D	REV'D

City of Seattle

Work Order No:	Approved:
Permit No:	Inspector's Book:
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	Revised As Built:
SDOT:	

Designed By: S. NJOLOMA
Drawn By: A. BYERS
Checked By: A. MENCKE
Approved By: A. MENCKE

ANDREW S. MENCKE — STATE OF WASHINGTON — 23847 — REGISTERED PROFESSIONAL ENGINEER

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BOLIMA DRAFTING & DESIGN INC.

Submitted: I. LAMB Date: 01/13/12
Approved: S. AL-TAMIMI Date: 01/13/12

LINE IS 1 INCH AT FULL SIZE (IF NOT 1", SCALE ACCORDINGLY)

SOUNDTRANSIT

Scale: 1"=40'
Filename: N30_L05_SP017.dwg
Contract No: N130
Date:

LINK CONTRACT N130
TUNNELS - NORTH PORTAL TO ROOSEVELT

TUNNEL STRUCTURE
PLAN AND PROFILE
STA NB 1378+00 TO STA NB 1389+00

Drawing No. L05-SP017
Vault Plan No.
Sheet No. Rev No. 0

Attachment A-17

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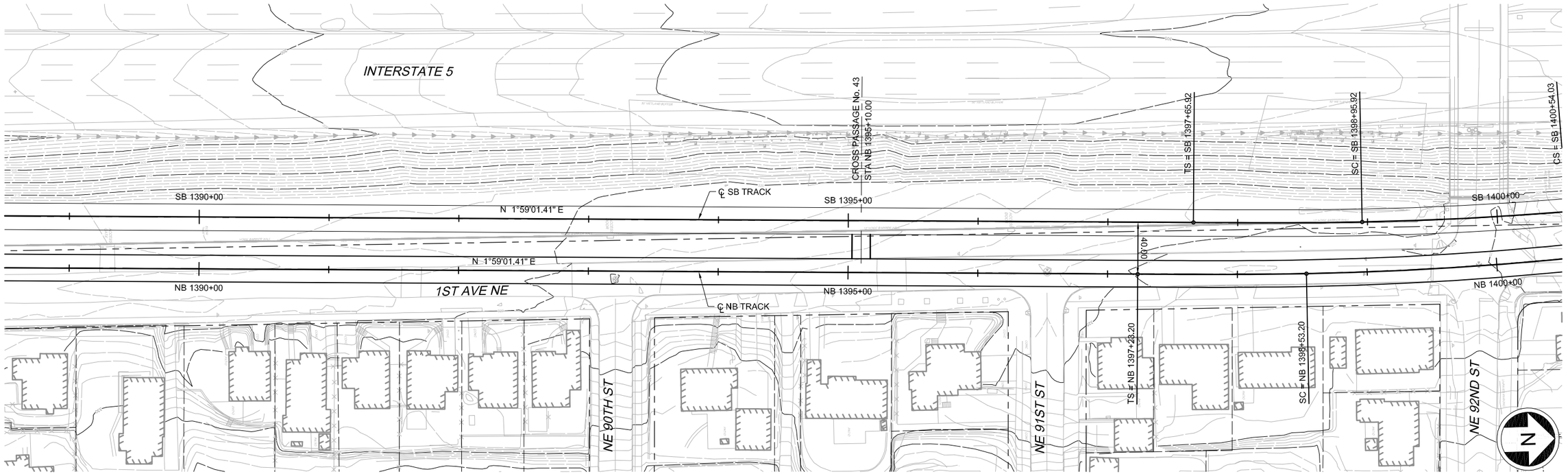

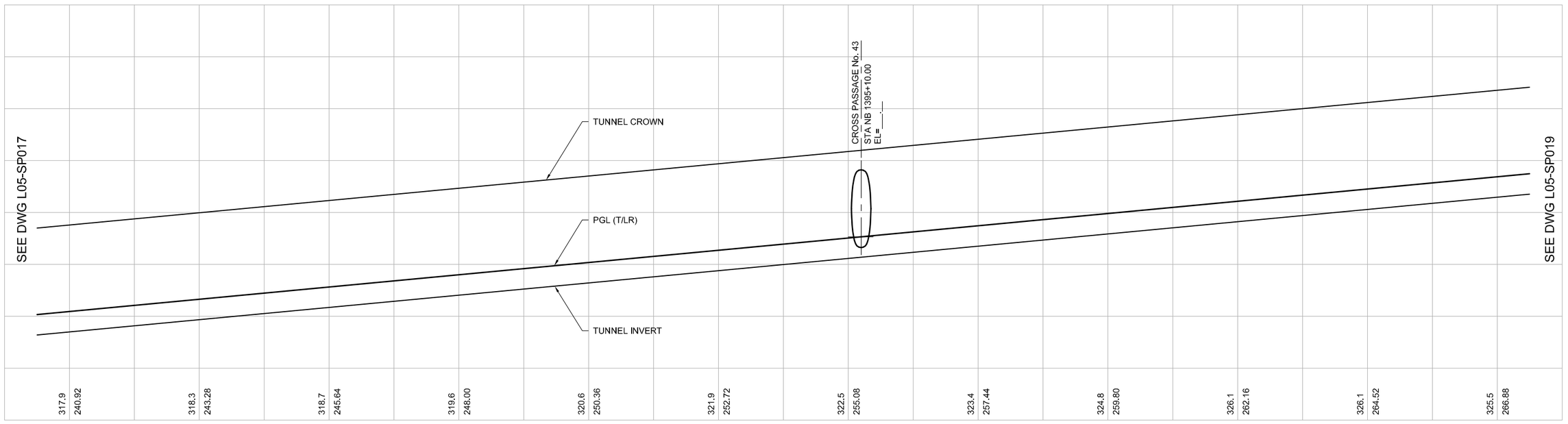

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No.	Date	Dsn	Chk	App	Revisions

City of Seattle

Work Order No:	Approved:
Permit No:	Inspector's Book:
	Received:
	Revised As Built:
SDOT:	

Designed By:	S. NJOLOMA
Drawn By:	A. BYERS
Checked By:	A. MENCKE
Approved By:	A. MENCKE

ANDREW S. MENCKE — STATE OF WASHINGTON — 43847 — REGISTERED PROFESSIONAL ENGINEER

60% SUBMITTAL

JACOBS ASSOCIATES
Engineers/Consultants
BOLIMA DRAFTING & DESIGN INC.

Submitted:	Date:	Approved:	Date:
I. LAMB	01/13/12	S. AL-TAMIMI	01/13/12

LINE IS 1 INCH AT FULL SIZE (IF NOT 1" - SCALE ACCORDINGLY)

SOUNDTRANSIT

Scale:	1"=40'
Filename:	N30_L05_SP018.dwg
Contract No:	N130
Date:	

LINK CONTRACT N130
TUNNELS - NORTH PORTAL TO ROOSEVELT

TUNNEL STRUCTURE
PLAN AND PROFILE
STA NB 1389+00 TO STA NB 1400+00

Drawing No.	L05-SP018
Vault Plan No.	
Sheet No.	Rev No. 0

Attachment A-18

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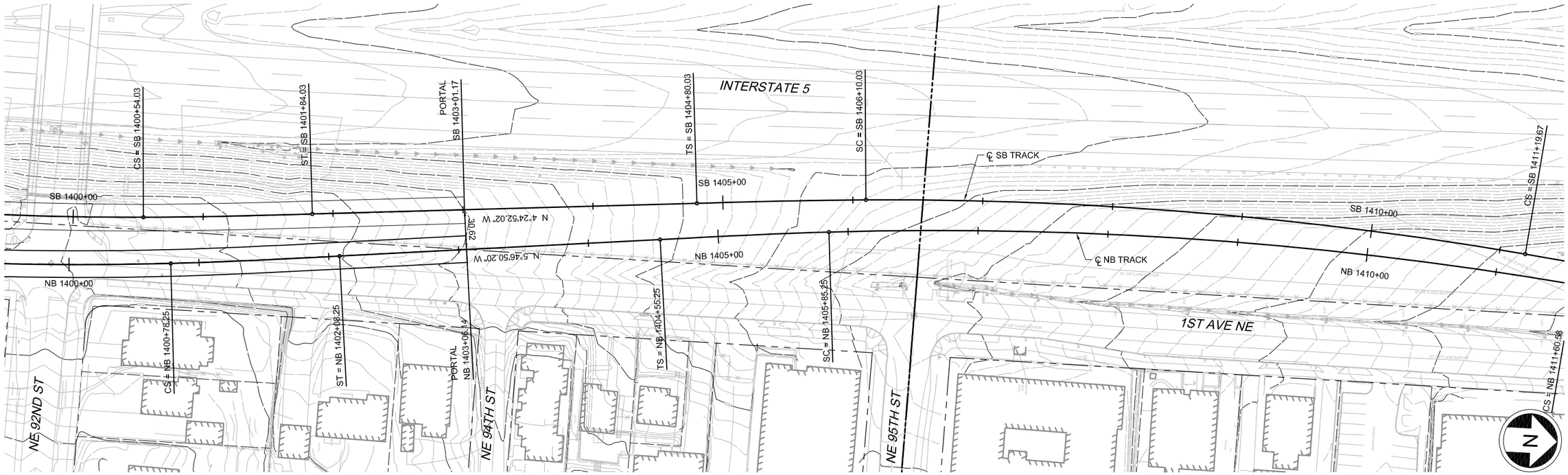

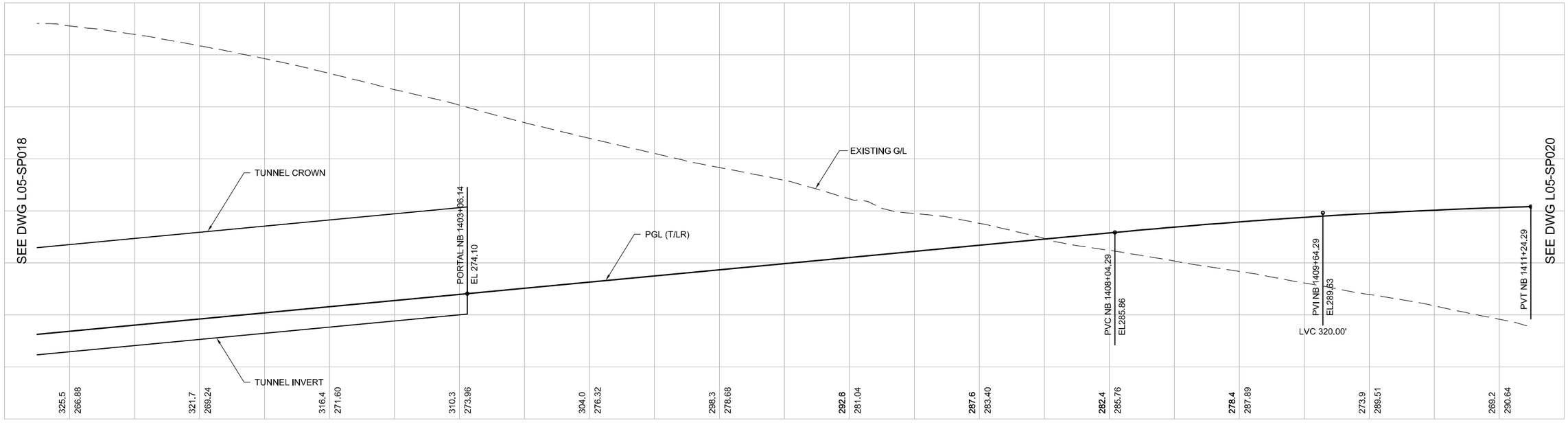

No.	Date	Dsn	Chk	App	Revisions

City of Seattle

Work Order No:	Approved:
Permit No:	Inspector's Book:
	Received:
	Revised As Built:
SDOT:	

Designed By:	S. NJOLOMA
Drawn By:	A. BYERS
Checked By:	A. MENCKE
Approved By:	A. MENCKE

ANDREW S. MENCKE — STATE OF WASHINGTON — 23847 — REGISTERED PROFESSIONAL ENGINEER

60% SUBMITTAL

JACOBS ASSOCIATES
Engineers/Consultants
BOLIMA DRAFTING & DESIGN INC.

Submitted:	Date:	Approved:	Date:
I. LAMB	01/13/12	S. AL-TAMIMI	01/13/12

LINE IS 1 INCH AT FULL SIZE (IF NOT 1" - SCALE ACCORDINGLY)

SOUNDTRANSIT

Scale:	1"=40'
Filename:	N30_L05_SP019.dwg
Contract No:	N130
Date:	

LINK CONTRACT N130
TUNNELS - NORTH PORTAL TO ROOSEVELT

TUNNEL STRUCTURE
PLAN AND PROFILE
STA NB 1400+00 TO STA NB 1411+00

Drawing No.	L05-SP019
Vault Plan No.	
Sheet No.	Rev No. 0

Attachment A-19

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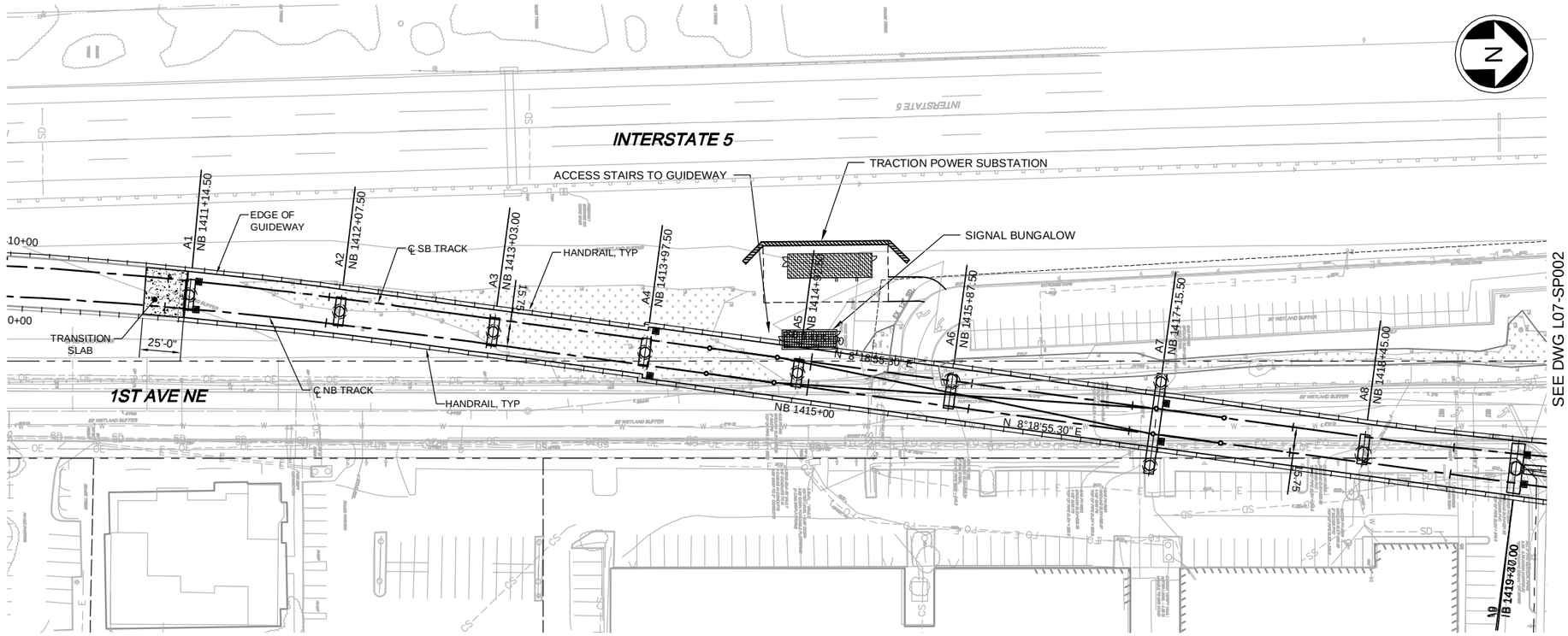

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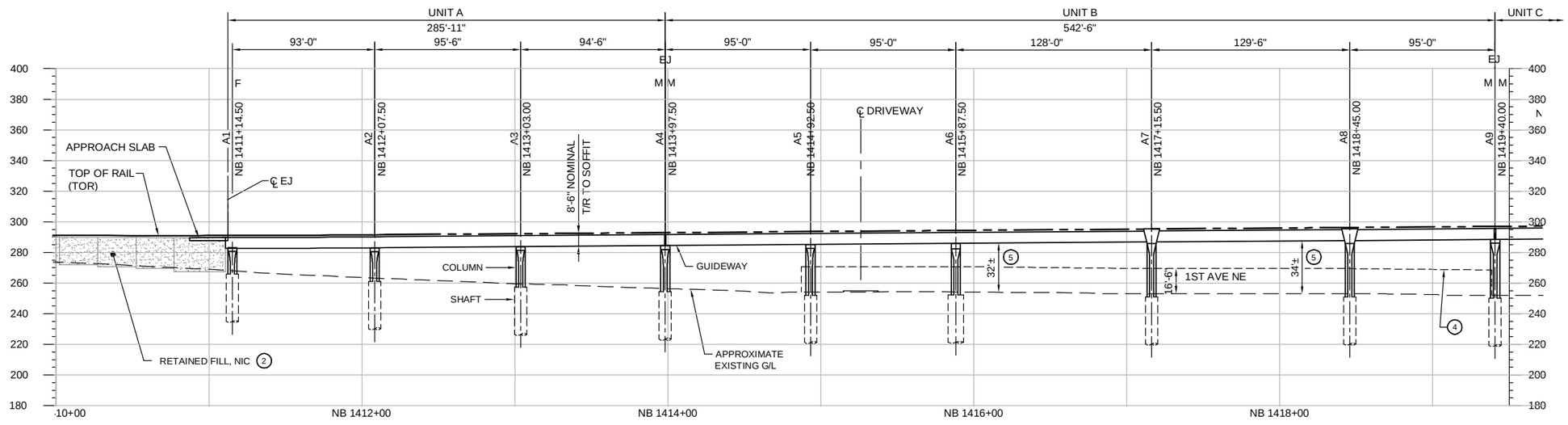

DEVELOPED ELEVATION

NOTES:

1. SEE TRACK PLAN AND PROFILE DRAWINGS FOR ALIGNMENT AND PROFILE DATA.
2. MSE WALL WITH PRECAST CONCRETE PANELS. WSDOT STANDARD 1-5 FINISH OF EITHER FRACTURED FIN, RANDOM BOARD, OR STRIATED.
3. TRACTION POWER SUBSTATION AND SIGNAL BUNGALOW LOCATIONS ARE APPROXIMATE.
4. DASHED LINE INDICATES ENVELOPE OF MINIMUM VERTICAL CLEARANCE.
5. APPROXIMATE VERTICAL CLEARANCE.

LEGEND:

- WIND BARRIER
- HANDRAIL
- DECK DRAIN

No.	Date	Dsn	Chk	App	Revisions

City of Seattle

Work Order No:	Approved:
Permit No:	Inspector's Book:
	Received:
	Revised As Built:
SDOT:	

Designed By: Y. POLYAKOV
Drawn By: T. STEWART
Checked By: L. AMUNDSON
Approved By: Y. POLYAKOV

YAKOV POLYAKOV — STATE OF WASHINGTON — 19955 — STRUCTURAL ENGINEER — PROFESSIONAL ENGINEER

30% SUBMITTAL

JACOBS ASSOCIATES
Engineers/Consultants
PARSONS BRINCKERHOFF

Submitted: Date:
Approved: Date:

LINE IS 1 INCH AT FULL SIZE (IF NOT, SCALE ACCORDINGLY)

SOUNDTRANSIT

Scale: 1"=40'
Filename: N60_L07_SP001.dwg
Contract No: N160
Date:

LINK CONTRACT N160
NORTHGATE STATION & ELEVATED GUIDEWAYS

ELEVATED GUIDEWAY
GENERAL LAYOUT
SHEET 1 OF 3

Drawing No. L07-SP001
Vault Plan No.
Sheet No. Rev No.
Attachment A-20

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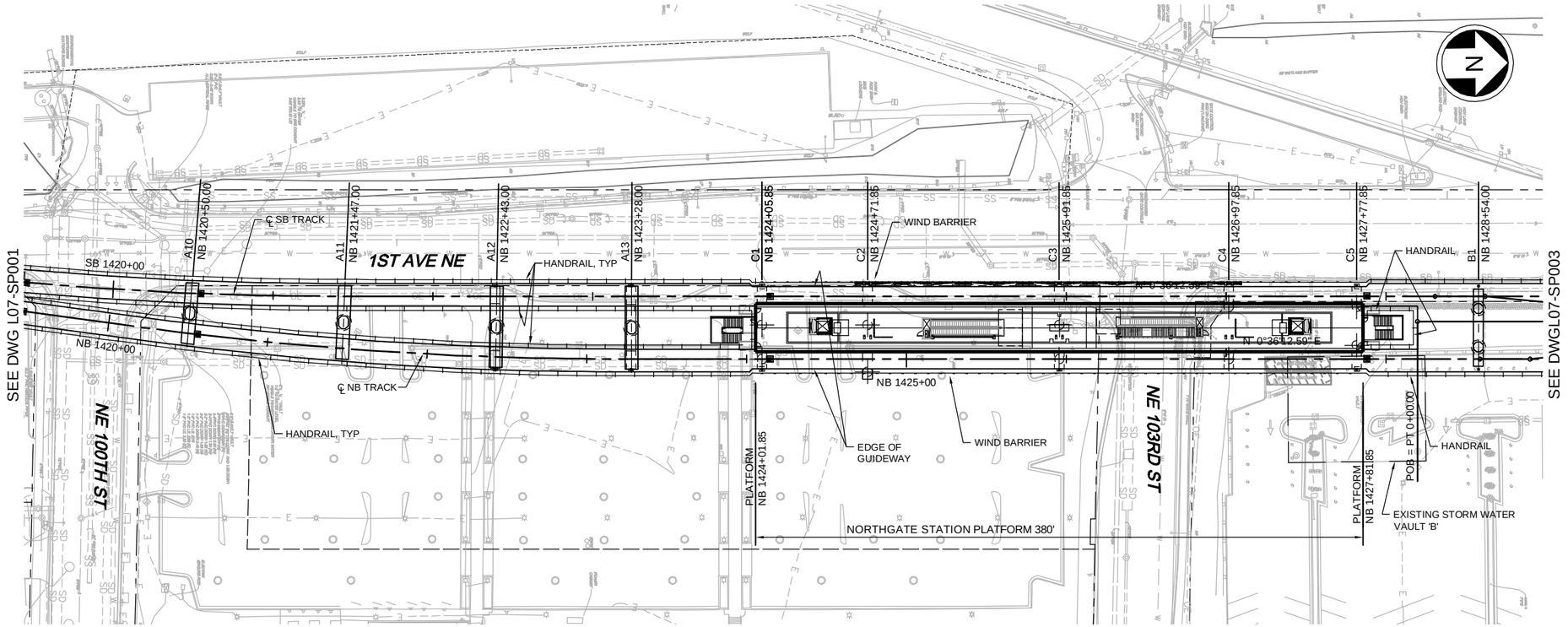
1. SEE NOTES ON DRAWING No. L07-SP001.



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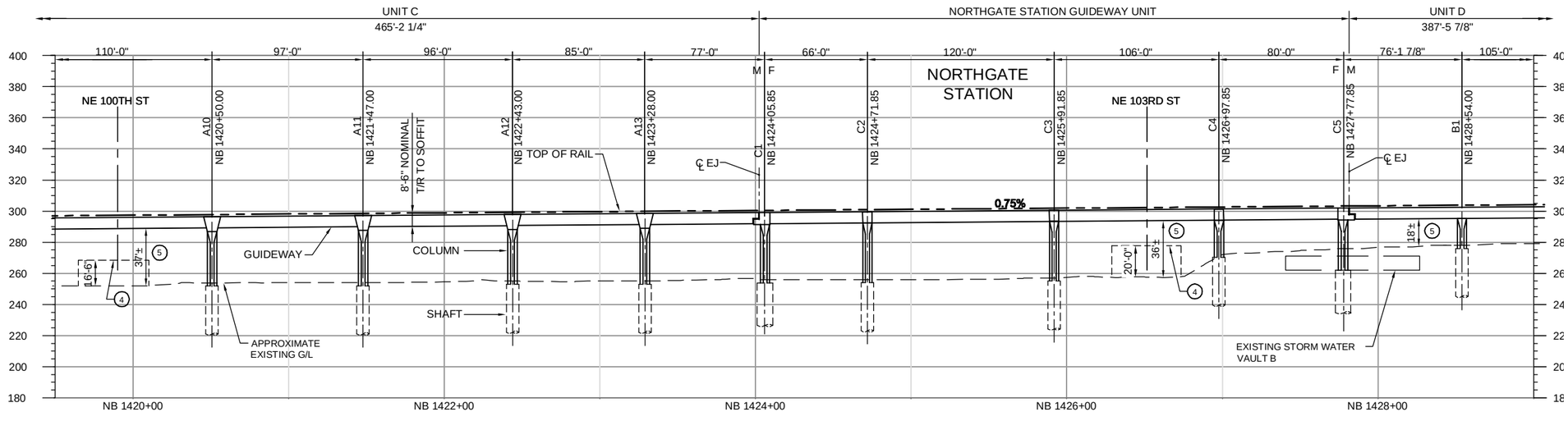

DEVELOPED ELEVATION

LEGEND:

WIND BARRIER
HANDRAIL
DECK DRAIN

No.	Date	Dsn	Chk	App	Revisions

City of Seattle

Work Order No:	Approved:
Permit No:	Inspector's Book:
	Received:
	Revised As Built:
SDOT:	

Designed By:	Y. POLYAKOV
Drawn By:	T. STEWART
Checked By:	L. AMUNDSON
Approved By:	Y. POLYAKOV

30% SUBMITTAL

JACOBS ASSOCIATES
Engineers/Consultants
PARSONS BRINCKERHOFF

Submitted: Date:

Approved: Date:

LINE IS 1 INCH AT FULL SIZE (IF NOT, SCALE ACCORDINGLY)

SOUNDTRANSIT

Scale:	1"=40'
Filename:	N60_L07_SP002.dwg
Contract No:	N160
Date:	

LINK CONTRACT N160
NORTHGATE STATION & ELEVATED GUIDEWAYS

ELEVATED GUIDEWAY
GENERAL LAYOUT
SHEET 2 OF 3

Drawing No.	L07-SP002
Vault Plan No.	
Sheet No.	Rev No.

Attachment A-21

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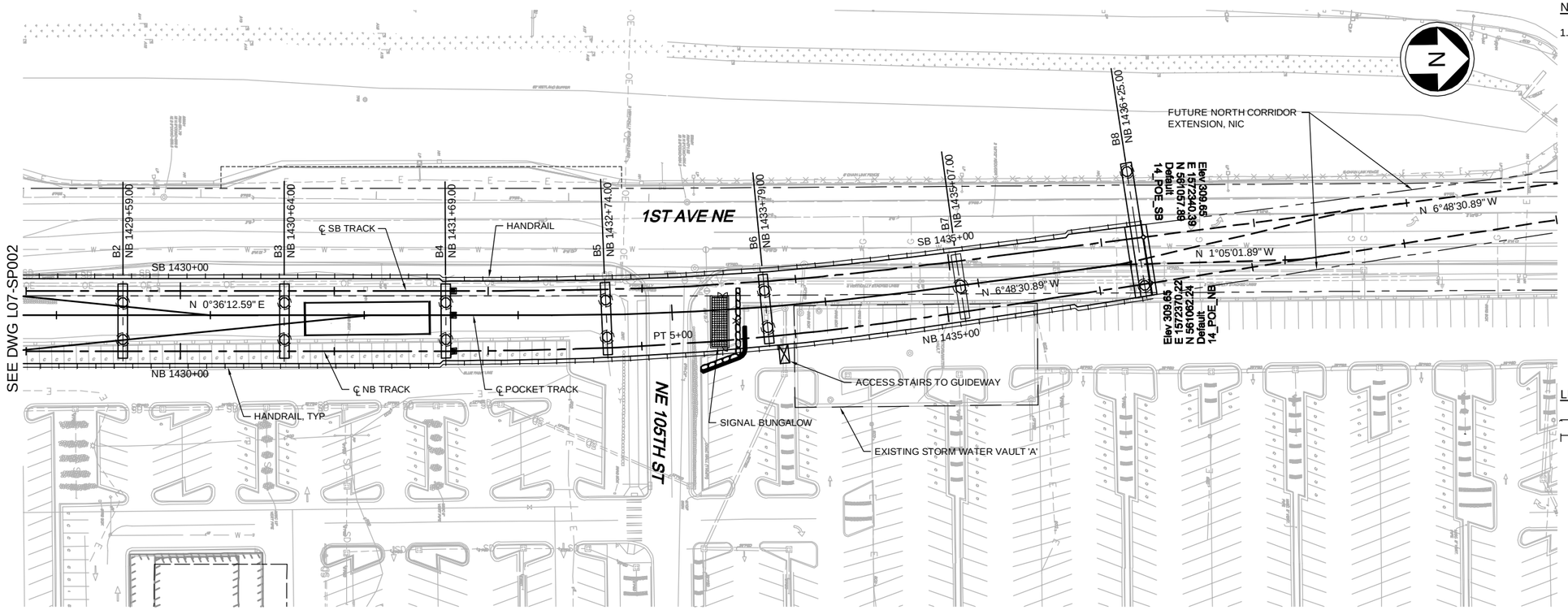

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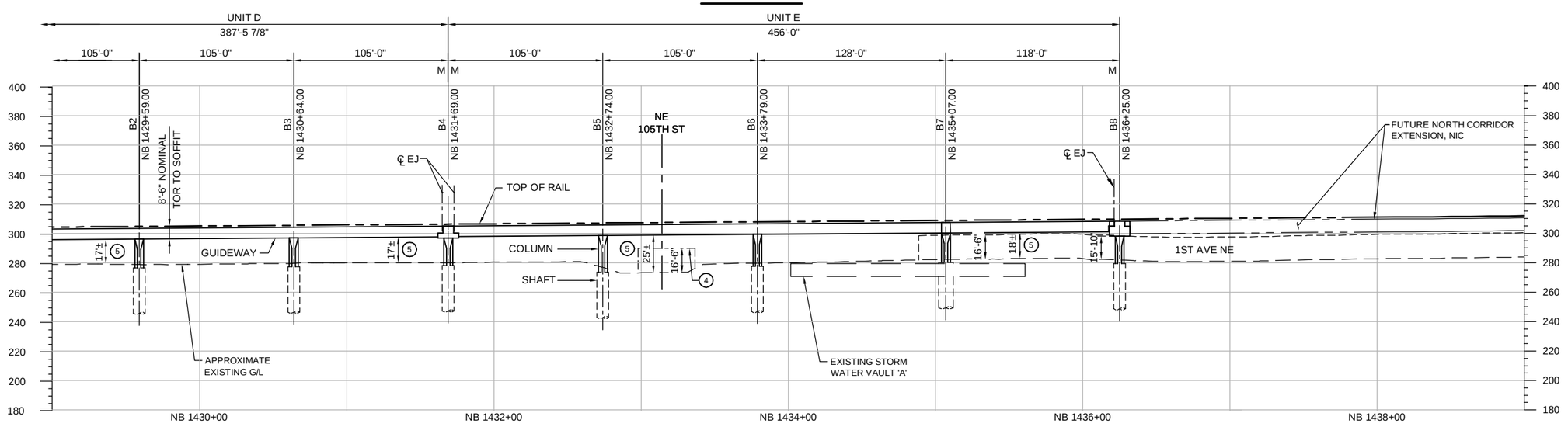

DEVELOPED ELEVATION

NOTES:

1. SEE NOTES ON DRAWING No. L07-SP001.

LEGEND:

- WIND BARRIER
- HANDRAIL
- DECK DRAIN

No.	Date	Dsn	Chk	App	Revisions

City of Seattle

Work Order No:	Approved:
Permit No:	Inspector's Book:
	Received:
	Revised As Built:
SDOT:	

Designed By:	Y. POLYAKOV
Drawn By:	T. STEWART
Checked By:	L. AMUNDSON
Approved By:	Y. POLYAKOV

YAKOV POLYAKOV — STATE OF WASHINGTON — 31252 — STRUCTURAL ENGINEER — PROFESSIONAL ENGINEER

30% SUBMITTAL

JACOBS ASSOCIATES
Engineers/Consultants
PARSONS BRINCKERHOFF

Submitted: Date:

Approved: Date:

LINE IS 1 INCH AT FULL SIZE (IF NOT, ADJUST ACCORDINGLY)

SOUNDTRANSIT

Date:

Scale:	1"=40'
Filename:	N60_L07_SP003.dwg
Contract No:	N160

LINK CONTRACT N160
NORTHGATE STATION & ELEVATED GUIDEWAYS

ELEVATED GUIDEWAY
GENERAL LAYOUT
SHEET 3 OF 3

Drawing No.	L07-SP003
Vault Plan No.	
Sheet No.	Rev No.
Attachment A-22	

VAULT SERIAL NO. | DATE | MARK | MADE | CHK'D | REV'D

NATURE OF REVISIONS

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Attachment B
Noise and Vibration

Attachment B Noise and Vibration

Noise

A detailed noise impact and mitigation analysis was performed for the North Link Light Rail Project. The detailed analysis included 58 receiver locations, which represent 128 single- and multi-family residences between the tunnel portal at NE 94th Street and the Northgate Station.

In order to establish baseline noise levels along the corridor, noise levels were measured for 48 hours or more at four sites along 1st Avenue NE. Existing noise levels at residences near the portal ranged from 74 to 77 dBA L_{dn}, with peak hour noise levels ranging from 67 to 74 dBA L_{eq}. Noise levels at the condominiums east of the Northgate Station were measured at 67 dBA L_{dn} with peak hour noise levels of 64 to 69 dBA L_{eq}. The major noise source for all residences in the study area, from NE 92nd Street to the Northgate Station, is traffic on I-5.

Operational noise levels from the light rail were predicted to range from 52 to 70 dBA Ldn at the receiver locations. Based on the measured noise levels, the FTA impact criteria for each receiver was determined and the noise impact predictions shown on Table B-2 and Figure B-1, with a more detailed figure of the affected properties provided in Figure B-2, which includes cross sections.

Two different options for noise abatement measures were evaluated for the noise impacts. Option one is to provide a set of three noise walls. The first wall would be located on the retaining wall of the retained cut section, with heights ranging from 4 to 16 feet high, ending at the high rail vehicle access pad. A second sound wall would be located near the tracks, beginning just south of the high rail vehicle access, overlapping the retained cut wall, starting at 12 feet and reducing to 8 feet north of the trail track. A final wall would be located along the elevated structure from the retained fill section to just north of the double crossover, with a height of 6 feet. In addition to the noise walls, movable point or close point switch frogs would be used to reduce the noise levels at track crossovers. With the proposed noise mitigation measures, 23 of the impacts would be mitigated, but 10 units on the third and fourth floors of the condominiums could still exceed the FTA criteria. Those 10 units would be provided residential sound insulation. The selected option for noise mitigation for the upper units would provide a taller sound wall along the retained cut section, resulting in a wall that would be 23 feet tall near the Northgate Plaza Condominiums. Under this option, all noise impacts would be mitigated and no sound insulation would be required. The taller noise wall is not currently included in the project design.

Groundborne Noise and Vibration

A detailed groundborne noise and vibration impact and mitigation analysis was performed for the North Link Light Rail Project. The groundborne noise and vibration levels from future light rail operations have been projected for sensitive land uses between the University of Washington (UW) Station and the end of the tail track near Northgate Station. This analysis follows the procedure described in the Federal Transit Administration (FTA) guidance manual *Transit Noise and Vibration Impact Assessment*.[1] The results of the analysis are shown in Table B-1 and Figure B-1.

[1] *Transit Noise and Vibration Impact Assessment*, U.S. Dept. of Transportation, Federal Transit Administration, Office of Planning and Environment, Report No. FTA-VA-90-1003-06, May 2006.

Table B-1. Potential Groundborne Noise and Vibration Impacts

Project Area	Number of Potential Impacts			
	No mitigation (Standard fasteners)		Resilient Track Fasteners	
	Vibration	Groundborne Noise	Vibration	Groundborne Noise
North end of University of Washington Station to north end of Roosevelt Station	0	55-60	0	0
North end of Roosevelt Station to Northgate	0	85-90	0	0

Potential groundborne noise impacts have been projected at up to 150 properties. The FTA criteria for groundborne noise impacts are expressed as A-weighted sound levels, representing a sound level scale that corresponds to people's ability to hear changes in noise levels and how frequently a noise event occurs. For residential properties, the criteria for groundborne noise impacts is 35 dBA, and for offices, schools or similar sensitive uses, the criteria is 40 dBA. To avoid an impact, the predicted levels must be below the criteria. Groundborne noise levels are predicted to equal or exceed the FTA criteria by 1 to 4 dBA at 150 receptors, assuming rail supported by standard direct fixation fasteners (STDF). If resilient fasteners are used near these receptors, then groundborne noise are predicted to be below the FTA criteria by 1 to 8 dBA.[2] Approximately 60 of the affected properties are south of Roosevelt Station and 90 are located north of Roosevelt Station. Projected levels for other receptors is typically 1 to 4 dBA below the criteria using STDF.

Vibration levels are all predicted to be below the FTA criteria on both an overall basis and in the one third octave bands. The individual one third octave band levels are less than the overall levels. Two sets of criteria are indicated: one for human occupancy, and the other for sensitive manufacturing and research facilities. The standard for residential is 72 vdB, while the standard for sensitive facilities is 75 vdB. The projected levels for vibration take into account the use of resilient fasteners to mitigate groundborne noise impacts, but in most locations the ground vibration levels are at least 10 vdB below the criteria. The lack of ground vibration impact is consistent with the stiff nature of the over-consolidated glacial deposits in the area.[2] The FTA vibration criteria would be satisfied along the entire alignment with standard track fasteners, even if the resilient fasteners were not needed for the groundborne noise impacts identified above.[3, 4]

[2] Jacobs Associates/Michael Minor and Associates, for Sound Transit, North Link Final Design Task 820: Design of Noise Mitigation for At Grade and Elevated Guideways, January 2012

[3] Wilson Ihrig & Associates, 2011. North Link Final Design Task 830.2: N120 Subway Groundborne Noise and Vibration Analysis between University of Washington Station and Roosevelt Station. Memorandum dated December 20, 2011 to Salah Al-Tamimi and Tracy Reed from Derek Watry, James T. Nelson, and Dan Adams.

[4] Wilson Ihrig & Associates, 2012. North Link Final Design Task 830.2: N130 Subway Groundborne Noise and Vibration Analysis between Roosevelt Station and Northgate. Memorandum dated January 12, 2012 to Salah Al-Tamimi and Tracy Reed from Derek Watry, James T. Nelson, and Dan Adams.

Table B-2. North Link Light Rail Noise Analysis and Impact Summary

Receiver #, Address, Parcel #, Description, and Existing Noise Levels						Project Noise	FTA Criteria		Noise Impacts	
Rec #[1]	Address	Parcel[2]	Description[3]	L_{dn}[4]	Units[5]	L_{dn}[6]	Mod[7]	Sev[7]	Mod[8]	Sev[9]
R1	9220 1st Ave NE	3226049402	SF residence	74	1	57	66	73	--	--
R2	9226 1st Ave N	3226049264	SF residence	74	1	58	66	73	--	--
R3-1	102 NE 94th St	3226049178	Row House	74	1	59	66	73	--	--
R3-2	104 NE 94th St	3226049554	Row House	74	1	54	66	73	--	--
R3-3	106 NE 94th St	3226049555	Row House	72	1	54	66	72	--	--
R3-4	108 NE 94th St	3226049556	Row House	72	1	51	66	72	--	--
R4-1	9406 1st Ave NE	3226049280	Duplex	74	2	58	66	73	--	--
R4-2	9408 1st Ave NE	3226049563	Duplex (units A,B)	74	2	55	66	73	--	--
R5-1	9410 1st Ave NE	3226049170	SF residence	74	1	58	66	73	--	--
R5-2	9412 1st Ave N	3226049526	Triplex	68	1	52	63	69	--	--
R5-3	9412 1st Ave N	3226049526	Triplex	68	2	54	63	69	--	--
R6-1	9416 1st Ave NE	6173900000	South facing decks: Floor 1, Row 1	74	1	59	66	73	--	--
R6-2	9416 1st Ave NE	6173900000	South facing decks: Floor 1, Row 2	72	1	53	66	72	--	--
R6-3	9416 1st Ave NE	6173900000	South facing decks: Floor 1, Row 3	70	1	50	65	70	--	--
R6-4	9416 1st Ave NE	6173900000	South facing decks: Floor 2, Row 1	74	1	**66**	66	73	**1**	--
R6-5	9416 1st Ave NE	6173900000	South facing decks: Floor 2, Row 2	72	1	56	66	72	--	--
R6-6	9416 1st Ave NE	6173900000	South facing decks: Floor 2, Row 3	70	1	53	65	70	--	--
R6-7	9416 1st Ave NE	6173900000	South facing decks: Floor 3, Row 1	74	1	**67**	66	73	**1**	--
R6-8	9416 1st Ave NE	6173900000	South facing decks: Floor 3, Row 2	72	1	65	66	72	--	--
R6-9	9416 1st Ave NE	6173900000	South facing decks: Floor 3, Row 3	70	1	58	65	70	--	--
R6-10	9416 1st Ave NE	6173900000	South facing decks: Floor 4, Row 1	74	1	**68**	66	73	**1**	--
R6-11	9416 1st Ave NE	6173900000	South facing decks: Floor 4, Row 2	72	1	65	66	72	--	--
R6-12	9416 1st Ave NE	6173900000	South facing decks: Floor 4, Row 3	70	1	61	65	70	--	--
R6-13	9416 1st Ave NE	6173900000	North facing decks: Floor 1, Row 1	74	1	**69**	66	73	**1**	--
R6-14	9416 1st Ave NE	6173900000	North facing decks: Floor 1, Row 2	72	1	62	66	72	--	--
R6-15	9416 1st Ave NE	6173900000	North facing decks: Floor 1, Row 3	70	1	59	65	70	--	--
R6-16	9416 1st Ave NE	6173900000	North facing decks: Floor 2, Row 1	74	1	**69**	66	73	**1**	--
R6-17	9416 1st Ave NE	6173900000	North facing decks: Floor 2, Row 2	72	1	62	66	72	--	--
R6-18	9416 1st Ave NE	6173900000	North facing decks: Floor 2, Row 3	70	1	62	65	70	--	--

Table B-2. North Link Light Rail Noise Analysis and Impact Summary

Receiver #, Address, Parcel #, Description, and Existing Noise Levels						Project Noise	FTA Criteria		Noise Impacts	
Rec #[1]	Address	Parcel[2]	Description[3]	L_{dn}[4]	Units[5]	L_{dn}[6]	Mod[7]	Sev[7]	Mod[8]	Sev[9]
R6-19	9416 1st Ave NE	6173900000	North facing decks: Floor 3, Row 1	74	1	**69**	66	73	**1**	--
R6-20	9416 1st Ave NE	6173900000	North facing decks: Floor 3, Row 2	72	1	**68**	66	72	**1**	--
R6-21	9416 1st Ave NE	6173900000	North facing decks: Floor 3, Row 3	70	1	62	65	70	--	--
R6-22	9416 1st Ave NE	6173900000	North facing decks: Floor 4, Row 1	74	1	**69**	66	73	**1**	--
R6-23	9416 1st Ave NE	6173900000	North facing decks: Floor 4, Row 2	72	1	**68**	66	72	**1**	--
R6-24	9416 1st Ave NE	6173900000	North facing decks: Floor 4, Row 3	70	1	62	65	70	--	--
R7-1S	9512 1st Ave NE	1310450000	Floor 1 - facing tracks south units	74	2	**70**	66	73	**2**	--
R7-2S	9513 1st Ave NE	1310450000	Floor 2 - facing tracks south units	74	2	**70**	66	73	**2**	--
R7-3S	9514 1st Ave NE	1310450000	Floor 3 - facing tracks south units	74	2	**70**	66	73	**2**	--
R7-4S	9515 1st Ave NE	1310450000	Floor 4 - facing tracks south units	74	2	**70**	66	73	**2**	--
R7-1N	9512 1st Ave NE	1310450000	Floor 1 - facing tracks north units	74	2	**70**	66	73	**2**	--
R7-2N	9513 1st Ave NE	1310450000	Floor 2 - facing tracks north units	74	2	**70**	66	73	**2**	--
R7-3N	9514 1st Ave NE	1310450000	Floor 3 - facing tracks north units	74	2	**70**	66	73	**2**	--
R7-4N	9515 1st Ave NE	1310450000	Floor 4 - facing tracks north units	74	2	**70**	66	73	**2**	--
R7-5	9516 1st Ave NE	1310450000	Floor 1 - south side of building	72	1	65	66	72	--	--
R7-6	9517 1st Ave NE	1310450000	Floor 2 - south side of building	72	1	65	66	72	--	--
R7-7	9518 1st Ave NE	1310450000	Floor 3 - south side of building	72	1	65	66	72	--	--
R7-8	9519 1st Ave NE	1310450000	Floor 4 - south side of building	72	1	65	66	72	--	--
R7-9	9520 1st Ave NE	1310450000	Floor 1 - north side of building	70	1	63	65	70	--	--
R7-10	9521 1st Ave NE	1310450000	Floor 2 - north side of building	70	1	63	65	70	--	--
R7-11	9522 1st Ave NE	1310450000	Floor 3 - north side of building	70	1	63	65	70	--	--
R7-12	9523 1st Ave NE	1310450000	Floor 4 - north side of building	70	1	63	65	70	--	--
R8-1	9520 1st Ave NE	7532850000	Floor 1 - facing tracks	74	2	**70**	66	73	**2**	--
R8-2	9520 1st Ave NE	7532850000	Floor 2 - facing tracks	74	2	**70**	66	73	**2**	--
R8-3	9520 1st Ave NE	7532850000	Floor 1 - south side of building	72	2	64	66	72	--	--
R8-4	9520 1st Ave NE	7532850000	Floor 2 - south side of building	72	2	64	66	72	--	--
R8-5	9520 1st Ave NE	7532850000	Floor 1 - north side of building	72	2	64	66	72	--	--
R8-6	9520 1st Ave NE	7532850000	Floor 2 - north side of building	72	2	64	66	72	--	--
R-9-1	9522 1st Ave NE	870100000	Floor 1 - facing tracks	74	1	**70**	66	73	**1**	--

Table B-2. North Link Light Rail Noise Analysis and Impact Summary

Receiver #, Address, Parcel #, Description, and Existing Noise Levels						Project Noise	FTA Criteria		Noise Impacts	
Rec #[1]	**Address**	**Parcel[2]**	**Description[3]**	**L_{dn}[4]**	**Units[5]**	**L_{dn}[6]**	**Mod[7]**	**Sev[7]**	**Mod[8]**	**Sev[9]**
R-9-2	9522 1st Ave NE	870100000	Floor 2 - facing tracks	74	1	**70**	66	73	**1**	--
R-9-3	9522 1st Ave NE	870100000	Floor 3 - facing tracks	74	1	**70**	66	73	**1**	--
R-9-4	9522 1st Ave NE	870100000	Floor 4 - facing tracks	74	1	**70**	66	73	**1**	--
R10	308 NE Thornton Pl	8632860000	All six floors facing station	66	48	58	62	68	--	--
			Total Analyzed		**126**			**Total Impacts**	**33**	**0**

Notes:

1. Receivers shown on Figure B-2, except for R-10, at 30 NE Thornton Place (east of Northgate Station)
2. King County parcel numbers
3. General description of modeling location; all FTA Category 2 land use
4. Existing L_{dn} at receiver site
5. Number of units (residences, apartments, condominiums) represented by each receiver location
6. Project L_{dn} from light rail operations, including bells and crossovers where applicable
7. FTA moderate (Mod) and severe (Sev) impact criteria
8. Number of moderate noise impacts
9. Number of severe noise impacts

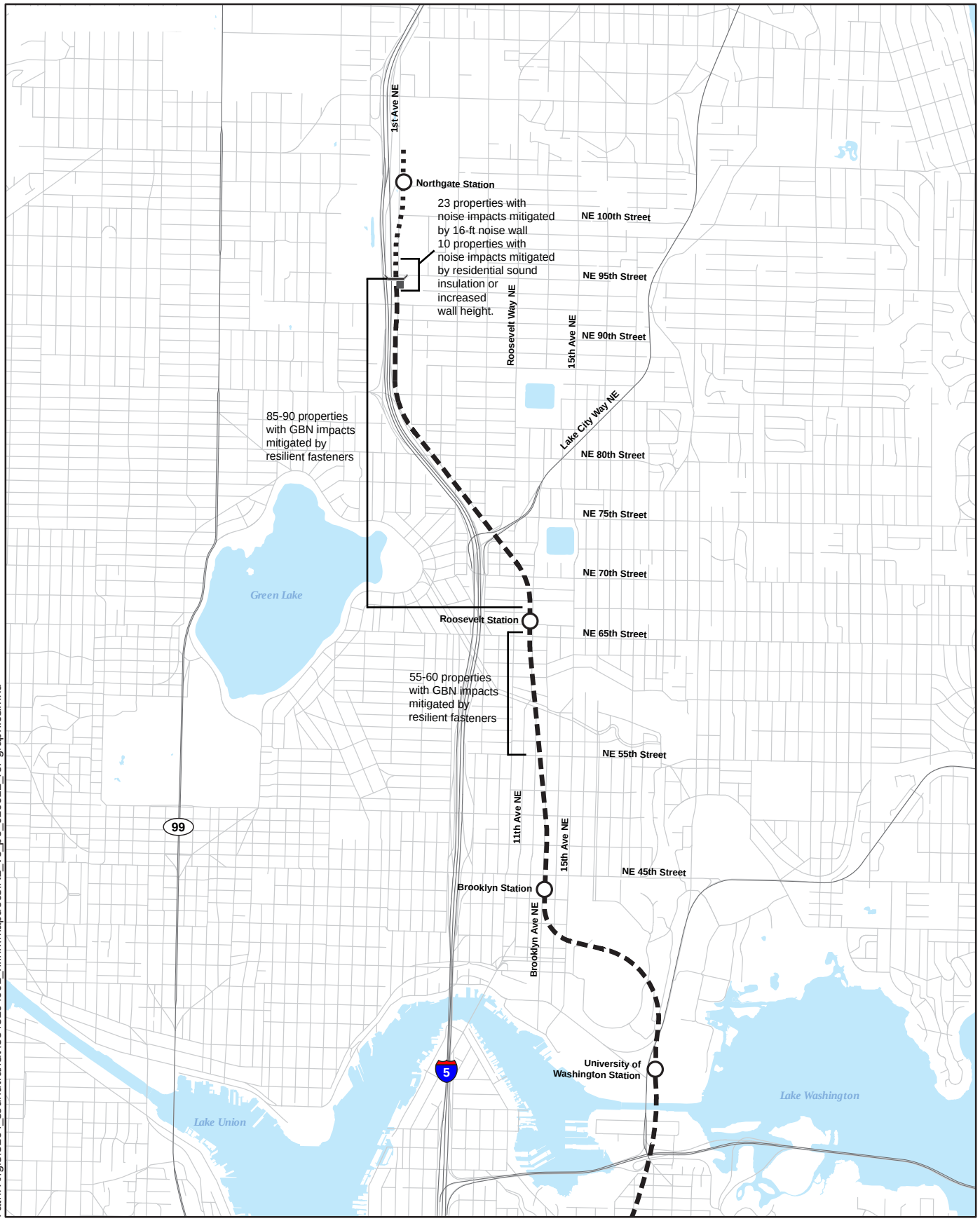
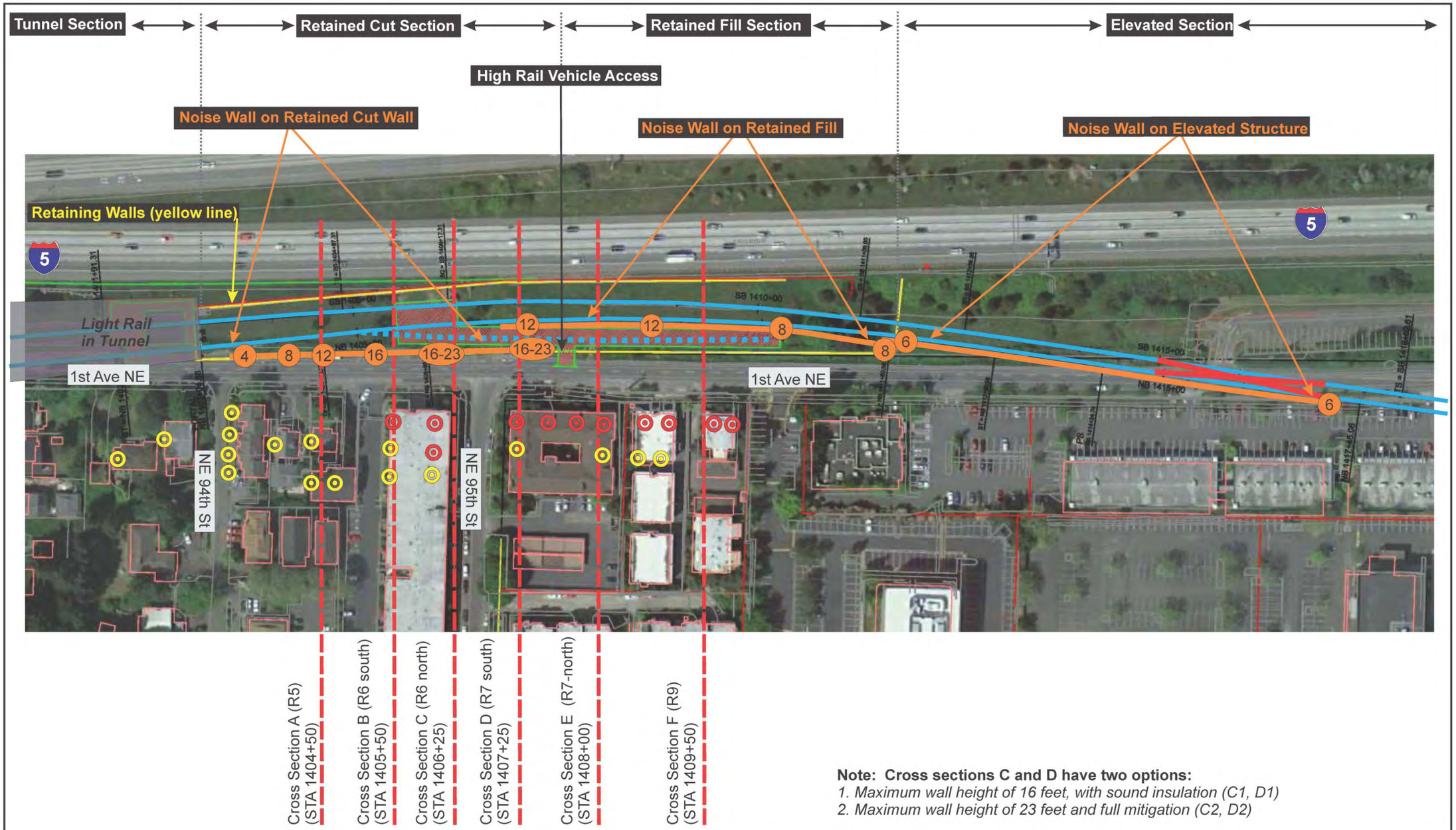
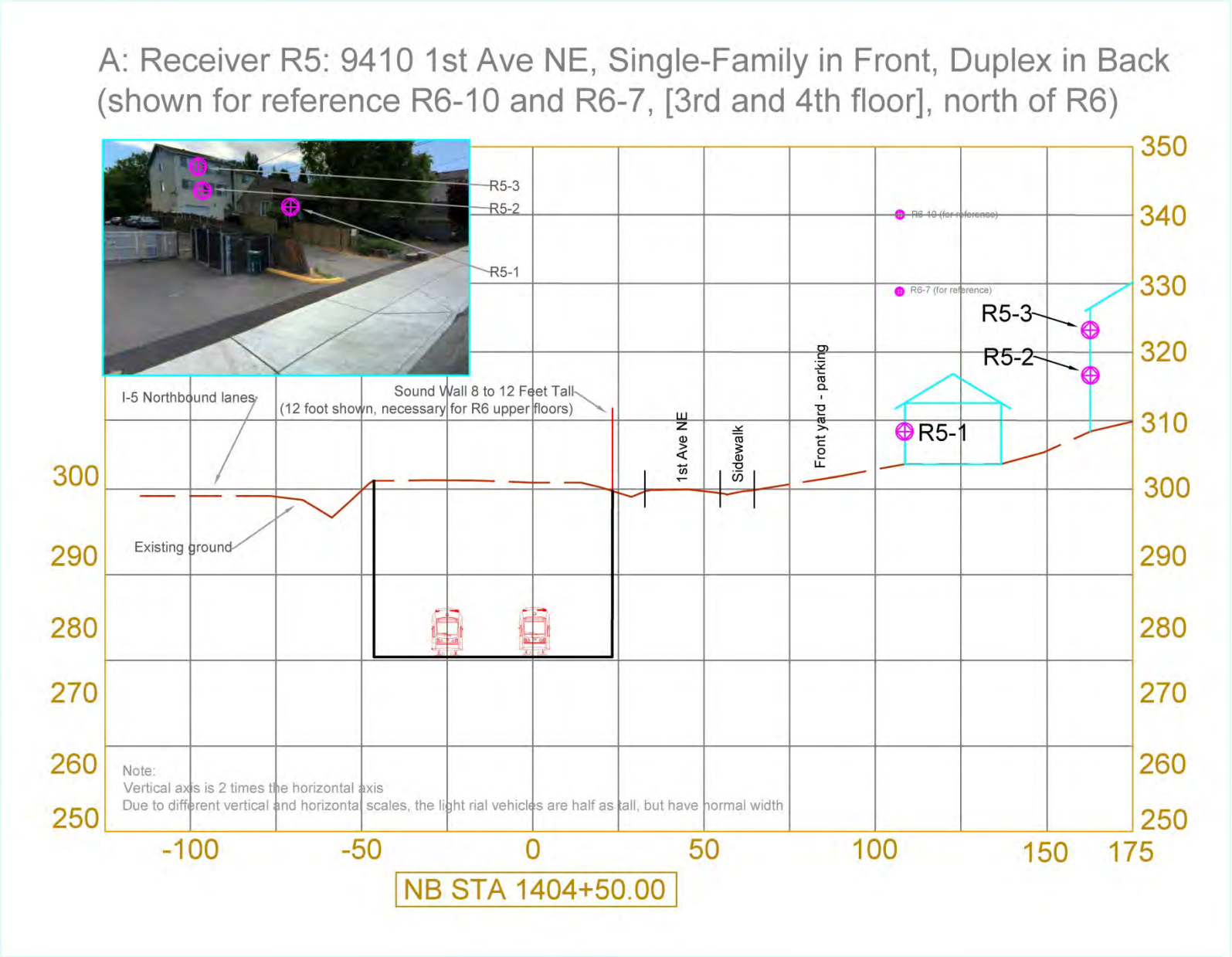


Figure B-1
Noise and Groundborne Noise Impacts Requiring Mitigation

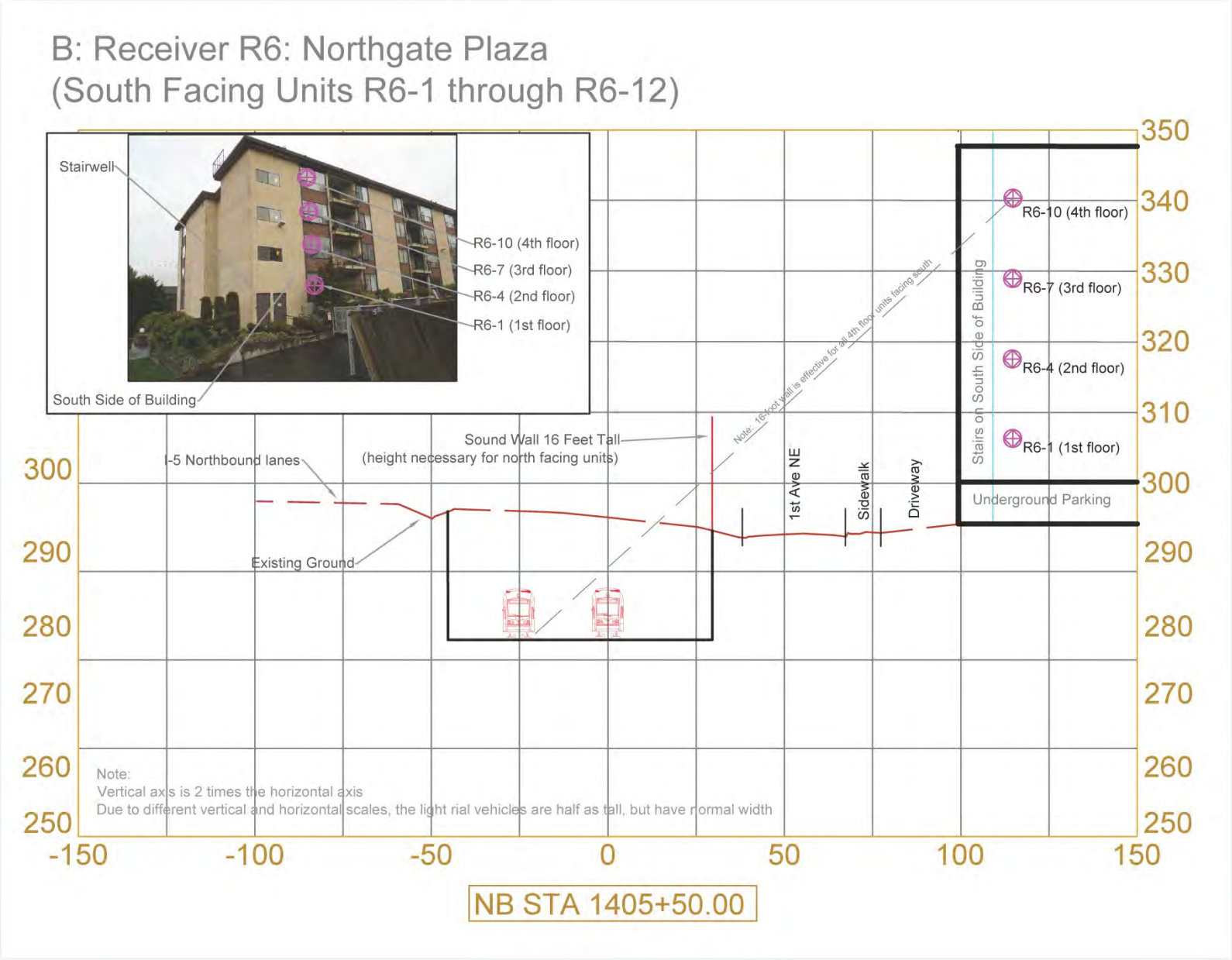
Figure B-2


Tunnel Section
Retained Cut Section
Retained Fill Section
Elevated Section
High Rail Vehicle Access
Noise Wall on Retained Cut Wall
Noise Wall on Retained Fill
Noise Wall on Elevated Structure
Retaining Walls (yellow line)
Light Rail in Tunnel
1st Ave NE
1st Ave NE
NE 94th St
NE 95th St
4
8
12
16
16-23
12
16-23
12
8
8
6
6
5
5
Cross Section A (R5) (STA 1404+50)
Cross Section B (R6 south) (STA 1405+50)
Cross Section C (R6 north) (STA 1406+25)
Cross Section D (R7 south) (STA 1407+25)
Cross Section E (R7-north) (STA 1408+00)
Cross Section F (R9) (STA 1409+50)
Note: Cross sections C and D have two options:
1. Maximum wall height of 16 feet, with sound insulation (C1, D1)
2. Maximum wall height of 23 feet and full mitigation (C2, D2)
No Impact
Impact
Light Rail Alignment
20
Noise Wall Locations and Heights (in feet)
Storage Track
Michael Minor & Associates
Sound.Vibration.Air
Portland, Oregon
0 50 100 200
1.00 in
Approximate Scale 1 inch = 100 feet
(11 x 17 inch format)
N
Detailed Noise Impact Analysis
Noise Wall Locations and Heights
North Link Light Rail Noise Analysis

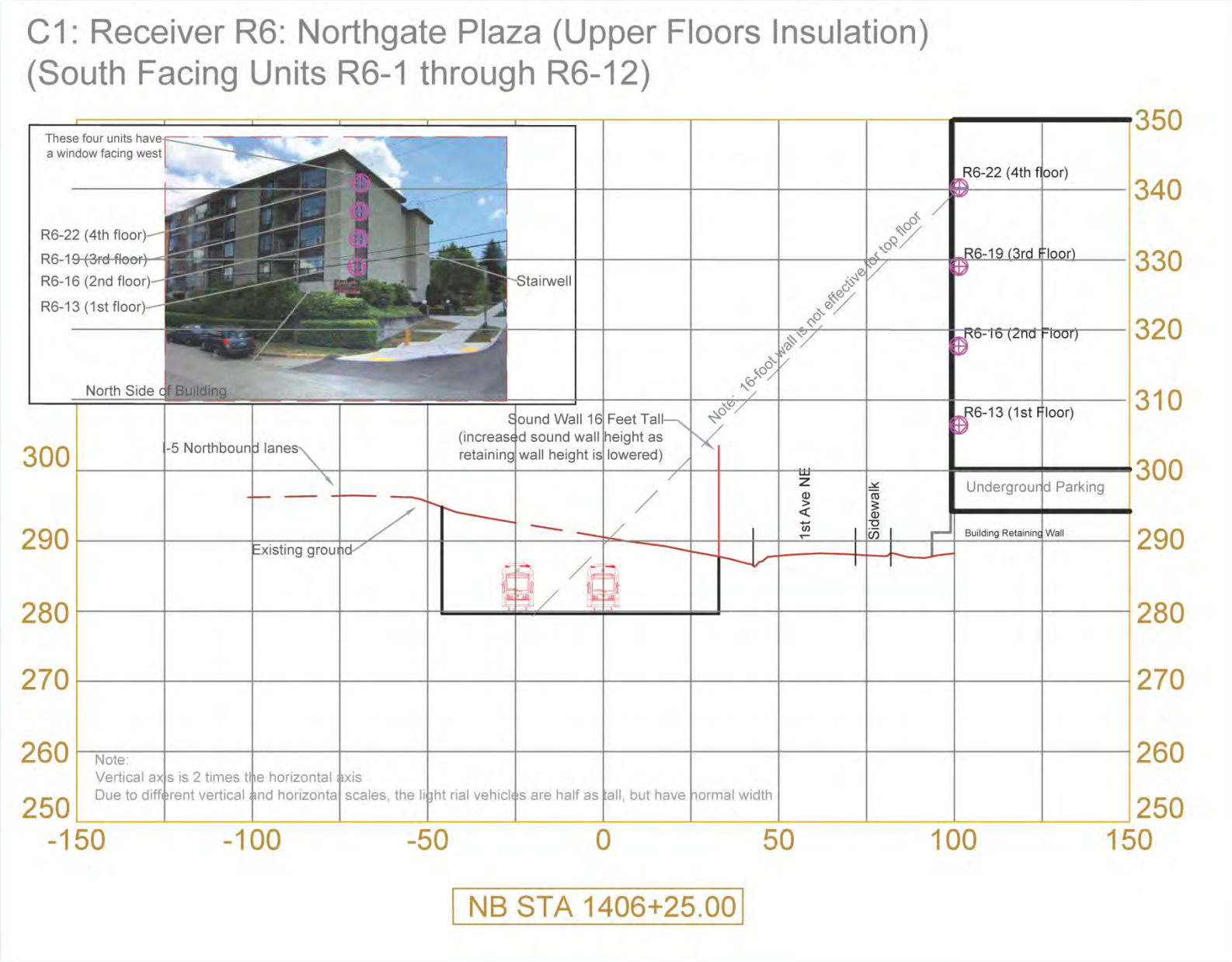
Cross Section A



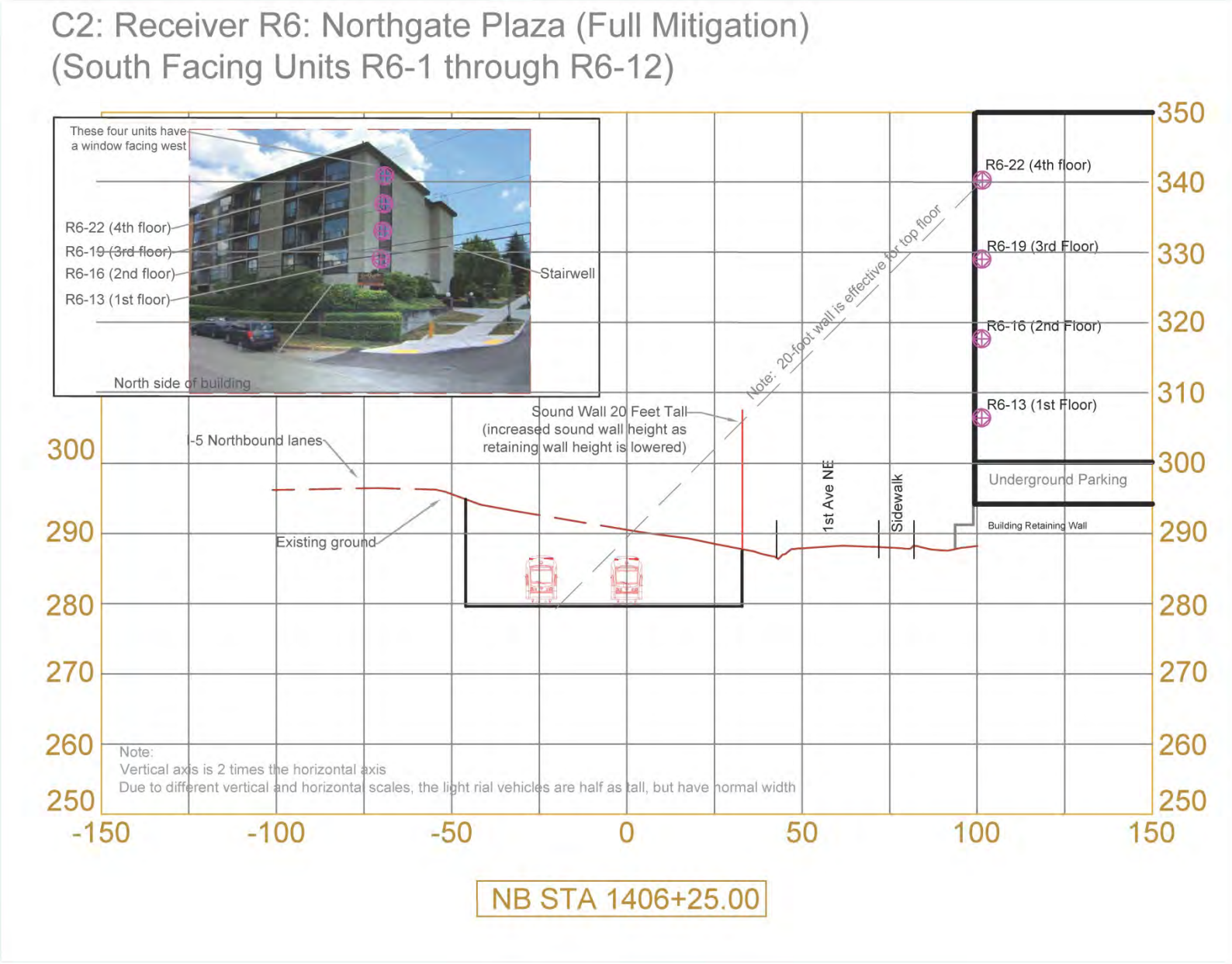
Cross Section B



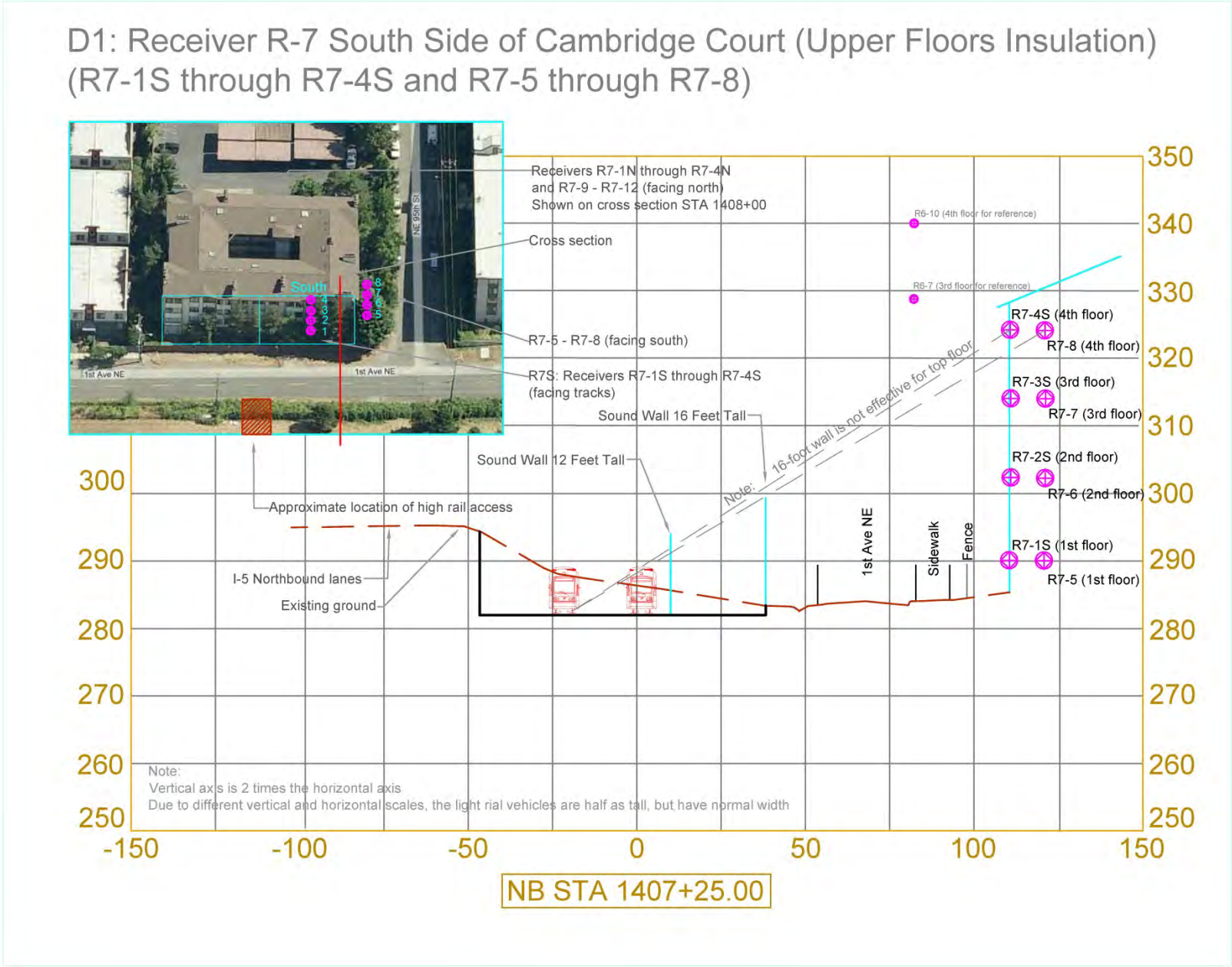
Cross Section C1



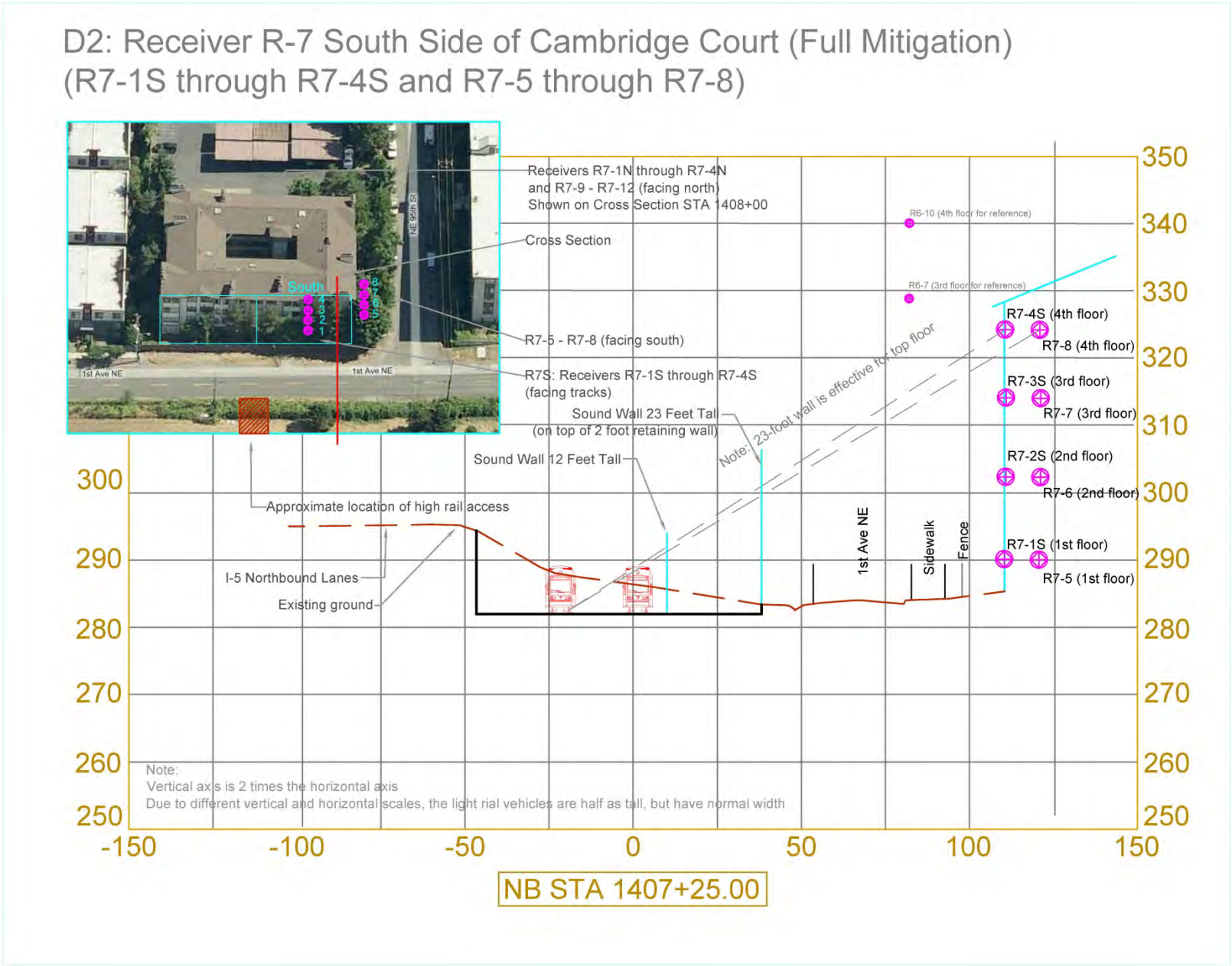
Cross Section C2



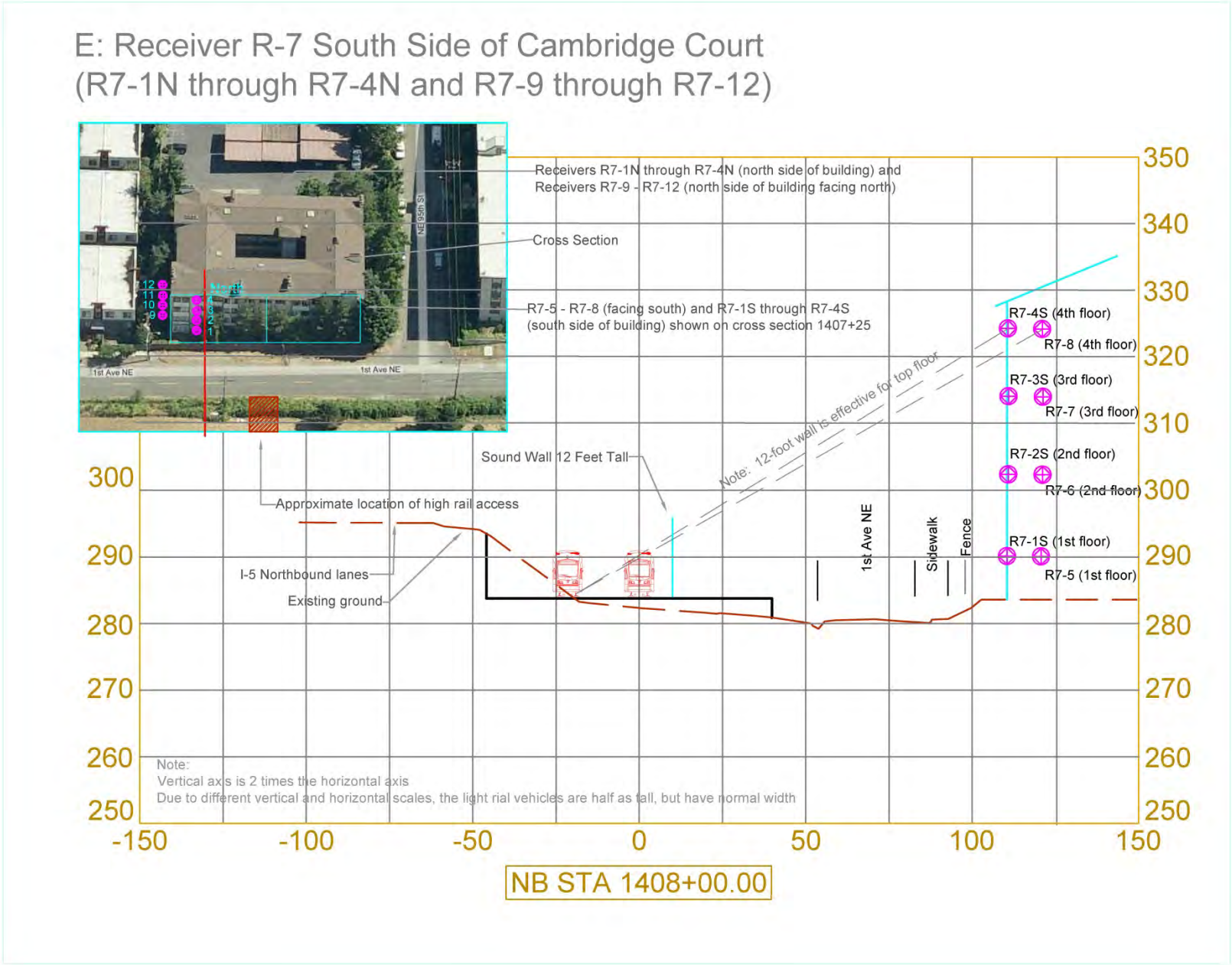
Cross Section D1



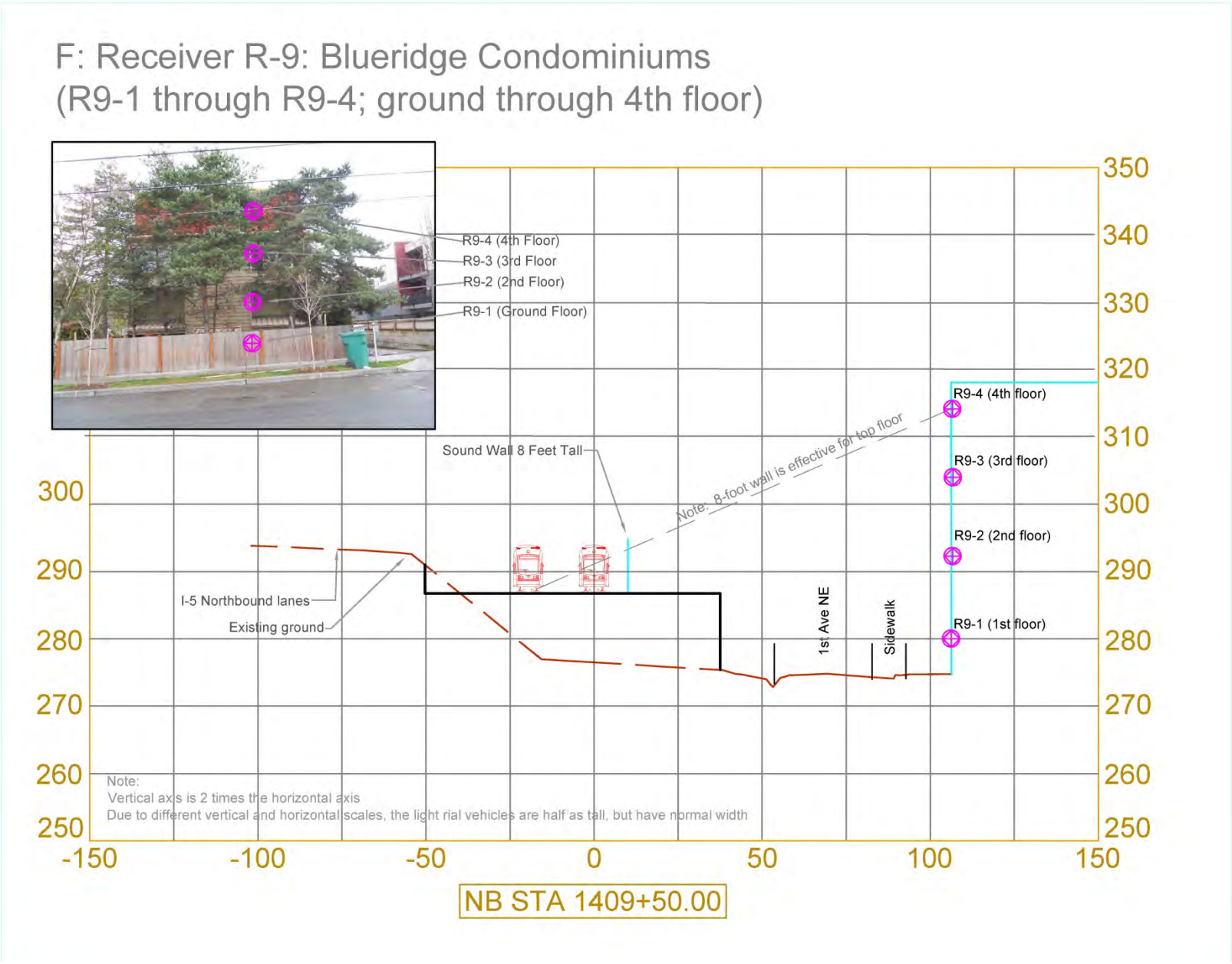
Cross Section D2



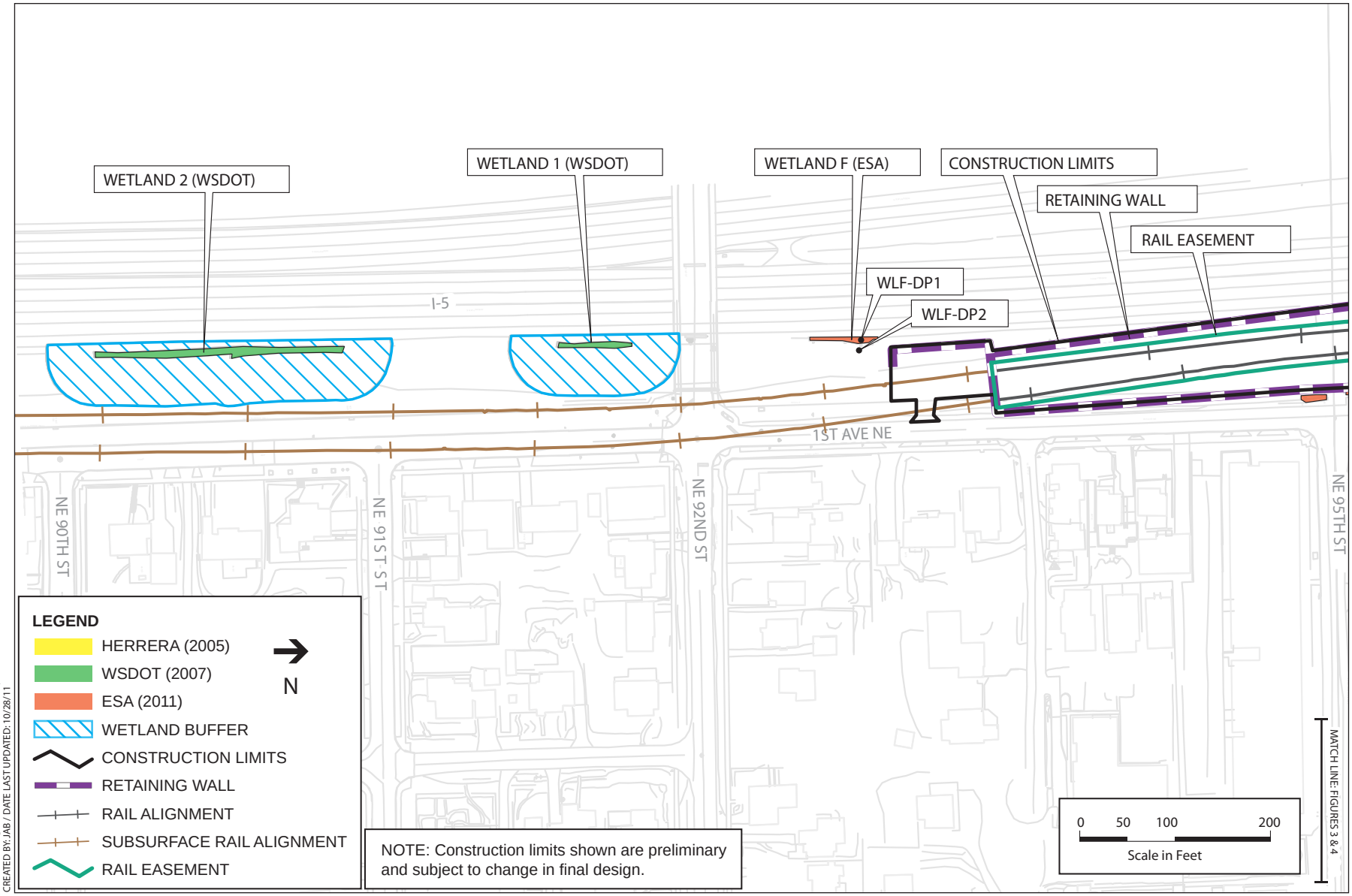
Cross Section E



Cross Section F



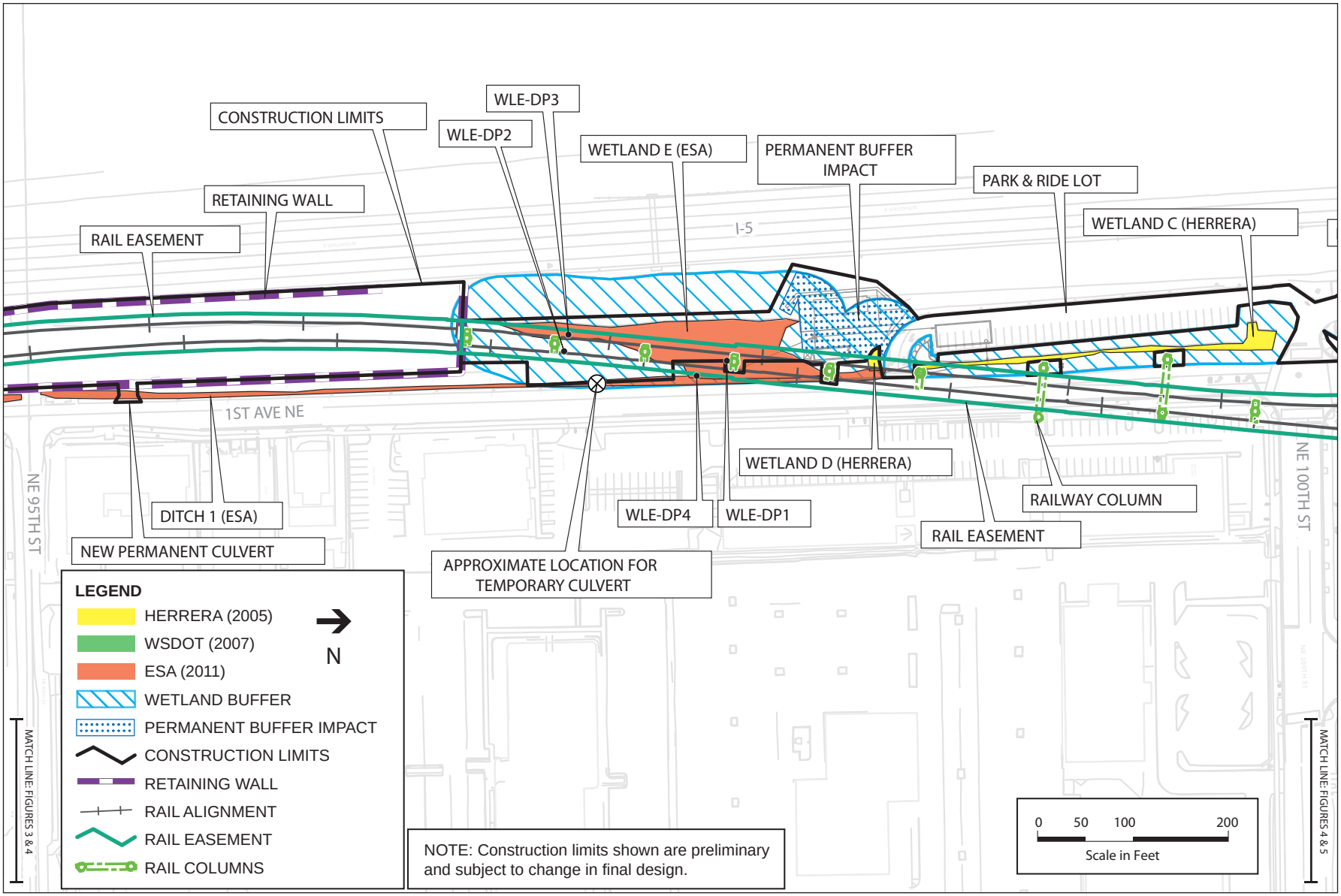
Attachment C
Wetland Effects



SOURCE: KPFF, 2011; ESA, 2011.

ST North Link . 210184

Attachment C-1
Wetlands and Watercourses in Study Area (South)
Seattle, Washington



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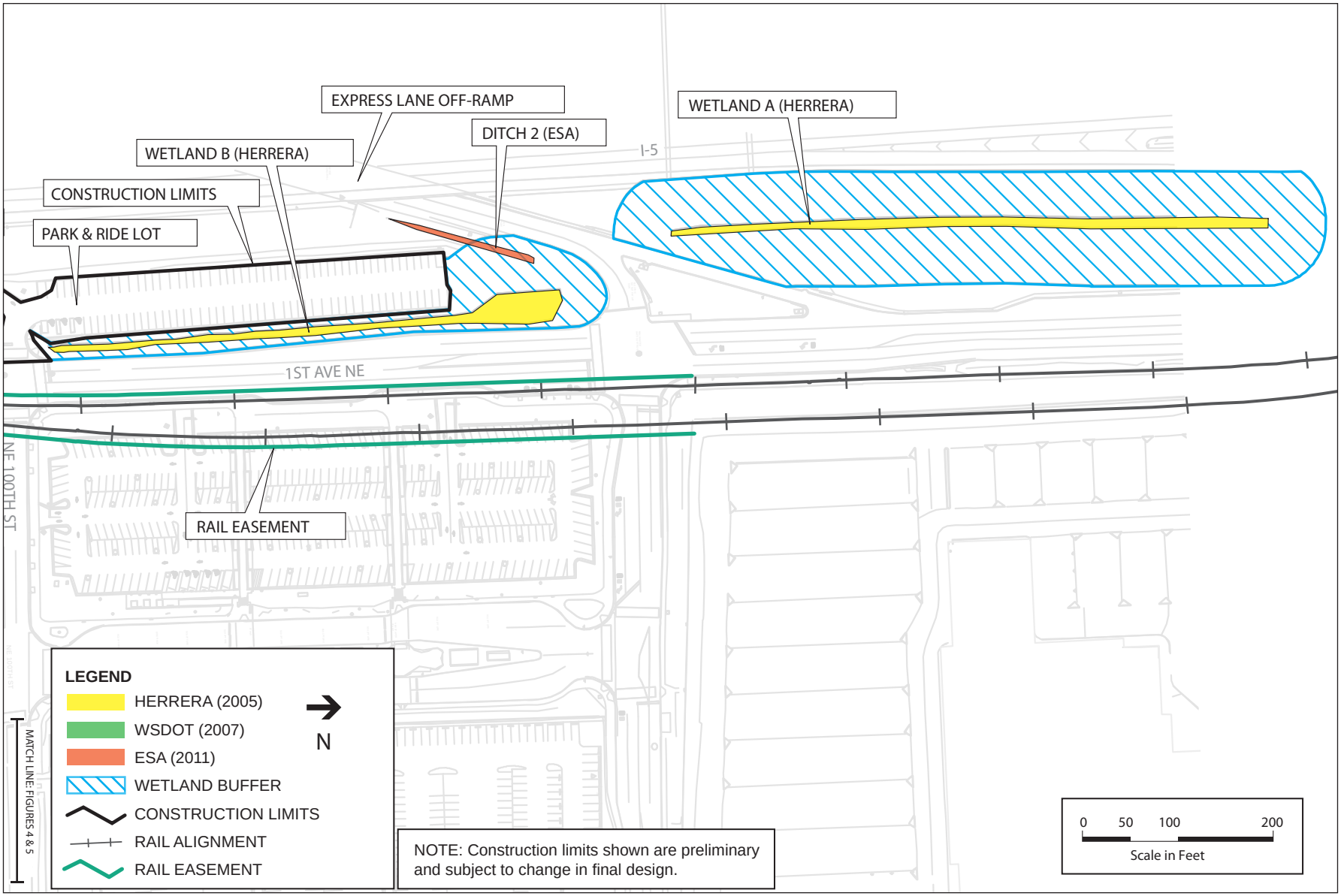
CREATED BY: JAB / DATE LAST UPDATED: 10/28/11

SOURCE: KPFF, 2011; ESA, 2011.

ST North Link . 210184

Attachment C-2
Wetlands and Watercourses in Study Area (Central)
Seattle, Washington



SOURCE: KPFF, 2011; ESA, 2011.

ST North Link . 210184

Attachment C-3
Wetlands and Watercourses in Study Area (North)
Seattle, Washington