42nd Ave S Bridge Replacement Type, Size, & Location Report

Prepared for:
City of Tukwila Public Works - Engineering
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Executive Summary

This project will replace the existing bridge over the Duwamish River that was constructed in 1949. The physical condition of this bridge has been deteriorating in recent years and requires constant maintenance. Recommendation for a replacement bridge and its alignment is based on considerations of the environmental process determinations, budget and stakeholder input. The completed bridge will have a roadway section that will consist of two 12-foot lanes, two 2-foot shoulders and a separated 10-foot pedestrian path for a total width of 42 feet out-to-out. The project is scheduled to go to construction in 2024.

The design team developed a list of critical project criteria and improvements/impacts for the project. Criteria was developed for environmental, social and cost considerations associated with the project. The criteria used for comparison purposes included:

Environmental:
- Natural River Flow Conditions
- Natural Bank Habitat Conditions

Social:
- Temporary MOT Impacts
- Aesthetics

Costs:
- Construction Costs (Bridge and Approaches)
- Right of Way Costs

In close collaboration with the City, the design team made careful examination of a final list of two alignments, 42nd Ave S and S 124th Street, and two viable structural bridge alternatives for each alignment, from all facets of engineering disciplines, seeking an optimized bridge solution with respect to the above mentioned criteria. The viable alternatives for each alignment are:

42nd Ave S Alignment
Alternative 1 A - Three-span precast concrete girder
Alternative 1 B - Three-span steel plate girder

S 124th Street Alignment
Alternative 2 A - Three-span precast concrete girder
Alternative 2 B - Three-span steel plate girder

Although the study presented in this report leads to the conclusion that the Alternative 2B on the S 124th Street alignment (i.e., Three-span steel plate girder bridge) best meets the engineering criteria set forth for the project, City staff, with feedback from the community through multiple public outreaches, have recommended to the design team to move forward with the Alternative 1B on the 42nd Ave S alignment. The cost of this alternative is approximately $24.4M.

The design team will advance the design of Alternative 1B on 42nd Ave S alignment to construction documents.

Table of Contents

1. Introduction

This project will replace the existing City of Tukwila's (City) South (S) 42nd Ave Bridge with a new multi-span bridge.

The existing 42nd Ave S Bridge was built in 1949. It is a 3-span bridge that is 280-foot-long (30':220':30') and 28-feet wide (24' curb-to-curb) with the main span consisting of a through-truss that spans over Duwamish River.

The Average Daily Traffic volume (ADT) on this bridge was estimated in 2018 at 10,300 vehicles per day with 15% of those vehicles being heavy trucks. The 42nd Ave S Bridge is a primary crossing of the Duwamish River for the Allentown neighborhood, the Burlington Northern Santa Fe (BNSF) Intermodal Facility, and the Baker Commodities which are considered as major stakeholders of this project.

On December 15, 2021, the bridge was subject to a high impact load from a truck. The truck struck one sway frame of the bridge and inflicted some critical damages to it and its associated vertical elements of the through-trusses of the bridge. The City staff quickly got involved in securing a contractor for the repair of the damaged elements of the bridge. The bridge damages were repaired via a straightening process and the repairs were completed on January 3rd, 2022.

The existing repaired bridge has a sufficiency rating of 6.00 SD and is considered Structurally Deficient and Functionally Obsolete.

The City has been struggling with the deterioration of this bridge for many years. Starting in the 1990's with an expensive painting project, and followed a few years later by the emergency shoring of the northern approach roadway with a sheet pile wall system when the river threatened to wash away its northern approach fill. Even after those repairs, the north approach has continued to settle requiring constant maintenance to provide a smooth transition onto the bridge. The existing steel truss is a Fracture Critical structure and requires costly special access inspections every 24 months which must be proceeded by a cleaning of the structure to allow complete access to critical connections. Cleaning the bridge is also expensive and a logistical headache that yields only short-term benefits. The bridge currently needs further maintenance, and the cost of the necessary repairs to provide improved level of service per today's standards exceeds the cost of replacing the bridge.

Improving the level of service is extremely important for this route that serves in excess of 10,000 vehicle per day with 15% of those vehicles being trucks. The bridge is the only viable route for container trucks entering and leaving the Tukwila BNSF Intermodal Facility and is currently load posted restricting the free movement of that freight. The bridge's many structural deficiencies are compounded by the crossing of the frequent heavy loads as well as by deterioration suffered during its 70-year service life. Deterioration that occurred despite the preventative maintenance performed on the bridge.

The bridge bearings are locked causing continuing damage from temperature related expansion and contraction of the bridge. These deficiencies coupled with the bridge geometry have resulted in a bridge at risk of collapse during a strong seismic event.

The current truss is also narrow with only 24 feet curb-to-curb which further restricts the flow of traffic. Another issue is the width of the single sidewalk at just over 3 feet with the additional intrusion of the bridge truss structure into the pedestrian walkway. The functional deficiencies compound the structural ones, and both are further amplified by the proximity of the bridge to the Tukwila Community Center. The bridge serves pedestrians and cyclists as the southern connection of the Green River trail with the Community Center and Allentown.

Appendix A presents the existing plans and Appendix B provides the current inspection report for the bridge.

The City has applied and has been successful in securing federal funds for the replacement of this deteriorated bridge.

This report entails the engineering design activities that have been performed by TranTech's team to prepare the herein Type, Size, & Location (TS&L) Report as part of the Phase 1 of designing a new bridge replacement for this route over the Duwamish River.

The consultant team is composed of the following members:

TranTech – Project Management, Structural Engineering; Civil Engineering
1 Alliance - Surveying
Landau – Geotechnical Engineering and Environmental Permitting
Natural Waters – Hydrology Engineering
Transpo – Traffic Engineering
Ott Sakai – Constructability & Estimation
EnviroIssues and Coaxis - Public Involvement
DCI – Right-of-way
Makers - Aesthetics

2. Type, Size & Location (TS&L) Study

For this TS&L study report to be prepared, many design team members from various engineering disciplines provided contributions in support of this investigation effort.

In the following report, a summary of these engineering activities is provided. Detailed reports are provided in the appendices.

Alternative Comparison Process:

The design team developed a list of critical project criteria and improvements/impacts for the project. Criteria was developed for environmental, social and cost considerations associated with the project. The criteria used for comparison purposes included:

Environmental:

- Natural River Flow Conditions
- Natural Bank Habitat Conditions

Social:

- Temporary MOT Impacts
- Aesthetics

Costs:

- Construction Costs (Bridge and Approaches)
- Right of Way Costs

Each of the criteria was assigned a weight for comparison purposes. Further discussion on the comparison criteria and how it was used for this study is included in Section 2.11 TS&L Alternative Comparison of this report.

In the following sections a summary of each engineering discipline with contributions to this study report is described in further detail.

2.1 Surveying

This activity is performed by the TranTech's team member 1 Alliance.

Appendix C provides a plan displaying the topography base map survey of the bridge site.

2.2 Geotechnical

This work element is performed by TranTech's geotechnical engineering team member Landau Associates, Inc. (LAI). In the following, a summary of the geotechnical engineering considerations associated with each studied alternative is provided. A detailed technical memo on this topic is provided in Appendix D.

LAI conducted a subsurface exploration program along the two alternative bridge alignments that included four exploratory borings (B-1 through B-4). Two of the borings (B-1 and B-2) were advanced approximately 90.3 and 74.5 feet (ft) below ground surface (bgs) adjacent to the existing bridge alignment, and two borings (B-2 and B-4) were advanced approximately 90.5 and 60.5 ft bgs along the alternative S 124th Street Bridge alignment.

Provided below is a summary of the subsurface soil conditions observed along the two, alternative bridge alignments.

Existing Bridge Corridor

Based on LAI's field observations, the soils/rock observed in the exploratory borings that were advanced along the existing bridge corridor (borings B-1 and B-2) were classified into the following geologic units:

- **Alluvium:** This unit was generally observed to consist of black and mottled orange, brown to brownish tan, and gray, very loose to medium dense sand with varying amounts of silt and clay and with trace organics and gravel, and very soft to medium stiff silt with varying amounts of sand and trace organics. This unit was observed to extend from approximately 0 to 50 ft below ground surface (bgs) and 0 to 25 ft bgs in borings B-1 and B-2, respectively.
- **Glacial Till:** This unit was encountered beneath the alluvium in borings B-1 and B-2 and was generally observed to consist of gray to greenish gray, dense to very dense sand with varying amounts of gravel, silt, cobbles, and boulders; and gray, hard silt with varying amounts of sand, gravel, cobbles, and boulders. This unit was observed to extend to the maximum depth of boring B-1 (90.3 ft bgs) and to a depth of about 74 ft bgs at the location of boring B-2.
- **Bedrock:** At the location of boring B-2, this unit was encountered beneath the glacial till at approximately 74 ft bgs and was observed to consist of grayish black siltstone. LAI did not observe this unit in boring B-1. LAI was able to sample only the upper 6 inches of this unit.

S 124th Street Corridor

Based on LAI's field observations, the soils observed in the exploratory borings that were advanced along the S 124th Street corridor (borings B-3 and B-4) were classified into the following geologic units:

- **Alluvium:** This unit was generally observed to consist of tan to blackish gray and blackish brown, very loose to medium dense sand with varying amounts of silt and peat lenses; and gray, very soft to hard silt. This unit was observed to extend from approximately 0 to 73 ft bgs and 0 to 20 ft bgs in borings B-3 and B-4, respectively.
- **Glacial Till:** This unit was encountered beneath the alluvium in borings B-3 and B-4 and was generally observed to consist of gray very dense sand with varying amounts of silt and trace gravel. At the location of boring B-3 between the depths of about 73 to 80 ft bgs, the till was observed to consist of tannish iron-stained, gravelly, silty, dense, fine to medium sand. The lower portion of the till unit was generally observed to consist of gray, bluish gray, tan, greenish gray, very dense sand with varying amounts of gravel and trace silt; and dark gray, hard silt with varying amounts of sand and gravel. This unit was observed to extend to the maximum depths of borings B-3 (90.5 ft bgs) and B-4 (60.5 ft bgs).

Geotechnical Considerations

Provided below is a summary of the geotechnical considerations that LAI identified for this project:

- Earthquake shaking should be anticipated during the design life of the replacement bridge, and the proposed bridge should be designed to resist earthquake loading using appropriate design methodology.
- Some of the upper soils along the two, alternative bridge alignments are susceptible to liquefaction during a strong motion earthquake. At the locations of the two, alternative bridge alignments, the estimated depth to the non-liquefiable soils was deeper on the Allentown side of the Duwamish River (50 to 70 ft vs 20 to 25 ft on the other side of the river).
- It is LAI's opinion that the slopes/riverbanks along the two, alternative bridge alignments could experience lateral spreading during a design seismic event.
- The upper 20 to 70 ft of soils along the two, alternative bridge alignments are soft/loose and have marginal foundation support characteristics. Furthermore, as noted above, portions of the upper soils may be subject to soil liquefaction and lateral spreading during a design-level earthquake. As a result, shallow foundations (e.g., spread footings), which are typically cost effective if they can be founded in hard or dense soils that have adequate bearing resistance and exhibit tolerable settlement under load, are not considered to be an appropriate foundation type for the proposed replacement bridge. Another reason that shallow foundations are not considered appropriate for the replacement bridge is because shallow foundations are not effective where soil liquefaction can occur at or below the footing level unless the liquefiable soil is removed, improved using ground improvement techniques, or is well below the footing level. Therefore, it is anticipated that the proposed replacement bridge will need to be supported by deep foundations.

- Driven pile foundations and drilled shaft foundations are two deep foundation types that can be used when shallow foundations are not appropriate. For this project, shaft foundations with a diameter of 8 to 10 ft or greater appear to be most advantageous because a very dense bearing stratum can be penetrated in order to obtain the anticipated required bearing, uplift, and lateral resistances. In addition, shafts can be cost effective if a single shaft per column can be used as opposed to a pile group with a pile cap, especially if temporary shoring is required to construct the pile cap. Finally, unlike driven piles, shafts have the advantage of a reduced potential to cause damage to existing adjacent facilities from pile driving vibrations.
- Soil liquefaction and lateral spreading could subject the replacement bridge foundations to down-drag and lateral loads, respectively. Downdrag loads could lead to bridge foundation damage (due to exceeding the structural capacity of the foundation) if not accounted for in the design, as well as increased foundation settlement. To mitigate the lateral spreading risk, the foundations for the replacement bridge will need to be situated outside of the zone of lateral spreading or the foundations will need to be designed to withstand the lateral forces imposed on the foundation by the moving soil. Potential methods to mitigate the liquefaction risk at the site include improving the soils such that liquefaction does not occur or to design the replacement bridge to tolerate the consequences of liquefaction (i.e., design the structure to tolerate downdrag loads and foundation settlement).
- Nominal axial resistances of single, 8- and 10-ft diameter drilled shafts can be preliminarily assumed to be equal to those presented in Table 4 in LAI’s attached preliminary geotechnical report.
- If it is necessary to place drilled shafts in groups with a center-to-center spacing of less than 3D (where D is the shaft diameter), then an axial group reduction factor will need to be incorporated into the design of the shaft.

2.3 Permitting

This work element is performed by TranTech's environmental engineering team member Landau Associates, Inc. (LAI). In the following a summary of the environmental permitting considerations associated with each studied alternative is provided. A detailed technical memo on this topic is provided in Appendix E.

Preliminary data was gathered to identify wetlands, waterways, wildlife habitats, cultural resources issues and the probable associated permitting requirements. The project area includes the extent of the 42nd Ave S Alternative and S 124th Street Alternative. The study area extends 200 feet from the project area for evaluation of wetland/waterway critical areas.

Existing Conditions

Public documents reviewed included City Critical Areas Mapping, National Wetlands Inventory (NWI) mapping, Federal Emergency Management Agency (FEMA) floodplain data, Washington Department of Fish and Wildlife (WDFW) priority habitats and species (PHS) data, and Washington Natural Heritage Program Geographic Information System (GIS) data sets regarding habitats and plants. LAI also conducted a wetland/waterway delineation in December 2020 to be utilized for survey pick-up which is presented in Appendix C.

Results of a literature search of readily available documentation and observations made during the site review indicate the following resources in the project area that should be considered as part of project permitting:

- Duwamish River, which is:
    - A navigable waterway under jurisdiction of Section 9 and Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act.
    - State-owned aquatic land managed by Washington Department of Natural Resources (DNR), specifically in the area of the S 124th Street Alignment (the 42nd Ave S Bridge is within existing easement).
    - A waters of the state subject to regulation under the Washington State Hydraulic Code (WAC 220-660).

  - A shoreline of the state subject to regulation under the City of Tukwila Shoreline Master Program (SMP). The City designates the shoreline environment as Urban Conservancy (south of 42nd Ave S) and Shoreline Residential (north of 42nd Ave S).
  - Suitable habitat for Endangered Species Act (ESA) -listed species, and designated critical habitat for ESA-listed species, including:
    - Puget Sound ESU Chinook (*Oncohrychus tshawytscha*)
    - Puget Sound DPS steelhead (*O. mykiss*)
    - Puget Sound DPS bull trout (*Salvinus confluentus*)
- FEMA 100-year floodplain associated with Duwamish River with base flood elevation of 16 ft (NAVD88).
- Adjacent sensitive land uses, including single family residences, Tukwila and Community Center.
- Potential archaeological/cultural resources in that the Washington Department of Archaeology and Historic Preservation (DAHP) Washington Information System for Architectural and Archaeological Records Data (WISAARD) identifies the project area in an area of "Survey Highly Advised" based on Predictive Model of Environmental Factors with Archaeological Resources Results (DAHP 2021).

The Washington Natural Heritage Program does not indicate any records of rare plants or unique habitats in the study area (NHP 2021).

Environmental Permits and Documentation

Documentation evaluating effects of the proposed project on environmental and cultural resources referenced above will be required in support of local, state, and federal permitting, and associated with federal funding to be provided through Washington State Department of Transportation (WSDOT) Local Programs. Summary of permits and supporting documents are provided in Appendix E. Environmental documentation required as part of the selected alignment is anticipated to include:

- Wetland/Waterway Critical Areas Report, which would supplement the wetland delineation report referenced above, and would include a discussion of mitigation sequencing. Options for mitigation may include riparian enhancements and/or removal of the existing bridge associated with selection of the S 124th Street Alternative.
- Area of Potential Effects and Cultural Resources Investigation Report, involving a field effort and impact evaluation.
- Joint Aquatic Resources Permit Application (JARPA)
- Endangered Species Act/Essential Fish Habitat effect determinations, documented in a Biological Assessment. Evaluation of potential project impacts is likely to

focus on water quality/quantity effects related to stormwater runoff associated with new impervious surfaces, riparian impacts, and change in over water coverage.
- WSDOT National Environmental Policy Act (NEPA) Categorical Exclusion Form and State Environmental Policy Act (SEPA) checklist, requiring design details of the proposed project.
- Section 4(f) De Minimis Impact Determination or Temporary Occupancy, requiring concurrence for use of recreation properties (i.e., Tukwila Community Center) for transportation projects.
- Environmental Justice letter to file describing potential impacts to protected populations.
- Traffic noise study for new roadway or significant change in existing roadway.
- Hazardous Material Corridors Study in support of right of way acquisition.
- Navigation Impact Report for the Duwamish River; completed.


22/07/2021

The environmental documentation supports applications for the following environmental permits, which will likely be necessary for the proposed project:

- NEPA determination from WSDOT Local Programs, and if necessary, the Federal Highway Administration.
- SEPA determination from the City.
- Shoreline Substantial Development permit or Exemption from the City
- US Army Corps of Engineers (USACE) Section 10/Section 404 permit for unavoidable impacts associated with bridge removal (i.e. in water impacts) and bridge crossing.
- Hydraulic Project Approval (HPA) from the Washington Department of Fish and Wildlife (WDFW).
- City wetland/waterway critical areas compliance to address any project activities within regulated waterways and associated buffers.
- Aquatic Lands Lease from DNR for new bridge alignment, or alignment outside of existing lease area.
- Advanced Approval Bridge permit from US Coast Guard; which provides the Technical Information Memo sent to the Coast Guard.

Typically, the USACE Section 404 permit for wetland impacts takes the most time to acquire. LAI assumes that the project would be permitted under the USACE Nationwide Permit (NWP) No. 14, Linear Transportation Projects, and would not require individual review by Ecology for CWA Section 401 Water Quality Certification. A conservative estimate to obtain a NWP is nine (9) months from submittal of the application. USACE review timeline should be reduced by the cultural resources and endangered species consultations that will be completed by WSDOT that are also required for CWA permitting. All other environmental permits can normally be obtained within 3 months of application.

Initial feedback from WDFW has been obtained regarding the project alternatives, with the Area Habitat Biologist indicating preference for maintaining the bridge location at the existing 42nd Ave S location, and suggestion for coordination with representative from the Muckleshoot Tribe. We understand that WDFW concern with the S 124th Street alignment includes impacts to habitat on the island located in the river channel. Coordination is ongoing with WDFW and Muckleshoot Tribe regarding the project alignments.

References:

DAHP. 2021. Washington Information System for Architectural and Archaeological Records Data (WISAARD). https://wisaard.dahp.wa.gov/Map. Accessed November 18, 2021.

FEMA. Map Service Center. Federal Emergency Management Agency. Accessed June 30, 2021. https://hazards.fema.gov/femaportal/prelimdownload/searchResult.action.

NHP. 2021. Sections that Contain Natural Heritage Features. Washington Natural Heritage Program. Available at: https://www.dnr.wa.gov/publications/amp_nh_trs.pdf. November 18.

2.4 Hydrology

This work element is performed by TranTech's team member Natural Waters. In the following, a summary of the hydrological engineering considerations associated with the project is provided.

The S 124th Street crossing is located in a straight reach of the Duwamish River which typically reduces the risk of lateral migration, erosion and scour as compared to being located on a sharp bend (e.g., proposed 42nd Ave S Bridge).

The S 124th Street crossing has more clearance (freeboard) above the 1% annual chance (100-year) water surface elevation (WSE).

On both alignments the bridge could be constructed to not affect the effective base flood elevations (BFE) and thus meet a no/zero-rise.

The goal of design for both 42nd Ave S and S 124th Street alignments is a no/zero-rise but if a no/zero-rise cannot be met, a conditional letter of map revision (CLOMR) would likely be required.

On both alignments the design goal will be ensuring all constructed elements are outside of the effective FEMA BFE [1% annual chance (100-year) flow]. This translates to the following design criteria

- Designing all foundations to account for total scour
- Designing walls to account for total scour such that roadway and approach spans cannot be compromised from potential scour.

2.5 Traffic

This work element is performed by TranTech's traffic engineering team member Transpo Group, Inc. (Transpo). A detailed technical memo on this topic is provided in Appendix F.


05/05/2020

Transpo conducted a transportation analysis to evaluate a possible bridge replacement for the 42nd Ave S bridge over the Duwamish River located near the Tukwila Community Center. The analysis focused on future 2040 weekday PM peak hour conditions for three different scenarios, as this represents peak demands in the area. The first scenario was "No Action" and represents no changes to the bridge and nearby intersections. The second and third scenarios remove the existing 42nd Ave S bridge and construct a new bridge by extending S 124th Street to the west to create a new intersection with Interurban Avenue S. For the second scenario, the new S 124th Street/Interurban Avenue S intersection would be constructed as a traffic signal intersection. For the third scenario, this new intersection is assumed to be a single-lane roundabout instead of a traffic signal. For the second and third scenarios, the 42nd Ave S/Interurban Avenue S intersection would remain signalized but reconfigured to remove the north leg.

Traffic volume forecasts for 2040 were developed based on two primary sources: the volumes used in the existing conditions analysis (adjusted for COVID-19 impacts); and forecast traffic growth from the Puget Sound Regional Council (PSRC) regional travel demand model. Manual edits and shifts were applied to account for the alternatives with a bridge closure where necessary. There are no known current development plans in the vicinity of the study intersection that are anticipated to add significant traffic to the study intersection beyond what is anticipated in the annual growth rates from the PSRC model volumes. The Tukwila level of service (LOS) standard is LOS E. Under 2040 No Action conditions, the signalized intersection of 42nd Ave S/Interurban Avenue S is anticipated to operate at LOS D. For the second scenario, the reconfigured intersection of 42nd Ave S/Interurban Avenue S and the new signalized intersection of S 124th Street/Interurban Avenue S would operate at LOS A and LOS B, respectively. For the third scenario, the roundabout at S 124th Street/Interurban Avenue S would operate at LOS A with other intersections operating similar to the second scenario. For all scenarios, no significant queuing is expected at major intersections and traffic signal warrants are met for the new intersection.

2.6 Public Outreach

This work element is performed by TranTech's team member EnviroIssues and later by Coaxis. The public outreach (PI) which started from early 2021 came in different forms and formats.

In February 2021, the City began outreach efforts by interviewing different project stakeholders from Allentown Community members to businesses affected by this project. Later in March 2021, the City's project website was updated with a presentation that provided more information about the project and informed the Community and other stakeholders of an upcoming virtual Townhall meeting on April 27, 2021. Post cards for this purpose were also sent out to the Community and other stakeholders.

The City of Tukwila provided community members and other stakeholders additional opportunities for engagement in the decision-making process for the 42nd Ave S Bridge Replacement Project by taking comments and votes on various project design elements through project website.

Participant responses were gathered both during an online survey, open to the public for votes from August 31, 2021 to September 30, 2021, as well as during a Gallery Day in-person meeting held on September 15, 2021 in Tukwila Community Center.

The online survey and the gallery day event presented stakeholders with 5 questions pertaining to various aesthetic elements of the bridge replacement project including bridge railing, landscaping concepts, color preference, gateway feature, and lighting concepts. There were 109 online survey participants, and many gallery attendees; the maximum responses received on any given element was 112 votes.

The City conducted two more in-person public meetings in 2022 at the Tukwila Community Center on February 22nd and March 22nd. The focus of these meetings was engaging the community regarding the alignment for the bridge replacement. On both occasions, the community strongly supported the 42nd Ave S Alignment. The City also conducted an online survey from March 15, 2022 through March 23, 2022 as well. On this on-line survey 156 citizens participated in which 117 (75%) of the participants selected the 42nd Ave S alignment. The presented information on all community town-hall meetings and the online surveys are presented in Appendix G.

2.7 Aesthetics

This work element is performed by TranTech team member Makers.

The team working on the architectural elements investigated concepts for the bridge railing, gateway and landscape and prepared three alternate designs for each category intended for the September open house Gallery Day. During this process, the team coordinated remotely with the full design team.

Appendix H presents the Gallery Day Townhall Boards displayed at the Tukwila Community Center on September 15, 2021. Participants at that open house were asked to select the preferred alternatives and the votes were tallied and added to the ones received through the online voting. Responses to the railing alternatives were mixed, with 42% preferring a complex plate and bar construction; 36% preferring a vertical orientation and 22% preferring a simple horizontal orientation. However, comments from the public indicated a strong interest in relating the bridge’s character to the local tribes.

Sixty two percent (a clear majority) preferred the “Natural” landscaping concept which featured a new trail south of the bridge and plantings of native trees and vegetation.

A clear majority (46%) preferred dark green over black, blue or grey as their favorite color.

The question “What should the gateway element relate to” was included.

- 24% indicated the Allentown Community
- 21% indicated the current bridge
- 20% indicated the Green River
- 19% favored the Tukwila Community Center
- 7% indicated the Green River Trail
- 9% indicated other

As noted above, there was strong interest for local input, which was not an option that was presented. This matter will be investigated, and options will be presented for this purpose.

In terms of luminaires, most preferred the El Mirage RNTA model with 41% of the votes.

2.8 Roadway/Utilities

2.8.1 Roadway Design Criteria

The proposed project will include a new two-lane bridge. The structure section discusses the types and sizes of bridge options considered. Two locations were considered, the existing bridge location on 42nd Ave S or build a new bridge at S 124th Street. Roadway design criteria for each of these locations was based on the 2019 Infrastructure Design and Construction Standards, the 2018 American Association of State Highway Transportation Officials (AASHTO) publication A Policy on Geometric Design of Highways and Streets and the latest editions and amendments of the Washington State Department of Transportation (WSDOT) Design Manual (M22-01.18). An exhibit of the proposed project footprint and profile for each option can be found in Appendix I.

Geometric Design Parameters

Design criteria for both 42nd Ave S and S 124th Street are consistent with the proposed roadway classification, existing and projected traffic volumes and movements, non-motorized needs, land use, and desired safety improvements. Table 2.8.1 below lists a summary of the design criteria for the project, and this is followed by additional detail regarding the basis of the selection.

TABLE 2.8.1

	42nd AVE S DESIGN CRITERIA	**S 124th STREET DESIGN CRITERIA**
Posted Speed	25 MPH	25 MPH
Design Speed	25 MPH	25 MPH
Stopping Sight Distance	162 feet	168 feet
Profile Grade*	5% max, 0.5% min	7.5% max, 0.5% min
Travel Lane Width	12 feet	12 feet
Sidewalk Width	10 feet	10 feet
Roadway Cross Slope	2% typical	2% typical

*The maximum profile grade allowed is 12% the max in this table is the slope proposed in Appendix I.

Federal Functional Class

42nd Ave S: Major Collector

124th Street: Major Collector

Average Daily Traffic (ADT)

The Average Daily Traffic on 42nd Ave S is 10,300 vehicles per day with over 15% heavy vehicles per table 1 of the Mobility of Traffic Mechanical Memo Appendix F. Past traffic data from bridge inspection reports and other information have included a higher percentage of heavy vehicles, but the most recent data is included in Appendix F.

Design Speed

The 42nd Ave S Option will be posted with a speed limit of 25 MPH, matching the existing conditions, and a design speed of 25 mph was used in the model.

The S 124th Street Option will be posted with a speed limit of 25 MPH, matching the existing conditions, and a design speed of 25 mph was used in the model.

Typical Roadway Sections

Appendix J includes the assumed section for the 42nd Ave S option and the S 124th Street option on the new bridge. The road will transition back to the existing road section width once off the bridge. The proposed pavement section will be finalized, by the geotechnical engineer, as design continues.

The 10’ sidewalk on the bridge would tie in nicely with the Tukwila Community Center frontage sidewalk and planter strip on the east side of 42nd Ave S for that option. The S 124th Street option would construction a missing link of sidewalk between the new bridge and the existing sidewalk at the Tukwila Community Center. This new sidewalk would be constructed at the existing Superette on the southeast corner of the 42nd/124th intersection.

Profile Grades

Maximum: 15% per Tukwila Design and Construction Standards Section 4.0.7. Grades over 15% require approval of the Director and the Fire Department. Streets with slopes greater than 15% shall be concrete.

Minimum: 0.5% (AASHTO A Policy on Geometric Design of Highways and Streets, Page 3-130), flatter is allowed when there is no curbing and a crown that will drain the roadway of stormwater. We will have curbing on at least one side of the road the length of the project so 0.5% minimum grade should be met.

Vertical Curves

Crest Vertical Curve. The length of vertical curve for crest conditions will be determined by Equations 3-44 and 3-45 on page 3-167 of the AASHTO A Policy on Geometric Design of Highways and Streets. These equations for vertical curves provide sufficient distance for a driver to come to a stop if an obstacle is within the roadway. Passing sight distance will not be met on the bridge, therefore the road will need to be striped as a “no passing” zone.

Sag Vertical Curve. The length of vertical curve for sag conditions will be determined by Equations 3-48 to 3-51 on page 3-173 of the AASHTO A Policy on Geometric Design of Highways and Streets. This will not require that the sags be illuminated, as there will be sufficient sight distance provided by vehicle’s headlights alone for stopping sight distance purposes.

Cross-Slope

All traffic lanes will have a design cross slope of 2% on the roadway and bridge structure, except at intersections and where tying into existing where cross slope will be matched.

Side Slopes/Walls

Including walls in the final design will be beneficial from a permitting standpoint as they will minimize the amount of fill/grading work in the shoreline buffer. Walls would help avoid floodplain impacts that may be associated with fill that would otherwise be needed. Walls at the back of walk in some locations will minimize right-of-way impacts, particularly to parking at the Superette on the southeast corner of the 42nd and S 124th intersection for the S 124th Street bridge crossing option. For these walls at the back of walk or other short walls modular block walls are an option. For medium height walls MSE walls may work, but during final design the temporary excavation for this type of wall needs to be considered and the temporary excavation necessary could impact existing improvements and/or utilities. For the 42nd Ave S option at the furthest north abutment, on the west side, it is a sheet pile wall is likely the best option. A sheet pile wall eliminates the need for a temporary excavation to construct the wall. Another advantage to a sheet pile wall is that the global stability of the wall can be achieved by simply increasing the embedment depth of the sheets, whereas deepening the embedment depth of an MSE wall creates the need for an enormous temporary excavation – possibly leading to additional conflicts with existing improvements. A sheet pile wall may be the best option for the S 124th Street option on the east side of the bridge as well, although there are additional options in this location that should be further explored in conjunction with the geotechnical engineer, environmental permitting specialist, and structural team.

Right-of-Way

The 42nd Ave S option would require permanent acquisition from the Tukwila Community Center, Parks property, to tie the wider bridge into the existing roadway. This would trigger additional environmental permitting for 4f requirements. This option would also require collaboration with King County to utilize their existing DNR Aquatic Lands Lease for the temporary bridge location. Since the 42nd Ave S option proposes to utilize the existing bridge shifted to the east and utilized as a detour bridge there would be overlap between the temporary detour bridge location and the sewer easement. Temporary construction easements (TCE) would also be needed from both Tukwila Parks and Rec and King County. A TCE with Tukwila parks would be needed at the Tukwila Community Center for the temporary bridge to connect to the existing roadway, it is likely the splash park would need to be closed for the duration of construction and trails and maintenance roads within the Tukwila Community Center property would be impacted. The parking lot may need to be utilized while portions of the existing roadway are needed for stockpiling and construction efforts. A TCE with King County would be needed for both their sewer easement as well as the trail connection and reconstruction under the new bridge.

For both options a portion of the trail would need to be regraded to assure there is a 10' separation between the trail grade and the bottom elevation of the new bridge. This would require a TCE from King County who owns the trail. There is already an existing maintenance agreement between King County and the City of Tukwila. See next section "Trail Connection" for more information regarding the trail.

The S 124th Street option also has right-of-way concerns. Two driveways and the Superette driveway would require right of way acquisition or TCEs. The right-of-way acquisition required at the intersection of 124th and 42nd would eliminate some parking at the Superette even with a block wall and pedestrian handrail at the back of walk, and the parking lot would need to be converted to a one way. The positive is a TCE for a temporary bridge would not be necessary as the existing bridge would be utilized until the new bridge is open, eliminating the need to tie into the roadway utilizing the Tukwila Community Center property. This option may eliminate the need for 4f during permitting, however a TCE may still be needed for the S 124th Street option.

Trail Connection

The trail allows, pedestrians, bicycles, and horses so there is a 10' clearance requirement to meet the active transportation need. More than 10' clearance may be required by emergency services or maintenance and this will be evaluated and coordination with emergency services and maintenance teams will occur during final design. Trail areas to be reconstructed shall consider chapter 1515 of the WSDOT design manual. To meet these requirements the trail would need to be realigned to lower the elevation as the bridge passes under the new bridge. Walls would need to be constructed with both options along the trail. The maximum trail grade is 5% or 8.33% with a 5' min. length ramp every 2.5' of elevation change to meet the requirements of the Public Rights-of-Way Accessibility Guidelines (PROWAG).

The trail connection for the S 124th Street option will require walls on either side of the connection to meet grade requirements connecting the proposed bridge to the existing trail. During a community engagement occurring online between August 31 and

September 30, 2021 with an in-person meeting Gallery Day meeting held September 15, 2021, three connection alternatives were voted on by the community. Natural Concept 2 for landscaping was selected (see Appendix G) During final design this natural landscape selected will be tied into the trail connection as much as possible while meeting the above noted PROWAG requirements for connection. This includes a 10' minimum width with 2' shoulders on either side and illumination is highly recommended with this vegetation style.

Utilities

Existing utilities crossing the 42nd Ave S bridge include a 6-inch high-pressure PSE gas main and a 10-inch City of Tukwila water main. Both utilities would need to be extended along Interurban Ave to the S 124th Street bridge if that option is selected and pursued. The existing utilities do not currently extend north past the 42nd Ave S and Interurban Ave intersection. The sewer main crossing under the Duwamish is proposed to remain for either alternative. The bridge replacement in its current location along 42^{nd} Ave S would require major coordination for placing the temporary bridge design during construction as noted above.

Stormwater

Stormwater runoff from either of the alternatives will discharge to the Duwamish River. There are existing conveyance systems located in both 42nd Ave S and S 124th Street. These systems may require modifications due to the project but will be utilized to the maximum extent possible.

The 42nd Ave S Bridge Replacement Project will be designed to meet the requirements outlined in the 2016 King County Surface Water Design Manual (KCSWDM) as adopted by the City of Tukwila. The project will likely be subject to a full drainage review because it will likely result in more than 2,000 square feet of new plus replaced impervious area. Typically, Core Requirements 1 through 9 and Special Requirements 1 through 5 apply to a project that is subject to a full drainage review; however, in some cases the project may be exempt from some of the core and special requirements.

The Duwamish River is considered a major receiving water downstream of the S. Boeing Access Road which means that projects are not subject to flow control requirements. This project is located approximately 9,000 feet upstream of the S. Boeing Access Road and thus will likely be required to meet the flow requirements.

Treatment of the stormwater runoff prior to it being discharged to the Duwamish River will likely be required. The type and level of stormwater treatment will be determined as part of the final design phase but will likely be a treatment system such as a StormFilter®.

2.9 Structural

To investigate viable structural bridge concepts that provides all of the City’s desired goals for this roadway facility, TranTech’s structural team focused on bridge structural concepts that meet important design criteria like minimizing/ eliminating the number of piers within the Duwamish River’s 100-year flood zone, being cost effective with minimal future maintenance costs and quicker construction.

The team focused its attention to four viable structural concepts, namely:

1. Standard steel or concrete girder
2. Precast segmental concrete
3. Cable-stayed
4. Truss

Through careful examination of each viable alternative, our structural team concluded that clear-span alternatives (i.e., concepts 2 through 4 above) are beyond City’s allocated budget for this project. Hence the investigations focused on exploring standard types of steel and concrete bridge alternatives on the two identified viable alignments of 42nd Ave S (i.e., existing alignment) and S 124th Street.

After careful consideration of the River’s 100-year flood levels and the connectivity constraints explained in Section 2.10, the following span arrangements were chosen for further investigation with respect to both of the aforementioned alignments:

1. Three span precast prestressed girder
2. Three-span steel plate girder

Moreover, for the steel alternative, the design team is envisioning utilization of weathering steel which is not only a low maintenance material but also does not require a paint coating.

Appendix J presents the preliminary concept drawings of these alternatives. In the following sections, further details regarding the final viable alternatives are presented:

Conventional L shape abutments/ piers are assumed for all considered alternatives. Per geotechnical engineer’s preliminary recommendation, deep foundations like oscillated drilled shafts, are envisioned for the substructure of all alternatives.

2.10 Constructability

This work element is performed by TranTech team member Ott Sakai (OS).

OS performed constructability review, construction schedule and cost estimate at the TS&L level for the 42nd Ave S Bridge replacement.

Appendix K presents the results of their investigations for the following:

- Project Constructability Review
- Project Construction Cost Summary
- Bridge Construction Schedule

As seen, OS has prepared a "contractor-style" estimate for the bridge structure based on the Concept drawings we received from the design team.

OS cost estimate has been prepared using crew-based costing, local wage rates, current market material prices and budget quotes obtained from precast concrete producers. The estimates were compiled using the HCSS Heavy Bid construction estimating software.

2.11 TS&L Alternatives Comparison

To compare the studied viable alternatives identified in the previous section, with respect to desired City goals for the project, an Alternative Comparison Matrix is developed. This matrix has the selected criteria as its rows and the studied alternatives as its columns.

One of the important criteria in this matrix is the project cost. Appendix L presents the Engineer's Opinion of cost for this project for all investigated alternatives.

The alternatives are ranked in an ordinal ranking fashion and then weighted per their respective importance. The criteria weights are determined with close coordination with the City team. The following are the ordinal ranking definitions:

State 1 – Substantial Benefit
State 2 – Moderate Benefit
State 3 – Minor Benefit
State 4 – No Benefit

The alternative with the combined lowest score is the most optimized alternative with respect to the chosen desired criteria in this ordinal ranking method.

The table below presents this Matrix where it is seen that the Alternative 2B (i.e., 3-span steel plate girder superstructure on the S 124th Street alignment) provides the lowest score and consequently brings the most benefit to the City as the owner of this bridge.

				Alignment A 42nd Ave S			Alignment B S 124th Street		
		Importance Factors (out of 100)		Alt. 1A concrete girders 3 spans	Alt. 2A steel plate girders 3 spans		Alt. 1B concrete girders 3 spans	Alt. 2B steel plate girders 3 spans	
Environmental:	Natural River Flow Conditions	15		2	2		1	1	
	Permittability	15		1	1		2	2	
Social:	Temporary MOT Impacts	15		2	2		1	1	
	Aesthetics	15		2	2		2	2	
Costs:	Construction Costs (Bridge and Approaches)	25		4	3		2	1	
	Right of Way Requirements	15		2	2		3	3	
Total Score: Sum (Importance Factor x State)		100		**235**	**210**		**185**	**160**	

Concluding remarks and recommendations

In close collaboration with the City, the design team made careful examination of a final list of two alignments, 42nd Ave S and S 124th Street, and two viable structural bridge alternatives for each alignment from all facets of engineering disciplines, seeking an optimized bridge solution with respect to the above mentioned criterions. The viable alternatives for each alignment are:

42nd Ave S Alignment

Alternative 1 A - Three-span precast concrete girder
Alternative 1 B - Three-span steel plate girder

S 124th Street Alignment

Alternative 2 A - Three-span precast concrete girder
Alternative 2 B - Three-span steel plate girder

The study presented in this report leads to the conclusion that the steel plate girder on the S 124th Street Alternative 2B (i.e., Three-span steel plate girder bridge) best meets the criteria set forth for the project.

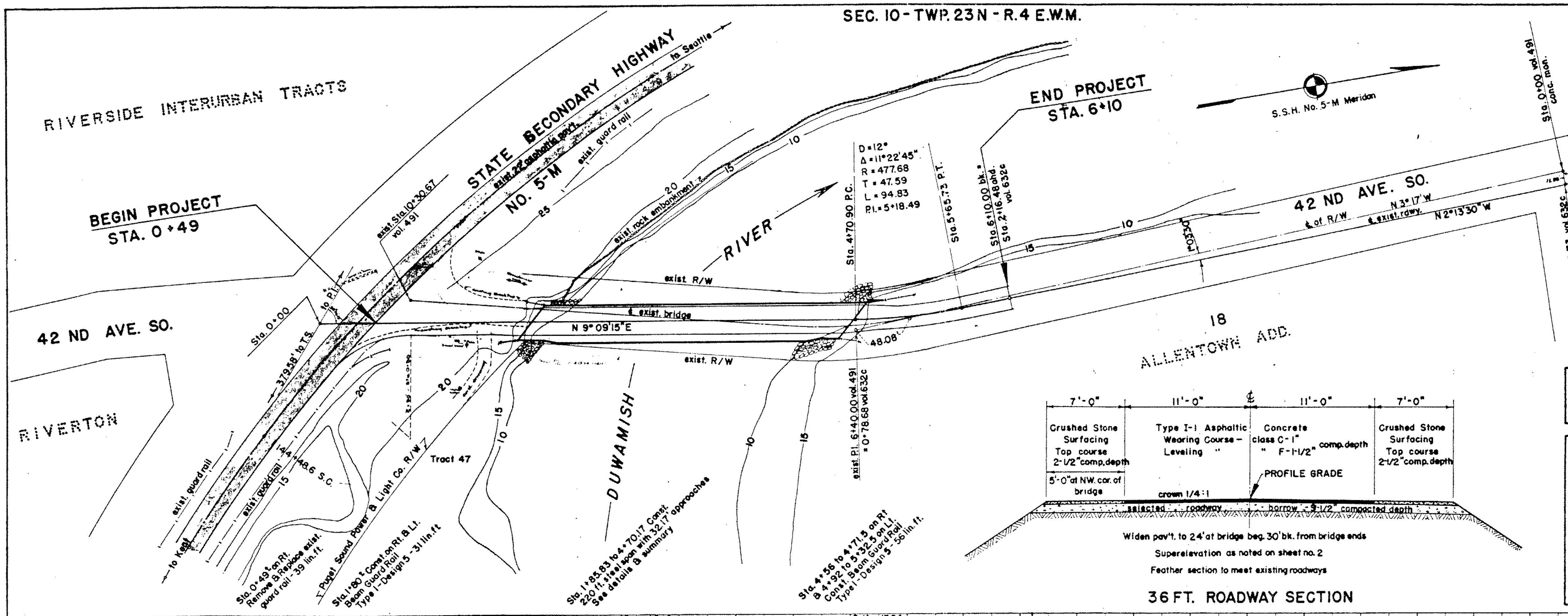
However, due to feedback from the community through multiple public outreaches, City staff have recommended to the design team to move forward with the Alternative 1B on the 42nd Ave S alignment. The cost of this alternative is approximately $24.4M.

The design team will advance the design of Alternative 1B on 42nd Ave S alignment to construction documents.

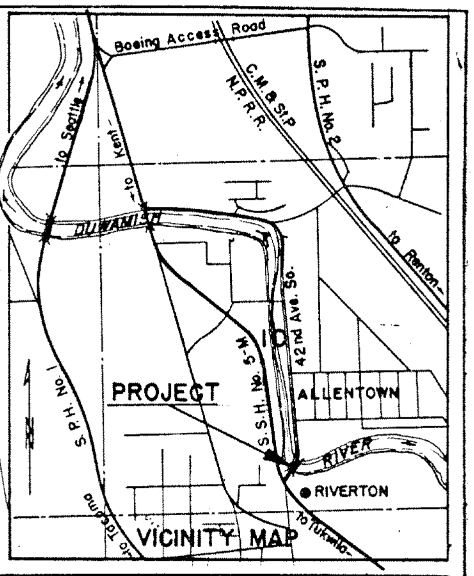
Appendix A – Existing Plans

Structure ID 08109700..

SEC. 10 - TWP. 23 N - R. 4 E.W.M.



36 FT. ROADWAY SECTION



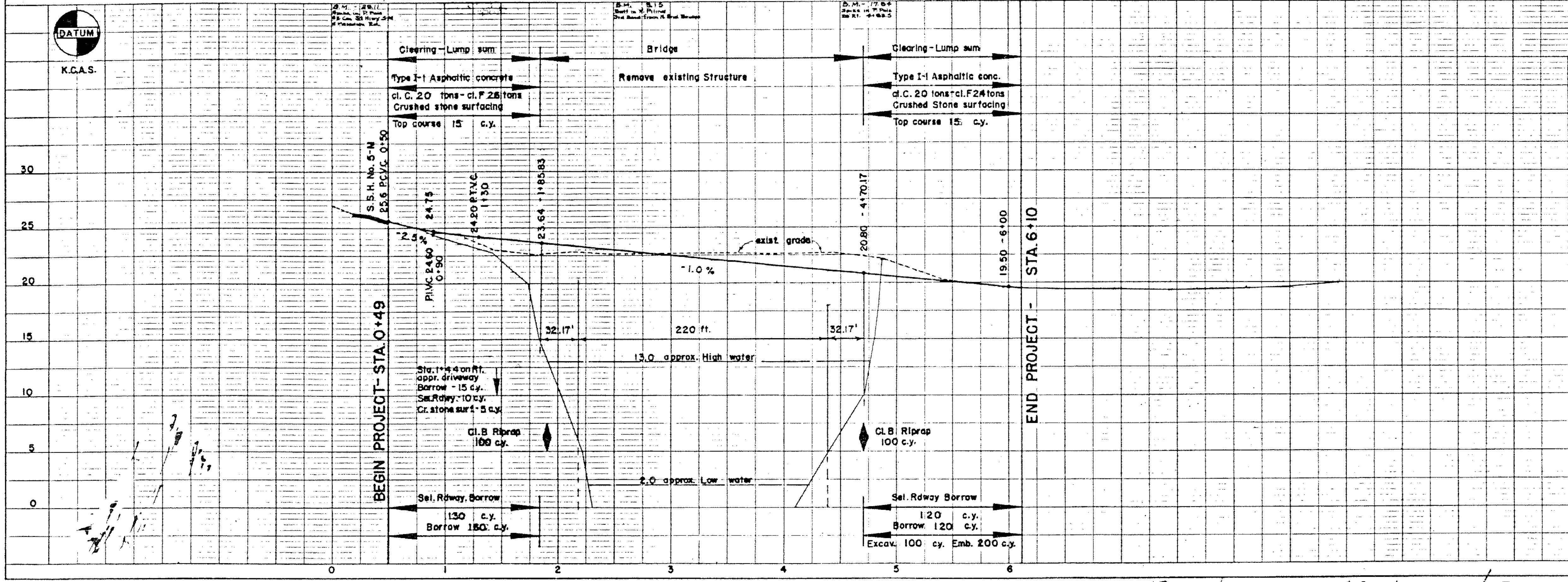
VICINITY MAP

ADOPTED BY THE BOARD OF KING COUNTY COMMISSIONERS
SEATTLE, WASHINGTON, July 23rd 1949
ATTEST: Ralph R. Stender DEPUTY CLERK Taylor M. Greene CHAIRMAN

KING COUNTY ENGINEERING DEPARTMENT
D. L. EVANS, COUNTY ROAD ENGINEER

BRIDGE NO. 3175 REPLACEMENT

OVER DUWAMISH RIVER AT RIVERTON, WASH.
SURVEY No. 10-23-4-18 COUNTY ROAD PROJECT No. B.I. NO. 15-S
SHEET 1 OF ___ SHEETS
SCALE: HOR. INCH = ~~100~~ 50 FT. VER. INCH = ~~10~~ 5 FT.
COMMISSIONER'S DISTRICT No. 2
APPROVED BY: D L Evans COUNTY ROAD ENGINEER
D. L. EVANS



SUMMARY OF QUANTITIES

Sta. 0+49 to 6+10 - 561 lin. ft.	0.106 miles	
Clearing	lump	Sum
Com. Excav.	100	c.y.
Borrow incl. overhaul	295	c.y.
Crushed Stone Surfacing - top crse.	35	c.y.
Type I-1 Asphaltic conc. cl. C.	40	tons
cl. F.	50	tons
Beam guard rail - type I des. 5	87	lin. ft.
Remove & Replace exist. guard rail	39	lin. ft.
Remove exist. Structure	lump	sum
Riprap - Class B	200	c.y.
Select Rdwy Borrow	260	c.y.
BRIDGE		
Struct. excav.	1,100	c.y.
Furn. untrt. timber piling	4,200	lin. ft.
Furn. pre-cast conc. piling	500	lin. ft.
Driving timber piles	104	only
Driving conc. piles	12	only
Shoring & Cribs	lump	sum
Concrete - class A	275	c.y.
Concrete - class F	345	c.y.
Concrete - class H	340	c.y.
Steel reinf. bars	64,000	lbs.
Structural steel	444,000	lbs.
Cast steel	2,500	lbs.
Forgings	700	lbs.
Bridge drains	7	only
Metal Railing	350	lin. ft.
Furn. & drive timber test piles	2	only
Furnish & drive pre-cast conc. test piles	2	only

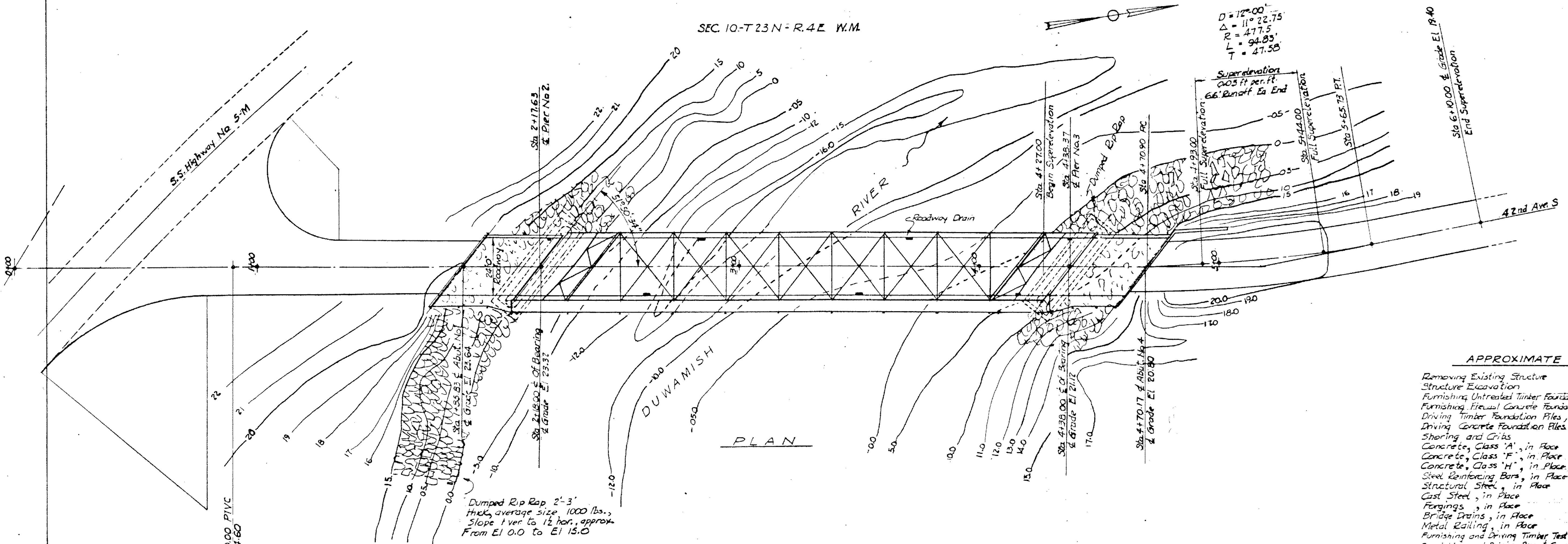
PLAN		
NOTE BOOK No. 8434	SURVEYED	
	PLOTTED	McGuire
	ALIGNMENT CHECKED	Massey
	RT. OF WAY CHECKED	7-8-49

PROFILE	
NOTE BOOK	SURVEYED
	PLOTTED
	GRADES CHECKED
No.	B.M.'s NOTED
	STRUCTURE NOTES CHECKED

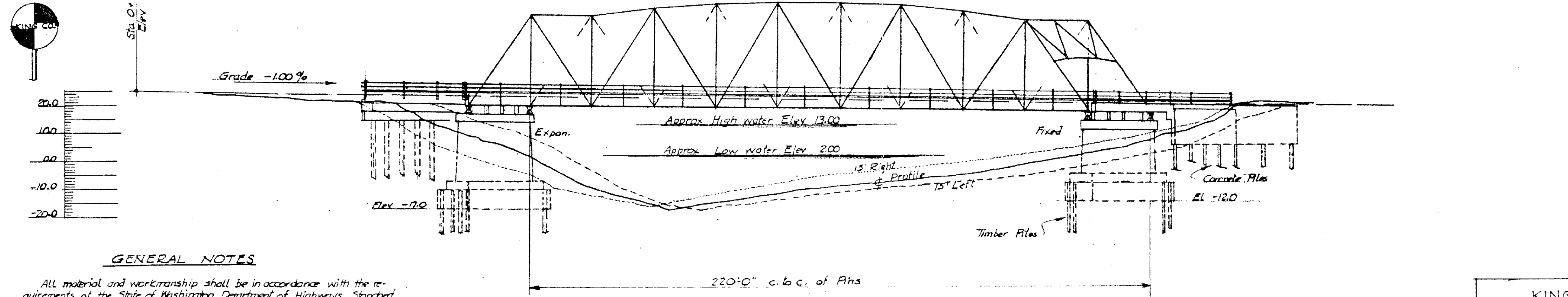
PLATE F. PLAN PROFILE F & A. & E. STANDARD
KEUFFEL & ESSER CO. NEW YORK

Riverton Br. 42 Ave. S. / Duwamish R.

67-20 30



PLAN



ELEVATION

(Existing Structure not shown)
Scale 1" = 20'

APPROXIMATE QUANTITIES

Removing Existing Structure	Lump Sum
Structure Excavation	1100. Cu Yd
Furnishing Untreated Timber Foundation Piles	4700. Lin Ft
Furnishing Precast Concrete Foundation Piles	300. Lin Ft
Driving Timber Foundation Piles, in Place	104. Each
Driving Concrete Foundation Piles, in Place	12. Each
Shoring and Cribs	Lump Sum
Concrete, Class 'A', in Place	275. Cu Yd
Concrete, Class 'F', in Place	345. Cu Yd
Concrete, Class 'H', in Place	340. Cu Yd
Steel Reinforcing Bars, in Place	64,000. Pounds
Structural Steel, in Place	444,000 Pounds
Cast Steel, in Place	2,500. Pounds
Forgings, in Place	700 Pounds
Bridge Drains, in Place	7 Each
Metal Railing, in Place	350 Lin Ft
Furnishing and Driving Timber Test Piles	2 Each
Furnishing and Driving Precast Conc. Test Piles	2 Each

DESIGN SPECS AASHO 1944
DESIGN LOADING H20-44

GENERAL NOTES

All material and workmanship shall be in accordance with the requirements of the State of Washington, Department of Highways, Standard Specifications for Road and Bridge Construction dated April 1948.

Footing elevations are subject to change depending on foundation material encountered, and reinforcing steel shall not be cut until the final footing elevations have been determined in the field.

All concrete in seals shall be Class "H" mix. Concrete in Pier shafts plinths and copings shall be Class "F" mix. All other concrete shall be Class "A" mix.

Concrete Piles shall develop a minimum bearing value of 28 tons.
Timber Piles shall develop a minimum bearing value of 24 tons.

All structural steel and cast steel shall be painted with one shop coat of red lead paint, Formula No A-1, and with a first field coat of brown paint, Formula B-1, and a second field coat of green paint Formula C-5. Angle faces of Collision Rail shall be painted white

KING COUNTY WASHINGTON
DL. EVANS COUNTY ROAD ENGINEER

DUWAMISH RIVER-ALLENTOWN BRIDGE
BOND ISSUE 15-5
GENERAL PLAN & LAYOUT

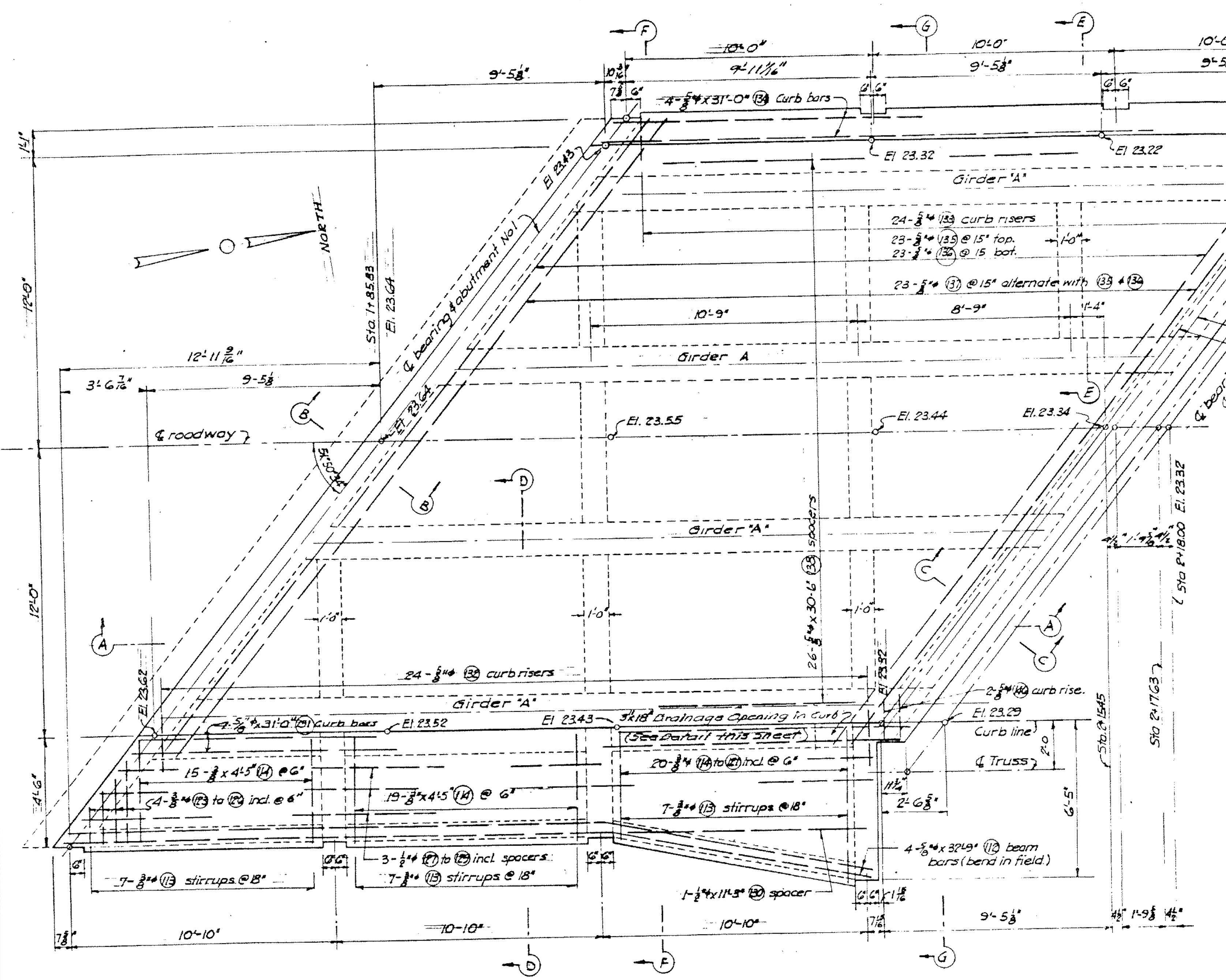
PREPARED BY
CECIL C. ARNOLD & RAYMOND C. SMITH
CONSULTING ENGINEERS
SEATTLE, WASHINGTON
JUNE 1949

Cecil C. Arnold
7/21/49 C.C.A.

DESIGNED C.C.A.
CHECKED RCS

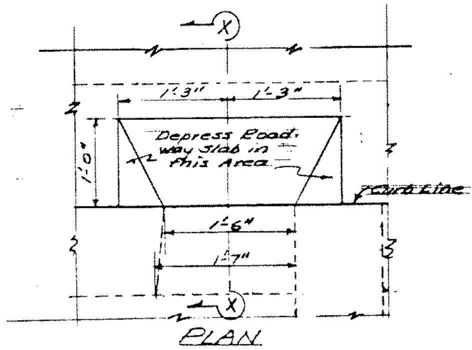
SHEET 2
OF 14 SHEETS

67-20A

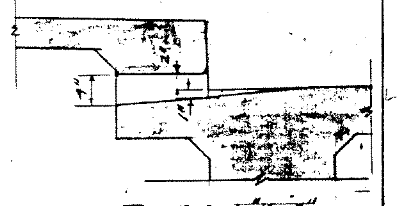


PLAN SOUTH APPROACH

Abutment 1 to Pier 2



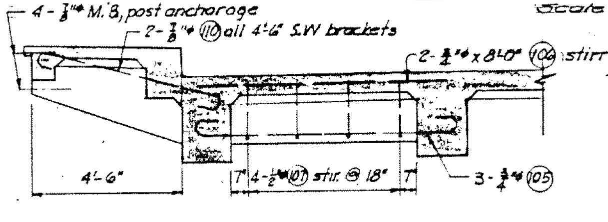
PLAN



SECTION "X-X"

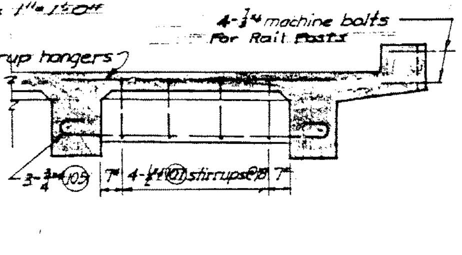
DRAINAGE OPENING IN EAST CURB

Scale 1"=1'-0"



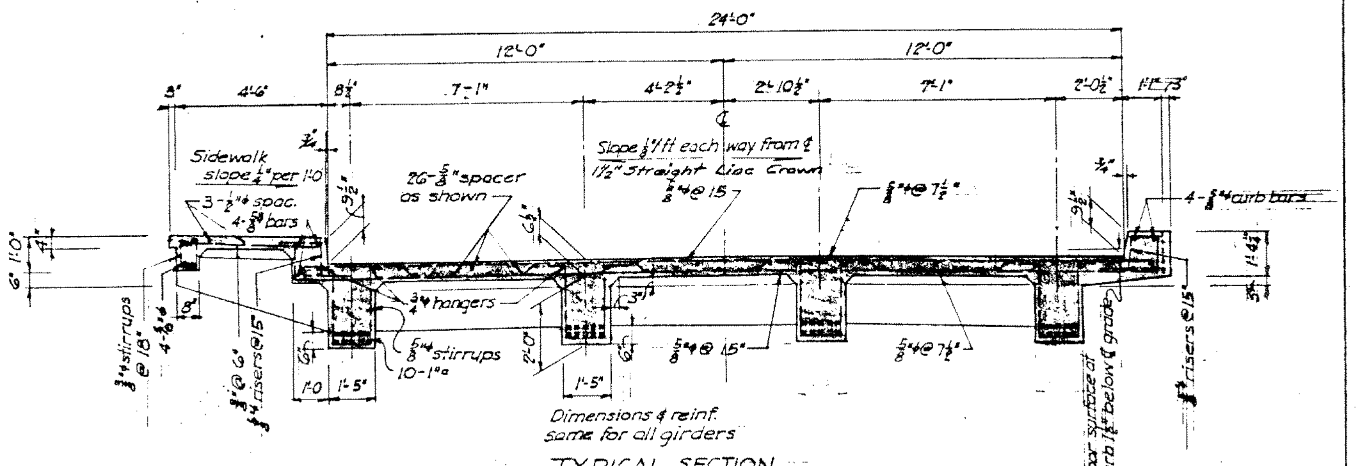
SECTION D-D

Cross beam reinforcement only



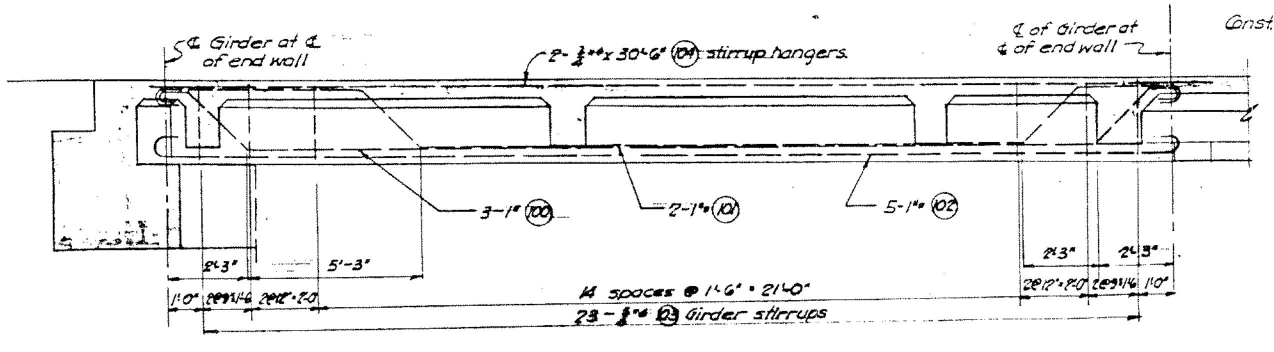
SECTION E-E

Cross beam reinforcement only



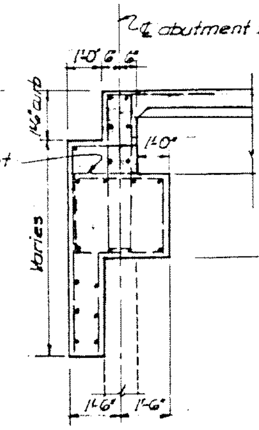
TYPICAL SECTION

Note:
Scale ⅜" = 1'-0"
Provide 1½" clear cover on all reinforcement, except bottom Slab Bars.
All reinforcing dimensions refer to center to center of bars.
Elevations refer to top of roadway slab
Section F-F ¢ G-G shown on sheet 4.
For endwall reinforcement see sheet 5
For endbeam reinforcement see sheet 6
Concrete Class "A".



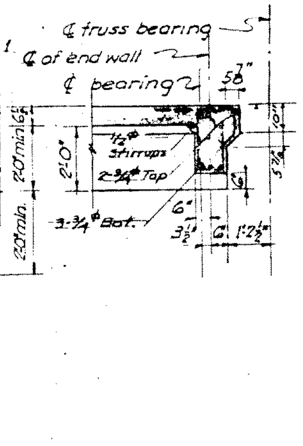
SECTION A-A

Reinforcement Girder "A"



SECTION B-B

End wall.



SECTION C-C

End beam.

KING COUNTY WASHINGTON
D.L. EVANS COUNTY ROAD ENGINEER

DUWAMISH RIVER-ALLENTOWN BRIDGE
BOND ISSUE NO. 155
SOUTH APPROACH SPAN

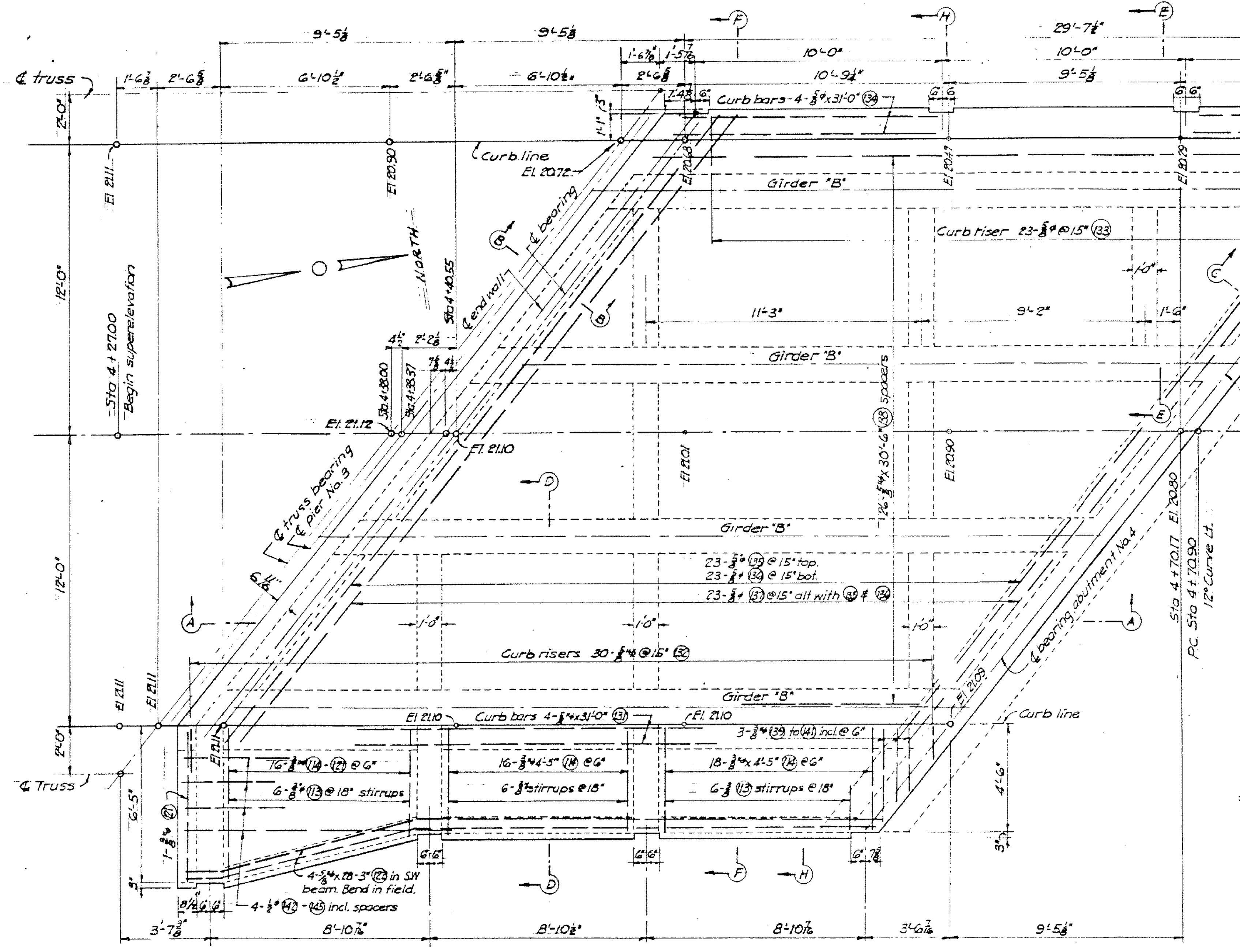
PREPARED BY
CECIL C. ARNOLD ¢ RAYMOND C. SMITH
CONSULTING ENGINEERS
SEATTLE, WASHINGTON
JUNE 1949

CECIL C. ARNOLD
7/21/49 CCA.

DESIGNED BY RCS
CHECKED BY

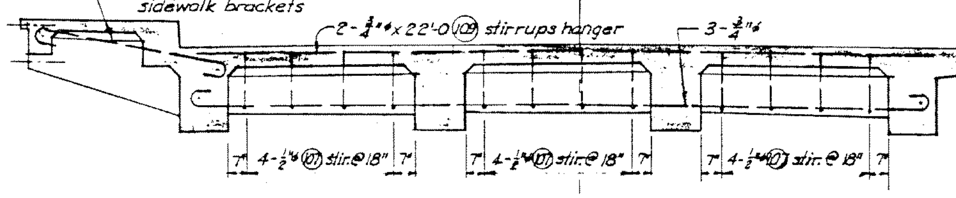
SHEET 3
OF 14 SHEETS

67-208



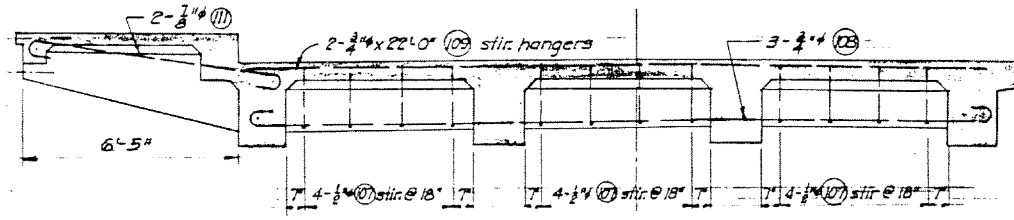
PLAN-NORTH APPROACH

Pier 3 to Abutment 4



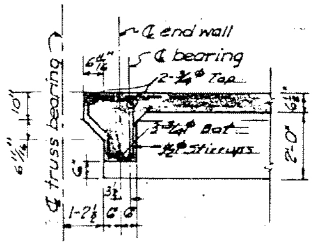
SECTION "FF"

Cross beam reinforcement only
Section H-H same except sidewalk brackets



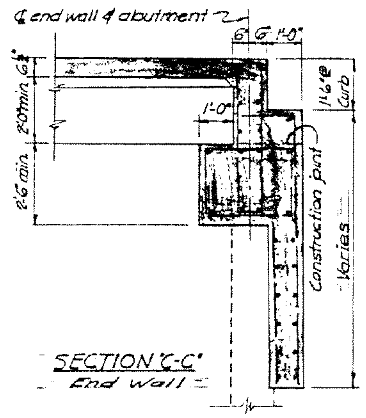
SECTION G-G

Cross beam reinforcement only



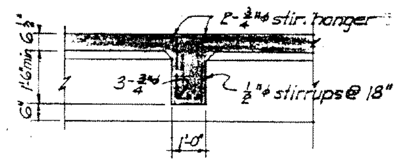
SECTION B-B

End Beam

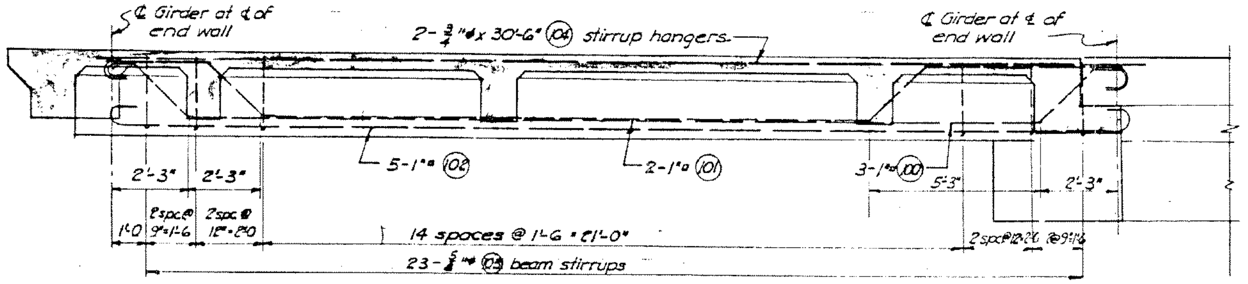


SECTION "C-C"

End Wall



TYPICAL SECTION-CROSS BEAMS



SECTION A-A

Reinforcement - Girder "B"

NOTE
End beam reinforcement see Pier 3 detail sheet 7.
For Wing Wall details see sheet 5
Sections D-D ＆ E-E shown on sheet 3
End wall reinforcement, see abutment 4 sheet 5.
Elevations refer to top of roadway slab.
All reinforcing dimensions refer to center to center of bars.
Provide 1½" clear cover unless otherwise noted.
Concrete Class "A"
Scale ⅜" = 1'-0"

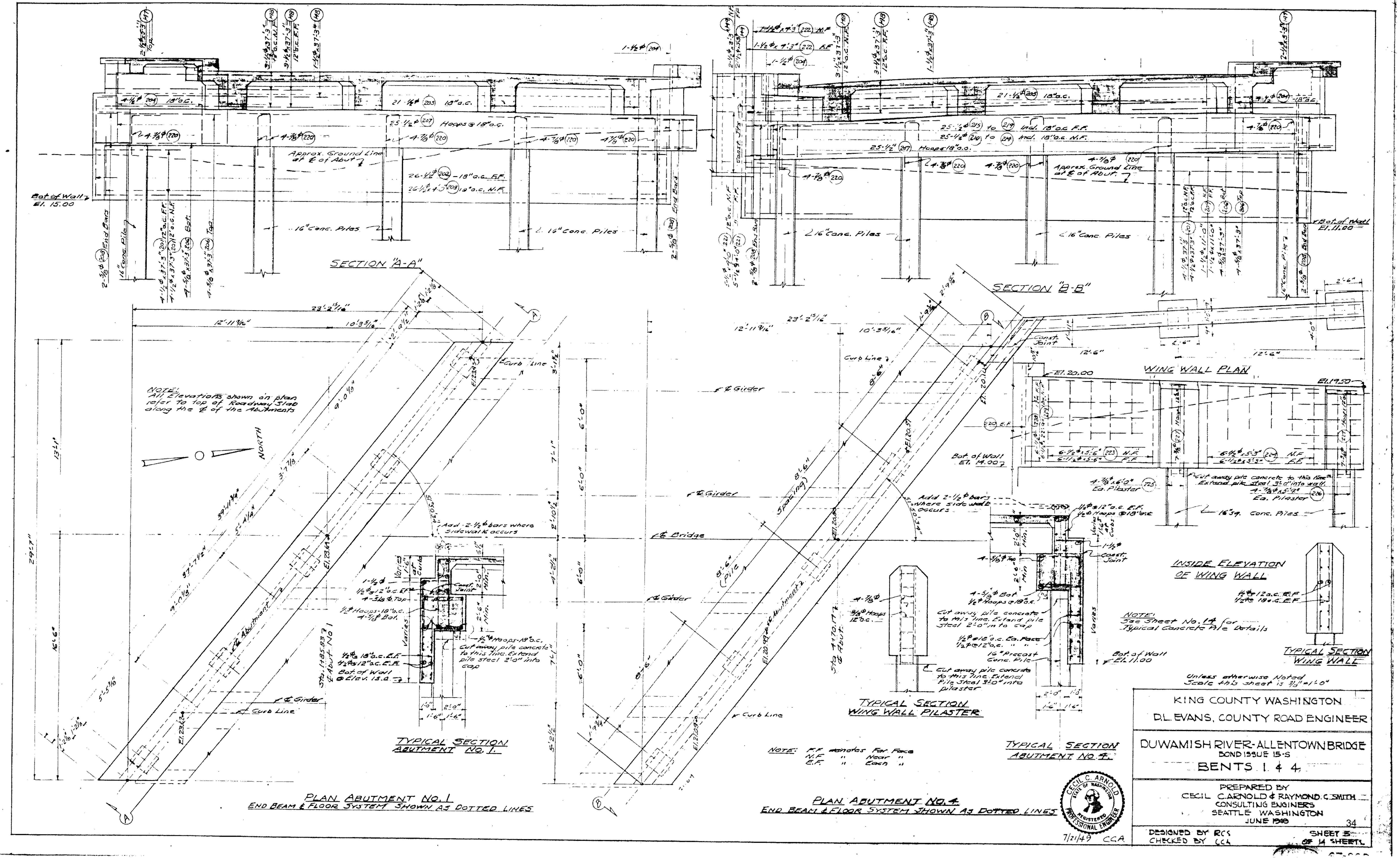
CECIL C. ARNOLD
7/21/49 C.C.A.

KING COUNTY WASHINGTON
D.L. EVANS COUNTY ROAD ENGINEER

DUWAMISH RIVER-ALLENTOWN BRIDGE
BOND ISSUE NO. 155
NORTH APPROACH SPAN

PREPARED BY
CECIL C. ARNOLD ＆ RAYMOND C. SMITH
CONSULTING ENGINEERS
SEATTLE, WASHINGTON
JUNE 1949

DESIGNED BY R.C.S.
CHECKED BY
SHEET 4
OF 14 SHEETS



NOTE: All Elevations shown on plan refer to top of Roadway Slab along the ℄ of the Abutments

NOTE: See Sheet No. 14 for Typical Concrete Pile Details

NOTE: F.F. denotes Far Face
N.F. " Near "
E.F. " Each "

Unless otherwise Noted
Scale this sheet is ⅜" = 1'-0"

CECIL C. ARNOLD
STATE OF WASHINGTON
REGISTERED PROFESSIONAL ENGINEER

7/21/49 CCA

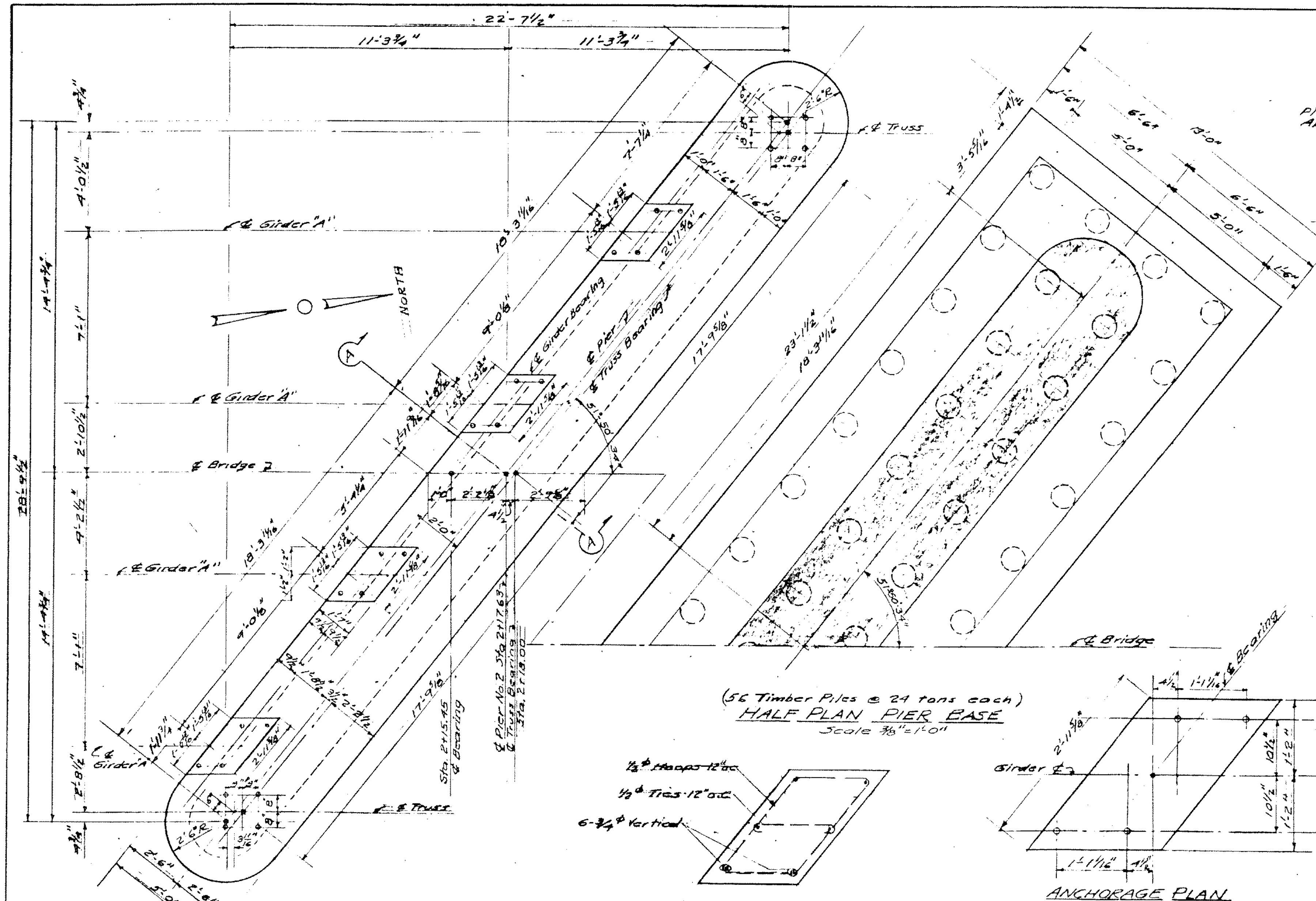
KING COUNTY WASHINGTON
D.L. EVANS, COUNTY ROAD ENGINEER

DUWAMISH RIVER-ALLENTOWN BRIDGE
BOND ISSUE 15-S
BENTS 1 & 4

PREPARED BY
CECIL C. ARNOLD & RAYMOND C. SMITH
CONSULTING ENGINEERS
SEATTLE WASHINGTON
JUNE 1948

DESIGNED BY RCS
CHECKED BY CCA

SHEET 5
OF 14 SHEETS.



COPING PLAN
Scale 3/8"=1'-0"

(56 Timber Piles @ 24 tons each)

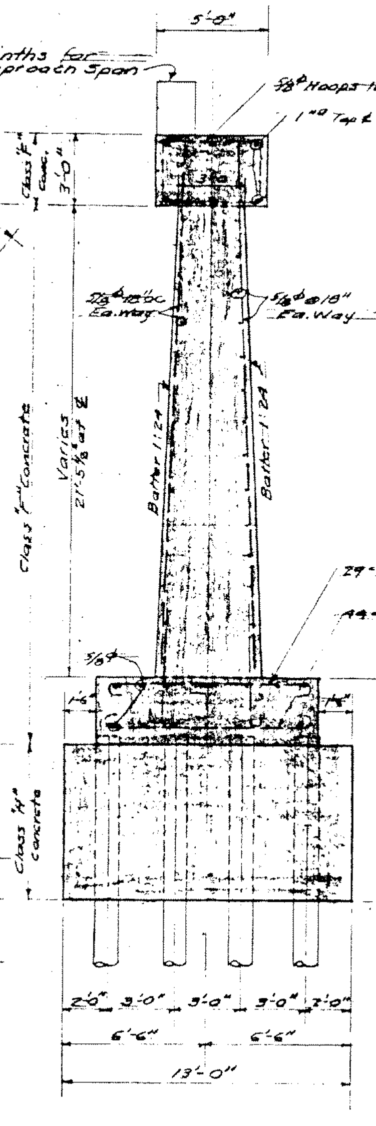
HALF PLAN PIER BASE
Scale 3/16"=1'-0"

1/2"ϕ Hoops 12" o.c.
1/2"ϕ Ties 12" o.c.
6-3/4"ϕ Vertical

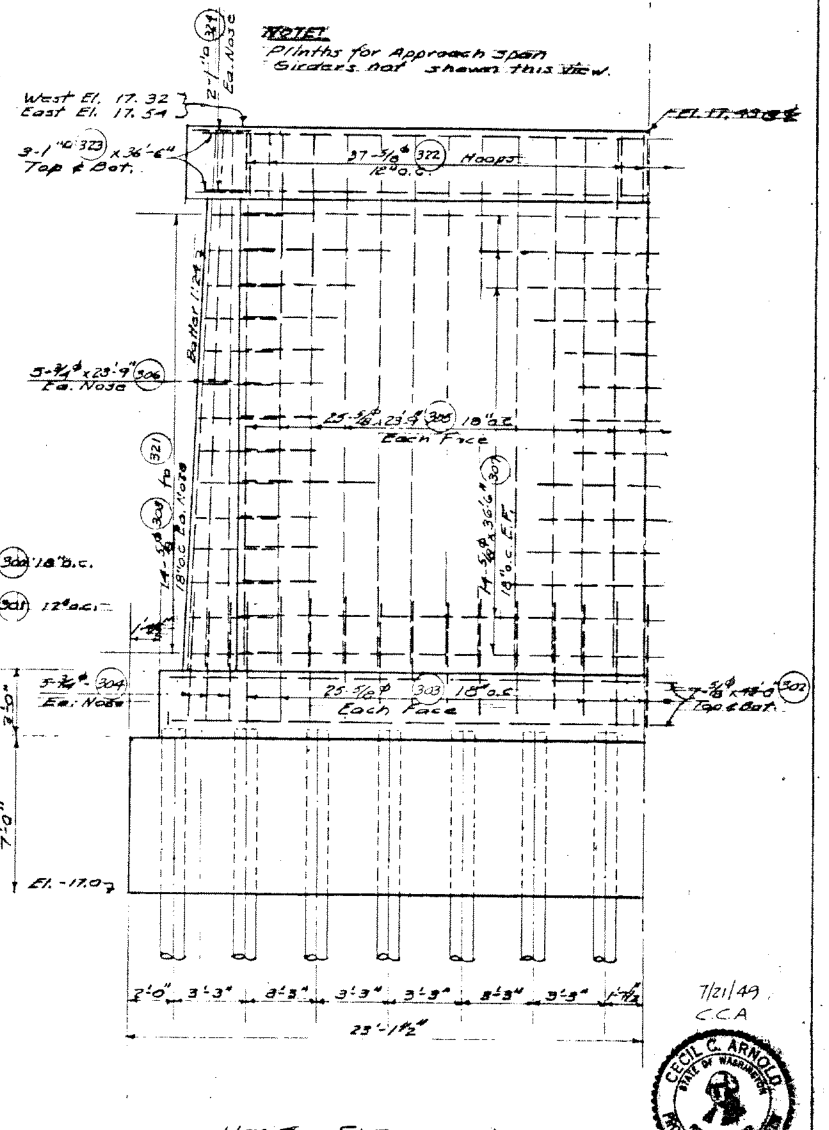
TYPICAL SECTION OF PLINTH
Showing Reinforcement Details
Scale 3/4"=1'-0"

Girder ℄
℄ Bearing

ANCHORAGE PLAN
TYPICAL FOR ALL PLINTHS
Scale 1"=1'-0"



SECTION "A-A"
Scale 1/4"=1'-0"



7/21/49
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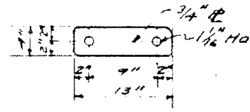
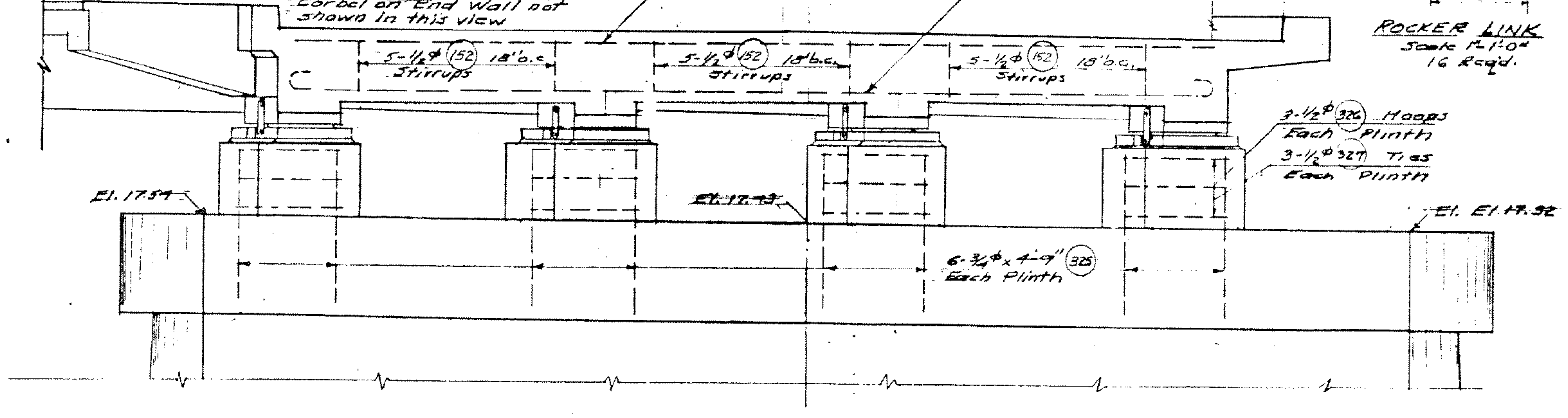
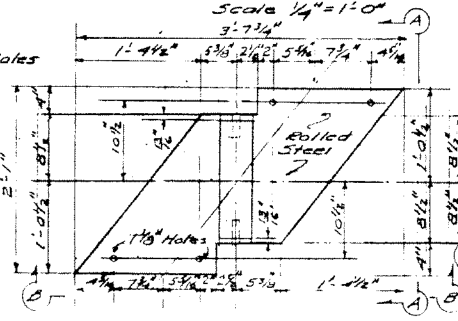
HALF ELEVATION
Scale 1/4"=1'-0"



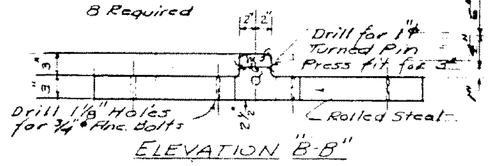
ROCKER LINK
Scale 1"=1'-0"
16 Req'd.



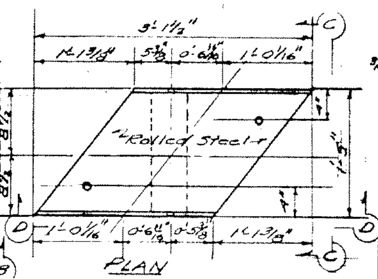
NORTH EAST ELEVATION
~~(Showing~~ Plinths & Approach Span End wall)
Scale 3/8"=1'-0"



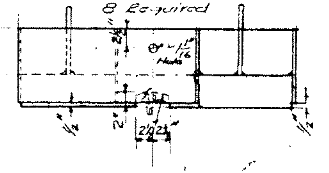
PLAN
GIRDER ROCKER BOTTOM PLATE
8 Required



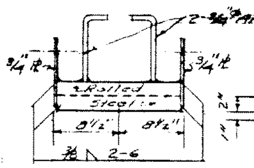
ELEVATION "B-B"
Scale 1"=1'-0"



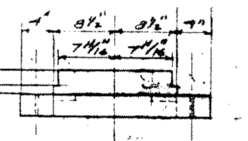
PLAN
GIRDER ROCKER-TOP PLATE
8 Required



ELEVATION "D-D"
Scale 1 1/2"=1'-0"



ELEV. "C-C"



ELEV. "A-A"

PIER NO. 2 - ~~Scales as shown~~

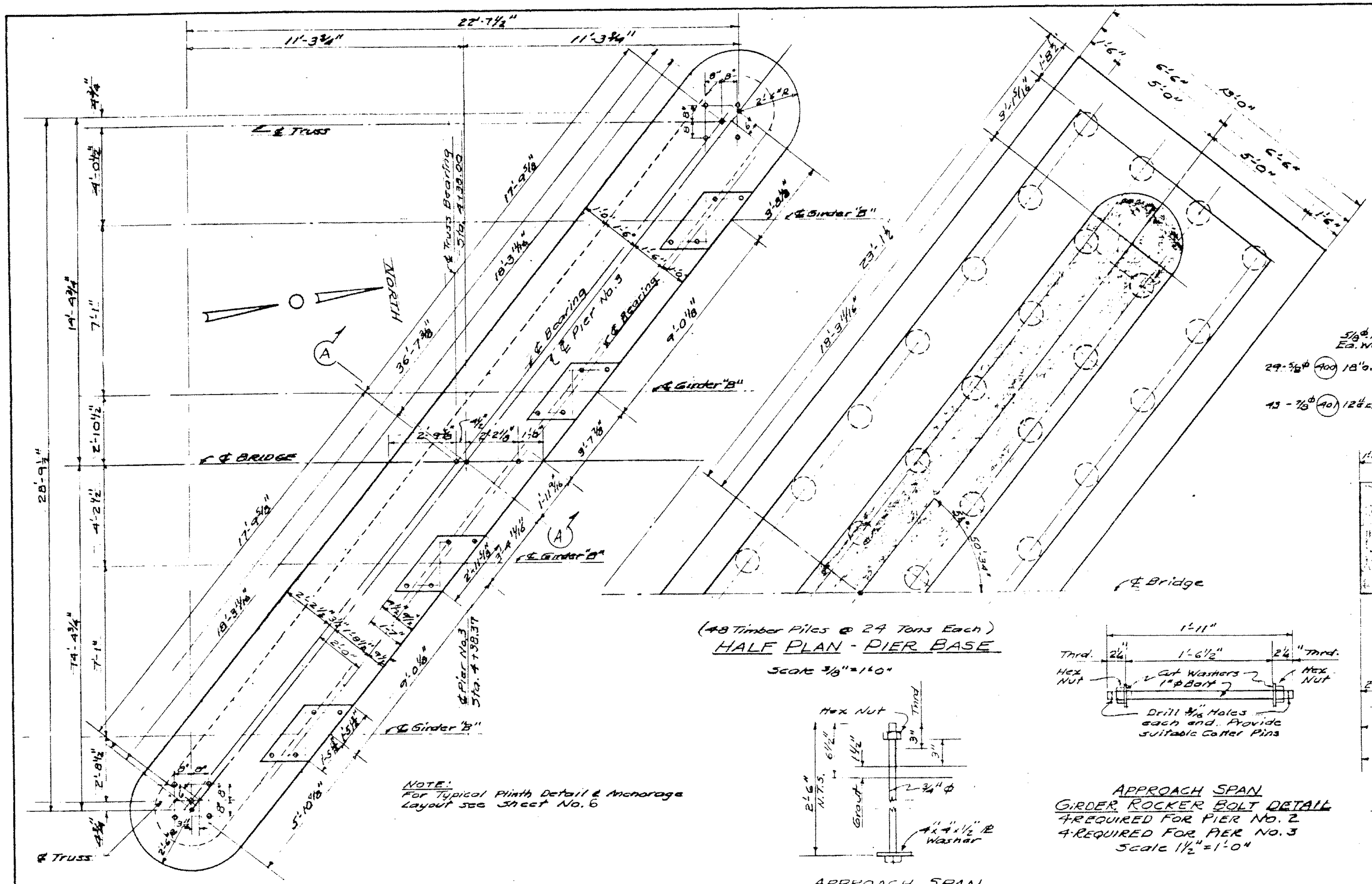
KING COUNTY WASHINGTON
D.L. EVANS COUNTY ROAD ENGINEER

DUWAMISH RIVER - ALLENTOWN BRIDGE
BOND ISSUE 155
PIER 2

PREPARED BY
CECIL C. ARNOLD & RAYMOND C. SMITH
CONSULTING ENGINEERS
SEATTLE - WASHINGTON
JUNE 1949

PREPARED BY RCS
CHECKED BY C.C.A.

SHEET 6
OF 14 SHEETS



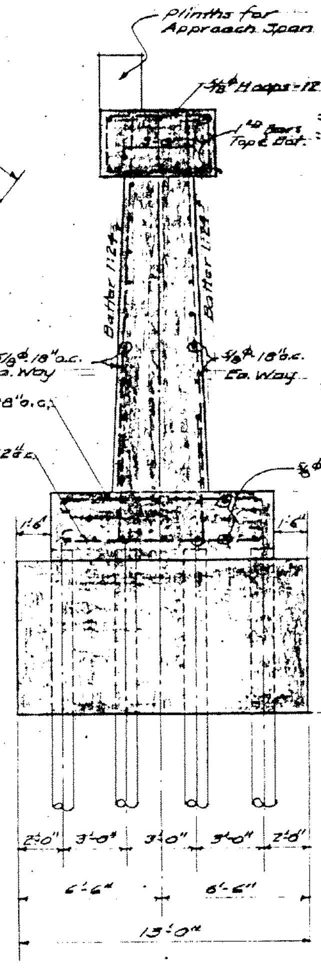
NOTE: For Typical Plinth Detail & Anchorage Layout see Sheet No. 6

COPING PLAN
Scale ⅜"= 1'-0"

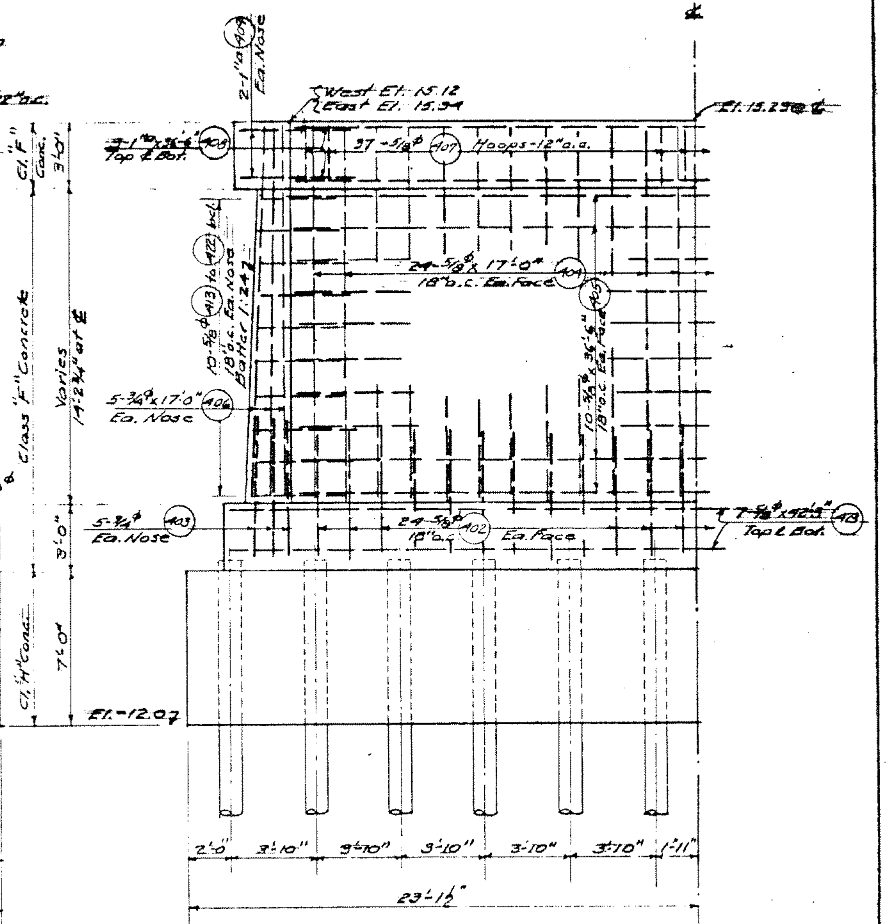
(48 Timber Piles @ 24 Tons Each)
HALF PLAN - PIER BASE
Scale ⅜"=1'-0"

APPROACH SPAN
ANCHOR BOLT DETAIL
16 REQUIRED FOR PIER NO. 2
16 REQUIRED FOR PIER NO. 3
Scale 1½"=1'-0"

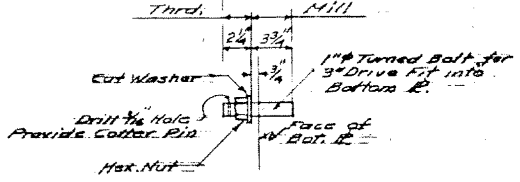
APPROACH SPAN
GIRDER ROCKER BOLT DETAIL
4 REQUIRED FOR PIER No. 2
4 REQUIRED FOR PIER No. 3
Scale 1½"=1'-0"



SECTION "A-A"
Scale ¼"=1'-0"



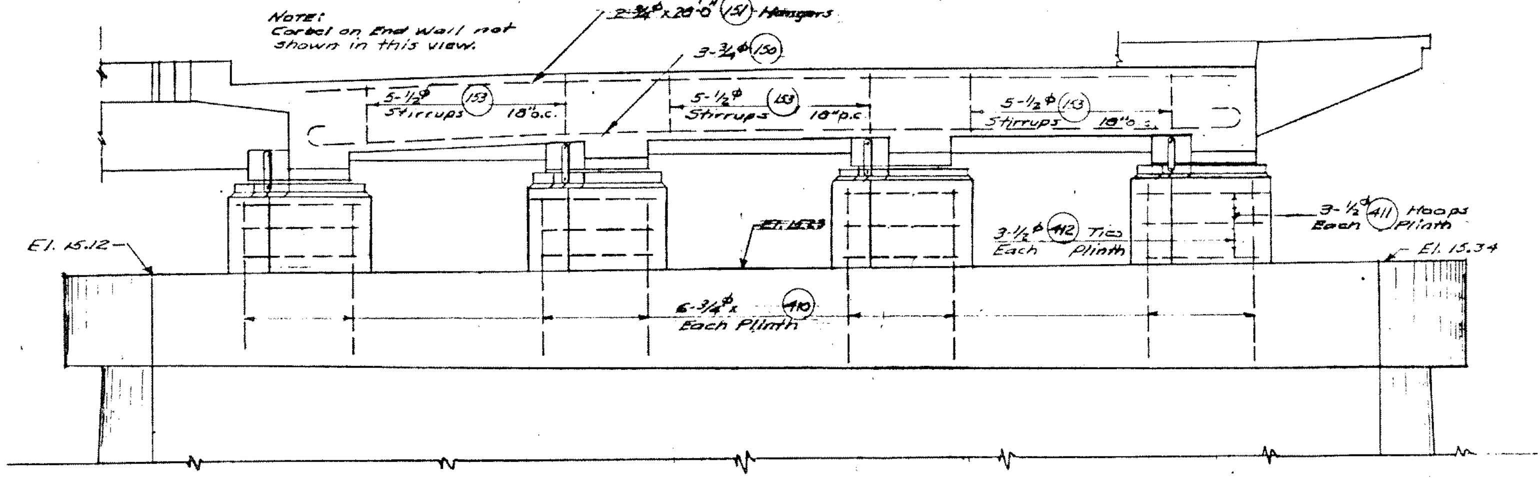
HALF ELEVATION
Scale ¼"=1'-0"



C.C.A
7/21/49

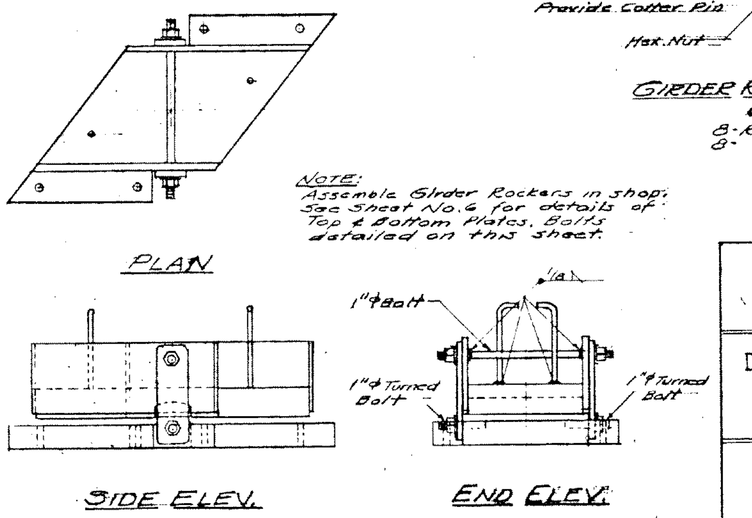
GIRDER ROCKER BOTTOM PLATE BOLT DETAIL
8-REQUIRED FOR PIER No. 2
8- " " " No. 3
Scale 1½"=1'-0"

PIER NO. 3 (Scales as shown)



NOTE: Corbel on End Wall not shown in this view.

SOUTH-WEST ELEVATION
(Showing Plinths & Approach Span End Wall)
Scale ⅜"=1'-0"



NOTE: Assemble Girder Rockers in shop. See Sheet No. 6 for details of Top & Bottom Plates. Bolts detailed on this sheet.

PLAN

SIDE ELEV.

END ELEV.

GIRDER ROCKER ASSEMBLY
Scale 1"=1'-0"

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DUWAMISH RIVER-ALLENTOWN BRIDGE
BOND ISSUE 155
PIER 3

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JUNE 1949

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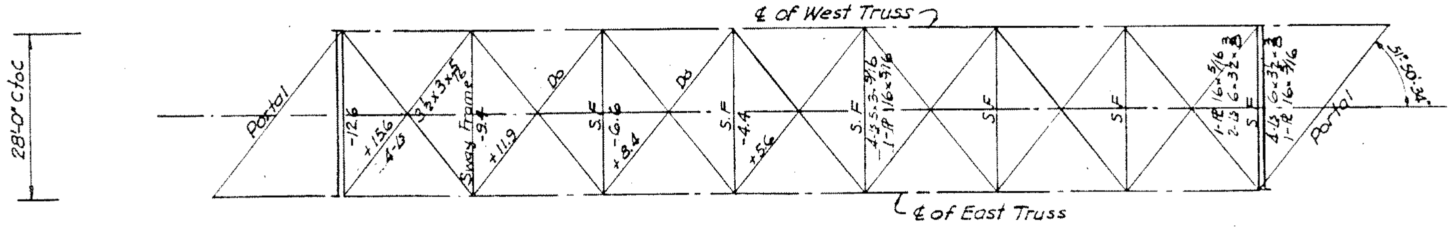
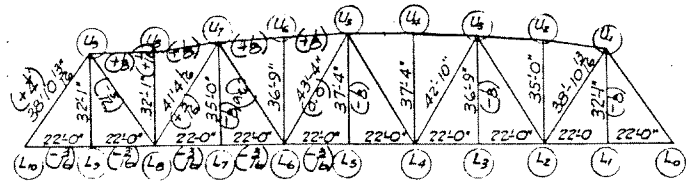
~~SHEET 7~~
~~OF 14 SHEETS.~~

(17825) 67-20F

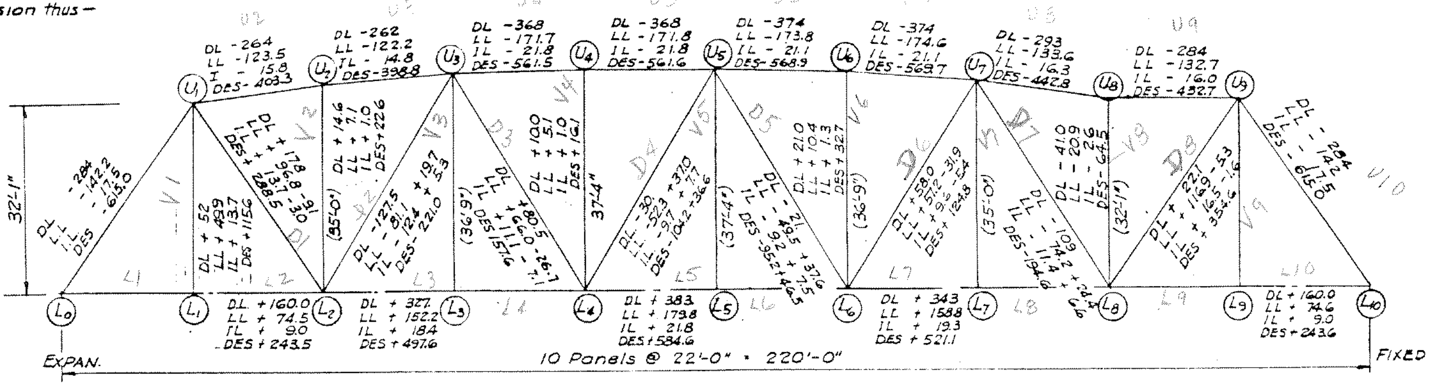


TOP LATERALS



GEOMETRIC LENGTHS AND ( ) CORRECTIONS THERETO TO OBTAIN NO LOAD CAMBER

NOTE
Tension thus +
Compression thus −

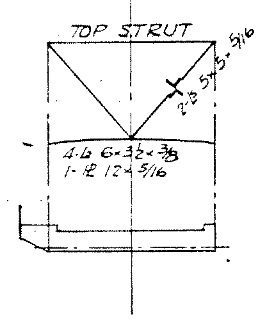


ELEVATION OF FAR (WEST) TRUSS

Scale 1"=15'

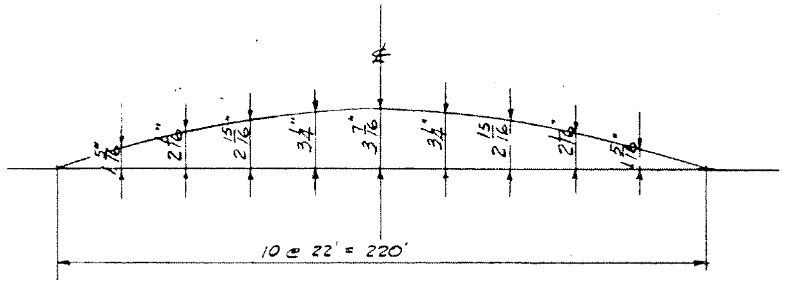
PIER REACTION
EACH TRUSS

D. LOAD	260K
L. LOAD	151K
W. LOAD	± 67K

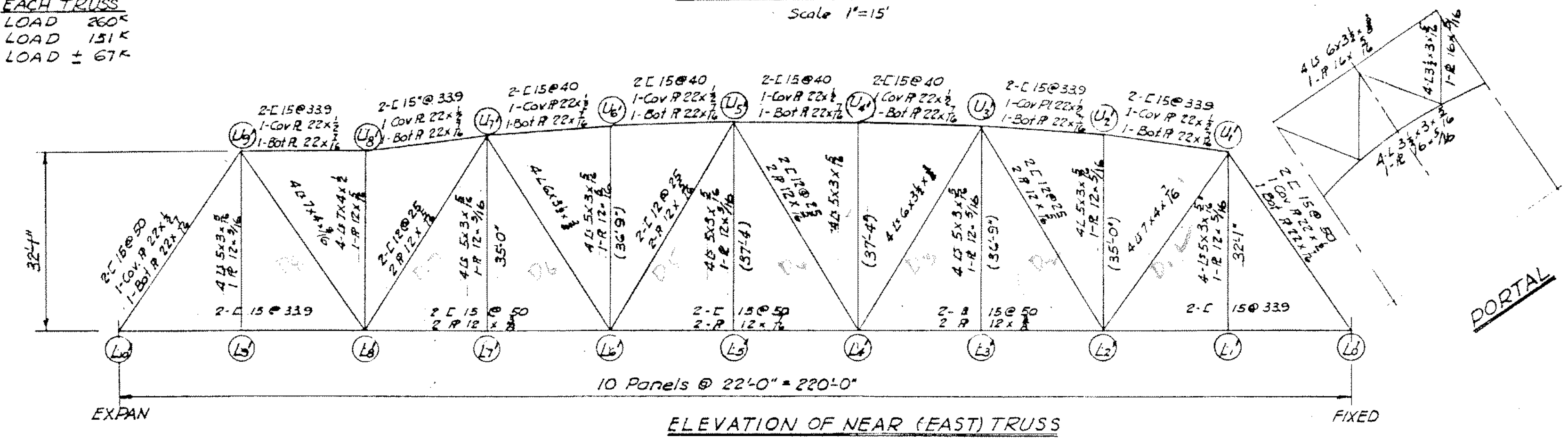


SWAY FRAMES

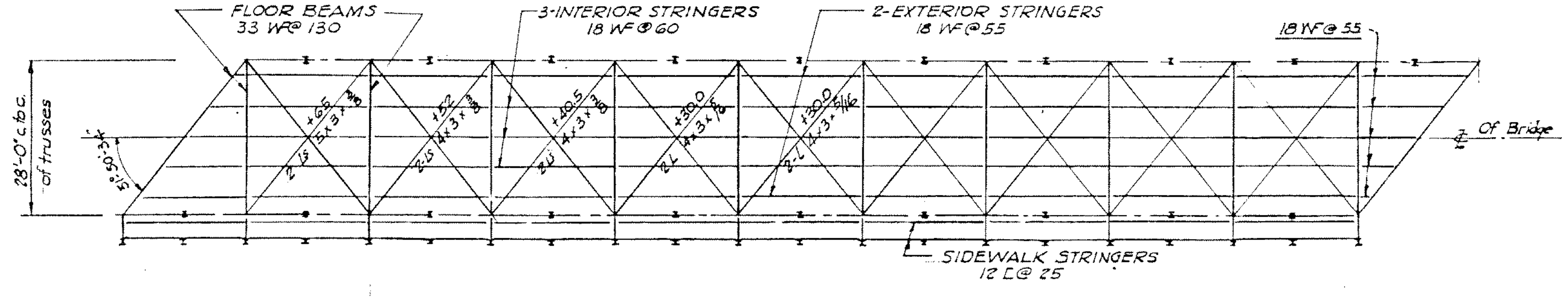
EAST TRUSS	WEST TRUSS
U8'	U1
U7'	U2
U6'	U3
U5'	U4
U4'	U5
U3'	U6
U2'	U7
U1'	U8



NO LOAD CAMBER DIAGRAM



ELEVATION OF NEAR (EAST) TRUSS



BOTTOM LATERALS & FLOOR SYSTEM

Scale 1"=15'

NOTE
All stresses and reactions are given in kips
Rivets 7/8"ϕ, open holes 15/16"ϕ except as shown otherwise

DESIGN SPECIFICATIONS: AASHO 1944
LOADING : H 20-44

KING COUNTY WASHINGTON
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DUWAMISH RIVER-ALLENTOWN BRIDGE
BOND ISSUE 15-S
STEEL SPAN-STRESS SHEET

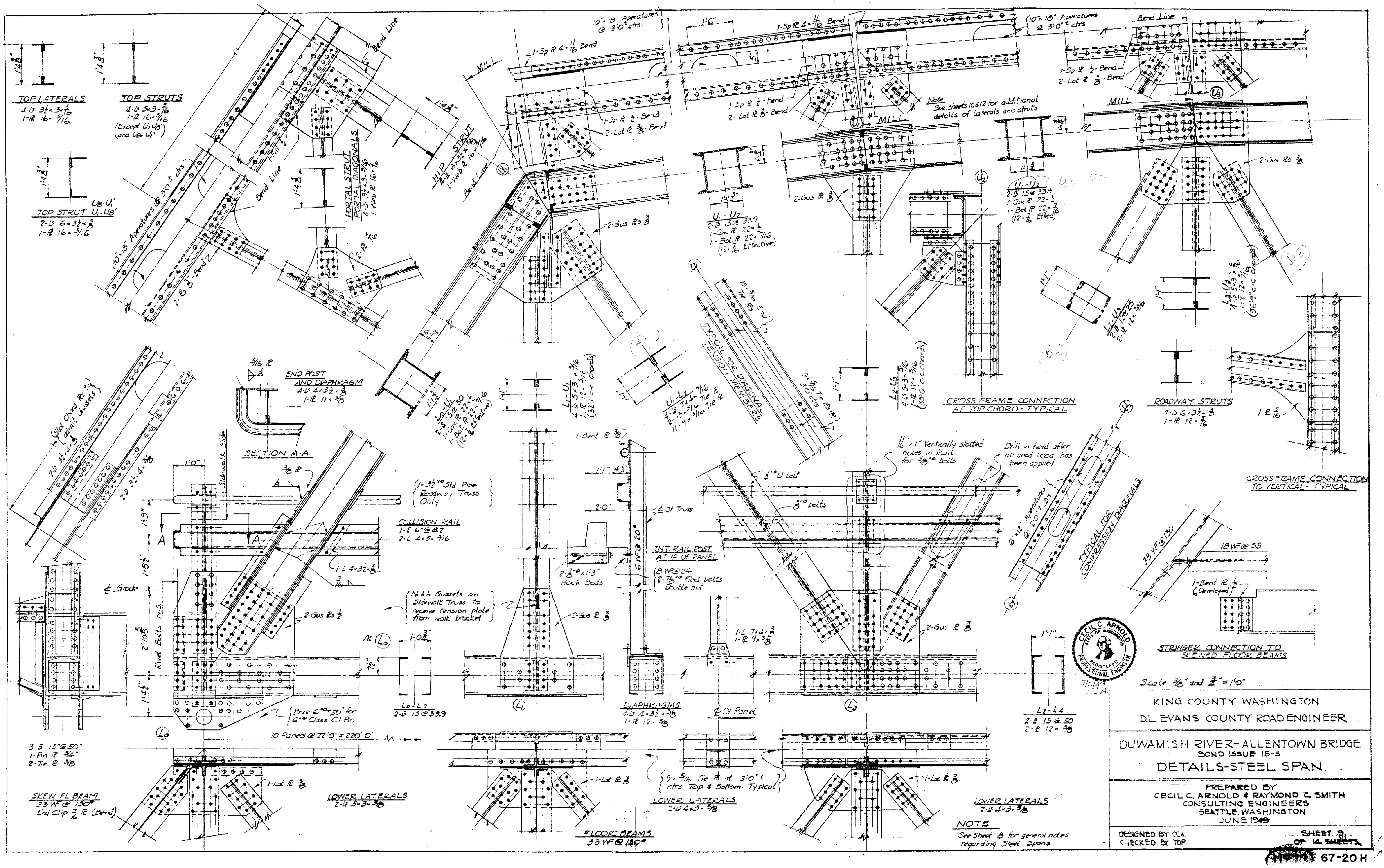
PREPARED BY
CECIL C. ARNOLD & RAYMOND C. SMITH
CONSULTING ENGINEERS
SEATTLE WASHINTON
JUNE 1949

CECIL C. ARNOLD
7/21/49 C.C.A

DESIGNED C.C.A.
CHECKED TOP.

SHEET 8
OF 14 SHEETS

67-20 G



CECIL C. ARNOLD

7/12/49

Scale 3/8" and ¾" = 1'-0"

NOTE
See Sheet 8 for general notes regarding Steel Spans

KING COUNTY WASHINGTON
D.L. EVANS COUNTY ROAD ENGINEER

DUWAMISH RIVER-ALLENTOWN BRIDGE
BOND ISSUE 15-S
DETAILS-STEEL SPAN.

PREPARED BY
CECIL C. ARNOLD & RAYMOND C. SMITH
CONSULTING ENGINEERS
SEATTLE, WASHINGTON
JUNE 1949

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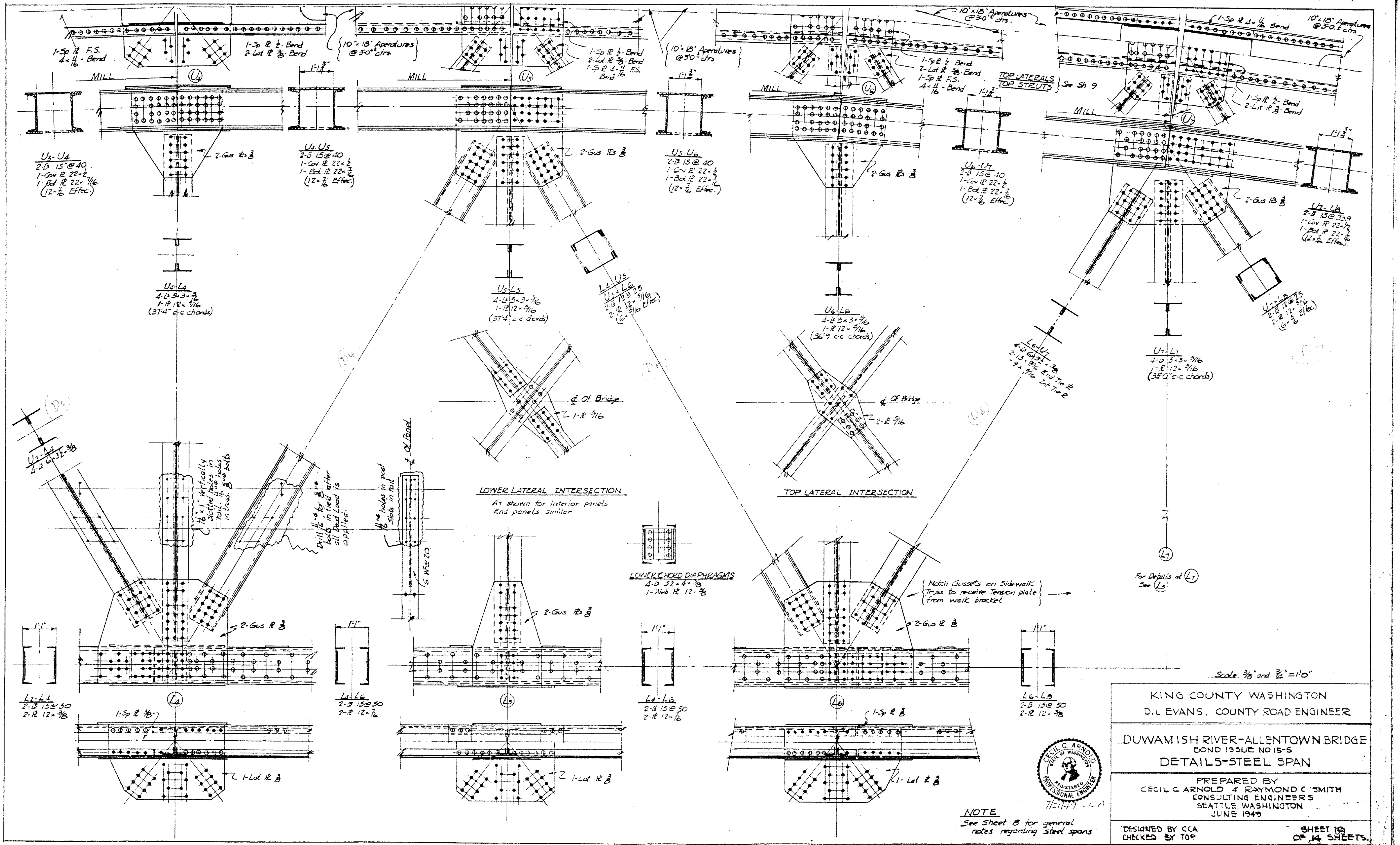
CHECKED BY TOP

SHEET 9
OF 14 SHEETS

67-20 H



Scale 3/8" and 3/4"=1'0"

KING COUNTY WASHINGTON
D.L EVANS, COUNTY ROAD ENGINEER

DUWAMISH RIVER-ALLENTOWN BRIDGE
BOND ISSUE NO 15-S
DETAILS-STEEL SPAN

PREPARED BY
CECIL C ARNOLD & RAYMOND C SMITH
CONSULTING ENGINEERS
SEATTLE, WASHINGTON
JUNE 1949

CECIL C. ARNOLD

7/21/49 CCA

NOTE
See Sheet 8 for general notes regarding steel spans

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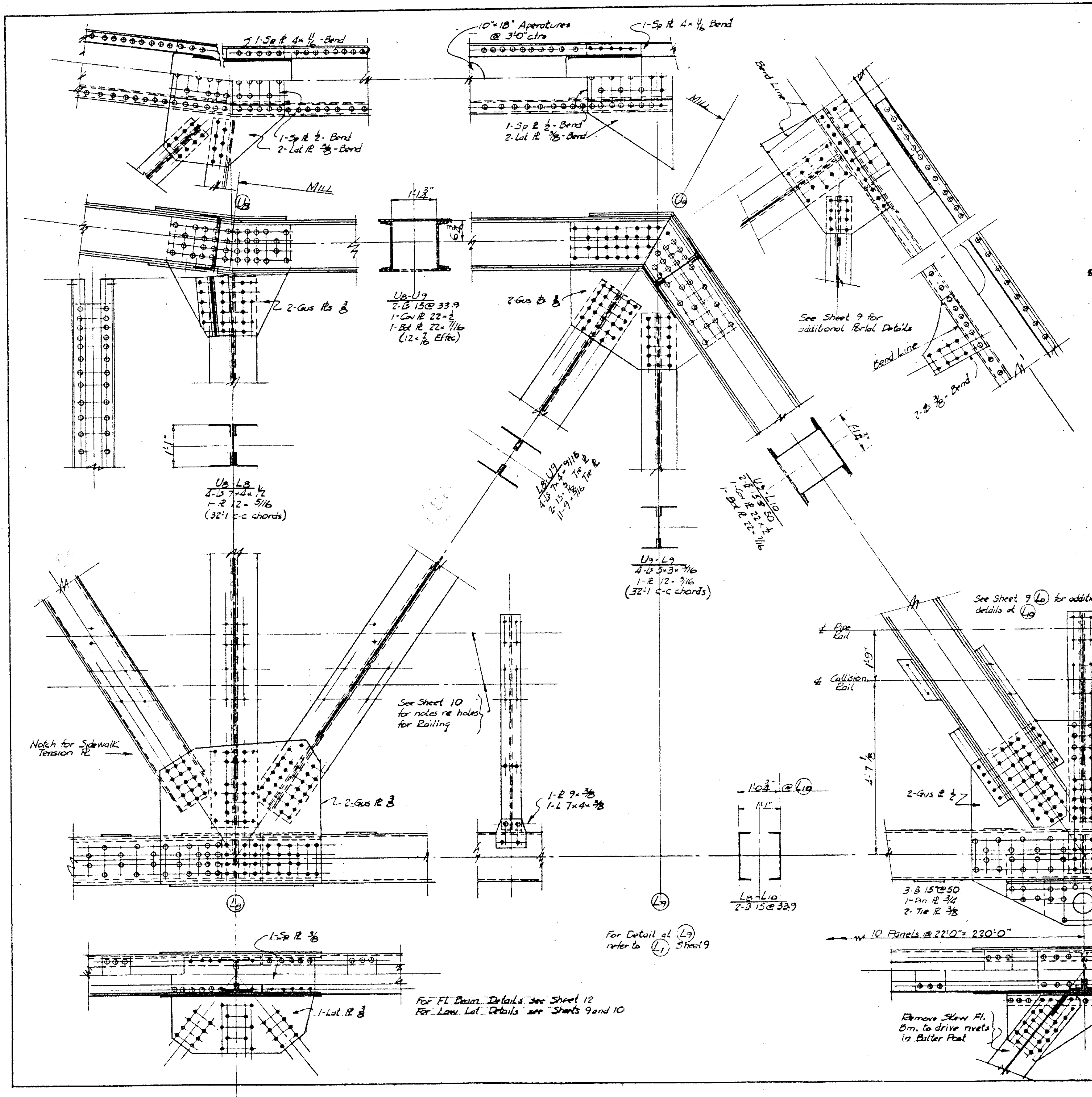
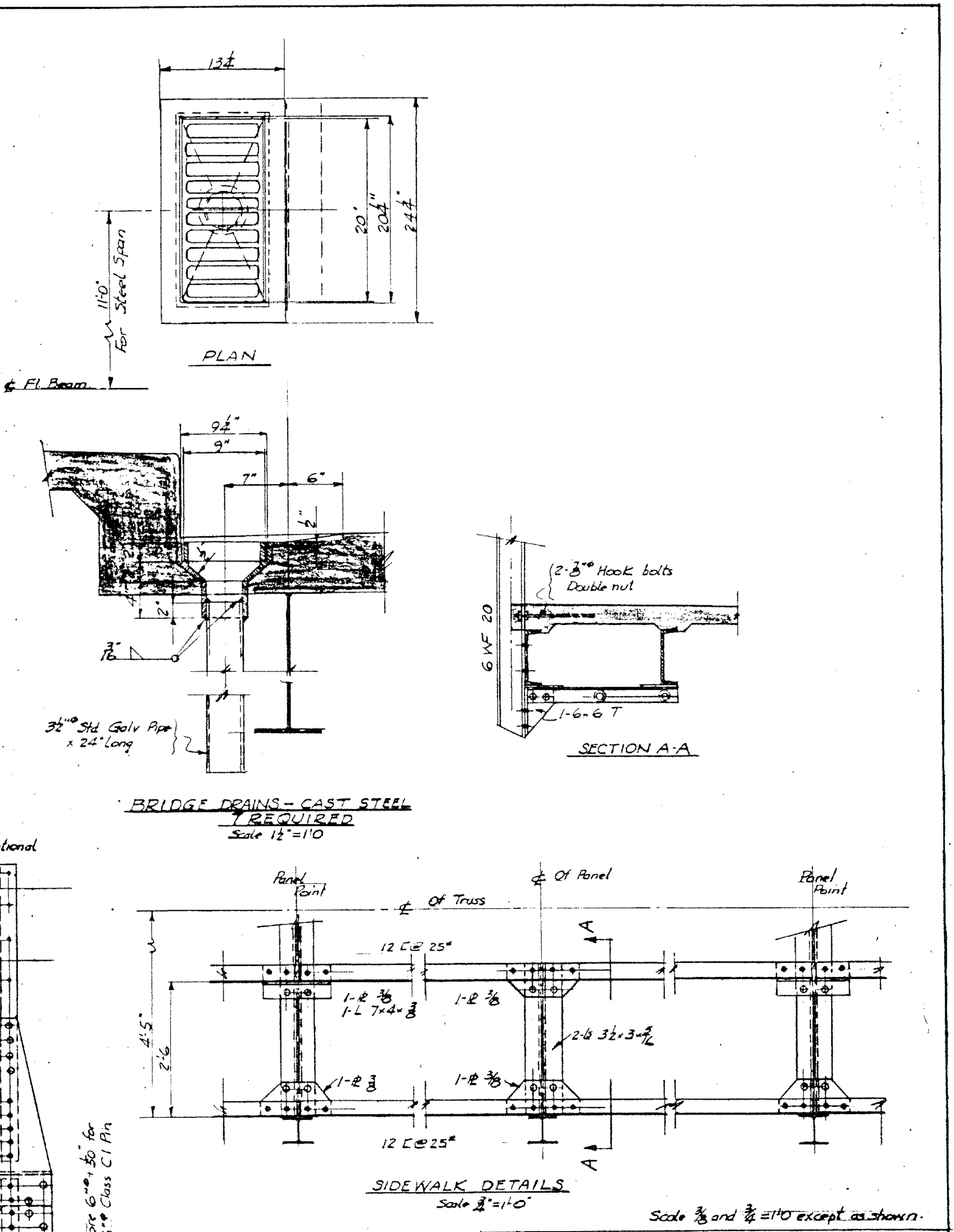
SHEET 10
OF 14 SHEETS.

11929 67-201





Scale ⅜ and ¾ = 1'-0 except as shown.

NOTE
See Sheet 8 for general notes regarding steel span.

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7/1/49 CCA.

KING COUNTY WASHINGTON

D.L. EVANS, COUNTY ROAD ENGINEER

DUWAMISH RIVER-ALLENTOWN BRIDGE
BOND ISSUE NO 15 S
DETAILS-STEEL SPAN

PREPARED BY
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SEATTLE, WASHINGTON
JUNE 1949

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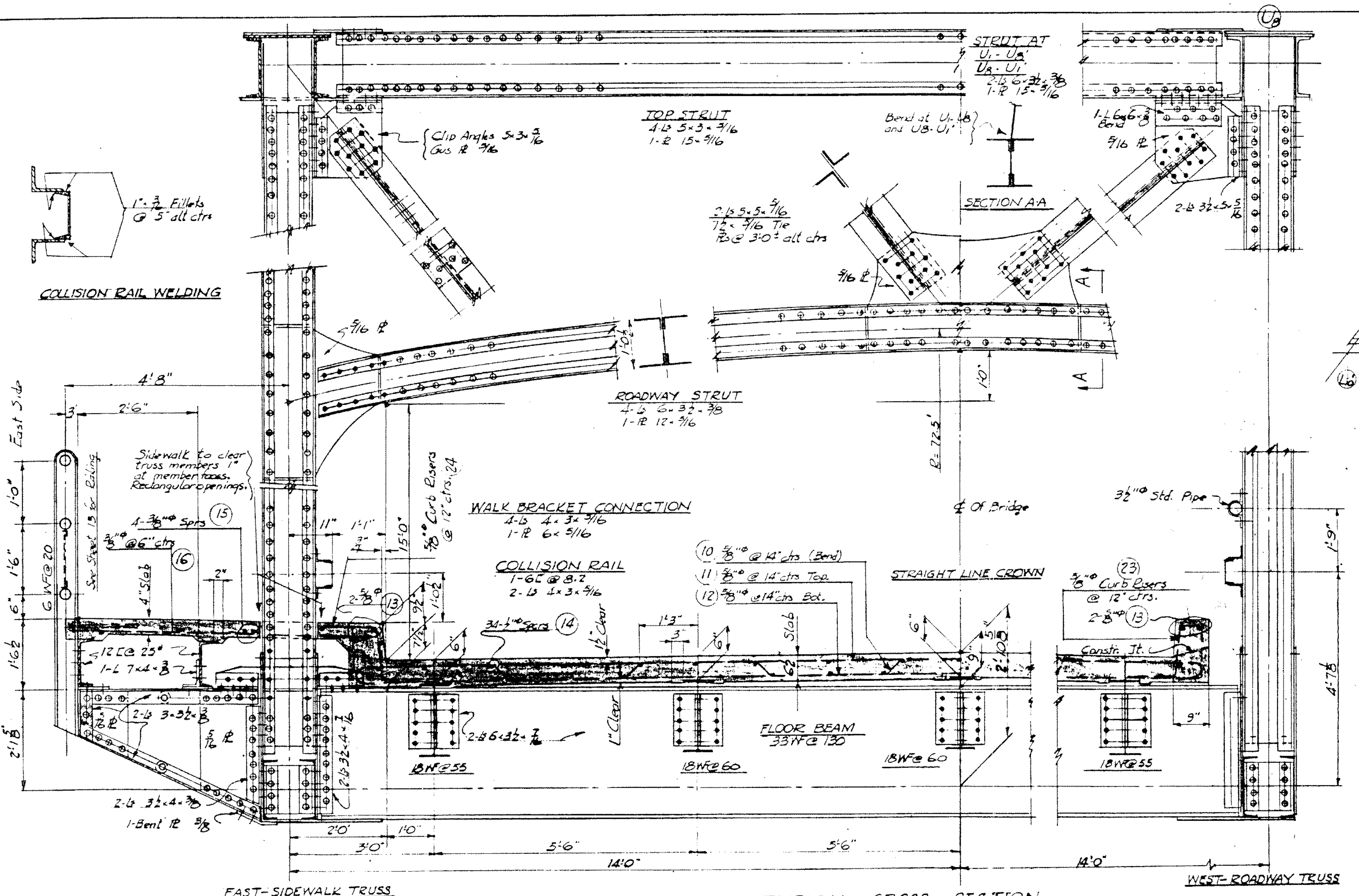
SHEET [illegible]
OF 14 SHEETS

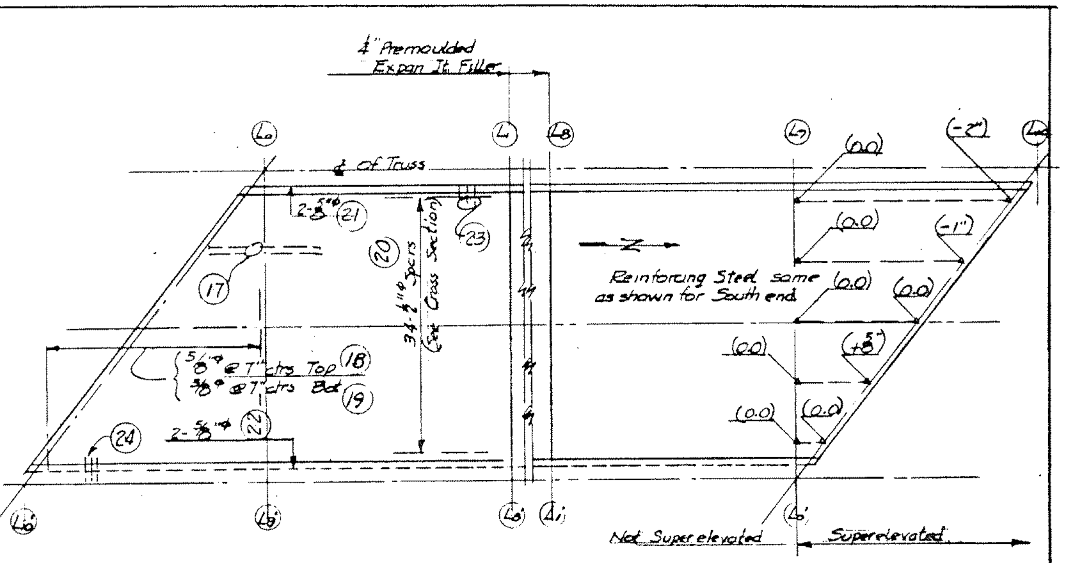
67-20J



COLLISION RAIL WELDING

TYPICAL CROSS SECTION

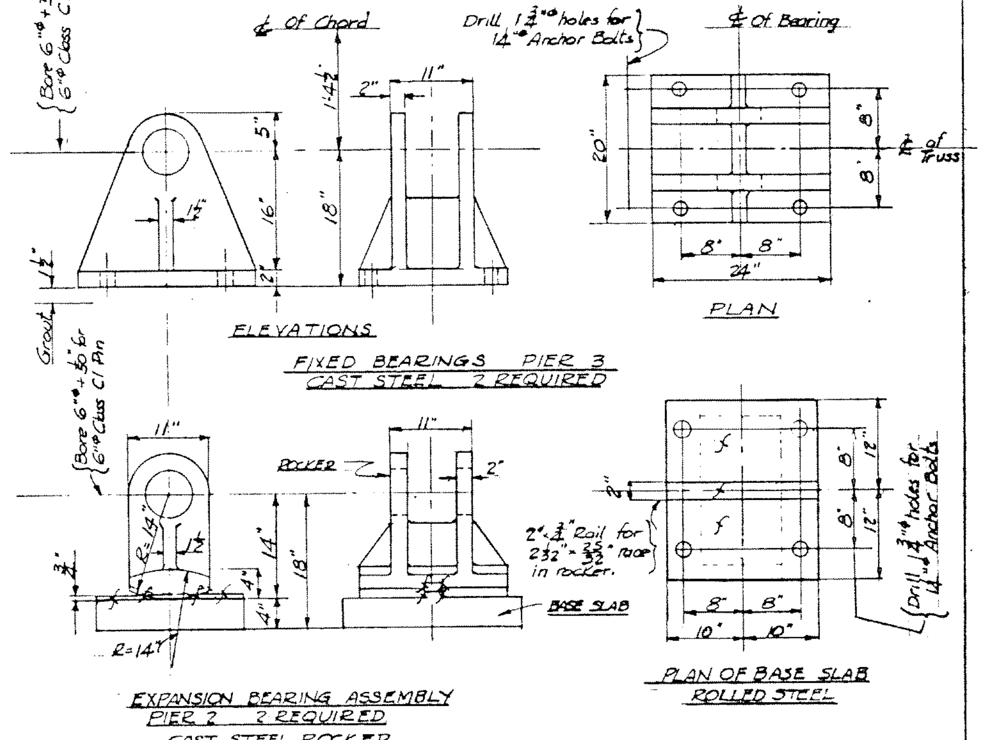
Slab as shown for Rectangular Panels Only



ROADWAY SLAB AT SPAN ENDS

Scale ⅛" = 1'-0

Dimensions in parenthesis, thus (0.0), indicate amount tops of stringers are to be raised or lowered in north triangular panel to attain superelevation. Maintain 6½" slab 6" above stringers at floor beams.

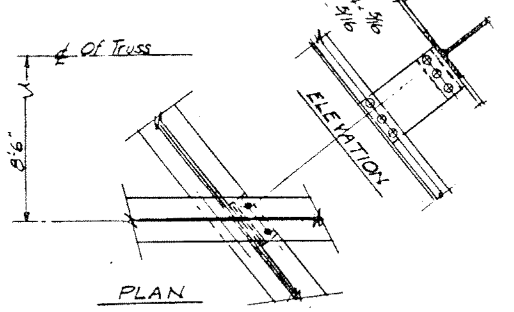


EXPANSION BEARING ASSEMBLY
PIER 2 2 REQUIRED
CAST STEEL ROCKER

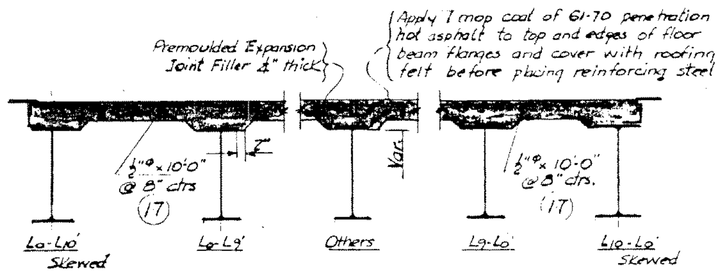
PLAN OF BASE SLAB
ROLLED STEEL

BEARING DETAILS

Scale 1" = 1'-0

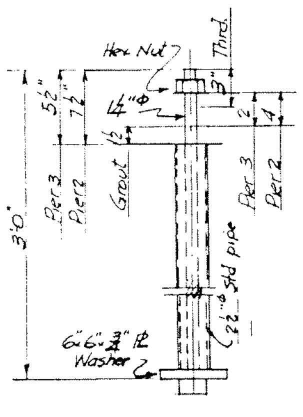


DETAIL OF LATERAL HANGER
4 SUCH EACH PANEL



ROADWAY SLAB OVER FLOOR BEAMS

Not to Scale



ANCHOR BOLT DETAIL
8 REQUIRED FOR PIER 2
8 REQUIRED FOR PIER 3

Scale 1½" = 1'-0"

7/21/49 C.C.A.

Scale ⅜" = 1'-0 except as shown otherwise.

NOTE
See Sheet 8 for general note regarding steel span.

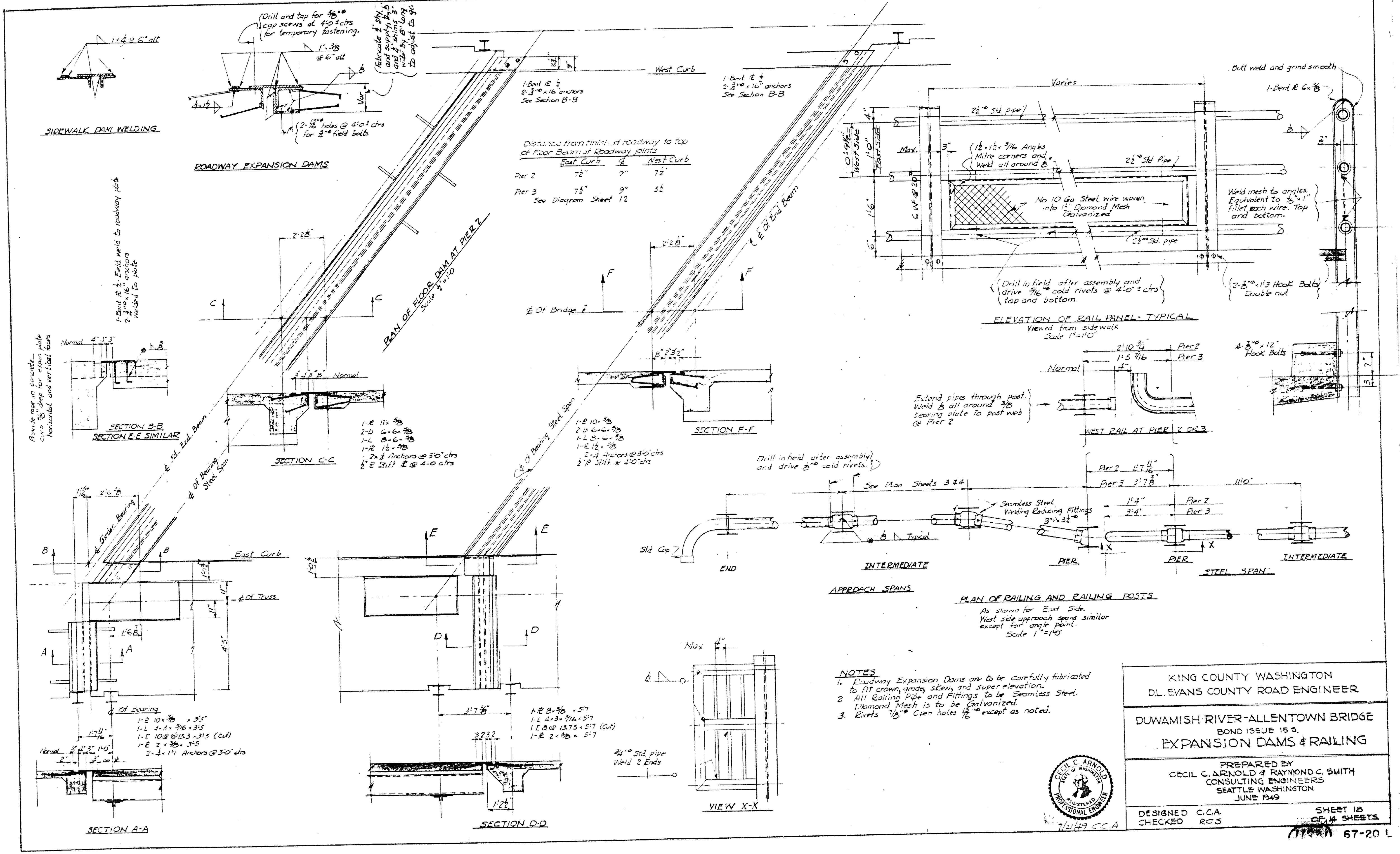
KING COUNTY WASHINGTON
D.L. EVANS, COUNTY ROAD ENGINEER

DUWAMISH RIVER-ALLENTOWN BRIDGE
BOND ISSUE 15 S
DETAILS-STEEL SPAN

PREPARED BY
CECIL C. ARNOLD & RAYMOND C. SMITH
CONSULTING ENGINEERS
SEATTLE WASHINGTON
JUNE 1949

DESIGNED BY C.C.A
CHECKED BY TOP

SHEET 12
OF 14 SHEETS



Distance from finished roadway to top of Floor Beam at Roadway joints

	East Curb	℄	West Curb
Pier 2	7½"	9"	7½"
Pier 3	7½"	9"	5½

See Diagram Sheet 12

NOTES
1. Roadway Expansion Dams are to be carefully fabricated to fit crown, grade, skew, and super elevation.
2. All Railing Pipe and Fittings to be Seamless Steel. Diamond Mesh is to be Galvanized.
3. Rivets ⅞"⌀ Open holes ¹⁵⁄₁₆"⌀ except as noted.

CECIL C. ARNOLD

7/21/49 CCA

KING COUNTY WASHINGTON
D.L. EVANS COUNTY ROAD ENGINEER

DUWAMISH RIVER-ALLENTOWN BRIDGE
BOND ISSUE 15 S.
EXPANSION DAMS & RAILING

PREPARED BY
CECIL C. ARNOLD & RAYMOND C. SMITH
CONSULTING ENGINEERS
SEATTLE WASHINGTON
JUNE 1949

DESIGNED C.C.A.
CHECKED RCS

SHEET 13
OF 14 SHEETS

67-20 L

BAR LIST

Note. All dimensions are out to out.

ABUTMENT No. 1.

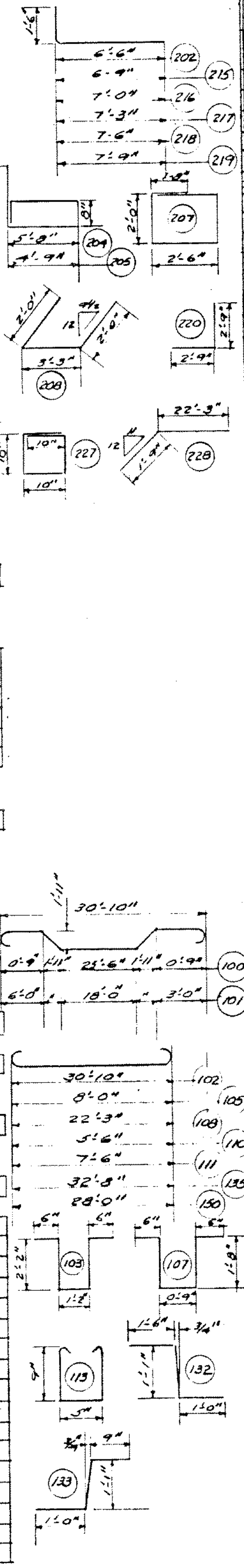
Mark	Location	No.	Size	Length	Bending Diagram
202	" " - Vert. F.F.	26	½φ	8'-0"	
203	" " - " - N.F.	26	½φ	4'-0"	Str.
204	End Wall - Vert.	5	½φ	14'-8"	
205	" " "	21	½φ	12'-10"	
206	Cap - Top & Bot.	8	⅝φ	37'-3"	Str.
207	" Hoops	25	½φ	10'-8"	
208	" End Bars	4	⅝φ	7'-3"	
220	" End of Piles	20	⅞φ	5'-6	
201	Curtain Wall Horiz.	8	½φ	37'-3"	Str.

ABUTMENT No. 4

Mark	Location	No.	Size	Length	Bending Diagram
201	Curtain Wall - Horiz.	8	½φ	37'-3"	Str.
209	" " "	2	½φ	11'-0"	"
210	" " Vert. N.F.	5	½φ	5'-0"	"
211	" " " "	5	½φ	5'-3"	"
212	" " " "	5	½φ	5'-6"	"
213	" " " "	5	½φ	5'-9"	"
214	" " " "	5	½φ	6'-0"	"
215	" " " F.F.	5	½φ	8'-3"	
216	" " " "	5	½φ	8'-6"	
217	" " " "	5	½φ	8'-9"	
218	" " " "	5	½φ	9'-0"	
219	" " " "	5	½φ	9'-3"	
204	End Wall - Vert.	5	½φ	14'-8"	
205	" " "	21	½φ	12'-10"	
206	Cap Top & Bot.	8	⅝φ	37'-9"	Str.
207	Cap Ties	25	½φ	10'-8"	
220	Pile Ends in Cap	20	⅞φ	5'-6"	
208	" Cap Ends	4	⅝φ	7'-3"	
221	Wing Wall - Horiz.	10	½φ	4'-0"	Str.
222	Curtain Wall - Vert.	2	½φ	9'-3"	"
223	Wing Wall - Vert.	12	½φ	5'-6"	"
224	" " "	12	½φ	5'-3"	"
225	" " Pilasters	4	⅞φ	6'-0"	"
226	" " "	4	⅞φ	5'-9"	"
227	" " " Ties	14	⅜φ	4'-2"	
228	" " Horiz.	6	½φ	24'-0"	
229	" " "	6	½φ	22'-9"	Str.

SOUTH APPROACH SPAN

Mark	Location	No.	Size	Length	Bending Diagram
100	Girder Bars	12	1"φ	34'-4"	
101	" "	8	1"φ	34'-4"	
102	" "	20	1"φ	32'-10"	
103	" Stirrups	92	⅝φ	6'-6"	
104	" Hangers	8	¾φ	30'-6"	Str.
105	Cross Beams	6	¾φ	9'-6"	
106	" " Hangers	4	¾φ	8'-0"	Str.
107	" " Stirrups	32	½φ	5'-0"	
108	" "	6	¾φ	23'-9"	
109	" " Hangers	4	¾φ	22'-0"	Str.
110	Sidewalk Brackets	4	⅞φ	7'-3"	
111	" "	2	⅞φ	9'-3"	
112	" Beams	4	⅝φ	32'-4"	Str.
113	" " Stirrups	21	⅜φ	2'-5"	
114	" Slab	36	⅜φ	4'-5"	Str.
115	" "	2	⅜φ	4'-7"	"
116	" "	3	⅜φ	4'-10"	"
117	" "	2	⅜φ	5'-2"	"
118	" "	3	⅜φ	5'-6"	"
119	" "	3	⅜φ	5'-10"	"
120	" "	3	⅜φ	6'-2"	"
121	" "	2	⅜φ	6'-5"	"
123	" "	1	⅜φ	3'-3"	"
124	" "	1	⅜φ	2'-9"	"
125	" "	1	⅜φ	2'-3"	"
126	" "	1	⅜φ	1'-6"	"
127	" "	1	½φ	30'-6"	"
128	" "	1	½φ	31'-3"	"
129	" "	1	½φ	32'-0"	"
130	" "	1	½φ	11'-3"	"
131	East Curb Bars	4	⅝φ	31'-0"	"
132	" " Risers	24	⅝φ	3'-7"	
133	West Curb Risers	24	⅝φ	2'-10"	



SOUTH APPROACH SPAN CONTD.

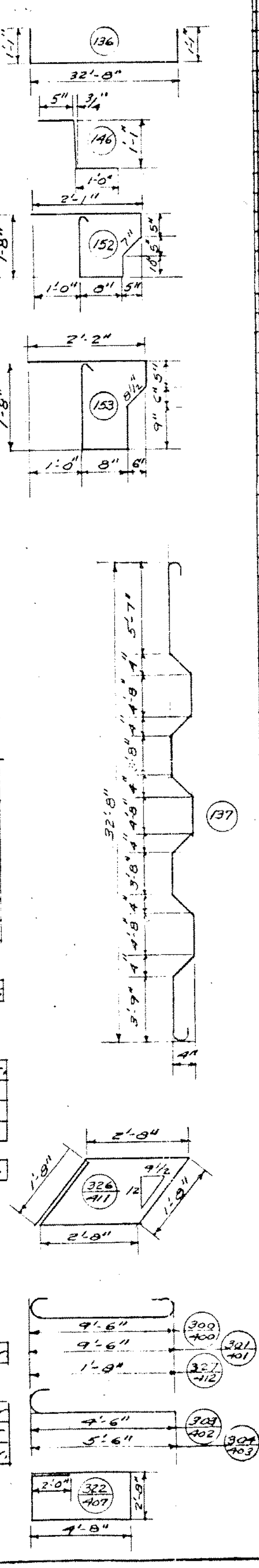
Mark	Location	No.	Size	Length	Bending Diagram
134	West Curb Bars	4	⅝φ	31'-0"	Str.
135	Slab Top	23	⅝φ	33'-11"	
136	" Bot.	23	⅝φ	34'-10"	
137	" Truss Bars	23	⅝φ	34'-9"	
138	" Spacers	26	⅝φ	30'-6"	Str.
146	East Curb Risers - Nor. End	2	⅝φ	2'-6"	"
147	South End Wall Top	2	½φ	5'-3"	"
148	" " "	7	½φ	37'-3"	
150	North " Beam Bot.	3	¾φ	29'-6"	
151	" " " Hangers	2	¾φ	28'-0"	Str.
152	" " " Stirrups	15	½φ	6'-7"	

NORTH APPROACH SPAN

Mark	Location	No.	Size	Length	Bending Diagram
100	Girder Bars	12	1"φ	34'-4"	
101	" "	8	1"φ	34'-4"	
102	" "	20	1"φ	32'-10"	
103	" Stirrups	92	⅝φ	6'-6"	
104	" " Hangers	8	¾φ	30'-6"	Str.
105	Cross Beams Bot.	6	¾φ	9'-6"	
106	" " Hangers	4	¾φ	8'-0"	Str.
107	" " Stirrups	32	½φ	5'-0"	
108	" " Bot.	6	¾φ	23'-9"	
109	" " Hangers	4	¾φ	22'-0"	Str.
110	Sidewalk Brackets	4	⅞φ	7'-3"	
111	" "	2	⅞φ	9'-3"	
122	" Beams	4	⅝φ	28'-3"	Str.
113	" " Stirrups	18	⅜φ	2'-5"	
114	" Slab Transverse	36	⅜φ	4'-5"	Str.
115	" " "	2	¾φ	4'-7"	"
116	" " "	2	⅜φ	4'-10"	"
117	" " "	2	¾φ	5'-2"	"
118	" " "	2	⅜φ	5'-6"	"
119	" " "	2	⅜φ	5'-10"	"
120	" " "	2	⅜φ	6'-2"	"
121	" " "	3	⅜φ	6'-5"	"
140	" " "	1	⅜φ	3'-0"	"
141	" " "	1	⅜φ	2'-6"	"
142	" " Spacers	1	½φ	30'-6"	"
143	" " "	1	½φ	29'-9"	"
144	" " "	1	½φ	28'-9"	"
145	" " "	1	½φ	10'-6"	"
139	" " Transverse	1	⅜φ	3'-6	"
131	East Curb Bars	4	⅝φ	31'-0"	"
132	" " Risers	30	⅝φ	3'-7	
133	West " "	23	⅝φ	2'-10"	
134	" " Bars	4	⅝φ	31'-0"	Str.
135	Slab Top	23	⅝φ	33'-11	
136	" Bot.	23	⅝φ	34'-10	
137	" Truss Bar	23	⅝φ	34'-9"	
138	" Spacers	26	⅝φ	30'-6"	Str.
147	North End Wall - Top	2	½φ	5'-3"	"
148	" " "	7	½φ	37'-3"	"
149	" " Stubs for Wing W.	4	½φ	3'-3"	Str.
150	South End Beam - Bot.	3	¾φ	29'-6"	
151	" " " Top	2	¾φ	28'-0"	Str.
153	" " " Stirrups	15	½φ	6'-7"	

PIER No. 2

Mark	Location	No.	Size	Length	Bending Diagram
300	Ftg. Top. Transverse	29	⅝φ	10'-9"	
301	" Bot. "	44	⅞φ	11'-3"	
302	" Spacers Top & Bot.	14	⅝φ	43'-0"	Str.
303	" Stubs for Stem Vert.	50	⅝φ	5'-2"	
304	" " " " "	10	¾φ	6'-9"	
305	Stem Vert. Sides	50	⅝φ	23'-9"	Str.
306	" Vert. - Nose	10	¾φ	23'-9"	Str.
307	" Sides - Horiz.	28	⅝φ	36-6	Str.
308	" Nose - Horiz.	2	⅝φ	8'-4"	
309	" " "	2	⅝φ	8'-7"	
310	" " "	2	⅝φ	8'-9"	
311	" " "	2	⅝φ	8'-11"	
312	" " "	2	⅝φ	9'-1"	

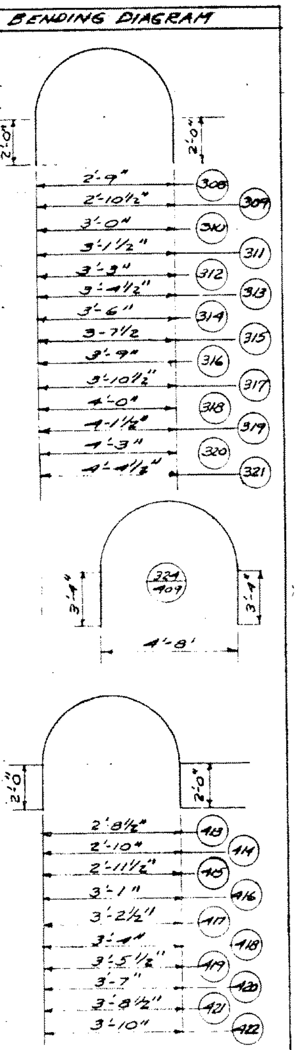


- PIER No. 2 CONTD. -

Mark	Location	No.	Size	Length	Bending Diagram
313	Stem Nose - Horiz.	2	⅝φ	9'-4"	
314	" " "	2	⅝φ	9'-6"	
315	" " "	2	⅝φ	9'-8"	
316	" " "	2	⅝φ	9'-11"	
317	" " "	2	⅝φ	10'-1"	
318	" " "	2	⅝φ	10'-3"	
319	" " "	2	⅝φ	10'-6"	
320	" " "	2	⅝φ	10'-8"	
321	" " "	2	⅝φ	10'-10"	
322	Coping Ties	37	⅝φ	16'-8"	
323	" Top & Bot.	6	1"φ	36'-6"	Str.
324	" Nose Horiz.	4	1"φ	14'-0"	
325	" Plinth Stubs	24	¾φ	4'-9"	Str.
326	Plinth Hoops	12	½φ	10'-4"	
327	" Cross Tie	12	½φ	2'-8"	

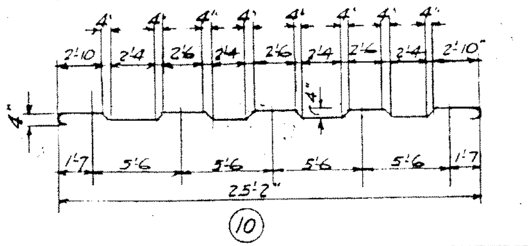
PIER No. 3

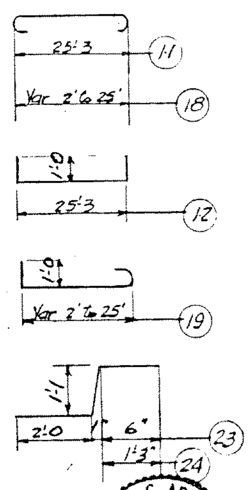
Mark	Location	No.	Size	Length	Bending Diagram
400	Footing Transverse Top	29	⅝φ	10'-4"	
401	" " Bot.	43	⅞φ	11'-3"	
402	" Stubs for Stem	48	⅝φ	5'-2"	
403	" " " "	10	¾φ	6'-9"	
423	" Spacers - Top & Bot.	14	⅝φ	42'-3"	Str.
404	Stem Face - Vert.	48	⅝φ	17'-0"	Str.
405	" " Horiz.	20	⅝φ	36'-6"	Str.
406	" Nose Vert.	20	¾φ	17'-0"	Str.
413	" " Horiz.	2	⅝φ	8'-3"	
414	" " "	2	⅝φ	8'-5"	
415	" " "	2	⅝φ	8'-8"	
416	" " "	2	⅝φ	8'-10"	
417	" " "	2	⅝φ	9'-1"	
418	" " "	2	⅝φ	9'-3"	
419	" " "	2	⅝φ	9'-5"	
420	" " "	2	⅝φ	9'-8"	
421	" " "	2	⅝φ	9'-10"	
422	" " "	2	⅝φ	10'-0"	
407	Coping Hoops	37	⅝φ	16'-8"	
408	" Horiz.	6	1"φ	36'-6"	Str.
409	" Nose	4	1"φ	14'-0"	
410	" Stubs for Plinths	24	¾φ	4'-9"	Str.
411	Plinth Hoops	12	½φ	10'-4"	
412	" Cross Ties	12	½φ	2'-8"	



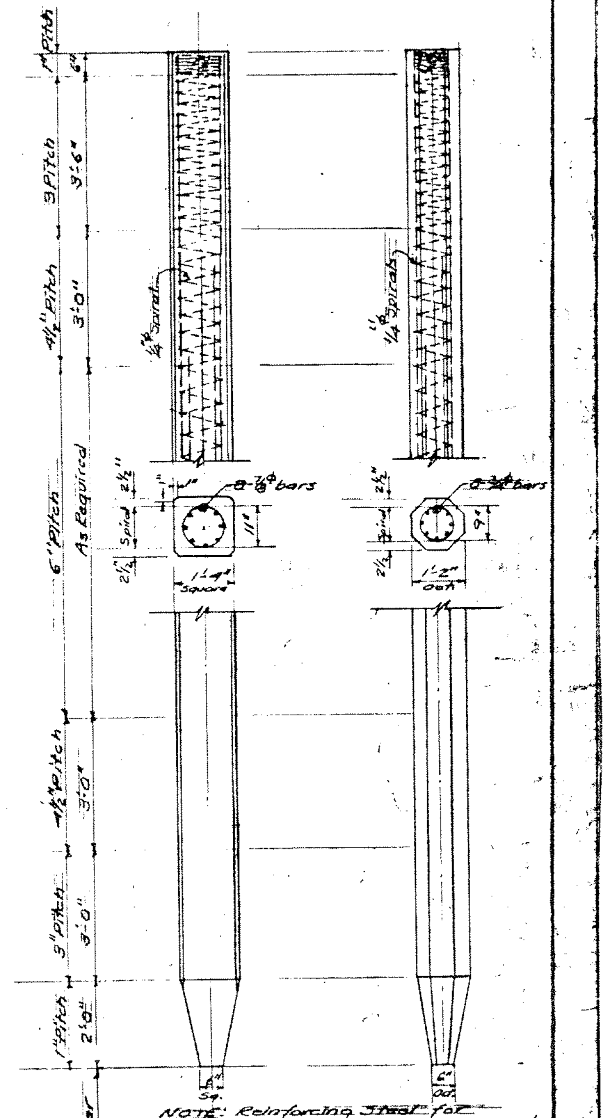
STEEL SPAN

Mark	Location	No.	Size	Length	Bending Diagram
10	Slab Transverse	162	⅝φ	27'-6	
11	Slab Transverse Top	171	⅝φ	26'-6	
12	Slab Transverse Bot.	171	⅝φ	27'-3	
13	Curb, Top	28	⅝φ	21-9	Str.
14	Slab Spcrs	238	½"φ	21-9	Str.
15	Walk Slab Spcrs	32	⅜φ	30-0	Str.
16	Walk Trans (cut in field)	444	⅜φ	6'-4	Str.
17	Roadway, Top Lo or Lg	74	½φ	10-0	Str.
18	Slab Trans. End Panels (Var)	70	⅝φ	14'-9	Av.
19	Slab Trans End Panels (Var)	70	⅝φ	15'-2	Av.
20	Slab Long. End Panels (Var)	68	½"φ	33'-6	Av.
21	Curb End Panels	4	⅝φ	23'-9	Str.
22	Curb End Panels	4	⅝φ	42'-9	Str.
23	Curb Riser	224	⅝φ	3'-7	
24	Curb Riser Walk side	224	⅝φ	4'-4	





7/21/49 C.C.A



NOTE: Reinforcing Steel for Piles not included in Bar List. Class "A" Concrete

16" SQUARE

14" OCTAGONAL (OPTIONAL)

PRECAST CONCRETE FOUNDATION PILE
Scale ½" = 1'-0"

KING COUNTY WASHINGTON
D.L. EVANS, COUNTY ROAD ENGINEER

DUWAMISH RIVER - ALLENTOWN BRIDGE
BOND ISSUE 15-5
BAR LIST & CONCRETE PILE

PREPARED BY
CECIL C. ARNOLD & RAYMOND C. SMITH
CONSULTING ENGINEERS
SEATTLE WASHINGTON
JUNE 1948

PREPARED BY RCS
CHECKED BY CCA

SHEET 14 OF 14 SHEETS

43

11832

67-20 M

Appendix B – Current Inspection Report

BRIDGE INSPECTION REPORT

Status: Released
Printed On: 4/18/2022
Agency: TUKWILA
CD Guid: 863a01ce-2af7-413d-866a-0c4b8a12e094
Release Date: 4/15/2022
Program Mgr: Sonia L. Lowry

Br. No. TUKxNx14 **SID** 08109700 **Br. Name** 42ND AVENUE SOUTH BR
Carrying 42ND AVE SO **Route On** 01037 **Mile Post** 1.04
Intersecting DUWAMISH RIVER **Route Under** **Mile Post**

Inspector's Signature MAG Cert # G1103 Cert Exp Date 4/15/2026
Co-Inspector's Signature HJ

0	2	Structural Eval	(1657)
0	2	Deck Geometry	(1658)
9		Underclearance	(1659)
8		Alignment	(1661)
5		Deck Overall	(1663)
5		Superstructure	(1671)
4		Substructure	(1676)
9		Culvert	(1678)
5		Chan/Protection	(1677)
N		Pier/Abut/Prot	(1679)
4		Drain Cond	(7664)
1		Drain Status	(7665)
M		Deck Scaling	(7666)
10		Scaling Pct	(7667)
7		Deck Rutting	(7669)
7		Exposed Rebar	(7670)
6		Curb Cond	(7672)

0	19	Operating Tons	(1552)
	0.52	Op RF	(1553)
0	11	Inventory Tons	(1555)
	0.31	Inv RF	(1556)
1		Operating Level	(1660)
K	P	Open/Closed	(1293)
8		Waterway	(1662)
U		Scour	(1680)
Y		Soundings Flag	(2693)
N		Revise Rating	(2688)
		Photos Flag	(2691)
C		Measure Clrnc	(2694)
6		Sdwk Cond	(7673)
5		Paint Cond	(7674)
3		Approach Cond	(7681)
7		Retaining Wall	(7682)
9		Pier Prot	(7683)

2		No Utilities	(2675)
1		Bridge Rails	(1684)
0		Transition	(1685)
0		Guardrails	(1686)
0		Terminals	(1687)
0.00		Asphalt Depth	(2610)
6.00		Design Curb Ht	(2611)
32.0		Bridge Rail Ht	(2612)
1949		Year Built	(1332)
0		Year Rebuilt	(1336)
Y		Subj to NBIS	(2614)

Alpha Span Type:	STrus
Sufficiency Rating:	6.00
Status:	SD
Routine Risk Category:	High Risk
Underwater Risk Category:	No Risk Category

Inspections Performed:

Freq	Hrs	Date	Rep Type
24	7.0	4/20/2021	Routine
24	7.0	4/20/2021	Fract Crit
			UW
			Special
24	**2.0**	**3/8/2022**	**Interim**
			UWI
	3.0	12/16/2021	Damage
			PRM Safety
			SEC Safety
			Condition
			Short Span
			In Depth
			Geometric

BMS Elements

Element	Element Description	Total	Units	State 1	State 2	State 3	State 4
12	Concrete Deck	6840	SF	6835	0	5	0
35	Concrete Deck Soffit	6840	SF	6836	0	4	0
110	Concrete Girder	256	LF	256	0	0	0
113	Steel Stringer	1100	LF	1050	0	50	0
126	Steel Thru Truss	440	LF	266	20	154	0
133	Truss Gusset Plates	40	EA	20	0	20	0
152	Steel Floor Beam	351	LF	331	0	20	0
205	Concrete Pile/Column	18	EA	10	0	8	0
212	Concrete Submerged Pier Wall	80	LF	77	3	0	0
215	Concrete Abutment	80	LF	70	0	10	0
234	Concrete Pier Cap/Crossbeam	84	LF	84	0	0	0
266	Concrete Sidewalk & Supports	1482	SF	1482	0	0	0
311	Moveable Bearing (roller, sliding, etc)	10	EA	2	0	0	8
313	Fixed Bearing	2	EA	2	0	0	0

BMS Elements (Continued)

Element	Element Description	Total	Units	State 1	State 2	State 3	State 4
330	Metal Bridge Railing	570	LF	458	100	12	0
340	Metal Pedestrian Railing	285	LF	285	0	0	0
357	Pack Rust	50	EA	46	4	0	0
361	Scour	4	EA	2	2	0	0
402	Open Concrete Joint	216	LF	0	0	216	0
408	Steel Sliding Plate	72	LF	0	72	0	0
901	Red Lead Alkyd Paint System	23760	SF	9000	110	13770	880

Notes

0 ORIENTATION
Beginning of bridge: South Abutment 1 (nearest traffic signal at Interurban Ave).
Green River Pedestrian Trail located under span 1.
Duwamish River flows east to west - note river tidal influence.
Old King County Bridge ID No. 3175

1 FRACTURE CRITICAL INSPECTION
Includes visual inspection of truss tension members: bottom chords, floor beams, diagonal and vertical members.
See Fracture Critical Report in Files Tab.
See bridge nomenclature for feature ID on skewed truss.

2 DAMAGE REPORT
2021/12/15 -Steel truss sustained damage from a high load impact. The bridge is currently closed to all traffic until assessment and repairs are completed.
2021/12/16 - Assessed damage limited to sway frame WL1-U1, EL2-U2, MW1-E2.
2021/12/25-31 - Heat Straightening of sway frame members completed.
2022/01/04 - Magnetic Particle testing of lower gusset plates at EL2 completed.
2022/01/05 - Follow up inspection of repairs to damaged sway frame members.
2022/01/27 - The City is reviewing options addressing traffic flow and posting on the structure.
2022/04/04 - Bridge opened to traffic. Lane pattern adjusted with temporary markers to allow one way traffic in one lane.
Southbound only.

3 UBIT 62 INSPECTION
UBIT can deploy through both sides of truss. Truss openings are narrow, bridge deck is narrow with low portals and sways. Bridge closed to all traffic for 2021 UBIT Inspections.
Full bridge closures recommended for UBIT inspections due to the bouncing motion of the UBIT boom caused by the high volume of truck traffic on the bridge during the inspection.
Police presence is required during inspection at the intersection of Interurban Ave S and 42nd Ave S 100' south of the bridge.

11 LOAD RATING
Controlling Point -
Gusset Plate, Yielding at L2U1

12 CONCRETE DECK
Open joints over floorbeam locations. Exposed aggregate in wheel lines and light to moderate rutting. Moderate to heavy scaling, pop-outs and mudball voids scattered throughout surface. Longitudinal cracks concentrated near ends of bridge, some porosity.

35 CONCRETE DECK SOFFIT
All spans:
Many minor areas of exposed transverse rebar along overhangs due to lack of cover and poor concrete consolidation.
Span 2:
Diagonal hairline leaching cracks near steel stringers. Deck fillets are spalled in several locations along top flanges of floorbeams. Scattered hairline transverse rusty leaching cracks in soffit. Moderate sized pockets of poor consolidation - truss spans 2-4 thru 2-7.
Span 3:
Soot stained throughout. Diagonal leaching cracks between girders 3A/B near Pier 3.

Notes (Continued)

110 CONCRETE GIRDER
Four lines of CIP concrete T-beams in Spans 1 and 3. Webs have hairline vertical and diagonal cracks.
Span 1:
1A - Vertical crack near Pier 2.
1D - Delamination on East Upper Flange at drainage pipe interface.
Span 3:
8 exposed stirrups on each girder, 4 evenly spaced sets of 2 with minor corrosion. All girders are covered with soot.
3A - 4" x 4" x 1" spall at Pier 3, west face.
End diaphragm at Pier 3 has hairline vertical leaching cracks.

113 STEEL STRINGER
Five lines of stringers. Square cope at connection to floorbeams, rust blisters on some copes - no cracks observed. Areas of corrosion top flanges.

126 STEEL THRU TRUSS GENERAL
See attached Fracture Critical Report for detail on fracture critical members.
Lower and upper panel points and those connecting members are covered in bird guano, active nests in upper chords and in lower panel points on gusset plates. Also see note133 Gusset Plates for details.

PACK RUST
Diagonals (compression): pack rust in seams, warping between rivet heads up to 1/8".
Verticals (tension): visible seem rust - no deformation at rivets.
Lower Chords: both consist of two channel beams from L2 to L8; addition plates riveted to interior webs, pack rust forming between channel webs and plates, plates are distorting up to 1/8" between rivets.
Gusset Plates: Pack rust between bottom lateral gusset plates and bottom chord, plates are bulging up to 3/8" at all chord joints. Pack rust between interior cover plates and bottom chord channel has caused warping of cover plate up to 1/4". Bottom laterals have seam rust and pack rust up to 3/8" along tops of members.
Upper Chords: minor seam rust along channel/plate seams throughout.

IMPACT DAMAGE
Traffic impact damage to truss south portal and sway members.
PORTALS:
South Portal:
U1W-U1E: High load traffic damage to south portal and sway frame. North flange of south portal is bent north 3" over length of 2 ft. Bottom flange of sway is bent upward 2" over 8" in length. Top flange of sway has a sine-wave shaped crimp, 1" over 7" in length. Center of sway is bent 1'-0" to north.

SWAYS
Seam rust between angle plates and webs along the upper chord.
M1W-M2E: Impact damage to sway, bent 5" to north; bottom flanges buckled center.
M2W-M3E: Minor impact damage bottom flange. Slightly out of plane.
Most sways have scrape marks across bottom flanges - typically northbound lane.

LOWER CHORD
Lower chord floor system sways have pack rust up to 5/8" thick between paired angles (sway flanges). Vertical flange of angles are bulging and the horizontal bottom flange exhibits downward deflection.
L7W: 2 rusty rivet heads on bottom plate.
L7-L8W: Pack rust on lower chord.
L8W: Pack rust 1/8" on bottom plate.
L9W-U9W: Pitting up to 1/8" near top of bottom gusset plate.
L9W: Gusset plate 7/16" thick. Pack rust 1/8" on bottom plate and 1/4" vertical plate.

UPPER CHORD
Rust along riveted seams most sections.
Interior upper flange has widespread peeling paint.
Interior lower flange has excessive amounts of bird guano.

Notes (Continued)

133 STEEL GUSSET PLATES
20 gusset node points per truss line.
Low Chord Plates:
Lateral gusset plates have pack rust, plates bulging up to 3/8" at most chord joints.
Interior cover plates at chord channel have pack rust; warping of cover plate up to 1/4".
Interior rivet heads have blistered or failed paint, many are heavily rusted.
All bottom low chord plates have excessive guano and active pigeon nests.
5LE bottom plate has two deformed rivet heads.
Upper Chord Plates:
Lateral interior cover plates have pack rust at connections, no warping noted.
Exterior upper plates have peeling paint; pack rust at connections.
Upper interior plates have excessive bird guano.

152 STEEL FLOOR BEAM
Two skewed end floor beams and ten transverse floor beams. Diagonal beams are EL0-WL0 and EL10-WL10.
Dirt and mud at connections to truss. Laminar rust along top flange with minor section loss (<2%).

Notes (Continued)

205 CONCRETE PILE
Ten octagonal concrete piles, five at each abutment.
All columns have rough finish concrete and a few hairline cracks at cap interface.
1C: 10" spall with exposed rebar.
4A, 4B, 4C: Hairline horizontal cracks at about 1 ft. spacing.

CONCRETE BEARING PEDESTALS
Eight concrete columns support sliding plate bearing, four each at Piers 2 & 3.
See Files Tab for Monitoring Diagram.

2A: South Face - Horizontal crack along cap interface, 6" diameter x 1" deep spall with exposed corroded rebar, with up to 25% section loss) and associated corner delamination, 5" wide x 18" high.
East Face - 13" long x 2" high x 1/2" deep spall with exposed rebar at top; 20" long x 14" high x up to 1" deep delaminated spall at bottom.
Northwest Corner - Full-height (31") spall on north face x 7" wide on north face x 9" high in west face x up to 4" deep with exposed rebar; the NW corner of bearing is unsupported and the bearing anchor and two rebars are exposed with corrosion and section loss.

2B: South Face - Horizontal crack and associated spalling, 11" long x 4" high x 1" deep with 2 exposed rebars, along cap interface with associated delamination/spalling on southeast corner with 2' high x 5" wide on the south and up to 12" long x 1" deep with exposed rebar on the east.
Northwest Corner - Full-height spall (31" high) x 6" long on west face x 6" on north face, rebar is exposed with 25% section loss; NW corner of bearing is unsupported.

2C: South Face - Horizontal crack along cap interface with associated spall, 4" wide x 1" high x 1" deep with exposed rebar; delamination 9" long x 16" high, at the southeast corner. The southeast corner is spalled along the top, 4" long x 4" wide x 4" deep, exposing the bearing anchor.
North Face - 14" long x 5" high x 1" deep spall with exposed horizontal rebar.
West Face - 2" x 2" x 1" deep spall with exposed rebar.

2D: South Face - Hairline cracking at cap interface with associated 6" diameter x 1" deep spall with exposed rebar. SE corner is spalled off, 18" high x 8" wide x 4" deep at the base exposing bearing anchor and rebar with corrosion and 10% section loss, delamination extends from spall onto east face 8" long x 6" high.
West Face - 5" long x 3" high x 1" deep spall with exposed rebar.
North Face - 2" diameter x 1" deep spall with exposed rebar.

3A: North Face - Horizontal cracking and spalls along cap interface, full-width x 6" high x 3" deep, with exposed anchor and previously noted water leakage. Column is tilted south at 2.2°.
Southeast Corner - Grout pad is chipped off exposing base plate anchorage.
South Face - Edge spalling about 4" long x 1" high x 1" deep near west end. Water leakage previously noted at southwest corner.
Top spall is 10" long 8" high, 3/8" deep.

3B: North Face - Horizontal cracks at cap interface. Multiple edge spalls along northwest corner, up to 8" high x 6" wide x 2" deep with exposed rebar. Column is tilted to the south at 0.5°. NW corner of bearing grout pad is spalled.
South Face - 3 spalls, typically 8-12" diameter x up to 1" deep, with exposed rebar, up to 50% section loss, and associated surrounding delaminations.

3C: South Face - Spall, 24' long x 6" high x 1.5" deep with 12" of horizontal rebar exposed. Southeast corner is spalled, 1" long x 3" high x 1" deep.
NW corner of bearing grout pad is spalled.

3D: Water leakage previously noted along base of south face. Minor edge spalls at southwest corner

212 CONCRETE SUBMERGED PIER WALL
Hairline vertical cracks in pier walls. Many 1-1/2" shallow form tie holes in both walls.
Pier 2: water abrasion along north face. Several spalls with exposed rebar north face.
Pier 3: Three 12" x 12" x 1" deep areas of abrasion in south face.

Br. No. TUKxNx14 **SID** 08109700 **Br. Name** 42ND AVENUE SOUTH BR
Carrying 42ND AVE SO **Route On** 01037 **Mile Post** 1.04
Intersecting DUWAMISH RIVER **Route Under** **Mile Post**

Notes (Continued)

215 CONCRETE ABUTMENT
Both abutments have a few hairline vertical cracks in concrete backwalls.
Abutment 1 - Void at backwall between Column 1C and 1D, 6' long x 2" high x 14" deep. Pedestrian trail under span 1 near abutment. Metal pedestrian rail and concrete retaining wall between trail and abutment.
Abutment 4 - Significant glass debris under Span 3. Void under backwall from pile 4A through 4D, minor erosion/sloughing. Heavy vegetation overgrowth between 4A - 4C.
Northwest abutment-wingwall interface; open diagonal crack above top of cap to ground line (2.0" gap at top) with 2 ft x 8" x 6" deep spall with 5" of exposed rebar.
Northeast wingwall: 8" x 6" x 3" deep spall. Two steel plates attached on the east side of north abutment wall at the NE corner bridge rail.

234 CONCRETE PIER CAP
Piers 2 and 3 only.
Both have hairline vertical cracks in perimeter, tops are covered with mud, moss and transient debris. Caps have open form tie holes.
Pier 2 - Several small spalls north and south face.

266 CONCRETE SIDEWALK & SUPPORTS
Surface: Transverse cracks at panel points, cracks are open up to 1/8", with minor edges spalling.
Southeast corner delaminated between Joint and rail post anchor, 12" long x 6" wide.
Soffit: Many hairline transverse cracks leaching on underside. Form anchors still in place on soffit along channel web.
Small shallow cover spalls with exposed rebar common throughout.
Supports: Steel knee braces support sidewalk in Span 2, top clips at truss are separating due to pack rust.

311 MOVEABLE BEARING
Rocker Bearings: Pier 2 - Bearing display signs of recent movement and are not considered frozen.
Truss bearings 2-1A & 2-1B are tipped towards expansion, with a 0.3° differential at the time of the 2021 inspection.

Year	Bearing 2-1A (°)	Bearing 2-1B (°)	Temperature (F°)
2021	6.2	5.9	51
2019	5.6	5.6	43

Rocker Bearings - support approach spans: Eight skewed steel bearings, each bearing has two hinge bars.
Bearings are mounted on concrete bearing pedestals at Piers 2 and 3. Pack rust between sole plates and hinge bars on all bearings.
Hinge bars at bearings 2A, 2D, 3-1A and 3-1D, are bulging up to 1/8" from pack rust, all eight bearings are frozen.
Bearing 3-1C has an isolated area of paint failure with exposed steel and minor laminar corrosion on the east face.
See Note 205 CONCRETE COLUMNS - for details on the concrete bearing pedestals.

313 FIXED BEARING
Pier 3 - Two pinned shoe bearings 3A and 3B support truss - minor rust on edges.

330 METAL BRIDGE RAILING
Retrofit thrie beam rail has minor traffic scrapes throughout. Loose rail connection at U5L5 east truss, rattles under traffic loads.
Tack welds broken on west rail, widespread.

340 METAL PEDESTRIAN RAILING
Rail panel section loose at bottom tube connection to post, east sidewalk north of center line of the river, between EL4 and EL5.

357 PACK RUST
Seam rust and pack rust - most 1/4" or less on built-up members throughout truss.

Notes (Continued)

361 SCOUR, FIELD
Pier 2 is located on the outside of a sharp meander bend in the Duwamish River.
Pier 2: Riprap along left bank has a scour scallop, approximately 8 to 10 feet in diameter at the center of pier, two relic piles are exposed in the scalloped area. During inspection flow increased velocity with the changing tide; back eddies were noted along the center and downstream face of pier, the thalweg flow is near the left bank at Pier 2.
Pier 3: Riprap is scattered and missing along the downstream half of pier. Aggradation is visible upstream right bank to mid channel.
SOUNDINGS: are taken from upstream rail at truss panel points:

YEAR	L0	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10
2021	18.6	33.5	43.4	37.0	43.5	32.1	29.3	27.8	26.2	23.1	15.8
2019	17.5	29.5	40.0	42.0	42.8	31.5	28.0	27.5	25.9	23.5	15.3
2015	18.5	30.5	36	23.5	42	28	30.2	35	23.8	43.5	28.5
2014	19	41.5	29.7	16	39.5	26.5	41	30	16	43	27
2013	18.8	44.5	28.5	34	34	23.5	42	27.5	30.5	37.5	25.5
2007	18.5	40.5	26.5	39	28.5	15	42	26	40	31	15

WL (2021) = 25.3'
Update soundings every two years or more often if lateral migration is suspected. Monitor riprap at low tide and low flow periods.

402 OPEN CONCRETE JOINT
Open joints over 8 floorbeams of main span have felt seals, most of the seal is worn away. Visible water and mud intrusion onto floorbeam top flanges noted many locations. See Repair No. 12306.

408 STEEL SLIDING PLATE
Located at Piers 2 and 3.
Both joints are full of sandy debris. Chips and D-spalls along edges of both joints typical along wheel lines. Water leaks through the joint onto truss main piers.
MEASUREMENTS: taken at center-line perpendicular to each joint.

YEAR	TEMP		PIER 2 (WEST)	PIER 3 (EAST)
2021	61°		1-0"	1-1/2"
2019	55°		1-0"	1-1/2"
2018	60°		1-0"	1-1/2"
2016	62°		1-0"	1-1/2"
2015	48°		7/8"	1-1/2"
2013	48°		15/16"	1-3/8"
2011	50°		15/16"	1-3/8"
2009	65°		1-0"	1-5/8"
2007	50°		1-1/2"	1-5/8"
2005	65°		1-0"	1-3/8"

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Notes (Continued)

901 RED LEAD ALKYD PAINT SYSTEM
Upper Chords - Top sways, upper gusset plates, and gusset connections:
Paint is thin and typically dull and chalky. Widespread peeling, exposed primer (orange), and bare steel with areas of surface corrosion in some locations, common on interior surfaces.

Vertical/Diagonal members:
Paint is dull and chalky throughout with isolated areas of peeling paint, concentrated near upper gusset connections.

Stringers:
Rust blooms, blistered paint, and peeling common on stringer notches at floor beam connections.

Low chord:
Exterior and upper flanges are dull and chalky with algae growth throughout. Interior flanges are peeling near the gusset plate connections.
Moss and algae on lateral low chord members and floor system.

1660 OPERATING LEVEL NOTE:
Bridge is posted.
Truck speed is limited to 15 MPH.

1663 DECK OVERALL
The code was downgraded based on deck and floor system deterioration. The deck panels are non-composite and are loose / slapping on the floor system under traffic. In addition, the floor system is creaking and groaning under load. These problems are not revealing themselves in recordable damage but the loose deck panels and lack of continuity was taken into account in a new load rating update.

1671 SUPERSTRUCTURE CONDITION
Coded 5 due to impact damage at south portal and pack rust throughout steel truss members.

1676 SUBSTRUCTURE CONDITION
Code reduced to 4 due to condition of concrete bearing pedestals under rocker bearings at piers 2 and 3.

1680 SCOUR , OFFICE
Scour analysis completed in 2014.
Intermediate piers are founded on timber piles, tip elevations are not available, the scour code = "U".
The channel is centered under L3-East, channel aggradation upstream of bridge from right bank to center of channel.
Calculated contraction scour is 0.6 feet, local pier scour ranges between 6 feet and 13 feet depending on angle of attack.
Plans indicate bottom of footing at -17.0 (Pier 2)
Top of rail is estimated per plans at 28.0.
Thalweg (2021) = -15.5

1685 TRANSITION
Bridge rail transition at Abutment 1, west side, is missing approach guard rail.
SE Transition rail has 6' of impact damage with 1 damaged/twisted post.

1686 GUARDRAILS
SE approach rail has an area of impact damage, approximately 30' long.
NW approach rail is 18" high along settlement area.

1687 TERMINAL
Breakaway Cable Terminals at southeast and northwest corners.
Impact attenuator at northeast corner.
Sloped concrete Jersey terminal at southwest corner.

2675 NO. OF UTILITIES
Two utilities are suspended from east edge under sidewalk:
One 12" diameter steel waterline with mechanically restrained joints.
One 6" diameter gas pipe. Gas line couplers are cracked and broken in many locations.

Notes (Continued)

2694 CLEARANCES
Vertical clearance at portals and Mid level sway braces, measured 3" from curb:
Minimum along East fog line: 14.95' at North Portal E-M9 - W-M10.
Minimum along West fog line: 14.97' at E-M2 - W-M2.
Minimum Clearance:
E-M1 - W-M2 = 15'-0 3/8" (West)
E-M2 - W-M2 = 14'-11 5/8" (west)
E-M3 - W-M3 = 15'-0" (East)
E-M4 - W-M4 = 15'-0" (East)
E-M5 - W-M5 = 15'-0 7/16"(East)
E-M6 - W-M6 = 15'-0 3/8" (East)
E-M7 - W-M7 = 15'-1 3/8" (East)
E-M8 - W-M8 = 15'-0 1/8" (East)
E-M9 - W-M9 = 15'-0 1/8" (East)
E-M9 - W-M10 = 14'-11 3/8" (West)

Span 1: Vertical Clearance along shared use path undercrossing, measured 6" from Pier 2 Wall along Girder 1A:
Minimum Measurement: 9'-3".

7664 DRAIN CONDITION
Deck drains are plugged throughout.

7672 CURB CONDITION
Cracks open 1/8" over truss floorbeams.

7681 APPROACH ROADWAY
South approach - Cracking along center line ACP seam.
Open pattern cracking and settlement up to 1.5" in southbound lane and along center line. Heavy wheel track rutting in southbound lane. Northbound lane asphalt is ramped up to 1/2" higher than deck.
North approach - Smooth approach, no settlement noted.

7682 RETAINING WALL
Sheet pile wall to retain NW approach fill, no defects noted.

Repairs

Repair No	Pr	R	Repair Descriptions	Noted	Maint	Verified
12306	1	B	JOINTS SPAN 2: (MAH Revised 4/10/2015) Open Joints: Clean out open joints over floor beams thoroughly and fill with a flexible sealant, priority 1 due to corrosion at top flanges of floorbeams from leaking joints.	3/25/1998		
13469	1	B	RAIL: SW transition is missing approach guard rail and terminal. SE guardrail is bent and deformed. NW guardrail has settled below acceptable standards. REPAIR - replace missing guard rail and terminal at SW corner, replace damaged rail at SE corner, reset NW rail and posts to bring rail up to standard height.	4/8/2013		
13471	1	B	PAINT: (Updated - 2021 HJ) Paint has failed in many locations along the top face of the upper truss chords. Pack rust is forming in seams of all built-up members. Moist soil and pigeon guano accumulated within truss panel points are accelerating paint failure. Algae and moss growing on many members. 1. Thoroughly pressure wash clean truss of all dirt/algae/guano. 2. Prepare surface and repaint bridge to encapsulate pack rust and protect truss members. 3. Add bird deterrent at all panel points, upper and lower chords.	4/8/2013		

Repairs (Continued)

Repair No	Pr	R	Repair Descriptions	Noted	Maint	Verified
13473	1	B	EXPANSION JOINT: Steel sliding plate expansion joints allows water and debris onto top of caps and bearings at Piers 2 and 3. The concrete edges at joints are chipped and spalled. REPAIR - Replace steel sliding plate expansion joints with either a strip seal with steel header or modular joint to eliminate water intrusion onto steel bearings.	4/8/2013		
13474	S	S	SCOUR: (Updated in 2019) Current scour code is coded "U" unknown due to the lack of pile tip elevation records. Check City bridge files for pile tipe elevations at intermediate piers.	4/16/2013		
13475	2	B	STRUCTURAL SUBSTRUCTURE: (Updated - HJ 04/20/21): Concrete columns supporting sliding bearings at Piers 2 and 3 have open cracking, exposed rebar and bearing anchors with section loss, spalls, and delaminations throughout columns and along cap interface. Pier 2 - Cap has spall, with rusted rebar and open cracks up to .05mm. Pier 3 - heavily abraded at waterline. Pier 4 - columns 4A-C have horizontal cracks. Abutment backwall is undermining along west half. West wing wall has large open crack and spalls. REPAIRS: P2 and P3 bearing columns - recommend design seismic retrofit steel collar and construct around bearing columns, anchored to cap, then fill tight with epoxy. Pier 2 - cap clean exposed rebar and patch spalls, epoxy inject cracks. Pier 3 - clean and patch abraded areas of pier wall. Pier 4 - FRP wrap columns 4 A-C. Reinforce west wingwall. Fill voids under abutment backwalls and add quarry spalls along abutment wall and under Span 3.	4/16/2013		
13476	2	B	SCOUR: (RPH Revised 7/22/2014): Small scour scallops in left bank armor in front of Pier 2. Riprap is sparse and scattered through mudbar in front of Pier 3. Monitor the downstream inside face of Pier 3 at low water. REPAIR - Replace missing riprap along banks and in front of piers.	4/17/2013		
13478	1	B	SWAY BRACES: Heat straighten south portal and sway E-M2/W-M2. Sway bracing measures 14' - 11" clearance at fogline. Vertical clearance signs are required for measured clearances less than or equal to 15'-3" Install warning signs at both portals with posted height 3" less than lowest measured clearance. Recommend raising portals and sways due to the high volume of truck traffic and existing damage to sway members.	4/10/2015		
13479	2	B	BEARINGS: Approach span bearings - slide movable bearing at pier 2 and 3 are corroded - and appear frozen. Replace sliding plates with elastomeric dynamic isolation bearings.	4/10/2015		
13480	2	B	DECK: SOFFIT - widespread consolidation pockets, spalls with exposed rebar east side of soffit. SURFACE - worn to aggregate, spalling along joints. Patches of light scaling. REPAIR: Chip any delamintaed concrete from exposed rebar, clean and seal exposed bar and patch spalls. Sack honeycombed areas throughout soffit. Shotblast deck surface, patch spalled areas and apply epoxy overlay.	4/10/2015		

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Repairs (Continued)

Repair No	Pr	R	Repair Descriptions	Noted	Maint	Verified
13481	1	U	UTILITY - GAS: Gas 6" dia. gas utility pipe couplers are cracked and broken in many locations. 1. Contact gas company to inform condition of couplers.	4/20/2021		
13482	2	J	DECK DRAINS: Deck drains are plugged with debris throughout. 1. Clean out drains and ensure proper functionality.	4/20/2021		

Inspections Performed and Resources Required

Report Type	Date	Freq	Hrs	Insp	CertNo	Coinsp	Note
Routine	4/20/2021	24	7.0	MAG	G1103	HJ	
Fracture Critical	4/20/2021	24	7.0	MAG	G1103	HJ	

Resources	Hours	Min	Pref	Max	Freq Date	Need Date	Override	Notes
UBIT	6.00							WSDOT UBIT 62 USED
Flagging	6.00							LOCAL AGENCY Flagging or road closure provided by City of Tukwila

Interim	3/8/2022	24	2.0	MAG	G1103	HJ	Inspect concrete bearing pedestals supporting approach span bearings at piers 2 and 3. See Note 205 and Files tab for pedestal details. 2022 monitoring conducted by HJ & KPS

Resources	Hours	Min	Pref	Max	Freq Date	Need Date	Override	Notes
Special Equipment								Ladder required to reach columns and bearings.

Damage	12/16/2021		3.0	MAG	G1103	JRL	Damage Report See Note 2 for damage and repair details.
2 Man UBIT	4/20/2021	24	7.0	MAG	G1103	HJ	

Resources	Hours	Min	Pref	Max	Freq Date	Need Date	Override	Notes
UBIT								WSDOT UB-62 used for 2021 inspection

Informational	4/13/2022			MAG	G1103	HJ	Bridge opened to traffic on 4 April 2022. Lane configuration adjusted to allow one lane southbound only. Posted for Truck speed limit 15 MPH.

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HJ (52) - E ELEVATION

{root}

Photo Type: E - Elevation

Orientation: W

Date: 4/20/2021

Repairs:

Remarks: East Elevation (Downstream)

MAG (228) S APPROACH

{root}

Photo Type: D - Deck

Orientation: N

Date: 4/20/2021

Repairs: 13469, 13478

Remarks: South Approach

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MAG (229) N APPROACH

{root}

Photo Type: D - Deck

Orientation: S

Date: 4/20/2021

Repairs: 13469, 13478

Remarks: North Approach

HJ (18) - TYP DECK

{root}

Photo Type: D - Deck

Orientation: N

Date: 4/20/2021

Repairs: 13480

Remarks: Typical Deck

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HJ (95) - TYP SUPERSTRUCTURE

{root}

Photo Type: G - General

Orientation: E

Date: 4/20/2021

Repairs: 13471

Remarks: Typical Superstructure

HJ (48) - ABUTMENT 1

{root}

Photo Type: G - General

Orientation: S

Date: 4/20/2021

Repairs:

Remarks: South Abutment

MAG (90) - PIER 2

{root}
Photo Type: G - General
Orientation: S
Date: 4/20/2021
Repairs: 13474, 13475, 13476
Remarks: Pier 2 (North Face)

MAG (91) - PIER 3

{root}
Photo Type: G - General
Orientation: N
Date: 4/20/2021
Repairs: 13474, 13475, 13476
Remarks: Pier 3 (South Face)

**HJ (100)
ABUTMENT
NORTH**

{root}

Photo Type: G - General
Orientation: N
Date: 4/20/2021
Repairs: 13475
Remarks: North Abutment

**2021_MAG (5)
DECK
AGGREGATE**

{root}

Photo Type: D - Deck
Orientation: DN
Date: 4/20/2021
Repairs: 13480
Remarks: Heavy Deck Scaling large

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**2021_MAG (19)
DECK SOFFIT
SPALLS**

{root}

Photo Type:	G - General
Orientation:	UP
Date:	4/20/2021
Repairs:	13480

Remarks: Deck Soffit Spalls with Exposed Rebar

**HJ (62) - GIRDER
1D DELAM**

{root}

Photo Type:	G - General
Orientation:	W
Date:	4/20/2021
Repairs:	

Remarks: Girder 1D - Delamination at Drainage Pipe Interface

HJ (101) - SPAN 3 - SOOT & REBAR

{root}

Photo Type: G - General
Orientation: UP
Date: 4/20/2021
Repairs:

Remarks: Span 3 Girders - Soot Stained and Typical Exposed Rebar

MAG (192) PACK RUST BT RIVETS

{root}

Photo Type: I - In Depth
Orientation: E
Date: 4/20/2021
Repairs: 13471

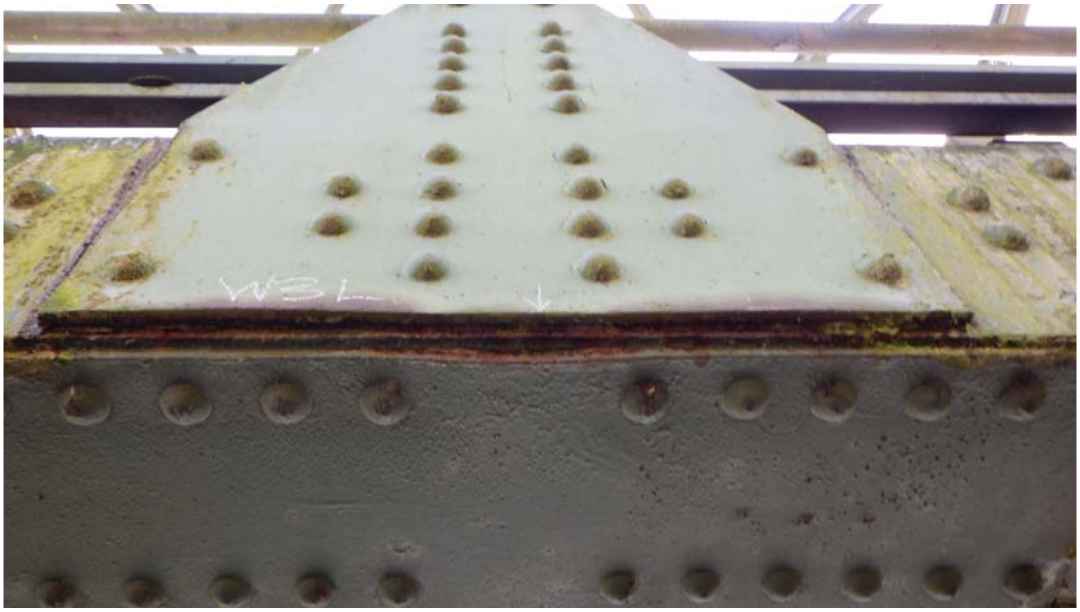
Remarks: Warping due to Pack Rust between Diagonal Connections

MAG (66) WL3 PLATE PACK RUST

{root}

Photo Type: I - In Depth
Orientation: UP
Date: 4/20/2021
Repairs: 13471

Remarks: Pack Rust and Associated Warping at W3L Gusset Plate



MAG (141) UPPER LATERAL PACK RUST

{root}

Photo Type: I - In Depth
Orientation: W
Date: 4/20/2021
Repairs: 13471

Remarks: Pack Rust between seams throughtout Upper Chords

MAG (43) WML1-EML2 SINE WAVE

{root}

Photo Type: I - In Depth
Orientation: W
Date: 4/20/2021
Repairs: 13478
Remarks: M1W-M2E Impact Damage to Mid Level Sway

MAG (37) ML1-ML2 OUT OF PLANE

{root}

Photo Type: U - Utility
Orientation: DN
Date: 4/20/2021
Repairs: 13478
Remarks: M1W-M2E Out of Plane Impact Deflection

HJ (67) - 2A COLUMN EXP ANCHOR

{root}

Photo Type: G - General
Orientation: E
Date: 4/20/2021
Repairs: 13475
Remarks: Column 2A West Face - Full Height Spalling with Exposed Bearing Anchors

HJ (85) - SE SIDEWALK DELAM

{root}

Photo Type: G - General
Orientation: DN
Date: 4/20/2021
Repairs:
Remarks: Southeast Sidewalk Delamination

MAG (16)
BARINGG 2-1B
TIP 5.9°

{root}

Photo Type: G - General
Orientation: W
Date: 4/20/2021
Repairs:
Remarks: Typical Rocker Bearing (2-1B Shown)

HJ (20) - JOINT 3

{root}

Photo Type: G - General
Orientation: W
Date: 4/20/2021
Repairs: 12306
Remarks: Typical open joint Span 2 (Joint 3 shown)

HJ (44) - JOINT 2 (SOUTH)

{root}

Photo Type: D - Deck

Orientation: E

Date: 4/20/2021

Repairs: 13473

Remarks: Steel Sliding Plate Joint (South) at south end of truss

HJ (37) JOINT 11 N

{root}

Photo Type: D - Deck

Orientation: W

Date: 4/20/2021

Repairs: 13473

Remarks: Steel Sliding Plate Joint (North) at north end of truss

HJ (7) LOAD POST & SPEED

{root}

Photo Type: G - General
Orientation: S
Date: 4/20/2021
Repairs:
Remarks: Load & Speed Posting

HJ (42) RAIL HEIGHT

{root}

Photo Type: G - General
Orientation: W
Date: 4/20/2021
Repairs: 13469
Remarks: North East Rail Height

MAG (103) UTILITY BROKEN COUPLER

{root}

Photo Type: G - General
Orientation: W
Date: 4/20/2021
Repairs: 13481
Remarks: Broken Utility Connector

HJ (125) MINIMUM VERT CLEARANCE

{root}

Photo Type: G - General
Orientation: DN
Date: 4/20/2021
Repairs: 13478
Remarks: Minimum Clearance Measurement (North Portal - East Fogline)

HJ (50) PED UNDERCROSSING

{root}

Photo Type: G - General

Orientation: W

Date: 4/20/2021

Repairs:

Remarks: Span 1 Mixed Use Trail Undercrossing

HJ (29) PLUGGED DECK DRAIN

{root}

Photo Type: D - Deck

Orientation: DN

Date: 4/20/2021

Repairs: 13482

Remarks: Plugged Deck Drain

HJ (9) S APPROACH SETTLEMENT

{root}

Photo Type:	G - General
Orientation:	DN
Date:	4/20/2021
Repairs:	

Remarks: South Approach Settlement

HJ (105) BEARING 3C

{root}

Photo Type:	G - General
Orientation:	W
Date:	4/20/2021
Repairs:	13479

Remarks: Approach Bearing (Bearing 3C Depicted)

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MAG (39) PAINT LOSS

{root}

Photo Type: G - General

Orientation: DN

Date: 4/20/2021

Repairs:

Remarks: Upper chord and gusset plate paint loss.

MAG (59) STRINGER NOTCH RUST

{root}

Photo Type: G - General

Orientation: W

Date: 4/20/2021

Repairs:

Remarks: Stringer notch rust in failed paint common on stringer notches

MAG (68) SWAY BRACE PK RUST

{root}

Photo Type: G - General
Orientation: NE
Date: 4/20/2021
Repairs:
Remarks: Pack rust between angles deforming bracing.

MAG (129) PANEL POINT

{root}

Photo Type: R - Repair
Orientation: DN
Date: 4/20/2021
Repairs:
Remarks: Garbage and debris accumulated in low panel point

MAG (57) EL2 PLATE PACK RUST

{root}

Photo Type: G - General

Orientation: UP

Date: 4/20/2021

Repairs:

Remarks: Gusset plate EL3 bending due to pack rust

MAG (97) EL6 BOT PLATE RIVETS

{root}

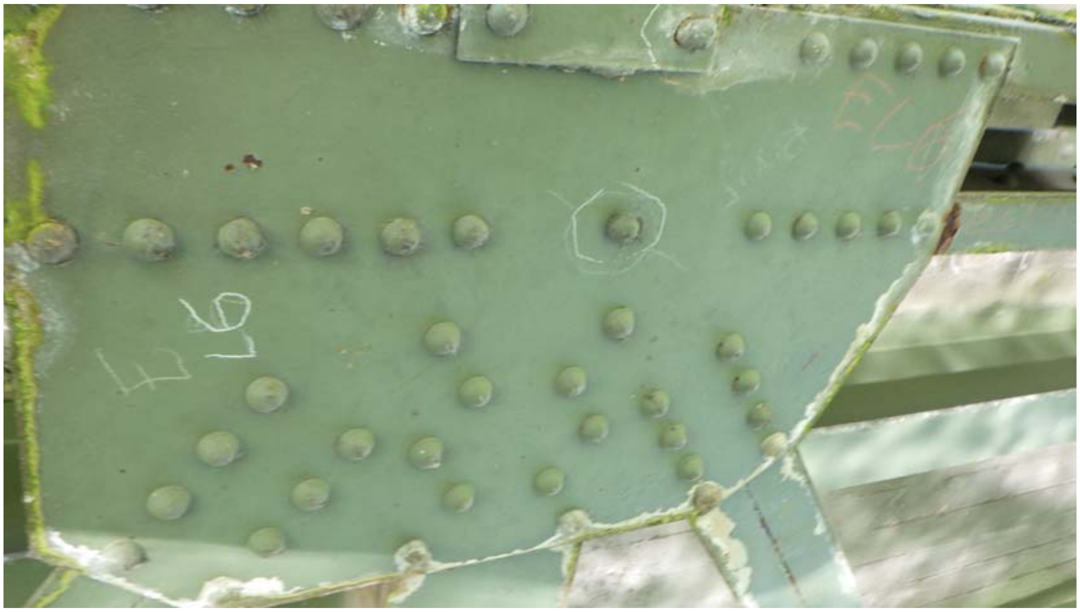
Photo Type: G - General

Orientation: UP

Date: 4/20/2021

Repairs:

Remarks: 2 deformed rivets in bottom gusset at EL6



MAG (178) BOT CHORD ALGAE

{root}

Photo Type: G - General
Orientation: S
Date: 4/20/2021
Repairs:

Remarks: Bottom chords and other floor system members are coverd with algae and moss

M- LATERAL W1-E2

Damaged sway brace frame

Photo Type: G - General
Orientation: DN
Date: 12/16/2021
Repairs:

REMARKS: Bent mid level latertal brace from impact damage connection at E vertical EUL2

WUL1 BENT FLANGE

Damaged sway brace frame

Photo Type: G - General

Orientation: N

Date: 12/16/2021

Repairs:

REMARKS: Bent flange from load impact near laterial vertical connection

M-LATERAL SE FACE

Damaged sway brace frame

Photo Type: G - General

Orientation: N

Date: 12/16/2021

Repairs:

RMARKS: Flange damage at impact point of mid level lateral brace.

M-LATERAL BOT FACE

Damaged sway brace frame

Photo Type: G - General

Orientation: UP

Date: 12/16/2021

Repairs:

REMARKS: Bottom flange at impact point of mid level lateral brace.

EUL2 AT PLATE EU2

Damaged sway brace frame

Photo Type: G - General

Orientation: E

Date: 12/16/2021

Repairs:

REMARKS: At upper gusset plate buckle in vertical.

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EUL2 VERTICAL BUCKLE

Damaged sway brace frame

Photo Type: G - General

Orientation: E

Date: 12/16/2021

Repairs:

REMARKS: East buckled vertical at mid lateral connection.

TUKxNx14_2022-04-12_KPS (3).JPG

Deck and Posting

Photo Type: G - General

Orientation: S

Date: 4/13/2022

Repairs:

REMARKS:
Load posting and speed limit sign north of bridge.

TUKxNx14_2022-04-12_KPS (4).JPG

Deck and Posting

Photo Type: G - General

Orientation: S

Date: 4/13/2022

Repairs:

REMARKS:
Load posting and speed limit sign at bridge. Travel lanes reduced to one lane, southbound only, across structure.

TUKxNx14_2022-04-12_KPS (5).JPG

Deck and Posting

Photo Type: D - Deck

Orientation: S

Date: 4/13/2022

Repairs:

REMARKS:
Travel lane temporarily reduced to one lane, southbound only, across bridge. Temporary striping and markers in place.

TUKxNx14_2022-04-12_KPS (7).JPG

Deck and Posting

Photo Type: G - General

Orientation: S

Date: 4/13/2022

Repairs:

REMARKS:
Type-3 barricades in place blocking northbound lane from intersection. Turn lanes and straight ahead lanes that feed onto bridge are closed and blocked with type-3 barricades.

SWAY FRAME REPAIRS

Repairs

Photo Type: R - Repair

Orientation: S

Date: 12/16/2021

Repairs:

REMARKS: Sway frame repairs to E and W verticals and mid-level sway

Br. No. TUKxNx14 **SID** 08109700 **Br. Name** 42ND AVENUE SOUTH BR

Carrying 42ND AVE SO **Route On** 01037 **Mile Post** 1.04

Intersecting DUWAMISH RIVER **Route Under** **Mile Post**

M SWAY AT IMPACT POINT

Repairs

Photo Type: R - Repair

Orientation: E

Date: 12/16/2021

Repairs:

REMARKS: South face sway at E vertical

M SWAY AT WEST VERTICAL

Repairs

Photo Type: R - Repair

Orientation: W

Date: 12/16/2021

Repairs:

REMARKS: west end lateral brace at w vertical south face

Br. No. TUKxNx14 **SID** 08109700 **Br. Name** 42ND AVENUE SOUTH BR

Carrying 42ND AVE SO **Route On** 01037 **Mile Post** 1.04

Intersecting DUWAMISH RIVER **Route Under** **Mile Post**

W VERTICAL

Repairs

Photo Type: R - Repair

Orientation: N

Date: 12/16/2021

Repairs:

REMARKS: Repaired flange at mid lateral connection south face

Br. No. TUKxNx14 **SID** 08109700 **Br. Name** 42ND AVENUE SOUTH BR
Carrying 42ND AVE SO **Route On** 01037 **Mile Post** 1.04
Intersecting DUWAMISH RIVER **Route Under** **Mile Post**

Entry Name	Folder Name	Type	Repairs	Page
HJ (52) - E ELEVATION	{root}	E		1
MAG (228) S APPROACH	{root}	D	13469, 13478	1
MAG (229) N APPROACH	{root}	D	13469, 13478	2
HJ (18) - TYP DECK	{root}	D	13480	2
HJ (95) - TYP SUPERSTRUCTURE	{root}	G	13471	3
HJ (48) - ABUTMENT 1	{root}	G		3
MAG (90) - PIER 2	{root}	G	13474, 13475, 13476	4
MAG (91) - PIER 3	{root}	G	13474, 13475, 13476	4
HJ (100) ABUTMENT NORTH	{root}	G	13475	5
2021_MAG (5) DECK AGGREGATE	{root}	D	13480	5
2021_MAG (19) DECK SOFFIT SPALLS	{root}	G	13480	6
HJ (62) - GIRDER 1D DELAM	{root}	G		6
HJ (101) - SPAN 3 - SOOT & REBAR	{root}	G		7
MAG (192) PACK RUST BT RIVETS	{root}	I	13471	7
MAG (66) WL3 PLATE PACK RUST	{root}	I	13471	8
MAG (141) UPPER LATERAL PACK RUST	{root}	I	13471	8
MAG (43) WML1-EML2 SINE WAVE	{root}	I	13478	9
MAG (37) ML1-ML2 OUT OF PLANE	{root}	U	13478	9
HJ (67) - 2A COLUMN EXP ANCHOR	{root}	G	13475	10
HJ (85) - SE SIDEWALK DELAM	{root}	G		10
MAG (16) BARINGG 2-1B TIP 5.9°	{root}	G		11
HJ (20) - JOINT 3	{root}	G	12306	11
HJ (44) - JOINT 2 (SOUTH)	{root}	D	13473	12
HJ (37) JOINT 11 N	{root}	D	13473	12
HJ (7) LOAD POST & SPEED	{root}	G		13
HJ (42) RAIL HEIGHT	{root}	G	13469	13
MAG (103) UTILITY BROKEN COUPLER	{root}	G	13481	14
HJ (125) MINIMUM VERT CLEARANCE	{root}	G	13478	14
HJ (50) PED UNDERCROSSING	{root}	G		15
HJ (29) PLUGGED DECK DRAIN	{root}	D	13482	15
HJ (9) S APPROACH SETTLEMENT	{root}	G		16
HJ (105) BEARING 3C	{root}	G	13479	16
MAG (39) PAINT LOSS	{root}	G		17
MAG (59) STRINGER NOTCH RUST	{root}	G		17

Br. No. TUKxNx14 **SID** 08109700 **Br. Name** 42ND AVENUE SOUTH BR

Carrying 42ND AVE SO **Route On** 01037 **Mile Post** 1.04

Intersecting DUWAMISH RIVER **Route Under** **Mile Post**

Entry Name	Folder Name	Type	Repairs	Page
MAG (68) SWAY BRACE PK RUST	{root}	G		18
MAG (129) PANEL POINT	{root}	R		18
MAG (57) EL2 PLATE PACK RUST	{root}	G		19
MAG (97) EL6 BOT PLATE RIVETS	{root}	G		19
MAG (178) BOT CHORD ALGAE	{root}	G		20
M- LATERAL W1-E2	Damaged sway brace frame	G		20
WUL1 BENT FLANGE	Damaged sway brace frame	G		21
M-LATERAL SE FACE	Damaged sway brace frame	G		21
M-LATERAL BOT FACE	Damaged sway brace frame	G		22
EUL2 AT PLATE EU2	Damaged sway brace frame	G		22
EUL2 VERTICAL BUCKLE	Damaged sway brace frame	G		23
TUKxNx14_2022-04-12_KPS (3).JPG	Deck and Posting	G		23
TUKxNx14_2022-04-12_KPS (4).JPG	Deck and Posting	G		24
TUKxNx14_2022-04-12_KPS (5).JPG	Deck and Posting	D		24
TUKxNx14_2022-04-12_KPS (7).JPG	Deck and Posting	G		25
SWAY FRAME REPAIRS	Repairs	R		25
M SWAY AT IMPACT POINT	Repairs	R		26
M SWAY AT WEST VERTICAL	Repairs	R		26
W VERTICAL	Repairs	R		27

Washington State
Department of Transportation

VISUAL FRACTURE CRITICAL INSPECTION REPORT

Bridge Name: 42nd Avenue South Bridge

Bridge No: TUKWILA-14

Structure ID: 08109700

Structure Type: Steel Truss

Agency: City of Tukwila

Milepost: 1.04

Date: 4/12/2011

Hours: 4

Inspector ID #: D2000

Lead Inspector Intials: RPH

Co-Inspector Intials: AT

Lead Inspector Signature:

Inspected items: Truss Tension Members

Co-Inspector Signature:

Procedures:

FCM Location	FCM Type	FCM Per Girder or Truss Line	'Beist' Server Plans		
			Sh. No.	Contr.	Sh. Name
Span 2	Riveted Truss	24	None		

Note: FCM = Fracture Critical Member

VISUAL FRACTURE CRITICAL
INSPECTION REPORT

Bridge Name:	42nd Avenue South Bridge	**Date:**	4/12/2011
Bridge No.:	TUKWILA-14	**Hours:**	4
Structure ID:	08109700	**Inspector ID #:**	D2000
Structure Type:	Steel Truss	**Lead Inspector:**	RPH
Agency:	City of Tukwila	**Co-Inspector:**	AT
Milepost:	1.04		

Truss / Girder	Span	Location	Feature Inspected	Detail Description	Remarks
East	2	L0L1	Other	Bottom Chord	Areas of seam rust at bottom chord channel ties and pack rust up to 3/8" at bottom lateral gusset plates.
East	2	L1L2	Other	Bottom Chord	Areas of seam rust at bottom chord channel ties and pack rust up to 3/8" at bottom lateral gusset plates.
East	2	L2L3	Other	Bottom Chord	Areas of seam rust at bottom chord channel ties and pack rust up to 3/8" at bottom lateral gusset plates.
East	2	L3L4	Other	Bottom Chord	Areas of seam rust at bottom chord channel ties and pack rust up to 3/8" at bottom lateral gusset plates.
East	2	L4L5	Other	Bottom Chord	Areas of seam rust at bottom chord channel ties and pack rust up to 3/8" at bottom lateral gusset plates.
East	2	L5L6	Other	Bottom Chord	Areas of seam rust at bottom chord channel ties and pack rust up to 3/8" at bottom lateral gusset plates.
East	2	L6L7	Other	Bottom Chord	Areas of seam rust at bottom chord channel ties and pack rust up to 3/8" at bottom lateral gusset plates.
East	2	L7L8	Other	Bottom Chord	Areas of seam rust at bottom chord channel ties and pack rust up to 3/8" at bottom lateral gusset plates.
East	2	L8L9	Other	Bottom Chord	Areas of seam rust at bottom chord channel ties and pack rust up to 3/8" at bottom lateral gusset plates.
East	2	L9L10	Other	Bottom Chord	Areas of seam rust at bottom chord channel ties and pack rust up to 3/8" at bottom lateral gusset plates.
East	2	L1U1	Other	Vertical	No defects noted.
East	2	L2U2	Other	Vertical	No defects noted.
East	2	L3U3	Other	Vertical	No defects noted.
East	2	L4U4	Other	Vertical	No defects noted.
East	2	L5U5	Other	Vertical	No defects noted.

Washington State Department of Transportation

VISUAL FRACTURE CRITICAL INSPECTION REPORT

Bridge Name: 42nd Avenue South Bridge
Bridge No.: TUKWILA-14
Structure ID: 08109700
Structure Type: Steel Truss
Agency: City of Tukwila
Milepost: 1.04

Date: 4/12/2011
Hours: 4
Inspector ID #: D2000
Lead Inspector: RPH
Co-Inspector: AT

Truss / Girder	Span	Location	Feature Inspected	Detail Description	Remarks
East	2	L6U6	Other	Vertical	No defects noted.
East	2	L7U7	Other	Vertical	Paint failure.
East	2	L9U9	Other	Vertical	No defects noted.
East	2	U1L2	Other	Diagonal	No defects noted.
East	2	U3L4	Other	Diagonal	No defects noted.
East	2	U5L4	Other	Diagonal	Up to 1/8" pack rust built up between riveted members along entire length.
East	2	U5L6	Other	Diagonal	Up to 1/8" pack rust built up between riveted members along entire length.
East	2	L6U7	Other	Diagonal	No defects noted.
East	2	L8U9	Other	Diagonal	No defects noted.

Washington State
Department of Transportation

VISUAL FRACTURE CRITICAL INSPECTION REPORT

Bridge Name: 42nd Avenue South Bridge
Bridge No.: TUKWILA-14
Structure ID: 08109700
Structure Type: Steel Truss
Agency: City of Tukwila
Milepost: 1.04

Date: 4/12/2011
Hours: 4
Inspector ID #: D2000
Lead Inspector: RPH
Co-Inspector: AT

Truss / Girder	Span	Location	Feature Inspected	Detail Description	Remarks
West	2	L0L1	Other	Bottom Chord	Areas of seam rust at bottom chord channel ties and pack rust up to 3/8" at bottom lateral gusset plates.
West	2	L1L2	Other	Bottom Chord	Areas of seam rust at bottom chord channel ties and pack rust up to 3/8" at bottom lateral gusset plates.
West	2	L2L3	Other	Bottom Chord	Areas of seam rust at bottom chord channel ties and pack rust up to 3/8" at bottom lateral gusset plates.
West	2	L3L4	Other	Bottom Chord	Areas of seam rust at bottom chord channel ties and pack rust up to 3/8" at bottom lateral gusset plates.
West	2	L4L5	Other	Bottom Chord	Areas of seam rust at bottom chord channel ties and pack rust up to 3/8" at bottom lateral gusset plates.
West	2	L5L6	Other	Bottom Chord	Areas of seam rust at bottom chord channel ties and pack rust up to 3/8" at bottom lateral gusset plates.
West	2	L6L7	Other	Bottom Chord	Areas of seam rust at bottom chord channel ties and pack rust up to 3/8" at bottom lateral gusset plates.
West	2	L7L8	Other	Bottom Chord	Areas of seam rust at bottom chord channel ties and pack rust up to 3/8" at bottom lateral gusset plates.
West	2	L8L9	Other	Bottom Chord	Areas of seam rust at bottom chord channel ties and pack rust up to 3/8" at bottom lateral gusset plates.
West	2	L9L10	Other	Bottom Chord	Areas of seam rust at bottom chord channel ties and pack rust up to 3/8" at bottom lateral gusset plates.
West	2	L1U1	Other	Vertical	No defects noted.
West	2	L2U2	Other	Vertical	No defects noted.
West	2	L3U3	Other	Vertical	No defects noted.
West	2	L4U4	Other	Vertical	No defects noted.
West	2	L5U5	Other	Vertical	No defects noted.

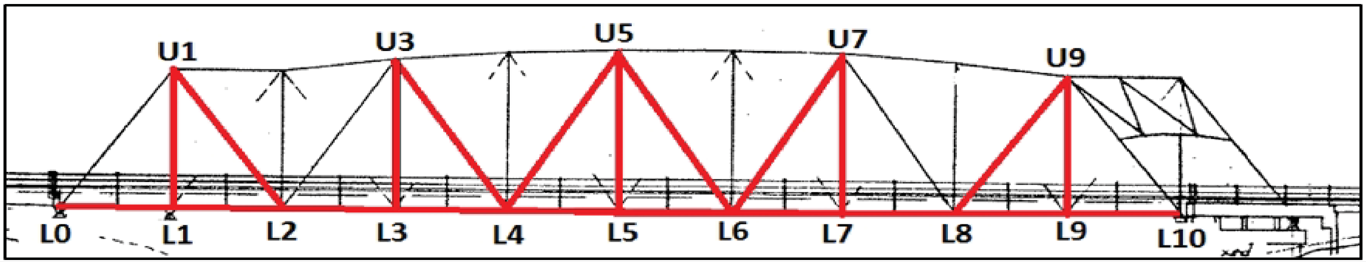
Washington State
Department of Transportation

VISUAL FRACTURE CRITICAL INSPECTION REPORT

Bridge Name:	42nd Avenue South Bridge	**Date:**	4/12/2011
Bridge No.:	TUKWILA-14	**Hours:**	4
Structure ID:	08109700	**Inspector ID #:**	D2000
Structure Type:	Steel Truss	**Lead Inspector:**	RPH
Agency:	City of Tukwila	**Co-Inspector:**	AT
Milepost:	1.04		

Truss / Girder	Span	Location	Feature Inspected	Detail Description	Remarks
West	2	L6U6	Other	Vertical	No defects noted.
West	2	L7U7	Other	Vertical	No defects noted.
West	2	L9U9	Other	Vertical	No defects noted.
West	2	U1L2	Other	Diagonal	No defects noted.
West	2	U3L4	Other	Diagonal	No defects noted.
West	2	U5L4	Other	Diagonal	Up to 1/8" pack rust built up between riveted members along entire length.
West	2	U5L6	Other	Diagonal	Up to 1/8" pack rust built up between riveted members along entire length.
West	2	L6U7	Other	Diagonal	No defects noted.
West	2	L8U9	Other	Diagonal	No defects noted.

Bridge: TUK14 42nd Avenue South Bridge
Structure ID: 08109700
Date Inspected: April 8, 2013



FCM		West Truss	East Truss
L0-L1	Bottom Chord	Rust forming at channel ties	Rust forming at channel ties
L1-L2	Bottom Chord	Rust forming at channel ties	Rust forming at channel ties
L2-L3	Bottom Chord	Pack rust in seams <3/8"	Pack rust in seams <1/4"
L3-L4	Bottom Chord	Pack rust in seams <3/8"	Pack rust in seams <1/4"
L4-L5	Bottom Chord	Pack rust in seams <1/4"	Pack rust in seams <1/4"
L5-L6	Bottom Chord	Pack rust in seams <1/4"	Pack rust in seams <1/4"
L6-L7	Bottom Chord	Pack rust in seams <1/4"	Pack rust in seams <1/4"
L7-L8	Bottom Chord	Pack rust in seams <1/4"	Pack rust in seams <1/4"
L8-L9	Bottom Chord	Rust forming at channel ties	Rust forming at channel ties
L9-L10	Bottom Chord	Rust forming at channel ties	Rust forming at channel ties
L1-U1	Vertical	No defects observed	No defects observed
L2-U1	Diagonal	No defects observed	No defects observed
L3-U3	Vertical	No defects observed	No defects observed
L4-U3	Diagonal	Pack rust in seams <1/8"	Pack rust in seams <1/8"
L4-U5	Diagonal	Pack rust in seams <1/8"	Pack rust in seams <1/8"
L5-U5	Vertical	No defects observed	No defects observed
L6-U5	Diagonal	Pack rust in seams <1/8"	Pack rust in seams <1/8"
L6-U7	Diagonal	Pack rust in seams <1/8"	Pack rust in seams <1/8"
L7-U7	Vertical	No defects observed	Paint failure
L8-U9	Diagonal	No defects observed	No defects observed
L9-U9	Vertical	No defects observed	No defects observed
L0	Gusset Plate	No defects observed	No defects observed
L1	Gusset Plate	No defects observed	No defects observed
L2	Gusset Plate	Minor pack rust, < 1/4"	Minor pack rust, < 1/4"
L3	Gusset Plate	Minor pack rust, < 3/8"	Minor pack rust, < 1/4"
L4	Gusset Plate	Minor pack rust, < 1/4"	Minor pack rust, < 1/4"
L5	Gusset Plate	Minor pack rust, < 1/4"	Minor pack rust, < 1/4"
L6	Gusset Plate	Minor pack rust, < 1/4"	Minor pack rust, < 1/4"
L7	Gusset Plate	Minor pack rust, < 1/4"	Minor pack rust, < 1/4"
L8	Gusset Plate	Minor pack rust, < 1/4"	Minor pack rust, < 1/4"
L9	Gusset Plate	No defects observed	No defects observed
L10	Gusset Plate	No defects observed	No defects observed
U1	Gusset Plate	No defects observed	No defects observed
U3	Gusset Plate	No defects observed	No defects observed
U5	Gusset Plate	No defects observed	No defects observed
U7	Gusset Plate	No defects observed	No defects observed
U9	Gusset Plate	No defects observed	No defects observed
L0W-L1E	Floorbeam	Rusting in top flange <2% section loss	Rusting in top flange <2% section loss
L1W-L2E	Floorbeam	Rusting in top flange <2% section loss	Rusting in top flange <2% section loss
L2W-L3E	Floorbeam	Rusting in top flange <2% section loss	Rusting in top flange <2% section loss
L3W-L4E	Floorbeam	Rusting in top flange <2% section loss	Rusting in top flange <2% section loss
L4W-L5E	Floorbeam	Rusting in top flange <2% section loss	Rusting in top flange <2% section loss
L5W-L6E	Floorbeam	Rusting in top flange <2% section loss	Rusting in top flange <2% section loss
L6W-L7E	Floorbeam	Rusting in top flange <2% section loss	Rusting in top flange <2% section loss
L7W-L8E	Floorbeam	Rusting in top flange <2% section loss	Rusting in top flange <2% section loss
L8W-L9E	Floorbeam	Rusting in top flange <2% section loss	Rusting in top flange <2% section loss
L9W-L10E	Floorbeam	Rusting in top flange <2% section loss	Rusting in top flange <2% section loss

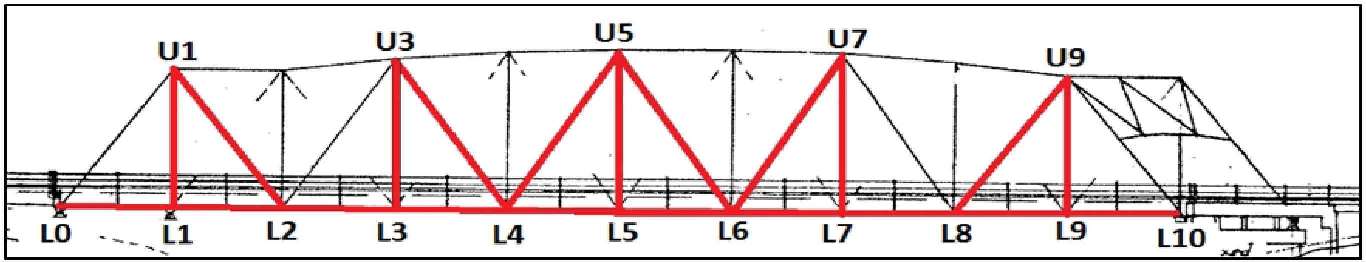
All Fracture Critical Members (FCM) were inspected visually.
Panel points were not cleaned prior to or during inspection.

Richard Hovde, PE D2000

Casey Hayes, PE

Tukwila 14 Fracture Critical Inspection Report

Bridge: TUK14 42nd Avenue South Bridge
Structure ID: 08109700
Date Inspected: April 8, 2015



FCM		West Truss	East Truss
L0-L1	Bottom Chord	Rust forming at channel ties	Rust forming at channel ties
L1-L2	Bottom Chord	Rust forming at channel ties	Rust forming at channel ties
L2-L3	Bottom Chord	Pack rust in seams <3/8"	Pack rust in seams <1/4"
L3-L4	Bottom Chord	Pack rust in seams <3/8"	Pack rust in seams <1/4"
L4-L5	Bottom Chord	Pack rust in seams <1/4"	Pack rust in seams <1/4"
L5-L6	Bottom Chord	Pack rust in seams <1/4"	Pack rust in seams <1/4"
L6-L7	Bottom Chord	Pack rust in seams <1/4"	Pack rust in seams <1/4"
L7-L8	Bottom Chord	Pack rust in seams <1/4"	Pack rust in seams <1/4"
L8-L9	Bottom Chord	Rust forming at channel ties	Rust forming at channel ties
L9-L10	Bottom Chord	Rust forming at channel ties	Rust forming at channel ties
L1-U1	Vertical	No defects observed	No defects observed
L2-U1	Diagonal	No defects observed	No defects observed
L3-U3	Vertical	No defects observed	No defects observed
L4-U3	Diagonal	Pack rust in seams <1/8"	Pack rust in seams <1/8"
L4-U5	Diagonal	Pack rust in seams <1/8"	Pack rust in seams <1/8"
L5-U5	Vertical	No defects observed	No defects observed
L6-U5	Diagonal	Pack rust in seams <1/8"	Pack rust in seams <1/8"
L6-U7	Diagonal	Pack rust in seams <1/8"	Pack rust in seams <1/8"
L7-U7	Vertical	No defects observed	Paint failure
L8-U9	Diagonal	No defects observed	No defects observed
L9-U9	Vertical	Pack rust at bottom plate <1/8"	No defects observed
L0	Gusset Plate	No defects observed	No defects observed
L1	Gusset Plate	No defects observed	No defects observed
L2	Gusset Plate	Minor pack rust, < 1/4"	Minor pack rust, < 1/4"
L3	Gusset Plate	Minor pack rust, < 3/8"	Minor pack rust, < 1/4"
L4	Gusset Plate	Minor pack rust, < 1/4"	Minor pack rust, < 1/4"
L5	Gusset Plate	Minor pack rust, < 1/4"	Minor pack rust, < 1/4"
L6	Gusset Plate	Minor pack rust, < 1/4"	Minor pack rust, < 1/4"
L7	Gusset Plate	Minor pack rust, < 1/4"	Minor pack rust, < 1/4"
L8	Gusset Plate	Minor pack rust, < 1/4"	Minor pack rust, < 1/4"
L9	Gusset Plate	Minor pack rust, < 1/4"	No defects observed
L10	Gusset Plate	No defects observed	No defects observed
U1	Gusset Plate	No defects observed	No defects observed
U3	Gusset Plate	No defects observed	No defects observed
U5	Gusset Plate	No defects observed	No defects observed
U7	Gusset Plate	No defects observed	No defects observed
U9	Gusset Plate	No defects observed	No defects observed
L0W-L1E	Floorbeam	Rusting in top flange <2% section loss	Rusting in top flange <2% section loss
L1W-L2E	Floorbeam	Rusting in top flange <2% section loss	Rusting in top flange <2% section loss
L2W-L3E	Floorbeam	Rusting in top flange <2% section loss	Rusting in top flange <2% section loss
L3W-L4E	Floorbeam	Rusting in top flange <2% section loss	Rusting in top flange <2% section loss
L4W-L5E	Floorbeam	Rusting in top flange <2% section loss	Rusting in top flange <2% section loss
L5W-L6E	Floorbeam	Rusting in top flange <2% section loss	Rusting in top flange <2% section loss
L6W-L7E	Floorbeam	Rusting in top flange <2% section loss	Rusting in top flange <2% section loss
L7W-L8E	Floorbeam	Rusting in top flange <2% section loss	Rusting in top flange <2% section loss
L8W-L9E	Floorbeam	Rusting in top flange <2% section loss	Rusting in top flange <2% section loss
L9W-L10E	Floorbeam	Rusting in top flange <2% section loss	Rusting in top flange <2% section loss

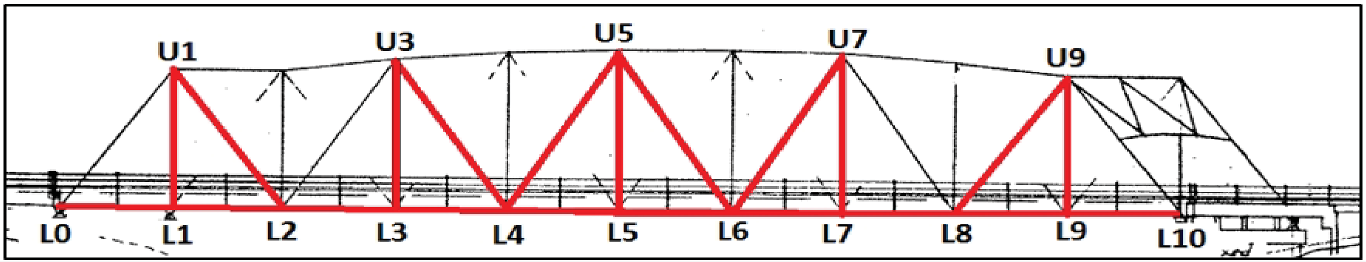
All Fracture Critical Members (FCM) were inspected visually.
Panel points were not cleaned prior to or during inspection.

Richard Hovde, PE D2000

Margaret Holwegner G1103

Tukwila 14 Fracture Critical Inspection Report

Bridge: TUK14 42nd Avenue South Bridge
Structure ID: 08109700
Date Inspected: April 26, 2017



FCM		West Truss	East Truss
L0-L1	Bottom Chord	Rust forming at channel ties	Rust forming at channel ties
L1-L2	Bottom Chord	Rust forming at channel ties	Rust forming at channel ties
L2-L3	Bottom Chord	Pack rust in seams <3/8"	Pack rust in seams <1/4"
L3-L4	Bottom Chord	Pack rust in seams <3/8"	Pack rust in seams <1/4"
L4-L5	Bottom Chord	Pack rust in seams <1/4"	Pack rust in seams <1/4"
L5-L6	Bottom Chord	Pack rust in seams <1/4"	Pack rust in seams <1/4"
L6-L7	Bottom Chord	Pack rust in seams <1/4"	Pack rust in seams <1/4"
L7-L8	Bottom Chord	Pack rust in seams <1/4"	Pack rust in seams <1/4"
L8-L9	Bottom Chord	Rust forming at channel ties	Rust forming at channel ties
L9-L10	Bottom Chord	Rust at channel ties, rust on flange near L9	Rust at channel ties, leaking mud
L1-U1	Vertical	Few rust blooms on east side	No defects observed
L2-U1	Diagonal	No defects observed	No defects observed
L3-U3	Vertical	No defects observed	20% top rivets rust, rust at top connection
L4-U3	Diagonal	Pack rust in seams <1/8"	Pack rust in seams <1/8"
L4-U5	Diagonal	Peeling paint, bulging on N & S sides	Pack rust in seams ~ 1/8", bulging
L5-U5	Vertical	No defects observed	No defects observed
L6-U5	Diagonal	Bulging entire length, both sides - pack rust	Pack rust in seams <1/8"
L6-U7	Diagonal	Pack rust in seams <1/8"	Pack rust in seams <1/8", top inner rust 12" x 3"
L7-U7	Vertical	Peeling paint, bulging on north face	No defects observed
L8-U9	Diagonal	No defects observed	No defects observed
L9-U9	Vertical	Rust on south face	Rust at top on south side
L0	Gusset Plate	Rust on bottom at connection with bearing	No defects observed
L1	Gusset Plate	No defects observed	Pack rust at bottom
L2	Gusset Plate	Minor pack rust, < 1/4"	Minor pack rust, < 1/4"
L3	Gusset Plate	Minor pack rust, < 3/8", bottom plate bulging	Minor pack rust, < 1/4" rust at connection
L4	Gusset Plate	Minor pack rust, < 1/4"	Minor pack rust, < 1/4"
L5	Gusset Plate	Minor pack rust, < 1/4" bottom pack rust	Minor pack rust, < 1/4", rust on bottom plate
L6	Gusset Plate	Minor pack rust, < 1/4" bottom rust, leaching	Minor pack rust, < 1/4", rust on bottom plate
L7	Gusset Plate	Minor pack rust, < 1/4"	Minor pack rust, < 1/4"
L8	Gusset Plate	Minor pack rust, < 1/4" bottom - peeling paint	Minor pack rust, < 1/4"
L9	Gusset Plate	Minor pack rust, < 1/4"	Some rust on bottom, dirt, moss and staining
L10	Gusset Plate	No defects observed	No defects observed
U1	Gusset Plate	Rust at connection	Paint peeling on rivets at top, east side
U3	Gusset Plate	rust on bottom	Rust on bottom
U5	Gusset Plate	Rust at top connection, bottom and side	Rust on top connection
U7	Gusset Plate	Pack rust on top connection	No defects observed
U9	Gusset Plate	Rust at top connection, at top plate	Rust at top connection
L0W-L1E	Floorbeam	Rusting in top flange <2% section loss	Rusting in top flange <2% section loss
L1W-L2E	Floorbeam	Pack rust, bottom leaching	Rusting in top flange <2% section loss
L2W-L3E	Floorbeam	Rusting in top flange <2% section loss	Rusting in top flange <2% section loss
L3W-L4E	Floorbeam	Bottom web rust	Rusting in top flange <2% section loss
L4W-L5E	Floorbeam	Bottom few rust blooms	Rusting in top flange <2% section loss
L5W-L6E	Floorbeam	Rusting in top flange <2% sec. loss, bottom rust	Rusting in top flange <2% section loss
L6W-L7E	Floorbeam	Rusting in top flange <2% sec. loss, bot flange rust	Rusting in top flange <2% section loss
L7W-L8E	Floorbeam	Rusting in top flange <2% sec. loss, bot flange rust	Rusting in top flange <2% section loss
L8W-L9E	Floorbeam	Rusting in top flange <2% section loss	Rusting in top flange <2% section loss
L9W-L10E	Floorbeam	Rusting in top flange <2% section loss	Rusting in top flange <2% section loss

All Fracture Critical Members (FCM) were inspected visually.
Panel points were not cleaned prior to or during inspection.

FRACTURE CRITICAL BRIDGE
INSPECTION SUMMARY SHEET

Bridge Name: 42 Avenue South
Bridge No: 0000TUK14
Structure ID: 08109700
Owner: City of Tukwila
Milepost: 1.04

Features to be inspected: Truss tension members

Procedures:

FCM Location	FCM Type	FCM Per Girder or Truss Line	Rivet Server Plans		
			Sh. No.	Contract	Sh. Name
Span 2	Riveted Truss	25	NONE		

Note: FCM = Fracture Critical Member

FRACTURE CRITICAL INSPECTION REPORT

Structure ID 8109700
Agency: Washington State
Date 4/12/2007
Bridge No. 0000TUK14
Hours 6
Bridge Name 42nd Ave So
Alphabetic Span Span 2 Steel truss
Inspector DAG G0409
Co-Inspector JB

Truss / Girder	Span	Location	Feature Inspected	Detail Description	Inspection Method	Surface Preparation	Remarks	FC Inspection Date
East	2	L0L1	other	Bottom Chord	VT	NO	No defects noted.	4/12/2007
East	2	L1L2	other	Bottom Chord	VT	NO	No defects noted.	4/12/2007
East	2	L2L3	other	Bottom Chord	VT	NO	No defects noted.	4/12/2007
East	2	L3L4	other	Bottom Chord	VT	NO	No defects noted.	4/12/2007
East	2	L4L5	other	Bottom Chord	VT	NO	No defects noted.	4/12/2007
East	2	L5L6	other	Bottom Chord	VT	NO	No defects noted.	4/12/2007
East	2	L6L7	other	Bottom Chord	VT	NO	No defects noted.	4/12/2007
East	2	L7L8	other	Bottom Chord	VT	NO	No defects noted.	4/12/2007
East	2	L8L9	other	Bottom Chord	VT	NO	No defects noted.	4/12/2007
East	2	L9L10	other	Bottom Chord	VT	NO	No defects noted.	4/12/2007
East	2	L1U1	other	Vertical	VT	NO	No defects noted.	4/12/2007
East	2	L2U2	other	Vertical	VT	NO	No defects noted.	4/12/2007
East	2	L3U3	other	Vertical	VT	NO	No defects noted.	4/12/2007
East	2	L4U4	other	Vertical	VT	NO	No defects noted.	4/12/2007
East	2	L5U5	other	Vertical	VT	NO	No defects noted.	4/12/2007
East	2	L6U6	other	Vertical	VT	NO	No defects noted.	4/12/2007
East	2	L7U7	other	Vertical	VT	NO	No defects noted.	4/12/2007
East	2	L8U8	other	Vertical	VT	NO	No defects noted.	4/12/2007
East	2	L9U9	other	Vertical	VT	NO	No defects noted.	4/12/2007
East	2	U1L2	other	Diagonal	VT	NO	No defects noted.	4/12/2007
East	2	U3L4	other	Diagonal	VT	NO	No defects noted.	4/12/2007
East	2	U5L4	other	Diagonal	VT	NO	There is up to 1/8" seam rust built up between the rivets along entire member.	4/12/2007
East	2	U5L6	other	Diagonal	VT	NO	There is up to 1/8" seam rust built up between the rivets along entire member.	4/12/2007
East	2	L6U7	other	Diagonal	VT	NO	No defects noted.	4/12/2007
East	2	L8U9	other	Diagonal	VT	NO	No defects noted.	4/12/2007
West	2	L0L1	other	Bottom Chord	VT	NO	No defects noted.	4/12/2007

FRACTURE CRITICAL INSPECTION REPORT

Structure ID 8109700
Bridge No. 0000TUK14
Bridge Name 42nd Ave So
Alphabetic Span Span 2 Steel truss

Agency: Washington State

Date 4/12/2007
Hours 6

Inspector DAG G0409
Co-Inspector JB

Truss / Girder	Span	Location	Feature Inspected	Detail Description	Inspection Method	Surface Preparation	Remarks	FC Inspection Date
West	2	L1L2	other	Bottom Chord	VT	NO	No defects noted.	4/12/2007
West	2	L2L3	other	Bottom Chord	VT	NO	No defects noted.	4/12/2007
West	2	L3L4	other	Bottom Chord	VT	NO	No defects noted.	4/12/2007
West	2	L4L5	other	Bottom Chord	VT	NO	No defects noted.	4/12/2007
West	2	L5L6	other	Bottom Chord	VT	NO	No defects noted.	4/12/2007
West	2	L6L7	other	Bottom Chord	VT	NO	No defects noted.	4/12/2007
West	2	L7L8	other	Bottom Chord	VT	NO	No defects noted.	4/12/2007
West	2	L8L9	other	Bottom Chord	VT	NO	No defects noted.	4/12/2007
West	2	L9L10	other	Bottom Chord	VT	NO	No defects noted.	4/12/2007
West	2	L1U1	other	Vertical	VT	NO	No defects noted.	4/12/2007
West	2	L2U2	other	Vertical	VT	NO	No defects noted.	4/12/2007
West	2	L3U3	other	Vertical	VT	NO	No defects noted.	4/12/2007
West	2	L4U4	other	Vertical	VT	NO	No defects noted.	4/12/2007
West	2	L5U5	other	Vertical	VT	NO	No defects noted.	4/12/2007
West	2	L6U6	other	Vertical	VT	NO	No defects noted.	4/12/2007
West	2	L7U7	other	Vertical	VT	NO	No defects noted.	4/12/2007
West	2	L8U8	other	Vertical	VT	NO	No defects noted.	4/12/2007
West	2	L9U9	other	Vertical	VT	NO	No defects noted.	4/12/2007
West	2	U1L2	other	Diagonal	VT	NO	No defects noted.	4/12/2007
West	2	U3L4	other	Diagonal	VT	NO	There is up to 1/8" seam rust built up between the rivets along entire member.	4/12/2007
West	2	U5L4	other	Diagonal	VT	NO	There is up to 1/8" seam rust built up between the rivets along entire member.	4/12/2007
West	2	U5L6	other	Diagonal	VT	NO	No defects noted.	4/12/2007
West	2	L6U7	other	Diagonal	VT	NO	No defects noted.	4/12/2007
West	2	L8U9	other	Diagonal	VT	NO	No defects noted.	4/12/2007

FRACTURE CRITICAL INSPECTION REPORT

Structure ID 8109700
Bridge No. 0000TUK14
Bridge Name 42nd Ave So
Alphabetic Span Span 2 Steel truss

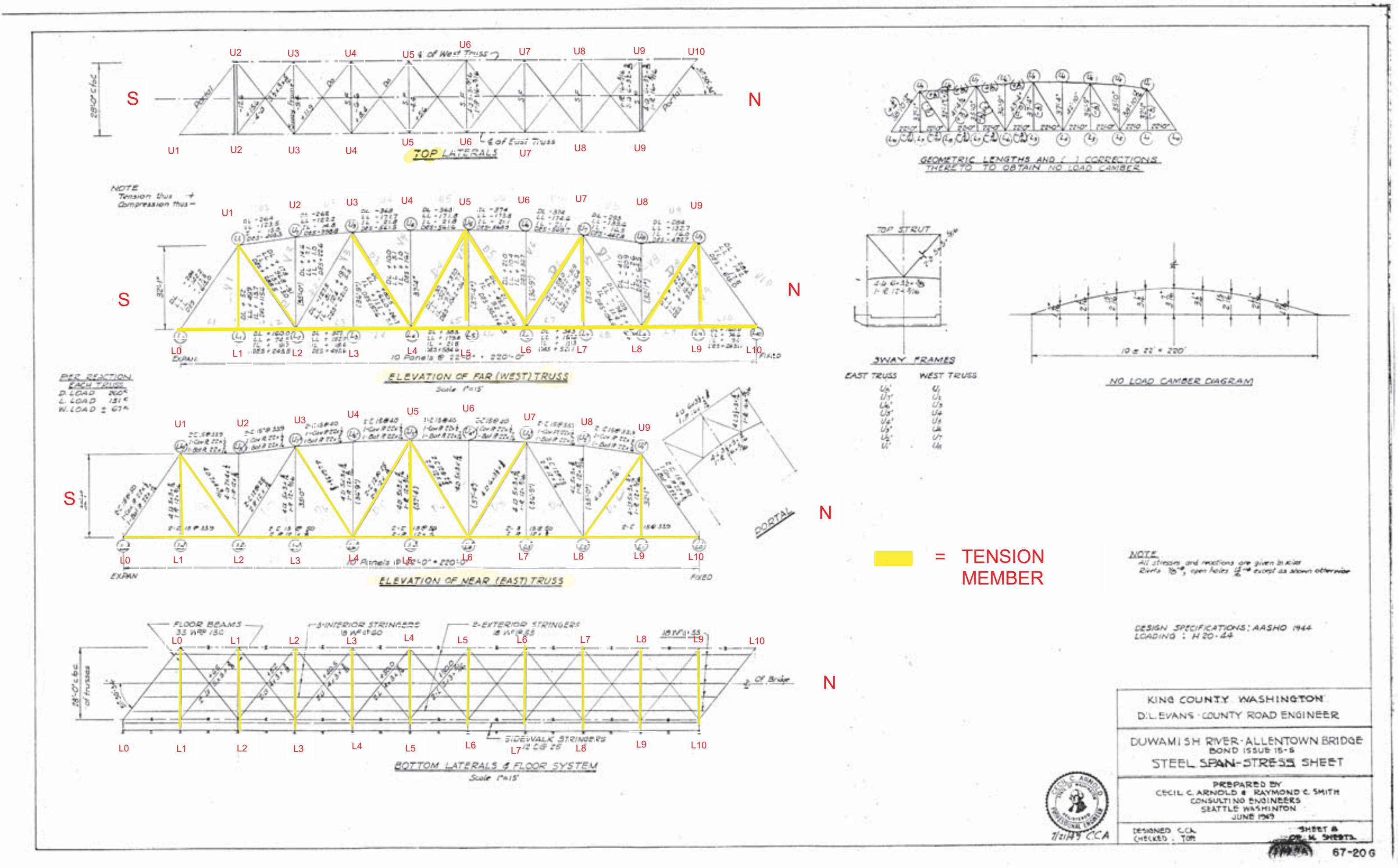
Agency: Washington State

Date 4/12/2007
Hours 6

Inspector DAG G0409
Co-Inspector JB

Truss / Girder	Span	Location	Feature Inspected	Detail Description	Inspection Method	Surface Preparation	Remarks	FC Inspection Date

INSPECTION METHODS	SURFACE PREPARATIONS
(VT) VISUAL	(NO) NONE
(PT) DYE PENETRANT	(WB) WIRE BRUSH
(UT) ULTRASONIC	(GR) GRINDING
(MT) MAGNETIC PARTICLE	(CE) CHEMICAL
(RT) RADIOGRAPHIC	(SB) SAND BLASTING
(OT) OTHER	(CH) CHIPPING HAMMER
	(OT) OTHER



NOTE
All stresses and reactions are given in kips
Rivets ⅞"ϕ, open holes 15/16"ϕ except as shown otherwise

DESIGN SPECIFICATIONS: AASHO 1944
LOADING : H 20-44

KING COUNTY WASHINGTON
D.L. EVANS · COUNTY ROAD ENGINEER

DUWAMISH RIVER-ALLENTOWN BRIDGE
BOND ISSUE 15-5
STEEL SPAN-STRESS SHEET

PREPARED BY
CECIL C. ARNOLD & RAYMOND C. SMITH
CONSULTING ENGINEERS
SEATTLE WASHINGTON
JUNE 1949

DESIGNED C.C.A.
CHECKED . TOR

SHEET 8
OF 14 SHEETS

7/21/49 CCA

67-20 G

Washington State
Department of Transportation

VISUAL FRACTURE CRITICAL INSPECTION REPORT

Bridge Name: 42nd Avenue South
Bridge No: 0000TUK14
Structure ID: 08109700
Structure Type: ST
Agency: City of Tukwila
Milepost: 1.04

Date: 8/11/2009
Hours: 3.5
Inspector ID #: G0910
Lead Inspector Intials: WDS
Co-Inspector Intials: HDR

Lead Inspector Signature:

Inspected items: Truss Tension Members

Co-Inspector Signature:

Procedures:

FCM Location	FCM Type	FCM Per Girder or Truss Line	'Beist' Server Plans		
			Sh. No.	Contr.	Sh. Name
Span 2	Riveted Truss	24	None		

Note: FCM = Fracture Critical Member

Washington State Department of Transportation

VISUAL FRACTURE CRITICAL INSPECTION REPORT

Bridge Name: 42nd Avenue South Bridge
Bridge No.: 0000TUK14
Structure ID: 88109700
Structure Type: ST
Agency: City of Tukwila
Milepost: 1.04

Date: 8/11/2009
Hours: 3.5
Inspector ID #: G0910
Lead Inspector: WDS
Co-Inspector: HDR

Truss / Girder	Span	Location	Feature Inspected	Detail Description	Remarks
East	2	L0L1	Other	Bottom Chord	Areas of seam rust at bottom chord channel ties and pack rust up to 3/8" at bottom lateral gusset plates.
East	2	L1L2	Other	Bottom Chord	Areas of seam rust at bottom chord channel ties and pack rust up to 3/8" at bottom lateral gusset plates.
East	2	L2L3	Other	Bottom Chord	Areas of seam rust at bottom chord channel ties and pack rust up to 3/8" at bottom lateral gusset plates.
East	2	L3L4	Other	Bottom Chord	Areas of seam rust at bottom chord channel ties and pack rust up to 3/8" at bottom lateral gusset plates.
East	2	L4L5	Other	Bottom Chord	Areas of seam rust at bottom chord channel ties and pack rust up to 3/8" at bottom lateral gusset plates.
East	2	L5L6	Other	Bottom Chord	Areas of seam rust at bottom chord channel ties and pack rust up to 3/8" at bottom lateral gusset plates.
East	2	L6L7	Other	Bottom Chord	Areas of seam rust at bottom chord channel ties and pack rust up to 3/8" at bottom lateral gusset plates.
East	2	L7L8	Other	Bottom Chord	Areas of seam rust at bottom chord channel ties and pack rust up to 3/8" at bottom lateral gusset plates.
East	2	L8L9	Other	Bottom Chord	Areas of seam rust at bottom chord channel ties and pack rust up to 3/8" at bottom lateral gusset plates.
East	2	L9L10	Other	Bottom Chord	Areas of seam rust at bottom chord channel ties and pack rust up to 3/8" at bottom lateral gusset plates.
East	2	L1U1	Other	Vertical	No defects noted.
East	2	L2U2	Other	Vertical	No defects noted.
East	2	L3U3	Other	Vertical	No defects noted.
East	2	L4U4	Other	Vertical	No defects noted.
East	2	L5U5	Other	Vertical	No defects noted.
East	2	L6U6	Other	Vertical	No defects noted.
East	2	L7U7	Other	Vertical	No defects noted.
East	2	L9U9	Other	Vertical	No defects noted.

Washington State Department of Transportation

VISUAL FRACTURE CRITICAL INSPECTION REPORT

Bridge Name:	42nd Avenue South Bridge	**Date:**	**8/11/2009**
Bridge No.:	0000TUK14	**Hours:**	**3.5**
Structure ID:	88109700	**Inspector ID #:**	**G0910**
Structure Type:	ST	**Lead Inspector:**	**WDS**
Agency:	City of Tukwila	**Co-Inspector:**	**HDR**
Milepost:	1.04		

Truss / Girder	Span	Location	Feature Inspected	Detail Description	Remarks
East	2	U1L2	Other	Diagonal	No defects noted.
East	2	U3L4	Other	Diagonal	No defects noted.
East	2	U5L4	Other	Diagonal	There is up to 1/8" pack rust built up between the riveted members along the entire length.
East	2	U5L6	Other	Diagonal	There is up to 1/8" pack rust built up between the riveted members along the entire length.
East	2	L6U7	Other	Diagonal	No defects noted.
East	2	L8U9	Other	Diagonal	No defects noted.
West	2	L0L1	Other	Bottom Chord	Areas of seam rust at bottom chord channel ties and pack rust up to 3/8" at bottom lateral gusset plates.
West	2	L1L2	Other	Bottom Chord	Areas of seam rust at bottom chord channel ties and pack rust up to 3/8" at bottom lateral gusset plates.
West	2	L2L3	Other	Bottom Chord	Areas of seam rust at bottom chord channel ties and pack rust up to 3/8" at bottom lateral gusset plates.
West	2	L3L4	Other	Bottom Chord	Areas of seam rust at bottom chord channel ties and pack rust up to 3/8" at bottom lateral gusset plates.
West	2	L4L5	Other	Bottom Chord	Areas of seam rust at bottom chord channel ties and pack rust up to 3/8" at bottom lateral gusset plates.
West	2	L5L6	Other	Bottom Chord	Areas of seam rust at bottom chord channel ties and pack rust up to 3/8" at bottom lateral gusset plates.
West	2	L6L7	Other	Bottom Chord	Areas of seam rust at bottom chord channel ties and pack rust up to 3/8" at bottom lateral gusset plates.
West	2	L7L8	Other	Bottom Chord	Areas of seam rust at bottom chord channel ties and pack rust up to 3/8" at bottom lateral gusset plates.
West	2	L8L9	Other	Bottom Chord	Areas of seam rust at bottom chord channel ties and pack rust up to 3/8" at bottom lateral gusset plates.

VISUAL FRACTURE CRITICAL
INSPECTION REPORT

Bridge Name:	42nd Avenue South Bridge	**Date:**	**8/11/2009**
Bridge No.:	0000TUK14	**Hours:**	**3.5**
Structure ID:	88109700	**Inspector ID #:**	**G0910**
Structure Type:	ST	**Lead Inspector:**	**WDS**
Agency:	City of Tukwila	**Co-Inspector:**	**HDR**
Milepost:	1.04		

Truss / Girder	Span	Location	Feature Inspected	Detail Description	Remarks
West	2	L9L10	Other	Bottom Chord	Areas of seam rust at bottom chord channel ties and pack rust up to 3/8" at bottom lateral gusset plates.
West	2	L1U1	Other	Vertical	No defects noted.
West	2	L2U2	Other	Vertical	No defects noted.
West	2	L3U3	Other	Vertical	No defects noted.
West	2	L4U4	Other	Vertical	No defects noted.
West	2	L5U5	Other	Vertical	No defects noted.
West	2	L6U6	Other	Vertical	No defects noted.
West	2	L7U7	Other	Vertical	No defects noted.
West	2	L9U9	Other	Vertical	No defects noted.
West	2	U1L2	Other	Diagonal	No defects noted.
West	2	U3L4	Other	Diagonal	No defects noted.
West	2	U5L4	Other	Diagonal	There is up to 1/8" pack rust built up between the riveted members along the entire length.
West	2	U5L6	Other	Diagonal	There is up to 1/8" pack rust built up between the riveted members along the entire length.
West	2	L6U7	Other	Diagonal	No defects noted.
West	2	L8U9	Other	Diagonal	No defects noted.

Washington State Department of Transportation

WSBIS Local Agency Inventory Report

Bridge ID

1001	2009	2132	1019	1286	1021	2023	1156	2181	2183	2185	1188	1196
Structure ID	Bridge Number	Bridge Name	Owner	Cust	County	City	Location	Section	Twnshp	Range	Latitude	Longitude
08109700	TUKxNx14	42ND AVENUE SOUTH BR	04	04	17	1320	0.04 MI E OF SR-599	10	23	04E	47° 29' 23.10"	122° 16' 49.00"

Facilities

1232	1256	1274	7281	7283	1276	1285	1288	1289	1293	1292	2295	7296
Feature Intersected	Facilities Carried	Region	Leg1	Leg2	FIPS	Toll	Para	Temp	OPC	NRHP	HAER	LRHP
DUWAMISH RIVER	42ND AVE SO	NW	11	0	72625	3	N		K	4		
									P			

Printed Date
4/18/2022

Sufficiency Rating:	6.00
Status:	SD
Routine Risk Category:	High Risk
Underwater Risk Category:	

Layout

1332	1336	1340	2346	1348	1352	1356	1360	1364	1367	1310	1312	1370	1374	1378	1379	1382	1383	1386	1387	1390	1394	1291	1397
Year Built	Year Rebuilt	Bridge Length	Screening Length	Maximum Span Length	Lanes On	Curb to Curb Deck Width	Out to Out Deck Width	Sidewalk Left	Sidewalk Right	Skew	Flared	Min Vert Over Deck	Min Vert Under	Vert Code	Min Lat Under Right	Lat Code	Min Lat Under Left	Nav Ctl Code	Nav Vert Clear	Nav Horiz Clear	Nav Vert Lift Clear	Median	Appr Rdwy
1949	0	284		220	2	24.0	30.0	0.0	3.5	38	N	15' 00"	00' 00"	N	0.0	N	0.0	0	0	0		0	36

Crossing

1432	1433	1434	1435	2440	1445	1451	1453	1457	1463	1467	2410	7479	1483	1484	1485	1486	1487	1489	1490	1354	1491	1495	1499	1413	2441
On Under	Hwy Class	Service Level	Route Number	Milepost	ADT	Truck %	Year of ADT	Future ADT	Future ADT Year	Linear Referencing System	NBI Bridge	Fed Aid Route #	NHS	BHS	STRAH	FLH	Funct. Class	NTN	Lane Use Direction	Lanes Under	Horizontal Clearance Route Dir	Horizontal Clearance Reverse Dir	Max Vert Clearance Route	Detour	Speed Limit
1	5	1	01037	1.04	10300	30	2018	12000	2038		Y	1037	0	0	0	0	17	N	2	0	24' 00"		*15' 00"*	2	15

Design

1532	1533	1535	1536	1538	1541	1544	1545	1546	1547	1548	1549	1550	1551	1552	1553	1554	1555	1556	1585	1588	1590	7565	7557
Main Span Material	Main Span Design	Appr Span Material	Appr Span Design	Number Main Spans	Number Appr Spans	Service On	Service Under	Deck Type	Wearing Surface	Membrane	Deck Protect	Design Load Code	Oper Rating Method	Oper Rating Tons	Oper Rating Factor	Inv Rating Method	Inv Rating Tons	Inv Rating Factor	Border State Cd	Border Pct	Border Structure ID	Fed Aid Project No	Design Exemption
3	10	1	04	1	2	5	5	1	1	0	0	4	1	0		1	0						
														19	**0.52**		**11**	**0.31**					

Load Rating

2587	2588	2589	2590	2591	2592	2593	2594	2597	2598	2595	2596
Type 3	Type 3S2	Type 3-3	NRL	SHV 4	SHV 5	SHV 6	SHV 7	EV 2	EV 3	OL 1	OL 2
0.96	0.72	0.67	0.59	0.89	0.78	0.71	0.64	0.62	0.42	0.53	0.28

Waterway/ Prop Imp

7832	7833	7834	7835	7836	7837	7838	7839	7840	7841	1844	1846	1847	2853	2860	1867	1873	2870	1861	1879	2883
Water Type	Flood Pln Intr	Flood Control	Scour Hist	Strmbd Matrl	Substr Stablty	Wtrwy Obstr	Strmbd Stablty	Strmbd Anabrn	Piers In Watr	Type Work	Work Meth	Stru Imp Length	Roadway Width	Cost Per SF	Struct Cost	Rdwy Cost	Engr Cost	Total Cost	Estmt Year	Prop Imp Cost Calc
B	A	B	H	2	3	N	A	N	2	31	1	294	38	800	4469	894	3575	8938	2014	Y
														950	**5306**	**1061**	**4245**	**10613**	**2022**	

Inspection Report Types

2920 Inspection	1990 Date	2646 Inspector	2649 Cert No	2654 Co-Inspector
Routine				
Fracture Critical				
Special Feature				
Underwater				
UW Interim				

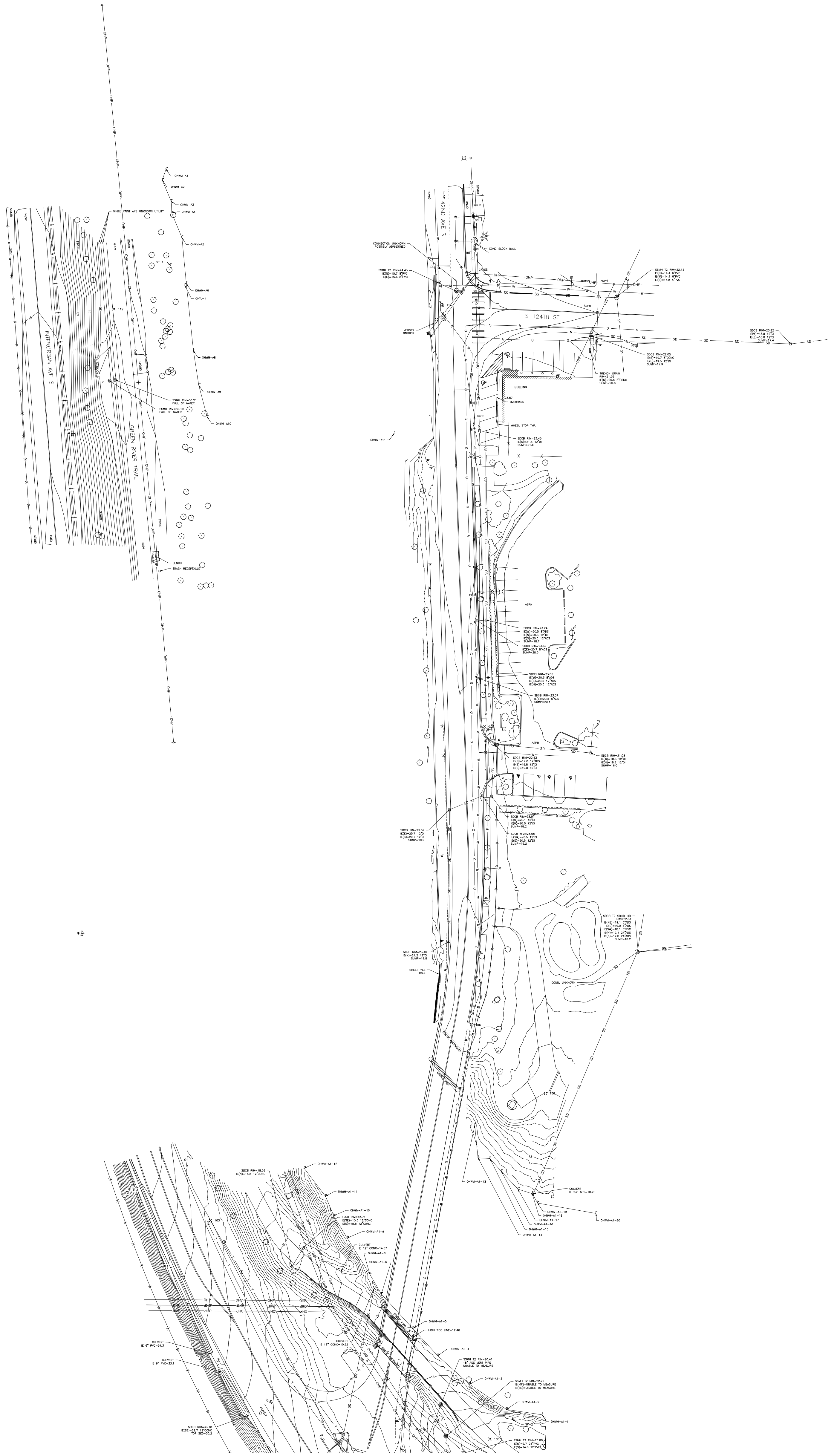
Inspection	Date	Inspector	Cert No	Co-Inspector
Interim	3/8/2022	MAG	G1103	HJ
In Depth				
Damage				
PRM Safety				
SEC Safety				

Inspection	Date	Inspector	Cert No	Co-Inspector
Condition				
Short Span				
Geometric				
Info	4/13/2022	MAG	G1103	HJ
Inventory				

Control Data Date: 4/14/2022

Control Data Guid: 863a01ce-2af7-413d-866a-0c4b8a12e094

Appendix C – Survey Map



CONTRACTOR SHALL FIELD
VERIFY EXISTING CONDITIONS.
EXISTING UTILITIES MUST BE
LOCATED AND PROTECTED
BEFORE AND DURING
CONSTRUCTION.

ATTENTION
IF ASSISTANCE IS NEEDED WITH NAVIGATING OR
UTILIZING
THIS BASE MAP IN CIVIL 3D PLEASE CONTACT
1-ALLIANCE AT (425) 598-2200.

SURVEY NOTES:

1. HORIZONTAL DATUM: PROJECT SYSTEM DERIVED FROM THE WASHINGTON STATE PLANE COORDINATE SYSTEM, NORTH ZONE (4601), NAD83(2011)(EPOCH2010.0), US SURVEY FOOT.
2. VERTICAL DATUM: NAVD88
3. BASIS OF BEARINGS: WASHINGTON STATE PLANE COORDINATE SYSTEM, NORTH ZONE (4601), NAD83(11), US SURVEY FOOT (GRID). [illegible]
4. PROJECT BENCHMARK: [illegible]
5. FIELD WORK FOR THIS SURVEY WAS PERFORMED IN [illegible]. MONUMENTS AND CONTROL POINTS SHOWN HEREON WERE VISITED AND/OR SET IN [illegible].
6. CONTOURS SHOWN ARE DERIVED FROM DIRECT FIELD OBSERVATIONS.
7. THE EXISTING UNDERGROUND UTILITIES SHOWN HEREON ARE APPROXIMATE LOCATIONS ONLY BASED ON THE FIELD LOCATION OF UTILITY LOCATE PAINT MARKS AND PHYSICAL FEATURES VISIBLE ON OR ABOVE THE GROUND SURFACE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ANY AND ALL UNDERGROUND UTILITIES BEFORE BEGINNING WORK. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES ARISING OUT OF HIS/HER FAILURE TO EXACTLY LOCATE AND PROTECT ALL EXISTING UTILITY FACILITIES.
8. UTILITY LOCATES FOR THIS PROJECT WERE PERFORMED BY APPLIED PROFESSIONAL SERVICES (425-[illegible]).

Appendix D – Geotechnical Investigations Technical Memo

DRAFT
Preliminary Geotechnical Engineering Report
42nd Avenue South Bridge Replacement
Tukwila, Washington

November 22, 2021

Prepared for

TranTech Engineering, LLC
365 118th Avenue SE, Suite 100
Bellevue, Washington 98005

LANDAU
ASSOCIATES

Preliminary Geotechnical Engineering Report
42nd Avenue South Bridge Replacement
Tukwila, Washington

This document was prepared by, or under the direct supervision of the undersigned, whose seal is affixed below.

Name: Steven R. Washington/No. 32250

Date: November 22, 2021

Document prepared by: ______________________ Sean Gertz, PE
Senior Engineer

Document reviewed by: ______________________ Steven R. Wright, PE
Quality Reviewer

Date:	November 22, 2021
Project No.:	1790003.010.011
File path:	\\edmdata01\projects\1790\003.010\R\Signature Page.docx
Project Coordinator:	TAC

TABLE OF CONTENTS

FIGURES

TABLES

APPENDICES

LIST OF ABBREVIATIONS AND ACRONYMS

AASHTO	American Association of State Highway and Transportation Officials
ADT	Average Daily Traffic
bgs	below ground surface
BNSF	Burlington Northern Santa Fe
City	City of Tukwila
ft	foot/feet
TranTech	TranTech Engineering, LLC
LAI	Landau Associates, Inc.
LRFD	Load Resistance Factor Design
pci	pounds per cubic inch
psi	pounds per square inch
NAVD88	North American Vertical Datum of 1988
PGA	peak ground acceleration
WSDOT	Washington State Department of Transportation

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1.0 INTRODUCTION

This report summarizes the results of preliminary geotechnical engineering services provided by Landau Associates, Inc. (LAI) to TranTech Engineering, LLC (TranTech; Project Civil and Structural Engineer) in support of preliminary design of the City of Tukwila (City; project owner) 42nd Avenue South Bridge Replacement project in Tukwila, Washington (site; Figure 1).

This report has been prepared with information provided by representatives of the City and TranTech, and with data collected during LAI's field exploration program.

1.1 Project Background and Description

The existing 42nd Avenue South Bridge was built in 1949. It is a 3-span bridge that is 280-feet-long and 28-feet wide [24 feet (ft) curb-to-curb], with the main span consisting of a through-truss that spans over the Duwamish River. The existing bridge has a sufficiency rating of 7.56 and is considered Structurally Deficient and Functionally Obsolete. The 2018 Average Daily Traffic (ADT) volume was 10,300 vehicles per day, with 30 percent of those vehicles being heavy trucks. The 42nd Avenue South Bridge is a primary crossing of the Duwamish River for the Allentown neighborhood, the Burlington Northern Santa Fe (BNSF) Intermodal Facility, and Baker Commodities, all of which are considered major stakeholders of this project.

The City has been struggling with the deterioration of this bridge for many years, starting in the 1990s with an expensive paint project followed a few years later by the emergency shoring of the northern approach roadway with a sheet pile wall system when the Duwamish River threatened to wash away its northern approach fill. Even after these repairs, the northern approach has continued to settle, and constant maintenance is required to provide a smooth transition onto the bridge. In addition, the existing steel truss is fracture critical, and the bridge requires costly special access inspections every 24 months. These inspections must be preceded by a cleaning of the structure to allow visual access to critical connections. Cleaning the bridge is expensive and a logistical challenge that yields only short-term benefits. The bridge currently needs further maintenance, but the cost of the necessary repairs far exceeds the cost of replacing the bridge.

The bridge is the only viable route for container trucks entering and leaving the Tukwila BNSF Intermodal Facility and is currently load posted, which restricts the free movement of that freight. The bridge's many structural deficiencies are compounded by the crossing of the frequent heavy loads as well as by deterioration suffered during its 70-year service life. In addition, the bridge bearings are locked, which causes continuing damage from temperature-related expansion and contraction. These deficiencies coupled with the bridge geometry have resulted in a bridge at risk of collapse during a seismic event.

This project will replace the existing 42nd Avenue South Bridge with a new multi-span bridge and improve the serviceability of 42nd Avenue South. The City is considering two alignments for the replacement bridge, one within the existing bridge corridor and one within the South 124th Street corridor. LAI understands that the replacement bridge will likely be supported on drilled shaft foundations with diameters on the order of 8 to 10 ft.

1.2 Scope of Services

TranTech retained LAI to provide preliminary geotechnical design services in support of preliminary design of the project. LAI provided the following services in accordance with the scope outlined in a Subconsultant Agreement for Services between LAI and TranTech, dated November 23, 2020:

- Reviewed readily available geologic and geotechnical data for the site and the surrounding area, including information gathered by others as part of the nearby King County Allentown Trunk and Sound Transit Central Link Light Rail projects.
- Evaluated the above-described information collected by others from the project area and developed preliminary geotechnical engineering conclusions and recommendations related to preparation of the project's Type, Size, and Location Report.
- Obtained public and private utility clearances prior to performing field explorations.
- Characterized subsurface soil and groundwater conditions along the existing bridge corridor and the South 124th Street corridor by advancing four exploratory borings at or near proposed bridge foundation locations.
- Collected representative soil samples from the exploratory borings.
- Completed a geotechnical laboratory testing program consisting of natural moisture content, grain size, and Atterberg Limits determinations on selected soil samples to aid in classifying site soils.
- Evaluated the information collected as part of the data review and field investigation program to develop preliminary geotechnical engineering conclusions and recommendations related to the preliminary design (i.e., 30 percent design) of the proposed replacement bridge.
- Prepared a written report, summarizing the findings of the field investigation and providing preliminary geotechnical design recommendations for the project. The report includes:
    - A site plan showing the locations of the exploratory borings completed for the project.
    - Summary logs of the subsurface conditions observed in the exploratory borings.
    - A discussion of the near-surface soil and groundwater conditions observed along the two bridge corridors.
    - A preliminary qualitative evaluation of the liquefaction and lateral spreading hazards at the two bridge sites.
    - Seismic design criteria in accordance with the American Association of State Highway and Transportation Officials (AASHTO) *LRFD Bridge Design Specifications.*
    - Preliminary geotechnical design recommendations for the preliminary design of deep foundations for the proposed replacement bridge.

2.0 SITE CONDITIONS

This section discusses the general geologic setting of the project area and describes the surface and subsurface conditions observed along the existing bridge and the South 124th Street bridge corridors at the time of LAI's field investigation. Interpretations of site conditions are based on the results of LAI's geologic review, site reconnaissance, and subsurface explorations.

2.1 Geologic Setting

General geologic information for the project area was obtained from the *Geologic Map of the Des Moines 7.5' Quadrangle, King County, Washington* (Booth and Waldron 2004). The project area is mapped as being underlain by alluvium. Booth and Waldron describe alluvium as moderately well sorted deposits of cobble gravel, pebbly sand, and sandy silt that is found along the floodplains of the Duwamish River. Glacial till, ice contact, and advance outwash deposits are also mapped in the vicinity of the project area.

Glacial till typically consists of a heterogeneous, non-sorted mixture of sub-rounded boulders, cobbles, gravel, and sand in a matrix of silt and clay. The heterogeneous nature of the glacial till is a result of it being mixed and transported before being deposited, overridden, and compacted by the weight of an advancing glacier.

2.2 Surface Conditions

The following sections describe the surface conditions in the vicinity of the existing bridge corridor and the South 124th Street corridor during LAI's field investigation.

2.2.1 Existing Bridge Corridor

On the south side of the Duwamish River, the project area is currently developed with hardscape (impervious, asphalt concrete pavement) associated with King County's Green River Trail, which passes beneath the existing bridge; overhead utilities; and landscaped areas (deciduous trees and grass) between Interurban Avenue South and the Green River Trail. Blackberry bushes and deciduous trees line the riverbank near the existing bridge landing. The site slopes towards the Duwamish River at variable grades, and a retaining wall of variable height passes beneath the existing bridge along the south edge of the Green River Trail.

On the north side of the Duwamish River, the project site is developed with hardscape (impervious, asphalt concrete pavement) and landscaping (deciduous trees and grass) associated with the Tukwila Community Center and the King County Duwamish River Siphon. The site slopes toward the Duwamish River at variable grades, and blackberry bushes and deciduous trees line the riverbank.

2.2.2 South 124th Street Corridor

On the east side of the Duwamish River, the project site is developed with hardscape (impervious, asphalt concrete pavement), overhead utilities, and signage associated with the 42nd Avenue South and the South 124th Street intersection. The site is generally flat except near the west edge of the intersection where the ground surface slopes down sharply toward the Duwamish River.

On the west side of the Duwamish River, the project site is generally developed with hardscape (impervious asphalt concrete pavement) associated with the Green River Trail, overhead utility lines along the east side of the trail, and landscaping that runs along the west side of the trail. Deciduous trees and blackberry bushes exist along the east side of the trail where the site slopes down toward the Duwamish River.

2.3 Subsurface Soil Conditions

The following sections present the subsurface conditions observed along the proposed existing bridge corridor and along the alternative South 124th Street corridor bridge alignment. The approximate locations of the borings described herein are shown on Figure 2. Additional information about LAI's field exploration program, including summary exploration logs, is provided in Appendix A. A discussion of LAI's geotechnical laboratory testing program and laboratory data are presented in Appendix B.

2.3.1 Existing Bridge Corridor

Based on LAI's field observations, the soils/rock observed in the exploratory borings that were advanced along the existing bridge corridor (borings B-1 and B-2) were classified into the following geologic units:

- **Alluvium:** This unit was generally observed to consist of black and mottled orange, brown to brownish tan, and gray, very loose to medium dense sand with varying amounts of silt and clay and with trace organics and gravel, and very soft to medium stiff silt with varying amounts of sand and trace organics. This unit was observed to extend from approximately 0 to 50 ft below ground surface (bgs) and 0 to 25 ft bgs in borings B-1 and B-2, respectively.
- **Glacial Till:** This unit was generally observed to consist of gray to greenish gray, dense to very dense sand with varying amounts of gravel, silt, cobbles, and boulders; and gray, hard silt with varying amounts of sand, gravel, cobbles, and boulders. This unit was observed to extend to the maximum depth of boring B-1 (90.3 ft bgs) and to a depth of about 74 ft bgs at the location of boring B-2.
- **Bedrock:** This unit was observed to consist of grayish black siltstone and was observed at approximately 74 ft bgs in boring B-2. LAI did not observe this unit in boring B-1. LAI was able to sample only the upper 6 inches of this unit.

2.3.2 South 124th Street Corridor

Based on LAI's field observations, the soils observed in the exploratory borings that were advanced along the South 124th Street corridor (borings B-3 and B-4) were classified into the following geologic units:

- **Alluvium:** This unit was generally observed to consist of tan to blackish gray and blackish brown, very loose to medium dense sand with varying amounts of silt and peat lenses; and gray, very soft to hard silt. This unit was observed to extend from approximately 0 to 73 ft bgs and 0 to 20 ft bgs in borings B-3 and B-4, respectively.
- **Glacial Till:** This unit was generally observed to consist of gray very dense sand with varying amounts of silt and trace gravel. At the location of boring B-3 between the depths of about 73 to 80 ft bgs, the till was observed to consist of tannish iron-stained, gravelly, silty, dense, fine to medium sand. The lower portion of the till unit was generally observed to consist of gray, bluish gray, tan, greenish gray, very dense sand with varying amounts of gravel and trace silt; and dark gray, hard silt with varying amounts of sand and gravel. This unit was observed to extend to the maximum depths of borings B-3 (90.5 ft bgs) and B-4 (60.5 ft bgs).

2.4 Groundwater Conditions

Use of the mud rotary drilling method precluded measurement of site groundwater levels. However, the water level observed within the adjacent Duwamish River suggests that groundwater elevations could be approximately 6 to 15 ft bgs at the existing bridge corridor explorations and approximately 20 ft bgs at the South 124th Street corridor explorations at the time of drilling. Groundwater conditions will vary depending on local subsurface conditions, weather conditions, the level of the Duwamish River, tidal fluctuations, and other factors.

3.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the results of the field exploration, preliminary engineering analyses performed, and review of existing data, it is LAI's opinion that subsurface conditions along the proposed existing bridge corridor are suitable for the proposed construction, provided the recommendations contained herein, and in subsequent design-level geotechnical documents, are incorporated into the project design. The following sections present preliminary geotechnical conclusions and recommendations related to seismic design considerations and foundation support for the proposed replacement bridge.

3.1 Seismic Design Considerations

The Pacific Northwest is seismically active, and the project area could be subject to ground shaking from a moderate to major earthquake. Consequently, earthquake shaking should be anticipated during the design life of the proposed improvements, and the proposed improvements should be designed to resist earthquake loading using appropriate design methodology.

To estimate lateral forces on project components, LAI recommends the seismic design parameters presented in Table 1. These parameters were obtained from the United States Geological Survey (USGS; accessed January 2021) seismic design maps for a seismic event with a 7-percent probability of exceedance in a 75-year period, consistent with the AASHTO *LRFD Bridge Design Specifications* (2020).

Table 1. Recommended Seismic Design Parameters

Location	Site Class	Peak Ground Acceleration (PGA) (g)	S_s (g)	S_1 (g)	F_a (--)	F_v (--)	F_{PGA} (--)
B-1 through B-4	**E**	0.456	1.01	0.338	0.9	2.648	0.9

F_a, F_v = site coefficients for short-period (0.2-second period) and long-period (1.0-second period) ranges of acceleration spectrum, respectively.
F_{PGA} = peak ground acceleration coefficient
g = acceleration due to gravity
PGA = peak ground acceleration
S_S, S_1 = 0.2-second and 1.0-second period spectral accelerations, respectively

3.1.1 Liquefaction

Liquefaction is a phenomenon where strong ground motions temporarily cause soils to lose strength and behave like a liquid. Liquefaction is generally limited to granular soils or non-plastic silts located below the water table that are in a relatively loose, unconsolidated condition at the time of a large, nearby earthquake. Near-surface soils at the project site were generally observed to be in a relatively loose condition; however, no groundwater was directly observed in the exploration due to the method that was used to advance the borehole. For preliminary design purposes, LAI assumed a groundwater elevation of 12-ft NAVD88 (North American Vertical Datum of 1988). In general, subsurface conditions on the east side of the Duwamish River were observed to be relatively poorer. Preliminary estimates of depths to non-liquefiable soils are presented in Table 2.

Table 2. Estimated Depth to Non-Liquefiable Soils

Location	Boring	Depth to Non-Liquefiable Soils (ft bgs)
Existing Bridge Corridor	B-1	50
Existing Bridge Corridor	B-2	25
South 124th Street Bridge Corridor	B-3	70
South 124th Street Bridge Corridor	B-4	20

ft = feet
bgs = below ground surface

3.1.2 Lateral Spreading

Lateral spreading typically occurs during soil liquefaction in the presence of sloping ground or a free face. It is LAI's opinion that slopes along the proposed bridge alignments could experience lateral spreading during a design seismic event. Preliminary recommendations regarding lateral spreading loads on drilled shaft foundations are presented in Section 3.2.1.1.

3.2 Preliminary Bridge Foundation Design

The following sections provide preliminary geotechnical recommendations related to preliminary design of the foundation for the proposed replacement bridge. The seismic parameters presented in Section 3.1 of this report are applicable to the preliminary design of the bridge. LAI recommends that the preliminary recommendations presented herein be updated as necessary during development of the project design.

3.2.1 Drilled Shaft Lateral Foundation Capacity

A computer program, such as Ensoft's LPILE program, can be used to calculate the lateral capacity of the foundations that will be used to support the proposed replacement bridge. LPILE uses lateral soil reaction (p) and lateral deflection (y) curves generalized from field load tests and soil input properties to approximate lateral pile deflections and moments. Preliminary recommended LPILE input parameters for the onsite soils in non-liquefied conditions at the locations of borings B-1 through B-4 are presented in Table 3.

Table 3. Preliminary Recommended Soil Parameters for LPILE Input, Non-Liquefied Condition

Location	Depth Below Existing Grade (ft)	Effective Unit Weight (pci)	Friction Angle (degrees)	Undrained Shear Strength (psi)	Soil Modulus K (pci)	Soil Strain ε_{50}	Soil Model
B-1	0 to 6	0.061	30	-	25	-	Sand (Reese)
	6 to 50	0.025	30	-	20	-	Sand (Reese)
	>50	0.042	38	-	125	-	Sand (Reese)
B-2	0 to 25	0.025	27	-	20	-	Sand (Reese)
	>25	0.042	38	-	125	-	Sand (Reese)
B-3	0 to 12	0.057	28	-	25	-	Sand (Reese)
	12 to 70	0.022	28	-	20	-	Sand (Reese)
	70 to 80	0.033	36	-	60	-	Sand (Reese)
	>80	0.042	38	-	125	-	Sand (Reese)
B-4	0 to 18	0.061	28	-	25	-	Sand (Reese)
	18 to 20	0.025	28	-	20	-	Sand (Reese)
	>20	0.042	38	-	125	-	Sand (Reese)

ε50 = strain at 50 percent stress level
ft = foot/feet
pci = pounds per cubic inch
psi = pounds per square inch

The recommended parameters assume a single shaft without group effects. Groups of shafts will have less lateral resistance than the sum of the single pile resistances due to soil structure interaction among closely spaced shafts. Consequently, the lateral load response of shafts in groups should be modified to account for this group effect. When the P-y method of analysis is used, this can be accomplished by multiplying the values of P by the P multipliers presented in Article 10.7.2.4 of the *LRFD Bridge Design Specifications* (AASHTO 2020). The minimum center-to-center pile spacing presented in the AASHTO 2020 *LRFD Bridge Design Specifications* is 3D (where D is the shaft diameter); however, Section 8.12.2.3 of the Washington State Department of Transportation (WSDOT) Geotechnical Design Manual (2021) provides guidance on how to account for the shading effect when the center-to-center pile spacing is between 2D and 3D.

To account for the effect of liquefied soils due to a design-level seismic event, LAI preliminarily recommends assuming no lateral resistance for soils at depths less than those presented in Table 2.

3.2.1.1 Lateral Spreading

Based on the results of LAI's field investigation, drilled shafts located along either of the proposed alignments may be subject to lateral loading as a result of liquefaction-induced lateral spreading during a design-level seismic event. The magnitude of lateral spreading loads at each location will largely be a function of the thickness of the non-liquefied ”crust” above the groundwater table. As noted previously, LAI has preliminarily assumed a groundwater elevation of 12-ft NAVD88 in liquefaction analyses. A higher groundwater table would result in a lower magnitude of lateral spreading loads, whereas a lower groundwater-table elevation would result in a higher magnitude. Lateral spreading loads are anticipated to be greatest in areas where the ground surface elevation adjacent to the drilled shaft foundation is the highest. Because of this, it may be possible to limit the magnitude of lateral spreading loads by locating the drilled shaft foundations at locations where the ground surface elevation is the lowest. Detailed lateral spreading analyses will be performed in subsequent phases of the project.

3.2.2 Drilled Shafts Axial Capacity

Preliminary recommendations for drilled shafts were developed in accordance with the *LRFD Bridge Design Specifications* (AASHTO 2020). LAI recommends minimum shaft embedment depths equal to one shaft diameter greater than the depths presented in Table 2. For preliminary planning purposes, drilled shafts should be assumed to have no axial capacity between the ground surface and the depths presented in Table 2. Below those depths, the preliminary nominal axial resistance of a single, 8- and 10-ft diameter drilled shaft can be preliminarily assumed to be equal to those presented in Table 4.

Table 4. Preliminary Drilled Shaft Axial Capacities

Shaft Diameter	Service Limit State Resistance		Strength/Extreme Limit State Resistance	
	End Bearing (kips)	Skin Friction (kips/ft)	End Bearing	Skin Friction (kips/ft)
8 ft	700	65	2.400	68
10 ft	865	80	3,770	85

kips = kilopounds
kips/ft = kilopounds per foot
Note:

1) Preliminary resistances presented herein are valid only for depths greater than those presented in Table 2. Drilled shafts should be preliminarily assumed to have no axial resistance at depths less than those presented in Table 2.

The preliminary axial resistances presented in Table 4 assume no permanent casing is used. If the shafts are constructed using permanent casing, the axial resistances should be multiplied by a factor of 0.7. Service limit state nominal capacities were developed assuming 1 inch of allowable settlement. Resistance factors applicable to the Service, Strength 1, and Extreme 1 limit states are presented in Table 5. Where the resistance factors are applied to a single shaft supporting a bridge pier (i.e., a non-redundant shaft), the recommended resistance factors should be reduced by 20 percent.

Table 5. Recommended Resistance Factors for Drilled Shaft Design

Loading	Service Limit	Strength Limit	Extreme Limit
Compression	1.0	0.55 (side friction) 0.50 (end-bearing)	1.0
Uplift	1.0	0.45 (side friction)	0.8

For preliminary planning purposes, drilled shaft nominal uplift resistances could be taken as equal to the nominal shaft friction capacities presented in Table 4.

3.2.2.1 Downdrag Loads

As previously noted, some soils in the vicinity of the drilled shafts that are being considered for foundation support for the replacement bridge are potentially liquefiable. It is estimated that the magnitude of liquefaction-induced settlement as a result of the design earthquake could be great enough [i.e., greater than 0.4 inch per the WSDOT *Geotechnical Design Manual* (2021)] that downdrag loads on the shafts could fully develop. Consequently, downdrag loads resulting from potential liquefaction induced settlement should be applied at the Extreme 1 limit state as described below.

Downdrag loads at the Extreme 1 limit state for each drilled shaft can be preliminarily taken as equal to those presented in Table 6. Section 2.3 of this report describes the soil profile that is anticipated at each bridge pier location. The downdrag loads assume no permanent casing will be used to construct the shafts. If the shafts are constructed using permanent casing, the downdrag loads presented in Table 6 should be multiplied by a factor of 0.7.

Table 6. Preliminary Recommended Seismic Downdrag Loads for Extreme 1 Limit State

Location	Boring	Shaft Diameter (ft)	Downdrag Load on Drilled Shaft (kips)
Existing Bridge Corridor	B-1	8	225
		10	280
	B-2	8	50
		10	65
South 124th Street Corridor	B-3	8	340
		10	420
	B-4	8	235
		10	290

ft = feet

3.2.2.2 Group Interaction Effect

If it is necessary to place drilled shafts in groups with a center-to-center spacing of less than 3D (where D is the shaft diameter), then an axial group reduction factor will need to be incorporated into the design of the shaft. Table 7 presents recommended axial group reduction factors.

Table 7. Recommended Axial Group Reduction Factors

No. of Rows in Group	Shaft Spacing (Center to Center)	Group Reduction Factor
Single	2D	0.9
	3D or greater	1
Multiple	2.5D	0.67
	3D	0.8
	4D or greater	1

D = shaft diameter

4.0 DESIGN PHASE GEOTECHNICAL SERVICES

Per Section 8.2.1 of the WSDOT *Geotechnical Design Manual* (WSDOT 2021), it is especially critical that groundwater conditions be well defined at the location of each drilled shaft. Following final determination of drilled shaft locations, LAI recommends that additional borings be conducted at each of the shaft locations. Piezometers should be installed in each boring to adequately define the limits and piezometric head in all unconfined, confined, and locally perched groundwater zones. Information from the supplemental field exploration program should then be analyzed by a geotechnical engineer, and geotechnical engineering conclusions and recommendations should be developed to support final design of the project.

5.0 USE OF THIS REPORT

Landau Associates has prepared this report for the exclusive use of TranTech Engineering, LLC and the City of Tukwila for specific application to the preliminary design of the 42nd Avenue South Bridge Replacement Project in Tukwila, Washington. No other party is entitled to rely on the information, conclusions, and recommendations included in this document without the express written consent of Landau Associates. Reuse of the information, conclusions, and recommendations provided herein for extensions of the project or for any other project, without review and authorization by Landau Associates, shall be at the user's sole risk. Landau Associates warrants that, within the limitations of scope, schedule, and budget, its services have been provided in a manner consistent with that level of skill and care ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions as this project. Landau Associates makes no other warranty, either express or implied.

6.0 REFERENCES

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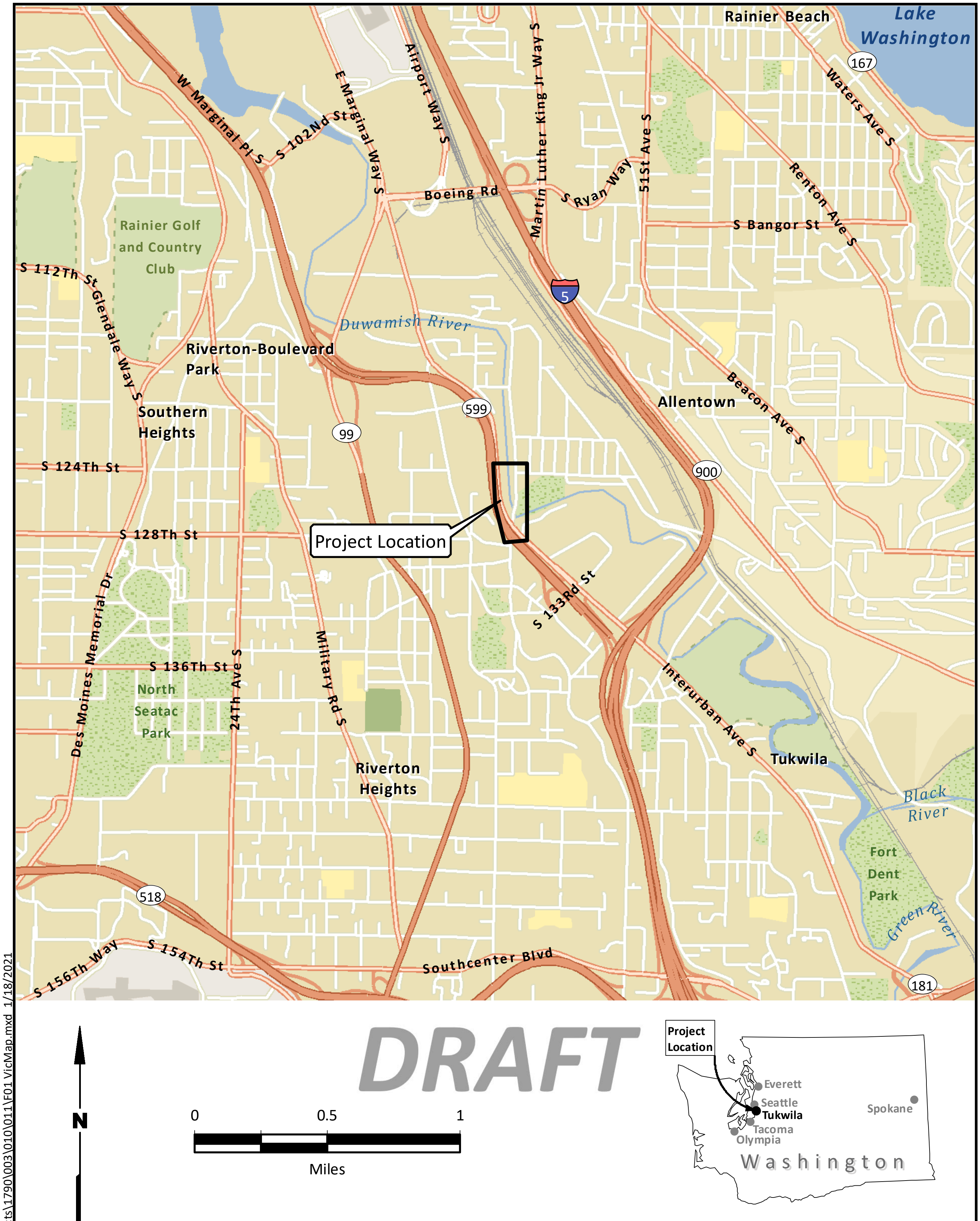

Data Source: Esri 2012

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Landau Associates

42nd Avenue South Bridge Replacement Tukwila, Washington	**Vicinity Map**	Figure 1

Legend

B-1 ● Boring Location and Designation

DRAFT

Note
1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.
2. 1-foot contour elevations (NAVD88, feet).

Source: Bing Imagery, 2021; 1-Alliance, 2021

0 100 200
Scale in Feet

LANDAU ASSOCIATES

42nd Avenue South
Bridge Replacement
Tukwila, Washington

Site and Exploration Plan

Figure
2

APPENDIX A

Field Explorations

APPENDIX A
FIELD EXPLORATIONS

Subsurface conditions along the two, alternative bridge alignments were explored by Landau Associates, Inc. (LAI) by advancing and sampling four exploratory borings (B-1 through B-4) between December 21, 2020 and December 24, 2020. The approximate locations of LAI's explorations are shown on Figure 2. Two of the borings (B-1 and B-2) were advanced approximately 90.3 and 74.5 feet (ft) below ground surface (bgs) adjacent to the existing bridge alignment, and two borings (B-2 and B-4) were advanced approximately 90.5 and 60.5 ft bgs along the alternative South 124th Street Bridge alignment. Under subcontract to LAI, the exploratory borings were advanced by Holocene Drilling, Inc. of Puyallup, Washington using the mud rotary drilling technique.

The field exploration program was coordinated and monitored by LAI personnel who also obtained representative soil samples, maintained a detailed record of the observed subsurface soil and groundwater conditions, and described the soil encountered by visual and textural examination. Each representative soil type observed in the explorations was described using the soil classification system shown on Figure A-1, in general accordance with ASTM International standard test method D2488, *Standard Recommended Practice for Description of Soils (Visual-Manual Procedure)*. The exploration logs are presented on Figures A-2 through A-5. These logs represent LAI's interpretation of subsurface conditions identified during the field exploration program. The stratigraphic contacts shown on the summary logs represent the approximate boundaries between soil types; actual transitions may be more gradual. The soil and groundwater conditions depicted are only for the specific dates and locations reported and, therefore, are not necessarily representative of other locations and times. A further discussion of soil and groundwater conditions is provided in the main text of this report.

Disturbed samples of soil encountered in the exploratory borings were obtained at select intervals using a 1.5-inch inside-diameter split-spoon sampler. The sampler was driven up to 18 inches into the undisturbed soil ahead of the drill bit with a 140-lb hammer falling a distance of approximately 30 inches. The number of blows required to drive the sampler for the final 12 inches of soil penetration, or a portion thereof, is noted on the boring log, adjacent to the appropriate sample notation. Samples collected in this manner were taken to LAI's laboratory for further examination and testing. A discussion of laboratory test procedures and the laboratory test results are presented in Appendix B. Upon completion of drilling and sampling, the boreholes were decommissioned in general accordance with the requirements of Washington Administrative Code 173-160.

Soil Classification System

MAJOR DIVISIONS			GRAPHIC SYMBOL	USCS LETTER SYMBOL(1)	TYPICAL DESCRIPTIONS (2)(3)
COARSE-GRAINED SOIL (More than 50% of material is larger than No. 200 sieve size)	GRAVEL AND GRAVELLY SOIL (More than 50% of coarse fraction retained on No. 4 sieve)	CLEAN GRAVEL (Little or no fines)	○	**GW**	Well-graded gravel; gravel/sand mixture(s); little or no fines
			○	**GP**	Poorly graded gravel; gravel/sand mixture(s); little or no fines
		GRAVEL WITH FINES (Appreciable amount of fines)	▥	**GM**	Silty gravel; gravel/sand/silt mixture(s)
			▨	**GC**	Clayey gravel; gravel/sand/clay mixture(s)
	SAND AND SANDY SOIL (More than 50% of coarse fraction passed through No. 4 sieve)	CLEAN SAND (Little or no fines)	░	**SW**	Well-graded sand; gravelly sand; little or no fines
			░	**SP**	Poorly graded sand; gravelly sand; little or no fines
		SAND WITH FINES (Appreciable amount of fines)	▥	**SM**	Silty sand; sand/silt mixture(s)
			▨	**SC**	Clayey sand; sand/clay mixture(s)
FINE-GRAINED SOIL (More than 50% of material is smaller than No. 200 sieve size)	SILT AND CLAY (Liquid limit less than 50)		▥	**ML**	Inorganic silt and very fine sand; rock flour; silty or clayey fine sand or clayey silt with slight plasticity
			▨	**CL**	Inorganic clay of low to medium plasticity; gravelly clay; sandy clay; silty clay; lean clay
			▦	**OL**	Organic silt; organic, silty clay of low plasticity
	SILT AND CLAY (Liquid limit greater than 50)		▥	**MH**	Inorganic silt; micaceous or diatomaceous fine sand
			▨	**CH**	Inorganic clay of high plasticity; fat clay
			▦	**OH**	Organic clay of medium to high plasticity; organic silt
	HIGHLY ORGANIC SOIL		≋	**PT**	Peat; humus; swamp soil with high organic content

OTHER MATERIALS	GRAPHIC SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS
PAVEMENT	■ ⁘	**AC** or **PC**	Asphalt concrete pavement or Portland cement pavement
ROCK	▩	**RK**	Rock (See Rock Classification)
WOOD	≋	**WD**	Wood, lumber, wood chips
DEBRIS	◇	**DB**	Construction debris, garbage

Notes:
1. USCS letter symbols correspond to symbols used by the Unified Soil Classification System and ASTM classification methods. Dual letter symbols (e.g., SP-SM for sand or gravel) indicate soil with an estimated 5-15% fines. Multiple letter symbols (e.g., ML/CL) indicate borderline or multiple soil classifications.
2. Soil descriptions are based on the general approach presented in the Standard Practice for Description and Identification of Soils (Visual-Manual Procedure), outlined in ASTM D 2488. Where laboratory index testing has been conducted, soil classifications are based on the Standard Test Method for Classification of Soils for Engineering Purposes, as outlined in ASTM D 2487.
3. Soil description terminology is based on visual estimates (in the absence of laboratory test data) of the percentages of each soil type and is defined as follows:

Primary Constituent:	> 50%	"GRAVEL," "SAND," "SILT," "CLAY," etc.
Secondary Constituents:	> 30% and ≤ 50%	"very gravelly," "very sandy," "very silty," etc.
	> 15% and ≤ 30%	"gravelly," "sandy," "silty," etc.
Additional Constituents:	> 5% and ≤ 15%	"with gravel," "with sand," "with silt," etc.
	≤ 5%	"with trace gravel," "with trace sand," "with trace silt," etc., or not noted.

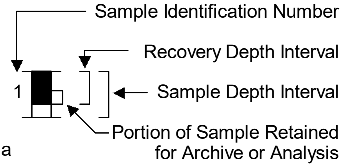
4. Soil density or consistency descriptions are based on judgement using a combination of sampler penetration blow counts, drilling or excavating conditions, field tests, and laboratory tests, as appropriate.

Drilling and Sampling Key

SAMPLER TYPE

Code	Description
a	3.25-inch O.D., 2.42-inch I.D. Split Spoon
b	2.00-inch O.D., 1.50-inch I.D. Split Spoon
c	Shelby Tube
d	Grab Sample
e	Single-Tube Core Barrel
f	Double-Tube Core Barrel
g	2.50-inch O.D., 2.00-inch I.D. WSDOT
h	3.00-inch O.D., 2.375-inch I.D. Mod. California
i	Other - See text if applicable
1	300-lb Hammer, 30-inch Drop
2	140-lb Hammer, 30-inch Drop
3	Pushed
4	Vibrocore (Rotosonic/Geoprobe)
5	Other - See text if applicable

SAMPLE NUMBER & INTERVAL



Field and Lab Test Data

Code	Description
PP = 1.0	Pocket Penetrometer, tsf
TV = 0.5	Torvane, tsf
PID = 100	Photoionization Detector VOC screening, ppm
W = 10	Moisture Content, %
D = 120	Dry Density, pcf
-200 = 60	Material smaller than No. 200 sieve, %
GS	Grain Size - See separate figure for data
AL	Atterberg Limits - See separate figure for data
GT	Other Geotechnical Testing
CA	Chemical Analysis

Groundwater

∇	Approximate water level at time of drilling (ATD)
▼	Approximate water level at time after drilling/excavation/well

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42nd Avenue South
Bridge Replacement
Tukwila, Washington

Soil Classification System and Key

Figure
A-1

B-1

LAI Project No: 1790003.010

SAMPLE DATA | **SOIL PROFILE**

Drilling Method: Mud Rotary

Ground Elevation (ft): Not Determined

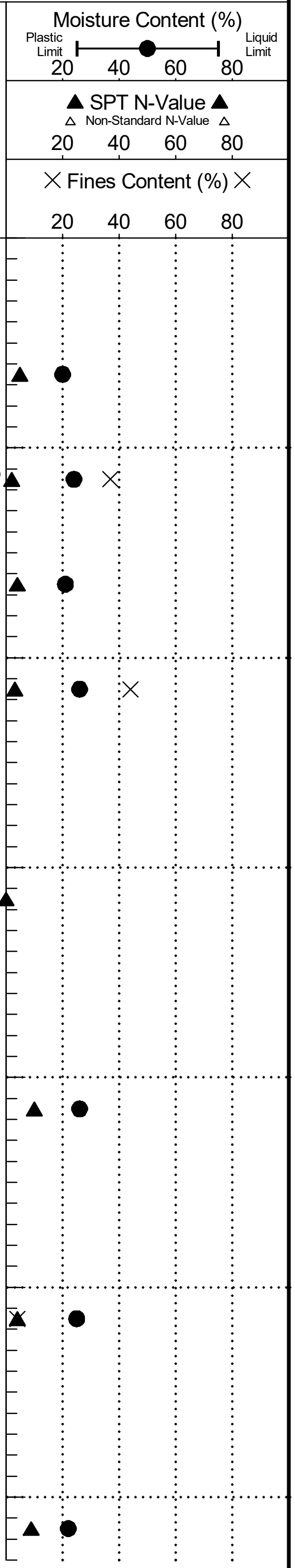
Logged By: BCS

Date: 12/24/20

Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	USCS Symbol	Description
0						SM	Brown, very silty, fine to medium SAND with trace organics (loose, moist) **(ALLUVIUM)**
		S-1	b2	5	W = 20		
5							-Becomes very loose
		S-2	b2	2	W = 24 GS		
		S-3	b2	4	W = 21		
10						SM	Tannish-brown, very silty, fine SAND (very loose, moist)
		S-4	b2	3	W = 26 GS		
15							-No recovery
		S-5	b2	0			
20						SP	Black and mottled orange, fine to medium SAND with trace silt (loose, moist)
		S-6	b2	10	W = 26		
25							-Becomes moist to wet -Grades to fine to medium
		S-7	b2	4	W = 25 GS		
30							-Grades to with trace gravel
		S-8	b2	9	W = 22		

Groundwater

Groundwater Not Observed Due to Drilling Method



Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

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42nd Avenue South
Bridge Replacement
Tukwila, Washington

Log of Boring B-1

Figure

A-2
(1 of 3)

B-1

LAI Project No: 1790003.010

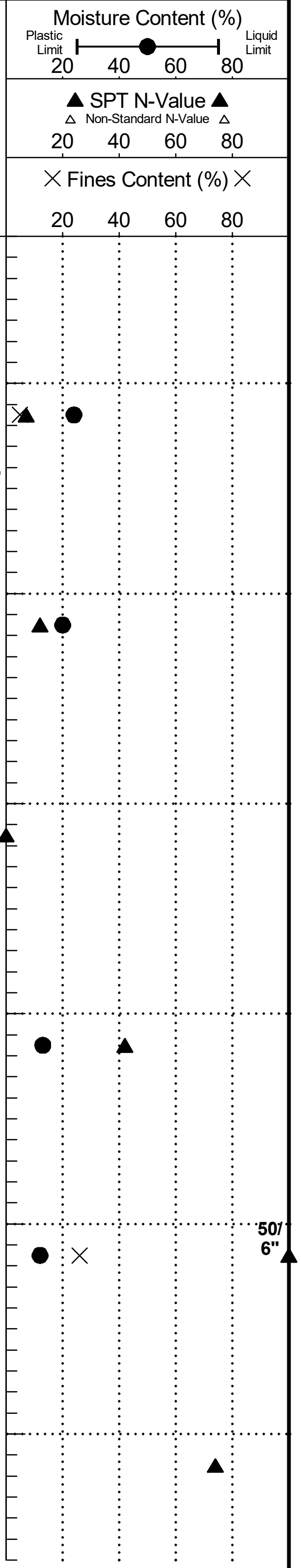
SAMPLE DATA / SOIL PROFILE

Drilling Method: Mud Rotary

Ground Elevation (ft): Not Determined

Logged By: BCS   Date: 12/24/20

Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	USCS Symbol	Description	Groundwater
						SP	Black and mottled orange, fine to medium SAND with trace silt (loose, moist)	Groundwater Not Observed Due to Drilling Method
35		S-9	b2	7	W = 24 GS		-Grades to without gravel	
40		S-10	b2	12	W = 20		-Becomes medium dense	
45		S-11	b2	0			-No recovery	
50		S-12	b2	42	W = 13	SM	Gray, gravelly, silty, fine to medium SAND with cobbles and boulders (dense to very dense, moist) **(GLACIAL TILL)**	
55		S-13	b2	50/ 6"	W = 12 GS		-Grades to with gravel	
60		S-14	b2	74				
		S-15	d					



Notes: 1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

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42nd Avenue South
Bridge Replacement
Tukwila, Washington

Log of Boring B-1

Figure
A-2
(2 of 3)

B-1

LAI Project No: 1790003.010

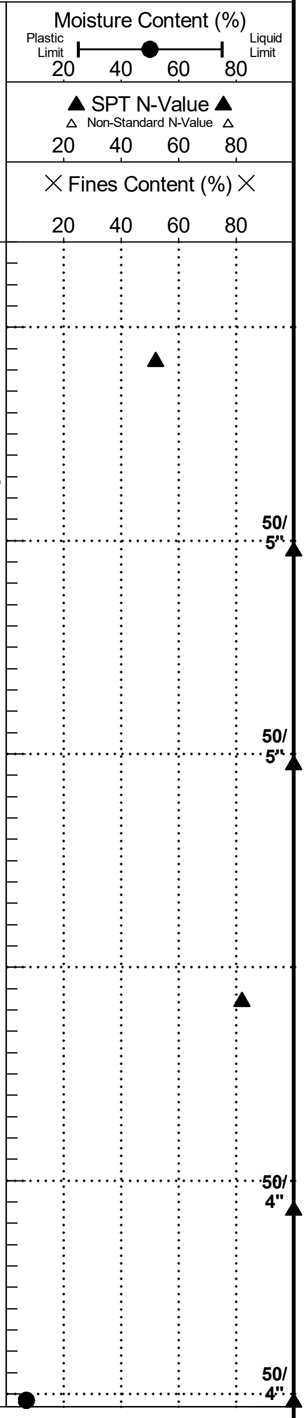
SAMPLE DATA | **SOIL PROFILE**

Drilling Method: Mud Rotary

Ground Elevation (ft): Not Determined

Logged By: BCS Date: 12/24/20

Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	USCS Symbol	Description	Groundwater
						SM	Gray, gravelly, silty, fine to medium SAND with cobbles and boulders (dense to very dense, moist) **(GLACIAL TILL)**	Groundwater Not Observed Due to Drilling Method
65		S-16	b2	52				
70		S-17	b2	50/ 5"			-Grades to gravelly	
75		S-18	b2	50/ 5"			-Grades to very silty	
80		S-19	b2	82		ML	Gray, very sandy SILT with trace gravel (hard, moist)	
85		S-20	b2	50/ 4"				
90		S-21	b2	50/ 4"	W = 7	SM	Greenish gray, gravelly, silty SAND (very dense, moist)	



Boring Completed 12/24/20
Total Depth of Boring = 90.3 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

1790003.01 11/19/21 N:\PROJECTS\1790003.010.011.GPJ SOIL BORING LOG WITH GRAPH

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42nd Avenue South
Bridge Replacement
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Log of Boring B-1

Figure
A-2
(3 of 3)

B-2

LAI Project No: 1790003.010

SAMPLE DATA

SOIL PROFILE

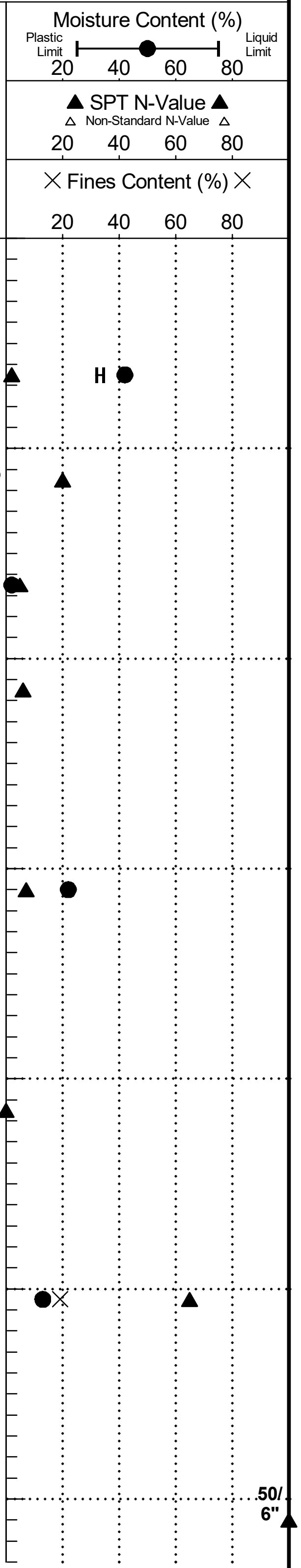
Drilling Method: Mud Rotary

Ground Elevation (ft): Not Determined

Logged By: BCS

Date: 12/21/20

Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	USCS Symbol	Description	Groundwater
0						ML	Brown, SILT with sand, boulders, and trace organics (very soft, moist) **(ALLUVIUM)**	Groundwater Not Observed Due to Drilling Method
		S-1	b2	2	W = 42 AL			
5							-Boulder	
		S-2	b2	20				
		S-3	b2	5	W = 2		-No recovery -Becomes soft	
10		S-4	b2	6		ML	Gray, SILT with sand and trace organics (medium stiff, moist)	
15		S-5	b2	7	W = 22			
20		S-6	b2	0		SM/ SC	Gray, clayey, silty SAND with organics (shells) (very loose, moist to wet)	
25		S-7	b2	65	W = 13 GS	GM	Gray, silty, very sandy, fine to coarse GRAVEL (very dense, moist) **(GLACIAL TILL)**	
30		S-8	b2	50/ 6"		ML		



Notes: 1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

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42nd Avenue South
Bridge Replacement
Tukwila, Washington

Log of Boring B-2

Figure
A-3
(1 of 3)

B-2

LAI Project No: 1790003.010

SAMPLE DATA / SOIL PROFILE

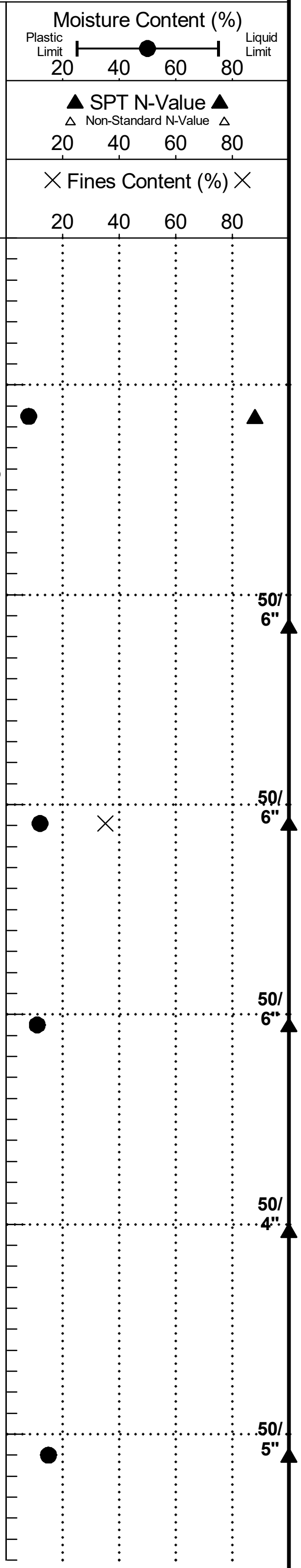
Drilling Method: Mud Rotary

Ground Elevation (ft): Not Determined

Logged By: BCS Date: 12/21/20

Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	USCS Symbol	Description
						ML	Gray, sandy SILT with trace gravel (hard, moist)
35		S-9	b2	88	W = 8	SM	Gray, very silty, fine to medoium SAND with gravel (very dense, moist)
40		S-10	b2	50/ 6"			-Grades to silty, fine to coarse
45		S-11	b2	50/ 6"	W = 12 GS		
50		S-12	b2	50/ 6"	W = 11		-Grades to with trace gravel
55		S-13	b2	50/ 4"			-Grades to gravelly
60		S-14	b2	50/ 5"	W = 15	SP	Gray, medium SAND with gravel and trace silt (very dense, moist)

Groundwater: Groundwater Not Observed Due to Drilling Method



Notes:
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2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

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42nd Avenue South
Bridge Replacement
Tukwila, Washington

Log of Boring B-2

Figure
A-3
(2 of 3)

B-2

LAI Project No: 1790003.010

SAMPLE DATA / SOIL PROFILE

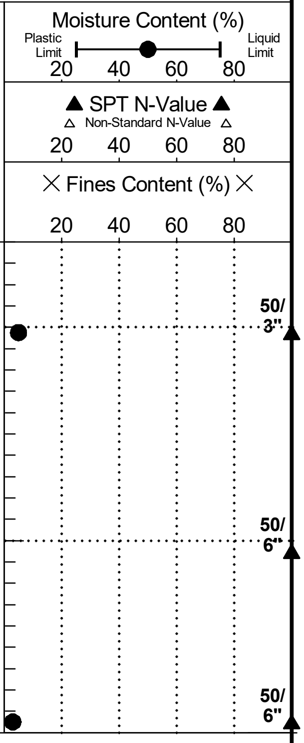
Drilling Method: Mud Rotary

Ground Elevation (ft): Not Determined

Logged By: BCS Date: 12/21/20

Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	Graphic Symbol	USCS Symbol	Soil Profile	Groundwater
							SP	Gray, medium SAND with gravel and trace silt (very dense, moist)	
65		S-15	b2	50/ 3"	W = 5		GP-GM	Gray, GRAVEL with sand and silt (very dense, moist)	Groundwater Not Observed Due to Drilling Method
70		S-16	b2	50/ 6"					
		S-17	b2	50/ 6"	W = 3		SLS	SILTSTONE (very dense, moist) **(BEDROCK)**	

Boring Completed 12/21/20
Total Depth of Boring = 74.5 ft.



Notes:
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2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

1790003.01 11/19/21 N:\PROJECTS\1790003.010.011.GPJ SOIL BORING LOG WITH GRAPH

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42nd Avenue South
Bridge Replacement
Tukwila, Washington

Log of Boring B-2

Figure
A-3
(3 of 3)

B-3

LAI Project No: 1790003.010

SAMPLE DATA

SOIL PROFILE

Drilling Method: Mud Rotary

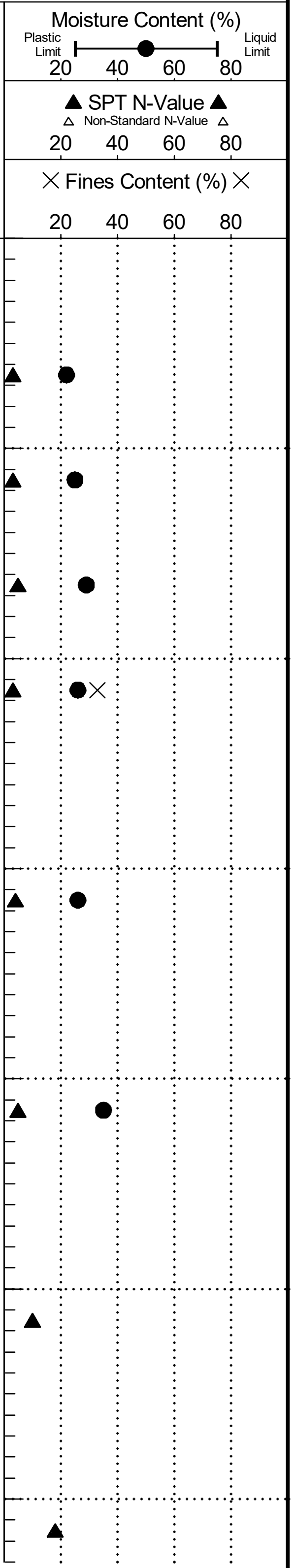
Ground Elevation (ft): Not Determined

Logged By: BCS

Date: 12/23/20

Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	USCS Symbol	Description
0						AC	Asphalt Pavement (6-inch Thickness) **(ASPHALT)**
						SM	Brown, very silty, fine SAND (very loose, moist) **(ALLUVIUM)**
		S-1	b2	3	W = 22		
5		S-2	b2	3	W = 25		
		S-3	b2	5	W = 29		-Becomes loose
10		S-4	b2	3	W = 26 GS		-Becomes very loose
15		S-5	b2	4	W = 26		
20		S-6	b2	5	W = 35		-Becomes loose and moist to wet -Grades to fine to medium sand
25		S-7	b2	10		SP	Blackish-brown, fine to coarse SAND with trace silt (medium dense, moist to wet)
30		S-8	b2	18			

Groundwater: Groundwater Not Observed Due to Drilling Method



Notes:
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2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

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42nd Avenue South
Bridge Replacement
Tukwila, Washington

Log of Boring B-3

Figure
A-4
(1 of 3)

B-3

LAI Project No: 1790003.010

SAMPLE DATA / SOIL PROFILE

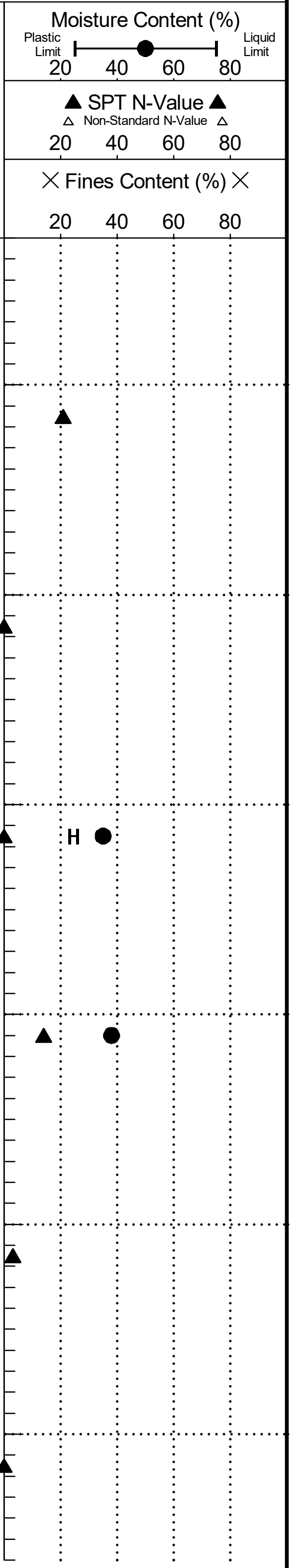
Drilling Method: Mud Rotary

Ground Elevation (ft): Not Determined

Logged By: BCS   Date: 12/23/20

Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	USCS Symbol	Description
						SP	Blackish-brown, fine to coarse SAND with trace silt (medium dense, moist to wet)
35		S-9	b2	21			
40		S-10	b2	0		ML	Gray, very sandy SILT (very soft, wet)
45		S-11	b2	0	W = 35 AL		-Grades to sandy and blackish-gray
50		S-12A	b2	14	W = 38	SP-SM	Black, fine SAND with silt (medium dense, moist to wet)
		S-12B	b2			SM	Black, very silty SAND (medium dense, moist to wet)
55		S-13	b2	3			
60		S-14	b2	0			

Groundwater: Groundwater Not Observed Due to Drilling Method



Notes:
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2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

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42nd Avenue South
Bridge Replacement
Tukwila, Washington

Log of Boring B-3

Figure
A-4
(2 of 3)

B-3

LAI Project No: 1790003.010

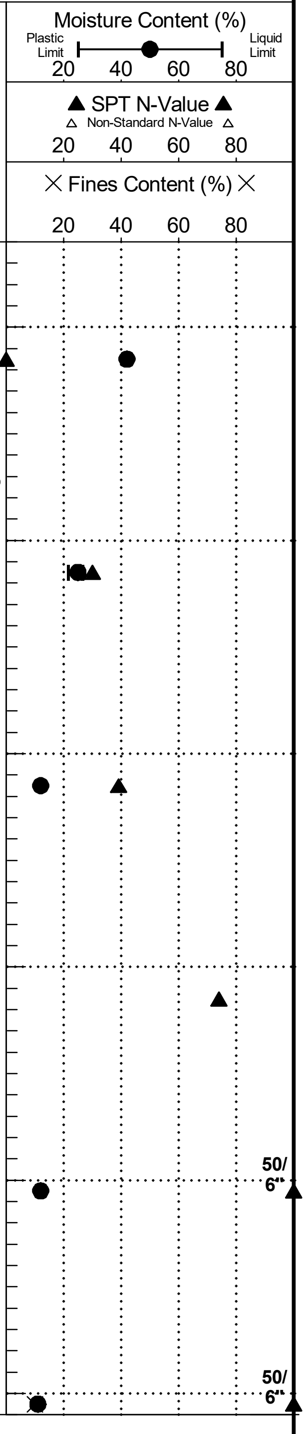
SAMPLE DATA / SOIL PROFILE

Drilling Method: Mud Rotary

Ground Elevation (ft): Not Determined

Logged By: BCS Date: 12/23/20

Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	USCS Symbol	Soil Profile	Groundwater
						SM ML ML	Black, very silty SAND (medium dense, moist to wet) Gray, sandy SILT (soft, moist to wet) -Becomes very soft Gray, sandy SILT (soft, moist to wet)	Groundwater Not Observed Due to Drilling Method
65		S-15	b2	0	W = 42			
70		S-16	b2	30	W = 25 AL	SM	Blackish-gray, very silty SAND with gravel and organics (shells) (medium dense to dense, moist to wet)	
						SM	Tannish-orange, gravelly, silty, fine to medium SAND (dense, moist) **(GLACIAL TILL)**	
75		S-17	b2	39	W = 12			
80		S-18	b2	74		SP	Bluish-gray, fine to coarse SAND with gravel and trace silt (very dense, moist)	
85		S-19	b2	50/ 6"	W = 12		-Grades to gray with trace gravel	
90		S-20	b2	50/ 6"	W = 11 GS		-Grades to very gravelly with silt	



Boring Completed 12/23/20
Total Depth of Boring = 90.5 ft.

Notes: 1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

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Bridge Replacement
Tukwila, Washington

Log of Boring B-3

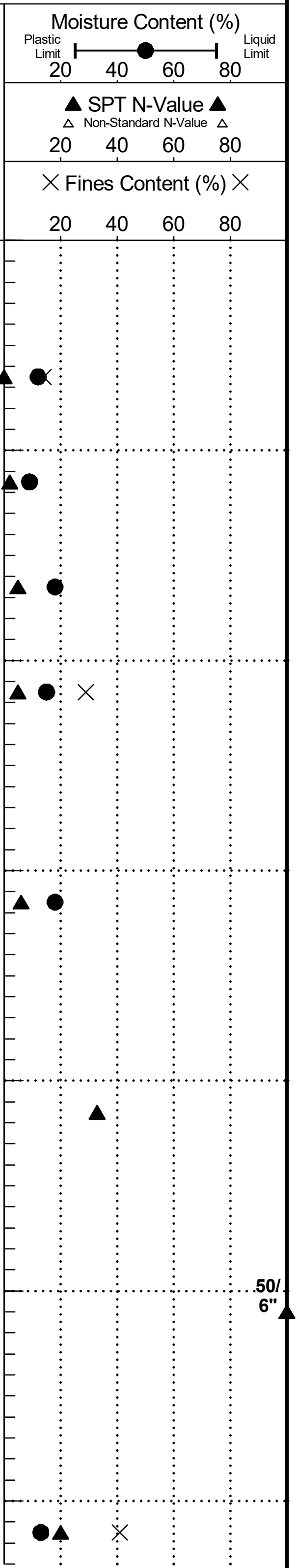
Figure
A-4
(3 of 3)

B-4

LAI Project No: 1790003.010

Drilling Method: Mud Rotary
Ground Elevation (ft): Not Determined
Logged By: BCS Date: 12/22/20

SAMPLE DATA						SOIL PROFILE			
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	Graphic Symbol	USCS Symbol		Groundwater
0							SP-SM	Tan, very gravelly, fine to coarse SAND with silt (very loose, moist) **(ALLUVIUM)**	Groundwater Not Observed Due to Drilling Method
		S-1	b2	0	W = 12 GS		SP-SM	Tan, very gravelly, fine to medium SAND with silt and trace organics (very loose, moist)	
5		S-2	b2	2	W = 9				
							PT	Black, fibrous PEAT	
		S-3	b2	5	W = 18		SP-SM	Tan, fine SAND with silt and trace organics (loose, moist)	
10		S-4	b2	5	W = 15 GS		SM	Tan, silty, fine SAND with gravel and trace organics (loose, moist)	
15		S-5	b2	6	W = 18		ML	Gray mottled, sandy SILT with gravel and trace peat (very stiff, moist)	
20		S-6	b2	33			ML	Tannish-gray, very sandy SILT with trace gravel (hard, moist) **(GLACIAL TILL)**	
25		S-7	b2	50/ 6"			SM	Gray, very silty, fine SAND with trace gravel (very dense, moist)	
30		S-8	b2	20	W = 13 GS			-Becomes gravelly	



Notes: 1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

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42nd Avenue South
Bridge Replacement
Tukwila, Washington

Log of Boring B-4

Figure
A-5
(1 of 2)

B-4

LAI Project No: 1790003.010

SAMPLE DATA

Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data
35		S-9	b2	50/ 6"	
40		S-10	b2	50/ 6"	
45		S-11	b2	61	W = 22
50		S-12A S-12B	b2	80	
55		S-13	b2	80	W = 13
60		S-14	b2	50/ 6"	W = 15 AL

SOIL PROFILE

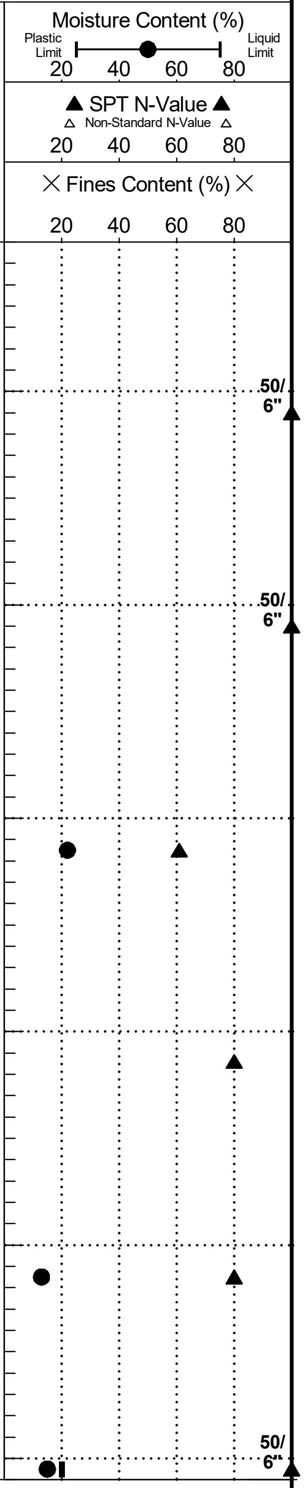
Drilling Method: Mud Rotary

Ground Elevation (ft): Not Determined

Logged By: BCS Date: 12/22/20

USCS Symbol	Description
SM	Gray, very silty, fine SAND with trace gravel (very dense, moist)
SW	Greenish-gray, fine to medium SAND with gravel (very dense, moist)
SP	Tan, fine to medium SAND (very dense, moist)
ML	Greenish-gray, sandy SILT with gravel (hard, moist)
SP	Tan, fine to medium SAND (very dense, moist)
ML	Dark gray, sandy SILT with gravel (hard, moist)

Groundwater: Groundwater Not Observed Due to Drilling Method



Boring Completed 12/22/20
Total Depth of Boring = 60.5 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

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42nd Avenue South
Bridge Replacement
Tukwila, Washington

Log of Boring B-4

Figure
A-5
(2 of 2)

APPENDIX B

Laboratory Soil Testing

APPENDIX B
LABORATORY SOIL TESTING

Soil samples obtained from the exploratory borings were taken to LAI's laboratory for further examination and testing. Laboratory tests were performed on representative soil samples to characterize certain engineering and index properties of the soils along the two, alternative bridge alignments. Testing was performed in accordance with the ASTM International (ASTM) standard test procedures noted below.

Natural Moisture Content

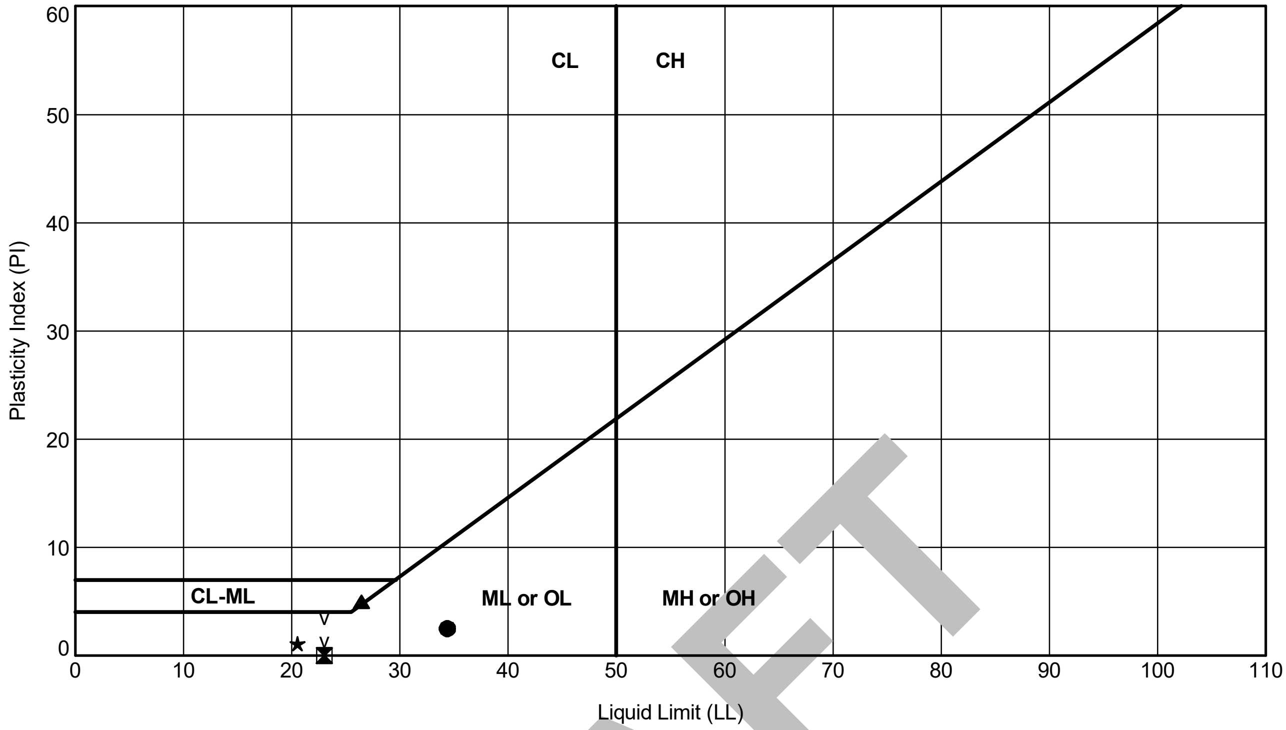
The natural moisture contents of select soil samples were determined in general accordance with ASTM D2216 test procedures. The results of the moisture content determinations are indicated adjacent to the corresponding samples on the summary boring logs in Appendix A.

Atterberg Limits Determination

The liquid limit (LL), plastic limit (PL), and plasticity index (PI) of select soil samples were determined in general accordance with ASTM D4318 test procedures. The tests were conducted on fine-grained soil samples to facilitate soil classification and estimation of certain engineering properties. Test results are summarized on Figure B-1.

Grain Size Analysis

Grain size analyses were conducted on select soil samples in general accordance with ASTM D422 test procedures. Samples selected for grain size analysis are designated with a “GS” in the “Test Data” column on the summary boring logs in Appendix A. The test results are presented on Figures B-2 through B-4.



ATTERBERG LIMIT TEST RESULTS

Symbol	Exploration Number	Sample Number	Depth (ft)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Natural Moisture (%)	Soil Description	Unified Soil Classification
●	B-2	S-1	2.5	34	32	2	42	SILT	ML
☒	B-3	S-11	45.0	23	26	NP	35	Very sandy SILT	ML
▲	B-3	S-16	65.0	26	21	5	25	Clayey SILT	CL-ML
★	B-4	S-14	60.0	21	19	2	15	SILT	ML

ASTM D 4318 Test Method

1790003.01 11/19/21 N:\PROJECTS\1790003.010.011.GPJ ATTERBERG LIMITS FIGURE

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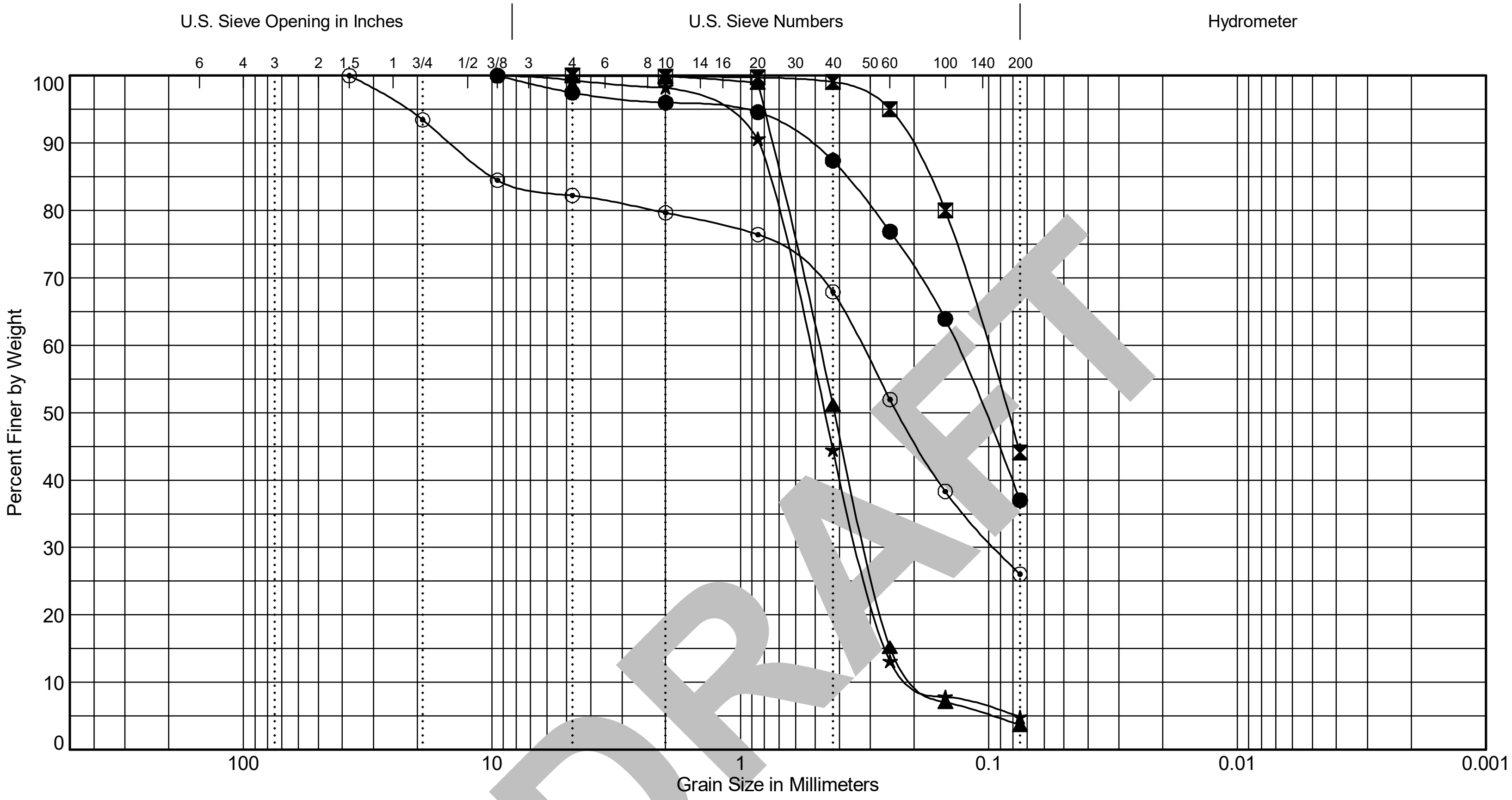
42nd Avenue South
Bridge Replacement
Tukwila, Washington

Plasticity Chart

Figure
B-1



Cobbles	Gravel		Sand			Silt or Clay
	Coarse	Fine	Coarse	Medium	Fine	

Symbol	Exploration Number	Sample Number	Depth (ft)	Natural Moisture (%)	Soil Description	Unified Soil Classification
●	B-1	S-2	5.0	24	Very silty, fine to medium SAND	SM
⧗	B-1	S-4	10.0	26	Very silty, fine SAND	SM
▲	B-1	S-7	25.0	25	Fine to medium SAND	SP
★	B-1	S-9	35.0	24	Fine to medium SAND	SP
⊙	B-1	S-13	55.0	12	Gravelly, silty, fine to medium SAND	SM

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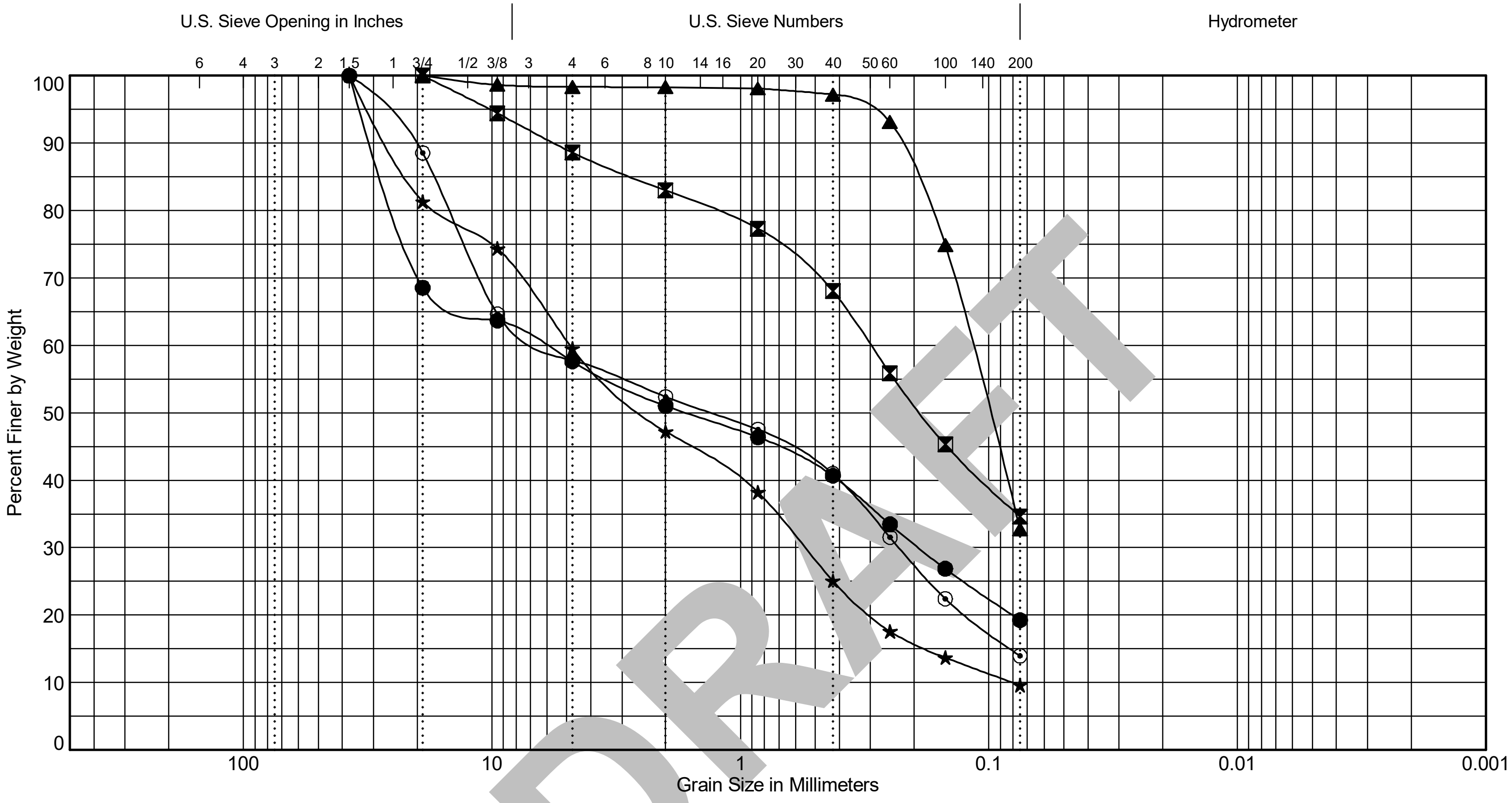
42nd Avenue South
Bridge Replacement
Tukwila, Washington

Grain Size Distribution

Figure
B-2



Cobbles	Gravel		Sand			Silt or Clay
	Coarse	Fine	Coarse	Medium	Fine	

Symbol	Exploration Number	Sample Number	Depth (ft)	Natural Moisture (%)	Soil Description	Unified Soil Classification
●	B-2	S-7	25.0	13	Silty, very sandy, fine to coarse GRAVEL	GM
⧗	B-2	S-11	45.0	12	Very silty, fine to medium SAND with gravel	SM
▲	B-3	S-4	10.0	26	Very silty, fine SAND	SM
★	B-3	S-20	90.0	11	Very gravelly, fine to coarse SAND with silt	SP-SM
⊙	B-4	S-1	2.5	12	Very gravelly, fine to medium SAND with silt	SP-SM

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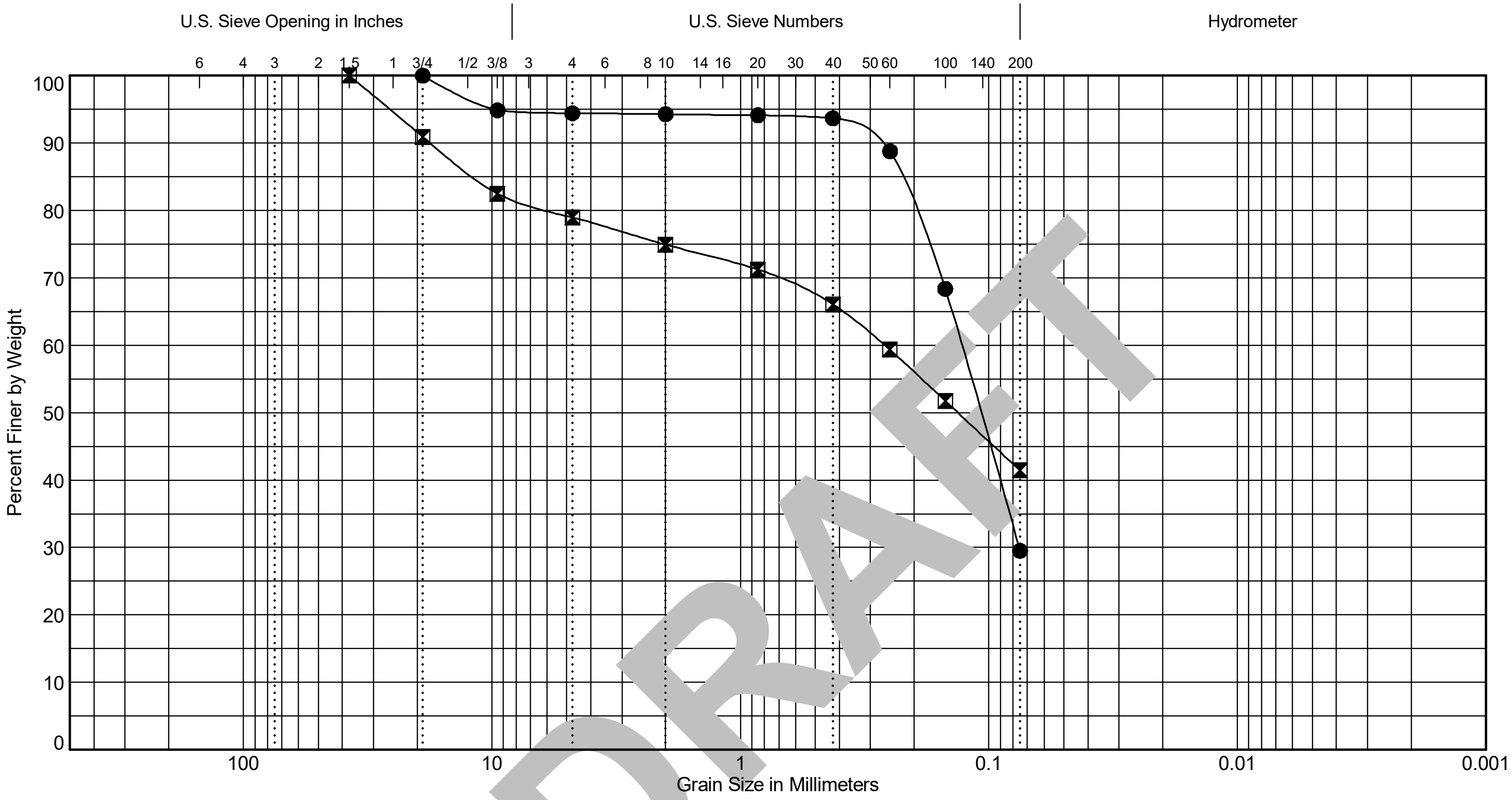
42nd Avenue South
Bridge Replacement
Tukwila, Washington

Grain Size Distribution

Figure
B-3



Cobbles	Gravel		Sand			Silt or Clay
	Coarse	Fine	Coarse	Medium	Fine	

Symbol	Exploration Number	Sample Number	Depth (ft)	Natural Moisture (%)	Soil Description	Unified Soil Classification
●	B-4	S-4	10.0	15	Silty, fine SAND with gravel	SM
☒	B-4	S-8	30.0	13	Gravelly, very silty, fine SAND	SM

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42nd Avenue South
Bridge Replacement
Tukwila, Washington

Grain Size Distribution

Figure
B-4

Appendix E – Permitting Matrices

ENVIRONMENTAL PERMITTING SUMMARY MATRIX[1],
42nd AVENUE SOUTH BRIDGE REPLACEMENT
TUKWILA, WASHINGTON

Permit or Act Compliance	Environmental Resource(s)	Reviewing Agency	Permit/ Reporting Trigger	Permit/Reporting Submittal Requirement(s)[2]	Agency Review Timeframe	ALTERNATIVES		Notes and Status
						42nd Avenue S	124th Street	
State Environmental Policy Act (SEPA)	Earth, air, water, plants, animals, energy, environmental health, land use, transportation, public services, and utilities	City of Tukwila	Any proposal which involves a non-exempt government "action." Project actions involve an agency decision on a specific project, including nonproject actions that involve decisions on policies, plans, or programs.	SEPA checklist	Up to 120 days.	**X, Exemption**	**X, DNS or MDNS anticipated**	SEPA checklist initiated based on 30 percent design. WAC 197-11-800(27), allows exemption for the repair, reconstruction, restoration, retrofitting or replacement of structurally deficient bridges provided certain conditions are satisfied.
National Environmental Policy Act (NEPA)	Natural resources, social, cultural, and economic resources	Federal Highway Administration (FHWA)/ Washington State Department of Transportation Local Programs, Northwest Region (WSDOT)	Federal nexus (includes project funding or permit)	WSDOT NEPA Categorical Exclusion Documentation Form	Variable depending on length of supporting consultations (i.e. refer to Endangered Species Act below).	**X**	**X**	NEPA compliance requires approval of the studies listed in this matrix (excluding SEPA), as necessary. WSDOT NEPA Categorical Exclusion Documentation Form to be submitted following completion of consultations associated with Biological Assessment and Cultural Resources investigation.
Section 404/401 Clean Water Act; Section 10 of the Rivers and Harbor Act	Waters of the U.S./ Navigable Waters (3)	US Army Corps of Engineers (USACE) Seattle Regulatory Branch	Dredge/fill in waters of the U.S., or crossing of navigable waterway.	Joint Aquatic Resources Permit Application (JARPA),Critical Areas Report; refer to Notes.	3 to 9 months for Nationwide Permit.	**X**	**X**	Section 404 Clean Water Act permit from USACE may require individual project review and issuance of Section 401 Water Quality Certification by the Washington State Department of Ecology (Ecology). Project may comply with condition of Nationwide Permit 14 (Linear Transportation Projects).
Hydraulic Project Approval	Waters of the State (3)	Washington Department of Fish and Wildlife (WDFW)	Any work that will use, divert, obstruct, or change the bed or flow of state waters, including streams and rivers.	SEPA determination Contents of JARPA, refer to Notes	Up to 45 days	**X**	**X**	WDFW requires SEPA Determination in order to issue HPA. Project applications are made through the online APPS online program.
Shoreline Management Act/Shoreline Master Program	Shorelines and areas landward 200 ft (3)	City of Tukwila	"Substantial development" within shoreline jurisdiction. "Substantial development" means any development of which the total cost or fair market value exceeds five thousand dollars, or any development which materially interferes with the normal public use of the water or shorelines of the state.	JARPA; City application form, SEPA checklist, Critical Areas Report, Biological Assessment, Geotechnical Report, site plans.	Up to 120 days.	**X**	**X**	The City designates the shoreline environment as Urban Conservancy (south of 42nd Avenue South) and Shoreline Residential (north of 42nd Avenue South).
Endangered Species Act and Magnuson-Stevens Act; City Critical Areas Regulations	Threatened and Endangered Species and Critical Habitat; Essential Fish Habitat	NOAA Fisheries/ US Fish and Wildlife Service (USFWS) /	Federal nexus (includes project funding or permit)	Biological Assessment and Essential Fish Habitat Evaluation (BA/EFH)	Concurrent with NEPA NOAA Fisheries determination may range from 6 to 12 months, or more.	**X**	**X**	BA/EFH documentation requires summary of project impacts/mitigation, including information regarding construction and stormwater design. Anticipated the project will result in a Biological Assessment documenting "May Affect, Not Likely to

ENVIRONMENTAL PERMITTING SUMMARY MATRIX[1],
42nd AVENUE SOUTH BRIDGE REPLACEMENT
TUKWILA, WASHINGTON

Permit or Act Compliance	Environmental Resource(s)	Reviewing Agency	Permit/ Reporting Trigger	Permit/Reporting Submittal Requirement(s)[2]	Agency Review Timeframe	ALTERNATIVES		Notes and Status
						42nd Avenue S	124th Street	
		WSDOT; City						Adversely Affect" (NLAA) or "May Affect, Likely to Adversely Affect (LAA), resulting in informal or formal consultation. WSDOT conducts consultations with NOAA Fisheries and USFWS.
Section 106 of the National Historic Preservation Act (NHPA)	Historic and cultural resources	WSDOT/ Department of Archeology and Historic Preservation (DAHP) and affected Tribes (WSDOT completes consultations with DAHP and affected tribes.)	Federal nexus (includes project funding or permit) .	Area of Potential Effect (APE) Letter Cultural Resources Report	Concurrent with NEPA. Up to 30 days for APE Up to 30 days for Cultural Resources Report	**X**	**X**	Project APE is first developed and submitted for concurrence prior to conducting field investigation in support of Cultural Resources. WSDOT completes consultations with affected Tribe(s) and DAHP.
Title IV of the Civil Rights Act of 1964, Executive Order 13166, Executive Order 12898	Environmental Justice	FHWA/ WSDOT	Federal nexus (includes project funding or permit) Disproportionate and adverse impacts to protected populations.	WSDOT NEPA Categorical Exclusion Documentation Form and associated documentation, if necessary (see Notes).	Concurrent with NEPA	**X, Exemption**	**X**	May be exempt for work limited to existing right of way. For non-exempt projects, review of data for census blocks adjacent to the project to identify protected populations along the project corridor and project impacts. Associated documentation is anticipated to include social and community impacts decision matrix and letter to file.
Section 4(f) of the Department of Transportation Act (DOT Act) of 1966	Publicly owned parks, recreational areas, wildlife and waterfowl refuges, or public and private historical sites	FHWA/ WSDOT	Federally funded transportation projects proposing use of Section 4(f) protected properties	De minimis form and letter of concurrence from Parks Department	Concurrent with NEPA	**X**	**X**	Required for temporary or permanent use of recreational property (i.e. parks).
CERCLA, MTCA, TSCA, RCRA, OSHA*	Hazardous and Problem Waste	FHWA/ WSDOT	Land acquisition and/or excavation below ground surface	WSDOT NEPA Categorical Exclusion Documentation Form and Hazardous Materials Discipline Report/Technical Memorandum.	Concurrent with NEPA	**X**	**X**	An evaluation to determine the likelihood of whether environmental conditions on or adjacent to the project corridor is present.
Federal Noise Control Act	Sensitive Land Uses (e.g. residences, parks, churches)	WSDOT	Federally funded transportation project providing new highway or significant change to existing highway	Traffic Noise Study	Concurrent with NEPA	**X**	**X**	"Significant change" to the highway consists of: • Moving the existing highway horizontally which halves the distance between the nearest edge of the travelled lane and the closest receptor's outdoor use area, or; • Altering the vertical alignment of an existing highway that exposes a new line-of-sight between the receptor and the traffic noise source.
Aquatic Lands Lease	State aquatic lands	Washington Department of Natural Resources (DNR)	Use or crossing of aquatic lands	JARPA, plans, survey	6 to 12 months		**X**	Application process can be initiated when JARPA and plans are available. DNR will issue permit following receipt of other agency permits.
Advance Approval of Bridges (33 CFR	Navigable Waters	US Coast Guard	Crossing of navigable waterway	Navigation Impact Report (NIR)	Completed	**X**	**X**	Advance Approval issued August 27, 2021, and includes conditions for approval.

ENVIRONMENTAL PERMITTING SUMMARY MATRIX[1], 42nd AVENUE SOUTH BRIDGE REPLACEMENT TUKWILA, WASHINGTON

						ALTERNATIVES		
Permit or Act Compliance	**Environmental Resource(s)**	**Reviewing Agency**	**Permit/ Reporting Trigger**	**Permit/Reporting Submittal Requirement(s)[2]**	**Agency Review Timeframe**	**42nd Avenue S**	**124th Street**	**Notes and Status**
115.70); Section 9 of the River and Harbors Act								

NOTES:

1. Summary of permits does not include construction related permits, including, but not limited to, right-of-way, utility, or local development/clearing/grading permits.
2. Permit/Reporting Submittal Requirements vary by project.
3. Waters of the U.S., Waters of the State, and shorelines include the Duwamish River in the project area. Wetlands and certain waterways are regulated by federal, state, and local governmental agencies, and compliance with one agency typically does not fulfill permitting requirements of any other agencies.

*The listed Acts apply to contaminated sites. Additional regulations may apply to disposal of hazardous and problem wastes.
Key to hazardous and problem waste regulations:

CERCLA: Comprehensive Environmental Response, Compensation, and Liability Act (42 USC 103)
MTCA: Model Toxics Control Act (WAC 173-340)
TSCA: Toxic Substances Control Act (15 USC 2601 and 2629)
RCRA: Resource Conservation and Recovery Act (UST Program) (WAC 173-360)
OSHA: Occupational Safety and Health Act (29 CFR 1910)

Appendix F – Mobility of Traffic Mechanical Memo

TECHNICAL MEMORANDUM

Date: February 18, 2021 **TG:** 1.20133.00

To: Adam Cox – City of Tukwila

From: Brent Turley, PE – Transpo Group
Francesca Liburdy – Transpo Group

cc: Kash Nikzad, PE – Trantech Engineering
Diane Sheesley, PE – Tratech Engineering

Subject: Tukwila 42nd Avenue S Bridge Replacement Transportation Analysis

This memorandum summarizes the results of the existing and future transportation analysis for the 42nd Avenue S bridge replacement in Tukwila, Washington. Existing conditions were evaluated as well as future horizon year 2040 conditions. Future 2040 alternatives were evaluated for three possible scenarios as further described below. The following memorandum summarizes the analysis of alternatives and findings.

Background and Study Area Description

The existing 42nd Avenue S bridge crosses the Duwamish River south of S 124th Street near the Tukwila Community Center. The existing and future conditions analysis includes the following study intersections:

1. 42nd Avenue S/S 124th Street
2. 42nd Avenue S/Interurban Avenue S
3. Access Roadway/Interurban Avenue S
4. Interurban Avenue S/S 124th Street (future conditions only)

The Interurban Avenue S/S 124th Street intersection will be evaluated under future alternatives analysis assuming the existing 42nd Avenue S bridge is replaced with a new bridge along the S 124th Street alignment.

Existing Conditions

Physical Features

42nd Avenue S is a two-lane roadway with a posted speed limit of 25 miles per hour (mph). Within the immediate vicinity of the 42nd Avenue bridge the speed limit is posted at 15 mph. 42nd Avenue S is considered a Major Collector by WSDOT.

Interurban Avenue S is a two- to five-lane north-south roadway with a posted speed limit of 35 mph. Interurban Avenue S is a major route through most of the City of Tukwila and provides access to SR 599, I-5, and I-405. No on-street parking is permitted. Interurban Avenue S is considered a Principal Arterial by WSDOT.

S 124th Street is a two-lane east-west roadway with a posted speed limit of 25 mph. A sidewalk with on-street parking runs along the south edge of the roadway, while a paved shoulder separated by c-curb from the vehicle travel lanes runs along the north edge of the roadway. S 124th Street is considered a Major Collector by WSDOT.

Non-Motorized Facilities

42nd Avenue S is designated as a bicycle friendly route based on the City of Tukwila's 2015 Comprehensive Plan and Transportation Element. Sidewalks are available on the east side of 42nd Avenue S north of S 124th Street, on the northeast side of Interurban Avenue S south of 42nd Avenue S and on the south side of S 124th Street. In addition, the Green River Trail extends along the south side of the Duwamish River in the study area, passing beneath the existing 42nd Avenue S bridge, while providing cycle and walk access.

Vehicle Classifications

Vehicle counts and classifications were collected along 42nd Avenue S in July 2020. The Average Daily Traffic volumes on 42nd Avenue S ranged from 3,600 in the northbound direction to 3,700 in the southbound direction.

Table 1 summarizes the key vehicle classifications along 42nd Avenue S. The two main categories of vehicles are passenger vehicles and heavy vehicles. Passenger vehicles include Federal Highway Administration (FHWA) classes 1-3, and heavy vehicles include FHWA classes 4 and above. Attachment A contains the complete vehicle classification data sheets summarized by FHWA vehicle type.

Table 1. Vehicle Classification

	42nd Avenue S	
Vehicle Type	NB	SB
Passenger Vehicles		
Passenger Cars	82%	84%
Motorcycles	1%	1%
Subtotal	*83%*	*85%*
Heavy Vehicles		
Medium Trucks (2 axles)	7%	6%
Heavy Truck (>2 axles)	7%	8%
Buses	3%	1%
Subtotal	*17%*	*15%*

Source: Transpo Group

Heavy vehicles represent approximately 15 to 17 percent of vehicles utilizing 42nd Avenue S. It is important to note that most heavy vehicles counted at the intersection were medium and heavy trucks, representing approximately 14 percent of the total vehicle volumes.

Existing Operations Analysis

Peak hour turning movement counts were collected for two hours during the weekday evening (4 p.m.to 6 p.m.) peak period in December 2020. Traffic volumes were analyzed for peak hour traffic operations. In addition, a 20-percent factor was applied to increase counts to account for the impacts of COVID-19 on vehicle travel patterns. This factor was based on WSDOT permanent traffic recorder (PTR) data on SR 599 in the vicinity of the study area. Attachment B contains the weekday peak hour turning movement count worksheets.

Existing weekday peak hour traffic operations were evaluated at the study intersections based on Level of Service (LOS) methodology. The LOS analysis method is identified in the 2016 *Highway Capacity Manual* (HCM) 6th Edition as described in Attachment C and evaluated using *Synchro 10* software program. For signalized and all-way stop control (AWSC) intersections, LOS is measured in average control delay per vehicle and is reported for the intersection as a whole. For two-way stop-control (TWSC) intersections, LOS is measured in control delay per vehicle at the worst movement of the intersection. Traffic operations for an intersection can be described alphabetically with a range of levels of service (LOS A through F), with LOS A indicating free-flowing traffic and LOS F indicating extreme congestion and long vehicle delays.

The City of Tukwila has adopted a LOS E standard for the study intersections based on the City's Comprehensive Plan Transportation Element. Table 2 summarizes the existing weekday peak hour operations. The detailed LOS worksheets are included in Attachment D.

Table 2. Existing (2020) Weekday PM Peak Hour Level of Service

	Traffic Control	LOS[1]	Delay[2]	WM[3]
1. 42nd Avenue S/S 124th Street	AWSC	B	11	-
2. 42nd Avenue S/Interurban Avenue S	Signal	C	30	-
3. Access Roadway/Interurban Avenue S	TWSC	B	13	SBL
4. Interurban Avenue S/S 124th Street (future conditions only)	N/A	N/A	N/A	N/A

Source: Transpo Group

1. Level of Service (A – F) as defined by the 2016 *Highway Capacity Manual* (HCM) (TRB), 6th Edition.
2. Average delay in seconds per vehicle.
3. Worst movement reported for unsignalized two-way stop-controlled intersections.

As shown in Table 2, the study intersections currently operate at LOS C or better during the PM peak hour, meeting City of Tukwila standards. The Interurban Avenue S/S 124th Street intersection will be evaluated under future conditions only when considering the possible S 124th Street bridge alternatives.

Future Conditions

The following section summarizes the future (2040) No Action and S 124th Street bridge alternatives. The No Action alternative evaluates 2040 forecast volumes at the study intersections with no change in traffic control or channelization from existing conditions. The S 124th Street bridge alternatives evaluate the closure of the existing 42nd Avenue S bridge and the construction of a new bridge that extends S 124th Street across the Duwamish River to intersect Interurban Avenue S. The alternatives consider either a traffic signal or a roundabout at the future Interurban Avenue S/S 124th Street intersection.

Future Demand

Traffic volume demand for 2040 was developed based on two primary sources: the volumes used in the existing conditions analysis (adjusted for COVID-19 impacts); and forecast traffic growth from the Puget Sound Regional Council (PSRC) regional travel demand model. Annual growth rates were developed from comparing 2025 and 2040 PSRC travel demand model volumes in the study area. These growth rates were then used to grow existing volumes to 2040 conditions. Manual edits and shifts were applied to account for the alternatives with a bridge closure where necessary. There are no known current development plans in the vicinity of the study intersection that are anticipated to add significant traffic to the study intersection beyond what is anticipated in the annual growth rates from the PSRC model volumes.

Future Operations Analysis

Estimated future operations were evaluated for the study intersections under 2040 future traffic conditions. Intersection operations were evaluated using Synchro 10 software for traffic signals and stop-controlled intersections, and Sidra 8 for roundabout intersections. The following alternatives were evaluated:

- **No Action Alternative** – this alternative maintains all existing channelization and traffic control from existing conditions.

- **S 124th Street Bridge with Signal** – this alternative removes the existing 42nd Avenue S bridge and constructs a new bridge extending S 124th Street to a new intersection with Interurban Avenue S as a signalized intersection. Single-lane approaches with no dedicated turn lanes are assumed at the Interurban Avenue S/S 124th Street intersection. The assumed signal timing includes actuated-uncoordinated timing with a 60-second cycle length. In addition, two-way stop control was assumed at the 42nd Avenue S/S 124th Street intersection, with stop-control at the north and south approaches. The 42nd Avenue S/Interurban Avenue S intersection remains signalized but is reconfigured with only three legs (north leg removed). A conceptual figure for this alternative is included in Attachment E.

- **S 124th Street Bridge with Roundabout** - this alternative is similar to the previous alternative, but the Interurban Avenue S/S 124th Street intersection is analyzed as a single-lane roundabout. A conceptual figure for this alternative is included in Attachment E.

Table 3 summarizes the 2040 future weekday PM peak hour LOS at the study intersections. Detailed LOS and queue worksheets are included in Attachment F.

Table 3. Future (2040) Weekday PM Peak Hour Level of Service

		No Action Alternative				**S 124th Street Bridge Alternatives**			
Intersection		**Traffic Control**	**LOS[1]**	**Delay[2]**	**WM[3]**	**Traffic Control**	**LOS[1]**	**Delay[2]**	**WM[3]**
1.	42nd Avenue S/S 124th Street	AWSC	B	14	-	TWSC	C	19	SB
2.	42nd Avenue S/Interurban Avenue S	Signal	D	41	-	Signal	A	10	-
3.	Access Roadway/Interurban Avenue S	TWSC	B	15	SBL	TWSC	B	14	SBL
4.	Interurban Avenue S/S 124th Street	N/A	N/A	N/A	N/A	Signal	B	16	-
						RAB	A	7	NB (V/C 0.54)

Source: Transpo Group
Note: TWSC = two-way stop-controlled, AWSC = all-way stop-controlled
1. Level of Service (A – F) as defined by the 2016 *Highway Capacity Manual* (HCM) (TRB), 6th Edition.
2. Average delay in seconds per vehicle.
3. Worst movement reported for unsignalized two-way stop-controlled intersections. Volume to capacity ratio (V/C) reported for roundabout intersections.

As shown in Table 3, all study intersections are anticipated to meet City of Tukwila standards under future No Action and either of the S 124th Street bridge alternatives. No significant queueing or vehicle delay are anticipated at the study intersections.

Signal Warrant Analysis

A signal warrant analysis[1] was conducted for the study intersections under existing and future (2040) baseline conditions. Hourly traffic volume percentages were developed using NCHRP Report 365, *Travel Estimation Techniques for Urban Planning*. These percentages were applied to the existing PM peak hour turning movement volumes to develop an hourly volume distribution. Hourly volumes are included in Attachment G. Hourly volumes were analyzed with Highway Capacity Software 7 (HCS7) to evaluate signal warrants. Table 4 summarizes the results of the signal warrant analysis at the study intersections.

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[1] *Manual on Uniform Traffic Control Devices* (MUTCD), Federal Highways Administration (2009).

Table 4. Signal Warrant Analysis Summary

		No Action Alternative		S 124th Street Bridge Alternative	
Intersection		Traffic Control	Warrants Met	Traffic Control	Warrants Met
1.	42nd Avenue S/S 124th Street	AWSC	NO	TWSC	NO
2.	42nd Avenue S/Interurban Avenue S	Signal	N/A	Signal	N/A
3.	Access Roadway/Interurban Avenue S	TWSC	NO	TWSC	NO
4.	Interurban Avenue S/S 124th Street	Intersection does not exist		Signal	YES

Source: Transpo Group
Note: N/A = Not applicable, warrants not evaluated

As shown in Table 4, signal warrants are only met for the Interurban Avenue S/S 124th Street intersection for the S 124th Street Bridge Alternatives. The signal warrants met included the 8-hour volume warrant and the 4-hour volume warrant. Detailed signal warrant worksheets at the intersection are included in Attachment G.

Summary of Findings

- Three potential future (2040) alternatives were evaluated:
    - No Action
    - S 124th Street Bridge with Signal
    - S 124th Street Bridge with Roundabout

- No Action Alternative:
    - Maintains existing channelization and traffic control
    - 42nd Avenue S/Interurban Avenue S intersection operates at **LOS D**
    - 42nd Avenue S/S 124th Street intersection operates at **LOS B**
    - Access Roadway/Interurban Avenue S intersection operates at **LOS B**

- S 124th Street Bridge Alternatives:
    - Removes the existing 42nd Avenue S bridge and constructs a new bridge extending S 124th Street to a new intersection with Interurban Avenue S
    - Signal Alternative – Interurban Avenue S/S 124th Street intersection operates at **LOS B** (2040 signal warrants are met)
    - Roundabout Alternative – Interurban Avenue S/S 124th Street intersection operates at **LOS A**
    - All other study intersections operate at **LOS C or better**

- Each alternative exceeds the City of Tukwila’s adopted intersection standard of LOS E

Attachment A: Vehicle Classification Summary Sheets

Allentown Classification Counts
July 2020
Average Daily Volumes

Location	Date	Direction	Motor Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total Vehicles
42nd Ave S	Pre-Inspection ADT	NB	29	2,703	569	63	222	152	2	45	157	4	1	1	0	3,948
		SB	34	2,549	399	28	162	192	1	27	99	2	1	1	1	3,495
		Total	**63**	**5,252**	**968**	**91**	**384**	**344**	**3**	**72**	**256**	**5**	**2**	**2**	**1**	**7,443**
	During Inspection	NB	21	1,827	388	94	164	87	0	42	98	2	0	1	1	2,726
		SB	23	1,640	297	22	123	135	2	21	70	0	1	0	0	2,335
		Total	**44**	**3,468**	**685**	**116**	**287**	**222**	**2**	**63**	**168**	**2**	**1**	**1**	**1**	**5,061**
	Post-Inspection ADT	NB	37	2,452	527	115	249	131	1	39	87	2	1	1	0	3,642
		SB	38	2,653	475	48	219	166	0	32	99	0	1	0	0	3,732
		Total	**75**	**5,105**	**1,003**	**162**	**468**	**298**	**1**	**71**	**186**	**2**	**2**	**1**	**1**	**7,374**
S 115th St	Pre-Inspection ADT	NB	16	630	161	1	30	3	0	3	0	0	0	0	0	846
		SB	18	627	154	1	31	2	0	3	0	0	0	0	0	835
		Total	**34**	**1,257**	**315**	**2**	**61**	**6**	**0**	**6**	**1**	**0**	**0**	**0**	**0**	**1,681**
	During Inspection	NB	17	1,148	275	2	72	27	1	7	19	1	0	0	0	1,570
		SB	25	1,291	311	2	79	23	0	7	7	1	0	0	0	1,745
		Total	**42**	**2,439**	**586**	**4**	**151**	**49**	**2**	**14**	**26**	**2**	**0**	**0**	**0**	**3,315**
	Post-Inspection ADT	NB	15	649	150	1	30	2	0	3	0	0	0	0	0	850
		SB	18	640	156	1	27	1	0	3	0	0	0	0	0	847
		Total	**33**	**1,289**	**306**	**2**	**58**	**3**	**0**	**6**	**0**	**0**	**0**	**0**	**0**	**1,697**
S 129th St	Pre-Inspection ADT	NB	28	1,704	458	5	133	26	1	10	9	0	0	0	0	2,373
		SB	24	1,539	485	7	128	29	1	6	12	1	0	0	0	2,232
		Total	**52**	**3,243**	**943**	**12**	**261**	**55**	**2**	**16**	**21**	**1**	**0**	**0**	**0**	**4,605**
	During Inspection	NB	24	1,989	513	8	163	96	1	13	136	2	0	1	1	2,947
		SB	97	1,807	606	6	176	153	3	13	87	1	1	0	0	2,950
		Total	**122**	**3,796**	**1,119**	**15**	**338**	**248**	**4**	**26**	**223**	**3**	**1**	**1**	**2**	**5,897**
	Post-Inspection ADT	NB	31	2,204	505	5	124	26	1	9	11	0	0	0	0	2,916
		SB	29	2,071	472	5	95	29	1	8	16	0	0	0	1	2,726
		Total	**60**	**4,275**	**977**	**9**	**219**	**55**	**1**	**16**	**27**	**0**	**0**	**0**	**1**	**5,642**

Allentown Classification Counts
July 2020
Average Hourly Volumes

Location	Date	Time Period	Motor Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total Vehicles
	Pre-Inspection Hourly	12:00 AM	1	103	15	2	9	10	0	7	7	0	0	0	0	**154**
		01:00 AM	0	69	13	1	8	8	0	4	9	0	0	0	0	**113**
		02:00 AM	1	60	11	0	4	12	0	4	9	0	0	0	0	**100**
		03:00 AM	1	51	10	1	5	12	0	3	12	0	0	0	0	**94**
		04:00 AM	0	59	10	1	6	14	0	2	5	0	0	0	0	**97**
		05:00 AM	1	87	21	1	9	20	0	2	8	0	0	0	0	**149**
		06:00 AM	1	109	26	1	9	24	0	2	11	1	0	0	0	**183**
		07:00 AM	3	139	34	2	12	23	1	3	13	0	0	0	0	**231**
		08:00 AM	4	177	44	2	19	17	0	3	14	0	0	0	0	**280**
		09:00 AM	4	222	46	4	21	19	0	3	18	1	0	0	0	**337**
		10:00 AM	4	249	55	4	24	14	1	4	14	0	0	0	0	**368**
		11:00 AM	5	283	55	3	26	18	1	4	16	1	0	0	0	**410**
		12:00 PM	4	327	66	5	22	20	0	4	18	1	0	0	0	**467**
		01:00 PM	6	340	68	6	26	16	0	3	14	0	0	0	0	**480**
		02:00 PM	5	342	57	6	26	18	0	3	12	0	0	0	0	**468**
		03:00 PM	4	351	63	5	26	13	0	2	11	0	0	0	0	**474**
		04:00 PM	3	344	58	6	24	16	0	4	9	0	0	0	0	**463**
		05:00 PM	4	367	61	6	24	12	0	2	10	0	0	0	0	**487**
		06:00 PM	4	341	57	7	22	12	0	3	8	0	0	0	0	**454**
		07:00 PM	2	321	49	5	14	12	0	2	7	0	0	0	0	**412**
		08:00 PM	2	280	51	6	15	11	0	2	9	1	0	0	0	**376**
		09:00 PM	4	269	43	8	13	8	0	3	7	0	0	0	0	**354**
		10:00 PM	1	205	32	6	11	9	0	2	8	0	0	0	0	**273**
		11:00 PM	1	160	23	5	11	9	0	3	7	0	1	0	0	**220**

Allentown Classification Counts
July 2020
Quick Summary of Types

Date	Time Period	Motor Bikes	Passenger Vehicles	Trucks
Pre-Inspection Hourly	12:00 AM	1	118	33
	01:00 AM	0	82	30
	02:00 AM	1	71	29
	03:00 AM	1	60	32
	04:00 AM	0	69	27
	05:00 AM	1	108	39
	06:00 AM	1	135	46
	07:00 AM	3	174	52
	08:00 AM	4	221	54
	09:00 AM	4	267	62
	10:00 AM	4	304	57
	11:00 AM	5	338	64
	12:00 PM	4	393	65
	01:00 PM	6	408	61
	02:00 PM	5	398	60
	03:00 PM	4	414	52
	04:00 PM	3	401	52
	05:00 PM	4	428	48
	06:00 PM	4	399	45
	07:00 PM	2	370	36
	08:00 PM	2	332	37
	09:00 PM	4	312	31
	10:00 PM	1	237	29
	11:00 PM	1	183	31

42nd Ave S		**Total**	**63**	**5,252**	**968**	**91**	**384**	**344**	**3**	**72**	**256**	**5**	**2**	**2**	**1**	**7,443**
	During Inspection Hourly	12:00 AM	0	80	13	1	9	11	0	6	13	0	0	0	0	**134**
		01:00 AM	0	64	12	0	10	10	0	5	13	1	0	0	0	**116**
		02:00 AM	0	53	11	1	8	18	0	6	14	0	0	0	0	**112**
		03:00 AM	2	42	12	1	8	15	0	4	13	0	0	0	0	**97**
		04:00 AM	0	70	15	0	5	17	0	2	8	0	0	0	0	**117**
		05:00 AM	0	99	28	1	8	23	0	3	7	0	0	0	0	**170**
		06:00 AM	0	89	30	0	8	18	0	1	11	0	0	0	0	**157**
		07:00 AM	3	96	29	1	12	10	0	0	5	0	0	0	0	**156**
		08:00 AM	1	59	17	0	5	3	1	0	3	0	0	0	0	**90**
		09:00 AM	1	20	4	0	1	1	0	0	0	0	0	0	0	**27**
		10:00 AM	1	27	5	0	1	0	0	0	0	0	0	0	0	**35**
		11:00 AM	0	27	5	0	2	0	0	0	0	0	0	0	0	**35**
		12:00 PM	2	34	7	0	2	1	0	0	0	0	0	0	0	**46**
		01:00 PM	3	126	25	3	10	4	0	0	3	0	0	0	0	**174**
		02:00 PM	4	204	40	10	18	7	0	4	6	0	0	0	0	**293**
		03:00 PM	4	241	44	11	27	8	0	3	6	0	0	0	0	**345**
		04:00 PM	3	289	52	7	27	9	0	3	6	0	0	0	0	**395**
		05:00 PM	5	350	64	20	28	12	0	3	7	0	0	0	0	**489**
		06:00 PM	4	348	65	11	29	11	0	3	9	0	0	0	0	**480**
		07:00 PM	5	301	57	19	20	11	0	2	9	0	0	0	0	**424**
		08:00 PM	3	279	58	12	16	9	0	3	9	0	0	0	0	**389**
		09:00 PM	1	228	37	7	12	6	0	4	11	0	0	0	0	**307**
		10:00 PM	0	187	33	5	11	8	0	4	9	0	0	0	0	**258**
		11:00 PM	2	154	23	2	9	10	0	7	7	0	0	0	0	**214**
		Total	**44**	**3,468**	**685**	**116**	**287**	**222**	**2**	**63**	**168**	**2**	**1**	**1**	**1**	**5,061**
	Post-Inspection Hourly	12:00 AM	0	109	19	6	10	6	0	2	5	0	0	0	0	**158**
		01:00 AM	0	73	16	4	7	7	0	4	6	0	0	0	0	**118**
		02:00 AM	0	62	12	2	6	8	0	2	7	0	0	0	0	**99**
		03:00 AM	0	54	11	2	6	8	0	3	9	0	0	0	0	**92**
		04:00 AM	1	67	11	2	6	12	0	1	5	0	0	0	0	**105**
		05:00 AM	1	90	21	2	10	18	0	2	6	0	0	0	0	**152**
		06:00 AM	3	113	31	3	12	21	0	3	8	0	0	0	0	**195**
		07:00 AM	3	126	38	4	22	17	0	3	8	0	0	0	0	**221**
		08:00 AM	3	160	39	5	23	16	0	4	10	0	0	0	0	**262**
		09:00 AM	4	222	53	9	27	15	0	5	12	0	0	0	0	**347**
		10:00 AM	6	244	62	10	26	13	0	3	10	0	0	0	0	**373**
		11:00 AM	4	267	59	13	27	15	0	3	10	1	0	0	0	**399**
		12:00 PM	7	307	60	12	29	15	0	4	8	0	0	0	0	**442**
		01:00 PM	7	322	62	10	29	17	0	4	10	0	0	0	0	**460**
		02:00 PM	4	335	62	10	35	16	0	4	10	0	0	0	0	**474**
		03:00 PM	6	332	62	6	31	15	0	4	9	0	0	0	0	**463**
		04:00 PM	4	338	58	5	27	15	0	3	9	0	0	0	0	**459**
		05:00 PM	5	352	61	6	29	14	0	3	9	0	0	0	0	**479**
		06:00 PM	3	331	60	6	23	11	0	3	7	0	0	0	0	**444**
		07:00 PM	4	305	53	5	18	10	0	3	7	0	0	0	0	**404**
		08:00 PM	3	284	45	8	20	9	0	3	6	0	0	0	0	**377**
		09:00 PM	3	260	46	12	21	8	0	3	5	0	0	0	0	**358**
		10:00 PM	2	199	37	11	15	7	0	2	4	0	0	0	0	**277**
		11:00 PM	1	153	27	10	11	6	0	3	5	0	0	0	0	**215**
		Total	**75**	**5,105**	**1,003**	**162**	**468**	**298**	**1**	**71**	**186**	**2**	**2**	**1**	**1**	**7,374**
	Pre-Inspection Hourly	12:00 AM	0	17	4	0	1	0	0	0	0	0	0	0	0	**22**
		01:00 AM	0	12	2	0	0	0	0	0	0	0	0	0	0	**14**
		02:00 AM	0	6	2	0	0	0	0	0	0	0	0	0	0	**8**
		03:00 AM	0	9	2	0	0	0	0	0	0	0	0	0	0	**11**
		04:00 AM	0	17	2	0	1	0	0	0	0	0	0	0	0	**20**
		05:00 AM	1	19	7	0	0	0	0	0	0	0	0	0	0	**27**
		06:00 AM	2	45	12	0	2	0	0	0	0	0	0	0	0	**62**
		07:00 AM	1	47	15	0	5	0	0	0	0	0	0	0	0	**70**
		08:00 AM	1	52	15	0	5	0	0	0	0	0	0	0	0	**74**
		09:00 AM	1	52	16	0	4	0	0	1	0	0	0	0	0	**74**
		10:00 AM	1	59	17	0	5	1	0	0	0	0	0	0	0	**83**
		11:00 AM	2	61	21	1	4	1	0	0	0	0	0	0	0	**89**
		12:00 PM	2	72	21	0	4	0	0	1	0	0	0	0	0	**100**
		01:00 PM	2	79	22	0	6	0	0	0	0	0	0	0	0	**109**
		02:00 PM	1	90	25	0	4	1	0	1	0	0	0	0	0	**122**
		03:00 PM	4	95	24	0	4	1	0	1	0	0	0	0	0	**129**

	Total	**63**	**6,219**	**1,070**
During Inspection Hourly	12:00 AM	0	92	40
	01:00 AM	0	76	39
	02:00 AM	0	64	47
	03:00 AM	2	54	40
	04:00 AM	0	84	32
	05:00 AM	0	128	41
	06:00 AM	0	119	38
	07:00 AM	3	125	27
	08:00 AM	1	76	12
	09:00 AM	1	24	2
	10:00 AM	1	32	2
	11:00 AM	0	32	2
	12:00 PM	2	41	4
	01:00 PM	3	151	17
	02:00 PM	4	244	35
	03:00 PM	4	286	43
	04:00 PM	3	340	44
	05:00 PM	5	414	50
	06:00 PM	4	413	51
	07:00 PM	5	358	42
	08:00 PM	3	337	37
	09:00 PM	1	264	34
	10:00 PM	0	220	33
	11:00 PM	2	177	33
	Total	**44**	**4,153**	**748**
Post-Inspection Hourly	12:00 AM	0	128	23
	01:00 AM	0	89	25
	02:00 AM	0	74	24
	03:00 AM	0	65	25
	04:00 AM	1	78	24
	05:00 AM	1	112	37
	06:00 AM	3	144	45
	07:00 AM	3	164	51
	08:00 AM	3	199	55
	09:00 AM	4	275	58
	10:00 AM	6	305	52
	11:00 AM	4	326	56
	12:00 PM	7	367	56
	01:00 PM	7	384	59
	02:00 PM	4	396	64
	03:00 PM	6	393	58
	04:00 PM	4	396	54
	05:00 PM	5	413	56
	06:00 PM	3	391	44
	07:00 PM	4	358	38
	08:00 PM	3	329	37
	09:00 PM	3	306	37
	10:00 PM	2	236	28
	11:00 PM	1	180	25
	Total	**75**	**6,107**	**1,030**
Pre-Inspection Hourly	12:00 AM	0	21	1
	01:00 AM	0	14	0
	02:00 AM	0	8	0
	03:00 AM	0	11	0
	04:00 AM	0	19	1
	05:00 AM	1	26	0
	06:00 AM	2	57	3
	07:00 AM	1	62	6
	08:00 AM	1	67	5
	09:00 AM	1	68	5
	10:00 AM	1	76	6
	11:00 AM	2	82	5
	12:00 PM	2	93	5
	01:00 PM	2	100	6
	02:00 PM	1	115	6
	03:00 PM	4	119	6

S 115th St		04:00 PM	3	89	22	0	4	0	0	1	0	0	0	0	0	**119**
		05:00 PM	2	89	23	0	3	1	0	0	0	0	0	0	0	**116**
		06:00 PM	2	87	16	0	4	0	0	0	0	0	0	0	0	**108**
		07:00 PM	1	81	13	0	2	0	0	0	0	0	0	0	0	**98**
		08:00 PM	2	64	8	0	1	0	0	1	0	0	0	0	0	**76**
		09:00 PM	2	52	11	0	2	0	0	0	0	0	0	0	0	**67**
		10:00 PM	2	41	9	0	1	0	0	0	0	0	0	0	0	**53**
		11:00 PM	2	25	4	0	1	0	0	0	0	0	0	0	0	**32**
		Total	**34**	**1,257**	**315**	**2**	**61**	**6**	**0**	**6**	**1**	**0**	**0**	**0**	**0**	**1,681**
	During Inspection Hourly	12:00 AM	0	11	3	0	1	0	0	0	0	0	0	0	0	**15**
		01:00 AM	0	10	4	0	0	0	0	0	0	0	0	0	0	**15**
		02:00 AM	0	7	1	0	0	0	0	0	0	0	0	0	0	**8**
		03:00 AM	0	14	3	0	0	0	0	0	0	0	0	0	0	**18**
		04:00 AM	0	20	3	0	0	0	0	0	0	0	0	0	0	**23**
		05:00 AM	1	23	8	0	3	0	0	0	0	0	0	0	0	**35**
		06:00 AM	4	65	23	0	1	3	0	1	1	0	0	0	0	**98**
		07:00 AM	1	93	33	1	11	4	0	1	2	0	0	0	0	**145**
		08:00 AM	2	133	45	0	14	5	0	1	1	0	0	0	0	**201**
		09:00 AM	1	179	44	1	15	6	0	1	2	1	0	0	0	**250**
		10:00 AM	1	185	52	1	11	3	0	1	4	0	0	0	0	**259**
		11:00 AM	3	214	47	0	13	5	0	2	5	0	0	0	0	**288**
		12:00 PM	2	245	55	0	16	6	1	1	2	0	0	0	0	**328**
		01:00 PM	4	221	57	0	19	6	0	2	3	1	0	0	0	**312**
		02:00 PM	4	201	44	0	13	5	0	1	4	0	0	0	0	**272**
		03:00 PM	6	179	37	0	10	4	0	1	1	0	0	0	0	**238**
		04:00 PM	3	163	35	0	7	1	0	1	0	0	0	0	0	**211**
		05:00 PM	3	119	26	0	4	0	0	0	0	0	0	0	0	**152**
		06:00 PM	2	95	18	0	4	0	0	0	0	0	0	0	0	**120**
		07:00 PM	1	75	14	0	3	0	0	0	0	0	0	0	0	**93**
		08:00 PM	1	70	12	0	3	0	0	0	0	0	0	0	0	**87**
		09:00 PM	1	53	9	0	1	0	0	0	0	0	0	0	0	**65**
		10:00 PM	2	38	5	0	0	0	0	0	0	0	0	0	0	**46**
		11:00 PM	1	26	7	0	1	0	0	0	0	0	0	0	0	**34**
		Total	**42**	**2,439**	**586**	**4**	**151**	**49**	**2**	**14**	**26**	**2**	**0**	**0**	**0**	**3,315**
	Post-Inspection Hourly	12:00 AM	0	17	4	0	0	0	0	0	0	0	0	0	0	**21**
		01:00 AM	0	10	3	0	0	0	0	0	0	0	0	0	0	**13**
		02:00 AM	0	9	1	0	0	0	0	0	0	0	0	0	0	**10**
		03:00 AM	0	9	2	0	0	0	0	0	0	0	0	0	0	**12**
		04:00 AM	0	13	4	0	0	0	0	0	0	0	0	0	0	**17**
		05:00 AM	0	22	6	0	1	0	0	0	0	0	0	0	0	**28**
		06:00 AM	3	39	10	0	1	0	0	1	0	0	0	0	0	**54**
		07:00 AM	1	45	14	0	4	0	0	0	0	0	0	0	0	**66**
		08:00 AM	1	50	15	0	4	0	0	0	0	0	0	0	0	**71**
		09:00 AM	2	59	18	0	4	1	0	0	0	0	0	0	0	**84**
		10:00 AM	1	64	20	0	5	0	0	0	0	0	0	0	0	**90**
		11:00 AM	1	68	19	0	4	1	0	1	0	0	0	0	0	**93**
		12:00 PM	2	75	18	0	5	0	0	1	0	0	0	0	0	**101**
		01:00 PM	3	78	23	0	4	0	0	1	0	0	0	0	0	**109**
		02:00 PM	3	92	20	0	4	0	0	0	0	0	0	0	0	**119**
		03:00 PM	3	97	22	0	5	0	0	1	0	0	0	0	0	**128**
		04:00 PM	3	100	22	0	4	0	0	1	0	0	0	0	0	**130**
		05:00 PM	2	103	21	0	3	0	0	0	0	0	0	0	0	**129**
		06:00 PM	2	84	17	0	3	0	0	0	0	0	0	0	0	**107**
		07:00 PM	2	73	13	0	2	0	0	0	0	0	0	0	0	**90**
		08:00 PM	2	68	13	0	2	0	0	0	0	0	0	0	0	**84**
		09:00 PM	2	52	10	0	1	0	0	1	0	0	0	0	0	**66**
		10:00 PM	1	39	7	0	1	0	0	0	0	0	0	0	0	**48**
		11:00 PM	1	24	6	0	0	0	0	0	0	0	0	0	0	**31**
		Total	**33**	**1,289**	**306**	**2**	**58**	**3**	**0**	**6**	**0**	**0**	**0**	**0**	**0**	**1,697**
		12:00 AM	1	56	11	0	3	0	0	0	0	0	0	0	0	**71**
		01:00 AM	0	36	11	0	1	0	0	0	0	0	0	0	0	**48**
		02:00 AM	0	31	7	0	1	1	0	0	0	0	0	0	0	**40**
		03:00 AM	1	23	9	0	1	1	0	0	1	0	0	0	0	**35**
		04:00 AM	0	32	6	0	3	1	0	0	1	0	0	0	0	**41**
		05:00 AM	2	51	19	0	6	5	0	0	1	0	0	0	0	**84**
		06:00 AM	1	65	25	0	8	3	0	0	1	0	0	0	0	**104**
		07:00 AM	1	87	36	1	13	2	0	1	1	0	0	0	0	**142**

	04:00 PM	3	111	5
	05:00 PM	2	112	3
	06:00 PM	2	103	4
	07:00 PM	1	94	2
	08:00 PM	2	72	2
	09:00 PM	2	63	2
	10:00 PM	2	50	1
	11:00 PM	2	29	1
	Total	**34**	**1,572**	**73**
During Inspection Hourly	12:00 AM	0	14	1
	01:00 AM	0	14	0
	02:00 AM	0	8	0
	03:00 AM	0	18	0
	04:00 AM	0	23	0
	05:00 AM	1	31	3
	06:00 AM	4	89	6
	07:00 AM	1	126	18
	08:00 AM	2	178	21
	09:00 AM	1	223	25
	10:00 AM	1	237	20
	11:00 AM	3	261	25
	12:00 PM	2	300	26
	01:00 PM	4	278	31
	02:00 PM	4	245	23
	03:00 PM	6	216	16
	04:00 PM	3	198	10
	05:00 PM	3	145	5
	06:00 PM	2	113	5
	07:00 PM	1	89	3
	08:00 PM	1	82	3
	09:00 PM	1	62	2
	10:00 PM	2	44	0
	11:00 PM	1	33	1
	Total	**42**	**3,025**	**244**
Post-Inspection Hourly	12:00 AM	0	20	0
	01:00 AM	0	12	0
	02:00 AM	0	10	0
	03:00 AM	0	12	0
	04:00 AM	0	17	0
	05:00 AM	0	27	1
	06:00 AM	3	50	2
	07:00 AM	1	60	5
	08:00 AM	1	65	4
	09:00 AM	2	76	5
	10:00 AM	1	84	5
	11:00 AM	1	87	5
	12:00 PM	2	93	6
	01:00 PM	3	101	5
	02:00 PM	3	111	5
	03:00 PM	3	119	6
	04:00 PM	3	122	5
	05:00 PM	2	124	3
	06:00 PM	2	101	3
	07:00 PM	2	86	3
	08:00 PM	2	80	2
	09:00 PM	2	62	2
	10:00 PM	1	45	1
	11:00 PM	1	30	0
	Total	**33**	**1,595**	**68**
	12:00 AM	1	67	3
	01:00 AM	0	46	2
	02:00 AM	0	38	2
	03:00 AM	1	32	3
	04:00 AM	0	37	4
	05:00 AM	2	70	12
	06:00 AM	1	90	12
	07:00 AM	1	123	18

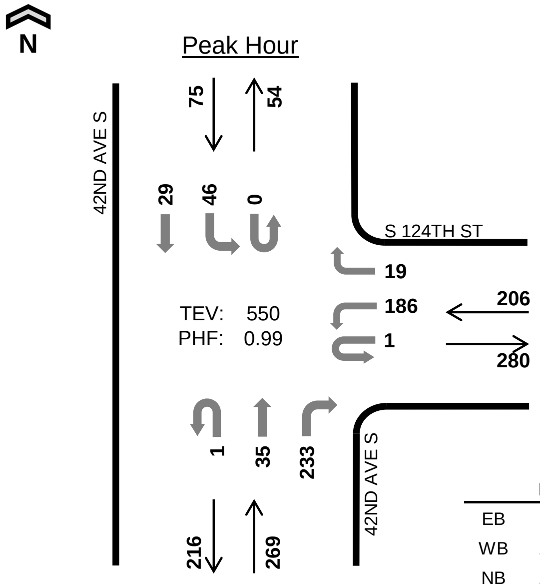
S 129th St	**Pre-Inspection Hourly**	08:00 AM	2	107	43	2	15	3	0	2	2	0	0	0	0	**175**
		09:00 AM	1	105	33	1	11	2	0	1	2	0	0	0	0	**156**
		10:00 AM	1	127	34	1	13	3	0	1	1	0	0	0	0	**181**
		11:00 AM	3	140	42	1	14	4	0	1	2	0	0	0	0	**206**
		12:00 PM	3	168	47	1	12	3	0	1	2	0	0	0	0	**236**
		01:00 PM	7	208	62	1	22	5	0	1	3	0	0	0	0	**309**
		02:00 PM	4	244	71	1	24	5	0	2	2	0	0	0	0	**353**
		03:00 PM	3	255	75	1	25	4	0	1	2	0	0	0	0	**365**
		04:00 PM	5	253	79	1	25	4	0	1	1	0	0	0	0	**369**
		05:00 PM	2	261	68	0	17	4	0	1	1	0	0	0	0	**353**
		06:00 PM	4	235	63	1	12	2	0	0	1	0	0	0	0	**317**
		07:00 PM	3	207	56	1	10	1	0	1	1	0	0	0	0	**280**
		08:00 PM	4	170	56	0	9	1	0	1	0	0	0	0	0	**241**
		09:00 PM	2	159	43	0	7	1	0	1	0	0	0	0	0	**212**
		10:00 PM	3	125	29	0	5	1	0	0	1	0	0	0	0	**164**
		11:00 PM	2	98	21	0	4	1	0	0	0	0	0	0	0	**126**
		Total	**52**	**3,243**	**943**	**12**	**261**	**55**	**2**	**16**	**21**	**1**	**0**	**0**	**0**	**4,605**
	During Inspection Hourly	12:00 AM	0	60	14	0	1	1	0	0	0	0	0	0	0	**76**
		01:00 AM	1	36	11	0	3	1	0	0	0	0	0	0	0	**52**
		02:00 AM	0	31	7	0	2	0	0	0	1	0	0	0	0	**41**
		03:00 AM	0	26	12	0	3	2	0	0	0	0	0	0	0	**43**
		04:00 AM	1	37	6	0	5	3	0	1	1	0	0	0	0	**53**
		05:00 AM	2	57	29	0	11	9	0	0	3	0	0	0	0	**111**
		06:00 AM	2	80	35	0	13	10	0	0	5	0	0	0	0	**145**
		07:00 AM	4	100	48	1	21	13	0	2	12	0	0	0	0	**201**
		08:00 AM	5	112	47	2	19	18	0	2	23	0	0	0	0	**229**
		09:00 AM	5	137	45	0	15	14	0	1	24	1	0	0	0	**242**
		10:00 AM	7	161	48	0	16	24	1	1	23	1	0	0	0	**282**
		11:00 AM	7	164	54	1	18	20	0	2	28	0	0	1	0	**294**
		12:00 PM	12	196	67	3	23	24	0	2	19	1	0	0	1	**348**
		01:00 PM	13	258	73	1	26	22	0	4	24	0	0	0	1	**421**
		02:00 PM	12	271	78	1	27	21	1	4	19	0	0	0	0	**433**
		03:00 PM	10	268	97	2	32	20	0	2	18	0	0	0	0	**450**
		04:00 PM	9	299	75	1	25	15	0	2	15	0	0	0	0	**441**
		05:00 PM	10	301	82	0	21	13	0	1	4	0	0	0	0	**431**
		06:00 PM	5	275	74	1	20	8	0	1	4	0	0	0	0	**389**
		07:00 PM	2	245	63	0	13	4	0	0	1	0	0	0	0	**329**
		08:00 PM	1	218	50	0	13	2	0	1	0	0	0	0	0	**286**
		09:00 PM	5	195	43	0	7	3	1	0	0	0	0	0	0	**255**
		10:00 PM	3	147	41	0	4	0	0	0	0	0	0	0	0	**195**
		11:00 PM	2	124	20	0	2	1	0	0	0	0	0	0	0	**150**
		Total	**122**	**3,796**	**1,119**	**15**	**338**	**248**	**4**	**26**	**223**	**3**	**1**	**1**	**2**	**5,897**
	Post-Inspection Hourly	12:00 AM	1	76	13	0	2	1	0	0	0	0	0	0	0	**92**
		01:00 AM	0	43	11	0	2	0	0	0	0	0	0	0	0	**56**
		02:00 AM	1	36	7	0	1	0	0	0	0	0	0	0	0	**45**
		03:00 AM	0	27	10	0	1	0	0	0	1	0	0	0	0	**39**
		04:00 AM	0	43	6	0	3	1	0	0	0	0	0	0	0	**55**
		05:00 AM	2	57	18	0	4	5	0	0	0	0	0	0	0	**86**
		06:00 AM	3	83	25	0	7	4	0	0	1	0	0	0	0	**123**
		07:00 AM	2	106	30	0	12	3	0	1	2	0	0	0	0	**155**
		08:00 AM	2	124	37	0	14	3	0	1	2	0	0	0	0	**184**
		09:00 AM	2	171	44	1	12	4	0	2	3	0	0	0	0	**239**
		10:00 AM	2	198	50	1	14	3	0	2	2	0	0	0	0	**271**
		11:00 AM	2	225	55	1	14	5	0	1	3	0	0	0	0	**307**
		12:00 PM	4	253	59	1	14	3	0	2	1	0	0	0	0	**336**
		01:00 PM	6	289	67	1	17	4	0	2	3	0	0	0	0	**387**
		02:00 PM	5	298	70	1	19	4	0	1	2	0	0	0	0	**400**
		03:00 PM	4	298	72	1	17	4	0	1	1	0	0	0	0	**397**
		04:00 PM	5	317	75	1	18	4	0	1	2	0	0	0	0	**422**
		05:00 PM	3	330	69	0	15	3	0	1	1	0	0	0	0	**421**
		06:00 PM	4	294	64	1	10	2	0	1	1	0	0	0	0	**376**
		07:00 PM	3	253	59	0	8	1	0	1	0	0	0	0	0	**324**
		08:00 PM	4	253	47	0	6	1	0	0	1	0	0	0	0	**311**
		09:00 PM	3	216	42	0	7	1	0	0	0	0	0	0	0	**269**
		10:00 PM	3	164	31	0	3	1	0	0	0	0	0	0	0	**203**
		11:00 PM	1	122	19	0	2	1	0	0	0	0	0	0	0	**145**
		Total	**60**	**4,275**	**977**	**9**	**219**	**55**	**1**	**16**	**27**	**0**	**0**	**0**	**1**	**5,642**

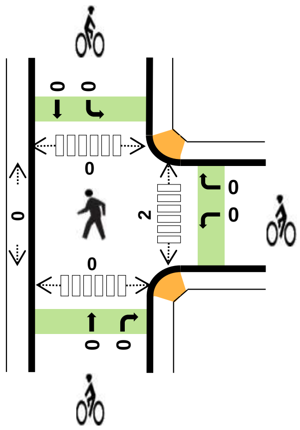
Pre-Inspection Hourly	08:00 AM	2	150	22
	09:00 AM	1	138	16
	10:00 AM	1	161	18
	11:00 AM	3	181	21
	12:00 PM	3	215	18
	01:00 PM	7	270	32
	02:00 PM	4	315	33
	03:00 PM	3	330	31
	04:00 PM	5	332	31
	05:00 PM	2	328	23
	06:00 PM	4	298	15
	07:00 PM	3	263	13
	08:00 PM	4	226	10
	09:00 PM	2	202	8
	10:00 PM	3	154	7
	11:00 PM	2	120	5
	Total	**52**	**4,185**	**356**
During Inspection Hourly	12:00 AM	0	73	3
	01:00 AM	1	47	4
	02:00 AM	0	38	3
	03:00 AM	0	37	5
	04:00 AM	1	42	10
	05:00 AM	2	86	23
	06:00 AM	2	115	27
	07:00 AM	4	149	48
	08:00 AM	5	159	62
	09:00 AM	5	182	55
	10:00 AM	7	208	66
	11:00 AM	7	218	68
	12:00 PM	12	263	70
	01:00 PM	13	331	77
	02:00 PM	12	349	71
	03:00 PM	10	365	72
	04:00 PM	9	374	56
	05:00 PM	10	383	39
	06:00 PM	5	349	33
	07:00 PM	2	308	18
	08:00 PM	1	268	17
	09:00 PM	5	238	11
	10:00 PM	3	188	4
	11:00 PM	2	144	3
	Total	**122**	**4,915**	**846**
Post-Inspection Hourly	12:00 AM	1	89	3
	01:00 AM	0	54	2
	02:00 AM	1	43	2
	03:00 AM	0	37	2
	04:00 AM	0	49	5
	05:00 AM	2	75	9
	06:00 AM	3	108	12
	07:00 AM	2	136	17
	08:00 AM	2	161	20
	09:00 AM	2	214	21
	10:00 AM	2	248	21
	11:00 AM	2	280	23
	12:00 PM	4	312	20
	01:00 PM	6	356	25
	02:00 PM	5	368	26
	03:00 PM	4	370	23
	04:00 PM	5	392	25
	05:00 PM	3	398	19
	06:00 PM	4	359	12
	07:00 PM	3	312	10
	08:00 PM	4	300	7
	09:00 PM	3	258	8
	10:00 PM	3	195	5
	11:00 PM	1	141	3
	Total	**60**	**5,253**	**320**

Attachment B: Peak Hour Traffic Counts

42ND AVE S
S 124TH ST

Date: 12-08-2020
Count Period: 3:30 PM to 6:30 PM
Peak Hour: 4:00 PM to 5:00 PM





	HV %:	PHF
EB	-	-
WB	16.5%	0.87
NB	13.0%	0.92
SB	4.0%	0.82
TOTAL	13.1%	0.99

Three-Hour Count Summaries

Interval Start		0				S 124TH ST				42ND AVE S				42ND AVE S				15-min Total	Rolling One Hour
		Eastbound				Westbound				Northbound				Southbound					
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM		0	0	0	0	0	49	0	4	0	0	7	58	0	14	7	0	139	0
4:15 PM		0	0	0	0	1	53	0	5	1	0	8	54	0	9	5	0	136	0
4:30 PM		0	0	0	0	0	38	0	4	0	0	12	61	0	12	11	0	138	0
4:45 PM		0	0	0	0	0	46	0	6	0	0	8	60	0	11	6	0	137	550
Peak Hour	All	0	0	0	0	1	186	0	19	1	0	35	233	0	46	29	0	550	0
	HV	0	0	0	0	0	33	0	1	0	0	1	34	0	0	3	0	72	0
	HV%	-	-	-	-	0%	18%	-	5%	0%	-	3%	15%	-	0%	10%	-	13%	0

Note: For all three-hour count summary, see next page.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	0	10	6	1	*17*	0	0	0	0	*0*	0	0	0	0	*0*
4:15 PM	0	8	11	1	*20*	0	0	0	0	*0*	0	0	0	0	*0*
4:30 PM	0	6	11	1	*18*	0	0	0	0	*0*	2	0	0	0	*2*
4:45 PM	0	10	7	0	*17*	0	0	0	0	*0*	0	0	0	0	*0*
Peak Hour	0	34	35	3	*72*	0	0	0	0	*0*	2	0	0	0	*2*

Three-Hour Count Summaries

Interval Start	0				S 124TH ST				42ND AVE S				42ND AVE S				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
3:30 PM	0	0	0	0	0	51	0	6	0	0	12	49	0	6	11	0	135	0
3:45 PM	0	0	0	0	0	54	0	3	0	0	10	47	0	11	5	0	130	0
4:00 PM	**0**	**0**	**0**	**0**	**0**	**49**	**0**	**4**	**0**	**0**	**7**	**58**	**0**	**14**	**7**	**0**	**139**	0
4:15 PM	**0**	**0**	**0**	**0**	**1**	**53**	**0**	**5**	**1**	**0**	**8**	**54**	**0**	**9**	**5**	**0**	**136**	540
4:30 PM	**0**	**0**	**0**	**0**	**0**	**38**	**0**	**4**	**0**	**0**	**12**	**61**	**0**	**12**	**11**	**0**	**138**	543
4:45 PM	**0**	**0**	**0**	**0**	**0**	**46**	**0**	**6**	**0**	**0**	**8**	**60**	**0**	**11**	**6**	**0**	**137**	**550**
5:00 PM	0	0	0	0	0	53	0	3	0	0	8	54	0	4	6	0	128	539
5:15 PM	0	0	0	0	0	53	0	6	0	0	9	55	0	11	6	0	140	543
5:30 PM	0	0	0	0	0	54	0	3	0	0	9	63	0	11	2	0	142	547
5:45 PM	0	0	0	0	0	42	0	3	0	0	8	50	0	4	9	0	116	526
6:00 PM	0	0	0	0	0	38	0	3	0	0	9	55	0	6	7	0	118	516
6:15 PM	0	0	0	0	0	47	0	5	0	0	7	59	0	8	4	0	130	506
Count Total	0	0	0	0	1	578	0	51	1	0	107	665	0	107	79	0	1,589	0
Peak Hour All	**0**	**0**	**0**	**0**	**1**	**186**	**0**	**19**	**1**	**0**	**35**	**233**	**0**	**46**	**29**	**0**	**550**	**0**
HV	**0**	**0**	**0**	**0**	**0**	**33**	**0**	**1**	**0**	**0**	**1**	**34**	**0**	**0**	**3**	**0**	**72**	**0**
HV%	**-**	**-**	**-**	**-**	**0%**	**18%**	**-**	**5%**	**0%**	**-**	**3%**	**15%**	**-**	**0%**	**10%**	**-**	**13%**	**0**

Note: Three-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
3:30 PM	0	10	9	0	*19*	0	0	0	0	*0*	0	0	0	0	*0*
3:45 PM	0	9	6	0	*15*	0	0	0	0	*0*	1	0	0	0	*1*
4:00 PM	**0**	**10**	**6**	**1**	***17***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	*0*
4:15 PM	**0**	**8**	**11**	**1**	***20***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	*0*
4:30 PM	**0**	**6**	**11**	**1**	***18***	**0**	**0**	**0**	**0**	***0***	**2**	**0**	**0**	**0**	*2*
4:45 PM	**0**	**10**	**7**	**0**	***17***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	***0***
5:00 PM	0	6	7	0	*13*	0	0	0	0	*0*	0	0	0	0	*0*
5:15 PM	0	6	6	0	*12*	0	0	0	0	*0*	0	0	0	0	*0*
5:30 PM	0	5	8	0	*13*	0	0	0	0	*0*	2	0	0	0	*2*
5:45 PM	0	10	10	0	*20*	0	0	0	0	*0*	0	0	0	0	*0*
6:00 PM	0	5	5	1	*11*	0	0	0	0	*0*	0	0	0	0	*0*
6:15 PM	0	10	9	0	*19*	0	0	0	0	*0*	1	0	0	0	*1*
Count Total	0	95	95	4	*194*	0	0	0	0	*0*	6	0	0	0	*6*
Peak Hr	**0**	**34**	**35**	**3**	***72***	**0**	**0**	**0**	**0**	***0***	**2**	**0**	**0**	**0**	***2***

Three-Hour Count Summaries - Heavy Vehicles

Interval Start	**0**				**S 124TH ST**				**42ND AVE S**				**42ND AVE S**				**15-min Total**	**Rolling One Hour**
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
3:30 PM	0	0	0	0	0	10	0	0	0	0	0	9	0	0	0	0	19	0
3:45 PM	0	0	0	0	0	9	0	0	0	0	0	6	0	0	0	0	15	0
4:00 PM	**0**	**0**	**0**	**0**	**0**	**10**	**0**	**0**	**0**	**0**	**1**	**5**	**0**	**0**	**1**	**0**	**17**	0
4:15 PM	**0**	**0**	**0**	**0**	**0**	**7**	**0**	**1**	**0**	**0**	**0**	**11**	**0**	**0**	**1**	**0**	**20**	71
4:30 PM	**0**	**0**	**0**	**0**	**0**	**6**	**0**	**0**	**0**	**0**	**0**	**11**	**0**	**0**	**1**	**0**	**18**	70
4:45 PM	**0**	**0**	**0**	**0**	**0**	**10**	**0**	**0**	**0**	**0**	**0**	**7**	**0**	**0**	**0**	**0**	**17**	**72**
5:00 PM	0	0	0	0	0	6	0	0	0	0	0	7	0	0	0	0	13	68
5:15 PM	0	0	0	0	0	6	0	0	0	0	1	5	0	0	0	0	12	60
5:30 PM	0	0	0	0	0	5	0	0	0	0	0	8	0	0	0	0	13	55
5:45 PM	0	0	0	0	0	10	0	0	0	0	0	10	0	0	0	0	20	58
6:00 PM	0	0	0	0	0	5	0	0	0	0	0	5	0	0	1	0	11	56
6:15 PM	0	0	0	0	0	10	0	0	0	0	0	9	0	0	0	0	19	63
Count Total	0	0	0	0	0	94	0	1	0	0	2	93	0	0	4	0	194	0
Peak Hour	**0**	**0**	**0**	**0**	**0**	**33**	**0**	**1**	**0**	**0**	**1**	**34**	**0**	**0**	**3**	**0**	**72**	**0**

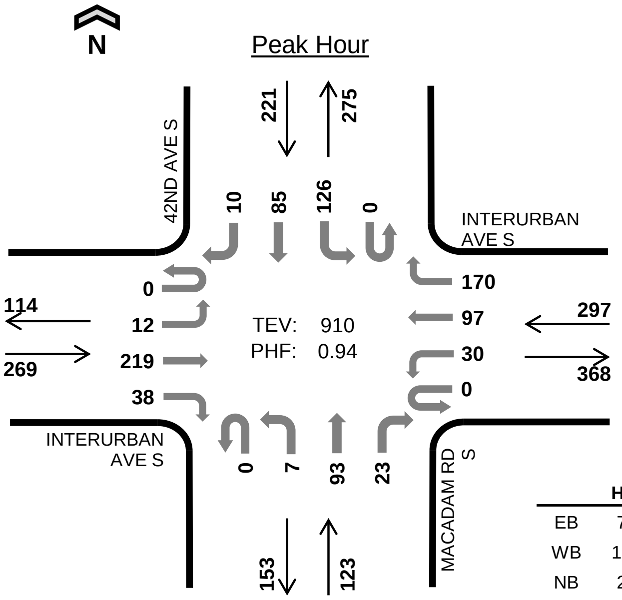
Three-Hour Count Summaries - Bikes

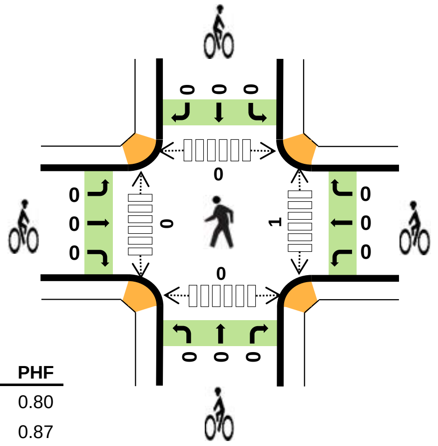
Interval Start	**0**			**S 124TH ST**			**42ND AVE S**			**42ND AVE S**			**15-min Total**	**Rolling One Hour**
	Eastbound			Westbound			Northbound			Southbound				
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
3:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:00 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	0
4:15 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	0
4:30 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	0
4:45 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Count Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peak Hour	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

MACADAM RD S
42ND AVE S

Date: 12-08-2020
Count Period: 3:30 PM to 6:30 PM
Peak Hour: 4:00 PM to 5:00 PM





	HV %:	PHF
EB	7.4%	0.80
WB	13.8%	0.87
NB	2.4%	0.88
SB	15.8%	0.94
TOTAL	10.9%	0.94

Three-Hour Count Summaries

Interval Start		INTERURBAN AVE S				INTERURBAN AVE S				MACADAM RD S				42ND AVE S				15-min Total	Rolling One Hour
		Eastbound				Westbound				Northbound				Southbound					
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM		0	4	58	7	0	6	18	37	0	2	25	6	0	28	25	5	221	0
4:15 PM		0	1	34	9	0	8	25	39	0	0	27	8	0	38	18	2	209	0
4:30 PM		0	3	71	10	0	10	23	46	0	2	24	4	0	25	20	1	239	0
4:45 PM		0	4	56	12	0	6	31	48	0	3	17	5	0	35	22	2	241	910
Peak Hour	All	0	12	219	38	0	30	97	170	0	7	93	23	0	126	85	10	910	0
	HV	0	4	16	0	0	0	11	30	0	0	2	1	0	27	2	6	99	0
	HV%	-	33%	7%	0%	-	0%	11%	18%	-	0%	2%	4%	-	21%	2%	60%	11%	0

Note: For all three-hour count summary, see next page.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	7	5	0	10	*22*	0	0	0	0	*0*	0	0	0	0	*0*
4:15 PM	2	14	2	8	*26*	0	0	0	0	*0*	0	0	0	0	*0*
4:30 PM	8	11	1	7	*27*	0	0	0	0	*0*	1	0	0	0	*1*
4:45 PM	3	11	0	10	*24*	0	0	0	0	*0*	0	0	0	0	*0*
Peak Hour	20	41	3	35	*99*	0	0	0	0	*0*	1	0	0	0	*1*

Three-Hour Count Summaries

Interval Start	INTERURBAN AVE S				INTERURBAN AVE S				MACADAM RD S				42ND AVE S				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
3:30 PM	0	2	57	10	0	7	21	42	0	4	21	5	0	40	17	5	231	0
3:45 PM	0	2	54	5	0	8	20	31	0	3	21	4	0	35	29	3	215	0
4:00 PM	**0**	**4**	**58**	**7**	**0**	**6**	**18**	**37**	**0**	**2**	**25**	**6**	**0**	**28**	**25**	**5**	**221**	0
4:15 PM	**0**	**1**	**34**	**9**	**0**	**8**	**25**	**39**	**0**	**0**	**27**	**8**	**0**	**38**	**18**	**2**	**209**	876
4:30 PM	**0**	**3**	**71**	**10**	**0**	**10**	**23**	**46**	**0**	**2**	**24**	**4**	**0**	**25**	**20**	**1**	**239**	884
4:45 PM	**0**	**4**	**56**	**12**	**0**	**6**	**31**	**48**	**0**	**3**	**17**	**5**	**0**	**35**	**22**	**2**	**241**	**910**
5:00 PM	0	2	51	8	0	6	14	42	0	5	18	4	0	30	22	2	204	893
5:15 PM	0	1	41	4	0	8	19	44	0	4	23	3	0	40	26	1	214	898
5:30 PM	0	5	37	7	0	2	25	40	0	2	29	2	0	34	19	1	203	862
5:45 PM	0	4	34	6	0	6	19	44	0	2	13	6	0	25	23	4	186	807
6:00 PM	0	4	33	3	0	3	24	37	0	3	18	4	0	30	13	3	175	778
6:15 PM	0	3	26	2	0	2	21	42	0	1	23	1	0	37	15	0	173	737
Count Total	0	35	552	83	0	72	260	492	0	31	259	52	0	397	249	29	2,511	0
Peak Hour All	**0**	**12**	**219**	**38**	**0**	**30**	**97**	**170**	**0**	**7**	**93**	**23**	**0**	**126**	**85**	**10**	**910**	**0**
HV	**0**	**4**	**16**	**0**	**0**	**0**	**11**	**30**	**0**	**0**	**2**	**1**	**0**	**27**	**2**	**6**	**99**	**0**
HV%	**-**	**33%**	**7%**	**0%**	**-**	**0%**	**11%**	**18%**	**-**	**0%**	**2%**	**4%**	**-**	**21%**	**2%**	**60%**	**11%**	**0**

Note: Three-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
3:30 PM	4	11	0	10	*25*	0	0	0	0	*0*	0	0	0	0	*0*
3:45 PM	6	9	0	11	*26*	0	0	0	0	*0*	1	0	0	0	*1*
4:00 PM	**7**	**5**	**0**	**10**	***22***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	*0*
4:15 PM	**2**	**14**	**2**	**8**	***26***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	*0*
4:30 PM	**8**	**11**	**1**	**7**	***27***	**0**	**0**	**0**	**0**	***0***	**1**	**0**	**0**	**0**	*1*
4:45 PM	**3**	**11**	**0**	**10**	***24***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	***0***
5:00 PM	8	9	1	4	*22*	0	0	0	0	*0*	0	0	0	0	*0*
5:15 PM	2	14	0	8	*24*	0	0	0	0	*0*	0	0	0	0	*0*
5:30 PM	5	14	0	5	*24*	0	0	0	0	*0*	1	0	0	0	*1*
5:45 PM	4	17	0	10	*31*	0	0	0	0	*0*	0	0	0	0	*0*
6:00 PM	6	13	0	6	*25*	0	0	0	0	*0*	0	0	0	0	*0*
6:15 PM	2	14	1	10	*27*	0	0	0	0	*0*	0	0	0	0	*0*
Count Total	57	142	5	99	*303*	0	0	0	0	*0*	3	0	0	0	*3*
Peak Hour	**20**	**41**	**3**	**35**	***99***	**0**	**0**	**0**	**0**	***0***	**1**	**0**	**0**	**0**	*1*

Three-Hour Count Summaries - Heavy Vehicles

Interval Start	INTERURBAN AVE S				INTERURBAN AVE S				MACADAM RD S				42ND AVE S				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
3:30 PM	0	1	2	1	0	0	3	8	0	0	0	0	0	7	0	3	25	0
3:45 PM	0	1	4	1	0	0	4	5	0	0	0	0	0	10	0	1	26	0
4:00 PM	**0**	**2**	**5**	**0**	**0**	**0**	**1**	**4**	**0**	**0**	**0**	**0**	**0**	**7**	**1**	**2**	**22**	0
4:15 PM	**0**	**0**	**2**	**0**	**0**	**0**	**4**	**10**	**0**	**0**	**1**	**1**	**0**	**7**	**0**	**1**	**26**	99
4:30 PM	**0**	**2**	**6**	**0**	**0**	**0**	**2**	**9**	**0**	**0**	**1**	**0**	**0**	**5**	**1**	**1**	**27**	101
4:45 PM	**0**	**0**	**3**	**0**	**0**	**0**	**4**	**7**	**0**	**0**	**0**	**0**	**0**	**8**	**0**	**2**	**24**	**99**
5:00 PM	0	1	7	0	0	0	4	5	0	1	0	0	0	4	0	0	22	99
5:15 PM	0	0	2	0	0	0	6	8	0	0	0	0	0	8	0	0	24	97
5:30 PM	0	0	4	1	0	0	8	6	0	0	0	0	0	4	1	0	24	94
5:45 PM	0	0	4	0	0	0	6	11	0	0	0	0	0	8	1	1	31	101
6:00 PM	0	0	6	0	0	0	9	4	0	0	0	0	0	5	0	1	25	104
6:15 PM	0	0	2	0	0	0	6	8	0	0	1	0	0	10	0	0	27	107
Count Total	0	7	47	3	0	0	57	85	0	1	3	1	0	83	4	12	303	0
Peak Hour	**0**	**4**	**16**	**0**	**0**	**0**	**11**	**30**	**0**	**0**	**2**	**1**	**0**	**27**	**2**	**6**	**99**	**0**

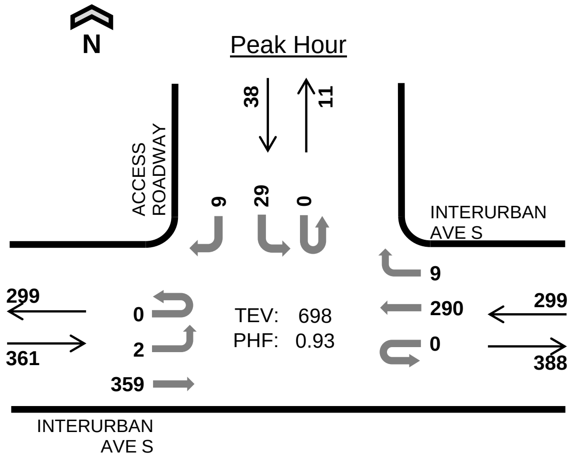
Three-Hour Count Summaries - Bikes

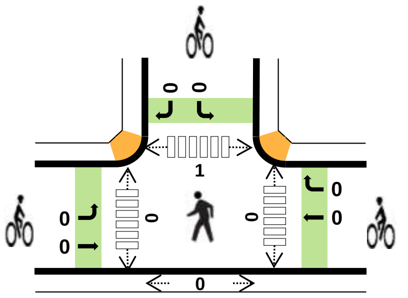
Interval Start	INTERURBAN AVE S			INTERURBAN AVE S			MACADAM RD S			42ND AVE S			15-min Total	Rolling One Hour
	Eastbound			Westbound			Northbound			Southbound				
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
3:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:00 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	0
4:15 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	0
4:30 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	0
4:45 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Count Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peak Hour	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

ACCESS ROADWAY
INTERURBAN AVE S

Date: 12-08-2020
Count Period: 3:30 PM to 6:30 PM
Peak Hour: 4:15 PM to 5:15 PM





	HV %:	PHF
EB	12.2%	0.91
WB	16.7%	0.87
NB	-	-
SB	7.9%	0.73
TOTAL	13.9%	0.93

Three-Hour Count Summaries

Interval Start		INTERURBAN AVE S				INTERURBAN AVE S				0				ACCESS ROADWAY				15-min Total	Rolling One Hour
		Eastbound				Westbound				Northbound				Southbound					
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:15 PM		0	1	80	0	0	0	68	3	0	0	0	0	0	8	0	5	165	0
4:30 PM		0	1	98	0	0	0	74	3	0	0	0	0	0	6	0	2	184	0
4:45 PM		0	0	95	0	0	0	84	2	0	0	0	0	0	5	0	1	187	0
5:00 PM		0	0	86	0	0	0	64	1	0	0	0	0	0	10	0	1	162	698
Peak Hour	All	0	2	359	0	0	0	290	9	0	0	0	0	0	29	0	9	698	0
	HV	0	1	43	0	0	0	47	3	0	0	0	0	0	3	0	0	97	0
	HV%	-	50%	12%	-	-	-	16%	33%	-	-	-	-	-	10%	-	0%	14%	0

Note: For all three-hour count summary, see next page.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:15 PM	10	16	0	3	*29*	0	0	0	0	*0*	0	0	0	0	*0*
4:30 PM	11	11	0	0	*22*	0	0	0	0	*0*	0	0	0	0	*0*
4:45 PM	12	12	0	0	*24*	0	0	0	0	*0*	0	0	1	0	*1*
5:00 PM	11	11	0	0	*22*	0	0	0	0	*0*	0	0	0	0	*0*
Peak Hour	44	50	0	3	*97*	0	0	0	0	*0*	0	0	1	0	*1*

Three-Hour Count Summaries

Interval Start	INTERURBAN AVE S				INTERURBAN AVE S				0				ACCESS ROADWAY				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
3:30 PM	0	0	100	0	0	0	66	2	0	0	0	0	0	4	0	3	175	0
3:45 PM	0	0	94	0	0	0	59	3	0	0	0	0	0	13	0	5	174	0
4:00 PM	0	0	90	0	0	0	58	1	0	0	0	0	0	3	0	2	154	0
4:15 PM	**0**	**1**	**80**	**0**	**0**	**0**	**68**	**3**	**0**	**0**	**0**	**0**	**0**	**8**	**0**	**5**	**165**	668
4:30 PM	**0**	**1**	**98**	**0**	**0**	**0**	**74**	**3**	**0**	**0**	**0**	**0**	**0**	**6**	**0**	**2**	**184**	677
4:45 PM	**0**	**0**	**95**	**0**	**0**	**0**	**84**	**2**	**0**	**0**	**0**	**0**	**0**	**5**	**0**	**1**	**187**	690
5:00 PM	**0**	**0**	**86**	**0**	**0**	**0**	**64**	**1**	**0**	**0**	**0**	**0**	**0**	**10**	**0**	**1**	**162**	**698**
5:15 PM	0	0	81	0	0	0	68	1	0	0	0	0	0	4	0	0	154	687
5:30 PM	0	0	73	0	0	0	67	0	0	0	0	0	0	3	0	0	143	646
5:45 PM	0	0	64	0	0	0	70	2	0	0	0	0	0	0	0	0	136	595
6:00 PM	0	0	67	0	0	0	65	0	0	0	0	0	0	1	0	0	133	566
6:15 PM	0	0	61	0	0	0	66	0	0	0	0	0	0	1	0	0	128	540
Count Total	0	2	989	0	0	0	809	18	0	0	0	0	0	58	0	19	1,895	0
Peak Hour All	**0**	**2**	**359**	**0**	**0**	**0**	**290**	**9**	**0**	**0**	**0**	**0**	**0**	**29**	**0**	**9**	**698**	**0**
HV	**0**	**1**	**43**	**0**	**0**	**0**	**47**	**3**	**0**	**0**	**0**	**0**	**0**	**3**	**0**	**0**	**97**	**0**
HV%	**-**	**50%**	**12%**	**-**	**-**	**-**	**16%**	**33%**	**-**	**-**	**-**	**-**	**-**	**10%**	**-**	**0%**	**14%**	**0**

Note: Three-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
3:30 PM	10	11	0	0	*21*	0	0	0	0	*0*	0	0	0	0	*0*
3:45 PM	14	9	0	0	*23*	0	0	0	0	*0*	0	0	2	0	*2*
4:00 PM	12	5	0	0	*17*	0	0	0	0	*0*	0	0	1	0	*1*
4:15 PM	**10**	**16**	**0**	**3**	***29***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	*0*
4:30 PM	**11**	**11**	**0**	**0**	***22***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	*0*
4:45 PM	**12**	**12**	**0**	**0**	***24***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**1**	**0**	*1*
5:00 PM	**11**	**11**	**0**	**0**	***22***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	***0***
5:15 PM	10	13	0	0	*23*	0	0	0	0	*0*	0	0	2	0	*2*
5:30 PM	8	14	0	0	*22*	0	0	0	0	*0*	0	0	0	0	*0*
5:45 PM	12	18	0	0	*30*	0	0	0	0	*0*	0	0	0	0	*0*
6:00 PM	12	13	0	0	*25*	0	0	0	0	*0*	0	0	0	0	*0*
6:15 PM	12	14	0	0	*26*	0	0	0	0	*0*	0	0	0	0	*0*
Count Total	134	147	0	3	*284*	0	0	0	0	*0*	0	0	6	0	*6*
Peak Hr	**44**	**50**	**0**	**3**	***97***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**1**	**0**	***1***

Three-Hour Count Summaries - Heavy Vehicles

Interval Start	INTERURBAN AVE S				INTERURBAN AVE S				0				ACCESS ROADWAY				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
3:30 PM	0	0	10	0	0	0	11	0	0	0	0	0	0	0	0	0	21	0
3:45 PM	0	0	14	0	0	0	9	0	0	0	0	0	0	0	0	0	23	0
4:00 PM	0	0	12	0	0	0	5	0	0	0	0	0	0	0	0	0	17	0
4:15 PM	**0**	**1**	**9**	**0**	**0**	**0**	**14**	**2**	**0**	**0**	**0**	**0**	**0**	**3**	**0**	**0**	**29**	90
4:30 PM	**0**	**0**	**11**	**0**	**0**	**0**	**11**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**22**	91
4:45 PM	**0**	**0**	**12**	**0**	**0**	**0**	**11**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**24**	92
5:00 PM	**0**	**0**	**11**	**0**	**0**	**0**	**11**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**22**	**97**
5:15 PM	0	0	10	0	0	0	12	1	0	0	0	0	0	0	0	0	23	91
5:30 PM	0	0	8	0	0	0	14	0	0	0	0	0	0	0	0	0	22	91
5:45 PM	0	0	12	0	0	0	17	1	0	0	0	0	0	0	0	0	30	97
6:00 PM	0	0	12	0	0	0	13	0	0	0	0	0	0	0	0	0	25	100
6:15 PM	0	0	12	0	0	0	14	0	0	0	0	0	0	0	0	0	26	103
Count Total	0	1	133	0	0	0	142	5	0	0	0	0	0	3	0	0	284	0
Peak Hour	**0**	**1**	**43**	**0**	**0**	**0**	**47**	**3**	**0**	**0**	**0**	**0**	**0**	**3**	**0**	**0**	**97**	**0**

Three-Hour Count Summaries - Bikes

Interval Start	INTERURBAN AVE S			INTERURBAN AVE S			0			ACCESS ROADWAY			15-min Total	Rolling One Hour
	Eastbound			Westbound			Northbound			Southbound				
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
3:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	0
4:30 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	0
4:45 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	0
5:00 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Count Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peak Hour	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

Attachment C: LOS Definitions

Highway Capacity Manual 2010/6th Edition

Signalized intersection level of service (LOS) is defined in terms of a weighted average control delay for the entire intersection. Control delay quantifies the increase in travel time that a vehicle experiences due to the traffic signal control as well as provides a surrogate measure for driver discomfort and fuel consumption. Signalized intersection LOS is stated in terms of average control delay per vehicle (in seconds) during a specified time period (e.g., weekday PM peak hour). Control delay is a complex measure based on many variables, including signal phasing and coordination (i.e., progression of movements through the intersection and along the corridor), signal cycle length, and traffic volumes with respect to intersection capacity and resulting queues. Table 1 summarizes the LOS criteria for signalized intersections, as described in the *Highway Capacity Manual 2010* and 6th Edition (Transportation Research Board, 2010 and 2016, respectively).

Table 1. Level of Service Criteria for Signalized Intersections

Level of Service	Average Control Delay (seconds/vehicle)	General Description
A	≤10	Free Flow
B	>10 – 20	Stable Flow (slight delays)
C	>20 – 35	Stable flow (acceptable delays)
D	>35 – 55	Approaching unstable flow (tolerable delay, occasionally wait through more than one signal cycle before proceeding)
E	>55 – 80	Unstable flow (intolerable delay)
F[1]	>80	Forced flow (congested and queues fail to clear)

Source: *Highway Capacity Manual 2010 and 6th Edition*, Transportation Research Board, 2010 and 2016, respectively.

1. If the volume-to-capacity (v/c) ratio for a lane group exceeds 1.0 LOS F is assigned to the individual lane group. LOS for overall approach or intersection is determined solely by the control delay.

Unsignalized intersection LOS criteria can be further reduced into two intersection types: all-way stop and two-way stop control. All-way stop control intersection LOS is expressed in terms of the weighted average control delay of the overall intersection or by approach. Two-way stop-controlled intersection LOS is defined in terms of the average control delay for each minor-street movement (or shared movement) as well as major-street left-turns. This approach is because major-street through vehicles are assumed to experience zero delay, a weighted average of all movements results in very low overall average delay, and this calculated low delay could mask deficiencies of minor movements. Table 2 shows LOS criteria for unsignalized intersections.

Table 2. Level of Service Criteria for Unsignalized Intersections

Level of Service	Average Control Delay (seconds/vehicle)
A	0 – 10
B	>10 – 15
C	>15 – 25
D	>25 – 35
E	>35 – 50
F[1]	>50

Source: *Highway Capacity Manual 2010 and 6th Edition*, Transportation Research Board, 2010 and 2016, respectively.

1. If the volume-to-capacity (v/c) ratio exceeds 1.0, LOS F is assigned an individual lane group for all unsignalized intersections, or minor street approach at two-way stop-controlled intersections. Overall intersection LOS is determined solely by control delay.

Attachment D: Existing LOS and Queue Worksheets

Intersection	
Intersection Delay, s/veh	10.6
Intersection LOS	B

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰↱		↑↱			↰↑
Traffic Vol, veh/h	225	25	50	280	55	35
Future Vol, veh/h	225	25	50	280	55	35
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99
Heavy Vehicles, %	17	17	13	13	4	4
Mvmt Flow	227	25	51	283	56	35
Number of Lanes	1	0	1	0	0	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right	SB	WB	
Conflicting Lanes Right	1	1	0
HCM Control Delay	11.4	10.5	9
HCM LOS	B	B	A

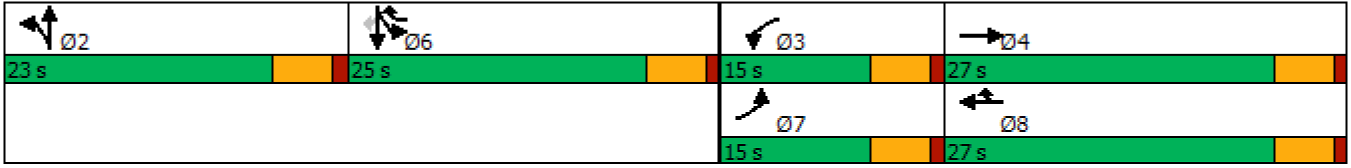
Lane	NBLn1	WBLn1	SBLn1
Vol Left, %	0%	90%	61%
Vol Thru, %	15%	0%	39%
Vol Right, %	85%	10%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	330	250	90
LT Vol	0	225	55
Through Vol	50	0	35
RT Vol	280	25	0
Lane Flow Rate	333	253	91
Geometry Grp	1	1	1
Degree of Util (X)	0.41	0.369	0.13
Departure Headway (Hd)	4.425	5.263	5.164
Convergence, Y/N	Yes	Yes	Yes
Cap	810	679	690
Service Time	2.466	3.331	3.226
HCM Lane V/C Ratio	0.411	0.373	0.132
HCM Control Delay	10.5	11.4	9
HCM Lane LOS	B	B	A
HCM 95th-tile Q	2	1.7	0.4

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBT	SBR
Lane Configurations	↰	↱	↰	↑	↱	↰	↑	↱	↰	↱
Traffic Volume (vph)	15	265	35	115	205	10	110	30	100	10
Future Volume (vph)	15	265	35	115	205	10	110	30	100	10
Turn Type	Prot	NA	Prot	NA	pt+ov	Split	NA	Free	NA	Perm
Protected Phases	7	4	3	8	8 6	2	2		6	
Permitted Phases								Free		6
Detector Phase	7	4	3	8	8 6	2	2		6	6
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0
Minimum Split (s)	15.0	23.0	15.0	23.0		23.0	23.0		23.0	23.0
Total Split (s)	15.0	27.0	15.0	27.0		23.0	23.0		25.0	25.0
Total Split (%)	16.7%	30.0%	16.7%	30.0%		25.6%	25.6%		27.8%	27.8%
Yellow Time (s)	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0
Lead/Lag	Lead	Lag	Lead	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes						
Recall Mode	None	None	None	None		Max	Max		Max	Max
Act Effct Green (s)	6.5	18.6	7.5	23.7	48.3	18.3	18.3	80.0	20.4	20.4
Actuated g/C Ratio	0.08	0.23	0.09	0.30	0.60	0.23	0.23	1.00	0.26	0.26
v/c Ratio	0.12	0.80	0.25	0.25	0.23	0.03	0.27	0.02	0.66	0.02
Control Delay	40.0	45.4	40.9	23.0	1.6	28.9	30.7	0.0	38.8	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.0	45.4	40.9	23.0	1.6	28.9	30.7	0.0	38.8	0.1
LOS	D	D	D	C	A	C	C	A	D	A
Approach Delay		45.1		12.3			24.5		37.3	
Approach LOS		D		B			C		D	

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 80
Natural Cycle: 85
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.80
Intersection Signal Delay: 29.7 Intersection LOS: C
Intersection Capacity Utilization 53.6% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 2: 42nd Ave S & Interurban Ave S



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBT	SBR
Protected Phases	7	4	3	8	8 6	2	2		6	
Permitted Phases								Free		6
Minimum Initial (s)	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0
Minimum Split (s)	15.0	23.0	15.0	23.0		23.0	23.0		23.0	23.0
Total Split (s)	15.0	27.0	15.0	27.0		23.0	23.0		25.0	25.0
Total Split (%)	16.7%	30.0%	16.7%	30.0%		25.6%	25.6%		27.8%	27.8%
Maximum Green (s)	10.0	22.0	10.0	22.0		18.0	18.0		20.0	20.0
Yellow Time (s)	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0
Lead/Lag	Lead	Lag	Lead	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0
Recall Mode	None	None	None	None		Max	Max		Max	Max
Walk Time (s)		7.0		7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		11.0		11.0		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0		0		0	0		0	0
90th %ile Green (s)	7.9	22.0	10.0	24.1		18.0	18.0		20.0	20.0
90th %ile Term Code	Gap	Max	Max	Hold		MaxR	MaxR		MaxR	MaxR
70th %ile Green (s)	0.0	22.0	8.5	35.5		18.0	18.0		20.0	20.0
70th %ile Term Code	Skip	Max	Gap	Hold		MaxR	MaxR		MaxR	MaxR
50th %ile Green (s)	0.0	21.7	7.4	34.1		18.0	18.0		20.0	20.0
50th %ile Term Code	Skip	Gap	Gap	Hold		MaxR	MaxR		MaxR	MaxR
30th %ile Green (s)	0.0	16.0	0.0	16.0		18.0	18.0		20.0	20.0
30th %ile Term Code	Skip	Gap	Skip	Hold		MaxR	MaxR		MaxR	MaxR
10th %ile Green (s)	0.0	12.3	0.0	12.3		18.0	18.0		20.0	20.0
10th %ile Term Code	Skip	Gap	Skip	Hold		MaxR	MaxR		MaxR	MaxR

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 80
Control Type: Actuated-Uncoordinated
90th %ile Actuated Cycle: 90
70th %ile Actuated Cycle: 88.5
50th %ile Actuated Cycle: 87.1
30th %ile Actuated Cycle: 69
10th %ile Actuated Cycle: 65.3

Queues
2: 42nd Ave S & Interurban Ave S

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBT	SBR
Lane Group Flow (vph)	16	330	37	122	218	11	117	32	266	11
v/c Ratio	0.12	0.80	0.25	0.25	0.23	0.03	0.27	0.02	0.66	0.02
Control Delay	40.0	45.4	40.9	23.0	1.6	28.9	30.7	0.0	38.8	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.0	45.4	40.9	23.0	1.6	28.9	30.7	0.0	38.8	0.1
Queue Length 50th (ft)	8	163	19	43	0	5	55	0	136	0
Queue Length 95th (ft)	28	#297	49	102	20	19	107	0	#257	0
Internal Link Dist (ft)		394		179			500		964	
Turn Bay Length (ft)	150		125			80		50		90
Base Capacity (vph)	214	493	201	572	997	405	427	1564	405	462
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.07	0.67	0.18	0.21	0.22	0.03	0.27	0.02	0.66	0.02

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↱		↰	↑	↱	↰	↑	↱		↰↑	↱
Traffic Volume (veh/h)	15	265	45	35	115	205	10	110	30	150	100	10
Future Volume (veh/h)	15	265	45	35	115	205	10	110	30	150	100	10
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1796	1796	1796	1693	1693	1693	1870	1870	1870	1663	1663	1663
Adj Flow Rate, veh/h	16	282	48	37	122	218	11	117	0	160	106	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	7	7	7	14	14	14	2	2	2	16	16	16
Cap, veh/h	32	328	56	57	399	707	412	433		250	165	
Arrive On Green	0.02	0.22	0.22	0.04	0.24	0.24	0.23	0.23	0.00	0.26	0.26	0.00
Sat Flow, veh/h	1711	1496	255	1612	1693	1434	1781	1870	1585	971	643	1409
Grp Volume(v), veh/h	16	0	330	37	122	218	11	117	0	266	0	0
Grp Sat Flow(s),veh/h/ln	1711	0	1750	1612	1693	1434	1781	1870	1585	1614	0	1409
Q Serve(g_s), s	0.7	0.0	14.1	1.8	4.6	7.1	0.4	4.0	0.0	11.4	0.0	0.0
Cycle Q Clear(g_c), s	0.7	0.0	14.1	1.8	4.6	7.1	0.4	4.0	0.0	11.4	0.0	0.0
Prop In Lane	1.00		0.15	1.00		1.00	1.00		1.00	0.60		1.00
Lane Grp Cap(c), veh/h	32	0	384	57	399	707	412	433		415	0	
V/C Ratio(X)	0.50	0.00	0.86	0.65	0.31	0.31	0.03	0.27		0.64	0.00	
Avail Cap(c_a), veh/h	220	0	495	207	478	774	412	433		415	0	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	37.8	0.0	29.2	37.1	24.5	11.8	23.1	24.5	0.0	25.7	0.0	0.0
Incr Delay (d2), s/veh	11.4	0.0	11.6	11.7	0.4	0.2	0.1	1.5	0.0	7.4	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.0	6.9	0.9	1.8	3.6	0.2	1.9	0.0	5.1	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	49.2	0.0	40.8	48.8	24.9	12.0	23.3	26.1	0.0	33.1	0.0	0.0
LnGrp LOS	D	A	D	D	C	B	C	C		C	A	
Approach Vol, veh/h		346			377			128	A		266	A
Approach Delay, s/veh		41.2			19.8			25.8			33.1	
Approach LOS		D			B			C			C	

Timer - Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		23.0	7.8	22.1		25.0	6.5	23.4
Change Period (Y+Rc), s		5.0	5.0	5.0		5.0	5.0	5.0
Max Green Setting (Gmax), s		18.0	10.0	22.0		20.0	10.0	22.0
Max Q Clear Time (g_c+I1), s		6.0	3.8	16.1		13.4	2.7	9.1
Green Ext Time (p_c), s		0.4	0.0	1.0		0.8	0.0	1.2

Intersection Summary	
HCM 6th Ctrl Delay	30.3
HCM 6th LOS	C

Notes

Unsignalized Delay for [NBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↰	↑↑	↑↱		↰	↱
Traffic Vol, veh/h	5	440	345	10	35	10
Future Vol, veh/h	5	440	345	10	35	10
Conflicting Peds, #/hr	1	0	0	1	1	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	50	-	-	-	55	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	12	12	17	17	8	8
Mvmt Flow	5	473	371	11	38	11

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	383	0	-	0	626	193
Stage 1	-	-	-	-	378	-
Stage 2	-	-	-	-	248	-
Critical Hdwy	4.34	-	-	-	6.96	7.06
Critical Hdwy Stg 1	-	-	-	-	5.96	-
Critical Hdwy Stg 2	-	-	-	-	5.96	-
Follow-up Hdwy	2.32	-	-	-	3.58	3.38
Pot Cap-1 Maneuver	1104	-	-	-	403	798
Stage 1	-	-	-	-	645	-
Stage 2	-	-	-	-	753	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1103	-	-	-	400	796
Mov Cap-2 Maneuver	-	-	-	-	496	-
Stage 1	-	-	-	-	641	-
Stage 2	-	-	-	-	752	-

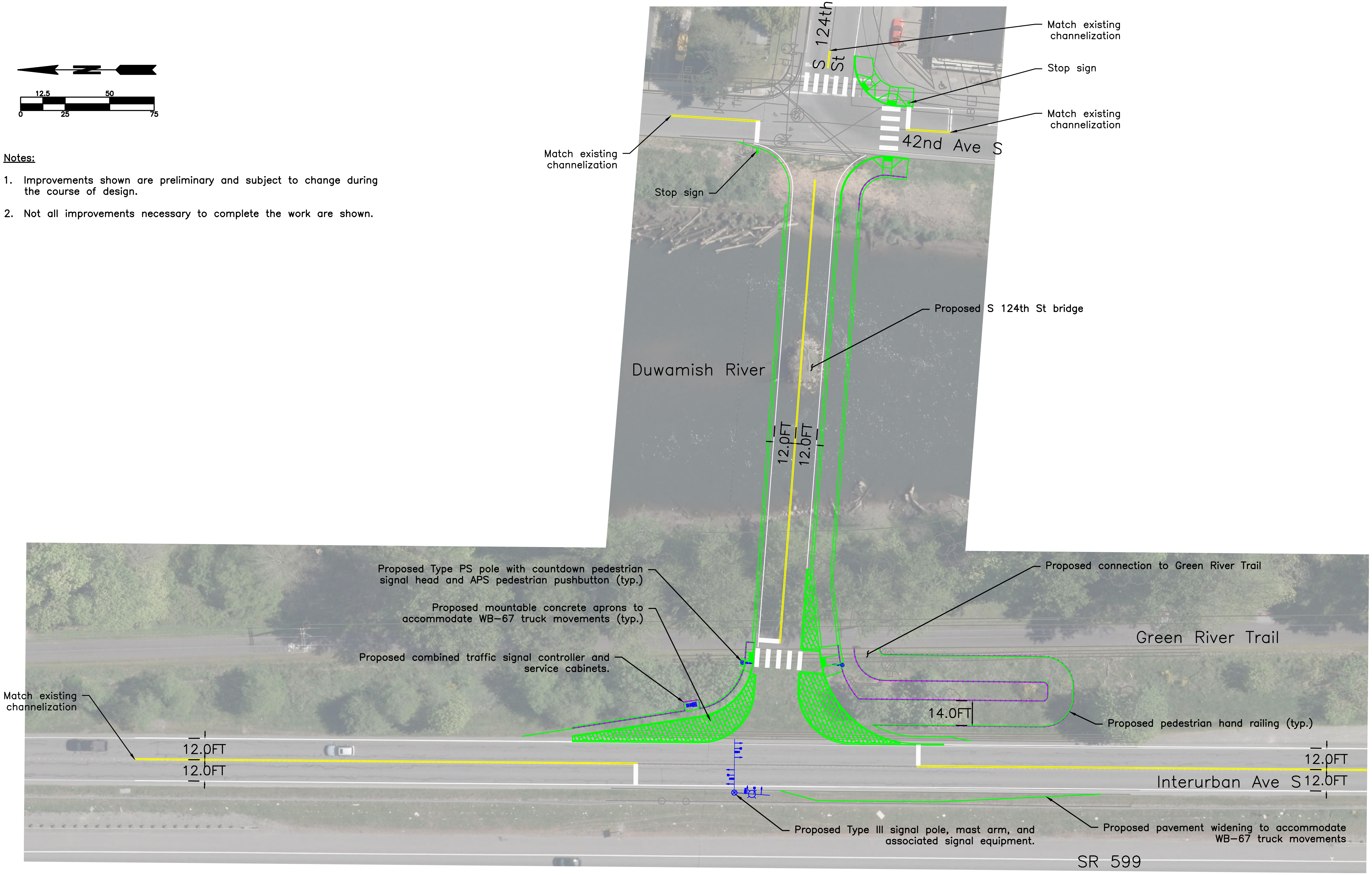
Approach	EB		WB		SB
HCM Control Delay, s	0.1		0		12.2
HCM LOS					B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1103	-	-	-	496	796
HCM Lane V/C Ratio	0.005	-	-	-	0.076	0.014
HCM Control Delay (s)	8.3	-	-	-	12.9	9.6
HCM Lane LOS	A	-	-	-	B	A
HCM 95th %tile Q(veh)	0	-	-	-	0.2	0

Attachment E: Intersection Concepts

Notes:

1. Improvements shown are preliminary and subject to change during the course of design.
2. Not all improvements necessary to complete the work are shown.



Conceptual Traffic Signal Layout - Interurban Ave S & S 124th St Bridge - Option 1

November 1, 2021

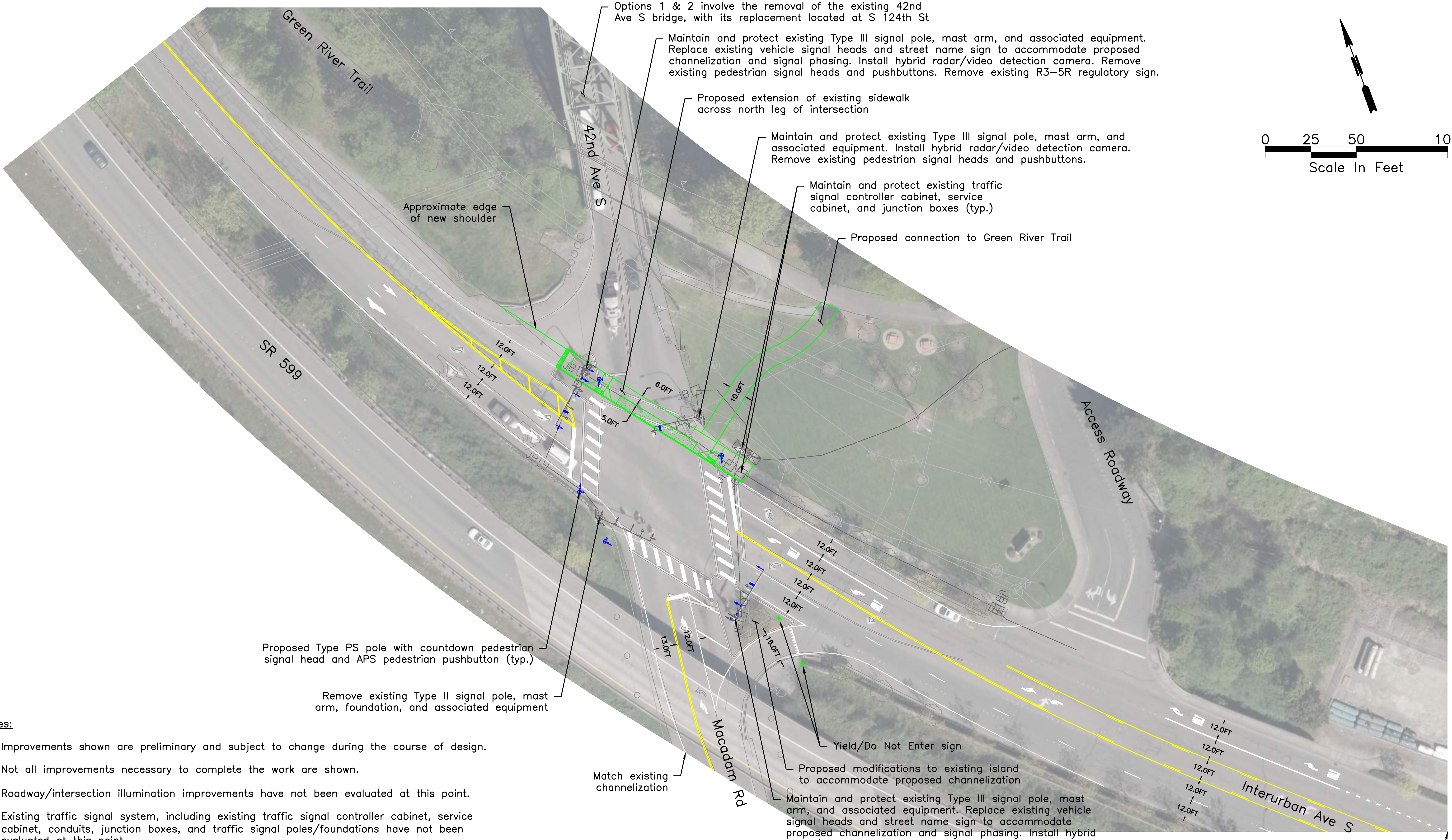
FIGURE

1

1.20133 - Tukwila 42nd Ave S Bridge Replacement

Nov 01, 2021 - 3:39pm chrisc M:\20\1.20133.00 - Tukwila S 42nd Ave Bridge Replacement\Engineering\CAD\Conceptual\20133-TG-CONCEPT-INTERURBAN & 124TH.dwg Layout: Traffic Signal

transpogroup
WHAT TRANSPORTATION CAN BE.



Options 1 & 2 involve the removal of the existing 42nd Ave S bridge, with its replacement located at S 124th St

Maintain and protect existing Type III signal pole, mast arm, and associated equipment. Replace existing vehicle signal heads and street name sign to accommodate proposed channelization and signal phasing. Install hybrid radar/video detection camera. Remove existing pedestrian signal heads and pushbuttons. Remove existing R3-5R regulatory sign.

Proposed extension of existing sidewalk across north leg of intersection

Maintain and protect existing Type III signal pole, mast arm, and associated equipment. Install hybrid radar/video detection camera. Remove existing pedestrian signal heads and pushbuttons.

Maintain and protect existing traffic signal controller cabinet, service cabinet, and junction boxes (typ.)

Proposed connection to Green River Trail

Approximate edge of new shoulder

Proposed Type PS pole with countdown pedestrian signal head and APS pedestrian pushbutton (typ.)

Remove existing Type II signal pole, mast arm, foundation, and associated equipment

Match existing channelization

Yield/Do Not Enter sign

Proposed modifications to existing island to accommodate proposed channelization

Maintain and protect existing Type III signal pole, mast arm, and associated equipment. Replace existing vehicle signal heads and street name sign to accommodate proposed channelization and signal phasing. Install hybrid radar/video detection camera. Remove and replace existing pedestrian signal heads and pushbuttons with countdown pedestrian signal head and APS pedestrian pushbutton.

Match existing channelization

Notes:

1. Improvements shown are preliminary and subject to change during the course of design.
2. Not all improvements necessary to complete the work are shown.
3. Roadway/intersection illumination improvements have not been evaluated at this point.
4. Existing traffic signal system, including existing traffic signal controller cabinet, service cabinet, conduits, junction boxes, and traffic signal poles/foundations have not been evaluated at this point.

Conceptual Traffic Signal and Channelization Layout - Interurban Ave S & 42nd Ave S - Option 1

1.20133.00 - Tukwila 42nd Ave S Bridge Replacement

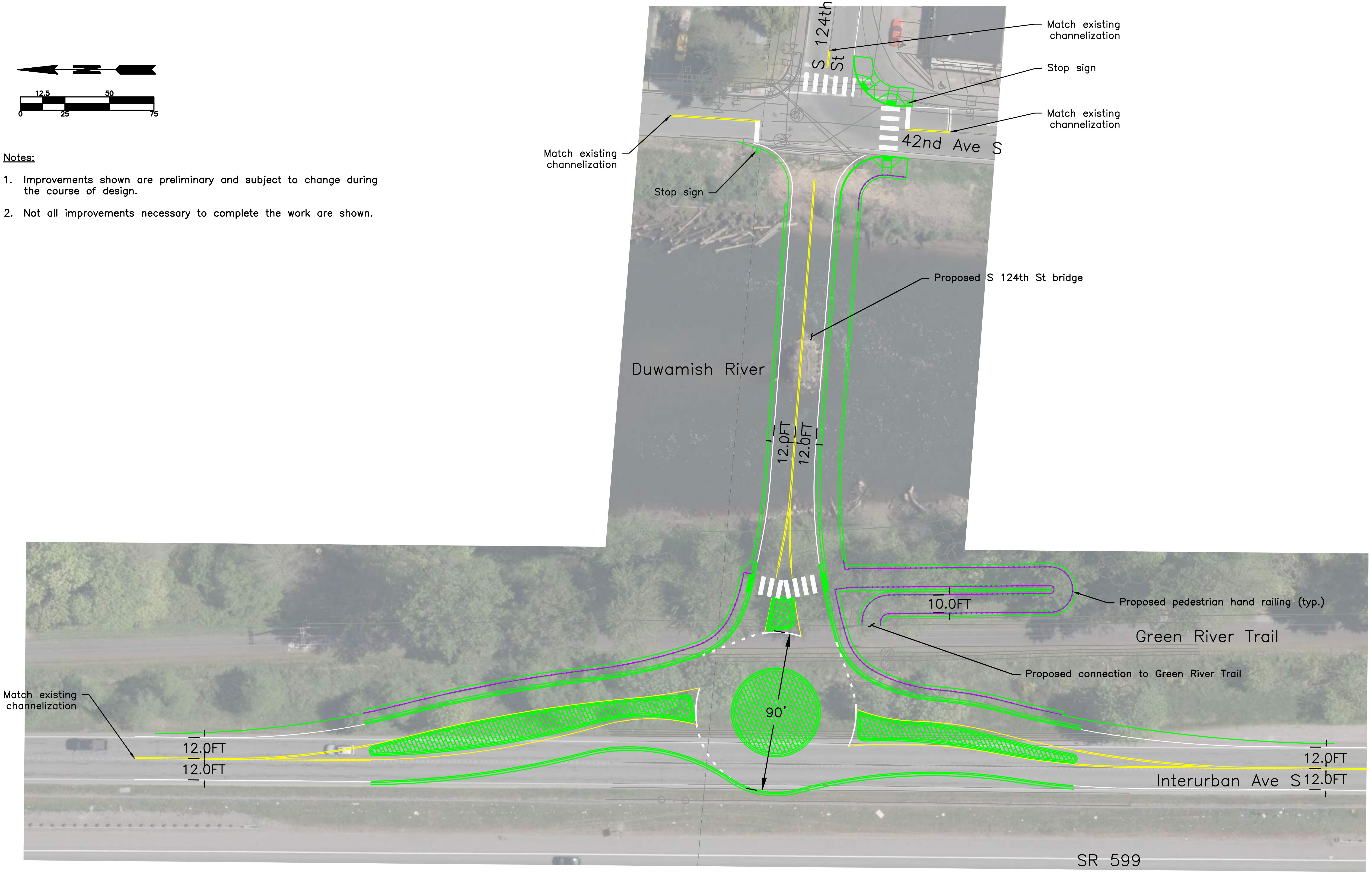
February 15, 2021

FIGURE

2

transpogroup
WHAT TRANSPORTATION CAN BE.

Feb 15, 2021 - 11:41am justinc \\srv-dfs-wa\Projects\20\1.20133.00 - Tukwila S 42nd Ave Bridge Replacement\Engineering\CAD\Conceptual\20133-TG-CONCEPT-INTERURBAN&42ND-OPT1&2.dwg Layout: Option 1



Notes:

1. Improvements shown are preliminary and subject to change during the course of design.
2. Not all improvements necessary to complete the work are shown.

Conceptual Roundabout Layout - Interurban Ave S & S 124th St Bridge - Option 2

1.20133 - Tukwila 42nd Ave S Bridge Replacement

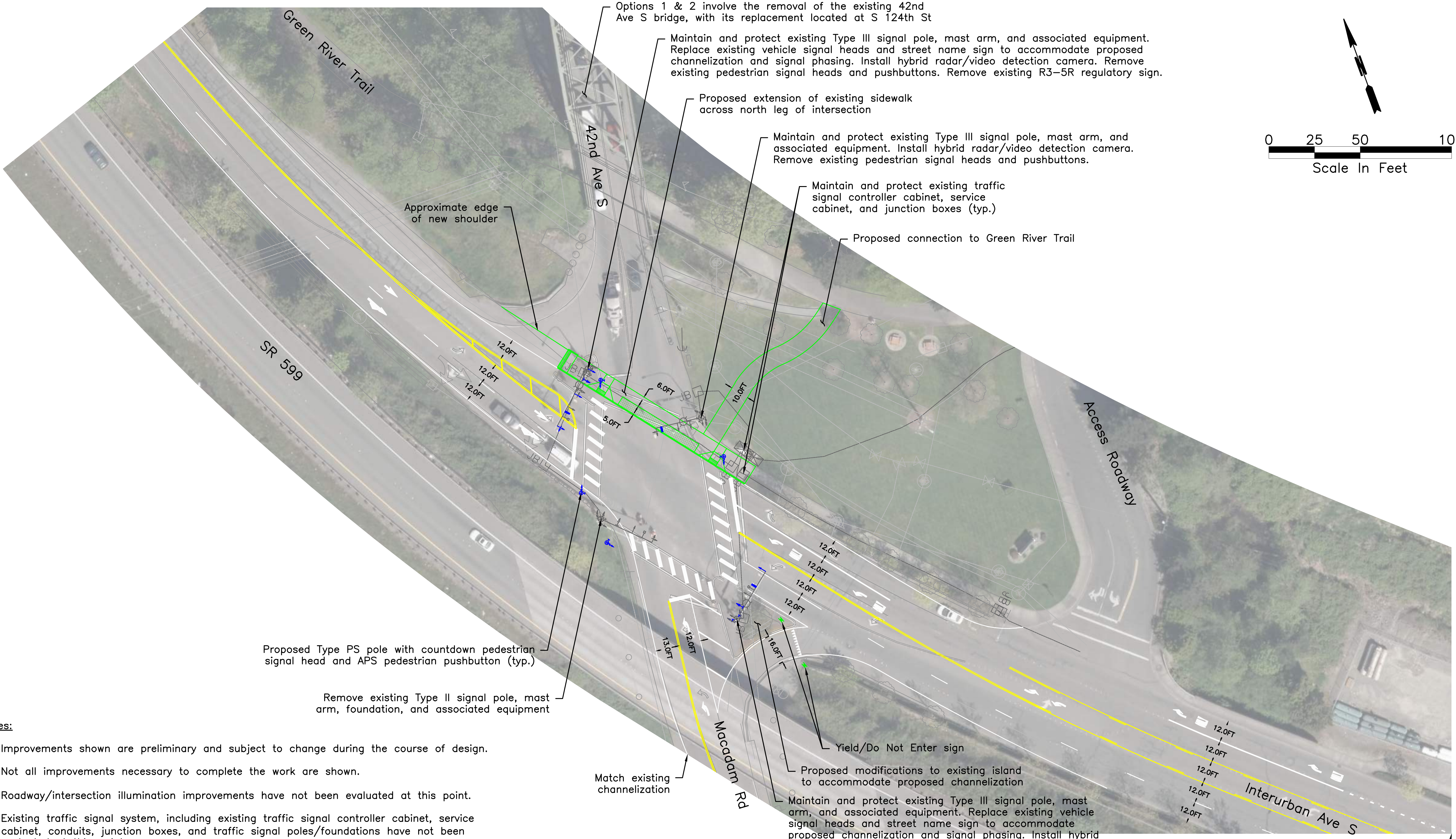
February 17, 2021

FIGURE

1

transpogroup
WHAT TRANSPORTATION CAN BE.

Feb 17, 2021 - 12:44am Damanin M:\20\1.20133.00 - Tukwila S 42nd Ave Bridge Replacement\Engineering\CAD\Conceptual\20133-TG-CONCEPT-INTERURBAN & 124TH.dwg Layout: Roundabout



Options 1 & 2 involve the removal of the existing 42nd Ave S bridge, with its replacement located at S 124th St

Maintain and protect existing Type III signal pole, mast arm, and associated equipment. Replace existing vehicle signal heads and street name sign to accommodate proposed channelization and signal phasing. Install hybrid radar/video detection camera. Remove existing pedestrian signal heads and pushbuttons. Remove existing R3-5R regulatory sign.

Proposed extension of existing sidewalk across north leg of intersection

Maintain and protect existing Type III signal pole, mast arm, and associated equipment. Install hybrid radar/video detection camera. Remove existing pedestrian signal heads and pushbuttons.

Maintain and protect existing traffic signal controller cabinet, service cabinet, and junction boxes (typ.)

Proposed connection to Green River Trail

Approximate edge of new shoulder

Proposed Type PS pole with countdown pedestrian signal head and APS pedestrian pushbutton (typ.)

Remove existing Type II signal pole, mast arm, foundation, and associated equipment

Match existing channelization

Yield/Do Not Enter sign

Proposed modifications to existing island to accommodate proposed channelization

Maintain and protect existing Type III signal pole, mast arm, and associated equipment. Replace existing vehicle signal heads and street name sign to accommodate proposed channelization and signal phasing. Install hybrid radar/video detection camera. Remove and replace existing pedestrian signal heads and pushbuttons with countdown pedestrian signal head and APS pedestrian pushbutton.

Match existing channelization

Notes:

1. Improvements shown are preliminary and subject to change during the course of design.
2. Not all improvements necessary to complete the work are shown.
3. Roadway/intersection illumination improvements have not been evaluated at this point.
4. Existing traffic signal system, including existing traffic signal controller cabinet, service cabinet, conduits, junction boxes, and traffic signal poles/foundations have not been evaluated at this point.

Conceptual Traffic Signal and Channelization Layout - Interurban Ave S & 42nd Ave S - Option 2

1.20133.00 - Tukwila 42nd Ave S Bridge Replacement

February 15, 2021

FIGURE
2

transpogroup
WHAT TRANSPORTATION CAN BE.

Feb 15, 2021 - 11:39am justlnc \\srv-dfs-wa\Projects\20\1.20133.00 - Tukwila S 42nd Ave Bridge Replacement\Engineering\CAD\Conceptual\20133-TG-CONCEPT-INTERURBAN&42ND-OPT1&2.dwg Layout: Option 2

Attachment F: Future (2040) LOS and Queue Worksheets

Intersection	
Intersection Delay, s/veh	13.5
Intersection LOS	B

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		↱			↰
Traffic Vol, veh/h	285	30	65	355	70	45
Future Vol, veh/h	285	30	65	355	70	45
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99
Heavy Vehicles, %	17	17	13	13	4	4
Mvmt Flow	288	30	66	359	71	45
Number of Lanes	1	0	1	0	0	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right	SB	WB	
Conflicting Lanes Right	1	1	0
HCM Control Delay	14.3	13.8	9.9
HCM LOS	B	B	A

Lane	NBLn1	WBLn1	SBLn1
Vol Left, %	0%	90%	61%
Vol Thru, %	15%	0%	39%
Vol Right, %	85%	10%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	420	315	115
LT Vol	0	285	70
Through Vol	65	0	45
RT Vol	355	30	0
Lane Flow Rate	424	318	116
Geometry Grp	1	1	1
Degree of Util (X)	0.565	0.502	0.182
Departure Headway (Hd)	4.791	5.678	5.637
Convergence, Y/N	Yes	Yes	Yes
Cap	759	636	637
Service Time	2.791	3.706	3.674
HCM Lane V/C Ratio	0.559	0.5	0.182
HCM Control Delay	13.8	14.3	9.9
HCM Lane LOS	B	B	A
HCM 95th-tile Q	3.6	2.8	0.7

2: 42nd Ave S & Interurban Ave S

Future (2040) No Action PM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBT	SBR
Lane Configurations	↰	↱	↰	↑	↱	↰	↑	↱	↰	↱
Traffic Volume (vph)	20	335	45	145	260	15	140	40	125	15
Future Volume (vph)	20	335	45	145	260	15	140	40	125	15
Turn Type	Prot	NA	Prot	NA	pt+ov	Split	NA	Free	NA	Perm
Protected Phases	7	4	3	8	8 6	2	2		6	
Permitted Phases								Free		6
Detector Phase	7	4	3	8	8 6	2	2		6	6
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0
Minimum Split (s)	15.0	23.0	15.0	23.0		23.0	23.0		23.0	23.0
Total Split (s)	15.0	26.0	15.0	26.0		24.0	24.0		25.0	25.0
Total Split (%)	16.7%	28.9%	16.7%	28.9%		26.7%	26.7%		27.8%	27.8%
Yellow Time (s)	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0
Lead/Lag	Lead	Lag	Lead	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes						
Recall Mode	None	None	None	None		Max	Max		Max	Max
Act Effct Green (s)	6.7	21.2	7.8	24.3	47.6	19.1	19.1	83.5	20.2	20.2
Actuated g/C Ratio	0.08	0.25	0.09	0.29	0.57	0.23	0.23	1.00	0.24	0.24
v/c Ratio	0.16	0.93	0.33	0.32	0.30	0.04	0.35	0.03	0.87	0.04
Control Delay	40.6	61.4	43.0	26.8	1.8	28.4	31.5	0.0	57.1	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.6	61.4	43.0	26.8	1.8	28.4	31.5	0.0	57.1	0.1
LOS	D	E	D	C	A	C	C	A	E	A
Approach Delay		60.4		14.0			24.7		54.5	
Approach LOS		E		B			C		D	

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 83.5

Natural Cycle: 85

Control Type: Actuated-Uncoordinated

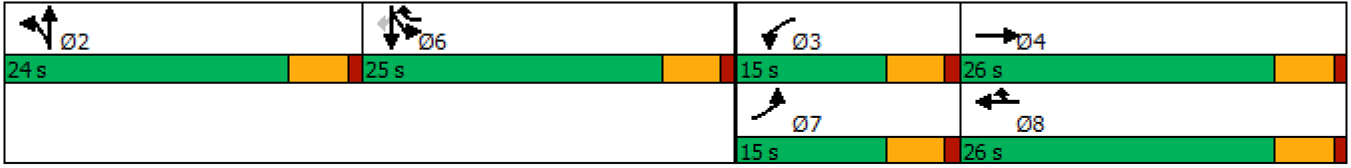
Maximum v/c Ratio: 0.93

Intersection Signal Delay: 38.9 Intersection LOS: D

Intersection Capacity Utilization 73.9% ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 2: 42nd Ave S & Interurban Ave S



Phasings
2: 42nd Ave S & Interurban Ave S

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBT	SBR
Protected Phases	7	4	3	8	8 6	2	2		6	
Permitted Phases								Free		6
Minimum Initial (s)	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0
Minimum Split (s)	15.0	23.0	15.0	23.0		23.0	23.0		23.0	23.0
Total Split (s)	15.0	26.0	15.0	26.0		24.0	24.0		25.0	25.0
Total Split (%)	16.7%	28.9%	16.7%	28.9%		26.7%	26.7%		27.8%	27.8%
Maximum Green (s)	10.0	21.0	10.0	21.0		19.0	19.0		20.0	20.0
Yellow Time (s)	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0
Lead/Lag	Lead	Lag	Lead	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0
Recall Mode	None	None	None	None		Max	Max		Max	Max
Walk Time (s)		7.0		7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		11.0		11.0		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0		0		0	0		0	0
90th %ile Green (s)	8.4	21.0	10.0	22.6		19.0	19.0		20.0	20.0
90th %ile Term Code	Gap	Max	Max	Hold		MaxR	MaxR		MaxR	MaxR
70th %ile Green (s)	7.3	21.0	9.3	23.0		19.0	19.0		20.0	20.0
70th %ile Term Code	Gap	Max	Gap	Hold		MaxR	MaxR		MaxR	MaxR
50th %ile Green (s)	0.0	21.0	8.0	34.0		19.0	19.0		20.0	20.0
50th %ile Term Code	Skip	Max	Gap	Hold		MaxR	MaxR		MaxR	MaxR
30th %ile Green (s)	0.0	21.0	0.0	21.0		19.0	19.0		20.0	20.0
30th %ile Term Code	Skip	Max	Skip	Hold		MaxR	MaxR		MaxR	MaxR
10th %ile Green (s)	0.0	21.0	0.0	21.0		19.0	19.0		20.0	20.0
10th %ile Term Code	Skip	Max	Skip	Hold		MaxR	MaxR		MaxR	MaxR

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 83.5

Control Type: Actuated-Uncoordinated

90th %ile Actuated Cycle: 90

70th %ile Actuated Cycle: 89.3

50th %ile Actuated Cycle: 88

30th %ile Actuated Cycle: 75

10th %ile Actuated Cycle: 75

Queues
2: 42nd Ave S & Interurban Ave S

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBT	SBR
Lane Group Flow (vph)	21	415	48	154	277	16	149	43	335	16
v/c Ratio	0.16	0.93	0.33	0.32	0.30	0.04	0.35	0.03	0.87	0.04
Control Delay	40.6	61.4	43.0	26.8	1.8	28.4	31.5	0.0	57.1	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.6	61.4	43.0	26.8	1.8	28.4	31.5	0.0	57.1	0.1
Queue Length 50th (ft)	11	225	25	57	0	7	71	0	183	0
Queue Length 95th (ft)	34	#428	60	128	23	24	129	0	#354	0
Internal Link Dist (ft)		394		179			500		964	
Turn Bay Length (ft)	150		125			80		50		90
Base Capacity (vph)	203	447	191	485	927	405	427	1564	384	446
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.93	0.25	0.32	0.30	0.04	0.35	0.03	0.87	0.04

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↱		↰	↑	↱	↰	↑	↱		↰↑	↱
Traffic Volume (veh/h)	20	335	55	45	145	260	15	140	40	190	125	15
Future Volume (veh/h)	20	335	55	45	145	260	15	140	40	190	125	15
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1796	1796	1796	1693	1693	1693	1870	1870	1870	1663	1663	1663
Adj Flow Rate, veh/h	21	356	59	48	154	277	16	149	0	202	133	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	7	7	7	14	14	14	2	2	2	16	16	16
Cap, veh/h	40	379	63	65	455	730	406	426		234	154	
Arrive On Green	0.02	0.25	0.25	0.04	0.27	0.27	0.23	0.23	0.00	0.24	0.24	0.00
Sat Flow, veh/h	1711	1502	249	1612	1693	1434	1781	1870	1585	973	641	1409
Grp Volume(v), veh/h	21	0	415	48	154	277	16	149	0	335	0	0
Grp Sat Flow(s),veh/h/ln	1711	0	1751	1612	1693	1434	1781	1870	1585	1614	0	1409
Q Serve(g_s), s	1.0	0.0	19.4	2.5	6.1	9.8	0.6	5.6	0.0	16.6	0.0	0.0
Cycle Q Clear(g_c), s	1.0	0.0	19.4	2.5	6.1	9.8	0.6	5.6	0.0	16.6	0.0	0.0
Prop In Lane	1.00		0.14	1.00		1.00	1.00		1.00	0.60		1.00
Lane Grp Cap(c), veh/h	40	0	441	65	455	730	406	426		387	0	
V/C Ratio(X)	0.53	0.00	0.94	0.74	0.34	0.38	0.04	0.35		0.86	0.00	
Avail Cap(c_a), veh/h	205	0	441	193	455	730	406	426		387	0	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	40.3	0.0	30.6	39.6	24.5	12.5	25.1	27.0	0.0	30.4	0.0	0.0
Incr Delay (d2), s/veh	10.6	0.0	28.4	15.1	0.4	0.3	0.2	2.3	0.0	21.9	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	0.0	11.3	1.2	2.4	4.9	0.3	2.7	0.0	8.6	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	50.9	0.0	58.9	54.7	24.9	12.8	25.2	29.2	0.0	52.3	0.0	0.0
LnGrp LOS	D	A	E	D	C	B	C	C		D	A	
Approach Vol, veh/h		436			479			165	A		335	A
Approach Delay, s/veh		58.6			20.9			28.9			52.3	
Approach LOS		E			C			C			D	

Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		24.0	8.4	26.0		25.0	6.9	27.4				
Change Period (Y+Rc), s		5.0	5.0	5.0		5.0	5.0	5.0				
Max Green Setting (Gmax), s		19.0	10.0	21.0		20.0	10.0	21.0				
Max Q Clear Time (g_c+I1), s		7.6	4.5	21.4		18.6	3.0	11.8				
Green Ext Time (p_c), s		0.6	0.0	0.0		0.3	0.0	1.3				

Intersection Summary	
HCM 6th Ctrl Delay	40.9
HCM 6th LOS	D

Notes

Unsignalized Delay for [NBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↰	↑↑	↑↱		↰	↱
Traffic Vol, veh/h	5	560	435	15	45	15
Future Vol, veh/h	5	560	435	15	45	15
Conflicting Peds, #/hr	1	0	0	1	1	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	50	-	-	-	55	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	12	12	17	17	8	8
Mvmt Flow	5	602	468	16	48	16

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	485	0	-	0	789	244
Stage 1	-	-	-	-	477	-
Stage 2	-	-	-	-	312	-
Critical Hdwy	4.34	-	-	-	6.96	7.06
Critical Hdwy Stg 1	-	-	-	-	5.96	-
Critical Hdwy Stg 2	-	-	-	-	5.96	-
Follow-up Hdwy	2.32	-	-	-	3.58	3.38
Pot Cap-1 Maneuver	1007	-	-	-	316	739
Stage 1	-	-	-	-	573	-
Stage 2	-	-	-	-	698	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1006	-	-	-	314	738
Mov Cap-2 Maneuver	-	-	-	-	427	-
Stage 1	-	-	-	-	570	-
Stage 2	-	-	-	-	697	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	13.4
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1006	-	-	-	427	738
HCM Lane V/C Ratio	0.005	-	-	-	0.113	0.022
HCM Control Delay (s)	8.6	-	-	-	14.5	10
HCM Lane LOS	A	-	-	-	B	B
HCM 95th %tile Q(veh)	0	-	-	-	0.4	0.1

Intersection	
Int Delay, s/veh	3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Vol, veh/h	65	370	5	0	290	15	5	5	5	45	5	45
Future Vol, veh/h	65	370	5	0	290	15	5	5	5	45	5	45
Conflicting Peds, #/hr	0	0	0	0	0	2	0	0	0	2	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	99	92	92	92	99	92	92
Heavy Vehicles, %	17	17	17	17	17	17	13	13	13	4	4	4
Mvmt Flow	71	402	5	0	315	15	5	5	5	45	5	49

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	332	0	0	407	0	0	897	879	407	879	874	325
Stage 1	-	-	-	-	-	-	547	547	-	325	325	-
Stage 2	-	-	-	-	-	-	350	332	-	554	549	-
Critical Hdwy	4.27	-	-	4.27	-	-	7.23	6.63	6.33	7.14	6.54	6.24
Critical Hdwy Stg 1	-	-	-	-	-	-	6.23	5.63	-	6.14	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.23	5.63	-	6.14	5.54	-
Follow-up Hdwy	2.353	-	-	2.353	-	-	3.617	4.117	3.417	3.536	4.036	3.336
Pot Cap-1 Maneuver	1148	-	-	1075	-	-	249	275	621	266	286	712
Stage 1	-	-	-	-	-	-	502	500	-	683	645	-
Stage 2	-	-	-	-	-	-	644	625	-	513	513	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1146	-	-	1075	-	-	214	252	620	243	263	711
Mov Cap-2 Maneuver	-	-	-	-	-	-	214	252	-	243	263	-
Stage 1	-	-	-	-	-	-	462	460	-	627	644	-
Stage 2	-	-	-	-	-	-	595	624	-	461	472	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.2	0	18	18.7
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	293	1146	-	-	1075	-	-	361
HCM Lane V/C Ratio	0.056	0.062	-	-	-	-	-	0.276
HCM Control Delay (s)	18	8.3	0	-	0	-	-	18.7
HCM Lane LOS	C	A	A	-	A	-	-	C
HCM 95th %tile Q(veh)	0.2	0.2	-	-	0	-	-	1.1

2: 42nd Ave S & Interurban Ave S

Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Configurations	↑↱	↰	↑	↰	↱
Traffic Volume (vph)	525	45	405	155	40
Future Volume (vph)	525	45	405	155	40
Turn Type	NA	Prot	NA	Prot	Perm
Protected Phases	2	1	6	3	
Permitted Phases					8
Detector Phase	2	1	6	3	8
Switch Phase					
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	23.0	15.0	23.0	15.0	23.0
Total Split (s)	32.0	15.0	47.0	23.0	23.0
Total Split (%)	45.7%	21.4%	67.1%	32.9%	32.9%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes			
Recall Mode	None	None	Max	None	Max
Act Effct Green (s)	33.8	7.6	42.0	18.0	18.0
Actuated g/C Ratio	0.48	0.11	0.60	0.26	0.26
v/c Ratio	0.47	0.28	0.43	0.36	0.10
Control Delay	13.4	32.2	9.2	24.1	7.8
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	13.4	32.2	9.2	24.1	7.8
LOS	B	C	A	C	A
Approach Delay	13.4		11.5	20.7	
Approach LOS	B		B	C	

Intersection Summary

Cycle Length: 70
Actuated Cycle Length: 70
Natural Cycle: 65
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.47
Intersection Signal Delay: 13.8 Intersection LOS: B
Intersection Capacity Utilization 45.5% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 2: 42nd Ave S & Interurban Ave S

	→	↙	←	↖	↗
Lane Group	EBT	WBL	WBT	NBL	NBR
Protected Phases	2	1	6	3	
Permitted Phases					8
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	23.0	15.0	23.0	15.0	23.0
Total Split (s)	32.0	15.0	47.0	23.0	23.0
Total Split (%)	45.7%	21.4%	67.1%	32.9%	32.9%
Maximum Green (s)	27.0	10.0	42.0	18.0	18.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0
Lead/Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes			
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	Max	None	Max
Walk Time (s)	7.0		7.0		7.0
Flash Dont Walk (s)	11.0		11.0		11.0
Pedestrian Calls (#/hr)	0		0		0
90th %ile Green (s)	27.0	10.0	42.0	18.0	18.0
90th %ile Term Code	Max	Max	MaxR	Hold	MaxR
70th %ile Green (s)	28.4	8.6	42.0	18.0	18.0
70th %ile Term Code	Hold	Gap	MaxR	Hold	MaxR
50th %ile Green (s)	29.5	7.5	42.0	18.0	18.0
50th %ile Term Code	Hold	Gap	MaxR	Hold	MaxR
30th %ile Green (s)	42.0	0.0	42.0	18.0	18.0
30th %ile Term Code	Hold	Skip	MaxR	Hold	MaxR
10th %ile Green (s)	42.0	0.0	42.0	18.0	18.0
10th %ile Term Code	Hold	Skip	MaxR	Hold	MaxR

Intersection Summary

Cycle Length: 70
Actuated Cycle Length: 70
Control Type: Actuated-Uncoordinated
90th %ile Actuated Cycle: 70
70th %ile Actuated Cycle: 70
50th %ile Actuated Cycle: 70
30th %ile Actuated Cycle: 70
10th %ile Actuated Cycle: 70

	→	↙	←	↖	↗
Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	750	48	431	165	43
v/c Ratio	0.47	0.28	0.43	0.36	0.10
Control Delay	13.4	32.2	9.2	24.1	7.8
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	13.4	32.2	9.2	24.1	7.8
Queue Length 50th (ft)	107	19	89	58	0
Queue Length 95th (ft)	168	47	146	109	22
Internal Link Dist (ft)	1009		179	500	
Turn Bay Length (ft)		125		80	50
Base Capacity (vph)	1606	226	1000	455	433
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.47	0.21	0.43	0.36	0.10

Intersection Summary

2: 42nd Ave S & Interurban Ave S

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↱		↰	↑	↰	↱
Traffic Volume (veh/h)	525	180	45	405	155	40
Future Volume (veh/h)	525	180	45	405	155	40
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1796	1796	1693	1693	1870	1870
Adj Flow Rate, veh/h	559	191	48	431	165	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	7	7	14	14	2	2
Cap, veh/h	1449	493	74	1203	214	
Arrive On Green	0.58	0.58	0.05	0.71	0.12	0.00
Sat Flow, veh/h	2588	851	1612	1693	1781	1585
Grp Volume(v), veh/h	381	369	48	431	165	0
Grp Sat Flow(s),veh/h/ln	1706	1643	1612	1693	1781	1585
Q Serve(g_s), s	7.1	7.2	1.7	5.8	5.3	0.0
Cycle Q Clear(g_c), s	7.1	7.2	1.7	5.8	5.3	0.0
Prop In Lane		0.52	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	989	953	74	1203	214	
V/C Ratio(X)	0.39	0.39	0.65	0.36	0.77	
Avail Cap(c_a), veh/h	989	953	273	1203	542	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	6.7	6.7	27.7	3.3	25.2	0.0
Incr Delay (d2), s/veh	0.2	0.3	9.0	0.8	5.8	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.0	2.0	0.8	1.4	2.4	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	7.0	7.0	36.7	4.2	31.0	0.0
LnGrp LOS	A	A	D	A	C	
Approach Vol, veh/h	750			479	165	A
Approach Delay, s/veh	7.0			7.4	31.0	
Approach LOS	A			A	C	

Timer - Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	7.7	39.3				47.0		12.1
Change Period (Y+Rc), s	5.0	5.0				5.0		5.0
Max Green Setting (Gmax), s	10.0	27.0				42.0		18.0
Max Q Clear Time (g_c+I1), s	3.7	9.2				7.8		7.3
Green Ext Time (p_c), s	0.0	4.6				3.0		0.3

Intersection Summary			
HCM 6th Ctrl Delay			10.0
HCM 6th LOS			A

Notes

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

3: Interurban Ave S & Access Roadway

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↰	↑↑	↱		↰	↱
Traffic Vol, veh/h	5	560	435	15	45	15
Future Vol, veh/h	5	560	435	15	45	15
Conflicting Peds, #/hr	1	0	0	1	1	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	50	-	-	-	55	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	12	12	17	17	8	8
Mvmt Flow	5	602	468	16	48	16

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	485	0	-	0	789	478
Stage 1	-	-	-	-	477	-
Stage 2	-	-	-	-	312	-
Critical Hdwy	4.28	-	-	-	6.72	6.32
Critical Hdwy Stg 1	-	-	-	-	5.52	-
Critical Hdwy Stg 2	-	-	-	-	5.92	-
Follow-up Hdwy	2.314	-	-	-	3.576	3.376
Pot Cap-1 Maneuver	1017	-	-	-	333	572
Stage 1	-	-	-	-	608	-
Stage 2	-	-	-	-	701	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1016	-	-	-	331	571
Mov Cap-2 Maneuver	-	-	-	-	445	-
Stage 1	-	-	-	-	604	-
Stage 2	-	-	-	-	700	-

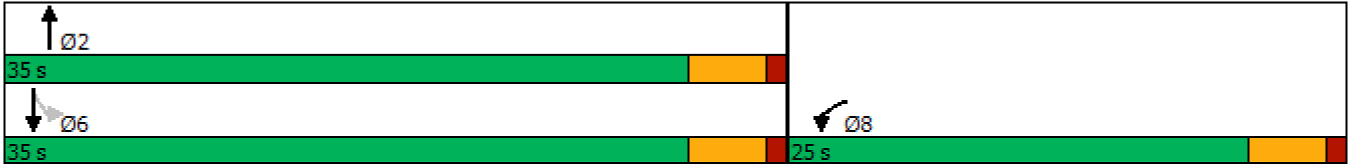
Approach	EB		WB		SB	
HCM Control Delay, s	0.1		0		13.5	
HCM LOS					B	

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1016	-	-	-	445	571
HCM Lane V/C Ratio	0.005	-	-	-	0.109	0.028
HCM Control Delay (s)	8.6	-	-	-	14.1	11.5
HCM Lane LOS	A	-	-	-	B	B
HCM 95th %tile Q(veh)	0	-	-	-	0.4	0.1

Lane Group	WBL	NBT	SBL	SBT
Lane Configurations	↙↙	↑↱		↰↑
Traffic Volume (vph)	315	160	40	390
Future Volume (vph)	315	160	40	390
Turn Type	Prot	NA	Perm	NA
Protected Phases	8	2		6
Permitted Phases			6	
Detector Phase	8	2	6	6
Switch Phase				
Minimum Initial (s)	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5	22.5	22.5
Total Split (s)	25.0	35.0	35.0	35.0
Total Split (%)	41.7%	58.3%	58.3%	58.3%
Yellow Time (s)	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0
Total Lost Time (s)	4.5	4.5		4.5
Lead/Lag				
Lead-Lag Optimize?				
Recall Mode	None	Max	Max	Max
Act Effct Green (s)	17.0	31.1		31.1
Actuated g/C Ratio	0.30	0.54		0.54
v/c Ratio	0.79	0.62		0.54
Control Delay	31.1	8.0		12.4
Queue Delay	0.0	0.0		0.0
Total Delay	31.1	8.0		12.4
LOS	C	A		B
Approach Delay	31.1	8.0		12.4
Approach LOS	C	A		B

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 57.1	
Natural Cycle: 55	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.79	
Intersection Signal Delay: 15.4	Intersection LOS: B
Intersection Capacity Utilization 80.3%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 4: Interurban Ave S & S 124th St



	↙	↑	↘	↓
Lane Group	WBL	NBT	SBL	SBT
Protected Phases	8	2		6
Permitted Phases			6	
Minimum Initial (s)	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5	22.5	22.5
Total Split (s)	25.0	35.0	35.0	35.0
Total Split (%)	41.7%	58.3%	58.3%	58.3%
Maximum Green (s)	20.5	30.5	30.5	30.5
Yellow Time (s)	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0
Lead/Lag				
Lead-Lag Optimize?				
Vehicle Extension (s)	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0
Recall Mode	None	Max	Max	Max
Walk Time (s)	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0
90th %ile Green (s)	20.5	30.5	30.5	30.5
90th %ile Term Code	Max	MaxR	MaxR	MaxR
70th %ile Green (s)	20.5	30.5	30.5	30.5
70th %ile Term Code	Max	MaxR	MaxR	MaxR
50th %ile Green (s)	18.4	30.5	30.5	30.5
50th %ile Term Code	Gap	MaxR	MaxR	MaxR
30th %ile Green (s)	15.0	30.5	30.5	30.5
30th %ile Term Code	Gap	MaxR	MaxR	MaxR
10th %ile Green (s)	11.1	32.8	32.8	32.8
10th %ile Term Code	Gap	Dwell	Dwell	Dwell

Intersection Summary

Cycle Length: 60
Actuated Cycle Length: 57.1
Control Type: Actuated-Uncoordinated
90th %ile Actuated Cycle: 60
70th %ile Actuated Cycle: 60
50th %ile Actuated Cycle: 57.9
30th %ile Actuated Cycle: 54.5
10th %ile Actuated Cycle: 52.9

Queues

4: Interurban Ave S & S 124th St

	↙	↑	↓
Lane Group	WBL	NBT	SBT
Lane Group Flow (vph)	362	596	458
v/c Ratio	0.79	0.62	0.54
Control Delay	31.1	8.0	12.4
Queue Delay	0.0	0.0	0.0
Total Delay	31.1	8.0	12.4
Queue Length 50th (ft)	108	53	97
Queue Length 95th (ft)	#202	154	187
Internal Link Dist (ft)	274	1009	238
Turn Bay Length (ft)			
Base Capacity (vph)	557	960	842
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.65	0.62	0.54

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

4: Interurban Ave S & S 124th St

	↙	↖	↑	↗	↘	↓
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		↱			↰
Traffic Volume (veh/h)	315	25	160	400	40	390
Future Volume (veh/h)	315	25	160	400	40	390
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	1648	1648	1693	1693	1707	1707
Adj Flow Rate, veh/h	335	27	170	426	43	415
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	17	17	14	14	13	13
Cap, veh/h	388	31	241	604	112	818
Arrive On Green	0.27	0.27	0.56	0.56	0.56	0.56
Sat Flow, veh/h	1435	116	428	1072	70	1451
Grp Volume(v), veh/h	363	0	0	596	458	0
Grp Sat Flow(s),veh/h/ln	1555	0	0	1500	1521	0
Q Serve(g_s), s	12.0	0.0	0.0	15.6	0.7	0.0
Cycle Q Clear(g_c), s	12.0	0.0	0.0	15.6	16.3	0.0
Prop In Lane	0.92	0.07		0.71	0.09	
Lane Grp Cap(c), veh/h	420	0	0	845	930	0
V/C Ratio(X)	0.86	0.00	0.00	0.71	0.49	0.00
Avail Cap(c_a), veh/h	589	0	0	845	930	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	18.8	0.0	0.0	8.6	7.1	0.0
Incr Delay (d2), s/veh	9.3	0.0	0.0	4.9	1.9	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.9	0.0	0.0	4.8	2.8	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	28.1	0.0	0.0	13.5	9.0	0.0
LnGrp LOS	C	A	A	B	A	A
Approach Vol, veh/h	363		596			458
Approach Delay, s/veh	28.1		13.5			9.0
Approach LOS	C		B			A

Timer - Assigned Phs	2	6	8
Phs Duration (G+Y+Rc), s	35.0	35.0	19.1
Change Period (Y+Rc), s	4.5	4.5	4.5
Max Green Setting (Gmax), s	30.5	30.5	20.5
Max Q Clear Time (g_c+I1), s	17.6	18.3	14.0
Green Ext Time (p_c), s	3.6	2.4	0.7

Intersection Summary	
HCM 6th Ctrl Delay	15.8
HCM 6th LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

MOVEMENT SUMMARY

Site: 101 [Interurban Ave S/S 124th St]

2040 Option 2 Weekday PM Peak Hour
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed mph
South: Interurban Ave S												
8	T1	170	14.0	0.534	4.4	LOS A	4.7	129.8	0.32	0.44	0.32	36.9
18	R2	426	14.0	0.534	4.5	LOS A	4.7	129.8	0.32	0.44	0.32	35.7
Approach		596	14.0	0.534	4.5	LOS A	4.7	129.8	0.32	0.44	0.32	36.0
East: S 124th St												
1	L2	335	17.0	0.378	11.4	LOS B	2.2	62.8	0.46	0.67	0.46	33.6
16	R2	27	17.0	0.378	5.5	LOS A	2.2	62.8	0.46	0.67	0.46	32.7
Approach		362	17.0	0.378	11.0	LOS B	2.2	62.8	0.46	0.67	0.46	33.5
North: Interurban Ave S												
7	L2	43	13.0	0.543	13.8	LOS B	4.1	114.2	0.71	0.78	0.78	35.0
4	T1	415	13.0	0.543	7.8	LOS A	4.1	114.2	0.71	0.78	0.78	35.1
Approach		457	13.0	0.543	8.4	LOS A	4.1	114.2	0.71	0.78	0.78	35.1
All Vehicles		1415	14.4	0.543	7.4	LOS A	4.7	129.8	0.48	0.61	0.50	35.0

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Attachment G: Signal Warrant Volumes and Worksheets

Warrants Summary

Information

Analyst	Transpo Group	Intersection	42nd Ave S/S 124th St
Agency/Co	Transpo Group	Jurisdiction	City of Tukwila
Date Performed	1/6/2021	Units	U.S. Customary
Project ID	1.20133.00	Time Period Analyzed	Option 3 Forecast 2040
East/West Street	S 124th St	North/South Street	42nd Ave S
File Name	42nd Ave S & S 124th St - Forecast 2040.xhy	Major Street	North-South

Project Description *1.20133.00*

General				**Roadway Network**	
Major Street Speed (mph)	25	☐	Population < 10,000	Two Major Routes	☐
Nearest Signal (ft)	1050	☐	Coordinated Signal System	Weekend Count	☐
Crashes (per year)	0	☐	Adequate Trials of Alternatives	5-yr Growth Factor	0

Geometry and Traffic	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N	0	0	0	0	0	0	0	1	0	0	1	0
Lane usage					LR			TR			LT	
Vehicle Volume Averages (vph)	0	0	0	210	0	22	0	48	262	51	33	0
Peds (ped/h) / Gaps (gaps/h)	--	0 / 0	--	--	0 / 0	--	--	0 / 0	--	--	0 / 0	--
Delay (s/veh) / (veh-hr)	--	0 / 0	--	--	0 / 0	--	--	0 / 0	--	--	0 / 0	--

Warrant 1: Eight-Hour Vehicular Volume	☐
1 A. Minimum Vehicular Volumes (Both major approaches --and-- higher minor approach) --or--	☐
1 B. Interruption of Continuous Traffic (Both major approaches --and-- higher minor approach) --or--	☐
1 (80%) Vehicular --and-- Interruption Volumes (Both major approaches --and-- higher minor approach)	☐
Warrant 2: Four-Hour Vehicular Volume	☐
2 A. Four-Hour Vehicular Volumes (Both major approaches --and-- higher minor approach)	☐
Warrant 3: Peak Hour	☐
3 A. Peak-Hour Conditions (Minor delay --and-- minor volume --and-- total volume) --or--	☐
3 B. Peak- Hour Vehicular Volumes (Both major approaches --and-- higher minor approach)	☐
Warrant 4: Pedestrian Volume	☐
4 A. Four Hour Volumes --or--	☐
4 B. One-Hour Volumes	☐
Warrant 5: School Crossing	☐
5. Student Volumes --and--	☐
5. Gaps Same Period	☐
Warrant 6: Coordinated Signal System	☐
6. Degree of Platooning (Predominant direction or both directions)	☐
Warrant 7: Crash Experience	☐
7 A. Adequate trials of alternatives, observance and enforcement failed --and--	☐
7 B. Reported crashes susceptible to correction by signal (12-month period) --and--	☐

7 C. (80%) Volumes for Warrants 1A, 1B --or-- 4 are satisfied	☐
Warrant 8: Roadway Network	☐
8 A. Weekday Volume (Peak hour total --and-- projected warrants 1, 2 or 3) --or--	☐
8 B. Weekend Volume (Five hours total)	☐
Warrant 9: Grade Crossing	☐
9 A. Grade Crossing within 140 ft --and--	☐
9 B. Peak-Hour Vehicular Volumes	☐

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Warrants Volume

Information

Analyst	Transpo Group
Agency/Co	Transpo Group
Date Performed	1/6/2021
Project ID	1.20133.00
East/West Street	S 124th St
File Name	42nd Ave S & S 124th St - Forecast 2040.xhy

Intersection	42nd Ave S/S 124th St
Jurisdiction	City of Tukwila
Units	U.S. Customary
Time Period Analyzed	Option 3 Forecast 2040
North/South Street	42nd Ave S
Major Street	North-South

Project Description *1.20133.00*

Warrant 1

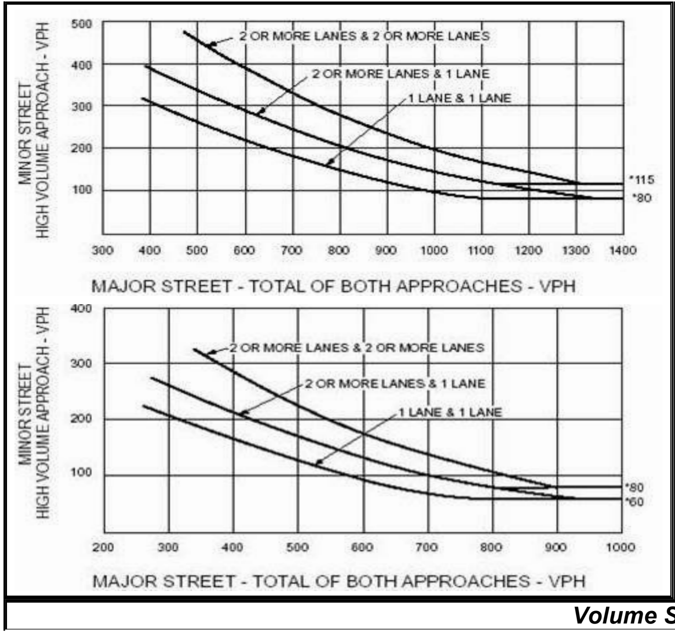
Condition A—Minimum Vehicular Volume

Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%	80%	70%	56%	100%	80%	70%	56%
1	1	500	400	350	280	150	120	105	84
2 or more	1	600	480	420	336	150	120	105	84
2 or more	2 or more	600	480	420	336	200	160	140	112
1	2 or more	500	400	350	280	200	160	140	112

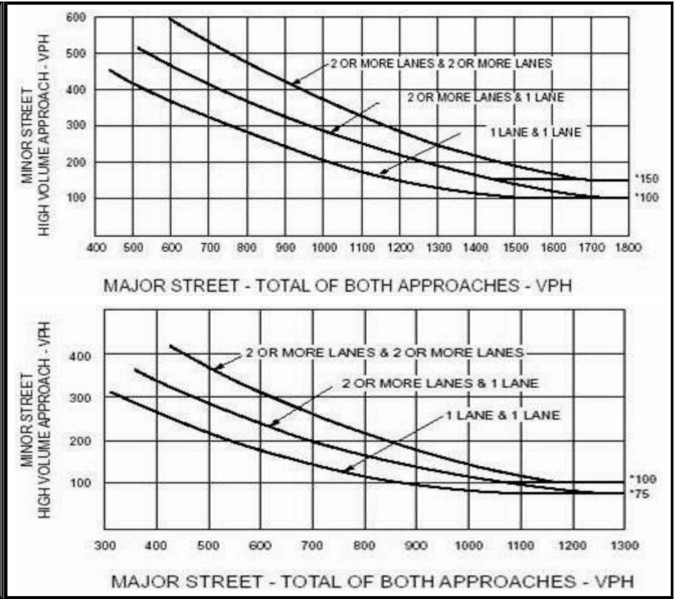
Condition B—Interruption of Continuous Traffic

Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%	80%	70%	56%	100%	80%	70%	56%
1	1	750	600	525	420	75	60	53	42
2 or more	1	900	720	630	504	75	60	53	42
2 or more	2 or more	900	720	630	504	100	80	70	56
1	2 or more	750	600	525	420	100	80	70	56

Warrant 2



Warrant 3



Volume Summary

Major Street Lanes 1 **Minor Street Lanes** 1 **Speed** 25 **Population** 10000+

Hours	Major Volume	Minor Volume	Total Volume	1A (100%)	1A (80%)	1B (100%)	1B (80%)	2 (100%)	3A (100%)	3B (100%)
07-08	421	249	670	No	Yes	No	No	No	No	No
08-09	313	185	498	No	No	No	No	No	No	No
09-10	228	134	362	No	No	No	No	No	No	No
10-11	281	165	446	No	No	No	No	No	No	No
11-12	326	191	517	No	No	No	No	No	No	No
12-13	427	251	678	No	Yes	No	No	No	No	No
13-14	366	216	582	No	No	No	No	No	No	No
14-15	401	236	637	No	Yes	No	No	No	No	No
15-16	520	306	826	Yes	Yes	No	No	Yes	No	No
16-17	535	315	850	Yes	Yes	No	No	Yes	No	No
17-18	528	312	840	Yes	Yes	No	No	Yes	No	No
18-19	392	231	623	No	No	No	No	No	No	No
Totals	4738	2791	7529	3	6	0	0	3	0	0

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Warrants Summary

Information			
Analyst	Transpo Group	Intersection	Access Roadway/Interurban Ave
Agency/Co	Transpo Group	Jurisdiction	City of Tukwila
Date Performed	1/6/2021	Units	U.S. Customary
Project ID	1.20133.00	Time Period Analyzed	Option 3 Forecast 2040
East/West Street	Interurban Ave S	North/South Street	Access Roadway
File Name	Access Roadway & Interurban Ave S - Option 3 - Forecast 2040.xhy	Major Street	East-West

Project Description *1.20133.00*

General				**Roadway Network**	
Major Street Speed (mph)	35	☐	Population < 10,000	Two Major Routes	☐
Nearest Signal (ft)	280	☐	Coordinated Signal System	Weekend Count	☐
Crashes (per year)	0	☐	Adequate Trials of Alternatives	5-yr Growth Factor	0

Geometry and Traffic	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N	1	2	0	0	2	0	0	0	0	1	0	1
Lane usage	L	T			TR					L		R
Vehicle Volume Averages (vph)	3	413	0	0	320	11	0	0	0	33	0	11
Peds (ped/h) / Gaps (gaps/h)	--	0 / 0	--	--	0 / 0	--	--	0 / 0	--	--	0 / 0	--
Delay (s/veh) / (veh-hr)	--	0 / 0	--	--	0 / 0	--	--	0 / 0	--	--	0 / 0	--

Warrant 1: Eight-Hour Vehicular Volume	☐
1 A. Minimum Vehicular Volumes (Both major approaches --and-- higher minor approach) --or--	☐
1 B. Interruption of Continuous Traffic (Both major approaches --and-- higher minor approach) --or--	☐
1 (80%) Vehicular --and-- Interruption Volumes (Both major approaches --and-- higher minor approach)	☐
Warrant 2: Four-Hour Vehicular Volume	☐
2 A. Four-Hour Vehicular Volumes (Both major approaches --and-- higher minor approach)	☐
Warrant 3: Peak Hour	☐
3 A. Peak-Hour Conditions (Minor delay --and-- minor volume --and-- total volume) --or--	☐
3 B. Peak- Hour Vehicular Volumes (Both major approaches --and-- higher minor approach)	☐
Warrant 4: Pedestrian Volume	☐
4 A. Four Hour Volumes --or--	☐
4 B. One-Hour Volumes	☐
Warrant 5: School Crossing	☐
5. Student Volumes --and--	☐
5. Gaps Same Period	☐
Warrant 6: Coordinated Signal System	☐
6. Degree of Platooning (Predominant direction or both directions)	☐
Warrant 7: Crash Experience	☐
7 A. Adequate trials of alternatives, observance and enforcement failed --and--	☐
7 B. Reported crashes susceptible to correction by signal (12-month period) --and--	☐

7 C. (80%) Volumes for Warrants 1A, 1B --or-- 4 are satisfied	☐
Warrant 8: Roadway Network	☐
8 A. Weekday Volume (Peak hour total --and-- projected warrants 1, 2 or 3) --or--	☐
8 B. Weekend Volume (Five hours total)	☐
Warrant 9: Grade Crossing	☐
9 A. Grade Crossing within 140 ft --and--	☐
9 B. Peak-Hour Vehicular Volumes	☐

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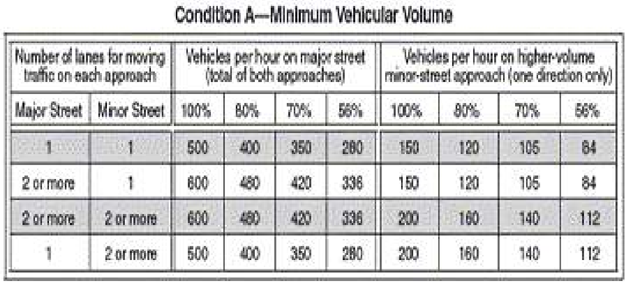
Warrants Volume

Information

Analyst	Transpo Group	Intersection	Access Roadway/Interurban Ave
Agency/Co	Transpo Group	Jurisdiction	City of Tukwila
Date Performed	1/6/2021	Units	U.S. Customary
Project ID	1.20133.00	Time Period Analyzed	Option 3 Forecast 2040
East/West Street	Interurban Ave S	North/South Street	Access Roadway
File Name	Access Roadway & Interurban Ave S - Option 3 - Forecast 2040.xhy	Major Street	East-West

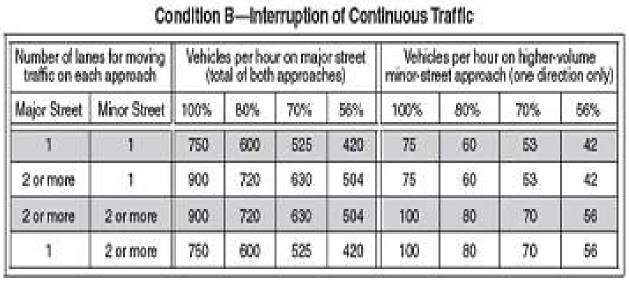
Project Description *1.20133.00*

Warrant 1



Condition A—Minimum Vehicular Volume

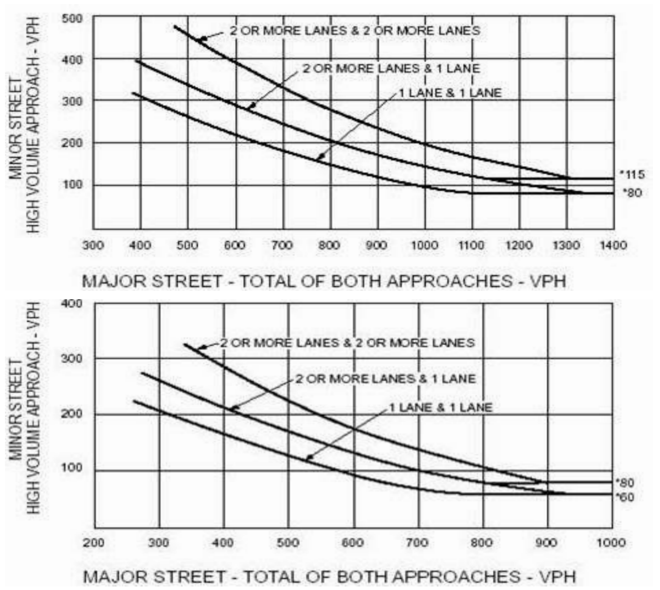
Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%	80%	70%	56%	100%	80%	70%	56%
1	1	500	400	350	280	150	120	105	84
2 or more	1	600	480	420	336	150	120	105	84
2 or more	2 or more	600	480	420	336	200	160	140	112
1	2 or more	500	400	350	280	200	160	140	112



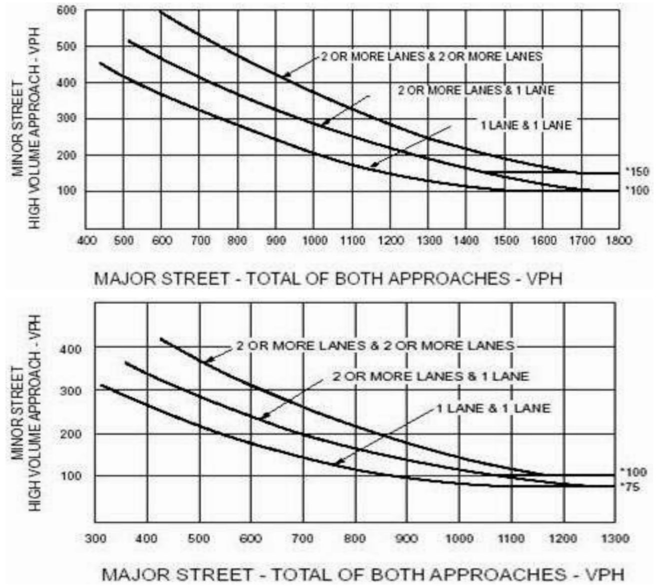
Condition B—Interruption of Continuous Traffic

Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%	80%	70%	56%	100%	80%	70%	56%
1	1	750	600	525	420	75	60	53	42
2 or more	1	900	720	630	504	75	60	53	42
2 or more	2 or more	900	720	630	504	100	80	70	56
1	2 or more	750	600	525	420	100	80	70	56

Warrant 2



Warrant 3



Volume Summary

Major Street Lanes 2+ **Minor Street Lanes** 2+ **Speed** 35 **Population** 10000+

Hours	Major Volume	Minor Volume	Total Volume	1A (100%)	1A (80%)	1B (100%)	1B (80%)	2 (100%)	3A (100%)	3B (100%)
07-08	801	47	848	No	No	No	No	No	No	No
08-09	595	35	630	No	No	No	No	No	No	No
09-10	431	25	456	No	No	No	No	No	No	No
10-11	531	32	563	No	No	No	No	No	No	No
11-12	616	36	652	No	No	No	No	No	No	No
12-13	809	48	857	No	No	No	No	No	No	No
13-14	693	41	734	No	No	No	No	No	No	No
14-15	761	45	806	No	No	No	No	No	No	No
15-16	987	59	1046	No	No	No	No	No	No	No
16-17	1015	60	1075	No	No	No	No	No	No	No
17-18	1004	59	1063	No	No	No	No	No	No	No
18-19	743	44	787	No	No	No	No	No	No	No
Totals	8986	531	9517	0	0	0	0	0	0	0

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Warrants Summary

Information			
Analyst	Transpo Group	Intersection	42nd Ave S/S 124th St
Agency/Co	Transpo Group	Jurisdiction	City of Tukwila
Date Performed	1/6/2021	Units	U.S. Customary
Project ID	1.20133.00	Time Period Analyzed	Forecast 2040
East/West Street	S 124th St	North/South Street	42nd Ave S
File Name	42nd Ave S & S 124th St - Forecast 2040.xhy	Major Street	East-West

Project Description *1.20133.00*

General				**Roadway Network**	
Major Street Speed (mph)	25	☐	Population < 10,000	Two Major Routes	☐
Nearest Signal (ft)	1050	☐	Coordinated Signal System	Weekend Count	☐
Crashes (per year)	0	☐	Adequate Trials of Alternatives	5-yr Growth Factor	0

Geometry and Traffic	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N	0	1	0	0	1	0	0	0	0	0	0	0
Lane usage		LT			TR						LR	
Vehicle Volume Averages (vph)	48	276	0	0	217	14	0	0	0	36	0	33
Peds (ped/h) / Gaps (gaps/h)	--	0 / 0	--	--	0 / 0	--	--	0 / 0	--	--	0 / 0	--
Delay (s/veh) / (veh-hr)	--	0 / 0	--	--	0 / 0	--	--	0 / 0	--	--	0 / 0	--

Warrant 1: Eight-Hour Vehicular Volume	☐
1 A. Minimum Vehicular Volumes (Both major approaches --and-- higher minor approach) --or--	☐
1 B. Interruption of Continuous Traffic (Both major approaches --and-- higher minor approach) --or--	☐
1 (80%) Vehicular --and-- Interruption Volumes (Both major approaches --and-- higher minor approach)	☐
Warrant 2: Four-Hour Vehicular Volume	☐
2 A. Four-Hour Vehicular Volumes (Both major approaches --and-- higher minor approach)	☐
Warrant 3: Peak Hour	☐
3 A. Peak-Hour Conditions (Minor delay --and-- minor volume --and-- total volume) --or--	☐
3 B. Peak- Hour Vehicular Volumes (Both major approaches --and-- higher minor approach)	☐
Warrant 4: Pedestrian Volume	☐
4 A. Four Hour Volumes --or--	☐
4 B. One-Hour Volumes	☐
Warrant 5: School Crossing	☐
5. Student Volumes --and--	☐
5. Gaps Same Period	☐
Warrant 6: Coordinated Signal System	☐
6. Degree of Platooning (Predominant direction or both directions)	☐
Warrant 7: Crash Experience	☐
7 A. Adequate trials of alternatives, observance and enforcement failed --and--	☐
7 B. Reported crashes susceptible to correction by signal (12-month period) --and--	☐

7 C. (80%) Volumes for Warrants 1A, 1B --or-- 4 are satisfied	☐
Warrant 8: Roadway Network	☐
8 A. Weekday Volume (Peak hour total --and-- projected warrants 1, 2 or 3) --or--	☐
8 B. Weekend Volume (Five hours total)	☐
Warrant 9: Grade Crossing	☐
9 A. Grade Crossing within 140 ft --and--	☐
9 B. Peak-Hour Vehicular Volumes	☐

Warrants Volume

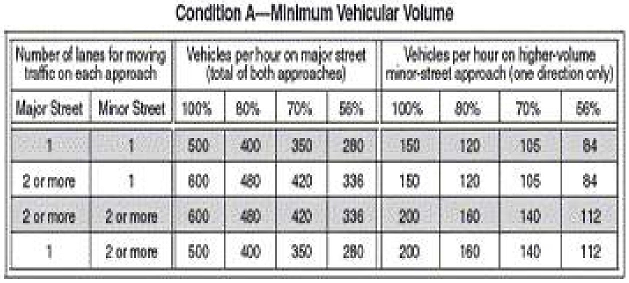
Information

Analyst	Transpo Group
Agency/Co	Transpo Group
Date Performed	1/6/2021
Project ID	1.20133.00
East/West Street	S 124th St
File Name	42nd Ave S & S 124th St - Forecast 2040.xhy

Intersection	42nd Ave S/S 124th St
Jurisdiction	City of Tukwila
Units	U.S. Customary
Time Period Analyzed	Forecast 2040
North/South Street	42nd Ave S
Major Street	East-West

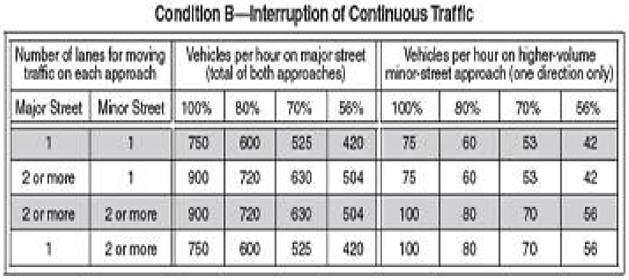
Project Description *1.20133.00*

Warrant 1



Condition A—Minimum Vehicular Volume

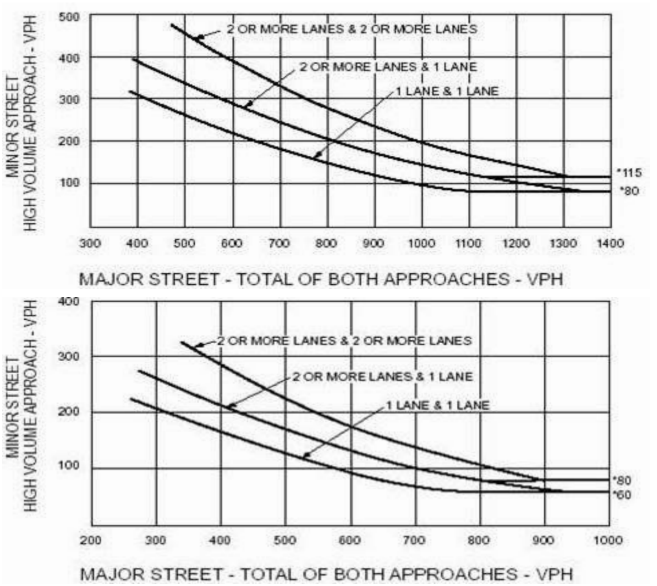
Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%	80%	70%	56%	100%	80%	70%	56%
1	1	500	400	350	280	150	120	105	84
2 or more	1	600	480	420	336	150	120	105	84
2 or more	2 or more	600	480	420	336	200	160	140	112
1	2 or more	500	400	350	280	200	160	140	112



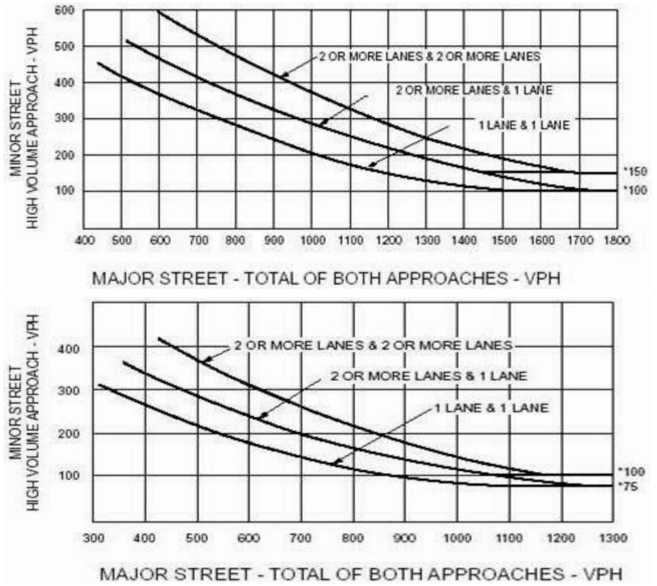
Condition B—Interruption of Continuous Traffic

Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%	80%	70%	56%	100%	80%	70%	56%
1	1	750	600	525	420	75	60	53	42
2 or more	1	900	720	630	504	75	60	53	42
2 or more	2 or more	900	720	630	504	100	80	70	56
1	2 or more	750	600	525	420	100	80	70	56

Warrant 2



Warrant 3



Volume Summary

Major Street Lanes 1 **Minor Street Lanes** 1 **Speed** 25 **Population** 10000+

Hours	Major Volume	Minor Volume	Total Volume	1A (100%)	1A (80%)	1B (100%)	1B (80%)	2 (100%)	3A (100%)	3B (100%)
07-08	596	74	670	No	No	No	No	No	No	No
08-09	443	55	498	No	No	No	No	No	No	No
09-10	320	40	360	No	No	No	No	No	No	No
10-11	394	50	444	No	No	No	No	No	No	No
11-12	459	57	516	No	No	No	No	No	No	No
12-13	602	76	678	No	No	No	Yes	No	No	No
13-14	516	65	581	No	No	No	No	No	No	No
14-15	566	71	637	No	No	No	No	No	No	No
15-16	734	93	827	No	No	No	Yes	No	No	No
16-17	755	95	850	No	No	Yes	Yes	No	No	No
17-18	747	93	840	No	No	No	Yes	No	No	No
18-19	553	70	623	No	No	No	No	No	No	No
Totals	6685	839	7524	0	0	1	4	0	0	0

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Warrants Summary

Information

Analyst	Transpo Group	Intersection	Access Roadway/Interurban Ave
Agency/Co	Transpo Group	Jurisdiction	City of Tukwila
Date Performed	1/6/2021	Units	U.S. Customary
Project ID	1.20133.00	Time Period Analyzed	Forecast 2040
East/West Street	Interurban Ave S	North/South Street	Access Roadway
File Name	Access Roadway & Interurban Ave S - Forecast 2040.xhy	Major Street	East-West

Project Description *1.20133.00*

General				Roadway Network	
Major Street Speed (mph)	35	☐	Population < 10,000	Two Major Routes	☐
Nearest Signal (ft)	280	☐	Coordinated Signal System	Weekend Count	☐
Crashes (per year)	0	☐	Adequate Trials of Alternatives	5-yr Growth Factor	0

Geometry and Traffic	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N	1	2	0	0	1	0	0	0	0	1	0	1
Lane usage	L	T			TR					L		R
Vehicle Volume Averages (vph)	3	413	0	0	320	11	0	0	0	33	0	11
Peds (ped/h) / Gaps (gaps/h)	--	0 / 0	--	--	0 / 0	--	--	0 / 0	--	--	0 / 0	--
Delay (s/veh) / (veh-hr)	--	0 / 0	--	--	0 / 0	--	--	0 / 0	--	--	0 / 0	--

Warrant 1: Eight-Hour Vehicular Volume	☐
1 A. Minimum Vehicular Volumes (Both major approaches --and-- higher minor approach) --or--	☐
1 B. Interruption of Continuous Traffic (Both major approaches --and-- higher minor approach) --or--	☐
1 (80%) Vehicular --and-- Interruption Volumes (Both major approaches --and-- higher minor approach)	☐
Warrant 2: Four-Hour Vehicular Volume	☐
2 A. Four-Hour Vehicular Volumes (Both major approaches --and-- higher minor approach)	☐
Warrant 3: Peak Hour	☐
3 A. Peak-Hour Conditions (Minor delay --and-- minor volume --and-- total volume) --or--	☐
3 B. Peak- Hour Vehicular Volumes (Both major approaches --and-- higher minor approach)	☐
Warrant 4: Pedestrian Volume	☐
4 A. Four Hour Volumes --or--	☐
4 B. One-Hour Volumes	☐
Warrant 5: School Crossing	☐
5. Student Volumes --and--	☐
5. Gaps Same Period	☐
Warrant 6: Coordinated Signal System	☐
6. Degree of Platooning (Predominant direction or both directions)	☐
Warrant 7: Crash Experience	☐
7 A. Adequate trials of alternatives, observance and enforcement failed --and--	☐
7 B. Reported crashes susceptible to correction by signal (12-month period) --and--	☐

7 C. (80%) Volumes for Warrants 1A, 1B --or-- 4 are satisfied	☐
Warrant 8: Roadway Network	☐
8 A. Weekday Volume (Peak hour total --and-- projected warrants 1, 2 or 3) --or--	☐
8 B. Weekend Volume (Five hours total)	☐
Warrant 9: Grade Crossing	☐
9 A. Grade Crossing within 140 ft --and--	☐
9 B. Peak-Hour Vehicular Volumes	☐

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Warrants Volume

Information

Analyst	Transpo Group
Agency/Co	Transpo Group
Date Performed	1/6/2021
Project ID	1.20133.00
East/West Street	Interurban Ave S
File Name	Access Roadway & Interurban Ave S - Forecast 2040.xhy

Intersection	Access Roadway/Interurban Ave
Jurisdiction	City of Tukwila
Units	U.S. Customary
Time Period Analyzed	Forecast 2040
North/South Street	Access Roadway
Major Street	East-West

Project Description *1.20133.00*

Warrant 1

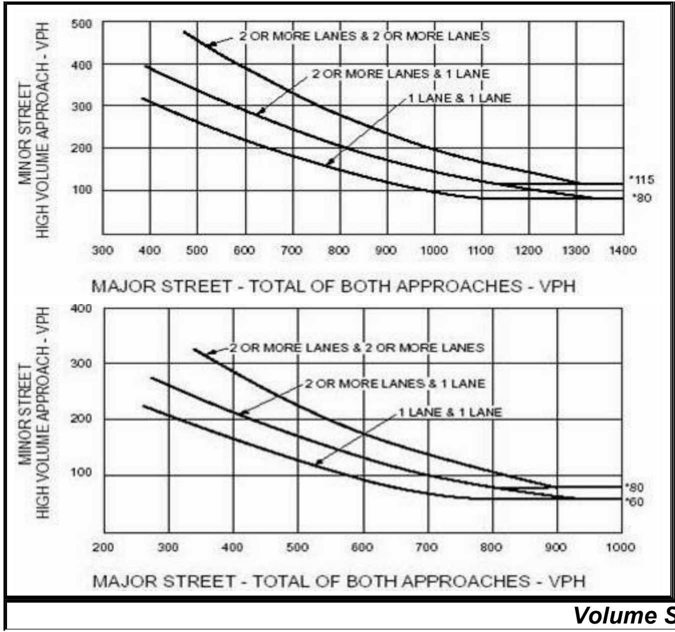
Condition A—Minimum Vehicular Volume

Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%	80%	70%	56%	100%	80%	70%	56%
1	1	500	400	350	280	150	120	105	84
2 or more	1	600	480	420	336	150	120	105	84
2 or more	2 or more	600	480	420	336	200	160	140	112
1	2 or more	500	400	350	280	200	160	140	112

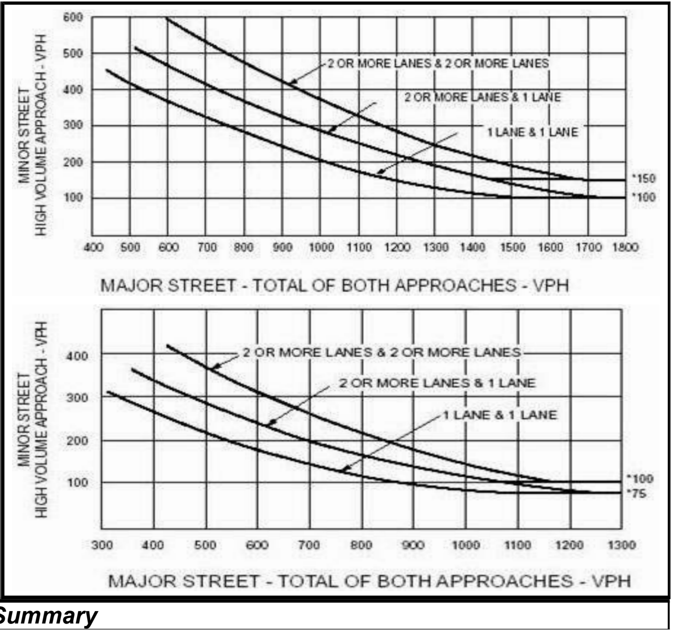
Condition B—Interruption of Continuous Traffic

Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%	80%	70%	56%	100%	80%	70%	56%
1	1	750	600	525	420	75	60	53	42
2 or more	1	900	720	630	504	75	60	53	42
2 or more	2 or more	900	720	630	504	100	80	70	56
1	2 or more	750	600	525	420	100	80	70	56

Warrant 2



Warrant 3



Volume Summary

Major Street Lanes 2+ **Minor Street Lanes** 2+ **Speed** 35 **Population** 10000+

Hours	Major Volume	Minor Volume	Total Volume	1A (100%)	1A (80%)	1B (100%)	1B (80%)	2 (100%)	3A (100%)	3B (100%)
07-08	801	47	848	No	No	No	No	No	No	No
08-09	595	35	630	No	No	No	No	No	No	No
09-10	431	25	456	No	No	No	No	No	No	No
10-11	531	32	563	No	No	No	No	No	No	No
11-12	616	36	652	No	No	No	No	No	No	No
12-13	809	48	857	No	No	No	No	No	No	No
13-14	693	41	734	No	No	No	No	No	No	No
14-15	761	45	806	No	No	No	No	No	No	No
15-16	987	59	1046	No	No	No	No	No	No	No
16-17	1015	60	1075	No	No	No	No	No	No	No
17-18	1004	59	1063	No	No	No	No	No	No	No
18-19	743	44	787	No	No	No	No	No	No	No
Totals	8986	531	9517	0	0	0	0	0	0	0

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Warrants Summary

Information

Analyst	Transpo Group	Intersection	Interurban Ave S/S 124th St
Agency/Co	Transpo Group	Jurisdiction	City of Tukwila
Date Performed	1/6/2021	Units	U.S. Customary
Project ID	1.20133.00	Time Period Analyzed	Forecast 2040
East/West Street	S 124th St	North/South Street	42nd Ave S
File Name	Interurban & S 124th St - Forecast 2040.xhy	Major Street	North-South

Project Description *1.20133.00*

General				**Roadway Network**	
Major Street Speed (mph)	35	☐	Population < 10,000	Two Major Routes	☐
Nearest Signal (ft)	1050	☐	Coordinated Signal System	Weekend Count	☐
Crashes (per year)	0	☐	Adequate Trials of Alternatives	5-yr Growth Factor	0

Geometry and Traffic	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N	0	0	0	0	0	0	0	1	0	0	1	0
Lane usage					LR			TR			LT	
Vehicle Volume Averages (vph)	0	0	0	232	0	18	0	118	295	29	287	0
Peds (ped/h) / Gaps (gaps/h)	--	0 / 0	--	--	0 / 0	--	--	0 / 0	--	--	0 / 0	--
Delay (s/veh) / (veh-hr)	--	0 / 0	--	--	0 / 0	--	--	0 / 0	--	--	0 / 0	--

Warrant 1: Eight-Hour Vehicular Volume	☑
1 A. Minimum Vehicular Volumes (Both major approaches --and-- higher minor approach) --or--	☑
1 B. Interruption of Continuous Traffic (Both major approaches --and-- higher minor approach) --or--	☐
1 (80%) Vehicular --and-- Interruption Volumes (Both major approaches --and-- higher minor approach)	☑
Warrant 2: Four-Hour Vehicular Volume	☑
2 A. Four-Hour Vehicular Volumes (Both major approaches --and-- higher minor approach)	☑
Warrant 3: Peak Hour	☑
3 A. Peak-Hour Conditions (Minor delay --and-- minor volume --and-- total volume) --or--	☐
3 B. Peak- Hour Vehicular Volumes (Both major approaches --and-- higher minor approach)	☑
Warrant 4: Pedestrian Volume	☐
4 A. Four Hour Volumes --or--	☐
4 B. One-Hour Volumes	☐
Warrant 5: School Crossing	☐
5. Student Volumes --and--	☐
5. Gaps Same Period	☐
Warrant 6: Coordinated Signal System	☐
6. Degree of Platooning (Predominant direction or both directions)	☐
Warrant 7: Crash Experience	☐
7 A. Adequate trials of alternatives, observance and enforcement failed --and--	☐
7 B. Reported crashes susceptible to correction by signal (12-month period) --and--	☐

7 C. (80%) Volumes for Warrants 1A, 1B --or-- 4 are satisfied	☑
Warrant 8: Roadway Network	☐
8 A. Weekday Volume (Peak hour total --and-- projected warrants 1, 2 or 3) --or--	☐
8 B. Weekend Volume (Five hours total)	☐
Warrant 9: Grade Crossing	☐
9 A. Grade Crossing within 140 ft --and--	☐
9 B. Peak-Hour Vehicular Volumes	☐

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Warrants Volume

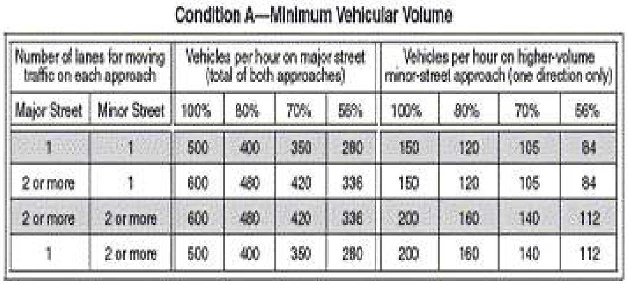
Information

Analyst	Transpo Group
Agency/Co	Transpo Group
Date Performed	1/6/2021
Project ID	1.20133.00
East/West Street	S 124th St
File Name	Interurban & S 124th St - Forecast 2040.xhy

Intersection	Interurban Ave S/S 124th St
Jurisdiction	City of Tukwila
Units	U.S. Customary
Time Period Analyzed	Forecast 2040
North/South Street	42nd Ave S
Major Street	North-South

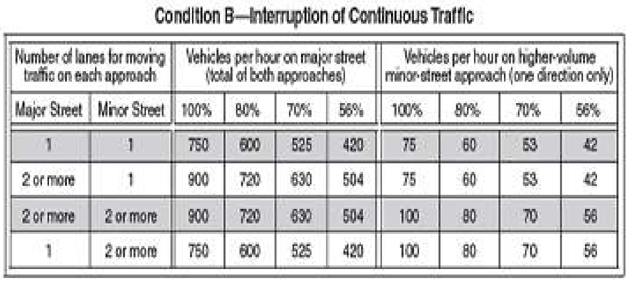
Project Description *1.20133.00*

Warrant 1



Condition A—Minimum Vehicular Volume

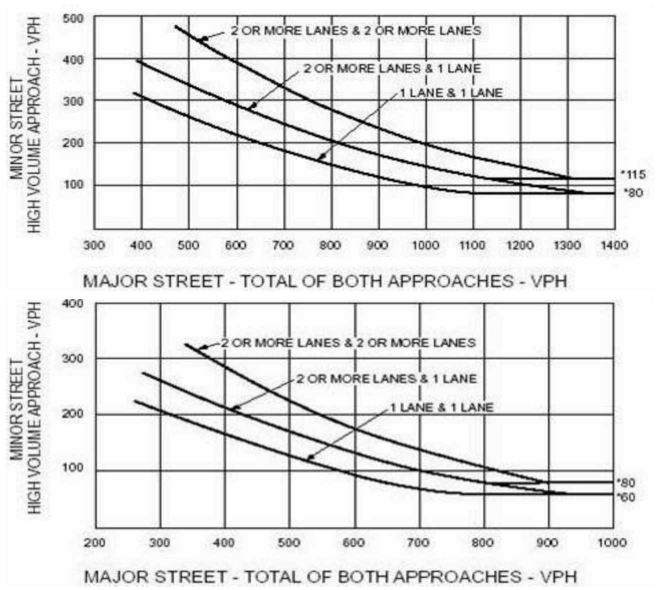
Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%	80%	70%	56%	100%	80%	70%	56%
1	1	500	400	350	280	150	120	105	84
2 or more	1	600	480	420	336	150	120	105	84
2 or more	2 or more	600	480	420	336	200	160	140	112
1	2 or more	500	400	350	280	200	160	140	112



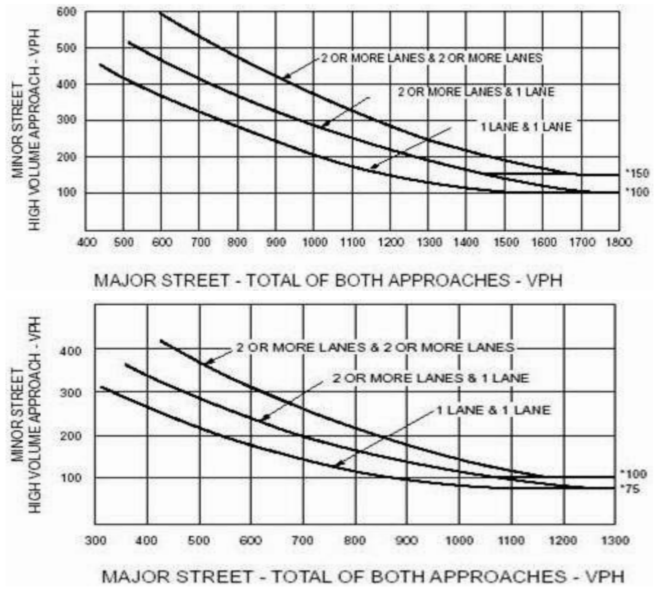
Condition B—Interruption of Continuous Traffic

Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%	80%	70%	56%	100%	80%	70%	56%
1	1	750	600	525	420	75	60	53	42
2 or more	1	900	720	630	504	75	60	53	42
2 or more	2 or more	900	720	630	504	100	80	70	56
1	2 or more	750	600	525	420	100	80	70	56

Warrant 2



Warrant 3



Volume Summary

Major Street Lanes 1 **Minor Street Lanes** 1 **Speed** 35 **Population** 10000+

Hours	Major Volume	Minor Volume	Total Volume	1A (100%)	1A (80%)	1B (100%)	1B (80%)	2 (100%)	3A (100%)	3B (100%)
07-08	782	268	1050	Yes	Yes	Yes	Yes	Yes	No	No
08-09	581	200	781	Yes	Yes	No	No	No	No	No
09-10	421	145	566	No	Yes	No	No	No	No	No
10-11	518	178	696	Yes	Yes	No	No	No	No	No
11-12	601	206	807	Yes	Yes	No	Yes	No	No	No
12-13	789	271	1060	Yes	Yes	Yes	Yes	Yes	No	No
13-14	677	232	909	Yes	Yes	No	Yes	Yes	No	No
14-15	742	255	997	Yes	Yes	No	Yes	Yes	No	No
15-16	963	330	1293	Yes	Yes	Yes	Yes	Yes	No	Yes
16-17	990	340	1330	Yes	Yes	Yes	Yes	Yes	No	Yes
17-18	980	336	1316	Yes	Yes	Yes	Yes	Yes	No	Yes
18-19	724	249	973	Yes	Yes	No	Yes	Yes	No	No
Totals	8768	3010	11778	11	12	5	9	8	0	3

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Appendix G – Public Outreach

Allentown Advocates Community Engagement Meeting

March 30, 2021

SEAL OF TUKWILA WASHINGTON
1908

Zoom tips

- Please stay muted until you are ready to speak
- Raise your hand to be called on to make a comment
- Type your questions or comment into the chat
- If you need technical support, text or call 206-940-6013

Introductions & Agenda

- Introductions
- Answer your questions – 3/29 from Sally Blake
- Community presentation
- Project history and need
- Where are we now?
- What’s next?

Answers to Your Questions

Why was the BNSF Access Study report from 2015/2016 never moved from draft to final form? This report had the 48th street bridge as the number one preferred option to reroute the truck traffic out of Allentown permanently.

- You are correct that the access study has been delayed. This happened because in August of 2017, the critical need to replace the 42nd Avenue Bridge became apparent, and the City has a civic and legal responsibility to ensure that the bridge does not fail and preserve public safety. Because the bridge currently has a sufficiency rating of 7.56 out of 100, the City must make the 42nd Avenue Bridge our number one infrastructure replacement project.

Answers to Your Questions

Why did the consultants contact only the businesses and not the residents in February regarding the possible rebuild of the 42nd Ave. Bridge and/or extending 124th street across the river?

- The intention has always been to include feedback from residents in the replacement bridge project and we had planned to start that outreach in the Spring. While we did initiate the outreach with some businesses, we recognize that feedback from residents is an essential part of the type, size, and location (TS&L) report. Your feedback will be included in the final bridge design.

Answers to Your Questions

Maria Cantwell was made aware of our situation with the truck traffic in Allentown approximately six years ago. She requested a formal “ASK “with a plan for the alternate bridge on 48th. Why wasn't Maria Cantwell’s request followed through on?

- Senator Cantwell has a long history of supporting the Allentown neighborhood. Because of the emergent reality of the need to replace the 42nd Avenue Bridge, the City has had to focus its infrastructure funding requests toward this project. Senator Cantwell’s support was for mitigating the impacts of the rail yard in the Allentown neighborhood however, it was never project specific.

Answers to Your Questions

Have the Federal standards for bridge maintenance and inspections been followed for the existing 42nd Ave bridge by the City of Tukwila?

- Yes. The City has an ongoing contract with King County Inspection Services and meets federal standards for bridge maintenance and inspections. The 42nd Ave S Bridge receives the National Bridge Inspection Standards (NBIS) 24-month Routine inspection, the 24-month mandated fracture critical inspections, as well as 6-month interim inspections for the north pier. Due to the critical nature of the bridge now we are on a 12-month inspection schedule

Answers to Your Questions

Regarding the approximate $11 million dollar pedestrian bridge constructed on West Valley Highway several years ago... where did the funding come from and what was the time-line for requesting it?

- The funding for the West Valley Highway pedestrian bridge came from four multi-year grant sources between 2006 and 2016. $6.8 million of this project was funded by the Washington State Regional Mobility grant, which supports projects improve multimodal connections and services between counties or regional transit centers.

Community Presentation

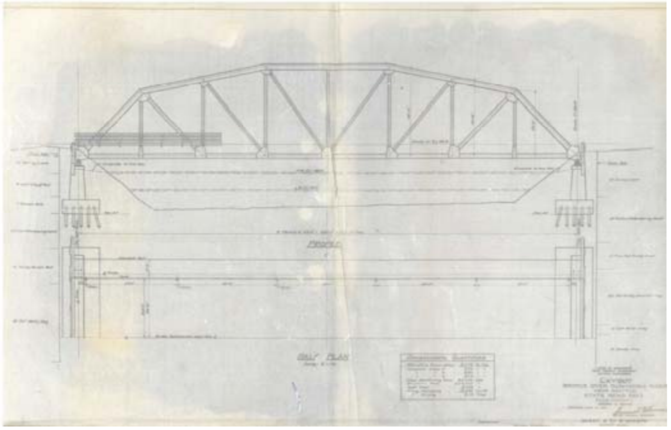
Looking forward

- Partner with you, Allentown residents
- Seek guidance from you to make the upcoming community meeting, and future community engagement, a success

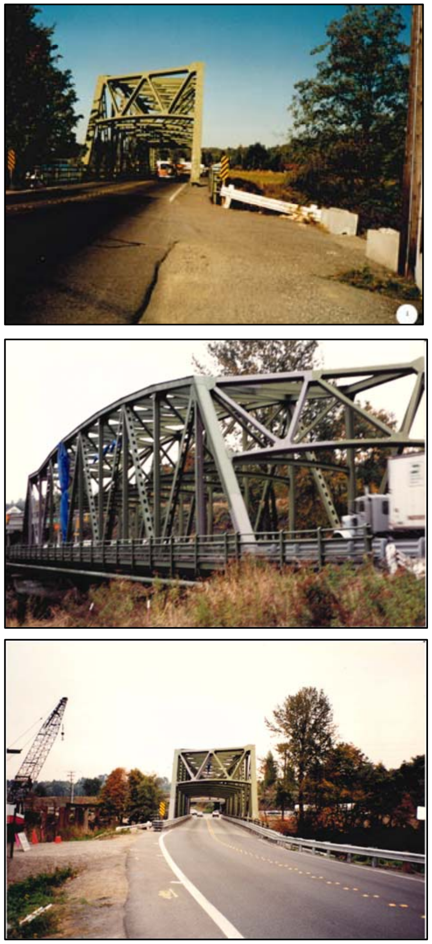
42nd Ave S Bridge Replacement Project - Community Engagement

Bridge History

- Design plans are dated in 1927
- Bridge was built 1949
- Weight and speed restricted in 2017 for several legal trucks
- Bridge was ordinally designed for 75 years



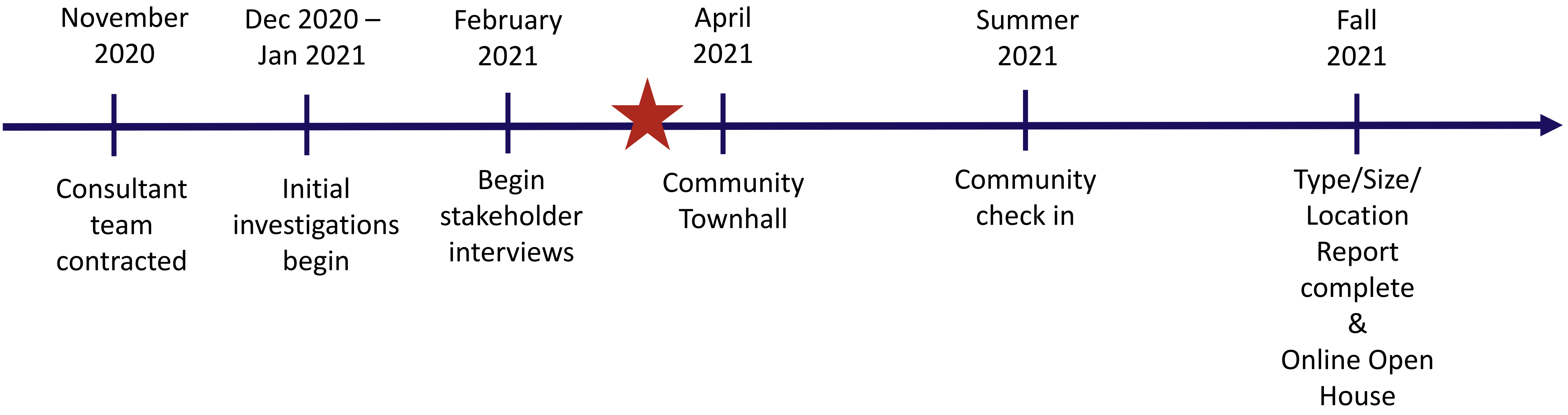
Reasons for Replacement



- Current Sufficiency Rating is 7.56 out of 100
- Substandard (Functionally Obsolete) for non-motorized access (i.e., pedestrian, bike, and ADA)
- Primary access to the Tukwila Community Center via pedestrian, bike, and vehicle
- Bridge is not ADA compliant
- Making the new structure multi use with pedestrian, bike, and vehicle access
- Wide-spread damages on the bridge including corrosion, pack-rust, frozen bearings and spalling concrete supports.
- Fracture-critical bridge susceptible to fatigue failure

1908

Where are we now?



November 2020	Consultant team contracted
Dec 2020 – Jan 2021	Initial investigations begin
February 2021	Begin stakeholder interviews
April 2021	Community Townhall
Summer 2021	Community check in
Fall 2021	Type/Size/ Location Report complete & Online Open House

Next steps – preparation for April 27 Townhall

March 31	Project website updated with this presentation and link to recorded meeting
April 2	Mail postcard notifications for April 27 Community Townhall
April 2	Survey to incorporate Allentown community feedback in the Type/Size/Location Report goes live on project website (TukwilaWA.gov/42nd)
April 7	Hard copy surveys available at the Tukwila Community Center
April 7	Posters delivered to Tukwila Community Center and Allentown Superette
April 14	Door-to-door notifications for April 27 Community Townhall
Weeks of April 12 & 19	Email and social media notification for April 27 Community Townhall
April 27	Online Community Townhall, via Zoom, begins at 5:30 PM

Community Townhall

Format: Presentation, Q/A, breakout groups

Community feedback: Below are questions the technical team needs to finish the Type / Size / Location report (TS&L report). Feedback will be used and shared in the TS&L report (due this summer).

A TS&L report will consider all reasonable replacement options and help narrow the choices. The report will determine the functional and physical characteristics of the bridge, how it will be constructed, and its location. This is the step before a project goes into 30% design.

Experience using the bridge

- What methods of travel do you use that take you over the bridge?
- What has been your experience crossing the bridge?
- What kind of issues, if any, do you and your family experience when using the bridge?

Future use of the bridge

- What ideas do you have for making the bridge a welcoming gateway into the Tukwila or Allentown community?
- Keeping in mind federal funding limitations, what do you hope the City of Tukwila prioritizes and considers when developing design and construction concepts for the bridge?

Engagement

- Due to COVID-19, we are unable to meet with folks in person and hold an in-person open house. As an alternative we plan to host an online open house for residents and bridge users. Are there ways you would suggest the City gather feedback from the community?
- What is the best way for us to keep you informed and engaged throughout the project?
- Are there other specific community groups or residents that you suggest we talk with?

Conclusion and next steps

- Do you have any remaining questions about the project that we did not cover?
- Do you have any additional thoughts that you want to make sure we capture?
- Before we conclude, are there any questions you have about the project that you would like to make sure we cover?

42nd Ave S Bridge Replacement Project - Community Engagement

SEAL OF TUKWILA WASHINGTON 1908

Stay Engaged

Visit the project website to:

- Sign up for the project listserv
- Get project updates
- Learn about upcoming engagement opportunities

→ **TukwilaWA.gov/42nd**

Adam Cox, Project Manager
(206) 431-2446
Adam.Cox@TukwilaWa.gov

Dimensions: half sheet (5.5x 8.5), double sided

FRONT

Header:
42nd Ave S Bridge Replacement Project
Upcoming Online Community Townhall, April 27

BACK

We need your feedback!
The 42nd Ave S Bridge is an important crossing on the Duwamish River that connects the City of Tukwila to surrounding communities and resources. The bridge, built in 1949, needs to be replaced and the City is exploring options for a new bridge design. The City needs your feedback to progress early planning on how a new bridge can better serve all users. This project is not related to the BNSF Access Study at 48th Pl S, east of Codiga Park.

Join us for an online community townhall
Learn more and RSVP at TukwilaWa.gov/42nd
Tuesday, April 27
5:30 – 7:30 pm

What to expect at the town hall

- A presentation by City of Tukwila staff
- Small group discussions
- Opportunities to share your thoughts and ask questions

If you can't make it, no worries! A community survey is available on the project website and at the Tukwila Community Center.

Please let us know if you're facing barriers to participating and need accommodations. Please email Adam.Cox@TukwilaWa.gov by April 16

City of Tukwila 42nd Avenue Bridge Replacement Project

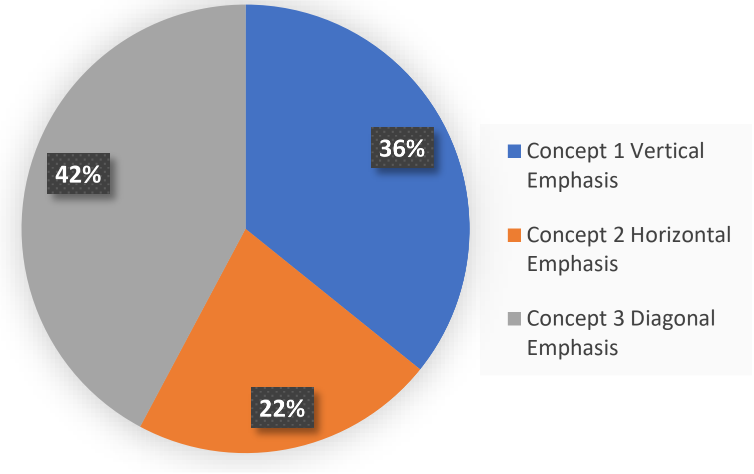
Community Outreach Stakeholder Engagement Results

The City of Tukwila provided community members and other stakeholders with an opportunity to engage in the decision-making process for the 42nd Avenue Bridge Replacement Project by taking comments and votes on various project design elements. Participant responses were gathered both during an online survey, open to the public for votes from August 31, 2021 to September 30, 2021, as well as during a Gallery Day Meeting held on September 15, 2021.

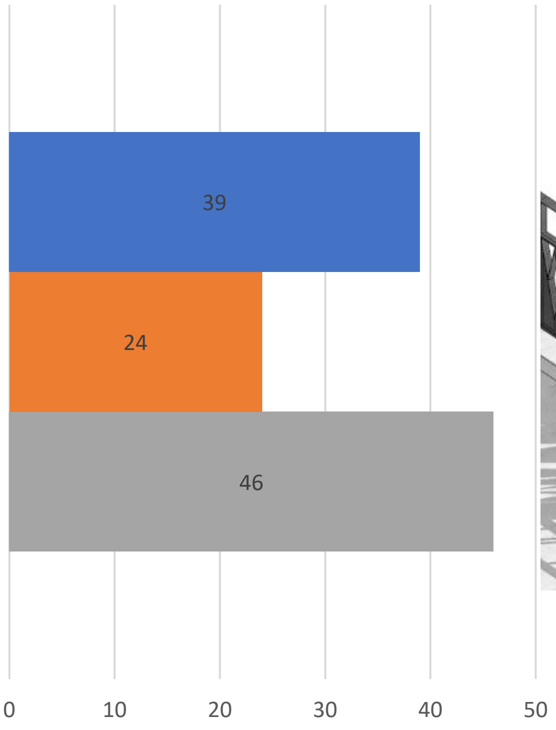
The online survey and the gallery event presented stakeholders with 5 questions pertaining to various design elements of the bridge replacement project including bridge railing and landscaping concepts, color preference, a gateway element, and lighting concepts. There were 109 online survey participants, and their responses are included in the following data along with responses from the Gallery attendees. Maximum responses received was 112 votes.

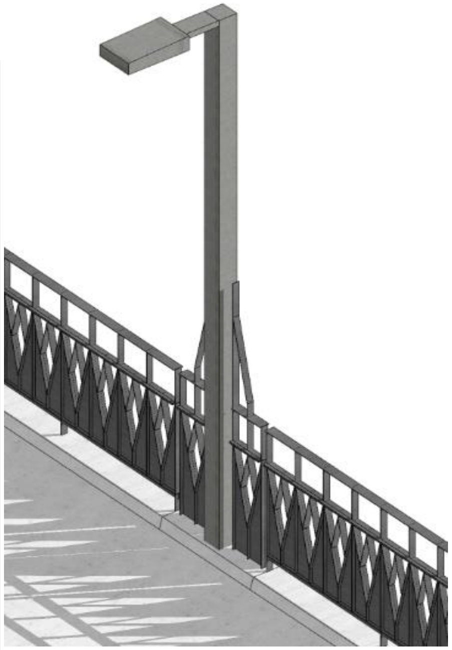
Question 1 - Railing Concepts

Survey Preference- Concept 3: Diagonal Emphasis



Total responses: 109



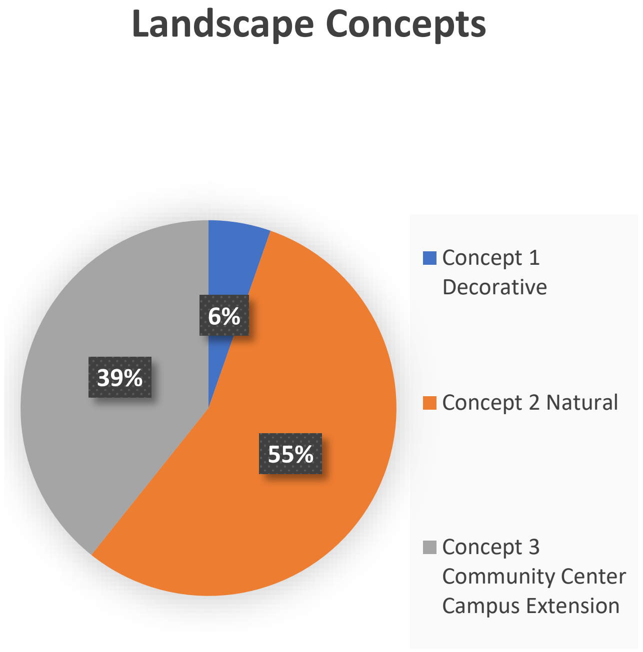


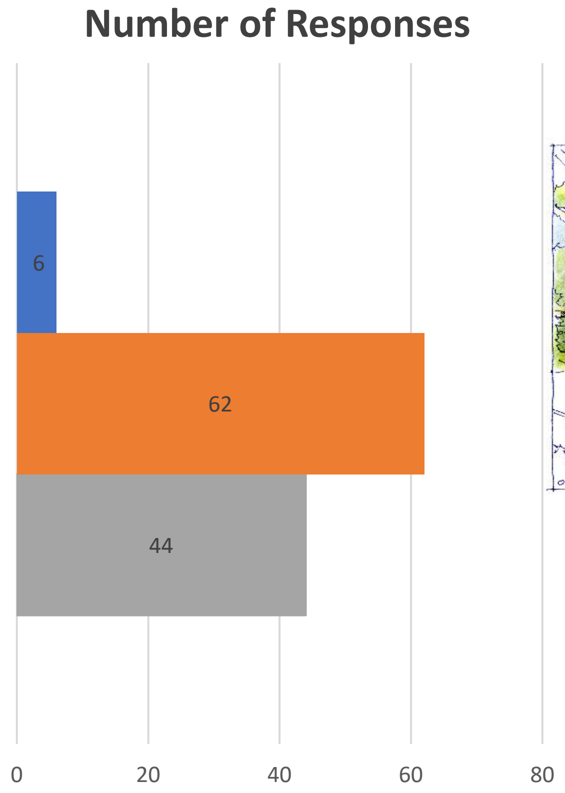
Pictured - Concept 3

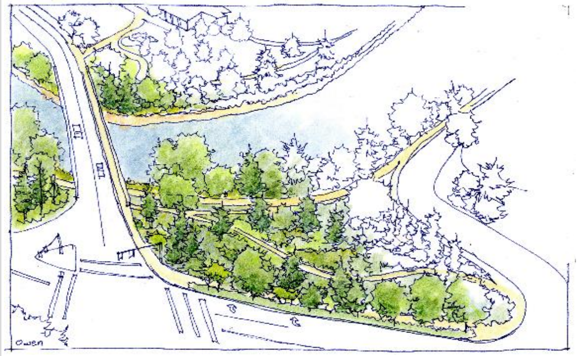
Total responses: 109

Question 2 - Landscape Concepts

Survey Preference - Concept 2: Natural





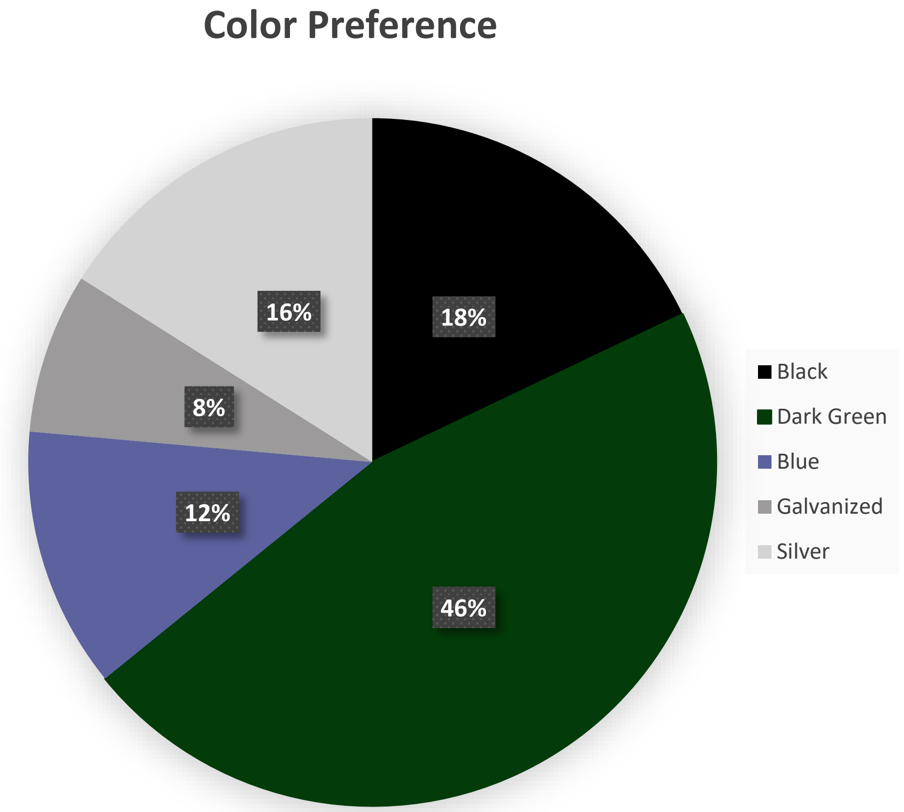


Pictured - Concept 2

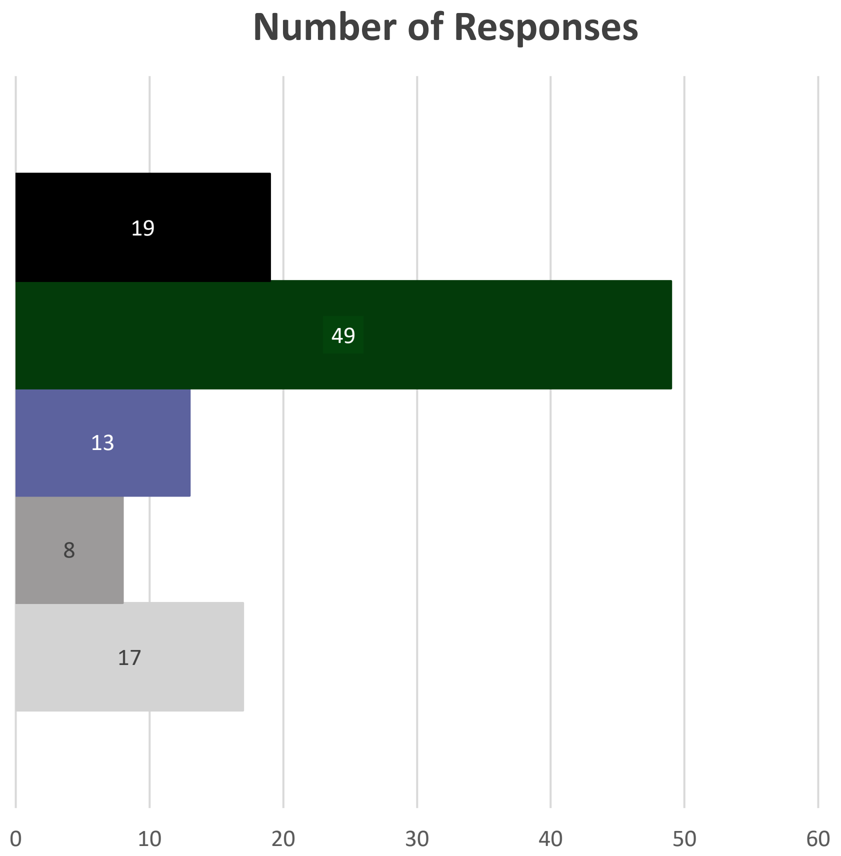
Total responses: 112

Question 3 - Color Preference

Survey Preference - Dark Green



Color Preference



Number of Responses

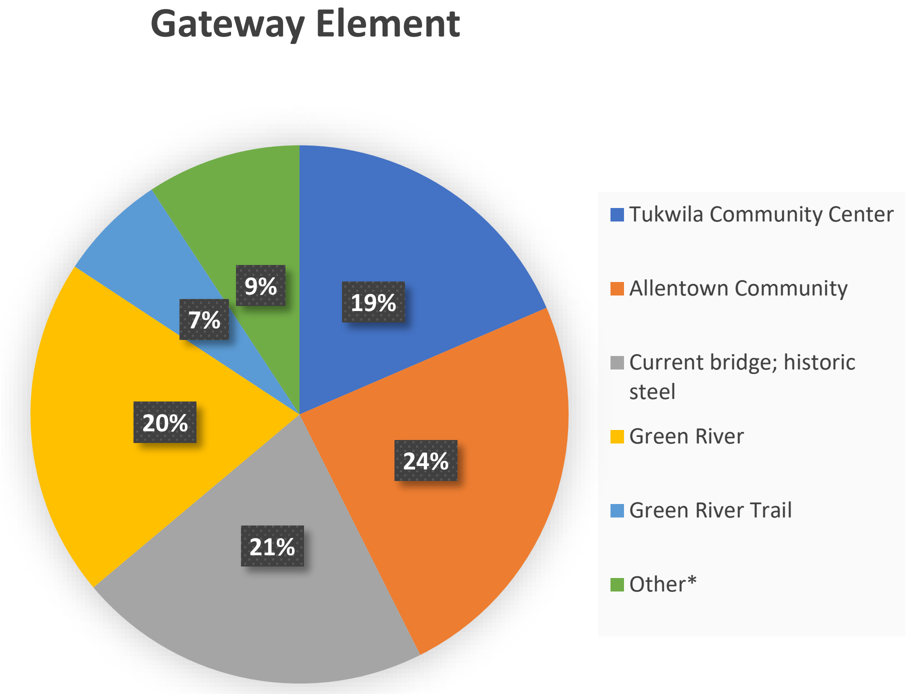
Total responses: 106

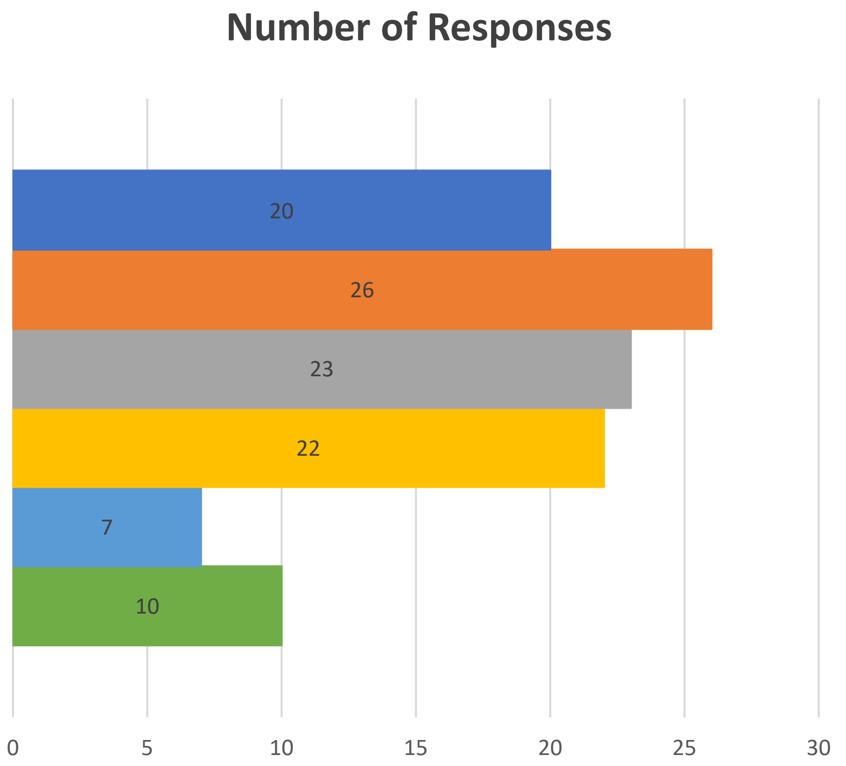
CITY OF TUKWILA

TRANTECH Engineering LLC

Question 4 - What should gateway element relate to?

Survey Preference - Allentown Community



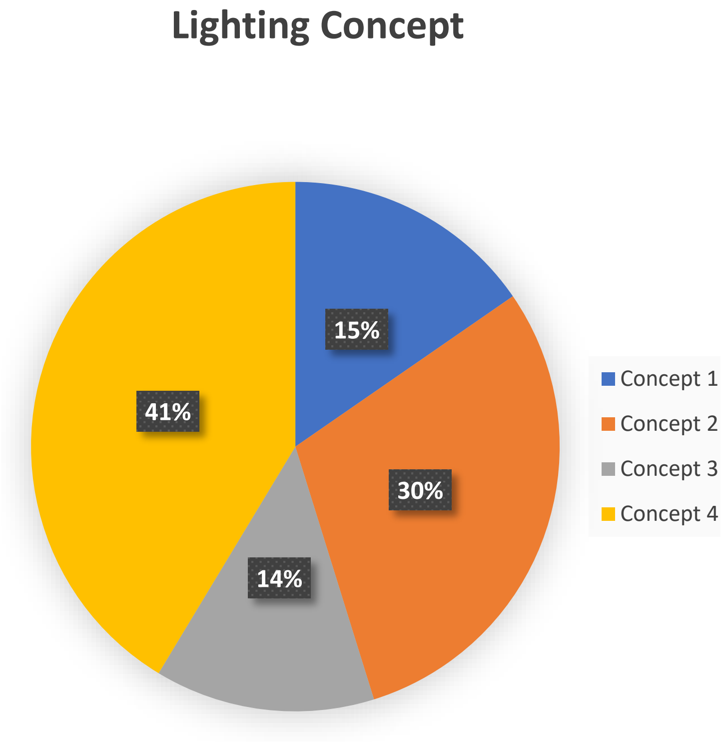


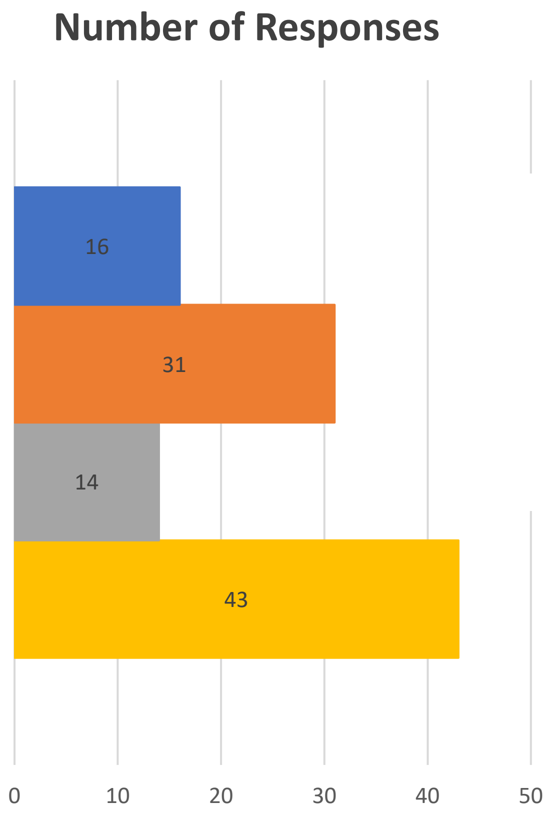
*Other: Duwamish Tribe & Allentown Community; the diversity of Tukwila; Duwamish Tribe/Native American; Duwamish waterway; Tukwila's connection to the Duwamish; collage of elements: Indian-Duwamish, community, history, river; include Duwamish tribe out of respect; combination of Green River + Trail

Total responses: 108

Question 5 - Lighting Concepts

Survey Preference - Concept 4





Attached El Mirage Spec; RNTA-8-14 Spec

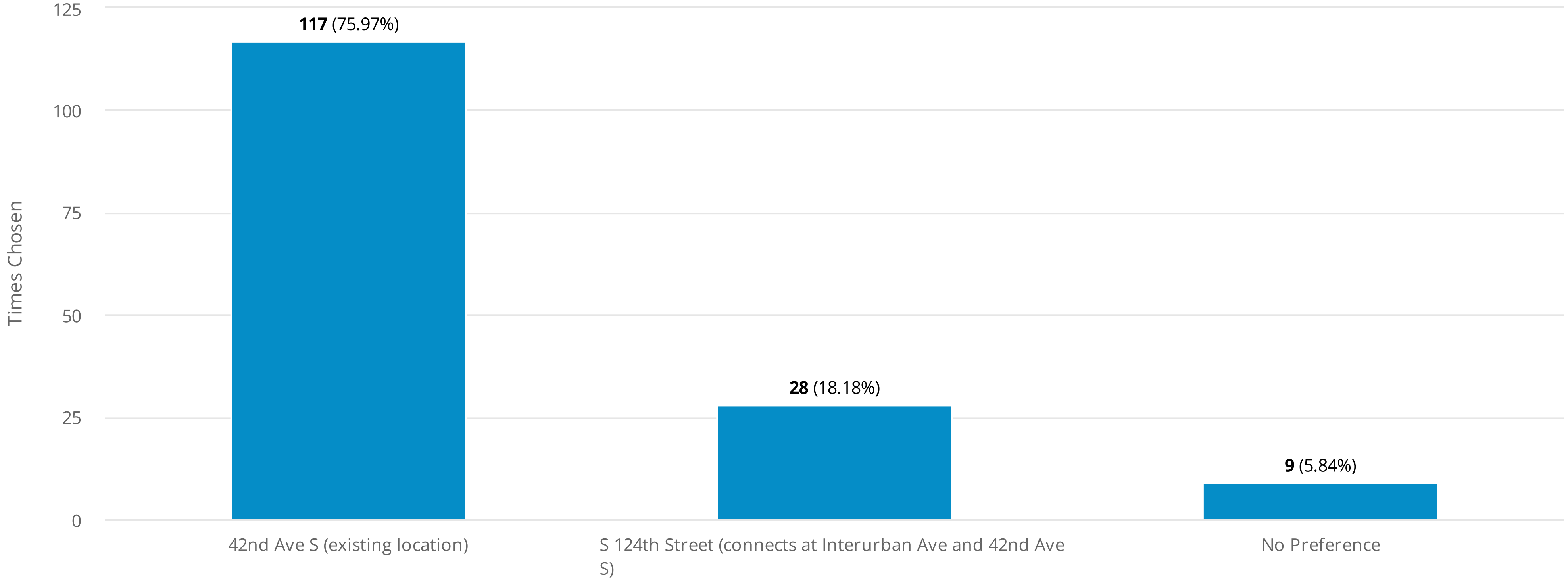
Pictured - Concept 4

Total responses: 104

42nd Ave S Bridge Replacement Survey

1. What alignment alternative do you prefer for the new bridge?

Number of responses: 154



2. Why do you prefer that alignment location alternative?

Number of responses: 130

Text answers:

Because Allentown residents prefer it and it keeps existing traffic flow.

I believe this option is better because it is a safer option for pedestrians who live in the community. I also believe this protects the corner store which is the closest store for many in the community.

Current traffic flow seems best

No private property disruption.

Safety qnd peace of mind.
would prefer no bridge at all.

its right next to the tukwila community center.

It makes the most sense and is the safest for flooding and costly repairs. It is the cheapest route.

Less disruptive to nature and path.

Just makes sense not to build over bike path. Then making left and right turns on to Interurban.

Allentown residents prefer it and it does not impact private property.

It's a more sensible solution & has less negative impact on the Allentown and Duwamish communities.

Because I don't want a new bridge closer to my neighborhood. We already have semi trucks & speeding cars coming through our neighborhood and even more now that the bridge is closed. There would be a negative impact to homes and Harry's if the bridge is placed at 124th.

So you don't disturb the neighborhood

The 124th extension is not completely described. The impact to the surrounding properties is not completely described; therefore, the cost estimate is questionable. The 124th location was planned without community residents being informed. And why has Tukwila issued building permits that are impacted by the way the truck traffic is routed in the Allentown area?

It doesn't appear that the S 124th street option has been thought through at all. There are a lot of different factors that are not addressed from both a logistical and cost perspective in the 124th street option. Residents have raised a lot of concerns about costs being left out specifically that have not been sufficiently addressed. The 124th street option is not actually an option until a viable plan is presented and that hasn't been done yet.

Safer for the community. Best options for BNSF traffic is 112th St extension or 48th Pl S bridge.

Discourages speeding and higher volumes of traffic at once. Also prevents a direct beeline for an important crosswalk to the Tukwila Community Center

Traffic interruption to the area would be less. Splitting access easily to the truck N train depot, and the Center...
Disadvantage is the cost.

Another intersection seems pointless. Huge excavation unnecessary for present location. No desire for trucks quick and rapid entrance into Allentown.

Least disruptive to neighborhood AND no traffic impact has been detailed to the community beyond " may impact some".
No cost for traffic revisions have been included in the 124th bridge plan. No details have bee given for cost & impact of grade changes needed for 124th Bridge. So i do not believe a reasonable comparison has been made.

Don’t do either. Get rid of the trucks!! Then open the bridge up. If trucks go on either route through the duwamish ticket them.

b/c 124th st route seems likely to worsen/increase volume of, rather than mitigate existing excess bnsf truck traffic issues and its harm/threat to community health/infrastructure; ignores months of community dialogue; doesn't improve neighborhood access/connection to rest of the city whether via individual auto, transit, pedestrian/ cyclist, etc

Makes the most sense.

1) It forces traffic to slow down because of the turns involved. The 124th St. option is a straight shot from the BNSF intermodal yard across the bridge with no stop sign or light at the 42nd Ave. South intersection. Your design prioritizes the trucks rather than the neighborhood residents by putting stop signs on 42nd Ave. South, which would force predominantly neighborhood traffic to stop, rather than trucks.
2) You did not include all the costs for the 124th Street option - there is no information about the costs of signage, lights, roundabouts, sidewalks, connections for walkers or transit passengers on the other side of the bridge. Stating it is less expensive without providing an accounting of ALL the costs involved is deceptive and inappropriate.
3) The information provided in the video did not include any rendering of the proposed 124th extension - I'm not going to vote for something when the information I'm supposed to basing a decision on is incomplete.
4) The attendees at the 2/22/2022 community meeting at the TCC unanimously rejected the 124th extension option. Why is this even being put in front of us again when it is overwhelmingly NOT what the people who live in the neighborhood and who deal with the situation on a daily basis have said they DO NOT want?

There are many reasons why replacing the bridge in the current location on 42nd Ave S is my preferred option.

- I feel a new bridge at the 124th location would further disrupt the river environment, and as someone who has traveled the river by canoe and observed many varieties of birds, fish, seal, otters, and I am sure is host tomany other species, I would like to minimize further man made structures. The river and ecosystem should be respected and treasured.

- The river and river bank in the location where the bridge currently is located has already had man made disturbance so replacing the bridge in the same location minimizes further disturbance to the river environment and ecosystem.

- Keeping the bridge in the same location allows for better access to/from the Duwamish River Trail and the Community Center.

- The positioning of the current bridge does not enable speeding as much as the 124th STRAIGHT and downsloping option would.

- There is already infrastructure in place, such as the light intersection, for keeping the bridge in the same location. A new lighted intersection would be needed to be studied and built for the 124th bridge option on the Interurban side, as well as another intersection on the Allentown side.

- What these new intersections on either side of the 124th option would look like are unknown, currently undetermined.

- The 124th option would impact private homeowners and the superette local small business.

- The elevation grade change needed for the bridge and road between the higher Interurban and lower 124th would, as shown at the Feb 22 community meeting, require some type of wall structure on the Allentown side. This would negatively impact homeowners and access to the Community Center for pedestrians, including children. This also would create challenges for access to the local small business superette.

- Community Support - The Allentown Community, as even noted in the video, has already provided feedback that keeping the bridge in the same location is the preferred option of the community.

The existing bridge can be used during construction.

Tearing out an old bridge foundation with dubious documentation in a suboptimal riverbend is a recipe for unexpected engineering challenges and unsustainable cost overruns.

Those managing this project have a responsibility to everyone who's going to be affected by this decision for the next 150 years. Not just to the vocal minority who disrupt community meetings to the point where it's not even worth participating in them.

Allentown Advocates do not speak for me. In all their interactions with elected officials, city employees, administrators, and engineers in public forums, they have been disgraceful, uncivil, and thoroughly unconvincing. Please do not let their emotionally abusive Facebook echo chamber NIMBY know-nothing whining override the engineering and budget considerations for this bridge replacement.

Regarding the ill managed eye sore, crime magnet, and pedestrian peril that is the corner store... when I shop there, the EMPLOYEES complain to me about robbery at gunpoint and the unaffordable food prices they themselves can't afford (to say nothing of the selection). If the city put real effort into getting an actual grocery store somewhere in the Allentown food desert, I doubt the AA goons would be able to use the corner store as an excuse for picking the worst possible option.

Because it’s the best location for the new bridge, elected officials and staff need to listen to the neighborhood.

I don't want to see future disruption of the river and the sensitive habitat areas. I also think that the existing route is better to keep the truck traffic slightly tamed through the residential neighborhood.

I'd rather not have a bridge at all.
42 will help keep trucks at shower speeds so a bit safer

Less disruption to the community and river bank.

The 124th street option is clearly in service of BNSF and not a viable replacement for the current bridge.

Trucks need to be rerouted out of Allentown for the health of residents, relocating the main bridge to Allentown is not the answer.

Don’t want the Little Store and adjacent properties cut off by the new bridge. Can we possibly toll the new bridge for trucks leaving BNSF? That way they have skin in the game to pay for it? ONLY TOLL vehicles over a certain weight. Is there a way to reopen the bridge and continue to reroute trucks out of BNSF by Boeing Access Road and Airport WY.

Cost and simplification of bridge and traffic flow.

Quickest most cost-effective solution, least amount of environmental impacts.

Easier access to Tukwila Community Center

No private property impact and traffic pattern already established

Hay muchos caminos por donde transitar

Best option

I have been in Allentown for over 40 years and I feel dispite the tragic things that have happend at the 3 way stop/ jersey barrier, relocating the bridge over the river creating a 4 way stop will create more of an issue. Relocating the bridge only continues the ongoing issue of the trucks going to BNSF through a residential neighborhood.

There has been more and more trucks over the years and rerouting them even though this detour has created a nightmare as I have had multipile semi trucks driving down 44th Ave S, 44th Pl S and along the river disregarding the detour regardless of the posted signage, Vehicle Enforcement needs to be down here ticketing them too by the way, but thays a different topic. I think it has been proven that a new bridge and entrance for BNSF should be established off Interurban Or an off ramp from I5 directly into their property. Maybe a new lane for the semi truck can go in off Boeing Access Rd?

Their is multipule other and better options for the truck traffic that caused this entire problem in the first place, Tukwila has been avoiding this known issue for ever and only now because it was hit is it being addressed. Sometimes the right decision should be made because its the right thing to do, not because something bad happened. The truck issue has been brought up everytime a new election comes around and these canidates always say they agree and will politic about it and once in, they forget about Allentown.

Please listen to the people that pay your wages, you were voted in because we trusted that you would listen.

ease of going and coming out of my neighborhood.

Familiarity. The scouring issues can be dealt with as they have in past.

Cost savings and assuming the traffic may be easier at the intersection near the mini mart.

Will preserve neighborhood feel, won't displace the corner store, preserves native vegetation in that stretch of the Duwamish River. Feeds out directly to Interurban.

More reasonable and already known, no more intrusion on the neighbirhoods

We are on S 124th and having the bridge closed has hampered our day to day life in accessing the freeway on-ramps. The increased traffic and lack of efficiency has led to unsafe drivers rushing around

Why do we need to disrupt other ecosystems when this would be the ideal location?

It has worked for years in this location and I believe it will have the least impact on the Allentown residents.

There's no reason to change it, and don't want to see the business and homes surrounding the the intersection to be at risk. It's fine how it was, just fix it.

I'm thinking we will lose the tree in the river, if you go with steel bridge and there is an incline my concern is how slick is it going to be going up or down it. Plus, how safe will it be at that cross walk at the little store? If there is a light or a stop sign people will blow right threw it. And it might be cheaper to go with a new location but people will be losing their property. That shouldn't be an option. Lastly, if you could spend those millions of dollars for that foot bridge that has all those fancy lights down by south center it shouldn't be a big deal to give Allentown what they want. We are constantly neglected. No, proper street signs, sidewalks, street sweepers. We get treated like crap. Start listening and quit trying to save a buck.

Less disruption to traffic and less intrusion to the homes in the Allentown area.

It's cheaper and will be less disruptive to traffic during construction.

Make sense to replace in the same area where intersection and turn lanes are already in place.

It will help keep truck out of a more residential area.

Easier and quicker to access community center from my home.

It allows a straight shot from 124th, no need for trucks to turn on to 42nd ave s

Zero impact to the Allentown community and environment.

Building the new bridge down 148th st would be nice... It would take the truck traffic off 124th (which would make the Allentown'ites happy), and send the trucks down a non-residential area. It would take some of us a bit longer to go around, from the Duwamish burg to Allentown, but we'd manage ok. The only unknown in my wee noggin is what environmental issues might arise from shunting trucks from the now-ailing bridge to the potential new locale. I would think (and hope) a very strenuous, comprehensive, and honest EIS would be the guide as to whether or not 148th is a viable alternative to the old bridge. Gotta take care of, and build on all the gains achieved re the river critters. Flora AND fauna critters. Less rats would be ok, tho...

Thank you most kindly for reading thru this rather long-winded mound of mass wordiness. I seriously don't know what the eventual outcome will look like, but here's to a successful finale to a bridge well-built!

Already in place. Prefer this bridge location as it is further away from my residence.

Current lights connections and intersections feel perfectly fine; waits are minor and overall traffic is well maintained with the current setup.

The new location proposed will negatively impact already stressed Allentown neighborhood. Connectivity to services will be more difficult on foot because there is no current sidewalk along connecting roadway. Provides a “straight shot” into the BNSF lots which will increase speeds and negatively impact the residential neighborhood.

Easy access to trail and street with sidewalks on the far side (no sidewalk at S 124th street Bridge option). I assume helps prevent speeding that a straight access bridge would encourage on S 124th (my house is on this street so I already hear people race down it sometimes). Also provides easy access across the way directly towards Southcenter without turning onto a busier street. It lastly should affect the corner store less. It's not the greatest store in the world but it is the only easily walkable store in the relative food desert of Allentown.

Most convenient for my household and our neighbors

I don’t see a big issue with us wing the alternative 124th option.

None of these options
No Bridge !

I really like the direct access to TCC and then up to MLK Way.

Straight shot

If 42nd could be closed south of S 124th Street, this reroute would allow more space for open park and recreation space, a potential bike trail extension, and the community center. The Duwamish river has so many roads that already run along it, having more green space would be a welcome change. And another big reason is that I would also like to see the bridge remain as a pedistrian only bridge. I have always loved this bridge! It is a beautiful bridge, a piece of urban art, and I don't think we should throw it away.

Because EVERYTHING is already there. All the roads go there. All the sidewalks are there. The intersection with traffic lights intersecting with Macadam. Why on earth would you create an alternative route? It is totally asinine. (Excluding BNSF and the power they wield within the city of Tukwila "public" planning department)

Safer, no impact to the little store & residents keep their driveways.

Why change an area that has been working so good for so many years.

Placing the bridge in the existing location keeps the bridge and intersection aligned with 42nd street to go under the freeway. The 124th St Alternative adds another traffic light along the busy Interurban. The grade at the 124th and Interuban will cause additional truck noise when stopping and starting close to the housing.

My third option is t available

Because the 124th option is a ridiculous joke. It s a cynical swipe at a horrible inconsiderate solution that only benefits BNSF. Impacting residents and blighting the river and community.

These are reasons I DON'T prefer the 124th St bridge location:

Quoting the presentation in the video, “coordination of driveways on the NE corner would be required” is a polite way of saying “removal of driveway space from home owners would be required”. It is unfair and immoral to expect homeowners to give up precious driveway space.

Taking away parking and reconfiguring the parking lot of the convenience store on the corner is also an unfair expectation of the store owner.

A new 124th St bridge would mean a longer route (both for walkers and drivers) heading to the metro park & ride and other businesses on interurban; i.e. Jack in the Box, Starbucks, Quiznos, Jackson’s, etc. Accessibility to the businesses on Interurban would be shorter and more direct if the bridge were to remain in its current location.

Pulling out onto Interurban Ave from a new 124th St location would be problematic; there would be long wait times for drivers and traffic would back up. At the existing 42nd Ave intersection, Interurban Ave is wide enough to accommodate a turn lane (in both directions) for traffic turning off of Interurban onto 42nd Ave. Interurban Ave gets narrower as you head west (towards the newly proposed intersection) which means there will not be enough room to accommodate turn lanes, which will lead to horrific back-ups on Interurban. Additionally, there is already a stop light at 42nd Ave S/Macadam, so it makes sense (both financially and logistically) to continue utilizing an existing stop light rather than creating an additional one.

There are no diagrams or renderings to show what the 124th St bridge would look like. How can I vote in favor of something if I can’t see what the end result will look like?

The 124th St option is not necessarily the cheaper option as stated in the video. In the cost analysis provided to the public, there are costs missing (specifically costs to put in a new intersection/stop light at 124th & Interurban). Important pieces of information are missing, which causes this presentation to be very dishonest and misleading. Not to mention, could end up being even MORE costly in the end.

A new bridge will disturb precious wildlife! Leave the wildlife alone and use/improve upon what is already in place.

It is closer to public transit.
It connects nicely to the Interurban Trail and sidewalks.
It is off to the side and a bit hidden so much more pleasant to look at.
It has natural traffic calming features built in. Traffic must stop at the 3 way stop on 124th so they are forced to slow down.
So many reasons to chose this one and so many reasons to reject the 124th St extention.

Closer to public transit for members of the neighborhood. Also, it will help mitigate speed through the neighborhood as it involves more stops for vehicles both cars and trucks alike.

Keeps existing traffic flow. Doesn’t cut off surrounding property and “Little Store”.

Could we toll the new bridge for vehicles over a certain weight threshold? To help pay for the construction if BNSF continues usage?

makes more sense and it is what the community wants, what about removing trucks from area , maybe you dont want to bother BNSF too much, so screw the community that pays your taxes. we will remember next election

The truck route bridge should be on 48th. Semitrucks regularly passing on 42nd makes a terrible environment for humans and dogs walking in the area.

Is shortest, best, pre-existing location, least interruption to community traffic, since BNSF will be using north end of their property, no more ongoing damage to Allentown environmentally or busting the Comprehensive Plan.

By choosing the 124th Street Bridge option, you could segregate vehicle and truck traffic from pedestrian traffic by turning the existing 42nd Ave Bridge into a pedestrian only bridge that has connectivity from the community center to the green river trail. This would ultimately provide a safer means of access to the trial from the community center while maintaining truck flow to the area businesses.

Seem to be minimal differences between the two alignment. Existing preferred without seeing benefits of the alternative.

It provides better access to and from the community center. Also better access to retail and food establishments along with bus stops for the residents of Allentown.

It is abit farther fm the neighborhood. Traffic flows better as it not at the intersection fm the community center.

Also open the road on the other side like it use to be when I was a child near the gas station can’t remember street name

It's an established route.

Preference to let the rail yard exit through the north end of their property, up by the old Associated Grocery warehouse on air port way.

?

It is a great spot for it

Familiar traffic patterns, less impact on private property, natural slowing of trucks because of stop sign after bridge, potentially less impact on current wildlife patterns

Least expensive and better traffic flow from trucks going to and from the rail yard. Also this choice seems better suited for climate change in regards to flooding and tidal surge.

Because I live in Allentown. The trucks already speed through this community. Having a straight shot to BNSF will make this problem much worse.

So that the TCC splash park and surrounding area can be enlarged.

Would prefer a new location if it will be larger and one lane each way.

Central to a better intersection

Disappointed that the community preference of 48th PL S seems to have been ignored again.
Pedestrians and cars should only be allowed on the 42nd Ave S bridge.

Convenient

I prefer the 42nd Ave alignment because it provides better connectivity of the Allentown neighborhood and the Tukwila Community Center to Interurban Ave and the Green River Trail --

Specifically, the alternative of placing the new bridge at 124th would add about 10 minutes of travel time to walk to the nearest transit stop, which is the Tukwila Park & Ride at 52nd and Interurban. That walk would also include a significant grade to match the elevation of the other side of the river out of the Allentown neighborhood where today there are currently no sidewalks. It is unclear whether the costs associated with the 124th alignment includes pedestrian facilities to make access to transit safe and convenient. Additionally, the connection to the Green River Trail in the 124th alignment is less ideal since it includes both a steep grade to cross the river and a series of switch backs to get back down to the trail. Aside from the many impacts on the private properties on the Allentown side of the river, this alignment does less to serve the community compared to the existing 42nd alignment.

The existing 42nd alignment provides a more direct connection to Interurban and transit and allows for a safer, better, connection to the Green River Trail.

Does not cut into existing greenbelt, stays in current foot print

Less impact on recently restored critical ecological area (river bank), no new river scour area, quicker pedestrian walking times to access public transit, concerns about speeding trucks and traffic with the other alignment option.

There is no residential impact on the south side, no schools. community center, etc. Closer to the I-5 noise. There are already industrial businesses on that road as well.

We don't need to make it easier for BNSF traffic to continue driving thru Allentown! You need to seriously consider another bridge location into the rail yard.

Would be less cost?

-The 42nd street alignment provides a direct and safe/well lit route to the most accessible public transportation stop (the Tukwila Park & Ride) for residents of Allentown. The 124th alternate adds at minimum 1/2 mile to this route for most residents of Allentown and requires more travel through areas with no sidewalk.
-The 42nd street alignment provides more direct access to the community center for existing residences outside of Allentown.
-The 42nd street alignment involves fewer long term impacts to Harry's/Superette, Allentown's only store.
-The 124th alternate appears to require additional traffic calming.
-The 124th alternate involves more impacts to existing utilities.
-The 124th alternate involves more impacts to existing residential properties and driveways.

Less expensive to build.
Less expensive future maintenance.
500 yr flood level (vs 100 yr with the 42nd)

124th will not require building a temporary bridge (using existing 42nd bridge)
124th is suggested by the Professional Engineers

As a resident of Allentown, I believe a replacement bridge at the current location is the best option. This will preserve current riverbank areas and pedestrian access, while being able to slow down the trucks going through the neighborhood. Having a bridge on 124th would allow trucks to speed through, while holding up traffic for Allentown residents.

It’s the easiest way in and out. The residents are just acting like Karen’s. BNSF have been there for literal years. If they don’t like their freight being there, move.

Several reasons:

1. Replacing the bridge in its current location will allow access to the community center and Allentown from the neighborhood on the south side of 42nd at the highway.

2. Building the bridge in its current location does not require a wall to be built that will hinder transportation through Allentown and along the river.

3. Building the bridge in its current location will lessen the environmental impact of the project and will allow the area across from 124th on the river to remain untouched.

4. Rebuilding the bridge in its location will not create a slope the trucks traveling through Allentown will use as an excuse to increase their speed going in either direction.

We dont need another bridge to cause more backups such as traffic lights not working in sync, truck drivers lined up to get in or out of the area, I think it will be chaos near our little store. Use the money that you're planning to use on the new bridge and upgrade what we have..build on that bridge to be better.

Use the pre existing location! Otherwise you will be disturbing the environment, residents, pre existing traffic and structure and ultimately doing more damage than is needed.

I feel it is the safer alternative

Critical river habitat at 124th. Should REALLY BUILD A NEW BRIDGE AT 48th Ave South so all truck traffic is not in a neighborhood!!!!

It's the most obvious choice. Only pro's, no cons.

It's less disruptive to the neighborhood.

It's safer for firetrucks responding that have to go south out of Allentown.

It will slow trucks from speeding.

It looks better and ties into existing intersection, which would require less construction and disruption of the current shoreline.

Would severely impact Allentown residents quality of life even more than it already does. Catering to railroad. Children who live here already can’t walk to their community center. Someone could get killed. It’s like letting the horses out of the barn if bridge is on 124th. Makes route to transit longer for Allentown residents if on 124 th. Affects homeowners driveways and property values. Grade is substantial not slight like you try to say in video.

Both options are viable.

Lower cost

Traffic flow would be enhanced.

The existing traffic flow is fine. To give the trucks a straight shot from the truck yard to Interurban would just increase the already speeding vehicles. Also, during to the height difference from 43nd to Interurban, there would have to be walls built which would ruin the ambiance of the neighborhood.

It works well with one 4 way intersection that aligns with macadam vs 2 three-way intersections that will cause more traffic/stops along interurban. It is also nicer for kids that walk to the community center from the Riverton side of town using the current bridge. If we are still planning on driving BNSF trucks to the black river yard the lazy right hand turn from interurban to 42nd is a lot easier for trucks to manage than a sharper turn to 128th.

It being a straight shot and less expensive. Room for cost increases.

Cheaper

More calming to traffic than long straight away. Requires less improvement at interurban and doesn't provide an additional interaction at 124th and Macadam.

It is the known route for many years. Not much disruption for drivers.

We need the bridge restore and make the person damaged pay for it. Tukwila needs to stop charging residents more taxes and ridiculous fees to pay for the bridge.

It is the stated preference of the community, and maintains the current traffic patterns. I think the 124th street option would encourage large trucks to travel through the neighborhood at a higher speed.

Doesn't destroy any more shoreline

It's home to me.

Less impact to the Green River Trail in current location. Trucks, although we want the reroute, would have better access when turning. There is no safe sidewalk for pedestrians on Interurban at that access point and we want our children and community members to be safe while walking our busy streets.

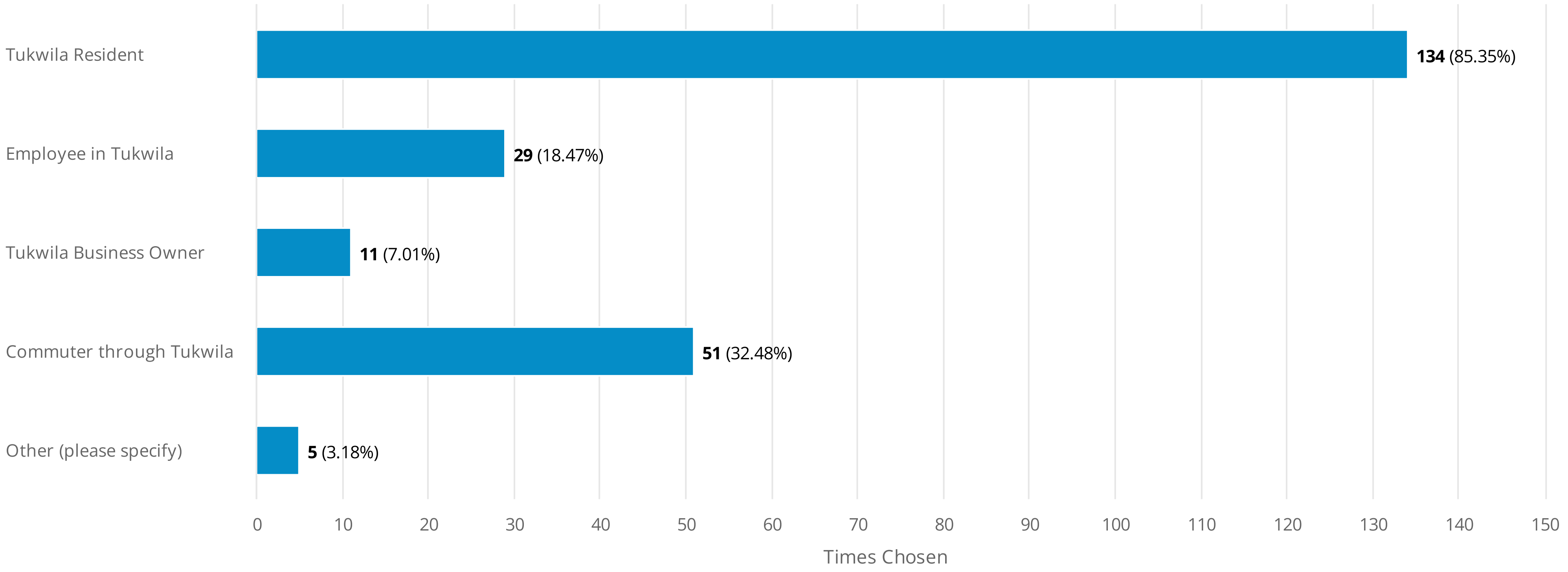
IF the bridge was relocated we MUST have a foot bridge in the existing location.

Having the trucks stop to make a turn rather than blow through the intersection to go straight will be safer for the neighborhood. The trucks often do not stop while leaving the BNSF yard nor at the 3 way stop after the yard. I doubt they would stop at this intersection of joy required to turn.

Seems like there would be more road construction if the bridge was moved to S 124th St, although maybe easier for big trucks to continue to go straight instead of turning on 42nd Ave S. The fact that most of the infrastructure exists already seems best to go that route, unless the former bridge is restored for bikes/pedestrians going to the community center.

3. Please check all that apply. This project impacts me as a:

Number of responses: 157



"Other (please specify)" text answers:

As a Friend of the Hill (Duwamish Hill Preserve) volunteer environmental steward. I have spent untold volunteer hours, along with hundreds of other volunteers, working diligently over the last few decades to improve and maintain the land along the Duwamish river. We remove invasive plants, plant native plants, collect garbage and in general encourage and support a healthy environment for both wildlife and people. This incredible landscape provides an opportunity for educating people about the Duwamish River, the native wildlife, as well as the history of this place. I, along with the other hundreds of volunteers over the years, are very invested in the health of this interconnected ecosystem in Tukwila and beyond.

Resident on S 124th St across from the basketball courts.

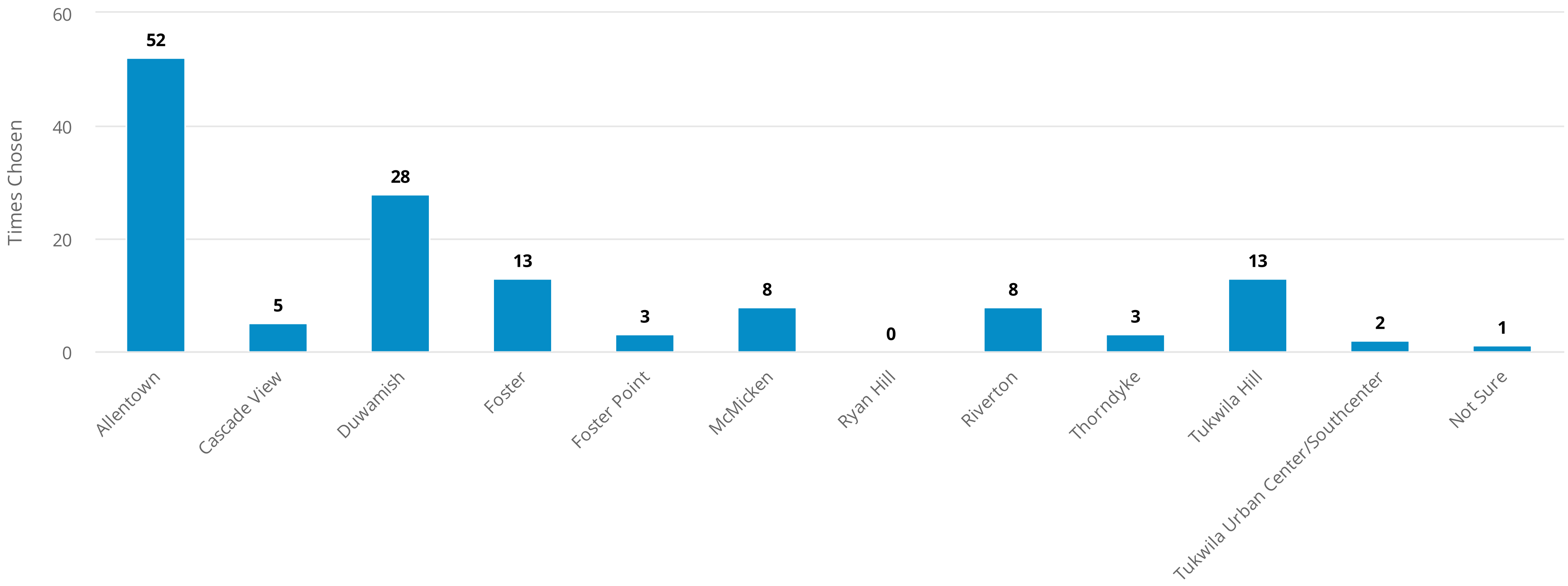
Truck driver

Use the community center and bike trails and parks in Allentown.

I ride a bike through Tukwila from Renton often.

4. If you identified as a Tukwila resident, which neighborhood do you live in?

Number of responses: 136



5. Other Comments:

Number of responses: 63

Text answers:

Cost differences are small in the scheme of things

It appears my vote will not count since the Counsel has already made its decision known before the 23rd.

The best alternative is the one promoted by Allentown Advocates. Why is it being ignored? Allentown residents have been pushing to remove semis from their neighborhood for decades!

We were told multiple times that a bridge over 124th wasn't going to be an option. I am disappointed to have seen it presented in the community meetings and now here in this survey. This survey asks all residents to list a preference but not all residents are impacted equally. The residents have spoken, we do not want a bridge at 124th, please respect the community voice!

Try to get it done within a year, please

This truck traffic problem has been around and ignored through the administrations of many mayors. Picking the 124th choice is really ignoring the residents.

The residents of Tukwila matter just as much as the businesses here. I worry our local government has lost sight of that and cares more about the businesses and maintaining that income versus protecting the interests of constituents.

City Employees in charge of this project did not conduct proper traffic impact studies before applying for grants. The feedback from the community has not been applied to any of the key decisions in this project. The timing of the City’s communications and grants seeking leads me to believe that the city never intended to factor in our community’s feedback.

If the council is considering moving location.
Strong consideration should be
Placed on existing projects..
Time to work with Public Bonds....
Let the people invest in the program.

The cheapest alternative please. Also, if a new bridge was built for truck access only, then the old bridge would be fine for cars. One truck weighs as much as around 20-30 cars. Literally, no way to put that many cars on the bridge. If you build a new bridge , in the new location, leave the old bridge for people and bikes.

I was very disappointed with the bad faith in which Tuk. Public Works appears to have acted when presenting these options, given months of dialogue with neighborhood stakeholders and hope future communications will take transparency and equity as guiding principles for decisions making rather than inconveniences.

I would like the City Administration to share with the City Council - publicly - what metrics it is using to compile this information, as well as a complete list of all the responses to #2 and #5. If you are giving equal weight to the responses from neighborhoods other than Allentown and Duwamish, which experience the daily impact of the City's negligence and neglect, that is not equitable or appropriate. The responses from those most directly impacted by the bridge condition and situation should be more heavily weighted and considered as a part of this process.

Thank you for keeping the community involved, informed and at the center of these discussions and decisions involving the City of Tukwila and our neighborhood, a place we have chosen to live in and love.

If you're interested in community input during the online meetings, please have a third party moderator for the presentations and hold all questions till the end. You can't run these events like a work meeting on zoom or the mob will take control and push people out of the process.

The community meeting survey WAS NOT a representational survey of the community... and we could argue about whether a ballot initiative would technically meet that standard. The truth is most people won't care once the bridge is up and accessible, no matter the complaining online and the occasional memeable lawn signage. In this city, we elected politicians to oversee the bureaucracy. No one can accuse those involved of being unresponsive to the community.

It isn't the easiest decision... please make the best decision.

The sooner the bridge can be completed the better.

Listen to the neighborhood.

Necesitamos caminos seguros para no lamentarnos en el futuro!!

Please rebuild the current bridge AND reroute the trucks. Maybe tax all BNSF truck for constant road repair, Crosswalk installation put up a camera and make them pay a toll and put the money back into Allentown with a new bridge JUST for BNSF trucks.

The extra cost appears to be covered by grants presupposing no delays. Environmental reviews are backlogged and that is a problem.

One concern on having it at the 124th st intersection would be speeding. It will make a straight shot from the BNSF railyard to the bridge. Also, it will add an additional traffic light along interurban. Which already has 5 in a one mile stretch.

Work with us who live here

I know regardless of this survey you as the council will do what you want. Doesn't matter what we want or what we say. But if you take those peoples land, you need to compensate them properly. I'm sure that if you or one of your family members lived in one of those house or owned that store you would be picking the other route. Facts.

As a business in the Allentown/Foster Point area we not only have employee using 42nd ave bridge but daily truck traffic

Can we please get speed bumps 40th Ave and 116th? Since the bridge closing cars are speed down our streets looking for ways around the river and I don’t want any kids to get hurt.

I think it would be nice for the allentown area to see what can be done to realign the shipping corridor, like what is the possibility of getting BNSF a direct connection to I-5 north/south

I would welcome a different design for the extension of 124th option that would not impact the homeowners & existing business in Allentown.

Thanks again!

Connection at 48th Place might be a good alternative.

Community trust in the process has been low. The bridge replacement project is an opportunity to bring the neighborhoods together, solve longstanding traffic issues and increase the quality of life, livability and property values in Allentown. Let’s not miss this incredible one in a generation opportunity to do something great!

I wonder if there's a way to improve our walking food desert situation.

No Trucks in Allentown !!

Please save this bridge! Keeping it should save some hard earned tax dollars.   The money saved could be used to keep it going as a beautiful, one of a kind, pedistrian trail.

I REALLY hope that the people in charge of making this obvious decision will STOP listening to BNSF and do what the residents of Allentown want. The residents of Allentown predate the railroad. We were here first and we want the 42nd Ave South bridge replaced! The city of Tukwila needs to stand up to the BNSF and tell them to reroute their trucks to Airport way. Where trucking belongs. NOT through a residential neighborhood.

42nd is the best choice. Thank You

Rather than build a temporary bridge.   How about keeping the existing detours at 115th St/Interuban Ave, and 129th Street Bridge open. In addition, temporarily open to cars the 56th St to Railroad Ave intersection during construction.   That would give three ways for residents to drive into the area and avoid the cost of a temporary bridge.

There will be lawsuits over the 124th option. Environmental advocacy groups are already preparing.

The 124th St option is being sold to us with half truths.
The video does not address many issues it has.
It doubles the travel to public transit. It has no sidewalks to use on the Interurban side.
The connection to the trail is haphazard and steep.
There would be no traffic calming on our side, the traffic would have the right of way into our neighborhood down an <8% grade.
The apron you would need in 3 directions to connect to in on Allentown side would impact all houses on that corner and the Little Store.
The list goes on and on. If we all vote this down and it stills goes through....it will prove what we already feel, that you have NO respect or empathy for what we go through daily with 10,000 vehicles going through our neighborhood.
See you at the meeting on the 22nd...

Please listen to the neighborhood most affected by this project. It was made abundently clear at the last community meeting that 42nd St. is the preferred option for replacement.

incompetency on the part of the city to ignore the biggest problem all together. GET THE TRUCKS OUT OF OUR NEIGHBORHOOD.

The truck route bridge should be on 48th. Semitrucks regularly passing on 42nd makes a terrible environment for humans and dogs walking in the area.

If there were a way to attach letters I've written, I'd do that. DeSean Quinn has the most recent.

I appreciate the coordination with businesses and industries in the vicinity of the project. It's important to keep trucks and their cargo on safe infrastructure. I understand this corridor is critical to the supply chain and modernizing the infrastructure is a priority.

The existing place is better because it is farther away fm
Neighbor!

Thanks for your work to support business and industry in Tukwila.

Please get these trucks out of our community. They create tremendous safety hazards, and air and noise pollution.

Thank you for preparing the video! However, in the video is fails to actually show the two different alignment options on a map. That context would be helpful for residents to understand what the real-world impacts of those alignments would be.

The real issues are rerouting the truck traffic, guard rails along the river and speeding. Moving the bridge is not the answer for truck traffic.

Please do not build the 124th option.

The video that accompanies this does not discuss impacts to walking corridors for residents outside of Allentown accessing the community center or for walking/biking residents inside of Allentown accessing the park&ride.
This seems to be an oversight and it would be very helpful for people to have more of this type of information before weighing in.

If you can’t fix the bridge, move down the road to where the Petersons gas station is and stop the poor little Karen’s from complaining. It’s annoying. Again, BNSF has been there for years and they knew what house they were buying and most likely saw the trucks. Those trucks haul their precious household items, Amazon purchases, etc. if they don’t like it, move or stop bitching.

It would serve the city council well to find alternative routes for the trucks traveling to BNSFs yard in Allentown. There is no reason the city council has to chose a plan that benefits BNSF over the residents of Tukwila. It is clear that the trucks cause the most wear to the bridge. It would benefit the city greatly if BNSF was forced to create its own route across their tracks from the yard and onto Airport Way so as to avoid future wear that will cause the bridge to be replaced much sooner.

Truck traffic in The Allentown neighborhood should be re-routed to a new bridge (or anywhere) so not to be causing dangerous traffic near the community center and parks! The 124th extension is bad as it disrupts critical habitat and routes truck traffic directly through the neighborhood. Replacement of the 42nd Ave South bridge is needed, but truck traffic needs to be re-routed out of the neighborhood!!!

Please do the right thing. The matrix analysis provided by the consultants is rigged to make the 124th option look better, but it's not.
-with the exception of cost, it presents both options as equal.
- the cost factor is rigged to give 4x the weight to an option that is within 10% of each other.
- it omitted many costs that would be required for 124th, making it 'appear' cheaper.
- it doesn't take into account community feedback or preferences

Disappointed that the you tube video script was favorable towards 124 option. Was not neutral

The bridge needs to be replaced. I live in the Foster Point neighborhood and people have short memories, the bridge leading to our neighborhood collapsed years ago. A truck crossing the bridge was too heavy and it collapsed. I worry the same will happen with the 42nd bridge. I see all of the comments and arguments and we just need to get the 42nd bridge replaced ASAP. My husband and I walk the trails around the Community Center and I will not cross the bridge when a large truck is driving across it.

We need to begin bringing the city into AT LEAST the 2000s

Are you really concerned about what the residents want or are you just interested in the impact it will have on BNSF?

The current city administration is reckless with money. They ran wayyyyy over budget wIth the bond and no one is being held accountable!!! the worst admin, planning, pemits, public works, street dept, code enforcement, dcd the WORST we've EVER HAD !! Don't feel we can trust them to do the right thing with the bridge oh and the money that has been spent on experts, consultants, committees!! This Mayor and City Manager they don't listen to the experts and do what they want! They have their own agenda they like you to think you have a say and they care about the Tukwila Community ….. Hahahaha. Look around our once beautiful city it's trashed!

Build the truck re-route!

Make sure there is plenty of access for pedestrians and people who use alternative transportation like bikes.

A separate bridge should be built for truck traffic to the rail yard, bypassing the residential neighborhood from 48th pl to railroad ave.

Please consider rerouting the trucks from the Allentown neighborhood to the industrial area on Interurban Ave. With a new bridge an absolute must along the river in that area there is no reason there would be a substantially greater environmental impact that would impede implimenting the proposed truck route bridge.

Move the BNSF route!!!!!

City of Tukwila

42nd Ave S Bridge Replacement Survey

March 2022

05/05/2020

What is a Type, Size, and Location (TS&L) Report?

- The TS&L is an industry standard for bridge replacement and/or construction.
- TS&L for the 42nd Ave S Replacement:
  - Type –
    - Two configurations used at both locations
      - Steel plate girders
      - Pre-stressed concrete girders
  - Size –
    - Width- two 12 ft travel lanes with an ADA-approved pedestrian path on the upstream side
    - Span length dependent on bridge location
  - Location –
    - Current location at 42nd Ave South
    - S. 124th alignment

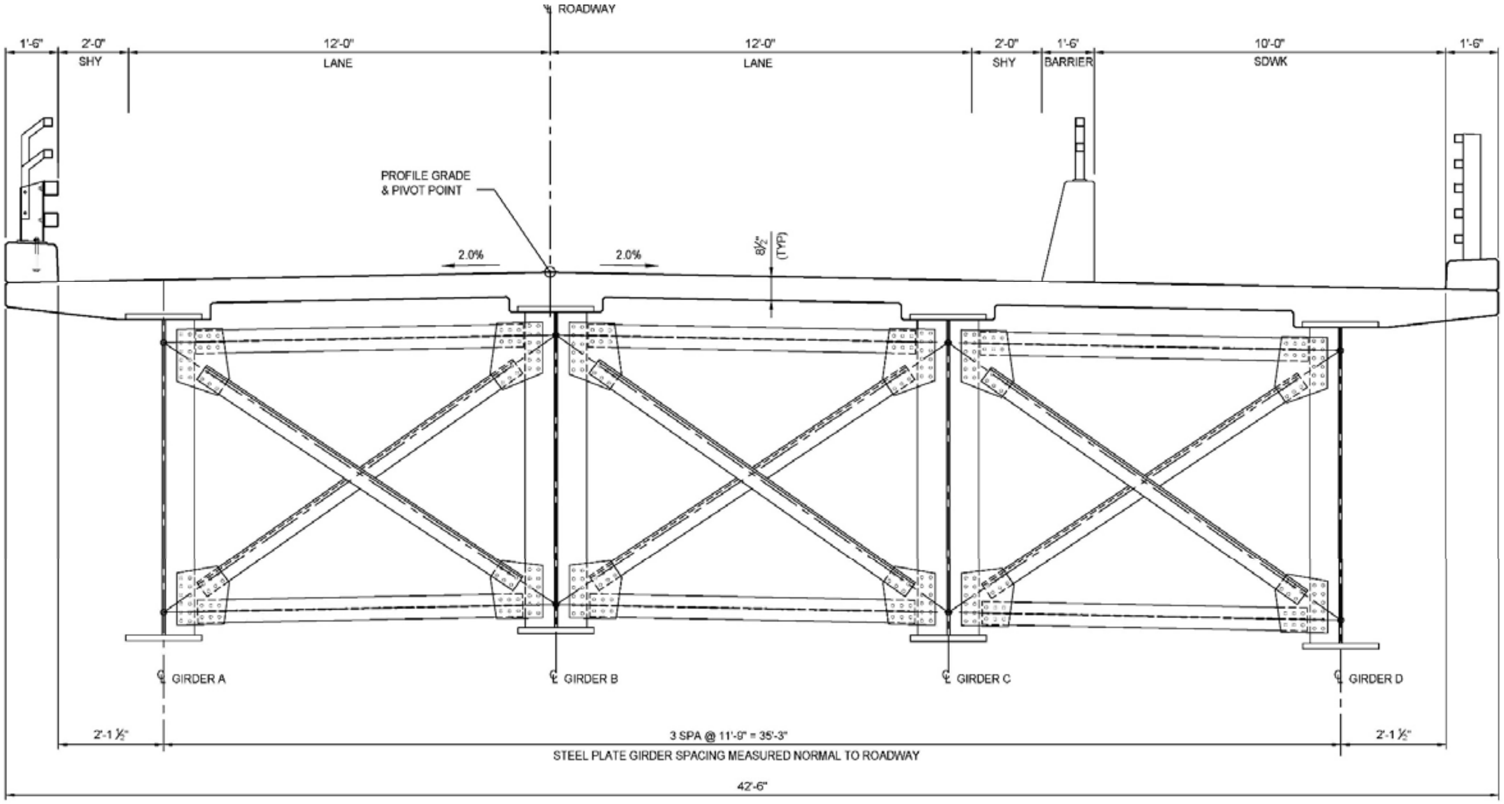
Alternative Cost Table

Bridge	Alignment	Total Approximate Costs
42nd Ave S Concrete Girder	1A	$25,957,499.00
42nd Ave S Steel Plate Girder	2A	$24,372,157.00
S 124th Ave S Concrete Girder	1B	$22,962,950.00
S 124th Ave S Steel Plate Girder	2B	$21,503,620.00

42nd Ave S vs S 124th Street Analysis

Bridge Typical Section – Both Locations

- 42.5’ wide cross section of bridge
- 10’ wide sidewalk on the upstream side
- (2) 12’ Travel lanes and 2’ shoulders
- Minimum 3-foot clearance with respect to 100-year flood



Road Plan & Profile

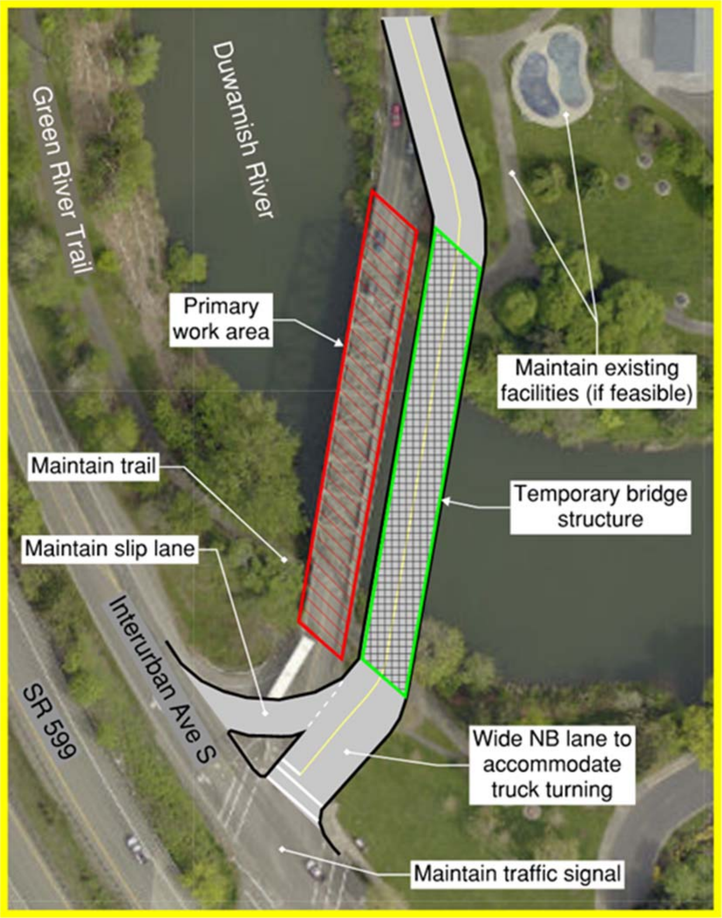
42nd Ave S Alignment

- Match existing prior to Interurban intersection
- Match existing elevation before Tukwila Community Center main driveway
- Rebuild maintenance driveway

124th Street Alignment

- Truck Aprons at Signal Interurban Ave for WB-67 Turning Movements (RAB option too)
- One Way Superette Parking Lot
- NE corner properties coordination for driveway

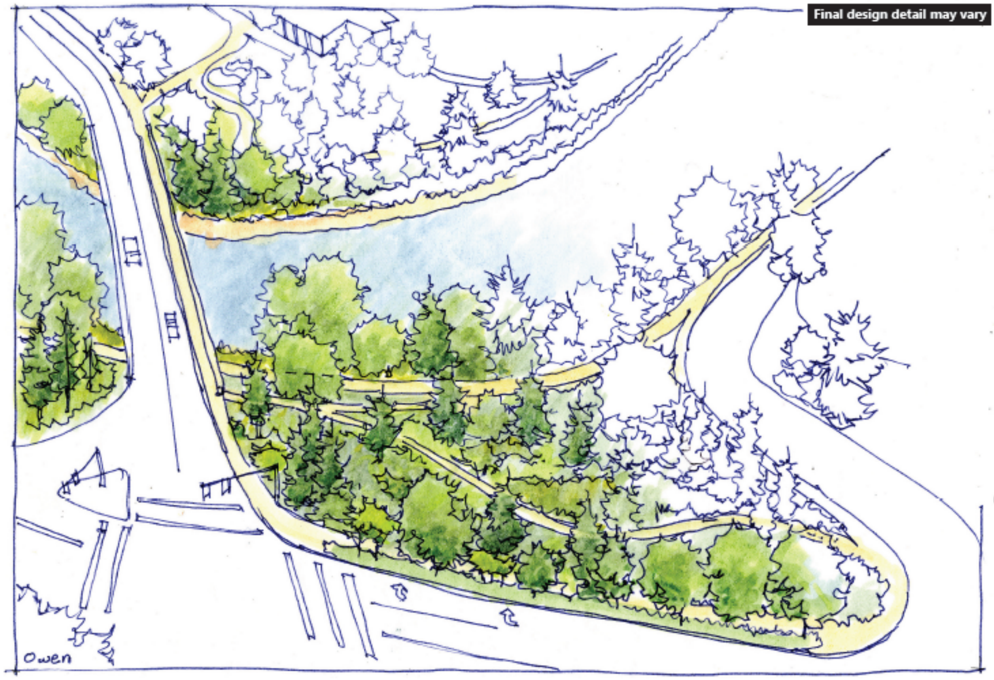
Temporary Detour for 42nd Ave S Alignment



Trail Connection – Both Locations

- 14’ wide path
- 10’ clearance under bridge (bicycles, horse riders, and pedestrians)
- Less than 5% grade, or less than 8.3% with a landing every 2.5’ vertical
- Connection will be a straight connection to the Green River Trail for the 42nd option,
- Connection can be one straight connection or a switchback for S 124th Street option

Landscape Concept 2. Natural



Pros & Cons

42nd Ave S Alignment

- Pros
  - Familiar traffic pattern
  - No impacts to private property
  - Allentown residents preferred option
- Cons
  - Possible hydrological/scour issues
  - Temporary structure during construction required
  - Most expensive option

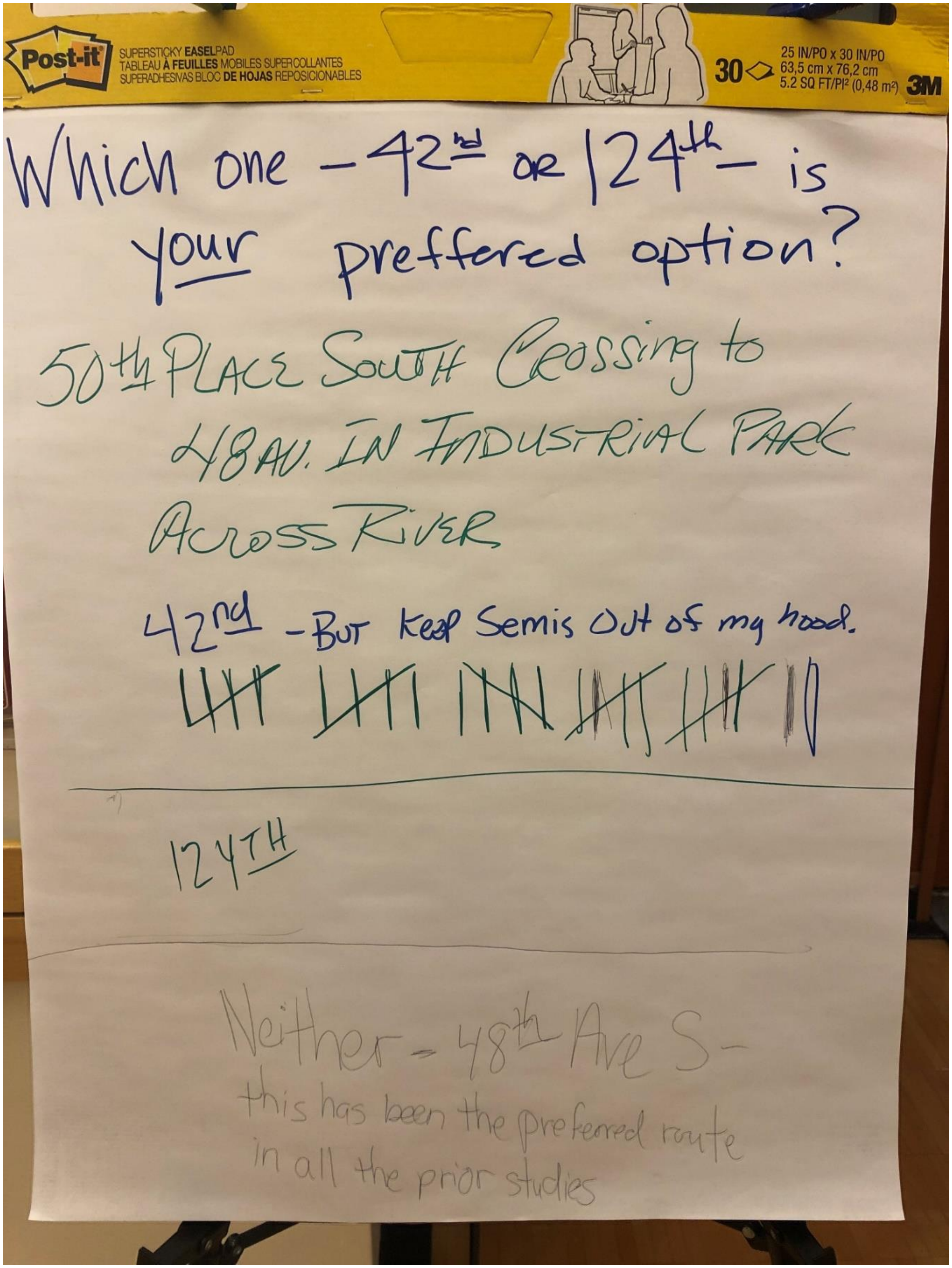
S 124th Street Alignment

- Pros
  - Best hydrological placement
  - Traffic control during construction
  - Least expensive option
- Cons
  - Unfamiliar traffic pattern
  - Potential impacts to private property
  - Allentown residents do not prefer this option

THANK YOU!

Next Meeting: March 22, 2022 at 5:30pm

Photos of Feedback Boards



Which one – 42nd or 124th – is your preffered option?

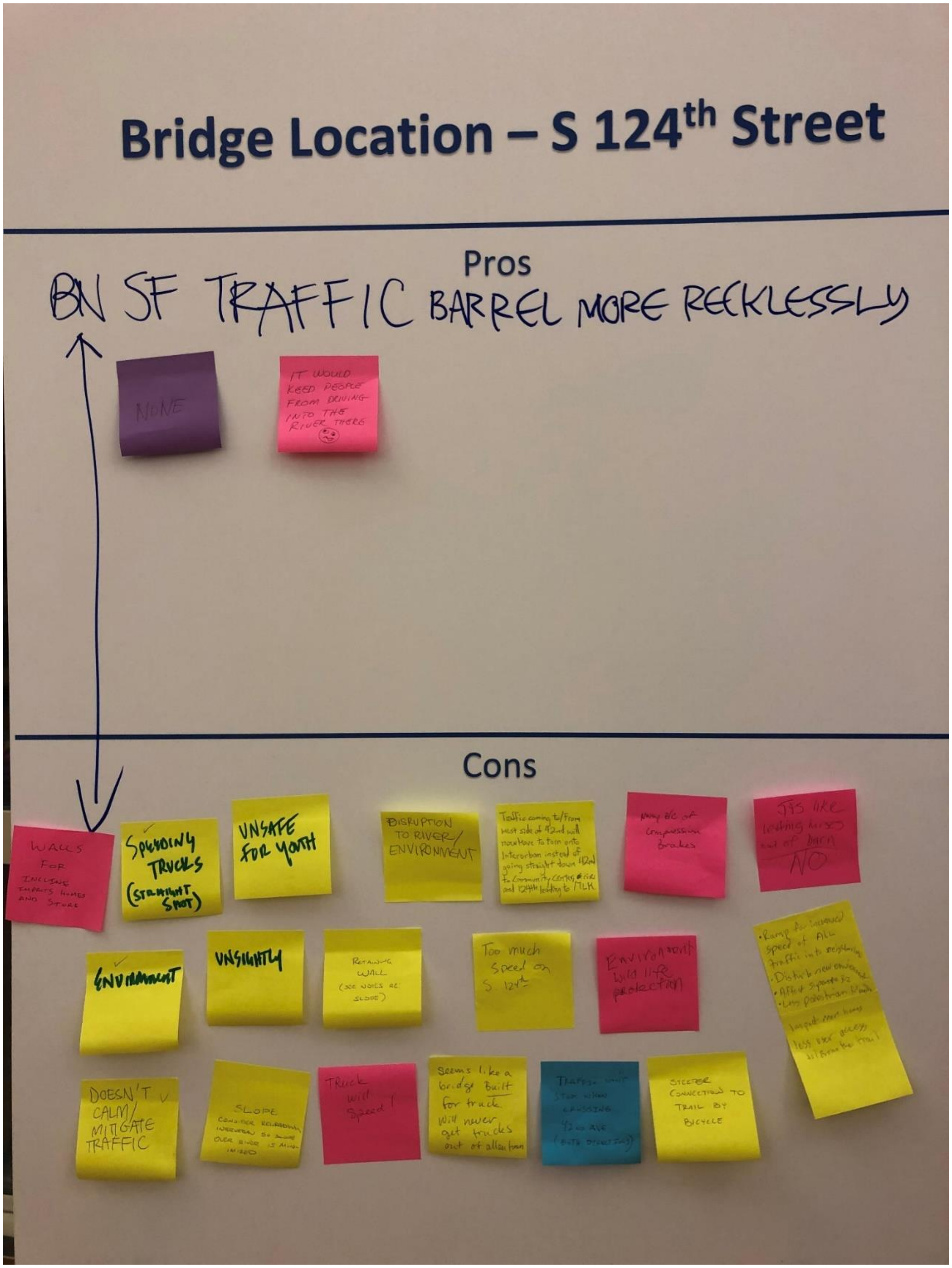
50th PLACE SOUTH Crossing to 48 AV. IN INDUSTRIAL PARK ACROSS RIVER

42nd – BUT Keep Semis Out of my hood.

124TH

Neither – 48th Ave S – this has been the preferred route in all the prior studies

S 124th Street Feedback



Bridge Location – S 124th Street

Pros

BN SF TRAFFIC BARREL MORE RECKLESSLY

NONE

IT WOULD KEEP PEOPLE FROM DRIVING INTO THE RIVER THERE

Cons

WALLS FOR INCLINE IMPACTS HOMES AND STORE

SPEEDING TRUCKS (STRAIGHT SHOT)

UNSAFE FOR YOUTH

DISRUPTION TO RIVER/ENVIRONMENT

Traffic coming to/From west side of 42nd will now have to turn onto Interurban instead of going straight down 42nd to Community Center, [illegible] and 124th leading to MLK.

Noisy b/c of compression brakes

Its like letting horses out of barn
NO

ENVIRONMENT

UNSIGHTLY

RETAINING WALL (SEE NOTES RE: SLOPE)

Too much speed on S. 124th

Environment Wild life protection

- Ramp for increased speed of ALL traffic into neighboring
- Disturb new environment
- Affect [illegible]
- Less pedestrian [illegible]

Impact more homes
less user access
[illegible] from the trail

DOESN'T CALM/MITIGATE TRAFFIC

SLOPE
CONSIDER REGRADING INTERURBAN SO [illegible] OVER RIVER IS MINIMIZED

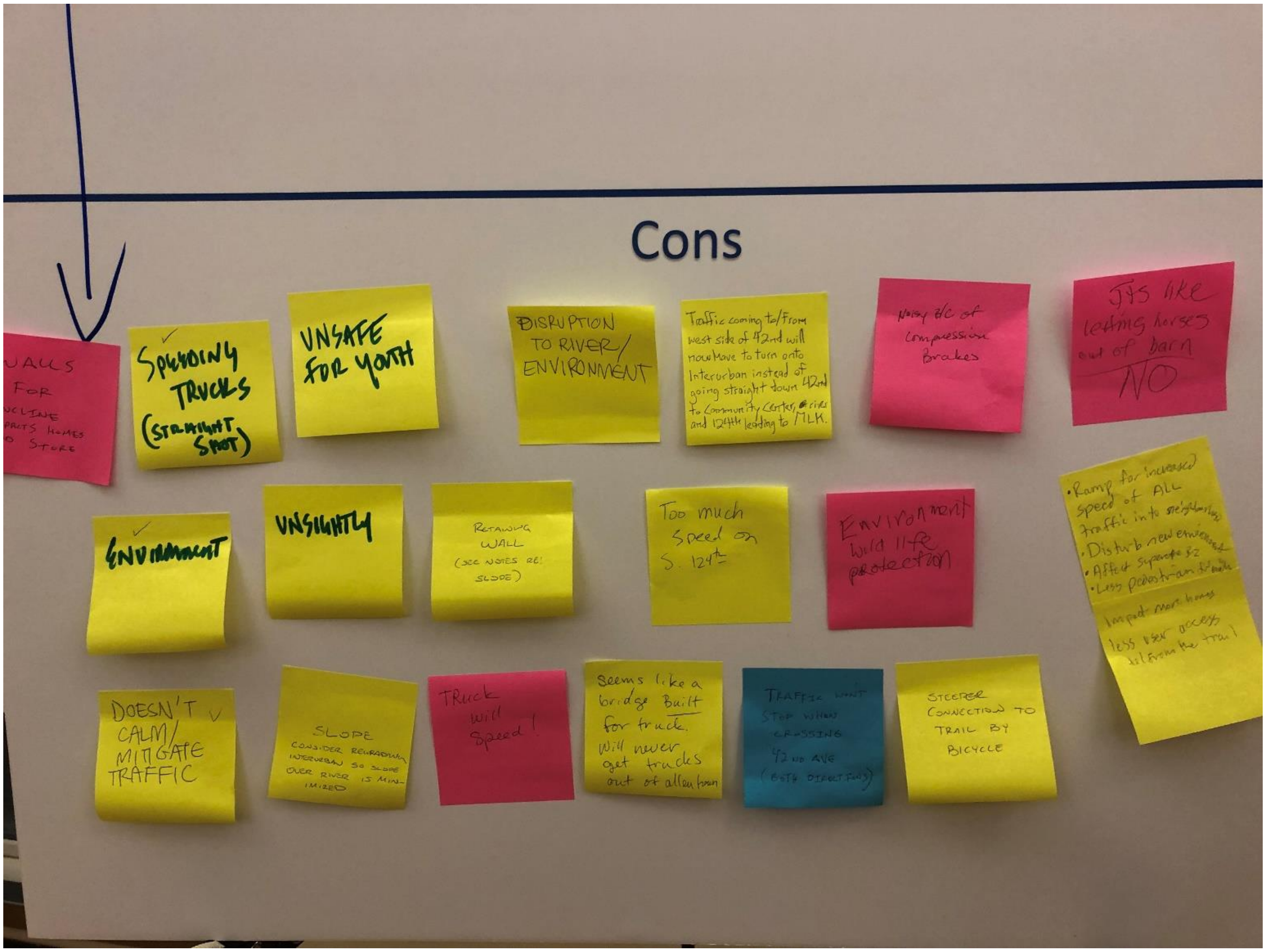
Truck will Speed!

Seems like a bridge Built for truck. Will never get trucks out of allentown

TRAFFIC [illegible] STOP WHEN CROSSING 42ND AVE (BOTH DIRECTIONS)

STEEPER CONNECTION TO TRAIL BY BICYCLE

S 124th Street Feedback



Cons

ALLS
FOR
CLINE
PACTS HOMES
O STORE

✓ SPEEDING TRUCKS (STRAIGHT SPOT)

UNSAFE FOR YOUTH

DISRUPTION TO RIVER/ ENVIRONMENT

Traffic coming to/From west side of 42nd will now have to turn onto Interurban instead of going straight down 42nd to Community Center, river and 124th leading to MLK.

Noisy b/c of compression Brakes

Its like letting horses out of barn
NO

✓ ENVIRONMENT

UNSIGHTLY

RETAINING WALL (SEE NOTES RE: SLOPE)

Too much speed on S. 124th

Environment wild life protection

- Ramp for increased speed of ALL traffic into neighborhoods
- Disturb new environment
- Affect Superfund site
- Less pedestrian [illegible]

Impact more homes
less user access to/from the trail

DOESN'T CALM/ MITIGATE TRAFFIC ✓

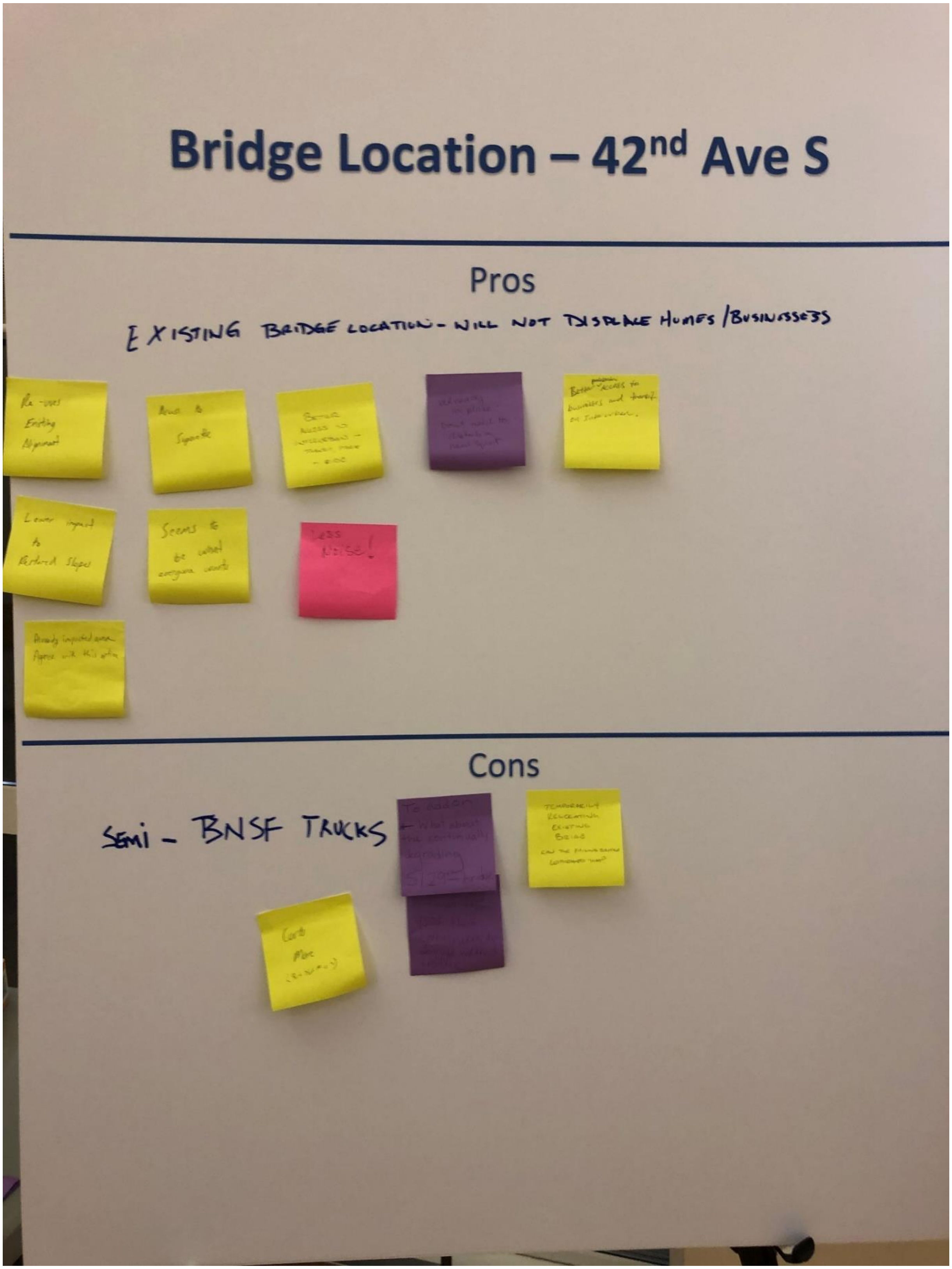
SLOPE
CONSIDER REGRADING INTERURBAN SO SLOPE OVER RIVER IS MINIMIZED

Truck will speed!

Seems like a bridge Built for truck. Will never get trucks out of allentown

TRAFFIC WON'T STOP WHEN CROSSING 42ND AVE (BOTH DIRECTIONS)

STEEPER CONNECTION TO TRAIL BY BICYCLE



Bridge Location – 42nd Ave S

Pros

EXISTING BRIDGE LOCATION - WILL NOT DISPLACE HOMES/BUSINESSES

Re-uses Existing Alignment

Seems to be what everyone wants

Lower impact to Restored Slopes

Less Noise!

Already impacted area. Agree with this option

Better access to businesses and transit on International.

Cons

SEMI - BNSF TRUCKS

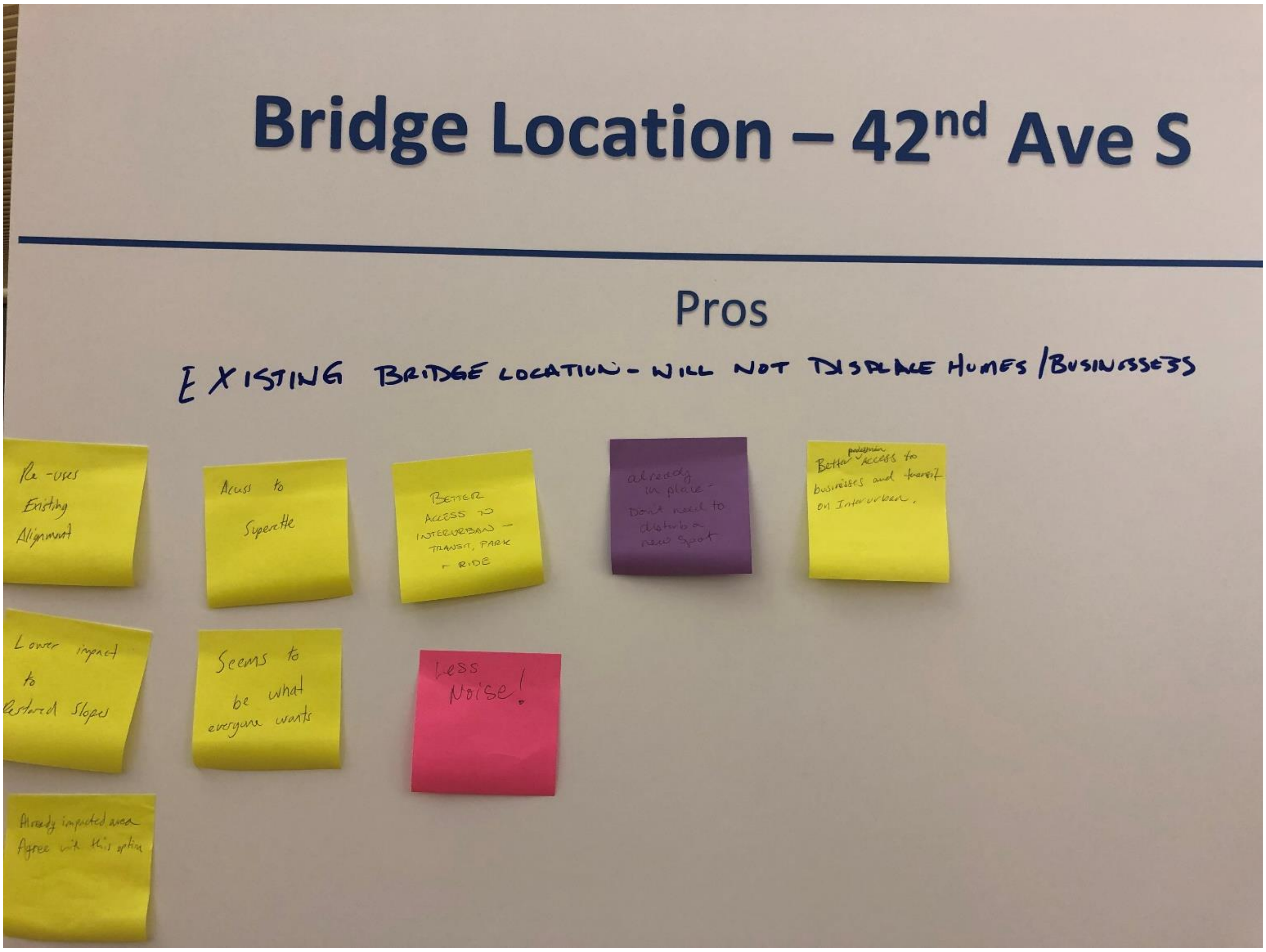
To add on - What about the continually degrading

TEMPORARILY RELOCATING EXISTING BRIDGE

CAN THE FAILING BRIDGE WITHSTAND THAT?

Costs More

42nd Ave S Feedback



Bridge Location – 42nd Ave S

Pros

EXISTING BRIDGE LOCATION - WILL NOT DISPLACE HOMES / BUSINESSES

Re-uses Existing Alignment

Access to Superette

BETTER ACCESS TO INTERURBAN – TRANSIT, PARK + RIDE

already in place - Don't need to disturb a new spot

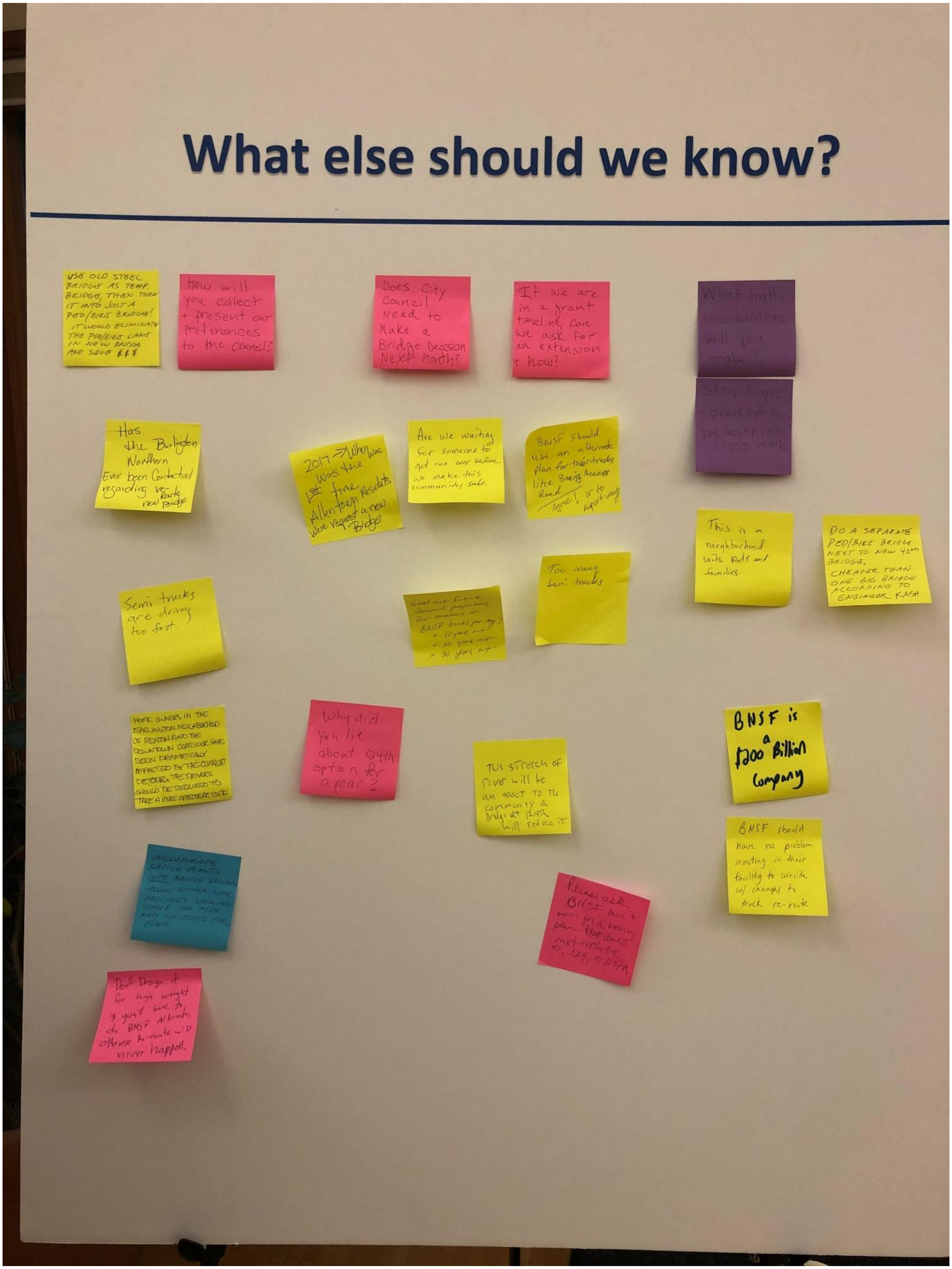
Better pedestrian access to businesses and transit on Interurban.

Lower impact to Restored Slopes

Seems to be what everyone wants

Less Noise!

Already impacted area
Agree with this option



What else should we know?

USE OLD STEEL BRIDGE AS TEMP. BRIDGE, THEN TURN IT INTO JUST A PED/BIKE BRIDGE! IT WOULD ELIMINATE THE PED/BIKE LANE IN NEW BRIDGE AND SAVE $$$

How will you collect + present our preferences to the council?

Does City Council Need to Make a Bridge Decision Next Month?

If we are in a grant timeline, can we ask for an extension + how?

What traffic considerations will you make?

Stop signs
speed limits
pedestrian cross walks

Has the Burlington Northern Ever been Contacted regarding re-Route new Bridge

2017 → When was Was the 1st time Allentown Residents Were request a new Bridge

Are we waiting for someone to get run over before we make this community safe.

BNSF should use an alternate plan for their trucks like Boeing Access Road
Agree!, or to Airport way

This is a neighborhood with kids and families.

DO A SEPARATE PED/BIKE BRIDGE NEXT TO NEW 42nd BRIDGE. CHEAPER THAN ONE BIG BRIDGE ACCORDING TO ENGINEER KASH

Semi trucks are driving too fast.

What are future demand projections for numbers of BNSF trucks per day?
+ 10 years out
+ 20 years out
+ 30 years out

Too many Semi trucks

HOME OWNERS IN THE EARLINGTON NEIGHBORHOOD OF RENTON AND THE DOWNTOWN CORRIDOR HAVE BEEN DRAMATICALLY IMPACTED BY THE CURRENT DETOUR. THE DRIVERS SHOULD BE REQUIRED TO TAKE A MORE APPROPRIATE ROUTE

Why did you lie about 124th option for a year?

This stretch of river will be an asset to the community a Bridge at 124th will reduce it

BNSF is a $200 Billion Company

BNSF should have no problem investing in their facility to work w/ changes to truck re-route

INCORPORATE NATIVE PLANTS INTO BRIDGE STRUCTURE ALONG EITHER SIDE, PROVIDES COOLING SHADE FOR FISH AND CRITTERS FOR FOOD

Please ask BNSF [illegible] for a [illegible] plan that does not include 42, 124, or 115/A

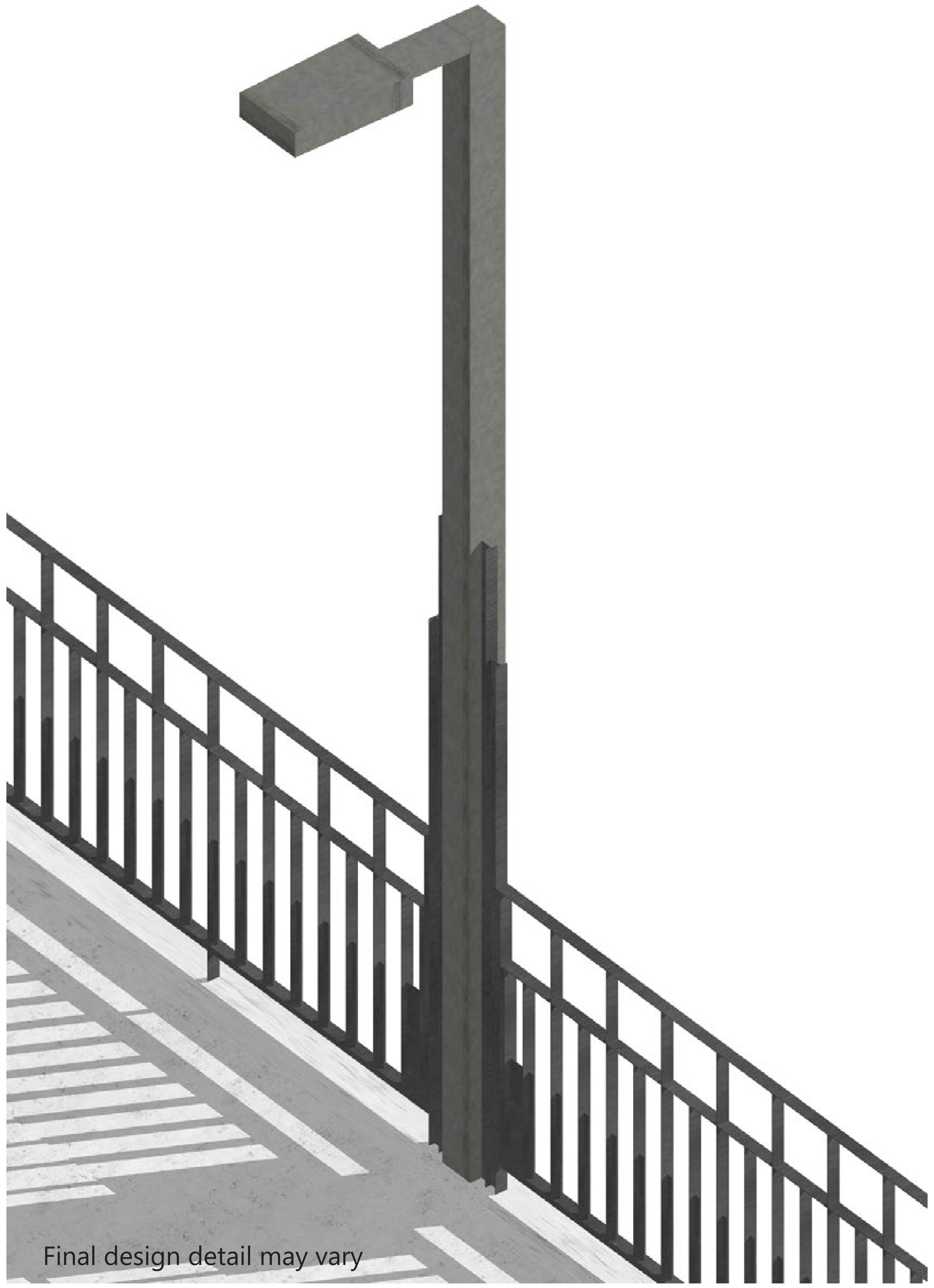
Don't Design it for high weight $ you'll have to do BNSF Alternate, otherwise Re-route will never happen.

Appendix H – Aesthetics Exhibits

Railing Concept 1. Vertical Emphasis

- Traditional
- Reflects existing fence south of Community Center
- Could be finished in green or black
- Light pole options shown separately

Final design detail may vary



Final design detail may vary

Your dots :

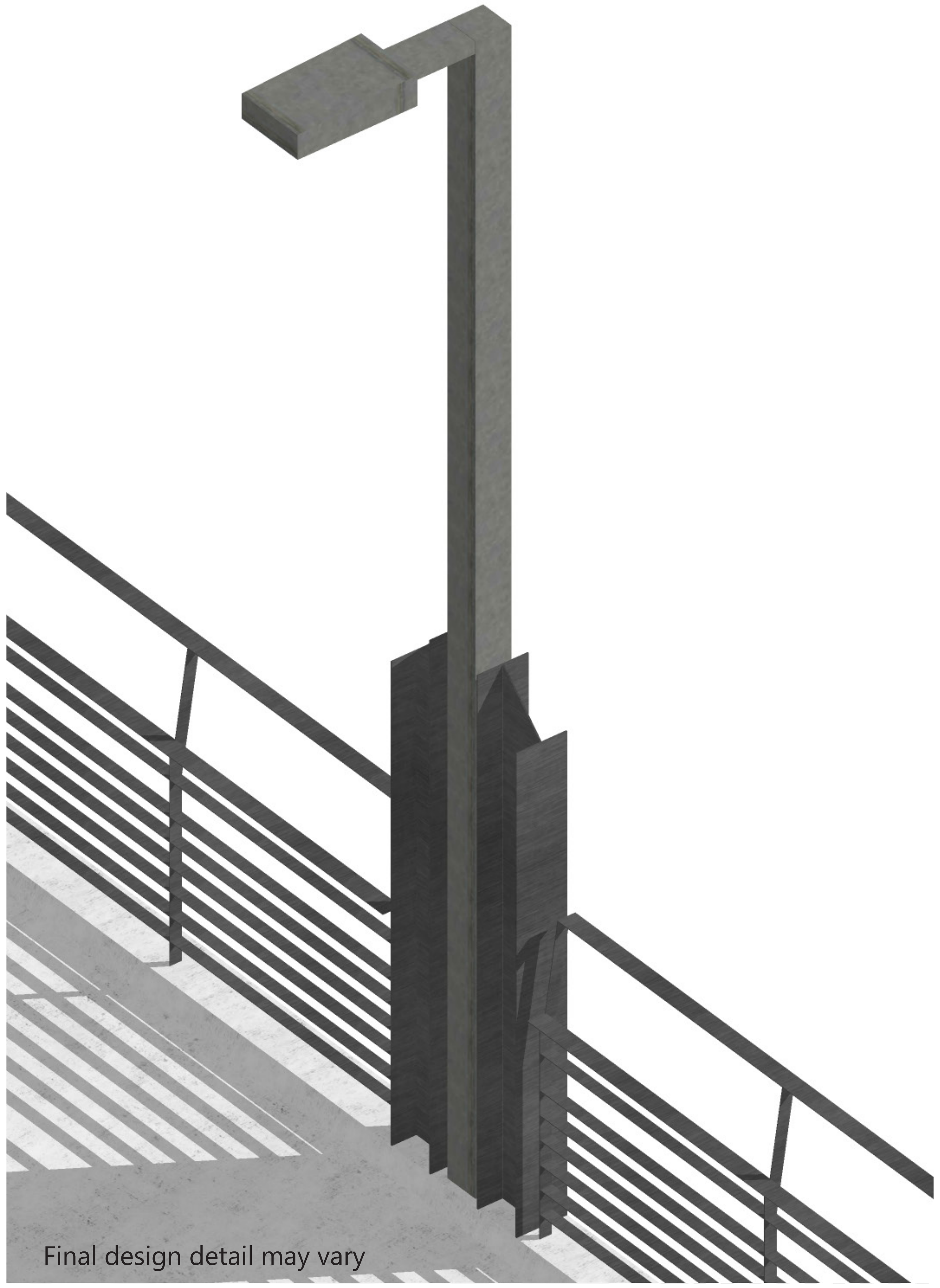
Your comments :

Dots from online survey :

Railing Concept 2. Horizontal Emphasis

- Horizontal configuration enhances the gentle arch of the bridge
- Clean and easy to construct
- Finish could be blue, aluminum, galvanized, or stainless steel.
- Light pole options shown separately

Final design detail may vary



Final design detail may vary

Your dots :

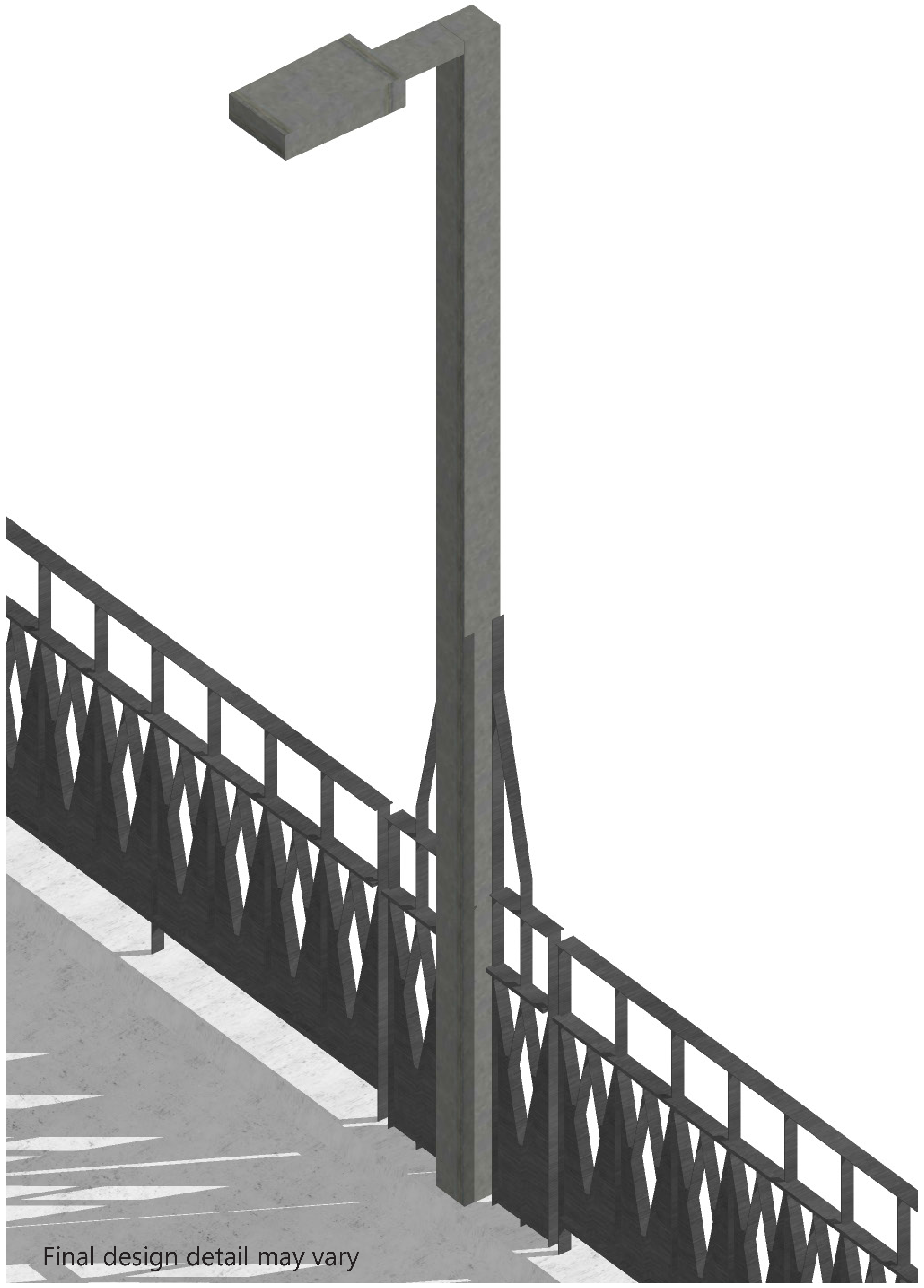
Your comments :

Dots from online survey :

Railing Concept 3. Diagonal Emphasis

- Diagonal elements included in railing.
- Steel plates ensures safety.
- Barrier rail between pedestrian and vehicle lanes could reflect diagonal geometry.

Final design detail may vary



Final design detail may vary

Your dots :

Your comments :

Dots from online survey :

Landscape Concept 1. Decorative

Final design detail may vary

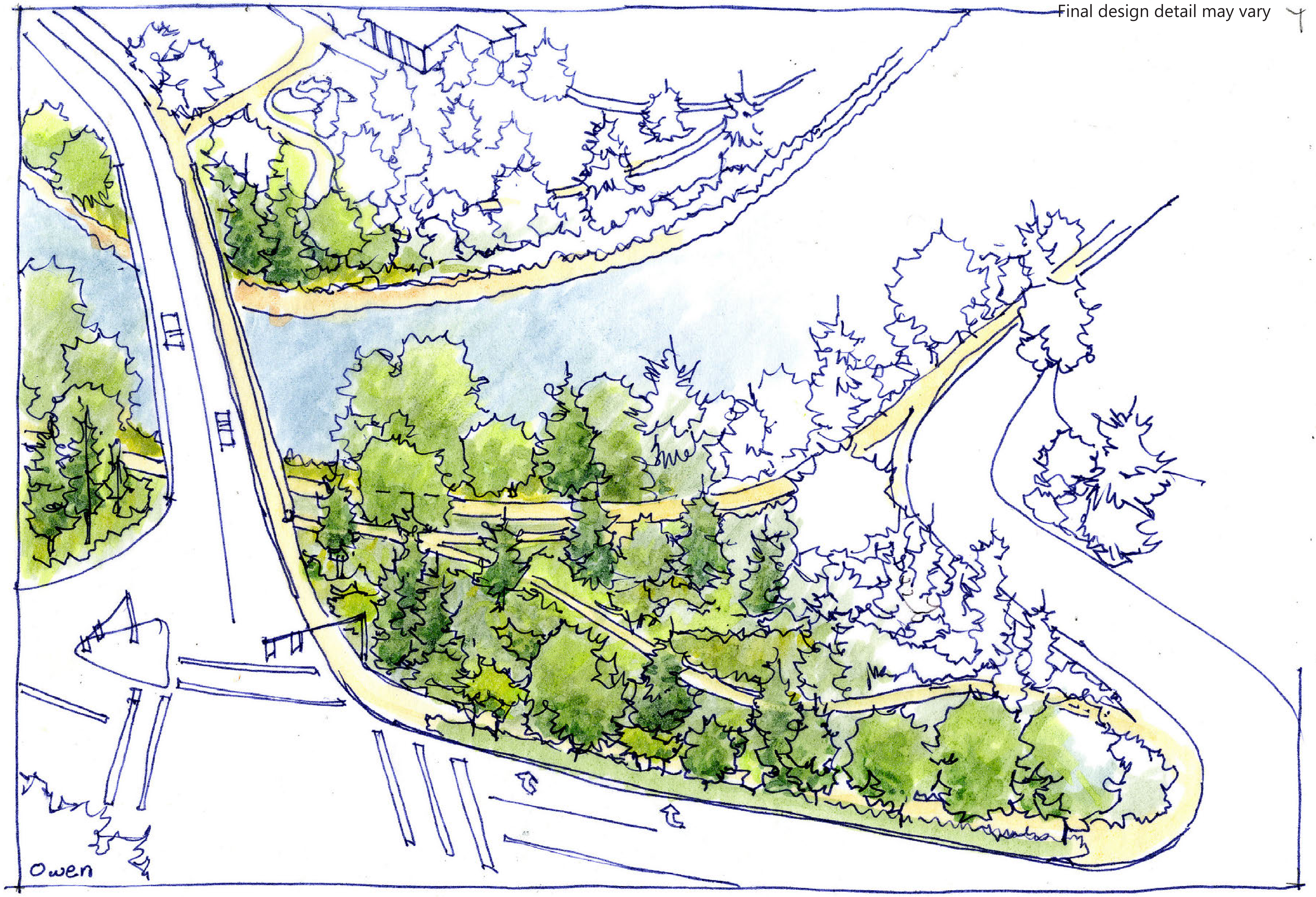
- Emphasis on enhancing a gateway for the Community Center.
- Ornamental trees along 42nd Ave S and Interurban Ave S.
- Small scale floral plantings an option.

Your dots :

Your comments :

Dots from online survey :

Landscape Concept 2. Natural



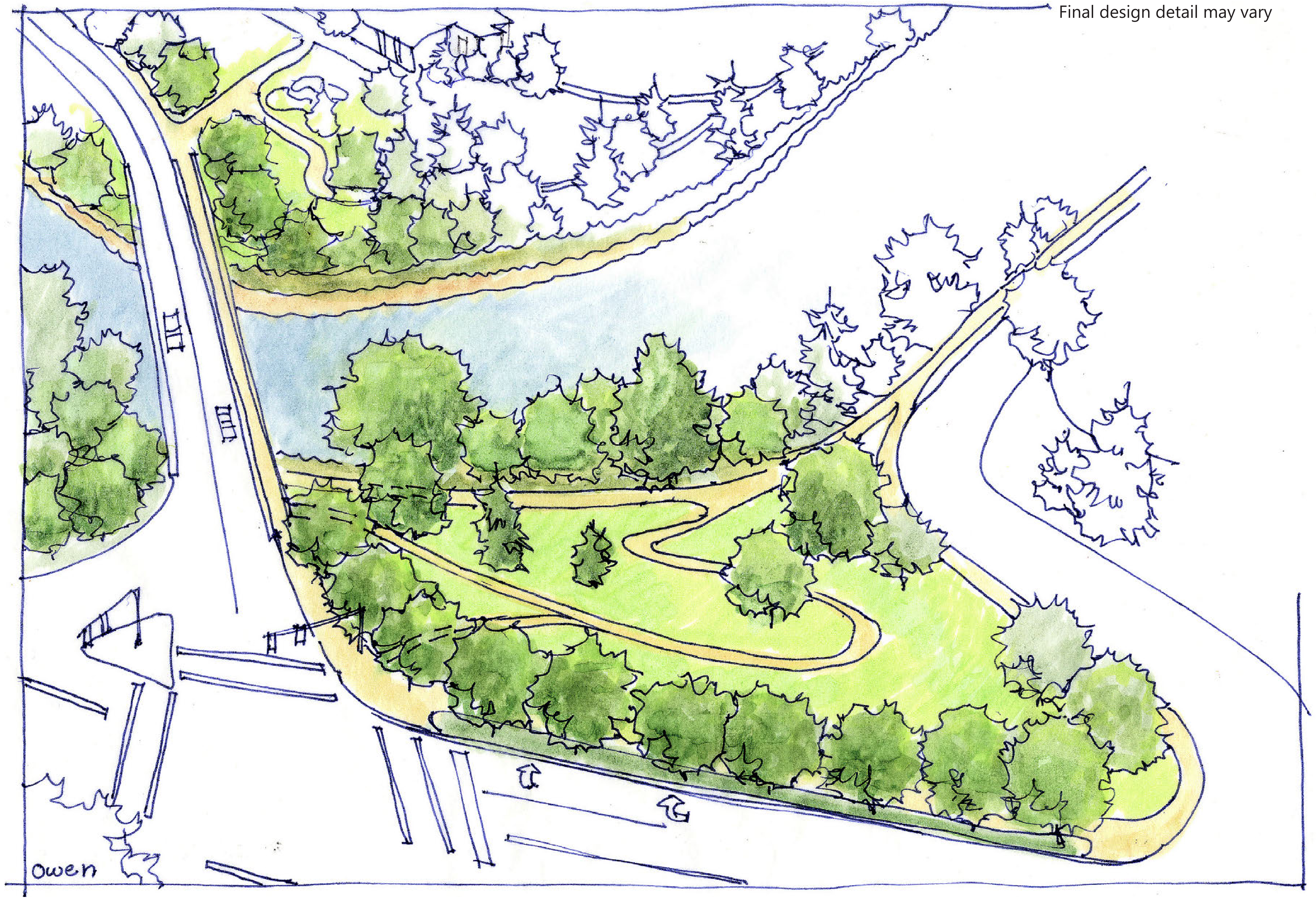
- Emphasis on enhancing the ecology through plantings of native vegetation.
- Opportunities for pathways.
- Best for stormwater and habitat
- Reinforces Green River Trail character.
- Pedestrian-friendly lighting recommended

Your dots :

Your comments :

Dots from online survey :

Landscape Concept 3. Community Center Landscaping Extension



- Emphasis on unifying both sides of the bridge and extending Community Center character.
- Extend street tree plantings in front of Community Center.
- Add gentler path from
- Green River Trail to Bridge. Plantings like Community Center.

Your dots :

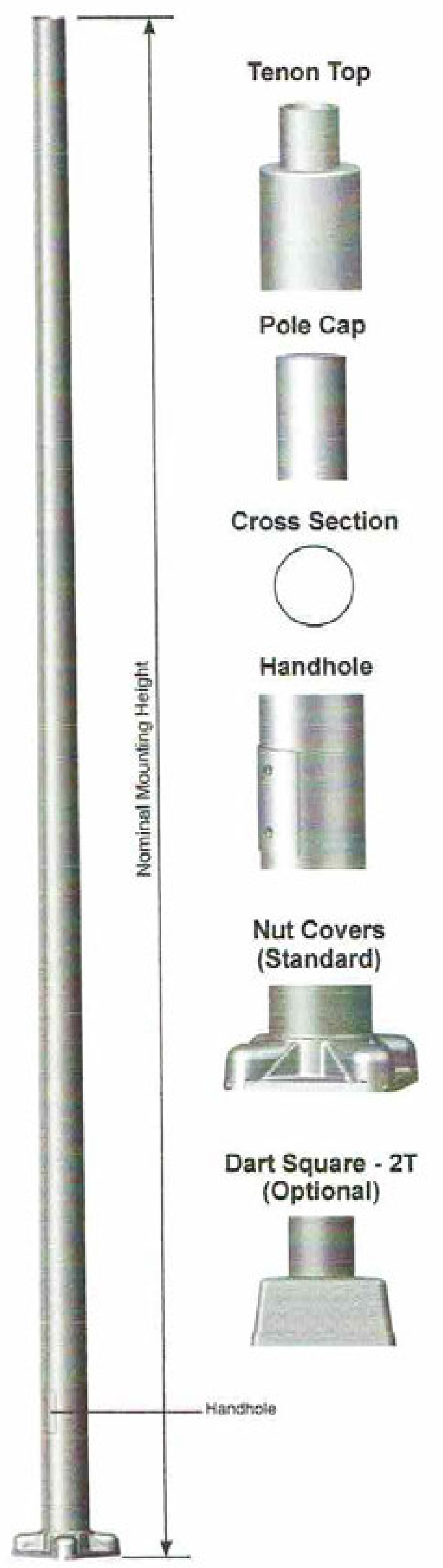
Your comments :

Dots from online survey :

Lighting Concept 1.
(integrate with railing concept 2/3)

- GCJ J-Series Fixture
- Mounted on 20’ tall round tapered pole with square base and showing rail of choice

Final design detail may vary



Your dots :

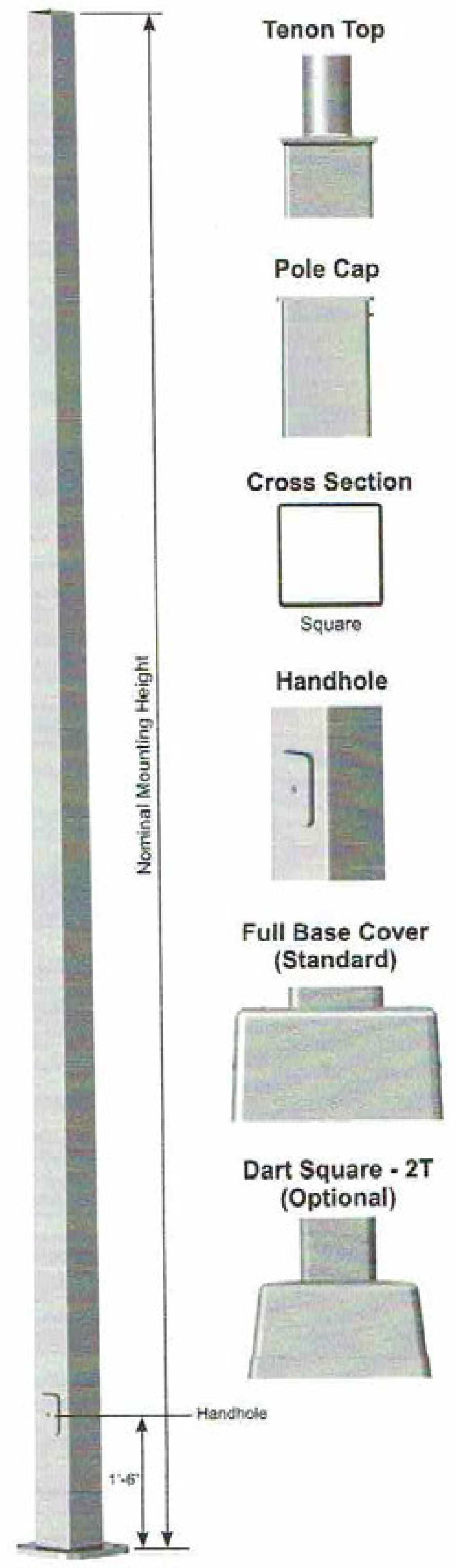
Your comments :

Online survey dots:

Lighting Concept 2.
(integrate with railing concept 2/3)

- Evolve Series Fixture
- Mounted on 20’ tall square tapered pole with square base and showing rail of choice

Final design detail may vary



Your dots :

Your comments :

Online survey dots:

Lighting Concept 3.

(integrate with railing concept 1)

- **Evolve-Contemporary Series Fixture**
- **Mounted on 16′ tall round non-tapered pole with square base and showing rail of choice**

Final design detail may vary

Your dots :

Your comments :

Online survey dots:

Lighting Concept 4.

(integrate with railing concept 1)

- **Pendant-Arm El Mirage Fixture**
- **Mounted on 16′ tall round non-tapered pole with square base and showing rail of choice**

Final design detail may vary

Your dots :

Your comments :

Online survey dots:

Color Preference

What is your color preference?

We are just beginning to consider different colors and finishes for the rail, light poles and other metallic elements. Some colors are more appropriate with different styles of railing and light poles and these are noted below. Please indicate your color preference by checking a box from options below:

	Your dots :	Dots from online survey :
Black **(goes best with railing concept 1/3)**		
Dark Green **(goes best with railing concept 1/2/3)**		
Blue **(goes best with railing concept 2/3)**		
Galvanized **(goes best with railing concept 2 easy maintenance)**		
Silver (Brushed Aluminum) **(goes best with railing concept 2 easy maintenance)**		

Gateway Preference

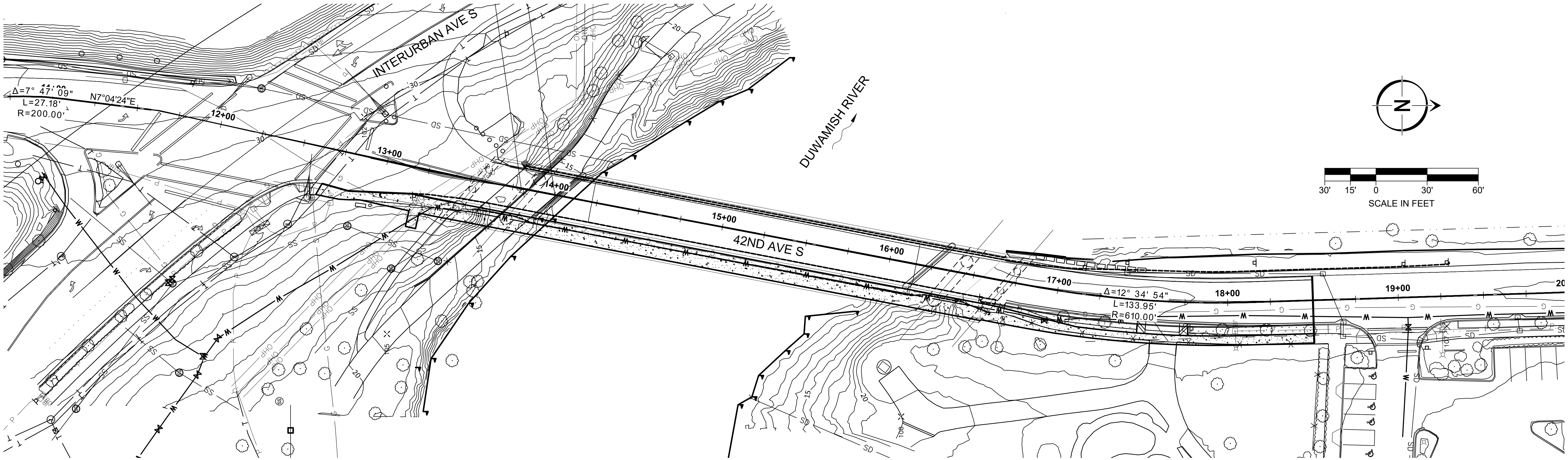
What should a gateway element relate to?

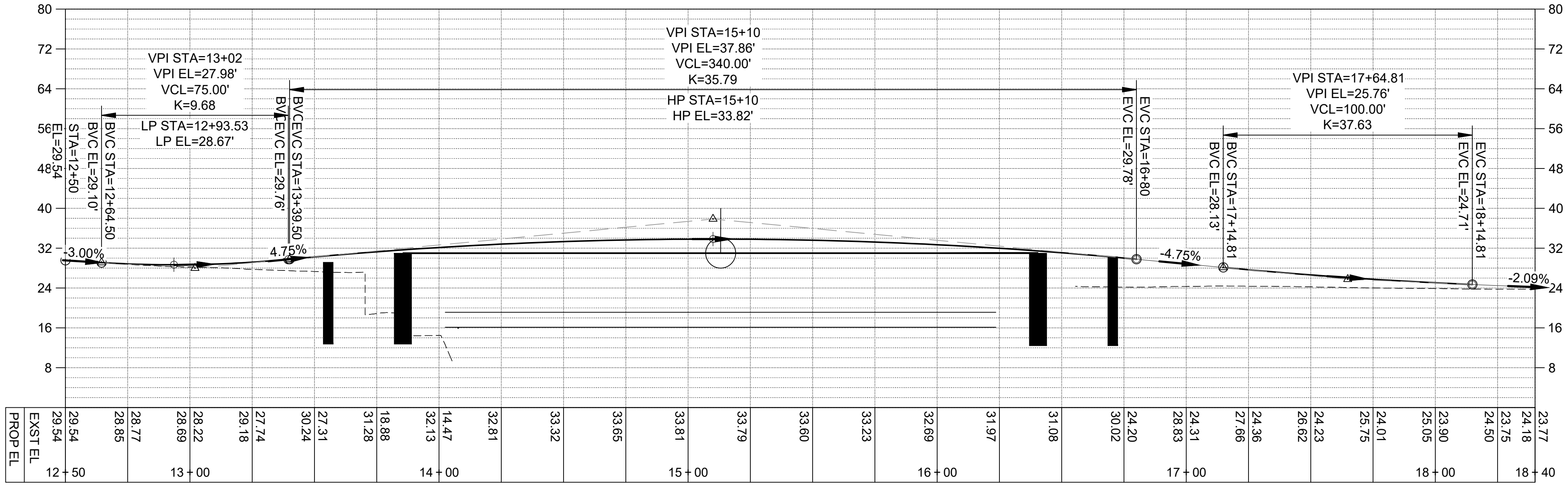
The project may include a Gateway element such as a sign, monument, or artwork. Many options are available, but it is desired to have a gateway element that relates to some aspect of its location and the bridge's function, as an important connecting structure. Please indicate which, if any, of the following attributes the gateway should reflect and/or celebrate. You may select more than one.

	Your dots :	Dots from online survey :
The Community Center		
The Allentown Community		
The current bridge with its historic steel character		
The Green River		
The Green River Trail		
Others, Please describe		

General Comments

Appendix I – Roadway/Utilities Exhibits





42nd AVE S Profile

Know what's **below**.
Call before you dig.

CITY OF TUKWILA

chearing 10/30/21 6:16pm - P:\2020\2020016 - 42nd Ave Bridge Replacement\000 CAD 20181010 Drawing\A-Model\2020016_BASE-DS.dwg

SEAL OF TUKWILA WASHINGTON 1908

PUBLIC WORKS DEPT.

ENGINEERING*STREETS*WATER*SEWER*PARKS*BUILDING

	By	Date
Designed		
Drawn		
Checked		
Proj Eng		
Proj Dir		
Field Bk #		

TRANTECH Engineering LLC
365 118th Ave. SE, Suite 100
Bellevue, Washington 98005
Phone: 425.453.5545

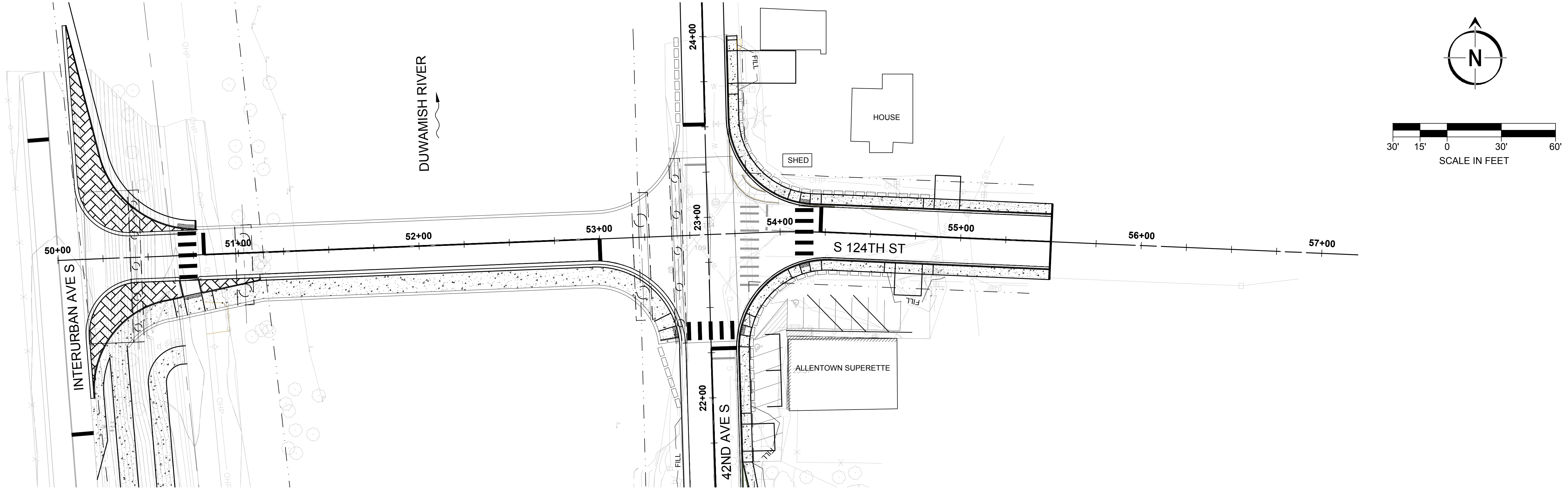
42ND AVENUE BRIDGE REPLACEMENT

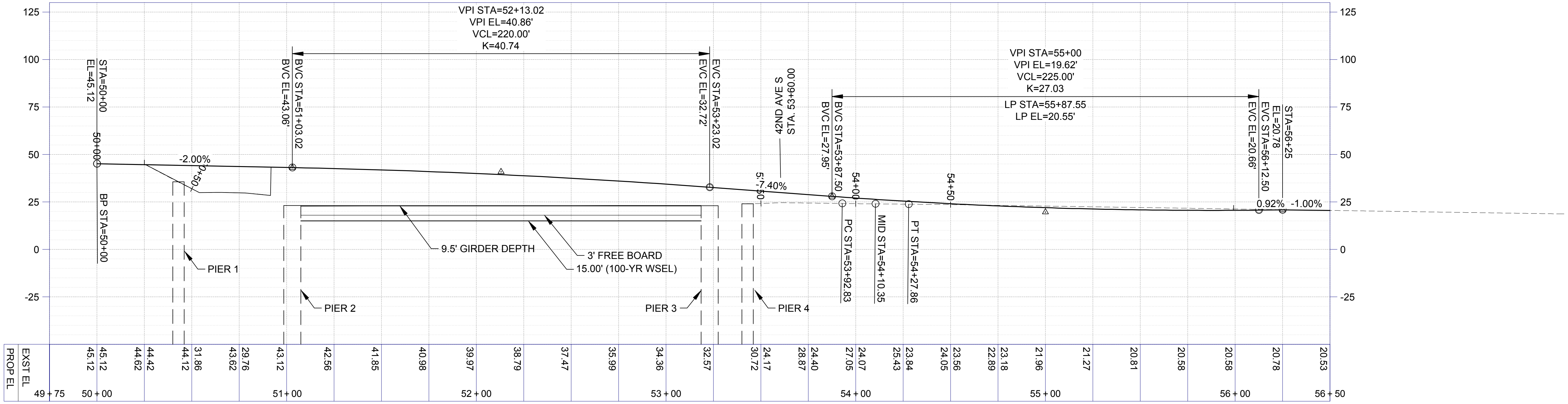
42ND ALTERNATIVE - PLAN & PROFILE

No.	Date	Revisions

EX01
1 of ####

File No. 2020016_BASE-DS.dwg
Scale AS SHOWN
Date OCT 2021





S 124TH ST - PROFILE

CITY OF TUKWILA

PUBLIC WORKS DEPT.
*ENGINEERING*STREETS*WATER*SEWER*PARKS*BUILDING*

	By	Date
Designed		
Drawn		
Checked		
Proj Eng		
Proj Dir		
Field Bk #		

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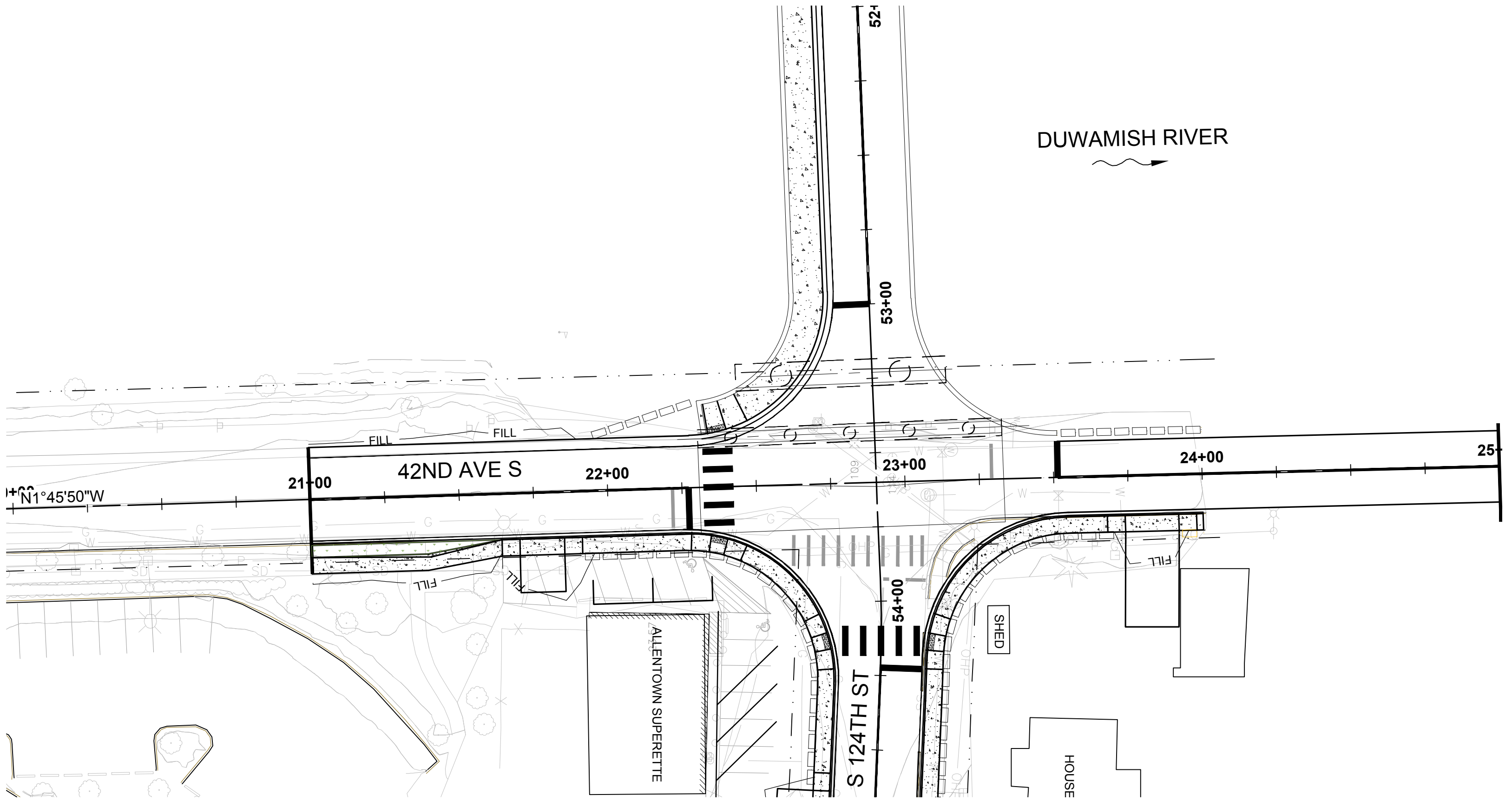
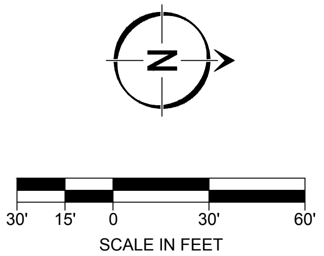
42ND AVENUE BRIDGE REPLACEMENT

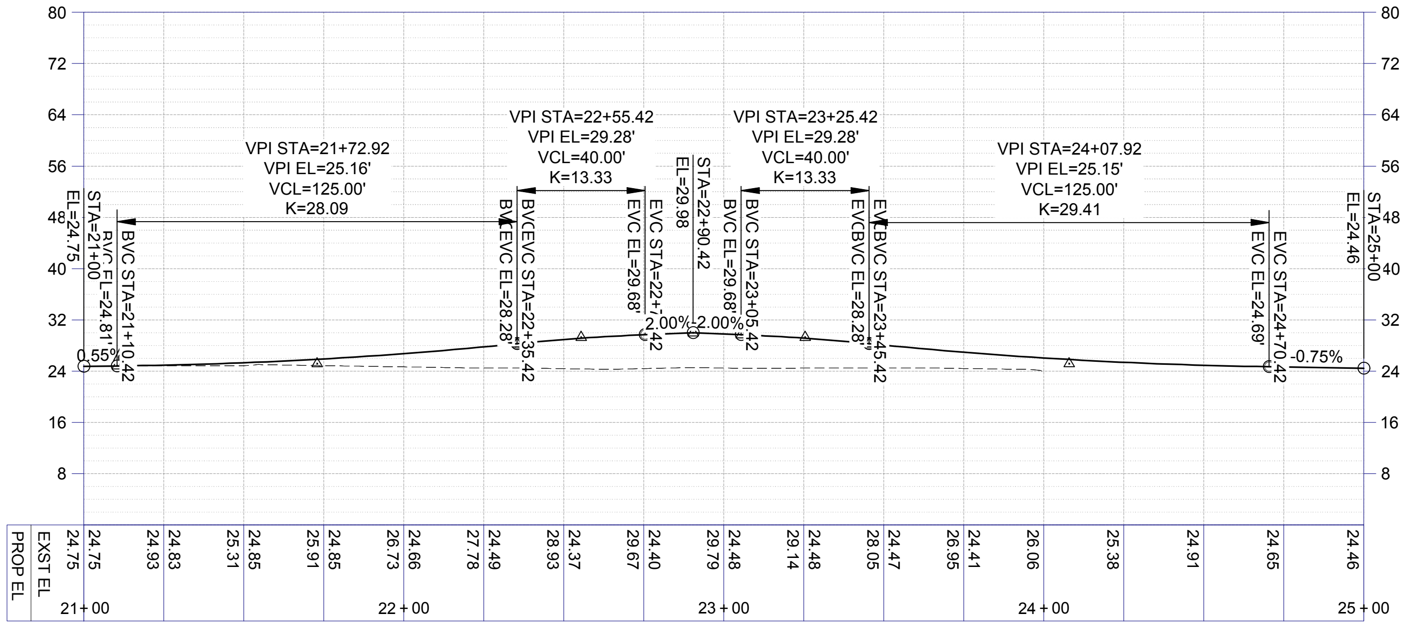
124TH ALTERNATIVE - PLAN & PROFILE 1

No.	Date	Revisions

EX02
2 of ####
File No. 2020016_BASE-DS.dwg
Scale AS SHOWN
Date OCT 2021







42ND AVE S - PROFILE

CITY OF TUKWILA

811

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1908

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42ND AVENUE BRIDGE REPLACEMENT

124TH ALTERNATIVE - PLAN & PROFILE 2

No.	Date	Revisions

EX03

3 of ####

File No. 2020016_BASE-DS.dwg
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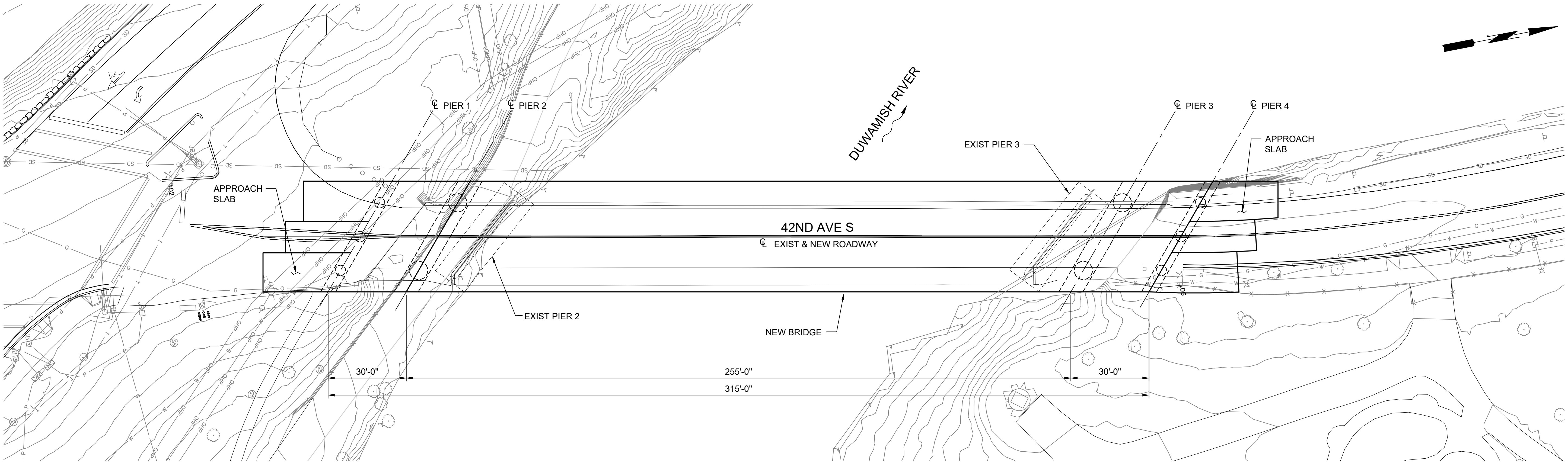
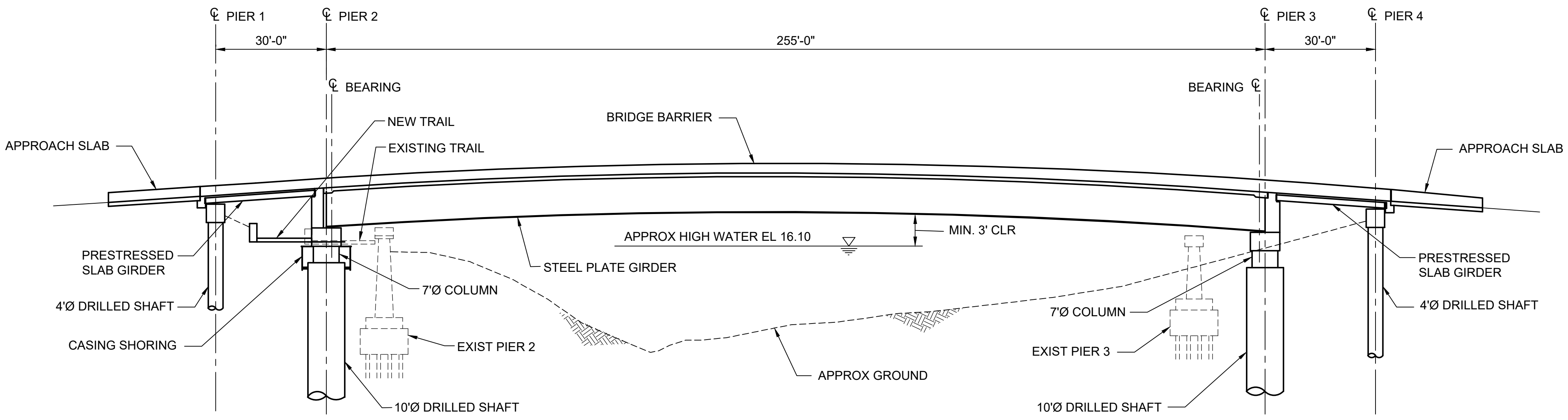
Date OCT 2021

Appendix J – Bridge Viable Structure Concept Alternatives Drawings

djensen 02/08/21 6:04pm - P:\2020\2020016 - 42nd Ave Bridge Replacement\000 CAD 2018\010 Drawing\C-Structural Sheet\Bridge Plan & Elev - Concept 1.dwg



BRIDGE PLAN



BRIDGE ELEVATION

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DUWAMISH RIVER - 42ND AVE. S BRIDGE REPLACEMENT

BRIDGE PLAN & ELEVATION - CONCEPT 1

No.	Date	Revisions

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File No. Bridge Plan & Elev - Concept 1.dwg
Scale 1"=20'
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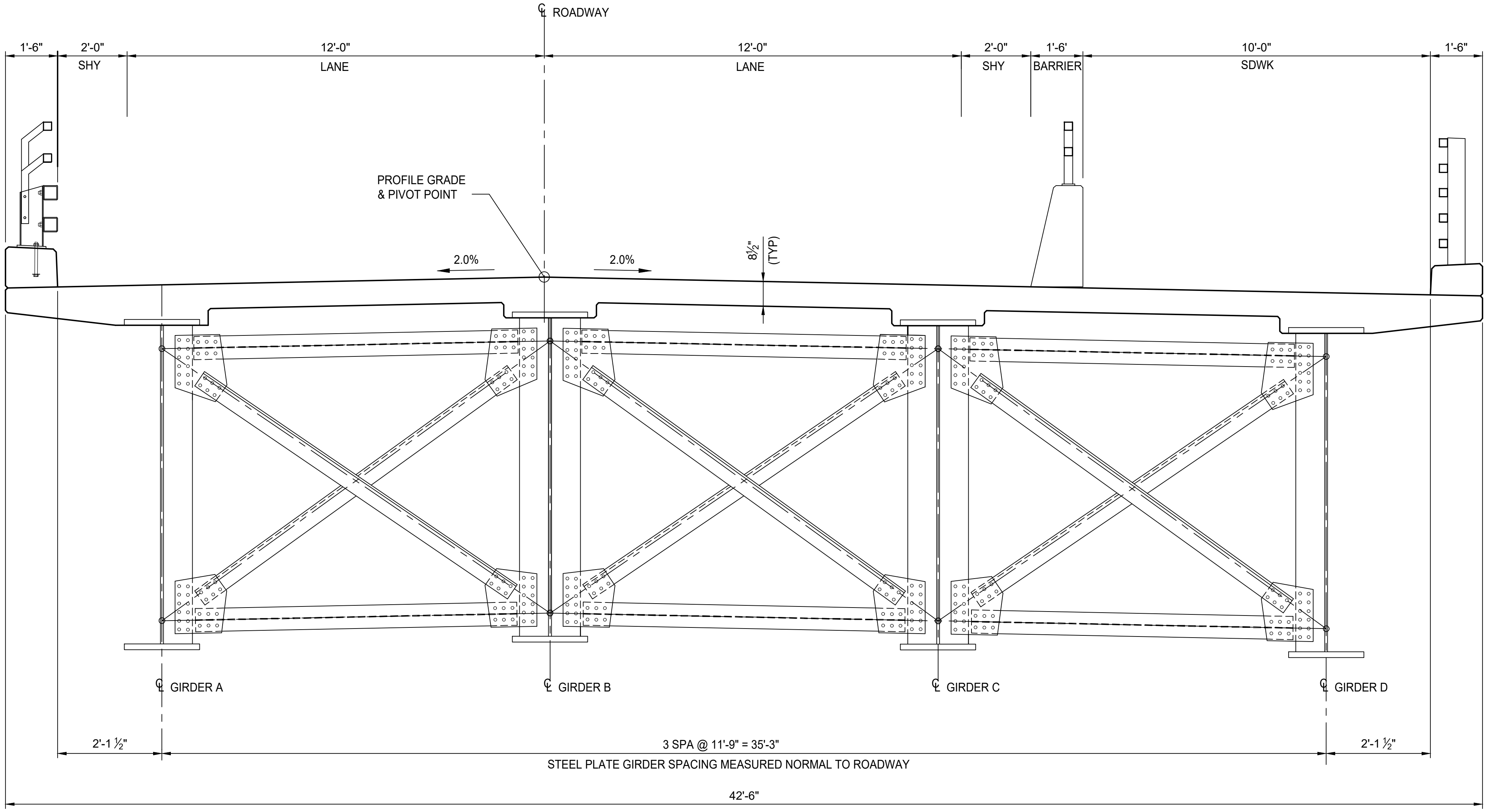

TYPICAL SECTION - SPAN 2
CONCEPT 1

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BRIDGE REPLACEMENT

TYPICAL BRIDGE SECTION - CONCEPT 1

No.	Date	Revisions

S2
X of -

File No. Framing Plan & Typ Sec.dwg
Scale 1/2"=1'-0"
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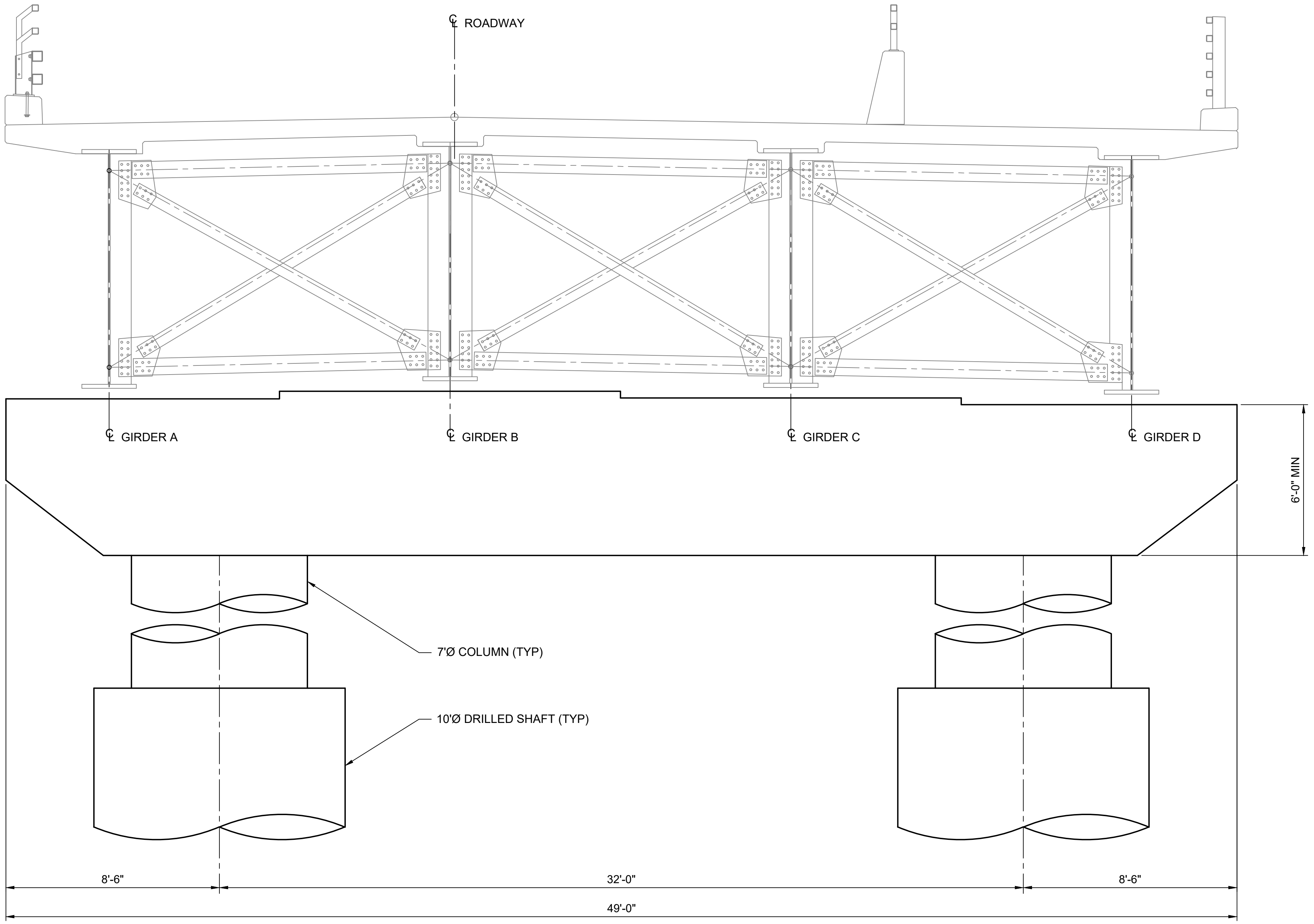

PIER ELEVATION - PIER 2 & 3

CITY OF TUKWILA

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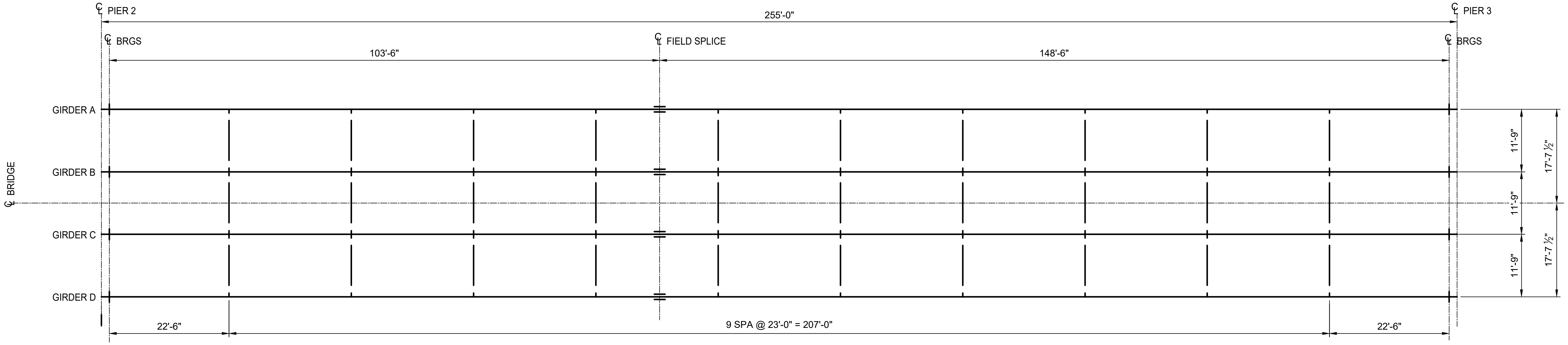
DUWAMISH RIVER - 42ND AVE. S
BRIDGE REPLACEMENT

PIER ELEVATION - PIER 2 & 3

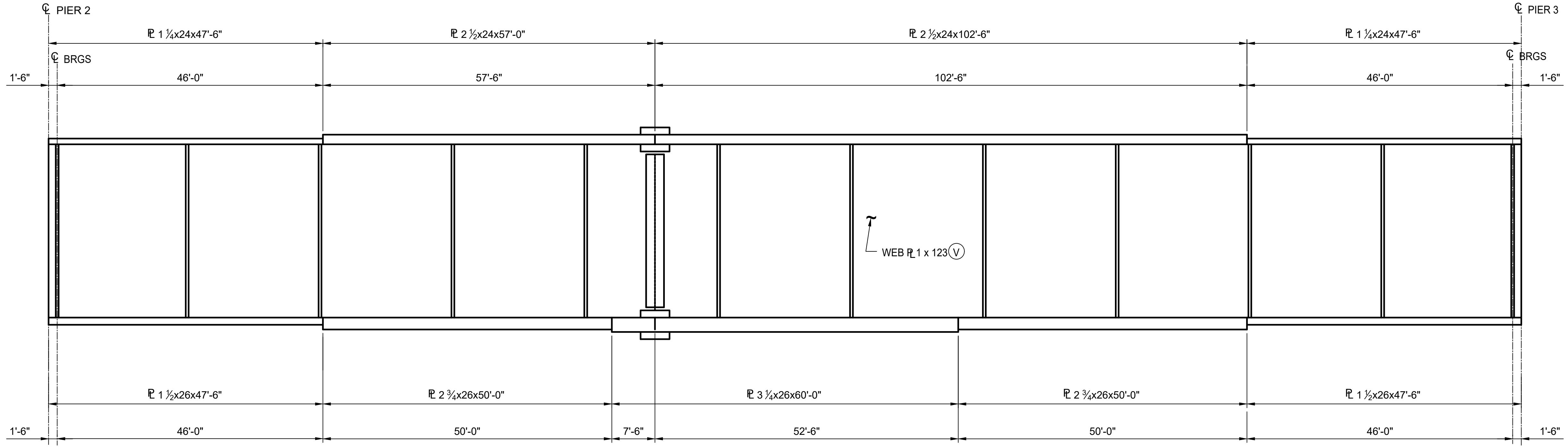
No.	Date	Revisions

S3
X of -

File No. Framing Plan & Typ Sec.dwg
Scale 1/2"=1'-0"
Date JUNE 2020



FRAMING PLAN



GIRDER ELEVATION - SPAN 2

CITY OF TUKWILA

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FRAMING PLAN AND ELEVATION

No.	Date	Revisions

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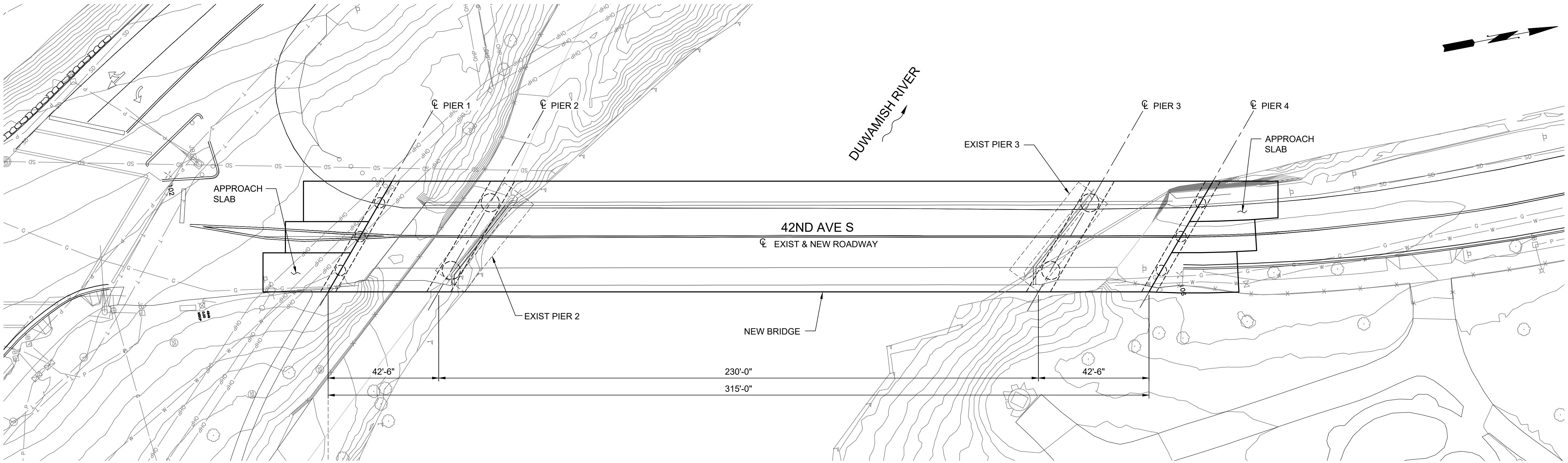
File No. Framing Plan & Typ Sec.dwg
Scale 3/32" =1'-0"
Date JUNE 2020



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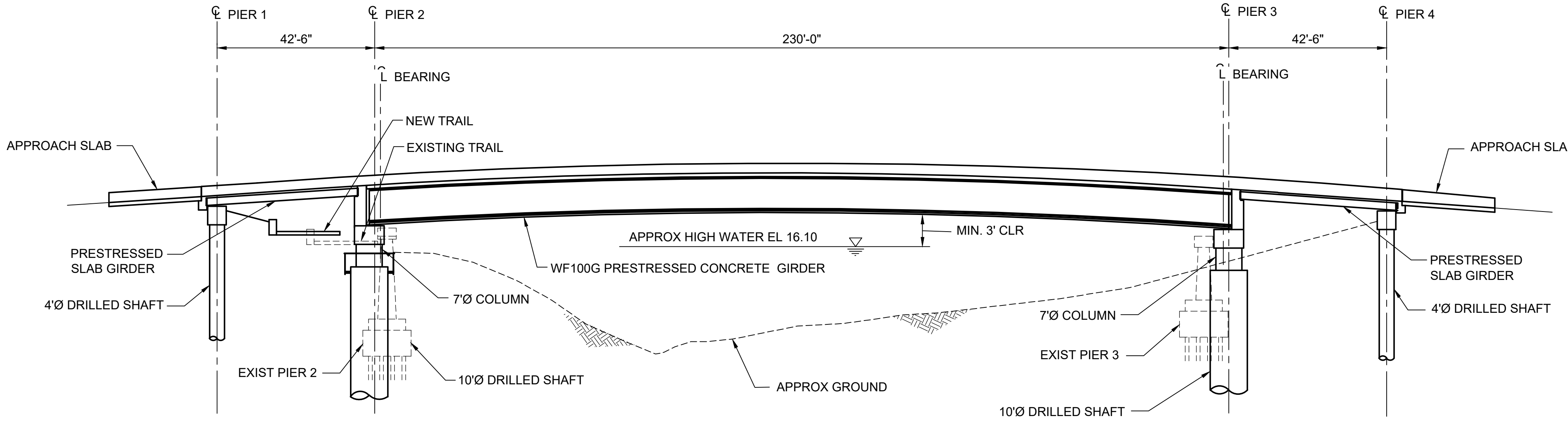

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DUWAMISH RIVER - 42ND AVE. S BRIDGE REPLACEMENT

BRIDGE PLAN & ELEVATION - CONCEPT 2

No.	Date	Revisions

S5

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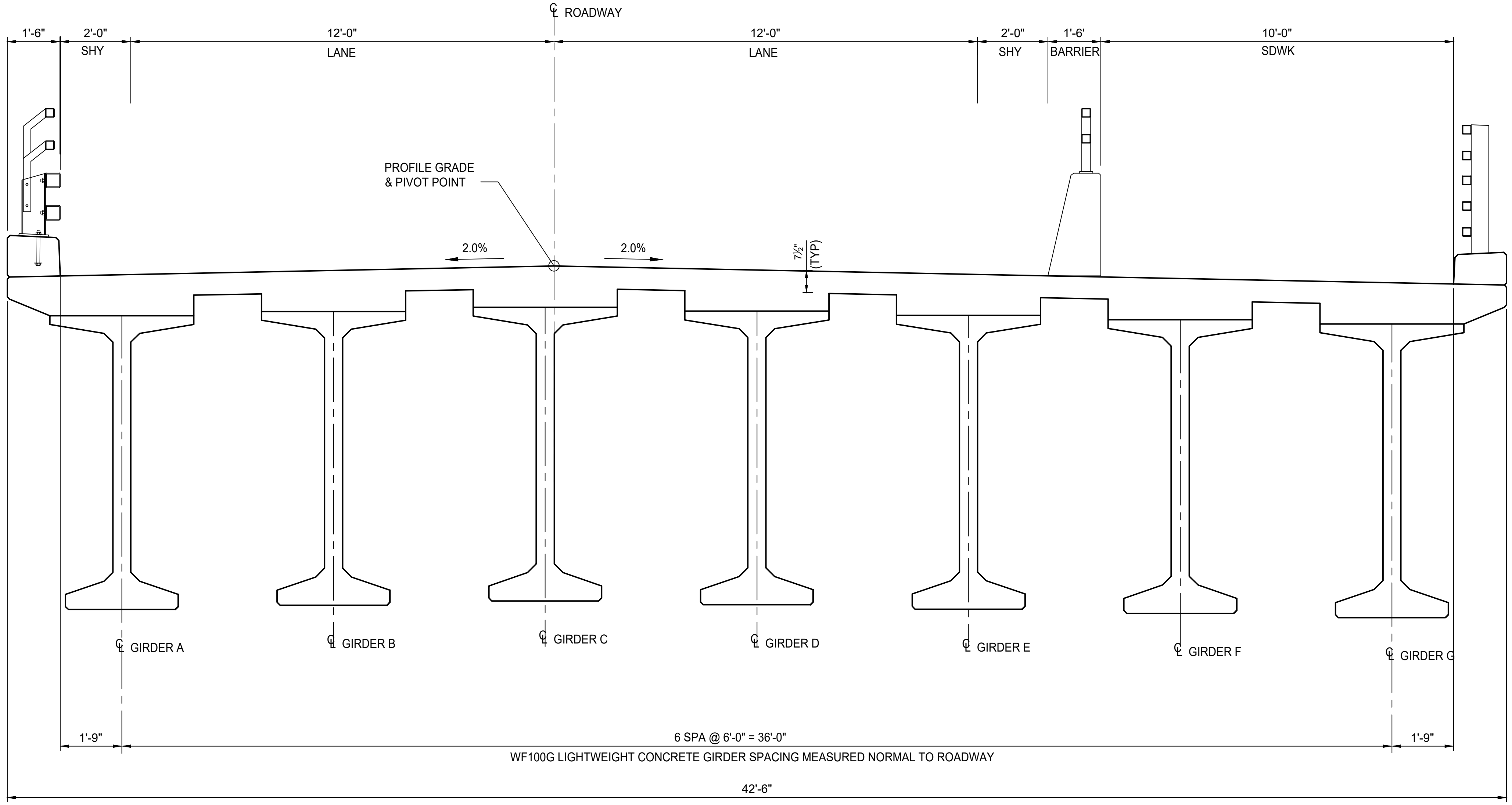
Scale 1"=20'
Date JUNE 2020



TYPICAL SECTION

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DUWAMISH RIVER - 42ND AVE. S
BRIDGE REPLACEMENT

TYPICAL BRIDGE SECTION - CONCEPT 2

No.	Date	Revisions

S6

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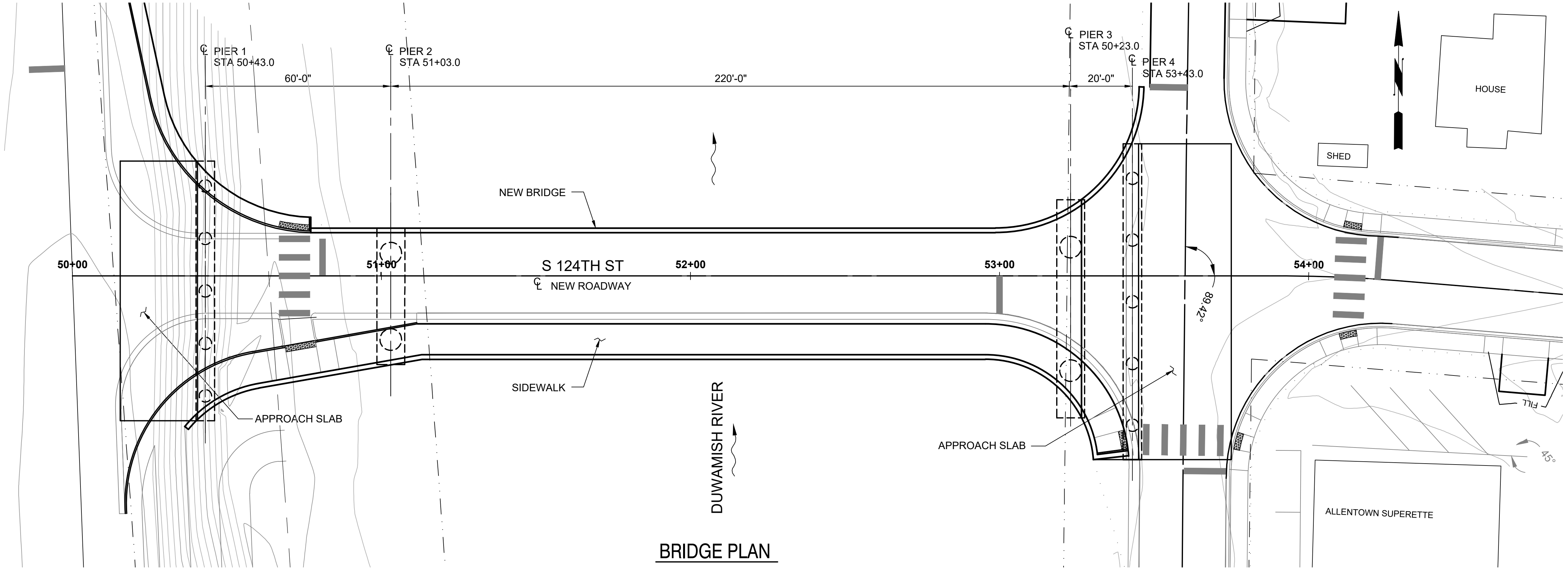
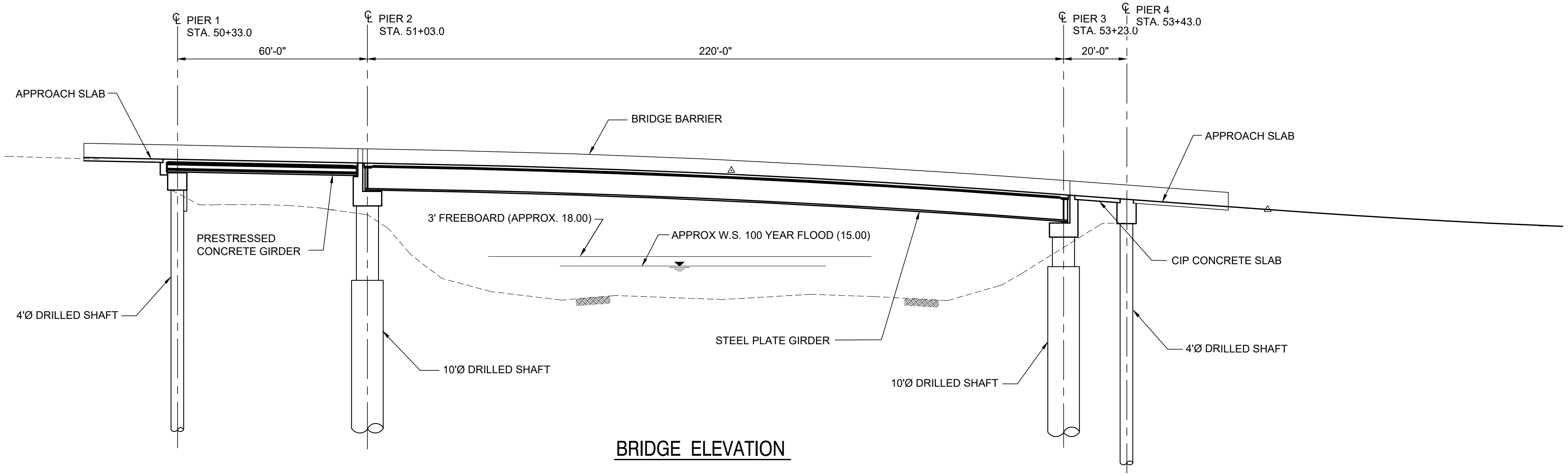
File No. Framing Plan & Typ Sec.dwg
Scale 1/2"=1'-0"
Date JUNE 2020



BRIDGE PLAN



BRIDGE ELEVATION

CITY OF TUKWILA

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DUWAMISH RIVER - 42ND AVE. S BRIDGE REPLACEMENT

CONCEPT 1
BRIDGE PLAN & ELEVATION

No.	Date	Revisions

S1
1 of 8
File No. 124th St Concept 1 & 2 Plan & Elev
Scale 1"=20'
Date DEC. 2020

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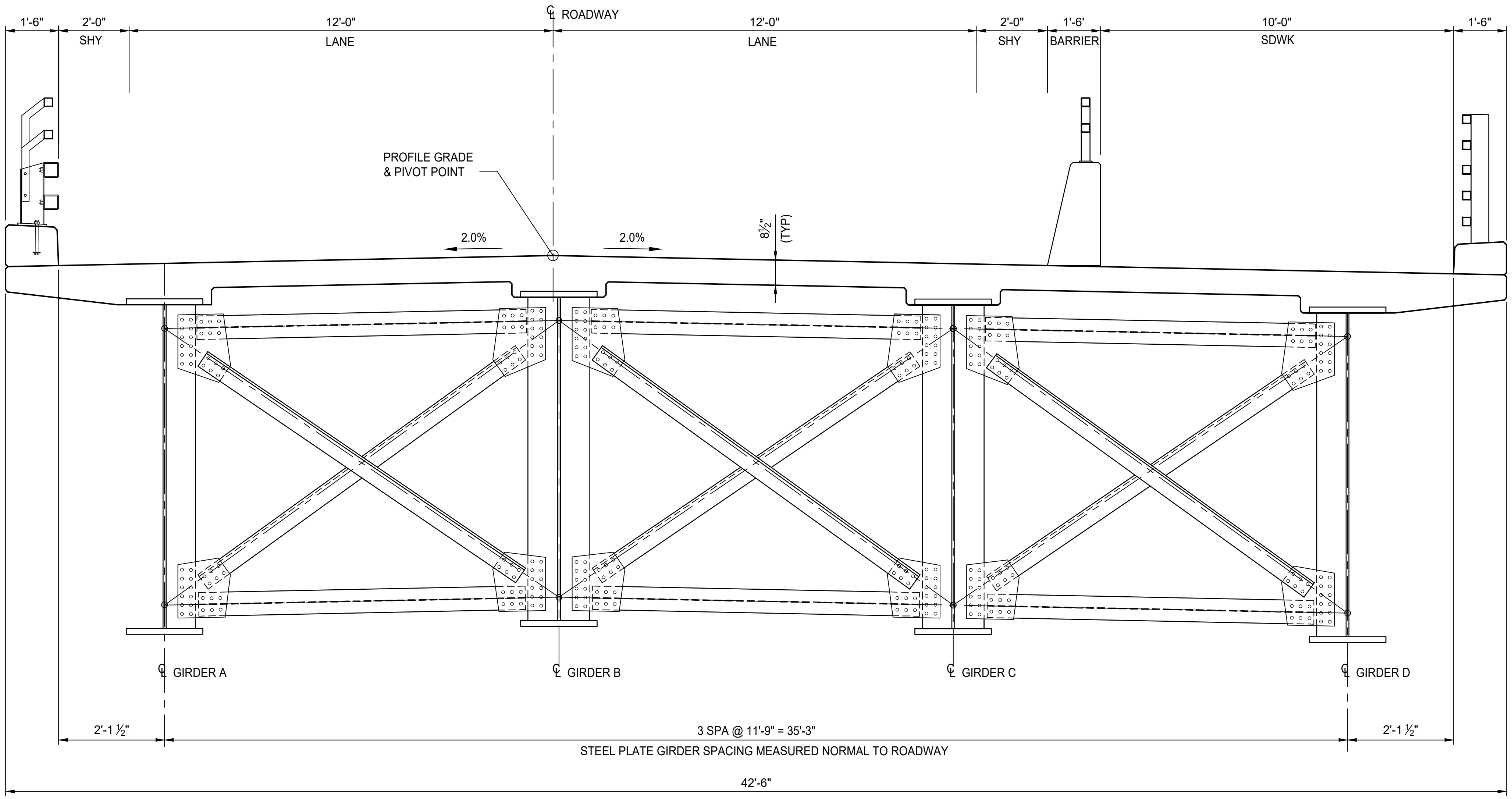

TYPICAL SECTION - SPAN 2

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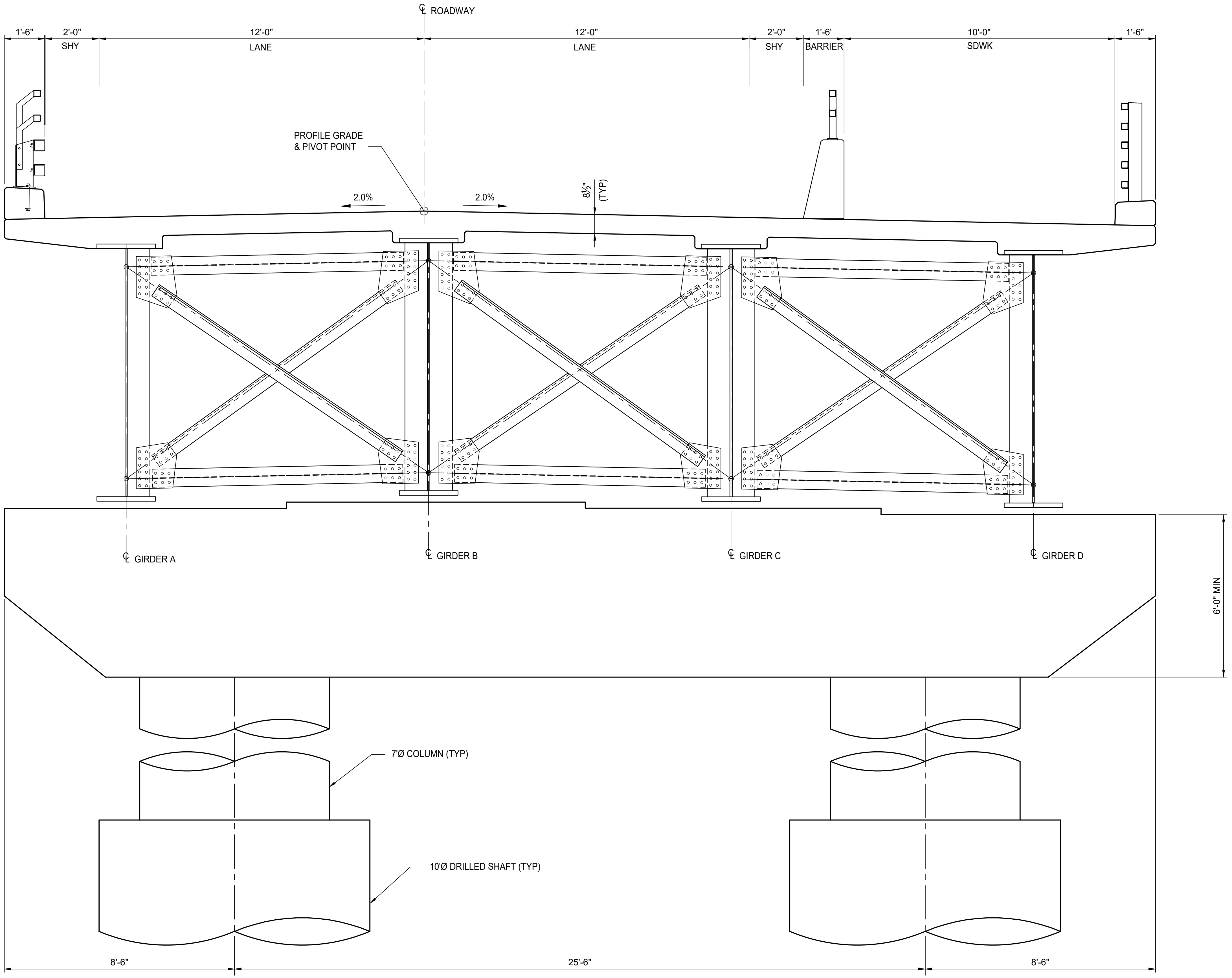
DUWAMISH RIVER - 42ND AVE. S BRIDGE REPLACEMENT

CONCEPT 1
TYPICAL SECTION - SPAN 2

No.	Date	Revisions

S2
2 of 8

File No. 124th ST Concept 1 & 2 Details.dwg
Scale 1/2"=1'-0"
Date DEC. 2020



PIER ELEVATION - PIER 2 & 3

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DUWAMISH RIVER - 42ND AVE. S
BRIDGE REPLACEMENT

CONCEPT 1
PIER ELEVATION - PIER 2 & 3

No.	Date	Revisions

S3
3 of 8

File No. 124th ST Concept 1 & 2 Details.dwg
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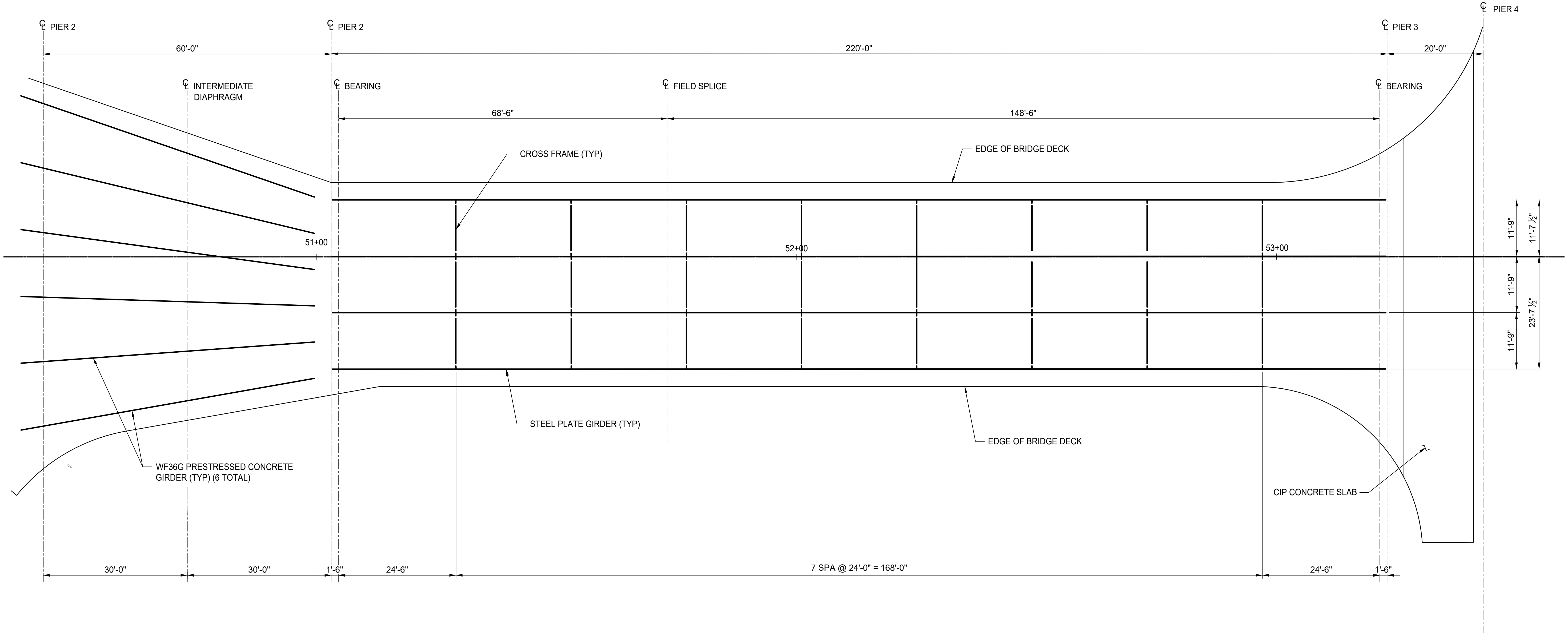

FRAMING PLAN

CITY OF TUKWILA

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DUWAMISH RIVER - 42ND AVE. S BRIDGE REPLACEMENT

CONCEPT 1
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No.	Date	Revisions

S4
4 of 8

File No. 124th ST Concept 1 & 2 Details.dwg
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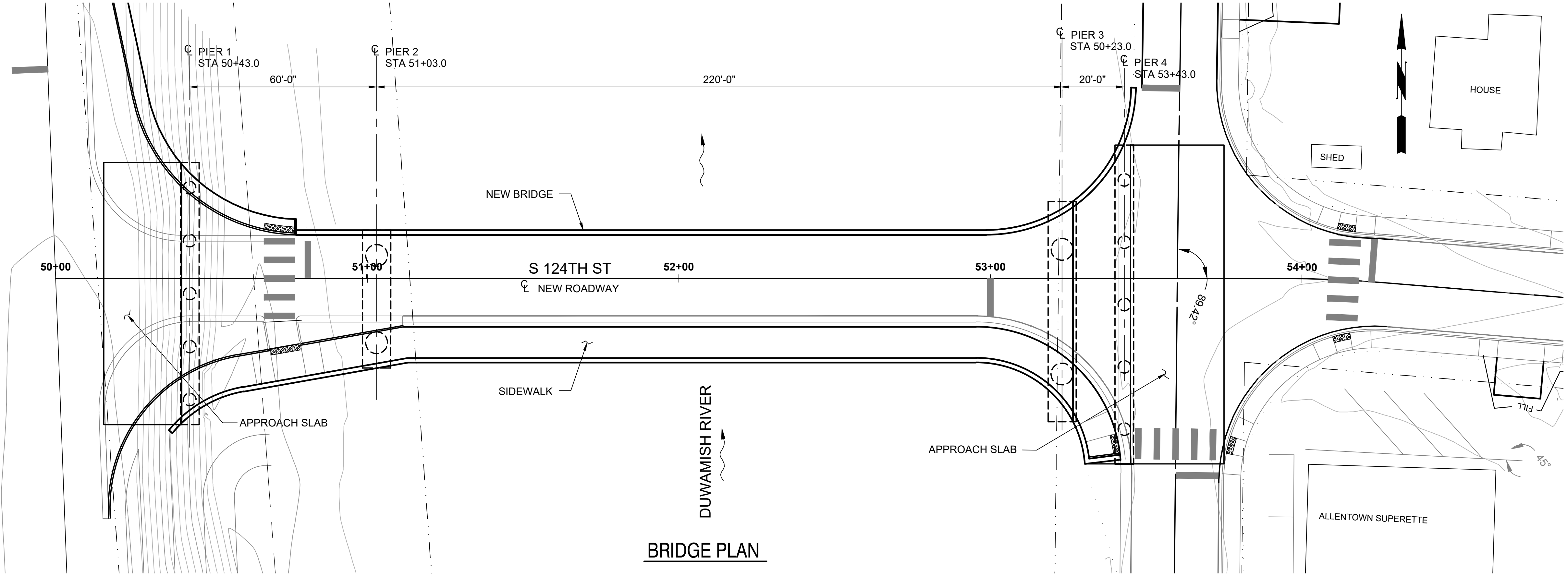
Date DEC. 2020



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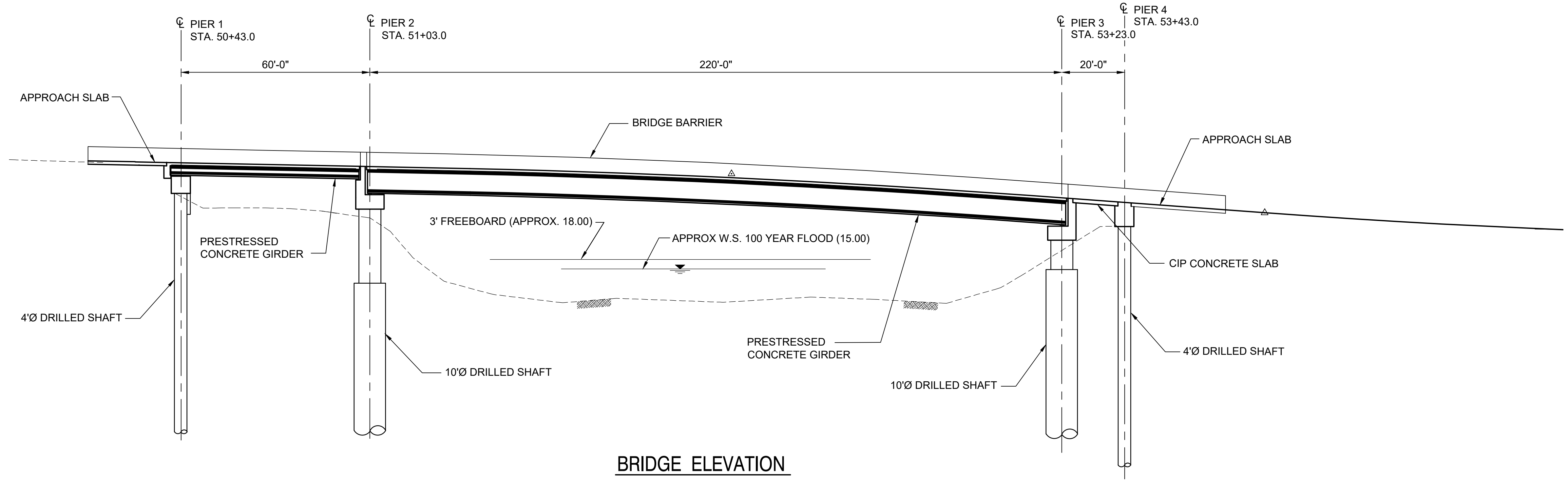

BRIDGE ELEVATION

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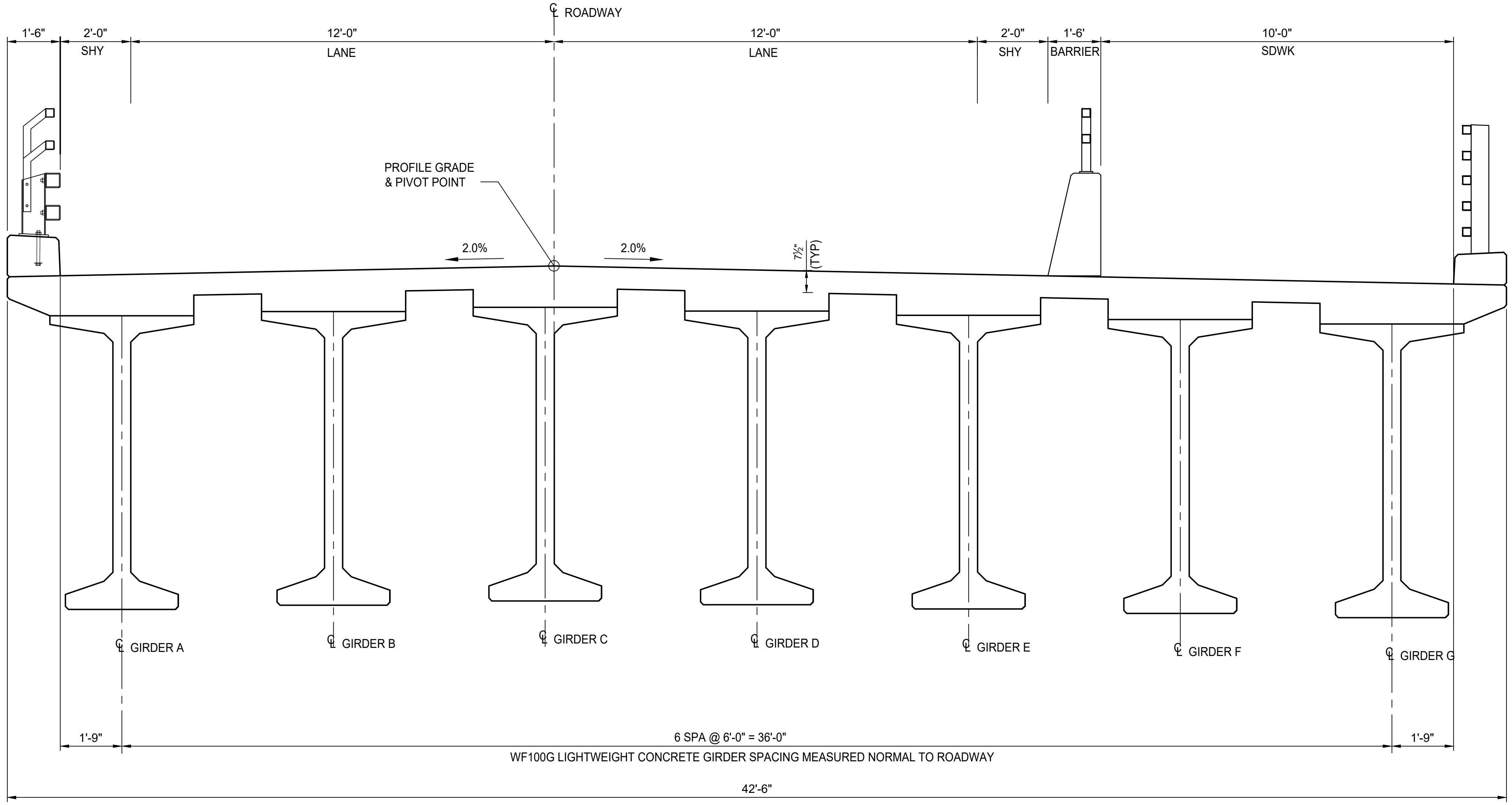
DUWAMISH RIVER - 42ND AVE. S
BRIDGE REPLACEMENT

CONCEPT 2
BRIDGE PLAN & ELEVATION

No.	Date	Revisions

S5
5 of 8

File No. 124th St Concept 1 & 2 Pla & Elev
Scale 1"=20'
Date DEC. 2020



TYPICAL SECTION - SPAN 2

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DUWAMISH RIVER - 42ND AVE. S
BRIDGE REPLACEMENT

CONCEPT 2
TYPICAL SECTION - SPAN 2

No.	Date	Revisions

S6
6 of 8

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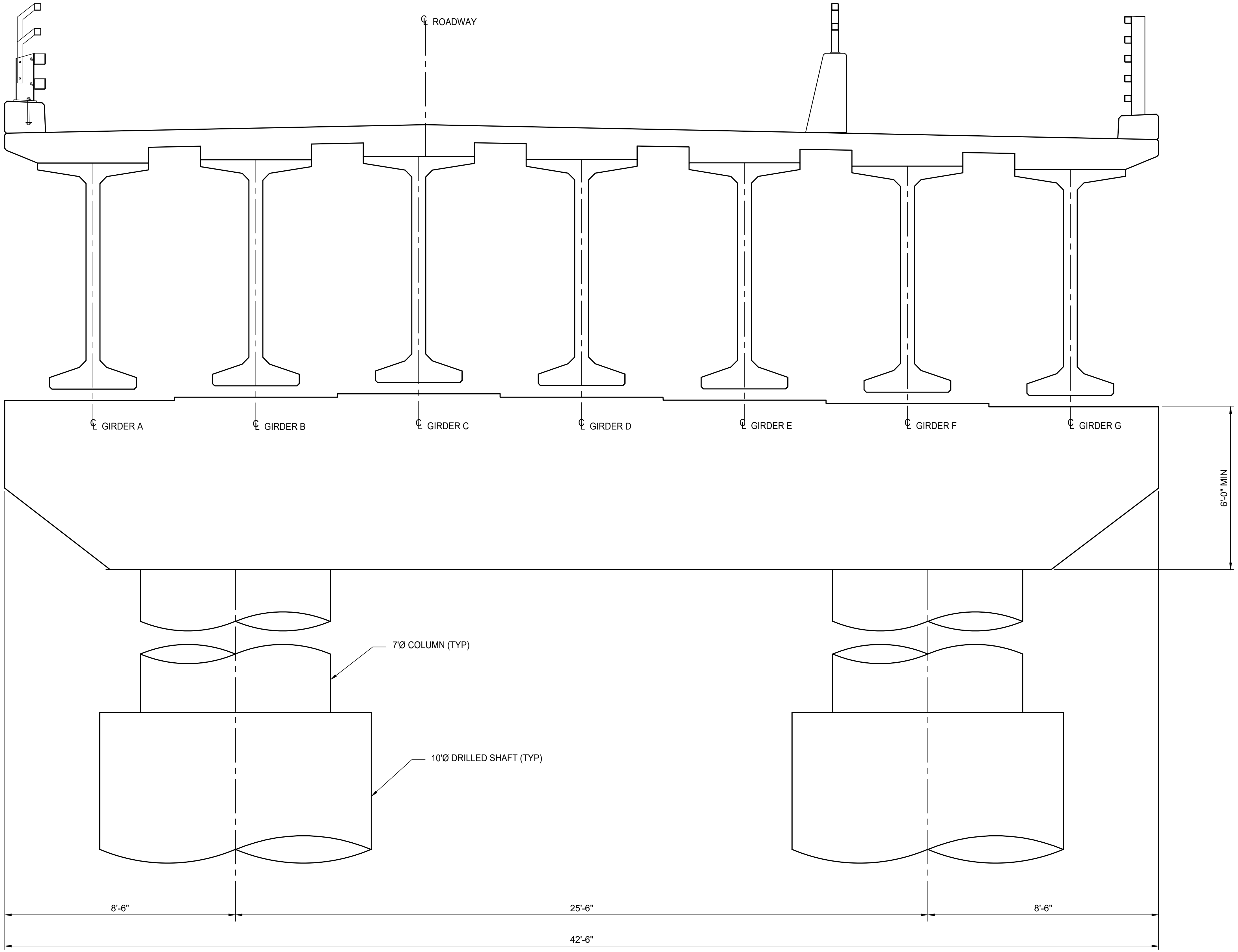

PIER ELEVATION - PIER 2 & 3

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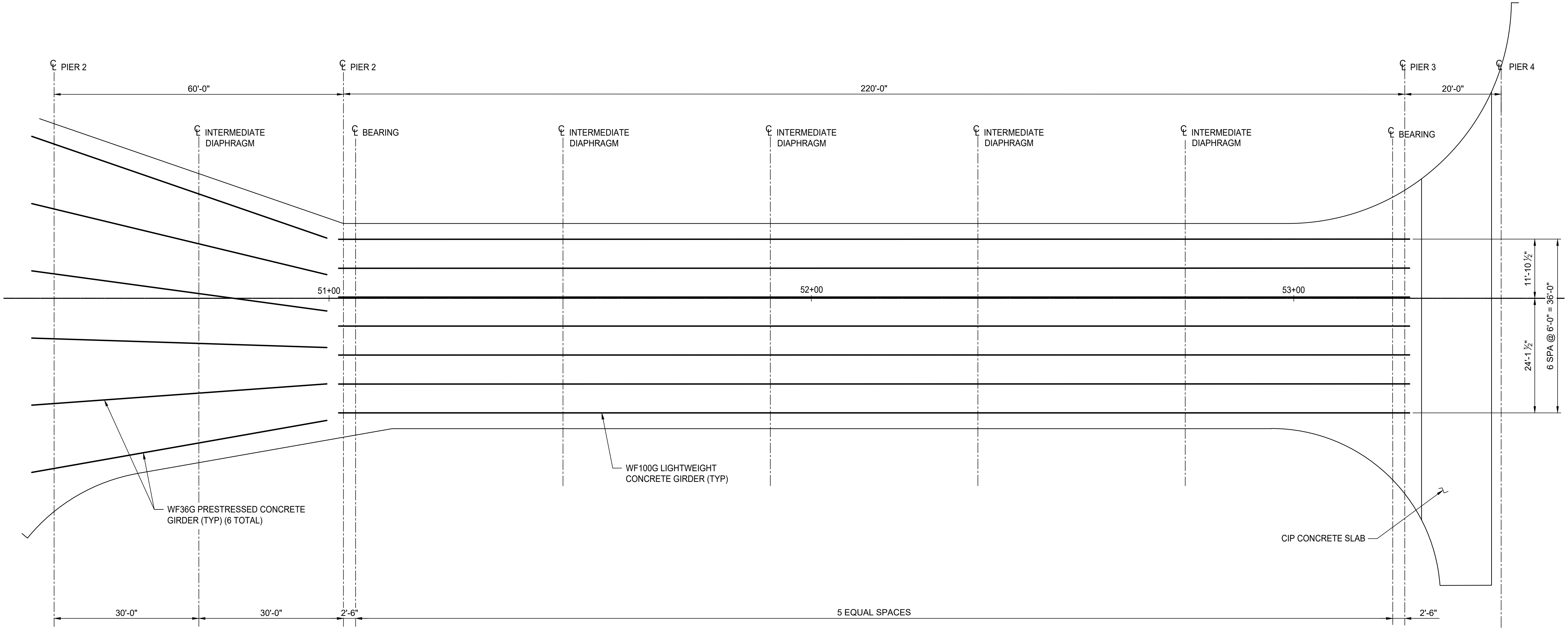
DUWAMISH RIVER - 42ND AVE. S BRIDGE REPLACEMENT

CONCEPT 2
PIER ELEVATION - PIER 2 & 3

No.	Date	Revisions

S7
7 of 8

File No. 124th ST Concept 1 & 2 Details.dwg
Scale 1/2"=1'-0"
Date DEC. 2020



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DUWAMISH RIVER - 42ND AVE. S BRIDGE REPLACEMENT

CONCEPT 2 FRAMING PLAN

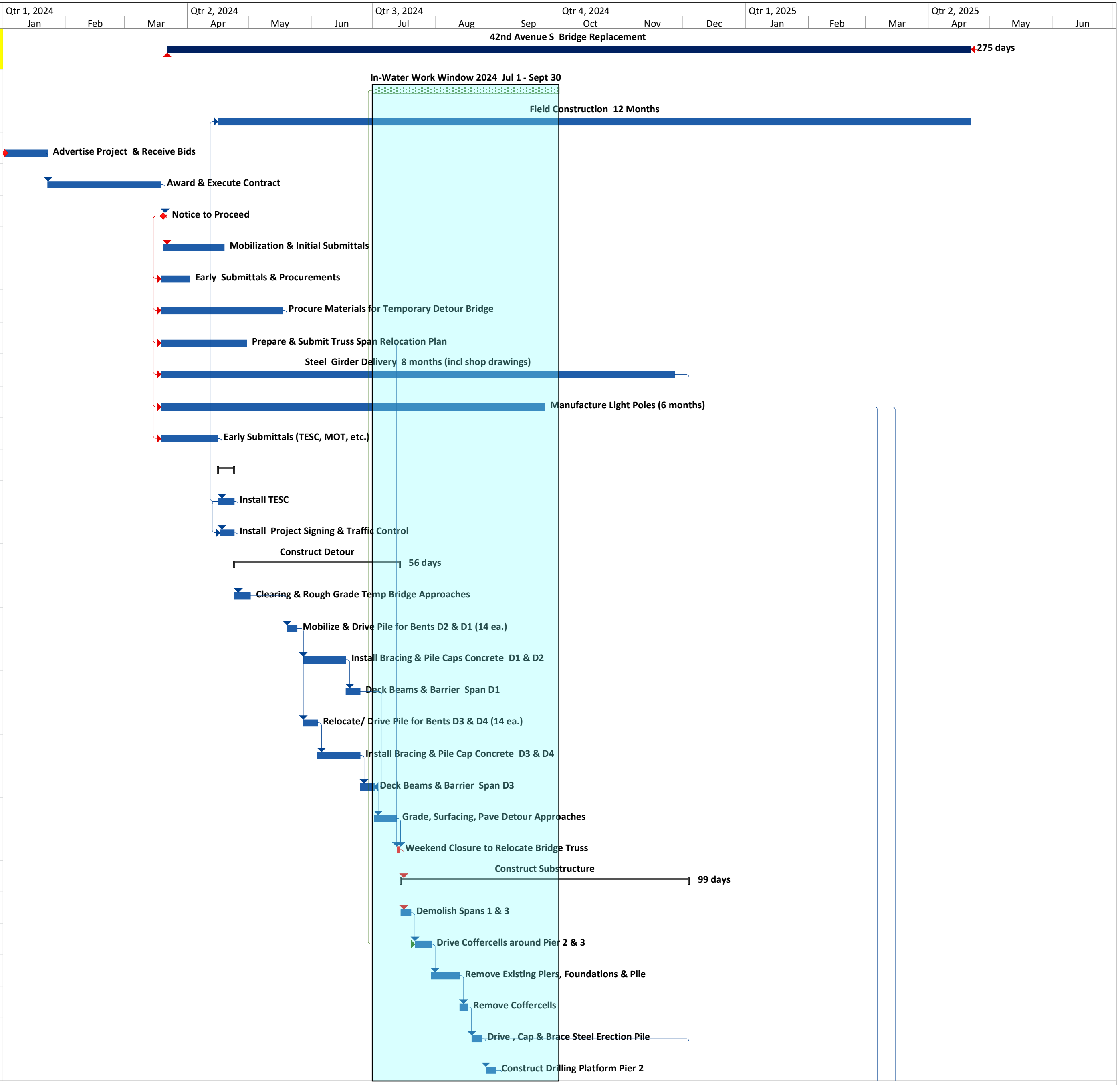
No.	Date	Revisions

S8
8 of 8

File No. 124th ST Concept 1 & 2 Details.dwg
Scale 3/32" =1'-0"
Date DEC. 2020

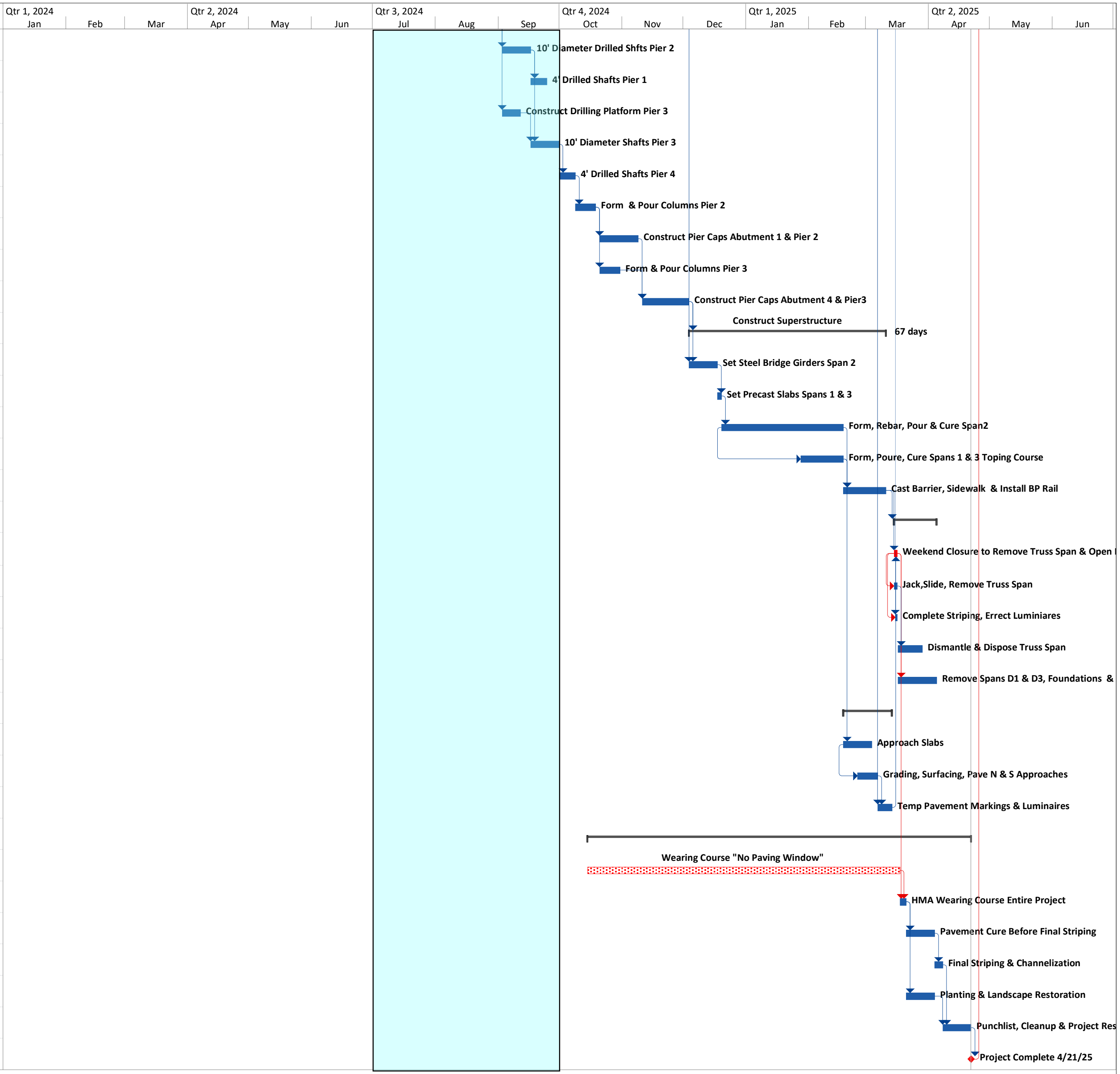
Appendix K – Constructability Memo

ID	Task Name	Duration	Start	Finish
1	**42nd Avenue S Bridge Replacement**	275 days	Fri 3/22/24	Mon 4/21/25
2	In-Water Work Window 2024 Jul 1 - Sept 30	64 days	Mon 7/1/24	Mon 9/30/24
3	Field Construction 12 Months	258 days	Tue 4/16/24	Mon 4/21/25
4	Advertise Project & Receive Bids	15 days	Tue 1/2/24	Mon 1/22/24
5	Award & Execute Contract	40 days	Tue 1/23/24	Mon 3/18/24
6	Notice to Proceed	1 day	Tue 3/19/24	Tue 3/19/24
7	**Mobilization & Initial Submittals**	22 days	Wed 3/20/24	Thu 4/18/24
8	Early Submittals & Procurements	10 days	Tue 3/19/24	Mon 4/1/24
9	Procure Materials for Temporary Detour Bridge	44 days	Tue 3/19/24	Fri 5/17/24
10	Prepare & Submit Truss Span Relocation Plan	30 days	Tue 3/19/24	Mon 4/29/24
11	Steel Girder Delivery 8 months (incl shop drawings)	176 days	Tue 3/19/24	Tue 11/26/24
12	Manufacture Light Poles (6 months)	132 days	Tue 3/19/24	Mon 9/23/24
13	Early Submittals (TESC, MOT, etc.)	20 days	Tue 3/19/24	Mon 4/15/24
14	**Preparatory Work**	**6 days**	**Tue 4/16/24**	**Tue 4/23/24**
15	Install TESC	6 days	Tue 4/16/24	Tue 4/23/24
16	Install Project Signing & Traffic Control	5 days	Wed 4/17/24	Tue 4/23/24
17	**Construct Detour**	**56 days**	**Wed 4/24/24**	**Sun 7/14/24**
18	Clearing & Rough Grade Temp Bridge Approaches	6 days	Wed 4/24/24	Wed 5/1/24
19	Mobilize & Drive Pile for Bents D2 & D1 (14 ea.)	5 days	Mon 5/20/24	Fri 5/24/24
20	Install Bracing & Pile Caps Concrete D1 & D2	15 days	Tue 5/28/24	Mon 6/17/24
21	Deck Beams & Barrier Span D1	5 days	Tue 6/18/24	Mon 6/24/24
22	Relocate/ Drive Pile for Bents D3 & D4 (14 ea.)	5 days	Tue 5/28/24	Mon 6/3/24
23	Install Bracing & Pile Cap Concrete D3 & D4	15 days	Tue 6/4/24	Mon 6/24/24
24	Deck Beams & Barrier Span D3	5 days	Tue 6/25/24	Mon 7/1/24
25	Grade, Surfacing, Pave Detour Approaches	8 days	Tue 7/2/24	Fri 7/12/24
26	**Weekend Closure to Relocate Bridge Truss**	2 days	Sat 7/13/24	Sun 7/14/24
27	**Construct Substructure**	**99 days**	**Mon 7/15/24**	**Tue 12/3/24**
28	Demolish Spans 1 & 3	5 days	Mon 7/15/24	Fri 7/19/24
29	Drive Coffercells around Pier 2 & 3	6 days	Mon 7/22/24	Mon 7/29/24
30	Remove Existing Piers, Foundations & Pile	10 days	Tue 7/30/24	Mon 8/12/24
31	Remove Coffercells	4 days	Tue 8/13/24	Fri 8/16/24
32	Drive , Cap & Brace Steel Erection Pile	5 days	Mon 8/19/24	Fri 8/23/24
33	Construct Drilling Platform Pier 2	5 days	Mon 8/26/24	Fri 8/30/24

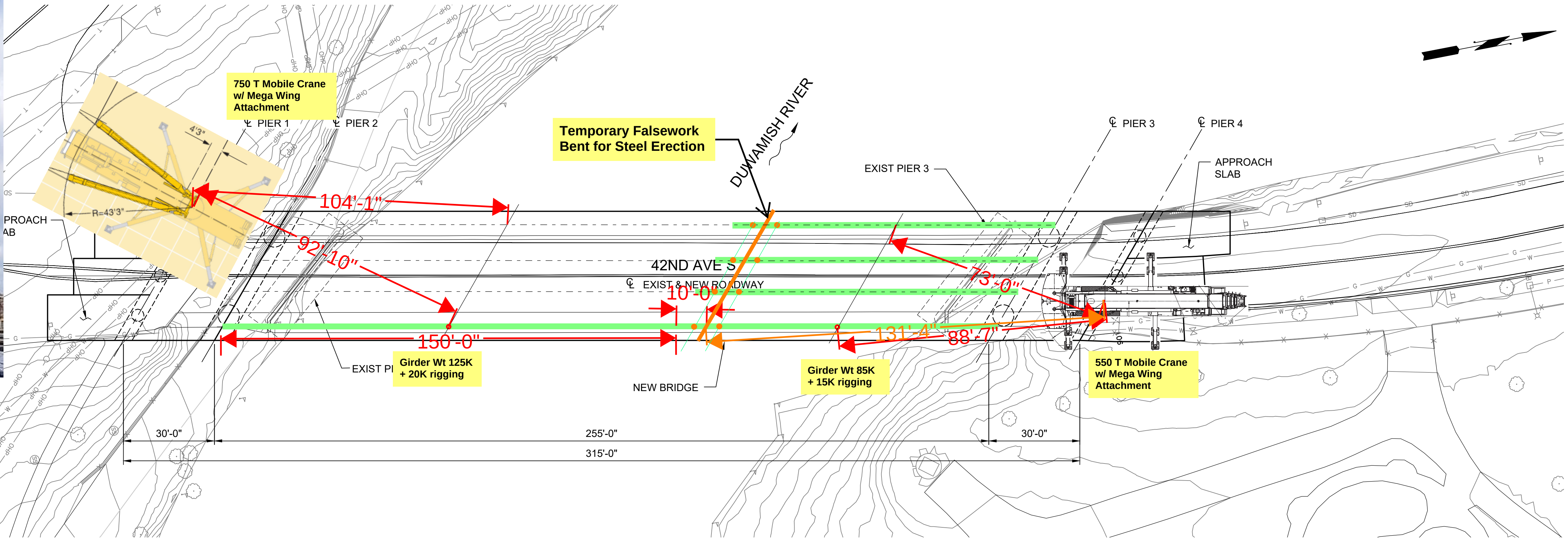


42nd Ave S Bridge Replacement - Preliminary Construction Schedule
Based on Concept 1 Steel Girder Plans

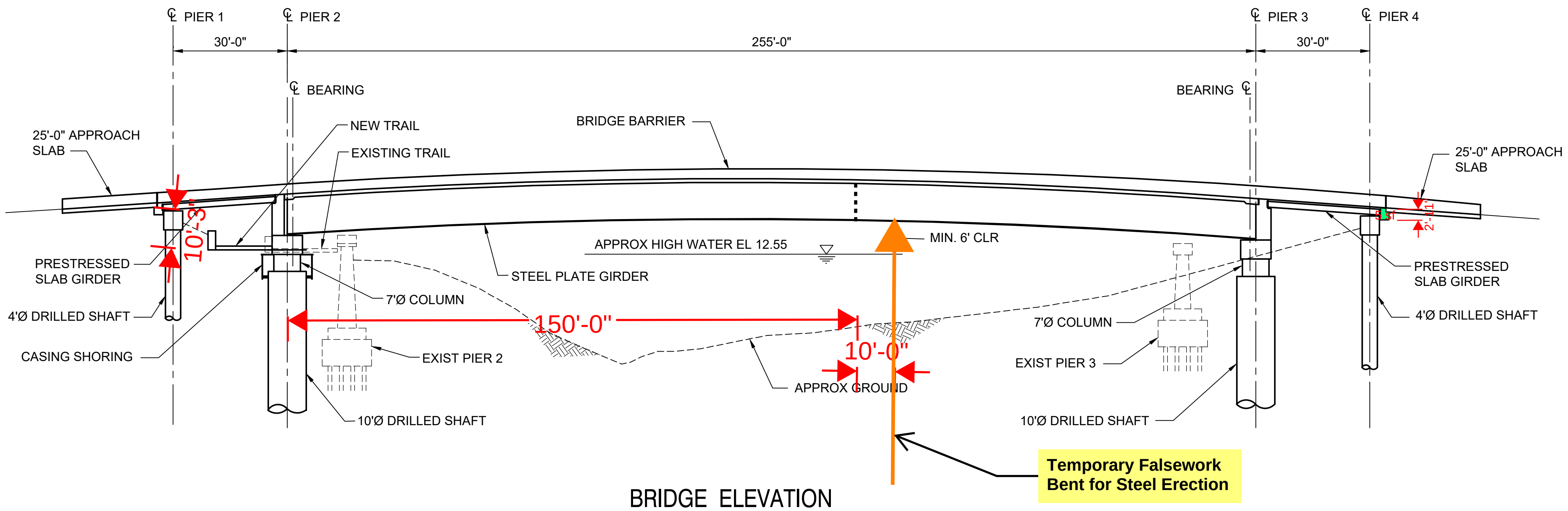
ID	Task Name	Duration	Start	Finish
34	10' Diameter Drilled Shfts Pier 2	10 days	Tue 9/3/24	Mon 9/16/24
35	4' Drilled Shafts Pier 1	6 days	Tue 9/17/24	Tue 9/24/24
36	Construct Drilling Platform Pier 3	7 days	Tue 9/3/24	Wed 9/11/24
37	10' Diameter Shafts Pier 3	10 days	Tue 9/17/24	Mon 9/30/24
38	4' Drilled Shafts Pier 4	6 days	Tue 10/1/24	Tue 10/8/24
39	Form & Pour Columns Pier 2	8 days	Wed 10/9/24	Fri 10/18/24
40	Construct Pier Caps Abutment 1 & Pier 2	15 days	Mon 10/21/24	Fri 11/8/24
41	Form & Pour Columns Pier 3	8 days	Mon 10/21/24	Wed 10/30/24
42	Construct Pier Caps Abutment 4 & Pier3	15 days	Mon 11/11/24	Tue 12/3/24
43	**Construct Superstructure**	**67 days**	**Wed 12/4/24**	**Mon 3/10/25**
44	Set Steel Bridge Girders Span 2	10 days	Wed 12/4/24	Tue 12/17/24
45	Set Precast Slabs Spans 1 & 3	2 days	Wed 12/18/24	Thu 12/19/24
46	Form, Rebar, Pour & Cure Span2	40 days	Fri 12/20/24	Mon 2/17/25
47	Form, Poure, Cure Spans 1 & 3 Toping Course	15 days	Tue 1/28/25	Mon 2/17/25
48	Cast Barrier, Sidewalk & Install BP Rail	15 days	Tue 2/18/25	Mon 3/10/25
49	**Remove Detour**	**15 days**	**Sat 3/15/25**	**Fri 4/4/25**
50	**Weekend Closure to Remove Truss Span & Open New Bridge**	2 days	Sat 3/15/25	Sun 3/16/25
51	Jack,Slide, Remove Truss Span	2 days	Sat 3/15/25	Sun 3/16/25
52	Complete Striping, Errect Luminiares	1 day	Sat 3/15/25	Sun 3/16/25
53	Dismantle & Dispose Truss Span	10 days	Mon 3/17/25	Fri 3/28/25
54	Remove Spans D1 & D3, Foundations & Approach Roadway	15 days	Mon 3/17/25	Fri 4/4/25
55	**Construct Bridge Approaches**	**18 days**	**Tue 2/18/25**	**Thu 3/13/25**
56	Approach Slabs	10 days	Tue 2/18/25	Mon 3/3/25
57	Grading, Surfacing, Pave N & S Approaches	8 days	Tue 2/25/25	Thu 3/6/25
58	Temp Pavement Markings & Luminaires	5 days	Fri 3/7/25	Thu 3/13/25
59	**Project Completion**	**131 days**	**Tue 10/15/24**	**Mon 4/21/25**
60	Wearing Course "No Paving Window"	106 days	Tue 10/15/24	Mon 3/17/25
61	HMA Wearing Course Entire Project	3 days	Tue 3/18/25	Thu 3/20/25
62	Pavement Cure Before Final Striping	10 days	Fri 3/21/25	Thu 4/3/25
63	Final Striping & Channelization	2 days	Fri 4/4/25	Mon 4/7/25
64	Planting & Landscape Restoration	10 days	Fri 3/21/25	Thu 4/3/25
65	Punchlist, Cleanup & Project Restoration	10 days	Tue 4/8/25	Mon 4/21/25
66	Project Complete 4/21/25	0 days	Mon 4/21/25	Mon 4/21/25



42nd Ave S Bridge Replacement - Preliminary Construction Schedule
Based on Concept 1 Steel Girder Plans



BRIDGE PLAN



BRIDGE ELEVATION

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Engineering LLC
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Bellevue, Washington 98005
Phone: 425.453.5545

DUWAMISH RIVER - S 42ND AVE BRIDGE REPLACEMENT

BRIDGE PLAN & ELEVATION - CONCEPT 1

No.	Date	Revisions

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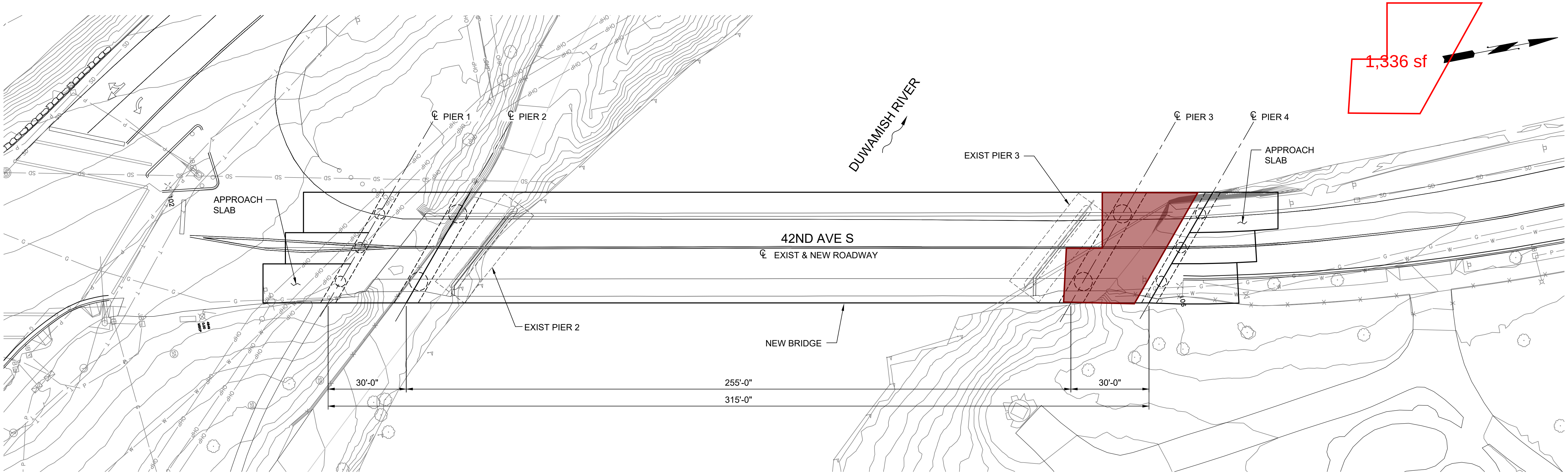
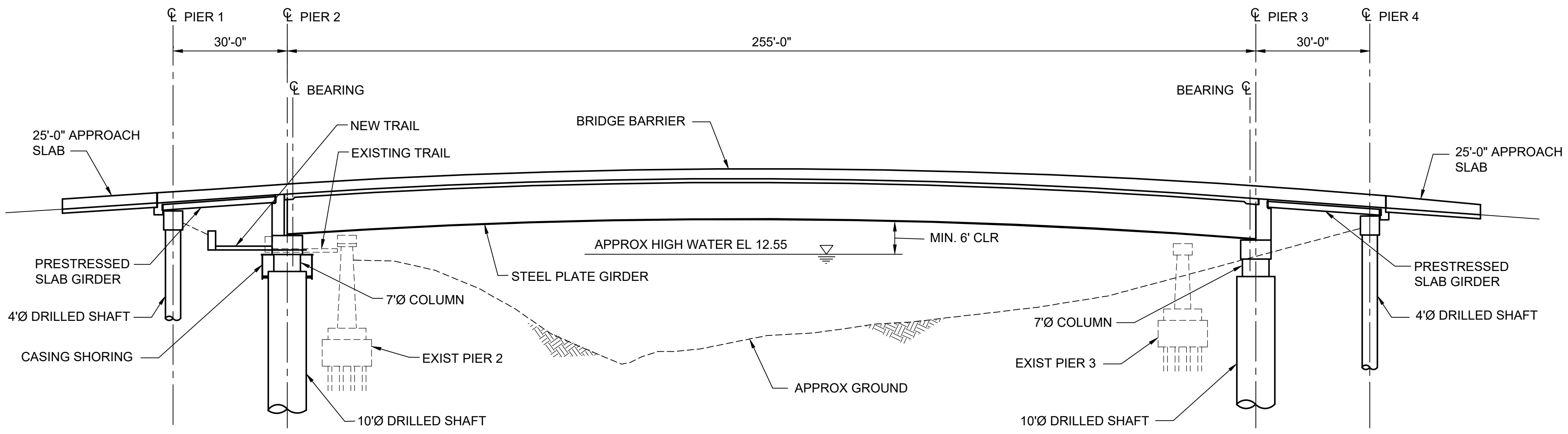


BRIDGE PLAN



BRIDGE ELEVATION

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DUWAMISH RIVER - S 42ND AVE BRIDGE REPLACEMENT

BRIDGE PLAN & ELEVATION - CONCEPT 1

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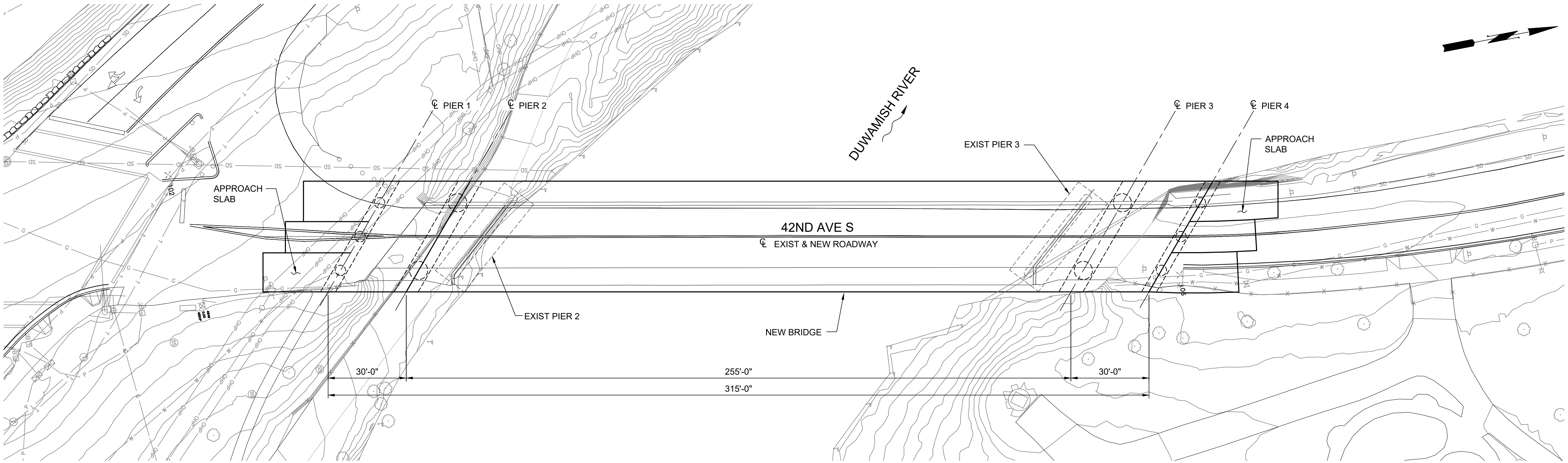
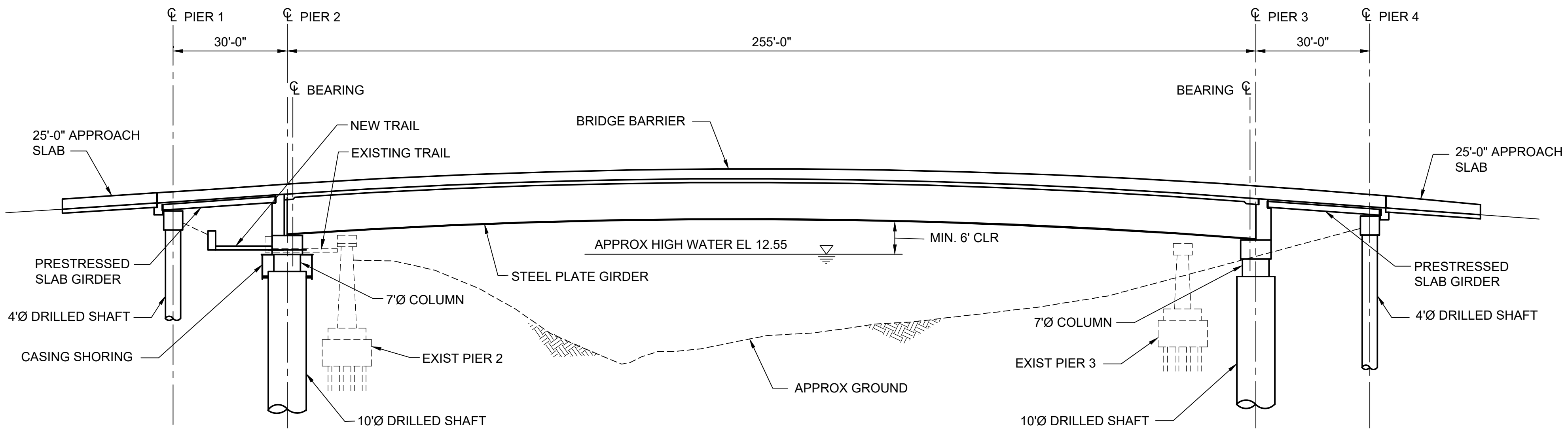


BRIDGE PLAN



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BRIDGE PLAN & ELEVATION - CONCEPT 1

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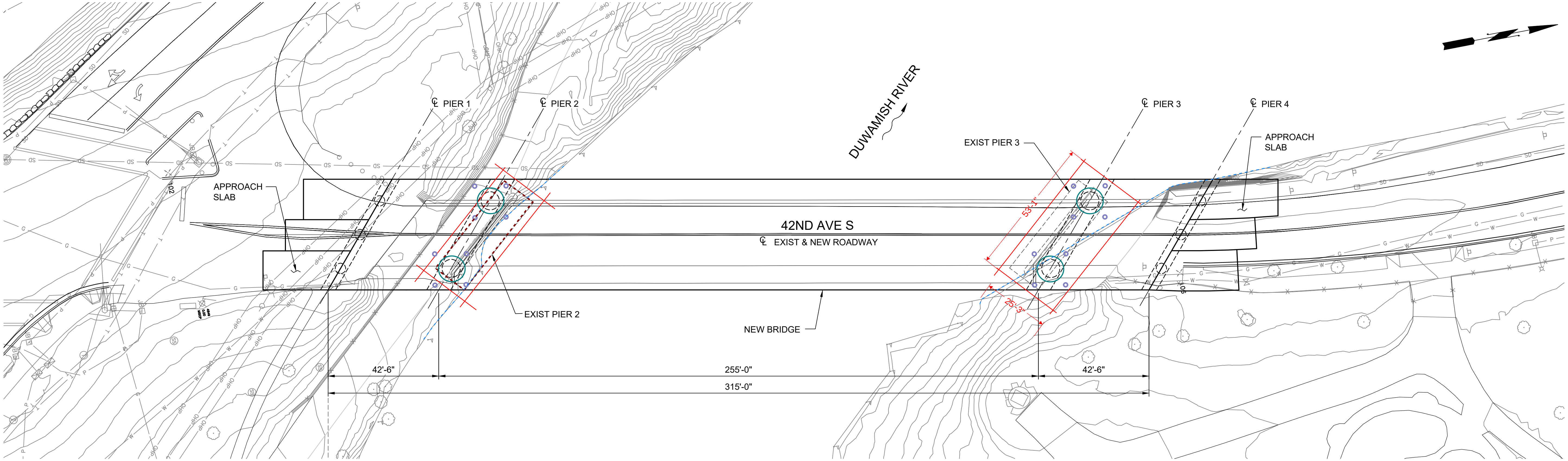
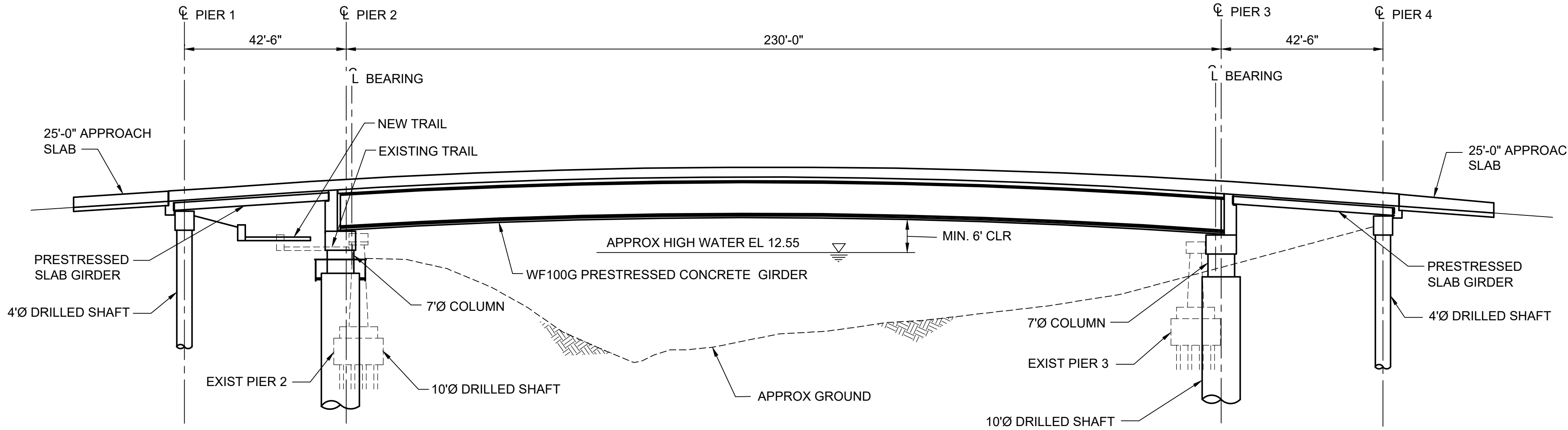


BRIDGE PLAN



BRIDGE ELEVATION

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DUWAMISH RIVER - S 42ND AVE BRIDGE REPLACEMENT

BRIDGE PLAN & ELEVATION - CONCEPT 2

No.	Date	Revisions

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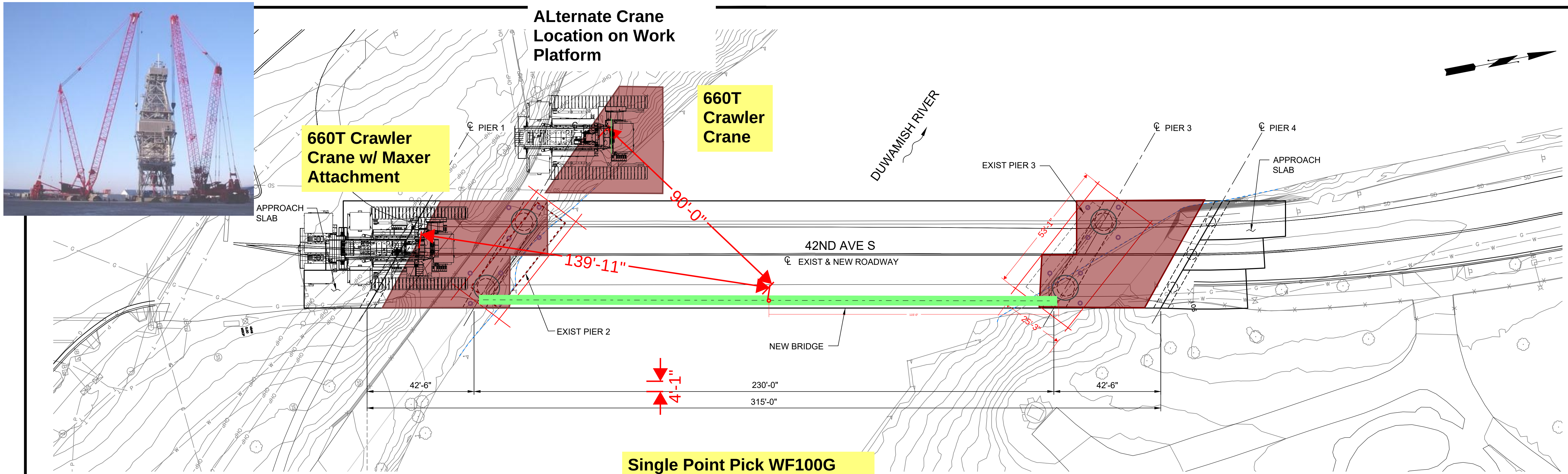
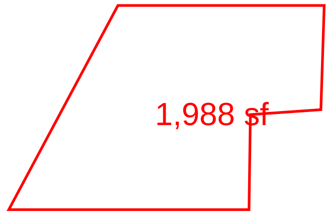
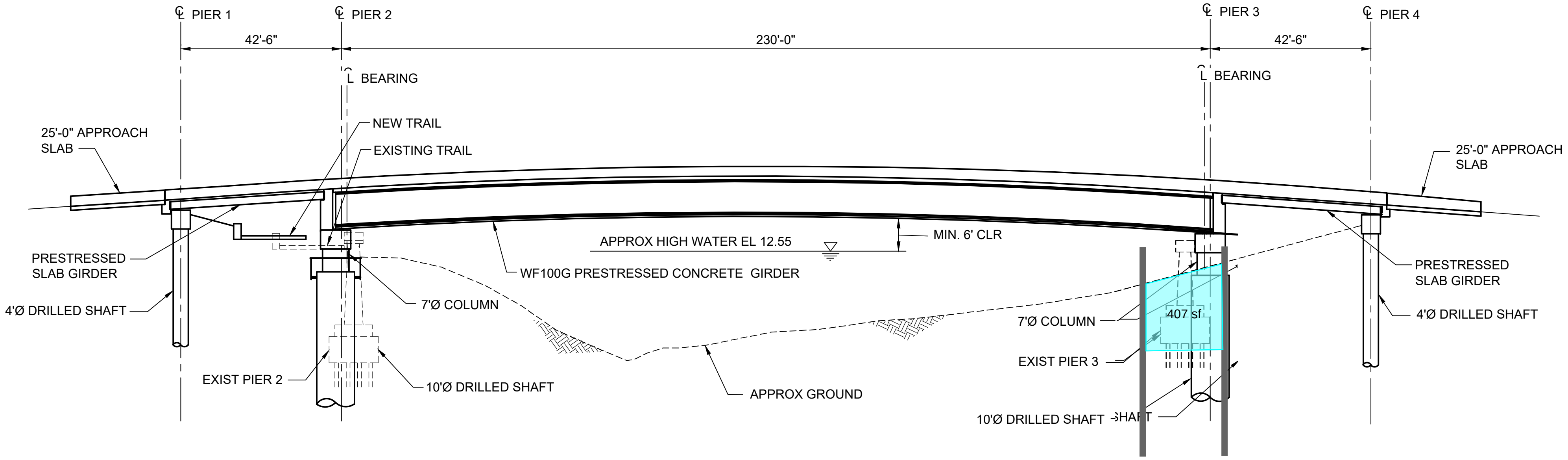
Date JUNE 2020



Single Point Pick WF100G Girder 250k + 25K Rigging





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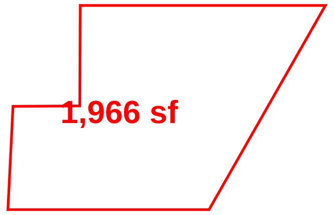

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DUWAMISH RIVER - S 42ND AVE BRIDGE REPLACEMENT

BRIDGE PLAN & ELEVATION - CONCEPT 2

No.	Date	Revisions

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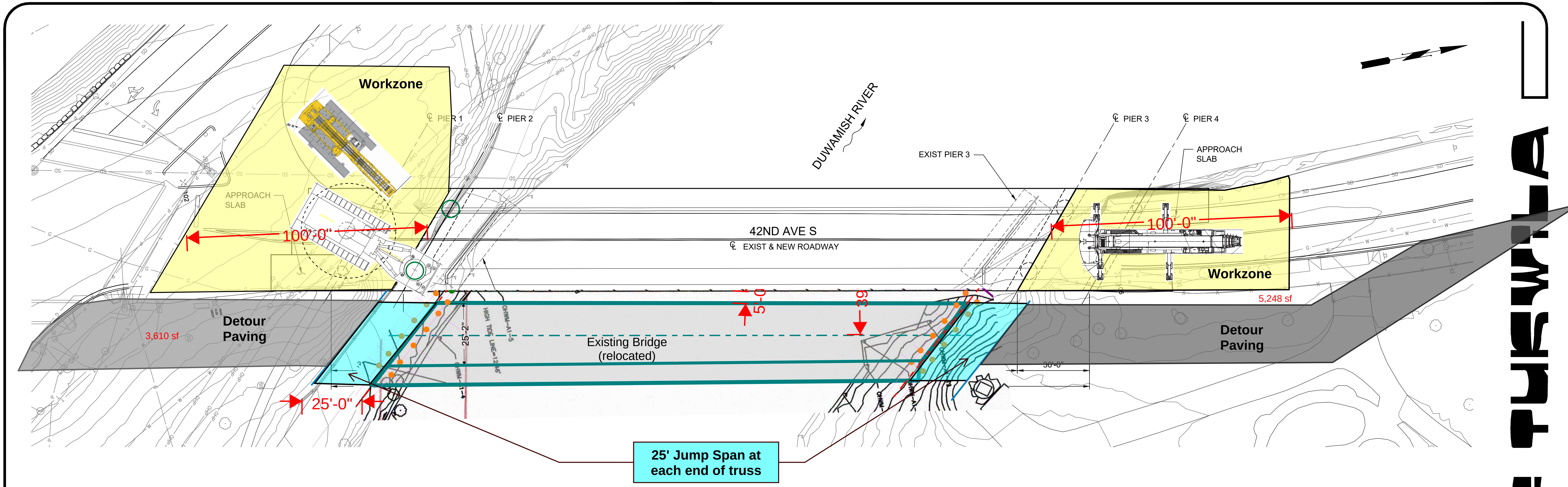
File No. Bridge Plan & Elev - Concept 2.dwg
Scale 1"=20'
Date JUNE 2020



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DUWAMISH RIVER - S 42ND AVE BRIDGE REPLACEMENT

Relocated Bridge & Detour Plan

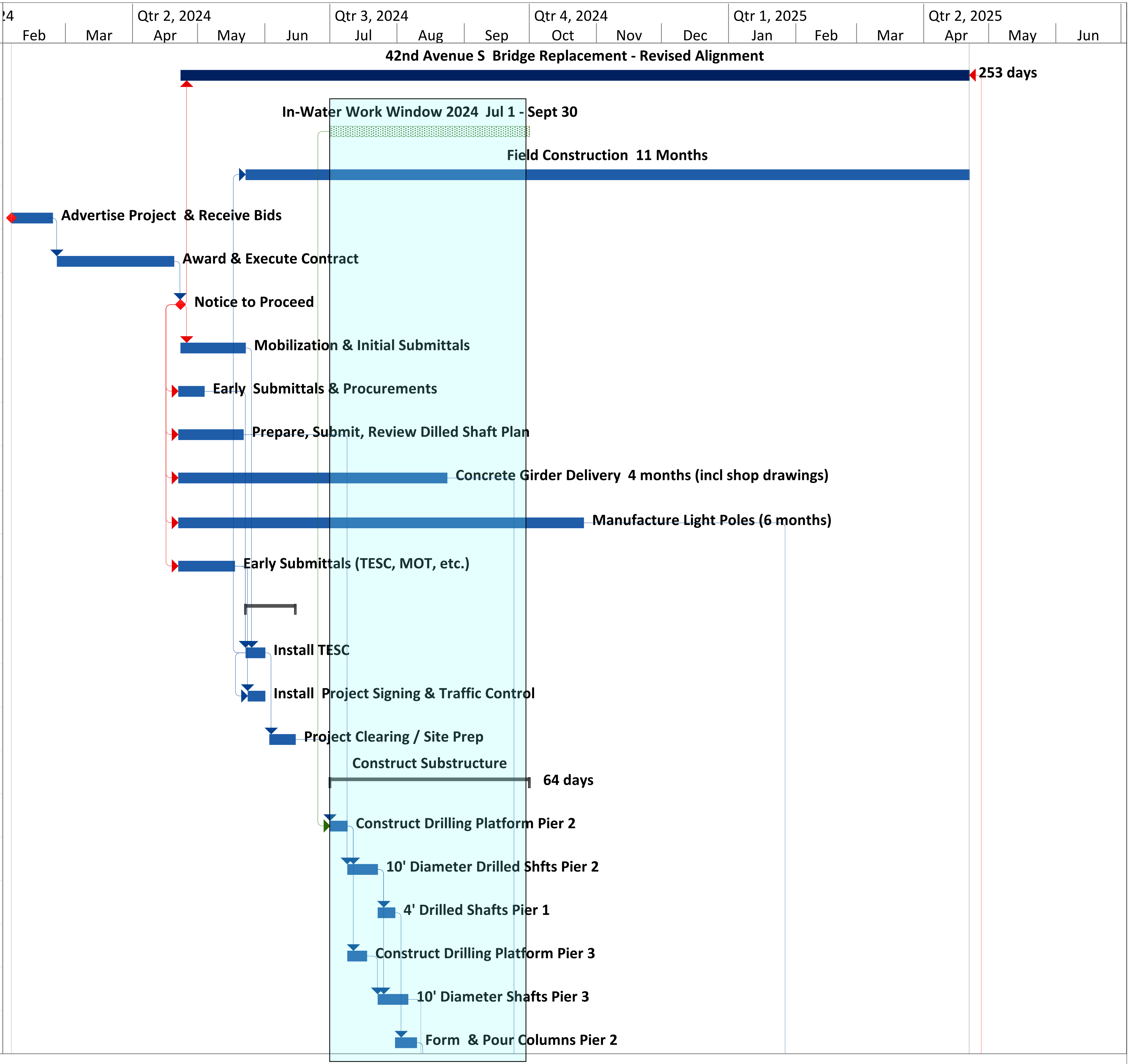
No.	Date	Revisions

File No. Bridge Plan & Elev - Conce

Scale 1"=20'

Date JUNE 2020

ID	Task Name	Duration	Start	Finish	Total Slack
1	**42nd Avenue S Bridge Replacement - Revised**	253 days	Tue 4/23/24	Mon 4/21/25	0 days
2	In-Water Work Window 2024 Jul 1 - Sept 30	64 days	Mon 7/1/24	Mon 9/30/24	0 days
3	Field Construction 11 Months	231 days	Thu 5/23/24	Mon 4/21/25	0 days
4	Advertise Project & Receive Bids	15 days	Mon 2/5/24	Fri 2/23/24	0 days
5	Award & Execute Contract	40 days	Mon 2/26/24	Fri 4/19/24	0 days
6	Notice to Proceed	1 day	Mon 4/22/24	Mon 4/22/24	0 days
7	**Mobilization & Initial Submittals**	22 days	Tue 4/23/24	Wed 5/22/24	0 days
8	Early Submittals & Procurements	10 days	Mon 4/22/24	Fri 5/3/24	13 days
9	Prepare, Submit, Review Dilled Shaft Plan	22 days	Mon 4/22/24	Tue 5/21/24	32 days
10	Concrete Girder Delivery 4 months (incl shop drawings)	88 days	Mon 4/22/24	Fri 8/23/24	51 days
11	Manufacture Light Poles (6 months)	132 days	Mon 4/22/24	Fri 10/25/24	92 days
12	Early Submittals (TESC, MOT, etc.)	20 days	Mon 4/22/24	Fri 5/17/24	3 days
13	**Preparatory Work**	**16 days**	**Thu 5/23/24**	**Fri 6/14/24**	**0 days**
14	Install TESC	6 days	Thu 5/23/24	Fri 5/31/24	0 days
15	Install Project Signing & Traffic Control	5 days	Fri 5/24/24	Fri 5/31/24	225 days
16	Project Clearing / Site Prep	10 days	Mon 6/3/24	Fri 6/14/24	10 days
17	**Construct Substructure**	**64 days**	**Mon 7/1/24**	**Mon 9/30/24**	**0 days**
18	Construct Drilling Platform Pier 2	5 days	Mon 7/1/24	Mon 7/8/24	0 days
19	10' Diameter Drilled Shfts Pier 2	10 days	Tue 7/9/24	Mon 7/22/24	0 days
20	4' Drilled Shafts Pier 1	6 days	Tue 7/23/24	Tue 7/30/24	0 days
21	Construct Drilling Platform Pier 3	7 days	Tue 7/9/24	Wed 7/17/24	14 days
22	10' Diameter Shafts Pier 3	10 days	Tue 7/23/24	Mon 8/5/24	11 days
23	Form & Pour Columns Pier 2	8 days	Wed 7/31/24	Fri 8/9/24	0 days



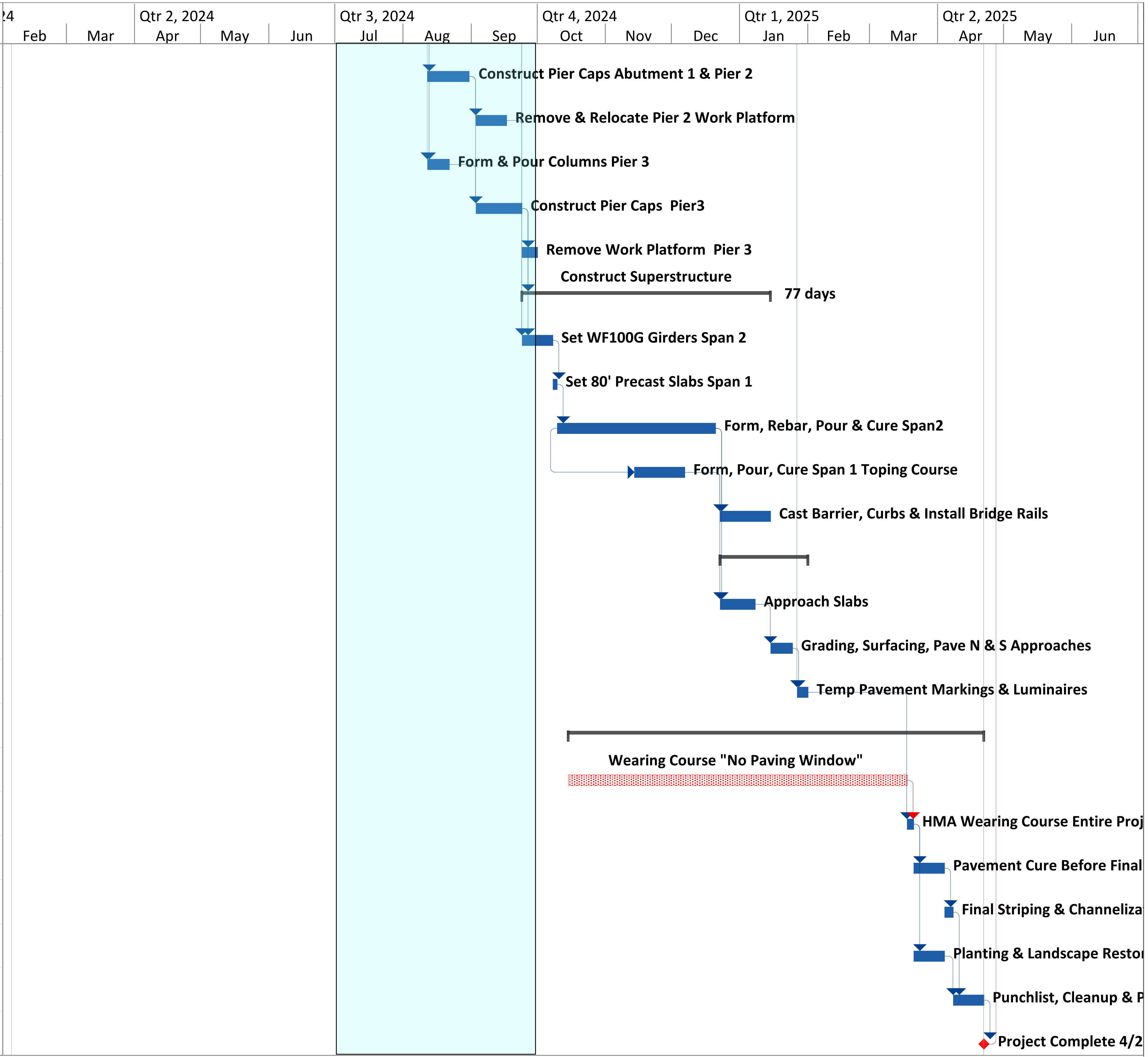
42nd Ave South - Alternate Alignment Construction Schedule 7-31-21
Sat 7/31/21

42nd Ave S Bridge Replacement - S 124th ST Alignment
Preliminary Construction Schedule

Sheet 1 of 2

Figure 3

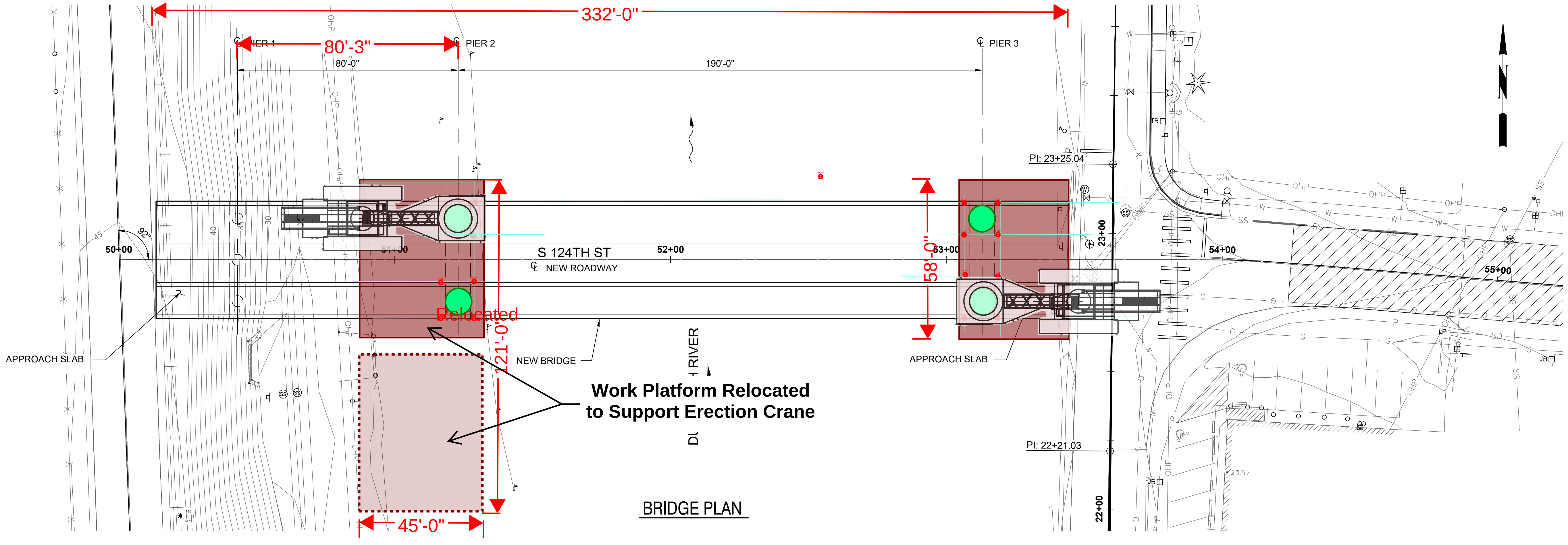
ID	Task Name	Duration	Start	Finish	Total Slack
24	Construct Pier Caps Abutment 1 & Pier 2	15 days	Mon 8/12/24	Fri 8/30/24	0 days
25	Remove & Relocate Pier 2 Work Platform	10 days	Tue 9/3/24	Mon 9/16/24	36 days
26	Form & Pour Columns Pier 3	8 days	Mon 8/12/24	Wed 8/21/24	7 days
27	Construct Pier Caps Pier3	15 days	Tue 9/3/24	Mon 9/23/24	0 days
28	Remove Work Platform Pier 3	5 days	Tue 9/24/24	Mon 9/30/24	0 days
29	**Construct Superstructure**	**77 days**	**Tue 9/24/24**	**Tue 1/14/25**	**31 days**
30	Set WF100G Girders Span 2	10 days	Tue 9/24/24	Mon 10/7/24	31 days
31	Set 80' Precast Slabs Span 1	2 days	Tue 10/8/24	Wed 10/9/24	31 days
32	Form, Rebar, Pour & Cure Span2	50 days	Thu 10/10/24	Fri 12/20/24	31 days
33	Form, Pour, Cure Span 1 Toping Course	15 days	Thu 11/14/24	Fri 12/6/24	41 days
34	Cast Barrier, Curbs & Install Bridge Rails	15 days	Mon 12/23/24	Tue 1/14/25	69 days
35	**Construct Bridge Approaches**	**28 days**	**Mon 12/23/24**	**Fri 1/31/25**	**31 days**
36	Approach Slabs	10 days	Mon 12/23/24	Tue 1/7/25	31 days
37	Grading, Surfacing, Pave N & S Approaches	8 days	Wed 1/15/25	Fri 1/24/25	31 days
38	Temp Pavement Markings & Luminaires	5 days	Mon 1/27/25	Fri 1/31/25	31 days
39	**Project Completion**	**131 days**	**Tue 10/15/24**	**Mon 4/21/25**	**0 days**
40	Wearing Course "No Paving Window"	106 days	Tue 10/15/24	Mon 3/17/25	0 days
41	HMA Wearing Course Entire Project	3 days	Tue 3/18/25	Thu 3/20/25	0 days
42	Pavement Cure Before Final Striping	10 days	Fri 3/21/25	Thu 4/3/25	0 days
43	Final Striping & Channelization	2 days	Fri 4/4/25	Mon 4/7/25	0 days
44	Planting & Landscape Restoration	10 days	Fri 3/21/25	Thu 4/3/25	2 days
45	Punchlist, Cleanup & Project Restoration	10 days	Tue 4/8/25	Mon 4/21/25	0 days
46	Project Complete 4/21/25	0 days	Mon 4/21/25	Mon 4/21/25	0 days



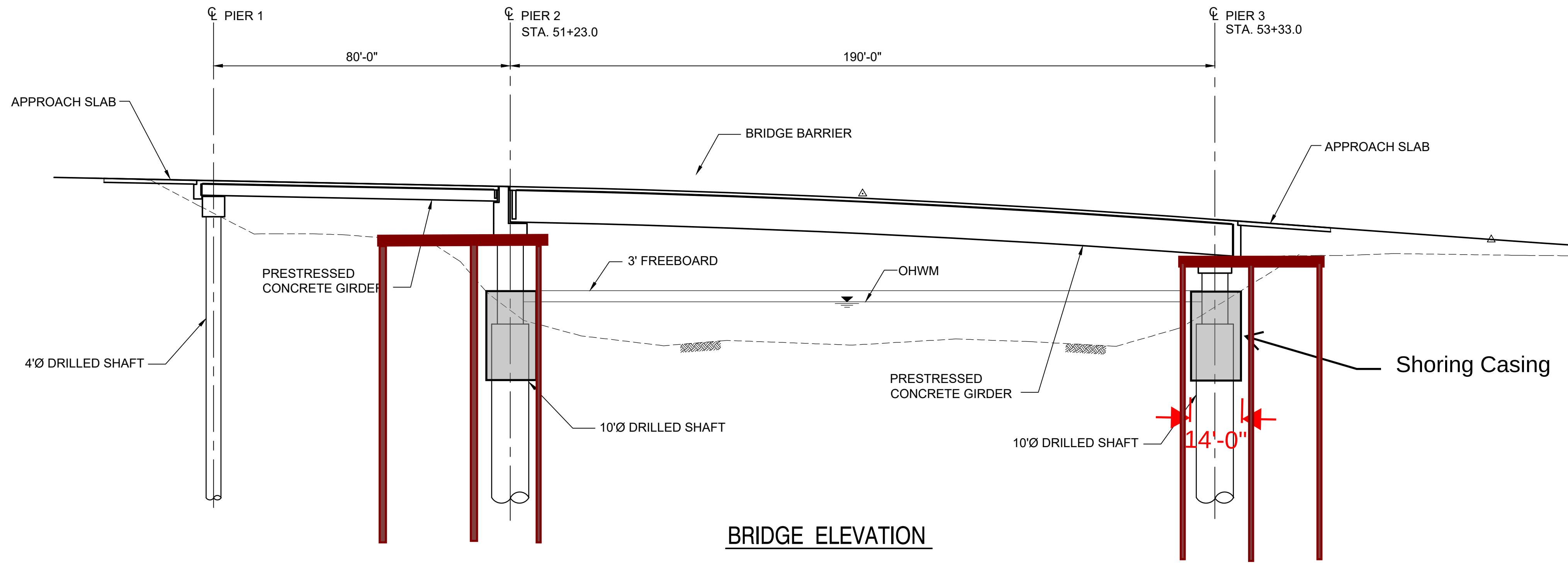
42nd Ave South - Alternate Alighment Construction Schedule 7-31-21
Sat 7/31/21

42nd Ave S Bridge Replacement - S 124th ST Alignment
Preliminary Construction Schedule

Sheet 2 of 2



BRIDGE PLAN



BRIDGE ELEVATION

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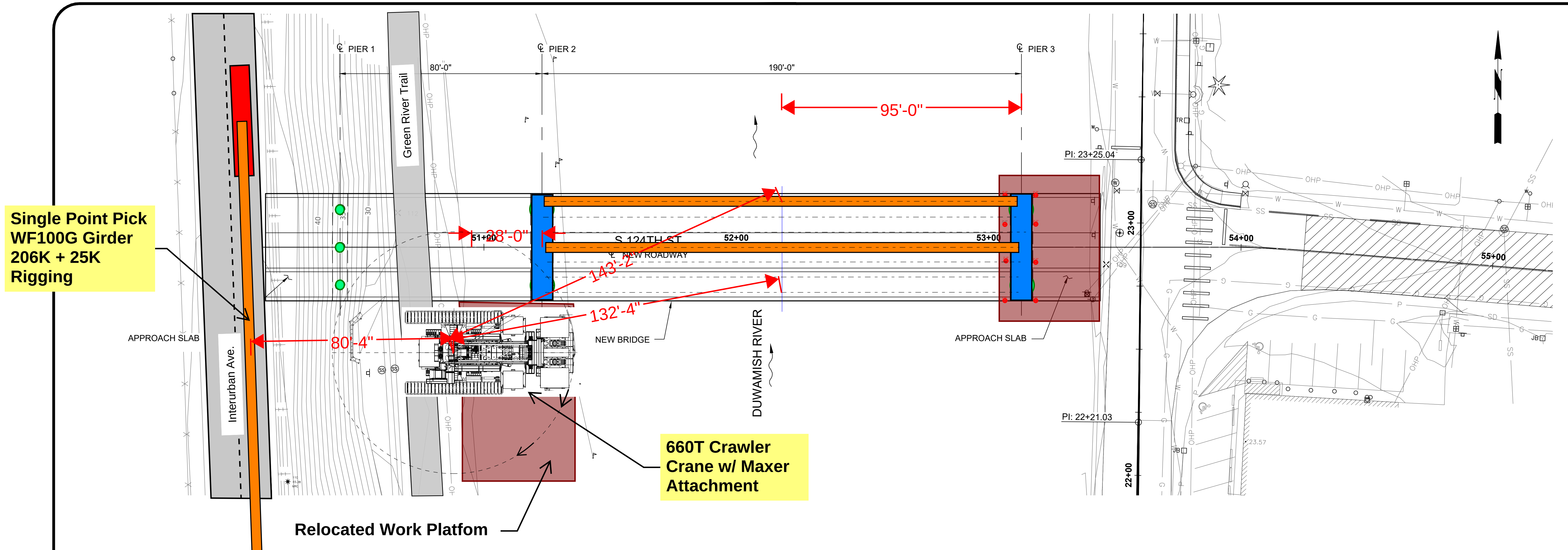
DUWAMISH RIVER - S. 124TH ST. BRIDGE

Work Platform Configurations

No.	Date	Revisions

Figure A1

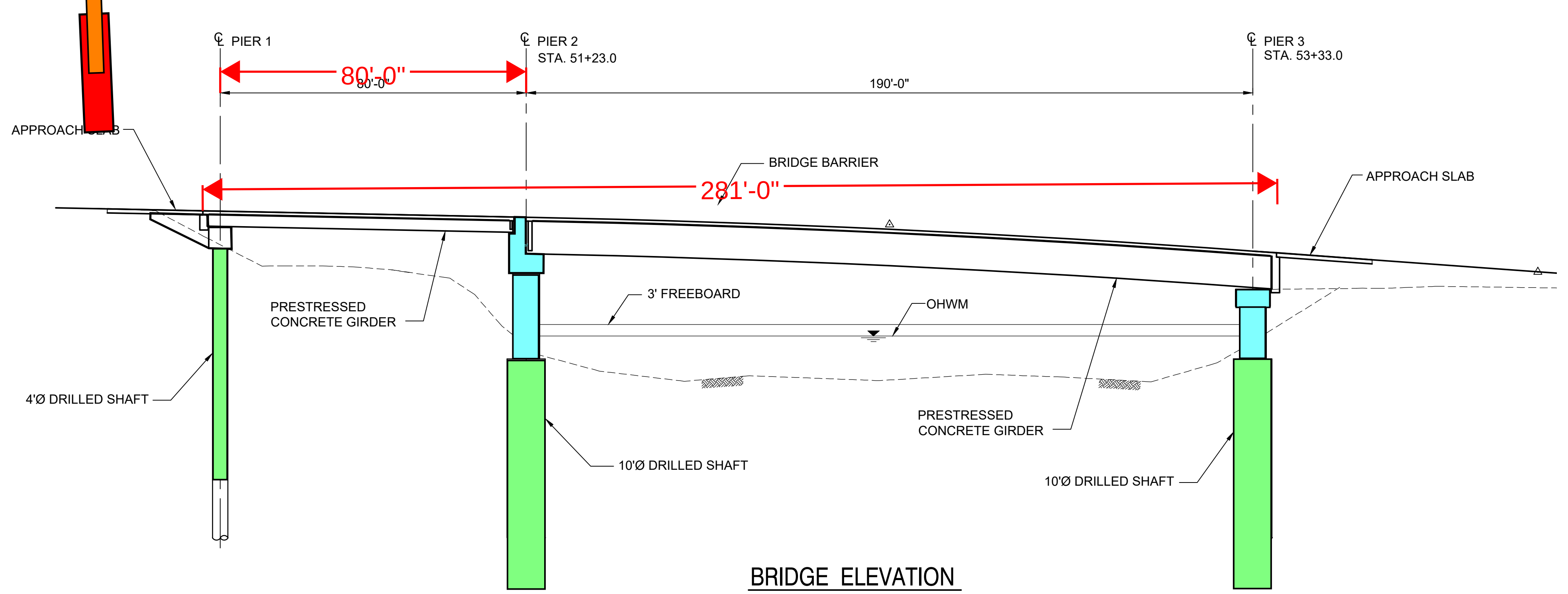
File No. 124th St Concept 1.dwg
Scale 1"=20'
Date JUNE 2021



Single Point Pick WF100G Girder 206K + 25K Rigging

660T Crawler Crane w/ Maxer Attachment

Relocated Work Platform



BRIDGE ELEVATION

18000 MAX-ER
Boom No. 55 or No. 55A , with 42,7m (140')
No. 56 Mast with 18m (59') position

223 170 kg (492,000 lb) Counterweight   145 150 kg (320,000 lb) Carbody Counterweight

390 090 kg (860,000 lb) Wheeled Counterweight or Hanging Counterweight

360° Rating   **kg (lb) x 1 000**

Boom m (ft)	42,7 (140)	54,9 (180)	67,1 (220)	79,2 (260)	91,4 (300)	103,6 (340)	115,8 (380)	134,0 (440)
Radius								
8,5 (28)	750,0 (1653.5)							
10,0 (34)	750,0 (1653.5)	684,8 1509.8)						
12,0 (40)	715,7 (1543.3)	684,8 1509.8)	570,9 (1258.0)					
14,0 (50)	649,9 (1310.1)	647,9 1303.8)	565,8 (1240.2)	405,6 (894.4)	– (655,0)			
18,0 (60)	502,1 (1089.4)	499,3 1083.3)	497,8 (1075.8)	405,6 (894.4)	297,1 (655,0)	223,1 (491.9)	– (374.2)	
20,0 (70)	450,8 (929.9)	448,0 (923.9)	444,6 (916.3)	405,6 (894.4)	297,1 (655,0)	223,1 (491.9)	169,7 (374.2)	117,2 (258.5)
24,0 (80)	373,1 (809.2)	370,4 (803.3)	367,0 (795.7)	364,8 (789.4)	297,1 (655,0)	223,1 (491.9)	169,7 (374.2)	117,2 (258.5)
30,0 (100)	294,5 (638.4)	291,9 (632.8)	288,5 (625.2)	285,6 (618.9)	284,2 (612.1)	223,1 (491.9)	169,7 (374.2)	117,2 (258.5)
36,0 (120)	233,1 (502.2)	239,1 (518.0)	235,6 (510.4)	232,8 (504.2)	229,7 (497.4)	223,1 (491.9)	169,5 (373.7)	116,4 (256.5)
42,0 (140)	181,4 (387.5)	201,0 (435.4)	197,6 (427.7)	194,8 (421.6)	191,8 (414.9)	189,9 (410.9)	167,2 (368.2)	115,1 (253.4)
48,0 (160)		167,5 (359.6)	168,9 (365.4)	166,1 (359.3)	163,1 (352.6)	161,3 (348.7)	159,4 (343.7)	113,6 (250.1)

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DUWAMISH RIVER - S. 124TH ST. BRIDGE

Main Span Girder Setting

No.	Date	Revisions

Figure A2

File No. 124th St Concept 1.dwg
Scale 1"=20'
Date JUNE 2021

Appendix L – Bridge Alternatives Opinion of Cost

42nd Ave S Bridge Replacement - 42nd Ave S Alignment
Steel Plate Girder Superstructure

TRANTECH
Engineering LLC

ITEM DESCRIPTION	QUANTITY	MEAS. UNIT	UNIT PRICE	COST
MOBILIZATION	1	LS	$ 1,262,913	$ 1,262,913
TESC	1	LS	50,000	$ 50,000
TEMP DETOUR ALIGNMENT (RELOCATE EXISTING BRIDGE)	1	LS	1,500,000	$ 1,500,000
TEMPORARY WORK BRIDGE	1	LS	360,000	360,000
EXIST BRIDGE REMOVAL & DISPOSAL	8,520	SF	50	$ 426,000
NEW BRIDGE	14,405	SF	475	$ 6,842,375
TRAFFIC CONTROL	1	LS	250,000	$ 250,000
APPROACH SLAB	275	SY	400	$ 110,000
SURVEYING	1	LS	200,000	$ 200,000
UTILITY RELOCATION	1	LS	200,000	$ 200,000
SOLDIER PILE WALL ALONG 42ND AVE S	8,000	SF	150	$ 1,200,000
CIVIL ROADWAY APPROACH ITEMS (15% OF ABOVE)	1	LS	1,490,756	$ 1,490,756
CORE CONSTRUCTION COST (CCC)				$ 13,892,044
RIGHT-OF-WAY				$ 200,000
CONTINGENCY (25% CCC)				$ 3,473,011
ENGINEERING (25% CCC)				$ 3,473,011
CONSTRUCTION ENGINEERING (18% CCC)				$ 2,500,568
INFLATION @ 3% FOR 2 YEARS				$ 833,523
TOTAL				**$ 24,372,157**

42nd Ave S Bridge Replacement - 42nd Ave S Alignment
Pre-stressed Concrete Girder Superstructure

TRANTECH
Engineering LLC

ITEM DESCRIPTION	QUANTITY	MEAS. UNIT	UNIT PRICE	COST
MOBILIZATION	1	LS	$ 1,345,742	$ 1,345,742
TESC	1	LS	50,000	$ 50,000
TEMP DETOUR ALIGNMENT (RELOCATE EXISTING BRIDGE)	1	LS	1,500,000	$ 1,500,000
TEMPORARY WORK BRIDGE	1	LS	360,000	360,000
EXIST BRIDGE REMOVAL & DISPOSAL	8,520	SF	50	$ 426,000
NEW BRIDGE	14,405	SF	525	$ 7,562,625
TRAFFIC CONTROL	1	LS	250,000	$ 250,000
APPROACH SLAB	275	SY	400	$ 110,000
SURVEYING	1	LS	200,000	$ 200,000
UTILITY RELOCATION	1	LS	200,000	$ 200,000
SOLDIER PILE WALL ALONG 42ND AVE S	8,000	SF	150	$ 1,200,000
CIVIL ROADWAY APPROACH ITEMS (15% OF ABOVE)	1	LS	1,598,794	$ 1,598,794
CORE CONSTRUCTION COST (CCC)				$ 14,803,161
RIGHT-OF-WAY				$ 200,000
CONTINGENCY (25% CCC)				$ 3,700,790
ENGINEERING (25% CCC)				$ 3,700,790
CONSTRUCTION ENGINEERING (18% CCC)				$ 2,664,569
INFLATION @ 3% FOR 2 YEARS				$ 888,190
TOTAL				**$ 25,957,499**

42nd Ave S Bridge Replacement - S 124th Street Alignment

Steel Plate Girder Superstructure

TRANTECH Engineering LLC

ITEM DESCRIPTION	QUANTITY	MEAS. UNIT	UNIT PRICE	COST
MOBILIZATION	1	LS	$ 1,102,593	$ 1,102,593
TESC	1	LS	50,000	$ 50,000
TEMP DETOUR ALIGNMENT (RELOCATE EXISTING BRIDGE)	1	LS	500,000	$ 500,000
TEMPORARY WORK BRIDGE	1	LS	360,000	360,000
EXIST BRIDGE REMOVAL & DISPOSAL	8,520	SF	50	$ 426,000
NEW BRIDGE	13,860	SF	475	$ 6,583,500
TRAFFIC CONTROL	1	LS	250,000	$ 250,000
APPROACH SLAB	350	SY	400	$ 140,000
SURVEYING	1	LS	200,000	$ 200,000
UTILITY RELOCATION	1	LS	1,000,000	$ 1,000,000
WALL ALONG 42ND AVE S	1,200	SF	75	$ 90,000
CIVIL ROADWAY APPROACH ITEMS (15% OF ABOVE)	1	LS	1,426,425	$ 1,426,425
CORE CONSTRUCTION COST (CCC)				$ 12,128,518
RIGHT-OF-WAY				$ 400,000
CONTINGENCY (25% CCC)				$ 3,032,129
ENGINEERING (25% CCC)				$ 3,032,129
CONSTRUCTION ENGINEERING (18% CCC)				$ 2,183,133
INFLATION @ 3% FOR 2 YEARS				$ 727,711
TOTAL				**$ 21,503,620**

42nd Ave S Bridge Replacement - S 124th Street Alignment
Pre-stressed Concrete Girder Superstructure

TRANTECH Engineering LLC

ITEM DESCRIPTION	QUANTITY	MEAS. UNIT	UNIT PRICE	COST
MOBILIZATION	1	LS	$ 1,178,838	$ 1,178,838
TESC	1	LS	50,000	$ 50,000
TEMP DETOUR ALIGNMENT (RELOCATE EXISTING BRIDGE)	1	LS	500,000	$ 500,000
TEMPORARY WORK BRIDGE	1	LS	360,000	360,000
EXIST BRIDGE REMOVAL & DISPOSAL	8,520	SF	50	$ 426,000
NEW BRIDGE	13,860	SF	525	$ 7,276,500
TRAFFIC CONTROL	1	LS	250,000	$ 250,000
APPROACH SLAB	275	SY	400	$ 110,000
SURVEYING	1	LS	200,000	$ 200,000
UTILITY RELOCATION	1	LS	1,000,000	$ 1,000,000
SOLDIER PILE WALL ALONG 42ND AVE S	1,200	SF	75	$ 90,000
CIVIL ROADWAY APPROACH ITEMS (15% OF ABOVE)	1	LS	1,525,875	$ 1,525,875
CORE CONSTRUCTION COST (CCC)				$ 12,967,213
RIGHT-OF-WAY				$ 400,000
CONTINGENCY (25% CCC)				$ 3,241,803
ENGINEERING (25% CCC)				$ 3,241,803
CONSTRUCTION ENGINEERING (18% CCC)				$ 2,334,098
INFLATION @ 3% FOR 2 YEARS				$ 778,033
TOTAL				**$ 22,962,950**