



MAGNOLIA BRIDGE REPLACEMENT TS&L STUDY

ALIGNMENT STUDY REPORT

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MAGNOLIA BRIDGE REPLACEMENT TS&L STUDY

ALIGNMENT STUDY REPORT

1. INTRODUCTION

The Magnolia Bridge is a primary structure in one of three corridors providing access between the Magnolia neighborhood and the rest of the City of Seattle. The other two corridors, West Dravus Street and West Emerson Street, are located north of the Magnolia Bridge. The existing bridge is approximately 3,000 feet long, connecting 15th Avenue West, near West Garfield Street, to West Galer Street on the bluff. The bridge also provides access to the Interbay area including Port of Seattle property (Piers 90 and 91), Elliott Bay Marina, and associated businesses near the water.

The original bridge was constructed in 1929 and has been modified, strengthened, and repaired several times — most recently following the February 28, 2001 Nisqually Earthquake. The City of Seattle has identified this bridge as an essential bridge that should be usable following a design seismic event. Even with the modifications and strengthening in the partial seismic retrofit completed in 2001, the existing bridge is susceptible to severe damage from a major seismic event. A study in 1997 indicated the cost of a full retrofit of the bridge to current seismic standards could equal half the cost of a new facility. The life of a retrofitted bridge would be less than that of a new bridge, and the costs to maintain the retrofitted bridge would increase every year. The main contributor to these increased costs would be corrosion of the reinforcing steel in the concrete due to the marine environment at the site.

2. PURPOSE

The purpose of this project is to replace the existing Magnolia Bridge structure, approaches, and related arterial connections with facilities that maintain convenient and reliable vehicular and non-motorized access between the Magnolia Community and the rest of the City of Seattle. Since the existing bridge also provides the only public vehicular access to the land between Terminal 91 and Magnolia Bluff, including Terminal 91, Smith Cove Park, Elliott Bay Marina, and US Navy Property, the project purpose includes provision of access to these areas.

3. PROJECT GOALS

A public involvement program including interviews with individual stakeholders, an open house, and the Design Advisory Group was conducted in accordance with the Public Involvement Plan. A record of all public meetings is contained in the City of Seattle Community Support Checklist.

Through the public involvement program, several common ideas or desires for the replacement facility have been expressed. These common ideas and desires are shown below and form the goals for the project:

Reliable Access

- Provide a seismically safe and more reliable route(s) to Magnolia.

Maintain or Improve Traffic Mobility

- Provide additional access points into Magnolia.
- Maintain or improve traffic flow on the 15th Avenue West corridor.
- Improve waterfront access to and from Magnolia.
- Improve public access to the waterfront.

- Maintain or improve the level of bicycle and pedestrian connections within and beyond the project area.

Maintain Neighborhoods and Businesses

- Maintain Magnolia's aesthetic qualities and community feel.
- Provide a route that will support Magnolia Village businesses.
- Support redevelopment of vacant or underutilized Interbay properties.

Mitigate Impacts of Construction and Operation

- Minimize impact to existing traffic patterns during construction.
- Minimize impact to the existing houses, businesses, and right-of-way.

In addition to these goals, the City of Seattle will develop the replacement facility using the following principles:

- Provide fair access to information regarding project progress to community, mass media and interested individuals.
- Create a transparent process of alignment development, evaluation and selection.
- Avoid cost overruns by identifying all major contributing factors.
- Consider aesthetics when developing the new structure.
- Keep estimated probable costs of construction in line with industry standards for similar projects.

4. PROJECT REVIEWERS

The City of Seattle along with the Project Team and the Design Advisory Group reviewed public and agency comments and concerns in evaluating potential alignment alternatives. The members of these teams are listed at the beginning of this report.

5. ALIGNMENT ALTERNATIVES

The process of generating initial design concepts and selecting and evaluating alignments commenced in 2002. Initial alignment alternatives were developed from previous team discussions, the first open house, stakeholder interviews, and previous studies. The evaluation of alignments involved extensive analysis, refinement, and elimination of problematic alignments. The primary means of selecting and evaluating the alignments was through the screening process described below.

5.1 FIRST LEVEL SCREENING

On October 17, 2002, members of the Magnolia Bridge Replacement Study team met to screen the initial candidate alignments. The team worked through 25 alignments and eliminated 12 alignments from further consideration. The remaining 13 alignments were consolidated into nine alternatives that were carried forward.

5.1.1 Alignments Considered

KPFF prepared and presented 22 alignments for evaluation. In addition, three new alignments and one variation were presented by team members for evaluation during the meeting. Table 1 identifies the candidate alignments that were considered, with a brief description of each. Graphics of each alignment are shown as Figures 1 through 25.

The objective of the meeting was to reduce the number of candidate alignments to 6 or 8 for further study and to confirm that all reasonably possible alignments had been identified and considered. The assumptions, design constraints, and criteria used to evaluate the alignments are presented in Sections 5.1.2 and 5.1.3.

Table 1
Candidate Alignments

No.	Alignment Location	Alignment Description	Bridge/ Structure Length	Total Route Length	Notes
1	Existing bridge footprint	Replace existing bridge at the same location with new structure. Construct drop ramps similar to the existing configuration.	3,800	3,800	Total 4 ramps to connect with T91
1 A	Existing bridge footprint	Replace existing bridge at the same location with new structure. Move west end connection at W Galer St to the south. Construct diamond I/C in the mid span to provide access to waterfront and Uplands.	3,800	3,800	Diamond I/C at mid span. Revised west end connection to W Galer St
2	Existing bridge footprint, W Marina Dr, 32 nd Ave W	Replace bridge at east end, drop to surface west of RR tracks, continue surface road to Smith Cove Park, connect W Marina Dr with 32 nd St with surface road or low bridge in tidelands. Improve 32 nd Street	1,500 east 1,000 west	8,600	Two separate structures
3	Existing bridge footprint, revise west end at connection to W Galer St	Replace bridge at east end, drop to surface west of RR tracks, continue surface road, replace west end structure with fill and/or new structure, add new surface road connecting to 21 st Ave W.	1,500 east 1,400 west	5,000	Two separate structures
4	Existing bridge footprint, revise west end at connection to W Galer St	Replace bridge at east end; construct new bridge south of existing in close proximity. Replace west end structure with new coming straight from W Galer St and swing to the north over Smith Cove Park. Provide drop ramps for Uplands/waterfront connection.	3,800	3,800	Drop ramps or diamond I/C at T91
5	South of existing bridge footprint, turn to the North over 15 th Ave W	Replace bridge at east end north of existing, turn to the south to cross RR tracks, continue parallel to the existing approx. 400' to the south over the water, connect straight with W Galer St. Construct ramps to connect with Uplands/waterfront.	4,000	4,000	Drop ramps at Smith Cove Park, full I/C at 15 th Ave W

Source: KPFF, 2002

Table 1 continued
Candidate Alignments

No.	Alignment Location	Alignment Description	Bridge/ Structure Length	Total Route Length	Notes
6	Long arc north of existing bridge (500' to 700') connecting to 15 th Ave W, and W Galer St at the existing locations	Construct new bridge in the form of long arc north of existing bridge. Construct new ramps to connect with 15 th Ave W at existing connection point. Construct ramps to connect with Uplands/waterfront.	4,300	4,300	Diamond I/C at mid span, th full I/C at 15 th Ave W
7	W Galer St flyover, along west side of RR tracks, W Galer St	Surface road from W Galer St flyover, cross under existing bridge, run along west side of RR tracks for approx. 1700', turn west connect with new structure at W Galer St.	1,700	4,800	
8	W Galer St flyover, along west side of RR tracks, W Galer St, and Thorndyke Ave W/ 23 rd Ave W	Surface road from W Galer St flyover, cross under existing bridge, run along west side of RR tracks for approx. 2200', turn west connect with new structure at W Galer St, and Thorndyke Ave W/ 23 rd Ave W.	1,700	5,300	
9	W Galer St Flyover, along west side of RR tracks, Thorndyke Ave W/W Halladay St, 20 th Ave W, 21 st Ave W	Surface road from W Galer St Flyover, cross under existing bridge, run along west side of RR tracks, connect with 20 th Ave W, 21 st Ave W and to Thorndyke Ave W at W Halladay St with a fill ramp or bridge.	1,000	5,400	
10	North of existing bridge, cross RR tracks, cross Port uplands, Thorndyke Ave W/23 rd Ave W	Begin 500' +/- north of existing bridge with at grade I/S, northwest (at angle) cross over RR tracks, drop and continue as a surface road, turn north and construct new fill and/or structure to connect with W Galer St.	1,500	4,000	Bridge at skew angle to RR tracks Fill ramp or bridge west end
11	W Wheeler St, cross RR tracks, cross Port uplands, Thorndyke Ave W/23 rd Ave W	Begin at Wheeler St and 15 th Ave W with at grade I/S, continue straight west and cross RR tracks, cross Port uplands with elevated structure, connect to Thorndyke Ave W/23 rd Ave W. Construct half diamond I/C to provide connection with Port uplands from east side only, and surface road connection with 21 st Ave W.	2,000	2,500	Half diamond I/C at T91

Source: KPFF, 2002

Table 1 continued
Candidate Alignments

No.	Alignment Location	Alignment Description	Bridge/ Structure Length	Total Route Length	Notes
12	W Armory Way, cross RR tracks, cross Port uplands, Thorndyke Ave W/W Halladay St	Begin at W Armory Way and 15 th Ave W with at grade I/S, continue on W Armory Way and cross over RR tracks at angle, turn west, and continue elevated structure, connect to Thorndyke Ave W at W Halladay St.	1,700	3,000	Bridge at skew angle to RR tracks
13	W Wheeler St, cross RR tracks, cross Port uplands, Thorndyke Ave W/ W Halladay St	Begin at Wheeler St and 15 th Ave W with at grade I/S, continue straight west and cross over RR tracks at angle, continue elevated structure, connect to Thorndyke Ave W/23 rd Ave W.	1,700	2,500	Bridge at skew angle to RR tracks
14	North of existing bridge, cross RR tracks, south side of existing bridge, W Galer St	Begin 900' +/- north of existing bridge with at grade I/S, cross over RR tracks, drop and continue as a surface road, turn south along toe of bluff, construct new fill and/or structure to connect with W Galer St.	1,400 east 1,800 west	4,000	
15	W Armory Way, cross RR tracks, cross Port uplands, W Galer St and Thorndyke Ave W/23 rd Ave W	Begin at W Armory Way and 15 th Ave W with at grade I/S, continue on W Armory Way approx. 500', turn west and cross over RR tracks, drop down and continue surface road, split to two connections: one south with new fill and/or structure to connect with W Galer St, second as a ramp connecting to Thorndyke Ave W/23 rd Ave W.	1,300 east 1,800 west 1,000 ramp	4,900	
16	W Armory Way, cross RR tracks, cross Port uplands, W Galer St and 21 st Ave W	Begin at W Armory Way and 15 th Ave W with at grade I/S, continue on W Armory Way approx. 500', turn west and cross over RR tracks, drop and continue as a surface road, split to two connections: one south with the new structure to connect with W Galer St, second connecting to 21 st Ave W.	1,400 east 1,800 west	5,100	
17	Existing bridge footprint, add direct connection to the 23 rd Ave W	Replace existing bridge at the same location with new structure. Construct direct connection via bridge to the 23 rd Ave W.	3,800 south 1,500 north	5,300	

Source: KPFF, 2002

Table 1 continued
Candidate Alignments

No.	Alignment Location	Alignment Description	Bridge/ Structure Length	Total Route Length	Notes
18	Existing bridge footprint, W Marina Dr, 32 nd Ave W, add direct connection to the 23 rd Ave W	Replace bridge at east end, drop to surface west of RR tracks, continue surface road to Smith Cove Park, connect W Marina Dr with 32 nd St. Add direct connection to the 23 rd Ave W via ramp or bridge.	1,500 east 1,000 west 1,200 north	8,600	Three structures
19	W Armory Way, cross RR tracks, cross Port uplands, cross Thorndyke Ave W, W Smith St/26 th Ave W, 23 rd Ave W, W Marina Dr	Begin at W Armory Way and 15 th Ave W with at grade I/S, continue on W Armory Way and cross over RR tracks at angle, turn west, and continue elevated structure, meet Thorndyke Ave W at grade, run along W Smith St, and terminate at 26 th Ave W. Improve 23 rd Ave W with connection to the South with W Marina Dr.	1,500 north 1,000 south	8,000	Two structures
20	Existing bridge footprint, across bluff connect with W Blaine St, W Marina Dr, 32 nd Ave W, add direct connection to the 23 rd Ave W	Replace bridge at east, continue elevated structure across bluff north of existing bridge, connect with W Blaine St and Condon Way W. Construct drop ramps with connection to road to Smith Cove Park, connect W Marina Dr.	4,400	6,900	
21	W Dravus St, Emerson Viaduct	Remove existing Magnolia Bridge without replacement. Improve connections through W Dravus St and Emerson Viaduct.	0	0	Scope of improvements to two other crossings need to be specified
22	W Armory Way, cross over RR tracks, cross Port uplands, W McGraw St	Begin at W Armory Way and 15 th Ave W with at grade I/S, continue on W Armory Way approx. 500', turn west and cross over RR tracks, drop and continue surface road, construct tunnel under bluff along W McGraw St with west portal at 32 nd Ave W/ McGraw St.	2,800 tunnel 1,600 east	5,500	

Source: KPFF

**Table 1 continued
Candidate Alignments**

No.	Alignment Location	Alignment Description	Bridge/ Structure Length	Total Route Length	Notes
23	First Connection: W Galer St flyover, along west side of RR tracks, W Galer St,	Surface road from W Galer St flyover, cross under existing bridge, run along west side of RR tracks for approx. 1700', turn west connect with new structure at W Galer St.	1,500 south	8,200	Proposed two crossings, one at the South end, another at the North end of T91
			2,200 north		
	Second Connection: W Armory Way, cross RR tracks, cross Port uplands, Thorndyke Ave W/23 rd Ave W	Begin at W Armory Way and 15 th Ave W with at grade I/S, continue on W Armory Way and cross RR tracks at angle, turn west, and continue elevated structure, connect to Thorndyke Ave W at 23 rd Ave W.			
24	W Armory Way, north of existing bridge, cross RR tracks, W Galer St, 21st Ave W, existing bridge footprint	Begin at W Armory Way and 15 th Ave W with at grade I/S, straight west to cross RR tracks, drop to surface and turn South at bottom of the bluff, connect with new structure at W Galer St. Add at grade street from W Galer St Fly over existing bridge footprint with access to the W Marina Dr. Construct new surface street from 21 st Ave W to the South, crossing northern route at grade and terminating at street serving Smith Cove Park.	1,400 north	6,100	
			1,500 south		
25	W Armory Way, North of existing bridge, cross RR tracks, Thorndyke Ave W/W Crockett St	Begin at W Armory Way and 15 th Ave W with at grade I/S, straight west to cross over RR tracks, continue elevated structure over Port uplands, and cross 23 rd Ave W at grade, continue along W Crockett St to Thorndyke Ave W.	2,200	3,200	Mid span ramp connection to T91

Source: KPFF, 2002

5.1.2 Assumptions and Design Constraints

Development and review of each of the candidate alignments were based on the following assumptions and design constraints:

- Some alignments would rely on future roads through Port of Seattle property to provide access to the waterfront and marina. If the alignment would not provide that access directly, it was assumed that the Port roads would provide the necessary public access routes. This assumption will be confirmed with Port staff.

- Alignments that would connect to 15th Avenue West must be able to make a direct free-flowing connection for both southbound traffic from Magnolia and northbound traffic on 15th Avenue West bound for Magnolia. This assumption will be confirmed after further traffic analysis.
- For the purpose of preliminary development, 6.5% was used as the maximum allowable roadway grade. In addition, a bridge crossing rail lines was assumed to have 5 feet of structure depth and provide 23.5 feet minimum vertical clearance over the rail.
- Alignments were not considered if they would impact the petroleum tank farm immediately north of the existing bridge. The cost of remediation necessary to cleanup contamination was considered to be prohibitive.

5.1.3 Analysis Criteria

During the meeting, the team developed a list of baseline fatal flaw elements to be used to eliminate an alignment from further consideration. If an alignment failed to provide the required element, significantly impacted or degraded the element, or was critically and negatively impacted by the element, it would have a fatal flaw. The baseline fatal flaws are as follows:

1. *Vehicular Access to Magnolia* – The alignment should provide equal or better access to Magnolia
2. *Vehicular Access to Interbay* – The alignment should not prohibit or interfere with access to and from the Interbay area.
3. *Vehicular Access to Marina/Waterfront from Magnolia* – The alignment should provide a workable access route to the marina/waterfront area from Magnolia.
4. *Public Access to Waterfront* – The alignment should not interfere with or limit public access to the waterfront.
5. *Olmsted Legacy or Critical Waterfront Parcels* – The alignment should not have a significant negative impact to the Olmsted plan or to important waterfront lands.
6. *Traffic flow on 15th Avenue* – The alignment should not degrade traffic flow on 15th Avenue.
7. *Construction Impacts* – The construction impacts of the alignment should be acceptable to the community.
8. *Cost* – The cost of the alignment should be reasonable.
9. *Hazardous Material* – The alignment should not be critically impacted by identified hazardous materials or contaminated areas.
10. *Major Displacement/Relocation* – The alignment should not cause excessive displacement or relocations of businesses or residents.
11. *Neighborhood Impacts* – The alignment should not have a significant negative impact on the adjacent neighborhoods.
12. *Bicycle and Pedestrian Connections* – The alignment should provide adequate bicycle and pedestrian access by maintaining existing facilities, and not preclude future facilities.

5.1.4 Conclusions

5.1.4.1 Alignments Eliminated from Further Consideration

Alignments 5, 7, 8, 9, 10, 14, 15, 17, 19, 20, 21, and 22 were eliminated from further consideration due to fatal flaws. Specific elimination elements are listed in Table 2. The alignments that were not eliminated have been renamed and will be refined for further evaluation.

- Alignments 7, 8, and 9 rely on the Galer flyover as the connection to 15th Avenue West. They were eliminated because the flyover would have limited capacity to carry traffic from both the waterfront/Port areas and traffic to and from Magnolia.
- Alignment 14 was eliminated by KPFF after the meeting. Upon further study, construction of a flyover connection at 15th Avenue West at the eastern terminus would have a significant impact on the properties on 15th Avenue West.
- Alignment 21 would eliminate the Magnolia bridge and improve the capacity of West Dravus Street and the Emerson Viaduct. This alignment was eliminated because it would fail to provide equal or improved access to Magnolia. Stakeholder and open house input has indicated a strong desire to maintain a direct connection to the south end of Magnolia and, in addition, to consider a new fourth connection. In view of this, reducing the number of connections to Magnolia would not be acceptable to the community.
- Alignment 22 would construct a tunnel to the interior of Magnolia. This alignment was eliminated due to the high cost of tunnel construction relative to the other bridge options. In addition, the western tunnel portal in Magnolia would displace many residents and its construction would have a large impact on the neighborhood.

5.1.4.2 Alternatives Carried Forward

The first level screening produced nine alternatives to carry forward. To avoid confusion, these alternatives have been renamed with letters in lieu of numbers. The new names for the alternatives carried forward are shown in Table 2.

- Alignments 1A and 4 were considered as variations of Alignment 1. These alignments will be considered together and refined as Alternative A.
- Alignment 18 was considered to be a variation of Alignment 2. These alignments will be considered together and refined as Alternative B.
- Alignment 3 will be further considered and refined as Alternative C.
- Alignment 6 will be further considered as Alternative D.
- Alignment 11 will be further considered as Alternative E.
- Alignment 13 was a variation of Alignment 12 with a different eastern connection point. These alignments will be considered together and refined as Alternatives F2 and F1 respectively.
- Alignment 24 was considered to be a variation of Alignment 16. These alignments will be considered together and refined as Alternative G.
- Alignment 23 will be further considered as Alternative H.
- Alignment 25 will be further considered as Alternative I.

Table 2
First Level Screening
Alignment Evaluation

No.	Comments	Fatal Flaw	Disposition	New Name
1	This alignment will need access to waterfront from Magnolia	none	Consider further	Rename as A
1A	This is a variation of Alignment 1, consider when refining the alternative	none	Consider as part of Alternative A	Consider with A
2		none	Consider further	Rename as B
3	1. Questionable improvement to Magnolia access 2. Indirect access route	none	Refine and further consider	Rename as C
4	Consider as a variation of Alignment 1	none	Consider as part of Alternative A	Consider with A
5	1. Significant in-water construction 2. Interferes with waterfront access 3. Impacts waterfront property	4, 5, 8	Eliminate	
6	1. 15th Ave connection is questionable 2. Requires refinement to reduce impact to Port facilities.	none	Consider further	Rename as D
7	1. Inadequate traffic capacity at Galer flyover 2. Impact to Port facilities	1, 6, 10	Eliminate	
8	Inadequate traffic capacity at Galer flyover	1, 6	Eliminate	
9	1. Inadequate traffic capacity at Galer flyover 2. Indirect route to Magnolia from 15th Ave	1, 6	Eliminate	
10	1. Poor single-point connection to Magnolia 2. Traffic distribution at Magnolia connection problematic 3. Other alignments provide a better connection to Magnolia 4. Connection at 15th has major impact	1,10	Eliminate	
11	1. Contingent on Port providing access to waterfront	none	Consider further	Rename as E
12		none	Consider further	Rename as F1
13		none	Variation of Alternative F	Rename as F2
14	Eliminated by KPFF after further evaluation of the impacts at the 15th Ave connection	6,10	Eliminate	
15	1. Traffic distribution at Magnolia connection problematic 2. Alignment 16 provides a better connection to Magnolia	1	Eliminate	
16		none	Consider further	Rename as G
17	1. Requires elevated intersection 2. Access to the waterfront from Magnolia is difficult	2, 3, 8	Eliminate	
18		none	Variation of Alternative B	Rename as B
19	1. Access to south not needed 2. Requires 2 bridges on magnolia side	8	Eliminate	

Source: KPFF, 2002

**Table 2 continued
First Level Screening
Alignment Evaluation**

No.	Comments	Fatal Flaw	Disposition	New Name
20	1. Impact to parklands on Magnolia 2. Does not improve access to Magnolia 3. Elevated intersection costly	1, 8, 11	Eliminate	
21	Does not improve access to Magnolia	1	Eliminate	
22	1. Tunnel portal at Magnolia has significant construction and traffic impact. 2. Significant cost impact	7, 8, 10, 11	Eliminate	
23		none	Consider further	Rename as H
24	This is a variation of Alignment 16, consider when refining the alternative	none	Variation of Alternative G	Consider with G
25		none	Consider further	Rename as I

Source: KPFF, 2002

5.2 SECOND LEVEL SCREENING

5.2.1 Alternatives Considered

Nine alternatives were carried forward from the first level screening. Brief descriptions of these alternatives are given below. In each of the alternatives, it is assumed there would be a north-south surface road connecting to 21st Avenue West at the north end and West Marina Place at the south end. Graphics for each alternative are shown as Figures 26 through 35.

5.2.1.1 Alternative A

Alternative A (Figure 26) would replace the existing bridge with a new structure immediately south of the existing bridge. The alternative would construct a diamond interchange in the bridge's mid-span to provide access to the waterfront and the Port uplands property. Connections at the east and west ends of the bridge would be similar to existing.

5.2.1.2 Alternative B

Alternative B (Figure 27) would replace the eastern end of the bridge to cross the Burlington Northern Santa Fe (BNSF) tracks and drop to ground level west of the railroad tracks. The surface road would provide access to Port uplands property and continue along the waterfront. Past Smith Cove Park and the marina, the alternative would connect West Marina Drive to 32nd Avenue West with a surface road or low bridge over the tidelands. The section of 32nd Avenue West between the waterfront and Clise Place West would be reconstructed.

5.2.1.3 Alternative C

Alternative C (Figure 28) would replace the eastern end of bridge to cross the BNSF tracks and drop to ground level. West of the railroad tracks, the surface road would turn to the north through the Port property. This alternative would replace the west end of the existing bridge with fill and/or a new structure that would wrap from north to south along the contours of the Magnolia hillside before connecting to West Galer Street. The alternative would also add a new surface road with a connection to 21st Avenue West.

5.2.1.4 Alternative D

Alternative D (Figure 29) would construct a new bridge in the form of a long arc north of the existing bridge. New ramps would be constructed to connect with 15th Avenue West (at the existing connection point). This alternative would construct a diamond interchange in the bridge mid-span to provide access to waterfront and the Port uplands property.

5.2.1.5 Alternative E

Alternative E (Figure 30) would construct a flyover ramp from 15th Avenue West northbound to West Wheeler Street and continue straight west across the railroad tracks and Port uplands with an elevated structure. The west end of this alternative would connect to the intersection of Thorndyke Avenue West and 23rd Avenue West. The alternative would construct half of a diamond interchange to provide a connection with the Port uplands from the east side only (the grade is too steep to connect from the west). A new surface road connection would be created with 21st Avenue West to the north and the waterfront to the south.

5.2.1.6 Alternative F

Alternative F (Figure 31) consists of two options:

Option F1

Option F1 would be a flyover ramp from 15th Avenue West continuing on West Armory Way and crossing over railroad tracks at an angle. This option would then turn west and continue on an elevated structure to connect with Thorndyke Avenue West at West Halladay Street.

Option F2

Option F2 would be a flyover ramp from 15th Avenue West continuing straight west to West Wheeler Street, and connecting with Thorndyke Avenue West at West Halladay Street. Access to the marina area in both options would be provided via an extension of 21st Avenue West southerly across Port uplands.

5.2.1.7 Alternative G

Alternative G (Figure 32) would construct a flyover ramp from 15th Avenue West northbound to West Armory Way. The alternative would continue on West Armory Way approximately 500 feet, turn west and cross over the railroad tracks, drop down to ground level and continue westerly along a surface road. The main route would then continue southward with new fill and/or a structure to connect with West Galer Street. The secondary surface connection northward would connect to 21st Avenue West and southward to West Marina Drive.

5.2.1.8 Alternative H

Alternative H (Figure 33) would include a north and a south crossing (the south crossing would not provide the necessary capacity alone):

- **South Crossing:** A surface road from the west end of the West Galer Street flyover would cross under the existing bridge, run along the west side of railroad tracks for approximately 1,700 feet, and turn west to connect with a new structure ascending to Magnolia at West Galer Street. Access to Port uplands and the waterfront would be provided by a surface connection north to 21st Avenue West and south and west to West Marina Drive.
- **North Crossing:** Beginning with a flyover at West Armory Way and 15th Avenue West, the alternative would continue on West Armory Way and cross the railroad tracks at a

skewed angle. The alternative would continue the elevated structure, turn west, and connect to Thorndyke Avenue West at 23rd Avenue West.

5.2.1.9 Alternative I

Alternative I (Figure 34) would begin with a flyover at West Armory Way and 15th Avenue West, move straight west across the railroad tracks, and continue on an elevated structure over the Port uplands. The alternative would cross over 23rd Avenue West and continue along West Boston Street to Thorndyke Avenue West. Ramps to and from the east would provide surface access to the Port uplands and the marina.

5.2.2 Project Team – First Evaluation

The study team developed detailed criteria to evaluate the nine alternatives carried forward. Evaluation criteria were split into four general categories:

- Environmental
- Transportation
- Urban Design
- Cost

Each alternative was evaluated based on equal weighting of all four categories. The results of each category were totaled to help prioritize the surviving alternatives in terms of functionality and impacts.

5.2.2.1 Evaluation Criteria

ENVIRONMENTAL CRITERIA

Air Quality

Transportation system air quality impacts are often associated with emissions of idling vehicles at roadway intersections or in slow-moving traffic. Traffic modeling has not been completed and an evaluation of air quality impacts could not be made.

Geologic Hazards

Potential earth and soils impacts associated with each alternative were evaluated based on a qualitative estimate of the amount of proposed right-of-way that would be located in steep slope hazard areas, erosion hazard areas, seismic hazard areas, or other geotechnically sensitive areas (as applied by the City of Seattle).

Habitat

Potential impacts to plant and animal species were evaluated for each alternative based on Threatened, Endangered and Sensitive Species occurrence information obtained through consultation with US Fish and Wildlife Service (USFWS), National Oceanic and Atmospheric Administration Fisheries (NOAA Fisheries, formerly National Marine Fisheries Service [NMFS]), Washington Department of Fish and Wildlife (WDFW), and Washington Department of Natural Resources (DNR). Evaluated information included the number and type of Threatened, Endangered, Candidate, Priority, or other sensitive plant or animal species known to occur in or use the project area, and whether the project would be located in or near any designated critical habitat.

Wetlands

Potential impacts to wetlands were evaluated based on the number, size, and quality of affected wetlands, and the corresponding mitigation requirements that would be imposed for each alternative. The wetland evaluation included a review of City of Seattle critical area maps,

USFWS National Wetlands Inventory (NWI) maps, aerial photographs, and a reconnaissance-level site visit.

Shorelines

Shoreline impacts were evaluated based on a qualitative estimate of the extent of physical alteration of shorelines, and the consistency of the alternative alignment with regulations for shorelines as designated in the City of Seattle's Shoreline Master Program and Seattle Municipal Code (SMC) 23.60.

Water Quality/Stormwater

Potential impacts to water quality associated with stormwater runoff during project construction and operation were evaluated for each alternative. The evaluation of potential water quality effects was based on a qualitative estimate of the amount of impervious surface generated for each alternative within the project termini.

Culture and Historic Resources

Potential impacts to archaeological, historical and cultural resources were evaluated for each alternative based on a review of the National Register of Historic Places, and information obtained in consultation with the State Historic Preservation Officer (SHPO), the City of Seattle, and appropriate Indian Tribes. Potential impacts also were assessed in terms of the effects to usual and accustomed tribal fishing grounds in aquatic areas.

Hazardous and Problem Waste

Project alternatives were evaluated based on: a) a qualitative estimate of the area with potential hazardous waste issues that would be disturbed by project construction; and b) proximity of the alternative to the 1,000-foot methane buffer for the Interbay Landfill.

Displacements

Based on a review of aerial photos and alternative alignment drawings, the number of residential, commercial and community facility displacements (existing uses within the alternative right-of-way) was estimated. Potential displacement impacts were based on a qualitative estimate the number, type and size of such uses within the right-of-way that would require relocation.

Public Lands

The number, approximate acreage and type of facility were evaluated for any publicly owned parks, recreation areas, wildlife and waterfowl refuges; sites that are on or eligible for the National Register of Historic Places; historic bridges; and bikeways as identified in Section 4(f) of the Transportation Act of 1966 and/or 23 Code of Federal Regulations (CFR) 771.135. Potential impacts to 4(f) resources were evaluated for each alternative based on a qualitative estimate of the number and/or approximate area of any resources located within or adjacent to the proposed right-of-way.

Noise

The noise evaluation was based on "Proximity Effects" criteria to evaluate the potential for disruptive impacts to existing uses and activities during project operation as a result of being located near the proposed project. While it was not possible to fully evaluate the nature or degree of proximity effects during the screening phase of alternatives analysis, the relative potential for disruptive impacts was estimated based on the number of existing uses that would be located within a fixed distance from the roadway. Based on a review of aerial photos and alternative alignment drawings, a qualitative estimate of the number of existing uses (residences, businesses, civic and community facilities) that are located within 500 feet of the roadway edge of pavement (EOP) was made for each alternative. The 500-foot distance is consistent with the effective

distance for transportation noise modeling as recognized by the Federal Highway Administration (FHWA).

TRANSPORTATION CRITERIA

Magnolia Street Motor Vehicle Traffic Impacts

Relative impacts to existing street circulation were evaluated based on the degree of change required for the alignment. This is a measure of the potential of an alignment to shift traffic to or from arterial routes such as from Magnolia Boulevard to other streets, particularly local access streets.

15th Avenue West/Elliott Avenue West Corridor Motor Vehicle Traffic Impacts

Relative impacts to existing 15th Avenue West/Elliott Avenue West traffic and freight mobility were evaluated based on modeled effects on traffic flow on 15th Avenue West, Elliott Avenue West, and connecting arterials. Changes in traffic volumes were evaluated at intersections operating at or near capacity. [Note: Current traffic counts have been made with the West Galer Street at-grade crossing of the BNSF tracks open between 15th Avenue West and Alaskan Way West. This crossing will close in early 2003 and traffic using this crossing will shift to the Galer Flyover ramp.]

Traffic Impact During Construction

This criterion was applied to evaluate relative disruption of existing traffic on the existing bridge during construction of the bridge replacement. This criterion assumes the existing Magnolia Bridge will remain in operation during most of the construction of the replacement bridge. The evaluation considered the duration of any periods of temporary route closure, the location of the closures, and the use of the affected roadway(s).

Motor Vehicular Access to Magnolia

Provisions for enhanced access to/from Magnolia were assessed in light of the directness of travel between Magnolia and 15th Avenue West/Elliott Avenue West, the quality of travel (for example, grade separations versus signalized intersections), and the provision for additional access routes. The number and quality of access routes were considered.

Motor Vehicular Access to Waterfront From the 15th Avenue West/Elliott Avenue West

Relative service of vehicular traffic to the waterfront (Smith Cove Park and marina area) to and from the east was assessed. Alternatives were evaluated based on the directness of the access (estimated travel distance), the quality of travel (for example, grade separations versus signalized intersections), and the clarity of the route in terms of driver expectations.

Motor Vehicular Access to Waterfront From Magnolia

Relative service of vehicular traffic to the waterfront (Smith Cove Park and marina area) to and from the west was assessed. There is no current direct access from Magnolia Bluff to the park and marina. The Magnolia Bridge has a pair of ramps to and from the east that provide access to park and marina. These ramps can only be accessed from the west by going to 15th Avenue West and then back west on the Magnolia Bridge. This evaluation criterion measured the effectiveness of an alternative in providing park and marina access from the bluff. Travel time determined the effectiveness.

Motor Vehicular Access to Port Property

Evaluation of the relative service of freight and general vehicular traffic to and from Port property to the 15th Avenue West/Elliott Avenue West corridor assumed the West Galer Street at-grade crossing of the BNSF Railway would be closed (scheduled for early 2003). Effects of project alternatives on Port access primarily considered Terminal 91 facilities, but also considered access to Port facilities south of West Galer Street. Access evaluation considered shared use of all or

portions of the Galer Flyover and any other access project by or affected by a bridge replacement alternative.

Emergency Service Impacts

Relative impacts on emergency service vehicle access were evaluated, taking into account police, fire and medical services. Impacts were evaluated based on directness of travel and expected response time.

Bicycle & Pedestrian Connections

This criterion evaluated the relative service provided by connections for bicycles and pedestrians, addressing the directness and ease of travel of new non-motorized facilities provided by the project. The project's effect on and connections to existing trails along the east and west sides of the Terminal 91 property, the Magnolia signed bicycle route (on Magnolia Boulevard, Thorndyke Avenue West, 20th Avenue West, and other streets), and the existing north-south trail connecting North Magnolia through Interbay also was considered.

Transit Connections

The alternatives' effect on transit operations was determined by reviewing existing use of the Magnolia Bridge (by King County Metro Routes 19, 24, and 33) and 15th Avenue West/Elliott Avenue West (by Routes 15 and 18), and estimating potential transit travel time impact. Travel time impacts were considered for vehicles (operating costs) and transit riders. Compatibility with the proposed Green Line monorail, waterfront street car, and potential commuter rail access was considered, based on current operational plans for these facilities.

Impacts to the Railroad

This criterion measured relative impacts on railroad operations and capacity, considering potential impacts to BNSF Railway facilities from project roadway alignments and structure crossings. Crossings considered bridge column placement and the required clearances between structure protection crash walls and yard and mainline tracks. The acceptability of facility impacts (track displacement or relocation) also was considered.

URBAN DESIGN CRITERIA

Effects on Magnolia Neighborhood

This criterion evaluated localized neighborhood impacts, including anticipated increases and decreases of traffic on neighborhood streets, any need to take properties, changes (positive or negative) to street character, and the ability to meet planned growth potential in the future.

Effects on Magnolia Village

This criterion evaluated increases or decreases in accessibility and visibility of the Magnolia Village for vehicles, as well as impacts on the pedestrian character of the Village.

Effects on Interbay

This criterion evaluated the relative provision of access to undeveloped parcels in order to support future desired job opportunities and economic development. Factors considered included impacts on existing uses and phasing, the contiguous nature of parcels, and connections to an internal circulation system in the Interbay properties. In addition, effects of the transportation system on the best use of property in relationship to the water, the greenbelt, and the railroad also were considered.

Effects on 15th Avenue West Corridor

This criterion evaluated impacts on the land use potential and the character of the 15th Avenue West corridor.

View

This criterion evaluated view impacts from ground level and from the nearby neighborhoods, as well as view potential from the bridge deck and as an entry into Magnolia.

Effects on Quality of Shoreline

This criterion evaluated: impacts on the character of the Elliott Bay shoreline; the location, safety and character of connections along the waterfront for all modes of transportation; and the ability of new infrastructure to support public uses along the shoreline in terms of both access and configuration.

Effects on Olmsted Legacy

This criterion evaluated the degree to which the alternative would support the spirit of Olmsted's planning for this important piece of the original plan (by clarifying and improving Olmsted linkages for the public benefit).

Effects on Parks

This criterion evaluated the ability of new infrastructure to support new and existing park uses in terms of both access and configuration. (Environmental issues associated with parks are considered elsewhere.)

Support for Transit-Oriented Development

This criterion evaluated the ability of transportation infrastructure to support future multi-modal use, connect between potential modes, and create a functional pedestrian realm in future development.

COST CRITERIA

Replacement Construction Costs

Evaluation of replacement construction costs included the following combination of factors:

- Relative construction costs of bridges and retaining walls (based on areas and lengths with consideration given to long spans and deep foundations);
- Relative construction costs of surface roadways (based on areas and lengths with consideration given to the depth of embankments); and
- Relative costs of providing an alternative route during construction for those alternatives that would require removal of the existing bridge prior to completion of the new facility.

Right-of-Way Costs

The relative costs of acquiring required right-of-way were based on area, with consideration given to both commercial and residential property.

Business Relocation Costs

The relative costs for relocating businesses were based on the number of anticipated displacements.

Residential Relocation Costs

The relative costs for relocating residents were based on the anticipated number of displacements.

Mitigation Costs

Relative mitigation costs were based on the estimated cost of measures identified in the environmental evaluation, such as wetlands mitigation, hazardous material disposal, etc. (excluding business/residential relocation costs, which are included in other criteria).

Fourth Access Costs

Relative costs for providing a fourth access to Magnolia from the 15th Avenue West/Elliott Avenue West corridor were based on the area of surface roadway and structure.

Protection of Infrastructure Costs

Costs associated with protecting infrastructure could not be assessed because insufficient information was available on the relative costs for protecting:

- Existing public infrastructure;
- Private utility infrastructure, such as protecting or relocating utilities (including power, water, sewer, etc.); and
- Protecting or relocating streets, bicycle paths, and sidewalks based on type, length and size of the affected facility.

Secondary Impacts on Business Relocation Costs

The relative costs associated with impacts on existing businesses within a cluster economy, such as additional costs for transportation, time, and inconvenience could not be evaluated. Insufficient information was available on the number of businesses remaining in the existing cluster group per relocated business.

5.2.2.2 Recommendations

The Project team met with the City of Seattle on November 25, 2002 to discuss the alternative recommendations that had been developed from the evaluation criteria. A “First Evaluation,” dated November 29, 2002, was prepared by the Project Team to document the results of this discussion. A copy of this evaluation is attached as Appendix A. A summary of the evaluation is contained in Table 3.

Table 3
Second Level Screening
First Evaluation Summary
Project Team – November 29, 2002

Alternative	Comments		Evaluations				Recommended for Further Development
	Advantages	Disadvantages	Environmental	Transportation	Urban Design	Cost	
A	<ul style="list-style-type: none"> No business or residential displacements identified. Good access to Magnolia. Retains dramatic views and entry into Magnolia. Lowest right-of-way costs. 	<ul style="list-style-type: none"> Requires construction adjacent to or over shoreline. Existing bridge shut down for extended periods. Interbay property separated from water. High construction costs. 	**	*	X	*	
B	<ul style="list-style-type: none"> No business displacements identified. Improved access to waterfront and Magnolia Village area. Could create a beautiful route into Magnolia. Medium construction, right-of-way & relocation costs. 	<ul style="list-style-type: none"> Potential direct impacts to aquatic shoreline and relatively high geological hazard impacts. Less direct route to Galer and Thorndyke areas. Much more compatible with a second access route. Highest mitigation costs. 	X	**	**	**	√
C	<ul style="list-style-type: none"> No residential displacements identified. Improved access to waterfront from Magnolia. Low relocation and right-of-way costs. 	<ul style="list-style-type: none"> Requires construction adjacent to or over shoreline. Less direct and slower route to Magnolia. All Magnolia traffic comes through center of Port property. High construction and mitigation costs 	*	*	X	*	
D	<ul style="list-style-type: none"> No residential displacements identified. Improved access to waterfront, Magnolia, and Port property. Allows land to be connected to water. Low mitigation and right-of-way costs 	<ul style="list-style-type: none"> Potential displacement of businesses on Port of Seattle properties. Some bridge closures during construction. Some view blockage of water from Port uplands. Highest construction costs. 	**	**	**	X	√
E	<ul style="list-style-type: none"> No shoreline impacts. Possible traffic benefits along 15th Ave. Include Thorndyke improvement per Olmsted plan. Medium construction costs. 	<ul style="list-style-type: none"> Business and residential displacements. No direct access from Magnolia to waterfront. Ramps impact land use along 15th Avenue corridor. Highest relocation and right-of-way costs. 	X	X	X	X	

Notes: ** = Best Alternatives, * = Good Alternatives, X = Not Recommended, √ = Recommended for Development
Source: HNTB, Shapiro & Associates, Mirai Associates, Weinstein A|U, KPFF. 2002.

**Table 3 continued
Second Level Screening
First Evaluation Summary
Project Team – November 29, 2002**

Alternative	Comments		Evaluations				Recommended for Further Development
	Advantages	Disadvantages	Environmental	Transportation	Urban Design	Cost	
F	<ul style="list-style-type: none"> No shoreline impacts. Possible traffic benefits along 15th Ave. Original Olmsted route: include Thorndyke improvement per Olmsted plan. Lowest construction costs. 	<ul style="list-style-type: none"> Business and residential displacements. No direct access from Magnolia to waterfront. Does not adequately support development on Port property. Highest relocation costs. 	X	X	X	**	
G	<ul style="list-style-type: none"> No shoreline impacts. Improved access to waterfront and Port property. Central access for Port property. Medium construction costs. 	<ul style="list-style-type: none"> Requires significant construction in steep slope areas. Less direct route to Magnolia. Ramps impact land use along 15th Avenue corridor. High mitigation and right-of-way costs. 	*	X	X	**	
H	<ul style="list-style-type: none"> No shoreline impacts. Two access points to Magnolia. Choices will reduce unnecessary traffic on bluff and Thorndyke. Lowest mitigation costs. 	<ul style="list-style-type: none"> Business displacements on Port of Seattle properties. Worse access to waterfront and port property from 15th Ave. Ramps impact land use along 15th Avenue corridor. High construction costs. 	**	**	**	X	√
I	<ul style="list-style-type: none"> No shoreline impacts. Good access to Magnolia. Parcelization of Port property is workable. Medium construction costs. 	<ul style="list-style-type: none"> Business and residential displacements. No direct access from Magnolia to waterfront. Neighborhood has heavy localized impacts along Boston. High relocation costs. 	X	X	X	X	

Notes: ** = Best Alternatives, * = Good Alternatives, X = Not Recommended, √ = Recommended for Development
Source: HNTB, Shapiro & Associates, Mirai Associates, Weinstein A|U, KPFF. 2002.

5.2.3 Design Advisory Group – First Evaluation

The Design Advisory Group met on December 4, 2002 to review the Project Team's evaluation of the nine alternatives carried forward from the first screening. The comments from this meeting are summarized below. (Each bullet represents a comment made by a Design Advisory Group member.)

- Time is needed to digest the information that has been presented on the nine alternatives before any meaningful recommendation can be made.

- The analyses need to be reviewed before the alternatives can be rated.
- Alternative A is good because it has worked for so long.
- Favor Alternatives A, B, and D, but Alternative B is the best. Alternative B would be a beautiful ride. How would a bike path be built onto the bridge?
- Positive comments for A, B, and H. Alternative B would be a nice entry into Magnolia.
- Alternative B provides opportunity to use Port property and doesn't compromise land development. It presents a tremendous opportunity to create an interesting shoreline.
- Don't route into Thorndyke and don't relocate any businesses. Concern about waterfront and park access makes Alternative B look good.
- If B works with the flow of traffic on 15th Avenue West and existing businesses in Interbay, then maybe it would work, but it introduces intersections.
- Alternative B may have fatal flaws: one intersection to the Village, seismic issues.
- Some combination of Alternatives B and H would be good. Make Alternative B a smaller alignment along the bluff with a second connection.
- Can some of the alternatives be combined in a different way? Alternative B is good because of the waterfront usage. H is good because of two access points. Could the Alternative B alignment be part of Alternative H?
- There is a lot to like in Alternative D, but Alternative H is better.
- Alternative D is good because it goes straight to Magnolia with no intersections.
- Alternative D would be good from a monorail perspective.
- Alternatives E and F work well because of the vessels that use fisherman's terminal and Pier 91.
- Alternative F doesn't rate well, but it goes up and over the railroad at a good spot.

5.2.4 Public and Community Group Comments

The nine alternatives were presented to the public at an Open House on December 5, 2002. Written comments were gathered from tablets posted next to each alternative, from mail-in comment forms, and from email. Table 4 quantifies the number of written comments that were for or against specific alternatives. The four alternatives with the greatest number of positive comments were Alternatives A, B, D and H.

Table 4
Open House Comment Distribution

Alternative	Positive Comments	Negative Comments
A	56	6
B	36	38
C	0	27
D	34	9
E	6	38
F	4	35
G	4	20
H	16	16
I	6	38

Source: EnviroIssues, 2002

5.2.5 Elliott Bay Marina to 32nd Avenue West Access Agreement

At the December 5, 2002, Open House, a Magnolia resident approached team members with a copy of the Final Environmental Impact Statement (FEIS) for the Elliott Bay Marina and stated

that there was a condition in the FEIS that prohibits the City from building Alternative B. A copy of the FEIS was obtained and a meeting was held with the Assistant City Attorney who was involved in the litigation surrounding the Marina development. There was a settlement agreement dated July 1986 which contains the statement "... No vehicular access between 32nd Avenue West and the Marina shall be permitted."

This agreement was signed by the Elliott Bay Marina Group, five individual property owners, the Magnolia Community Club, Puget Sound Alliance, City of Seattle, Washington State Department of Ecology, and the State Shorelines Hearings Board. The Assistant City Attorney advised that it appeared to be a binding agreement and it could only be changed through agreement of all the signature parties.

5.2.6 West Wheeler Street Underpass

At the December 5, 2002, Open House, a member of the public presented the idea of a westbound underpass at West Wheeler Street that would cross under 15th Avenue West, ascend and cross the railroad, and follow the same route as Alternative E to Magnolia. The underpass could be paired with an eastbound ramp that follows West Armory Way and connects with southbound 15th Avenue West (forming a "Y"-shaped configuration). There are no significant utilities along 15th Avenue West that would interfere with this route, and there is sufficient room along the east side of the street to ramp down toward the underpass (although there would be impacts on fronting businesses). The underpass would solve most residential displacement issues and, by eliminating the north to west flyover ramp connecting to Armory Way, would reduce residential and business impacts. Alternatives E, F, and H could all be modified to include this new underpass. However, there could be problems associated with constructing near the P-Patch and through old landfill areas.

5.2.7 Other Agencies and Community Groups

Following the December 5, 2002, Open House, the same material was used to give presentations and briefings to other agencies and community groups.

5.2.7.1 Port of Seattle Commission

The nine alternatives were presented to the Port of Seattle Commission on December 10, 2002. The settlement agreement contained in the Elliott Bay Marina FEIS (see paragraph 5.2.5) was explained and the Commissioners requested that the City continue to explore whether the settlement agreement could be amended. The City committed to meeting with the Port staff and their attorney to go over the settlement agreement and its impact on Alternative B. The Commission took no official action with regard to any of the alternatives at this time, nor did they express any preference toward any alternative.

5.2.7.2 BINMIC Action Committee

The nine alternatives were presented to the Ballard Interbay Northend Manufacturing and Industrial Center (BINMIC) Action Committee on December 11, 2002. The following comments and responses were discussed:

- Concern for steep grades because of delivery trucks serving businesses and residences.
- Concern for impacts to industrial land access for trucks and freight mobility.

5.2.7.3 15th Avenue Corridor Businesses

The nine alternatives were presented to interested 15th Avenue West Corridor businesses on December 11, 2002. Approximately twelve businesspeople attended this briefing and provided the following comments:

- The chosen alternatives should provide the best freight access, including ramp turning radii and other criteria.
- Alternatives should be combined or modified to mitigate impacts to specific properties.

5.2.7.4 Seattle City Council Transportation Committee

On December 17, 2002, the Transportation Committee was briefed on the project. This briefing included discussion of the nine alternatives being considered, public reaction to the alternatives, and identification of the alternatives that appear to be the best. The Transportation Committee did not voice any preference on the alternatives.

5.2.8 Project Team – Second Evaluation

On December 12, 2002, members of the Project Team and Seattle City staff met to determine which three alternatives should be recommended to be carried forward for further evaluation. Alternative B received little consideration at this time due to the Elliott Bay Marina to 32nd Avenue West Access Agreement restrictions (see paragraph 5.2.5). The team believed that this alternative should be eliminated from further consideration. During the discussion, good western and eastern connection points were identified to help eliminate alternatives that would provide poor connections.

5.2.8.1 Western Connections

Two good western connections were identified:

- The western connection of the existing Magnolia Bridge
- The intersection of 23rd Avenue West and Thorndyke, which would provide enough space and a good “T-shaped” intersection.

Western connections that would connect to Thorndyke at intersections other than 23rd Avenue West were eliminated because they could create significant neighborhood impacts (cut-through traffic from those attempting to get to the Village or those trying to leave southern and western Magnolia). It was also noted that the northern Thorndyke connection might not truly serve the purpose of “getting people to Magnolia.” Although cars could physically get to the neighborhood, drivers’ ability to get to the Village or access southern or western points of Magnolia would not be well served by a northern connection. The northern Thorndyke connection may only work in partnership with a southern route.

5.2.8.2 Eastern Connections

Four viable eastern connections were identified. These connections could be modified in terms of elevation—whether surface intersections or grade separations are provided.

- West Wheeler Street
- The existing West Garfield Street connection to the Magnolia Bridge
- West Armory Way
- West Galer Street

Other eastern connections resulted in significant residential and/or business displacements and/or made poor transportation connections, and were eliminated.

5.2.8.3 Recommendations

The Project Team recommended that Alternatives A, D, and H be carried forward. The Team suggested that Alternative H either connect to the existing Garfield overpass that currently provides linkage to the bridge over the railroad, or that a southern exit ramp be provided from the West Galer Street Flyover to 15th Avenue West.

The Team recommended that Alternatives B, C, D, F, G, and I be eliminated from further consideration.

5.2.9 Design Advisory Group – Second Evaluation

The Design Advisory Group met on January 8, 2003 to review the Project Team's second evaluation of the nine alternatives carried forward from the first screening. The Group determined that Alternative B has merit, but there is not enough information at this time to directly compare it with Alternatives A, D, and H. The Group does not want to drop this alternative and supports carrying Alternative B forward along with Alternatives A, D, and H for further evaluation and development of direct quantitative information for comparison.

5.2.10 City of Seattle Determination

The City of Seattle determined that Alternative B was not a viable option because it would violate the City's shoreline policies. The Seattle Municipal Code states: "Except for bridges necessary to cross a water body, new streets shall be permitted in the Shoreline District only if necessary to serve lots in the Shoreline District or to connect to public access facilities." Seattle's Comprehensive Plan states: "Streets, highways, freeways and railroads should be located away from the shoreline in order to maximize the area of waterfront lots and minimize the area of upland lots. Streets, highways, freeways and railroads not needed for access to shoreline lots shall be discouraged in the Shoreline District."

On April 15, 2003, the Mayor of Seattle said in a letter to the Magnolia neighborhood, "I have decided not to pursue a Magnolia bridge replacement plan that includes the shoreline alternative, known as Alignment B, and have directed the Seattle Department of Transportation (SDOT) to no longer consider it."

5.2.11 Alternatives Eliminated from Further Consideration

All of the evaluation criteria and comments were used along with the identification of the best western and eastern connections to eliminate alternatives from further consideration. Alternatives B, C, E, F, G, and I were eliminated from further consideration for the following reasons:

Alternative B

- Would violate City of Seattle shoreline policies.

Alternative C

- Low public support (traffic flow is poor given the 90-degree turn on the Port property and poor direct access to Magnolia).
- Would take drivers out of the desired direction of travel and add stop lights.
- Low preliminary evaluation rankings.

Alternative E

- Although Alternative E connects at good points, it would result in an adverse change in traffic patterns. Connecting to Thorndyke only works when in combination with a southern route.
- People in south and west Magnolia not happy with indirect route and traffic cutting through neighborhoods.
- Low preliminary evaluation rankings.
- Low public support.

Alternative F

- Poor connection point to Thorndyke.
- Doesn't provide good connection for future development of the Port property.
- Low preliminary evaluation rankings.
- Low public support.

Alternative G

- Does not include a southern connection and would create a very long route compared to existing.
- Low public support (impression that it's catering exclusively to Port property access).
- Low preliminary evaluation rankings.

Alternative I

- Poor connection to Thorndyke and poor eastern connection point.
- Would create severe neighborhood impacts.
- Low public support (especially given residential dislocation on the west along West Boston Street).
- Low preliminary evaluation rankings.

5.2.12 Alternatives Carried Forward

The second level screening recommended three alternatives to carry forward: Alternatives A, D, and H. These three alternatives will be developed to a greater level of detail in the environmental impact statement process which is the next phase of this study.

Alternative A

This alternative received good public support because it would not be much of a change from current conditions. There would be some environmental issues dealing with construction near and over water. Provisions for ramps to and from the west, and access to the marina need further study.

Alternative D

This alternative received good public support because it would swing to the north and open up the waterfront. The impact on existing businesses needs further study.

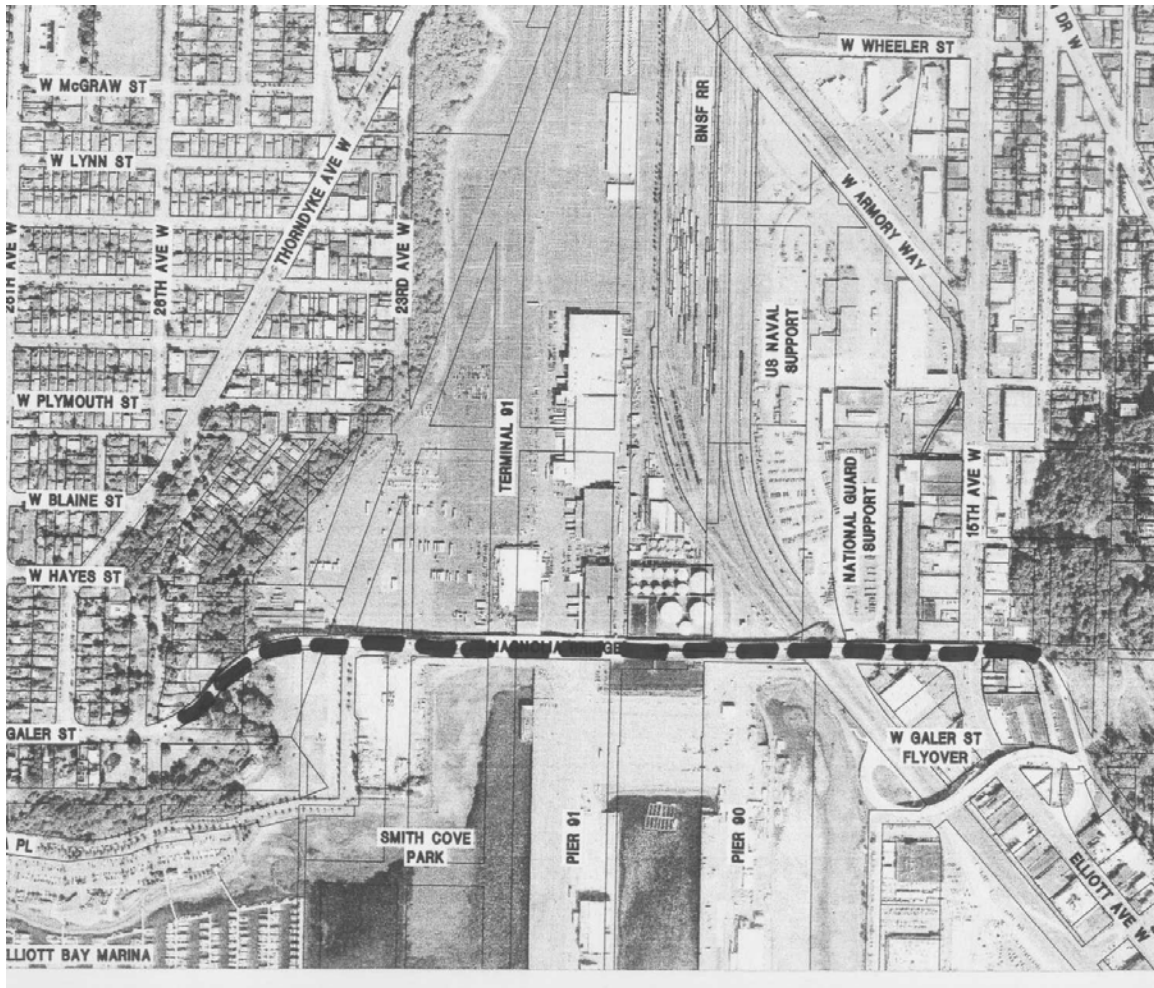
Alternative H

This alternative also received good public support and would rely on two alignments working in combination to effectively support traffic. The alignment needs a ramp from West Galer Street onto southbound Elliott Avenue West. Connections to the Port property from the north alignment need to be investigated.

Further evaluation under SEPA/NEPA will likely induce some modifications to the three alternatives as currently presented. The connection points and the general routing will remain the

same, but specific ramp locations and alignments will be modified as necessary to provide design enhancements and reduce impacts.

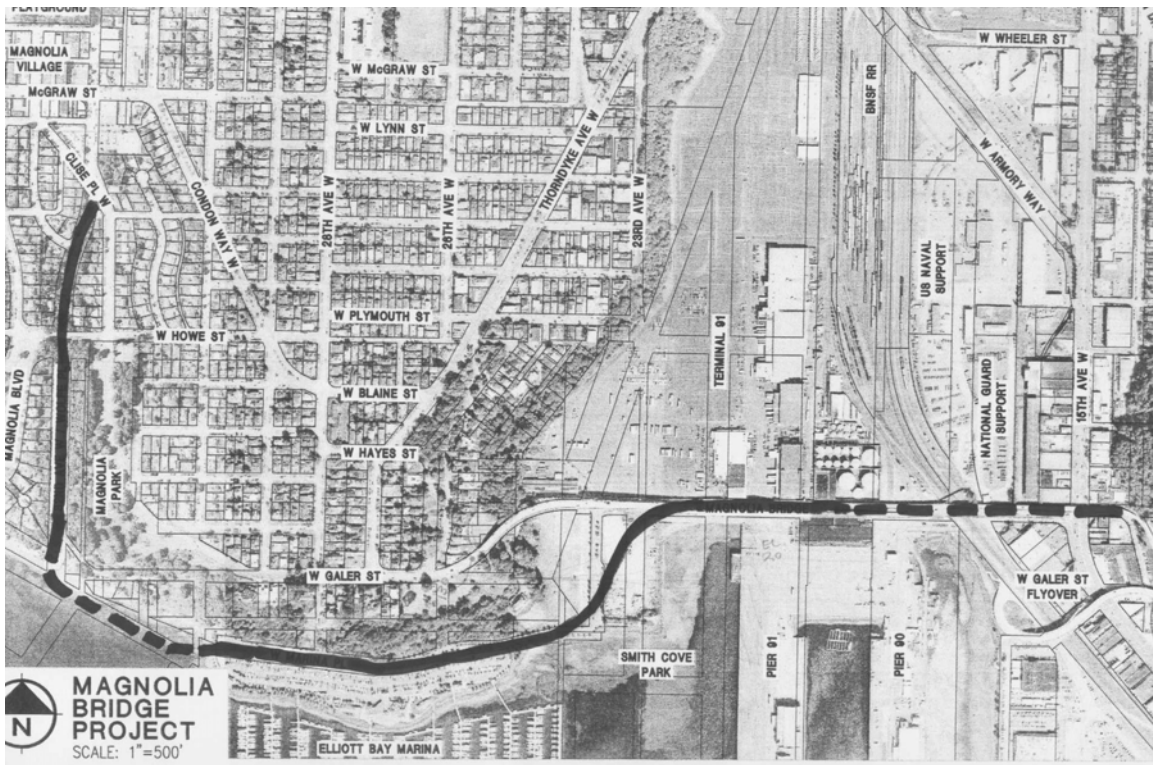
5.3 FIGURES



Source: KPFF, 2002



Figure 1
Alignment 1



Source: KPFF, 2002



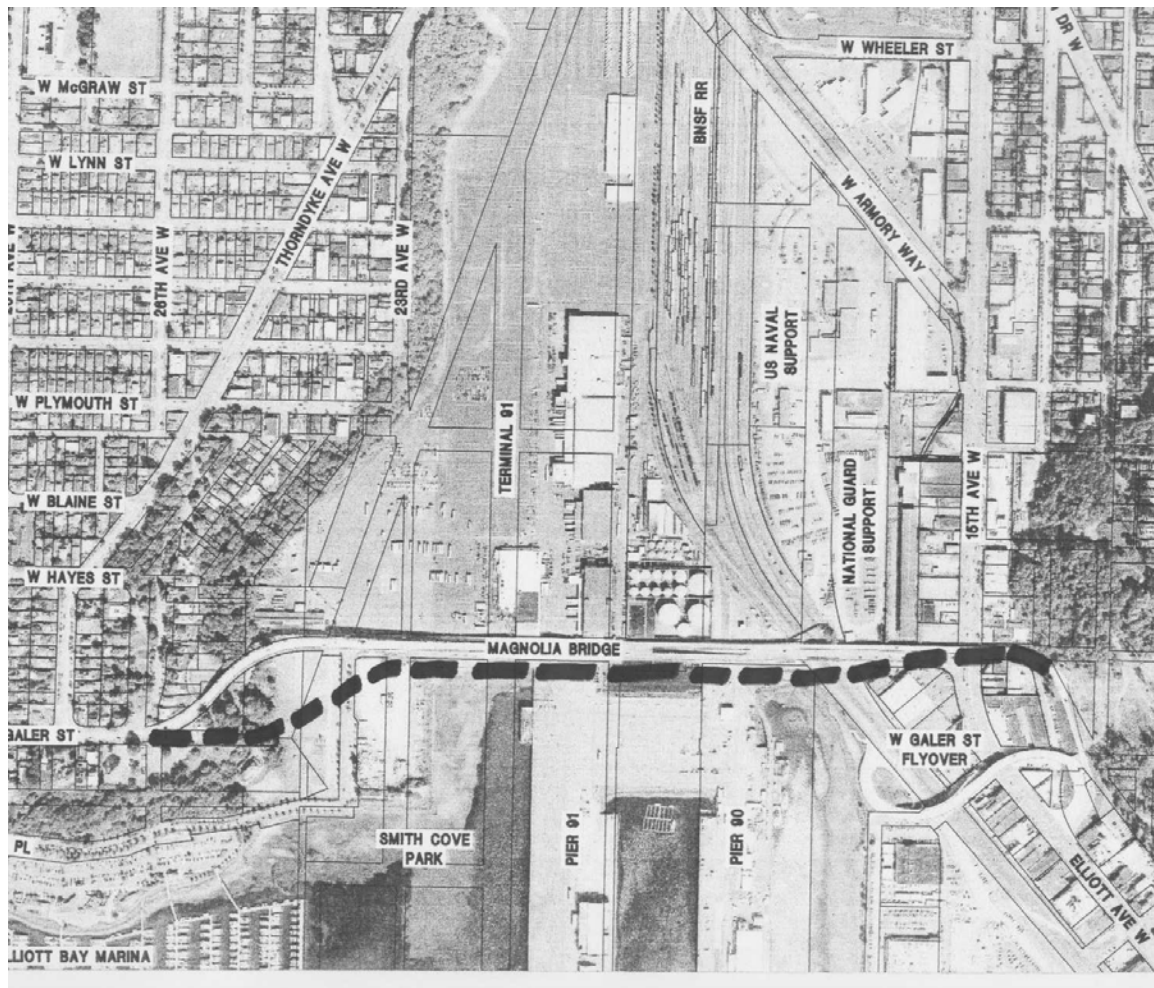
Figure 2
Alignment 2



Source: KPFF, 2002



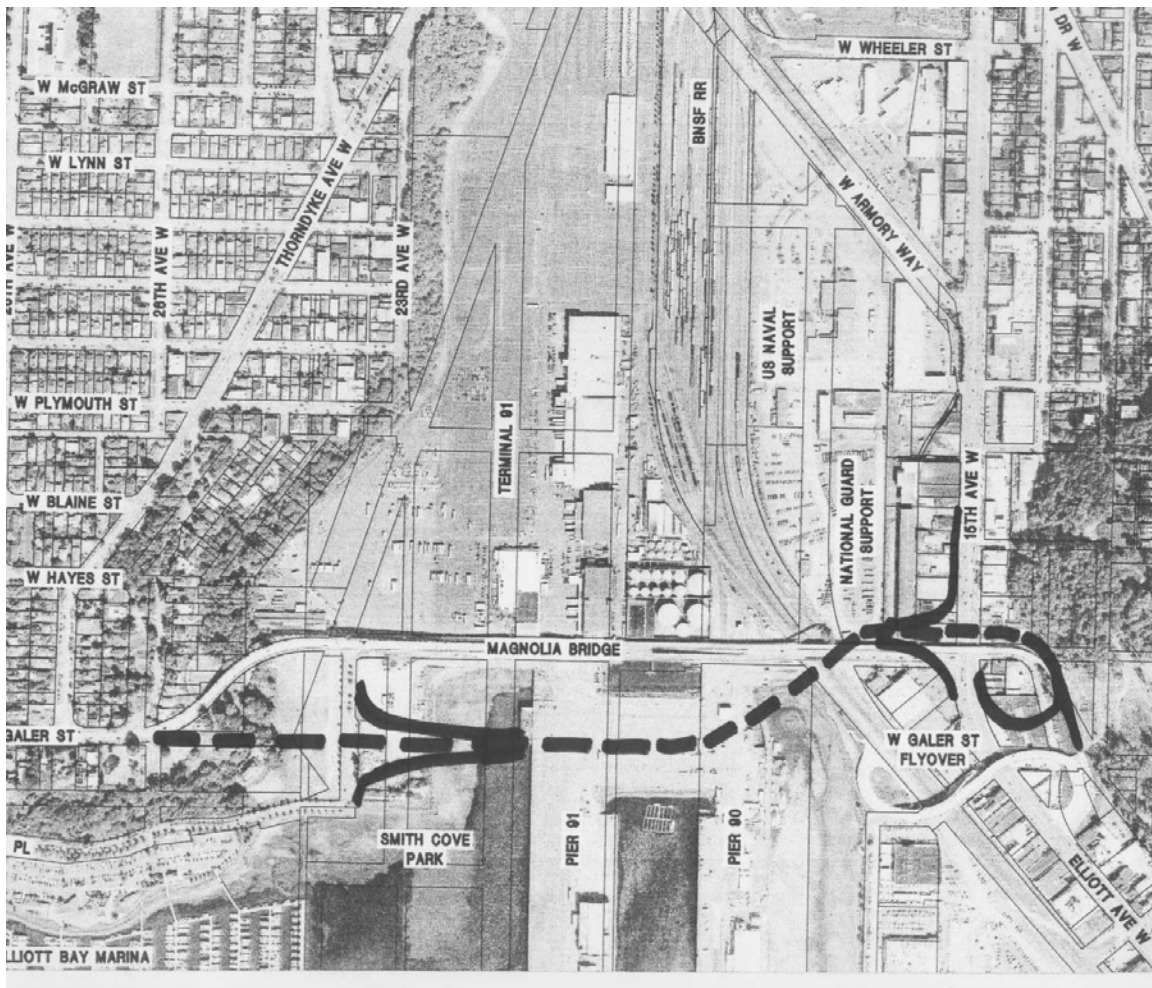
Figure 3
Alignment 3



Source: KPFF, 2002



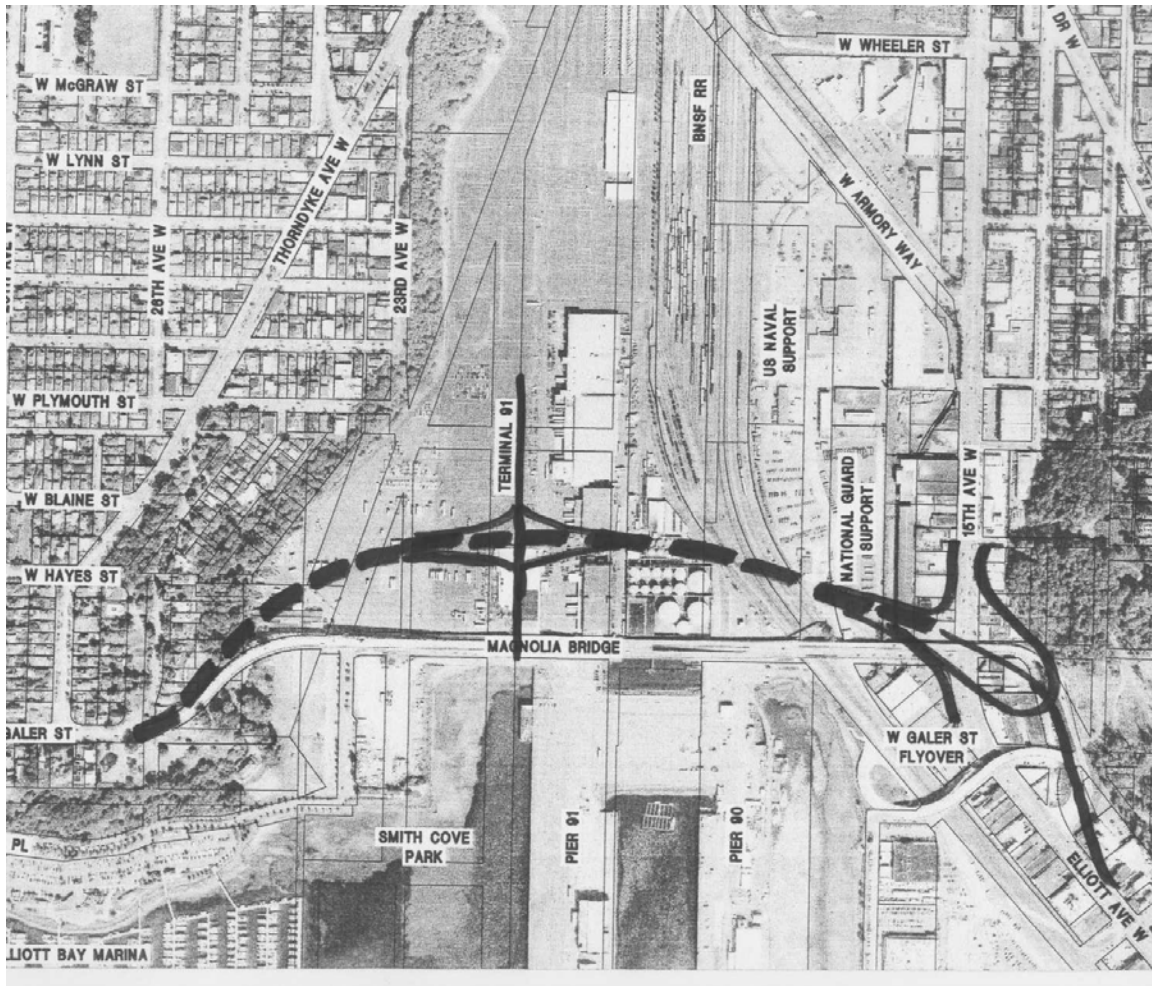
Figure 4
Alignment 4



Source: KPFF, 2002



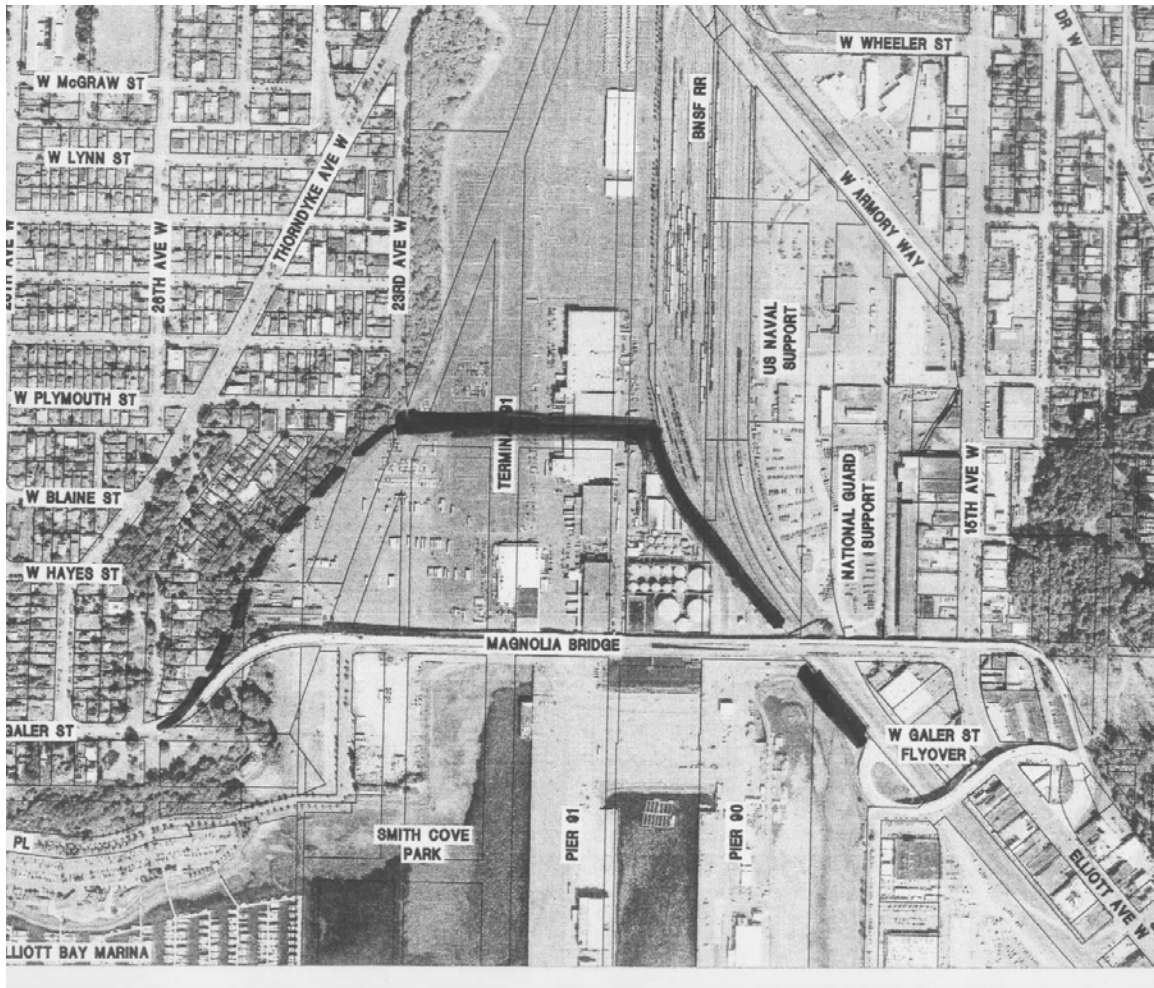
Figure 5
Alignment 5



Source: KPFF, 2002



Figure 6
Alignment 6



Source: KPFF, 2002



Figure 7
Alignment 7



Source: KPFF, 2002



Figure 8
Alignment 8



Source: KPFF, 2002



Figure 9
Alignment 9



Source: KPFF, 2002



Figure 10
Alignment 10



Source: KPFF, 2002



Figure 11
Alignment 11



Source: KPFF, 2002



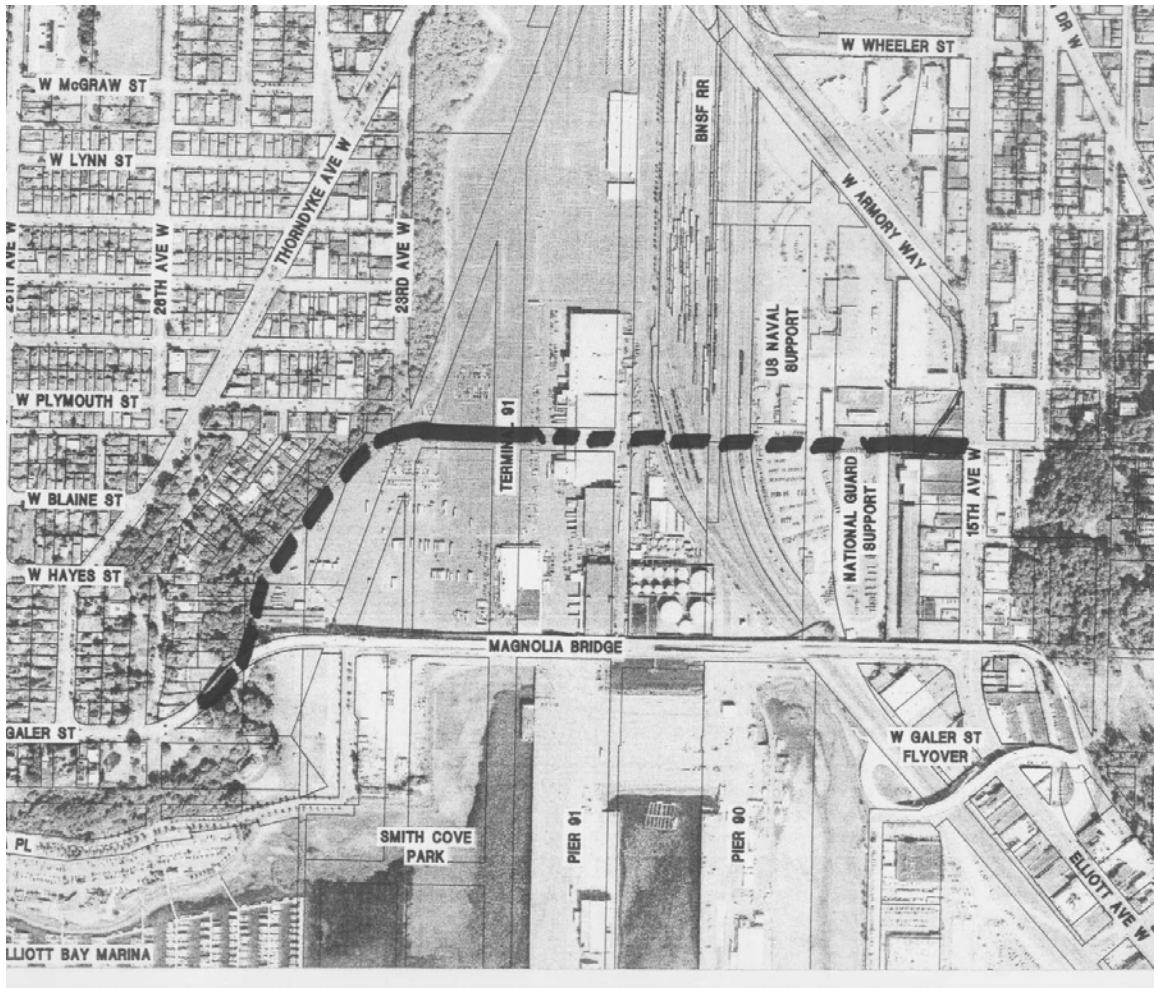
Figure 12
Alignment 12



Source: KPFF, 2002



Figure 13
Alignment 13



Source: KPFF, 2002



Figure 14
Alignment 14



Source: KPFF, 2002



Figure 15
Alignment 15



Source: KPFF, 2002



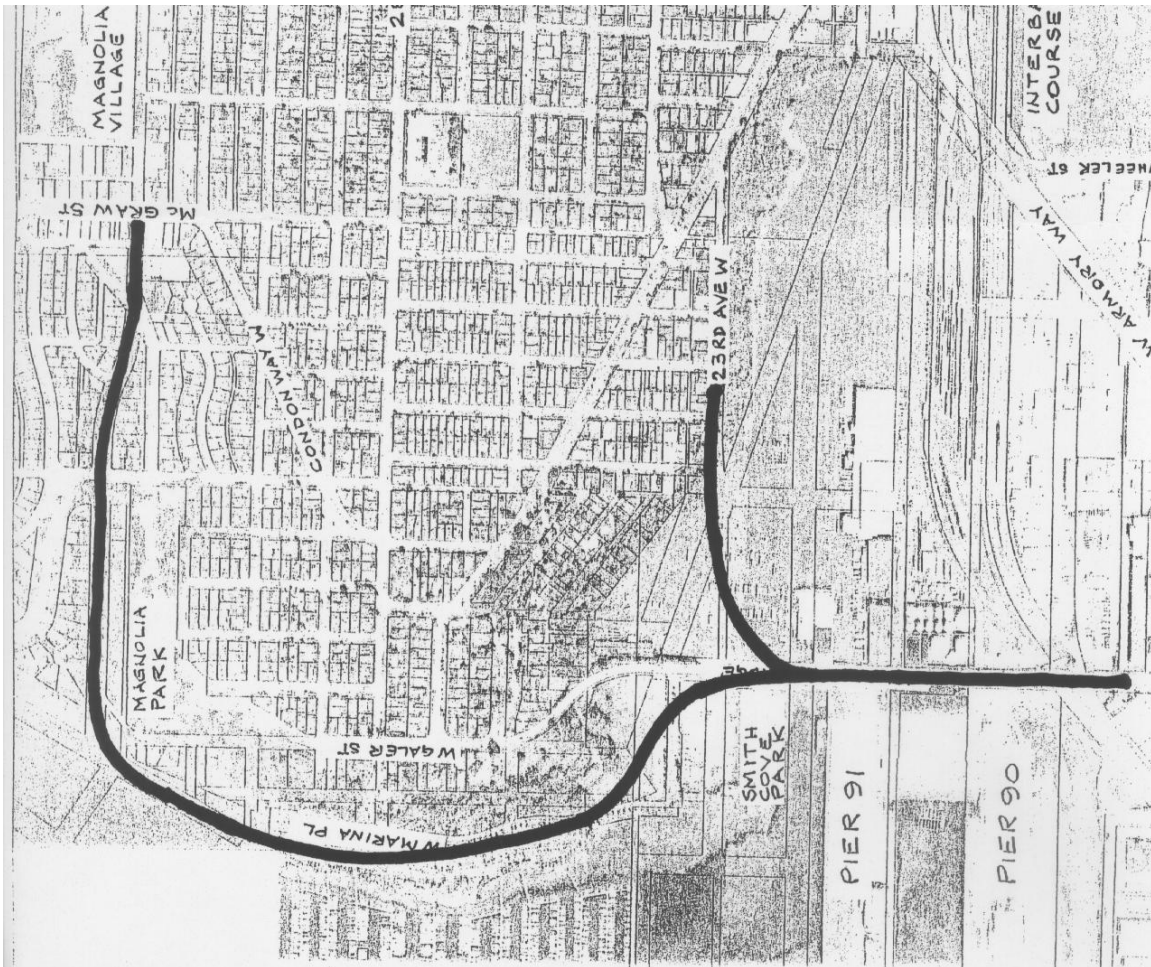
Figure 16
Alignment 16



Source: KPFF,2002



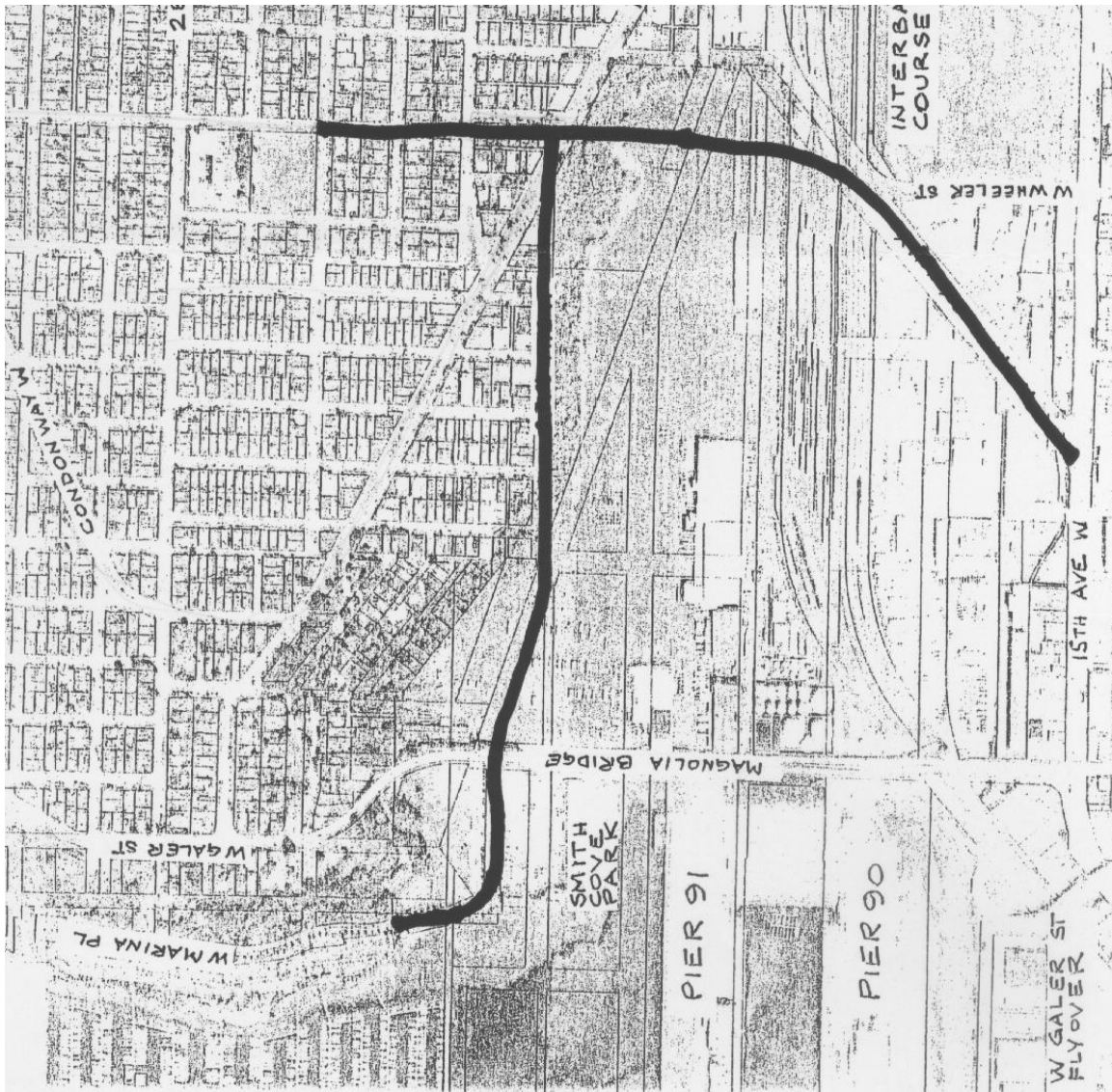
Figure 17
Alignment 17



Source: KPFF, 2002



Figure 18
Alignment 18



Source: KPFF, 2002



Figure 19
Alignment 19



Source: KPFF,2002



Figure 20
Alignment 20



Source: KPFF, 2002



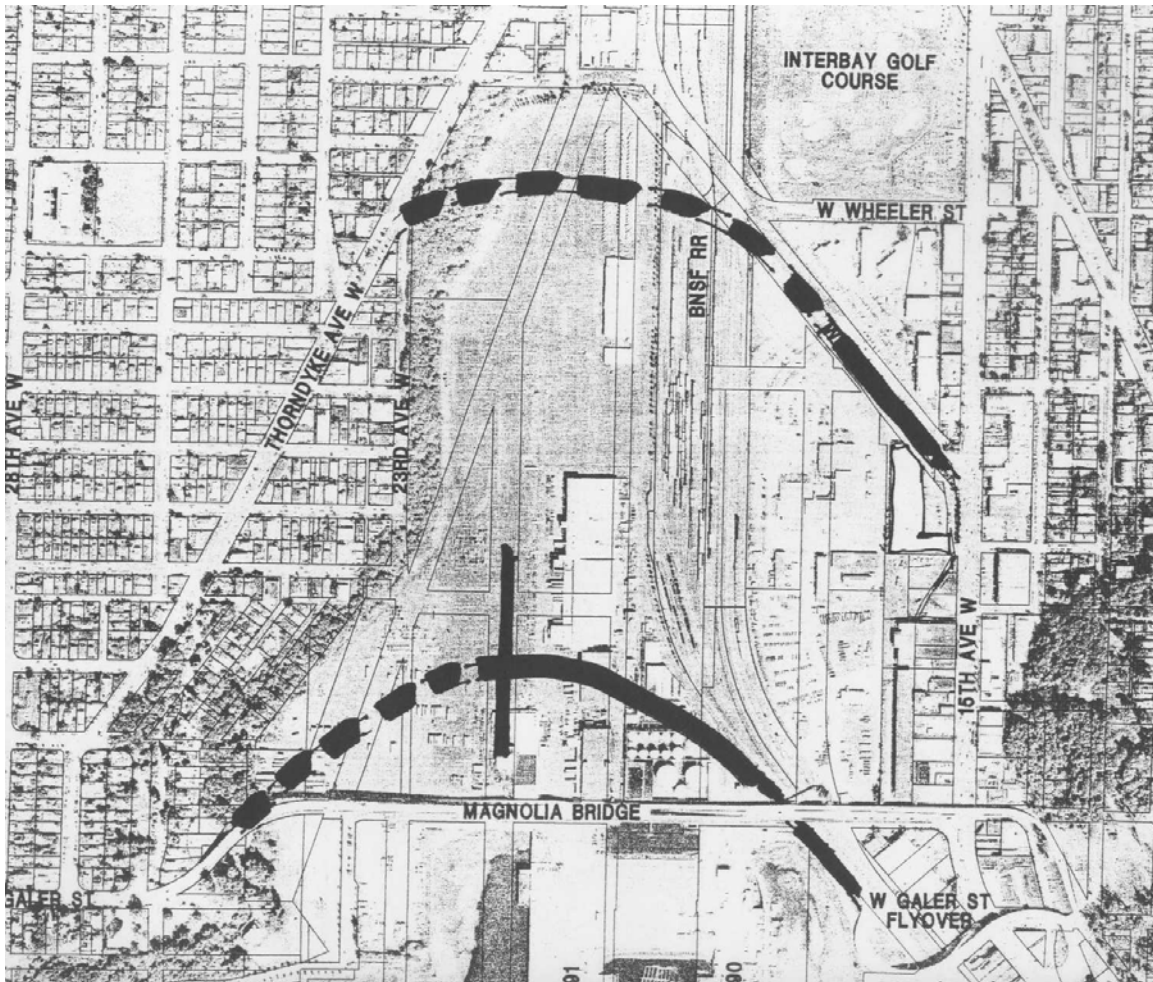
Figure 21
Alignment 21



Source: KPFF, 2002



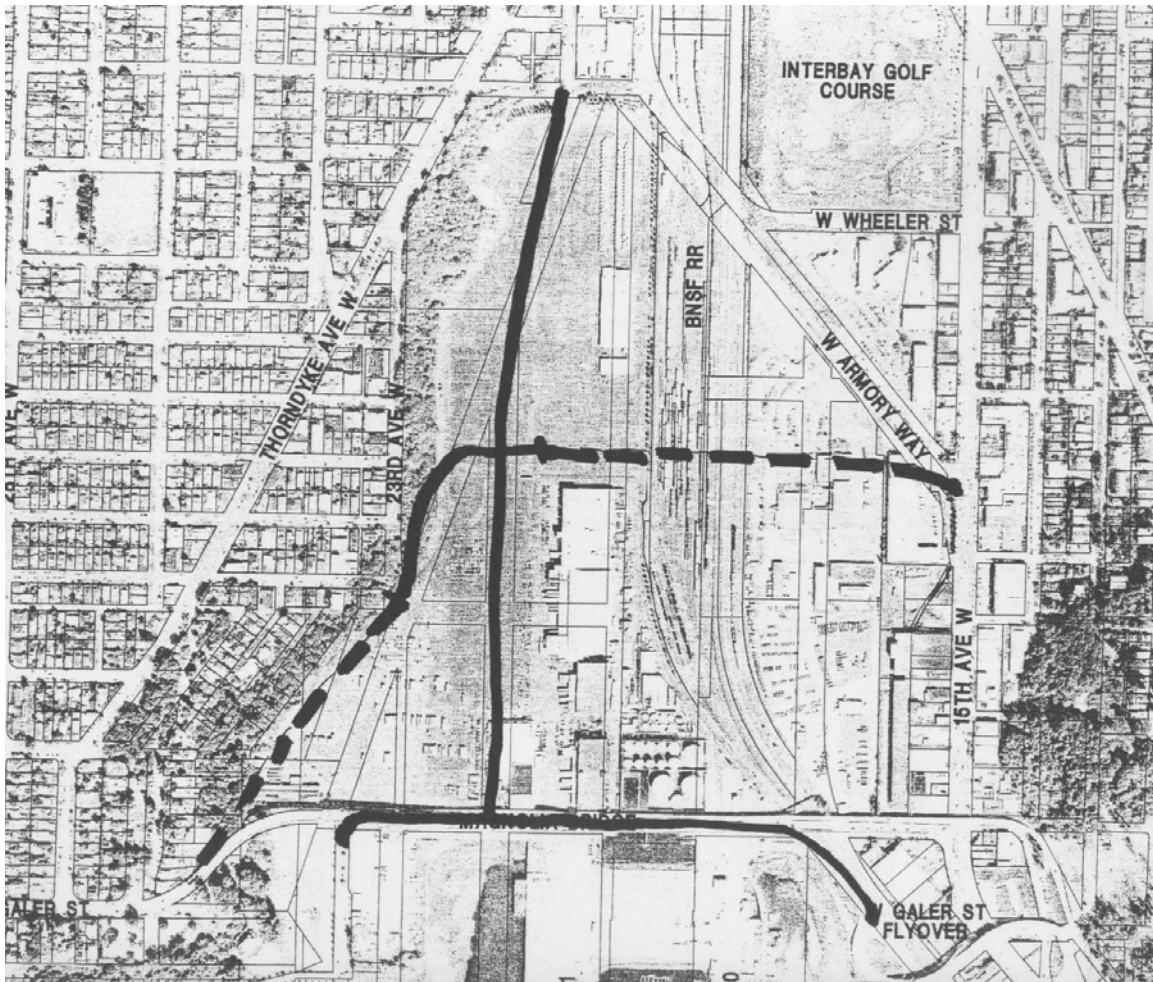
Figure 22
Alignment 22



Source: KPFF, 2002



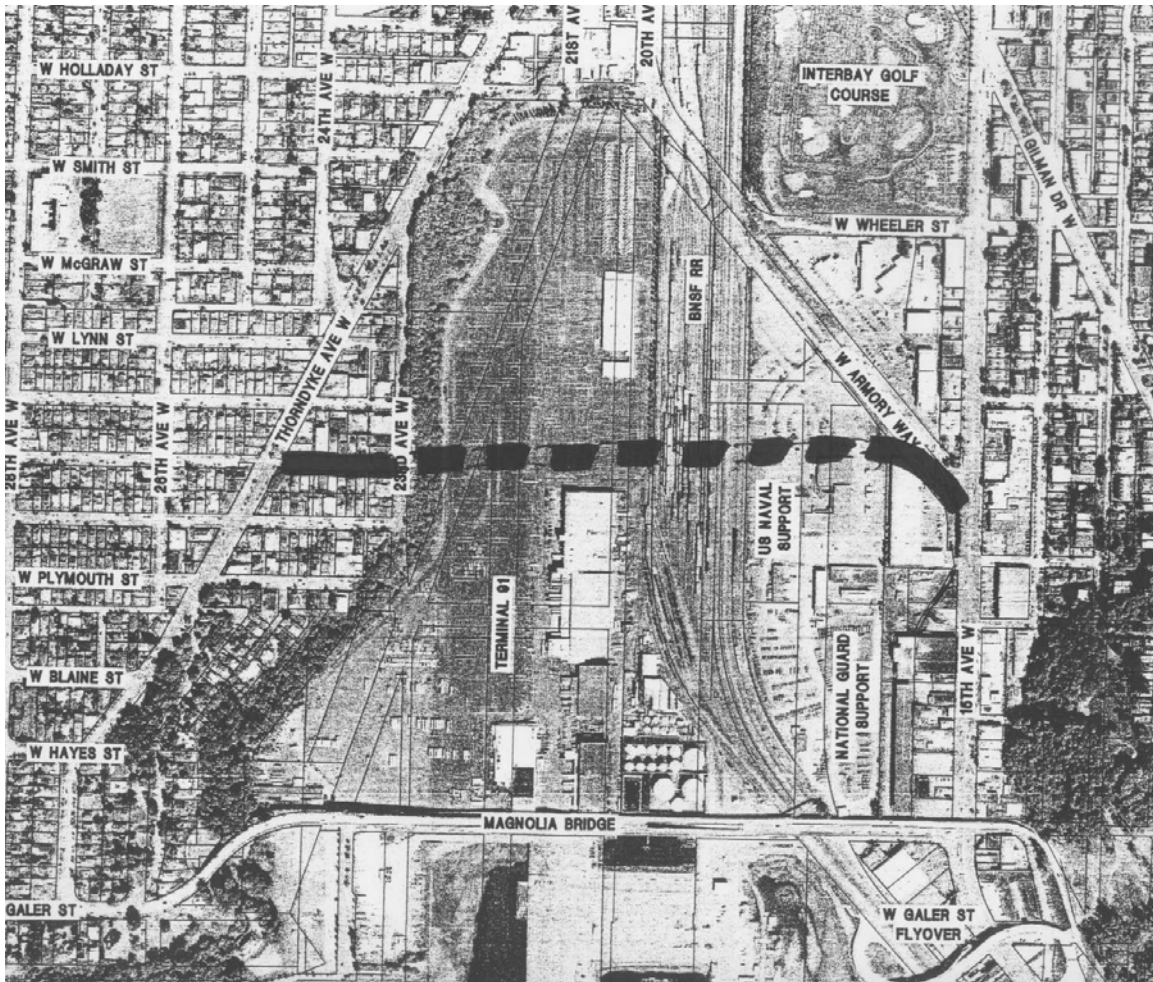
Figure 23
Alignment 23



Source: KPFF, 2002



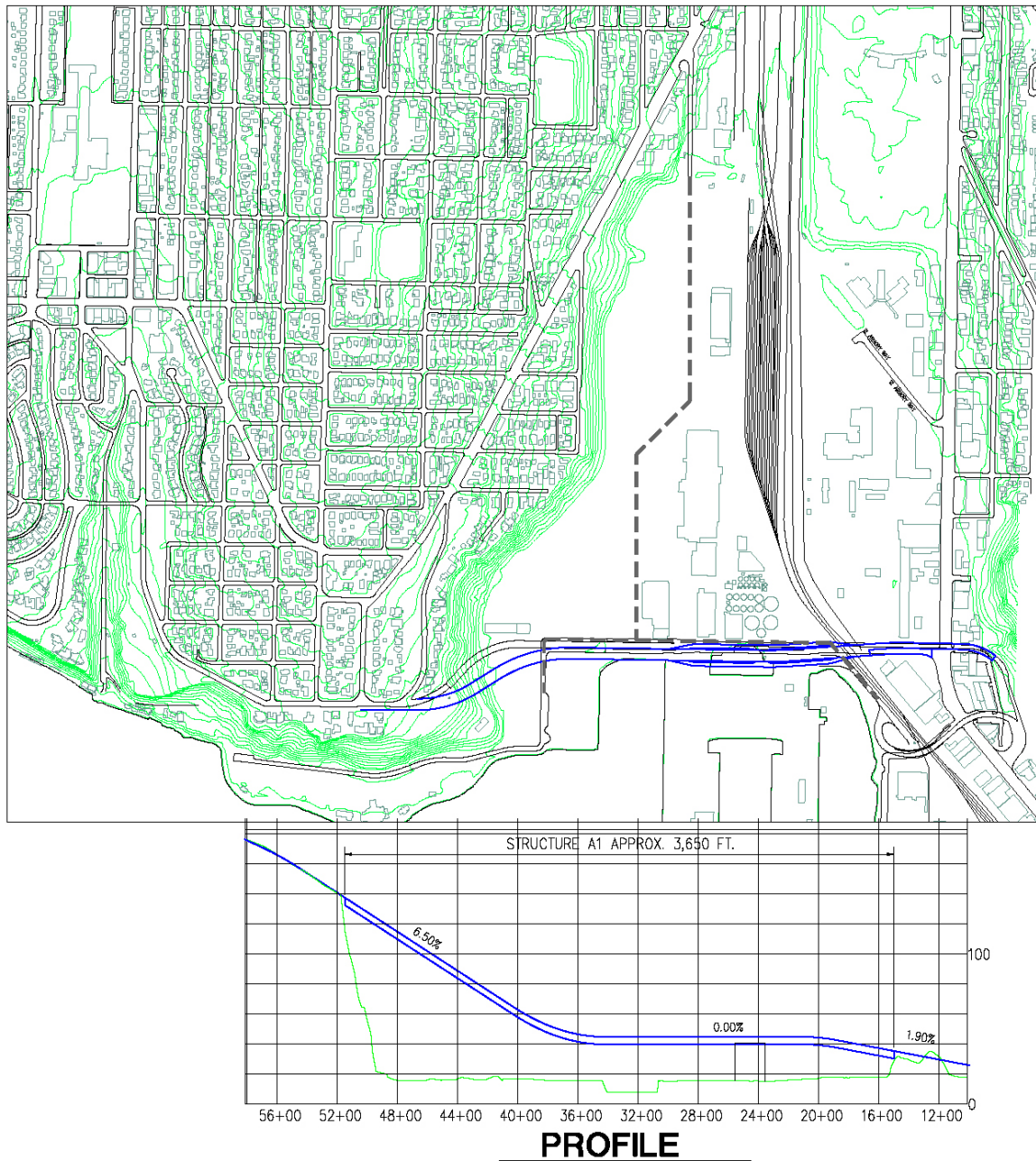
Figure 24
Alignment 24



Source: KPFF, 2002



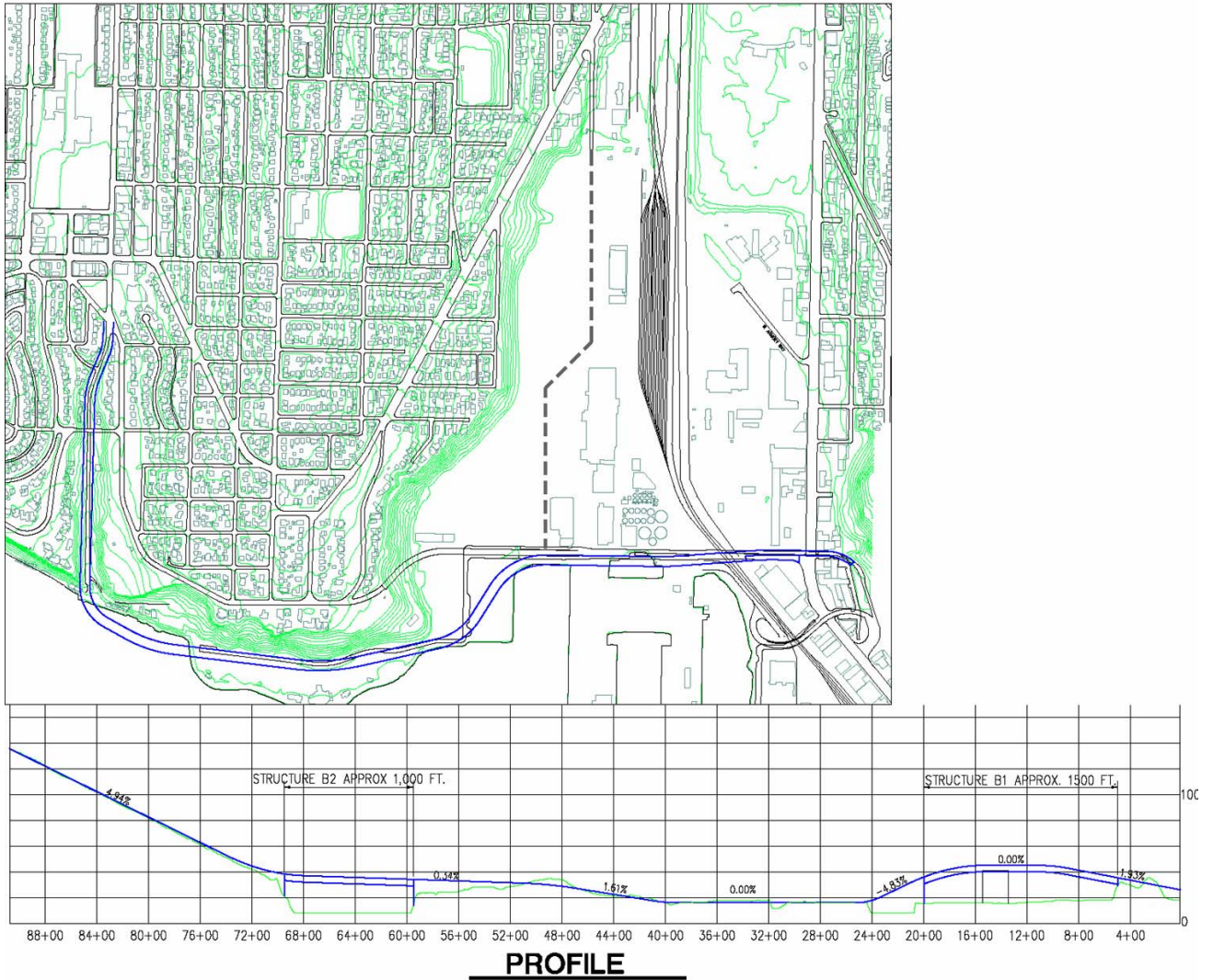
Figure 25
Alignment 25



Source: KPFF, 2002



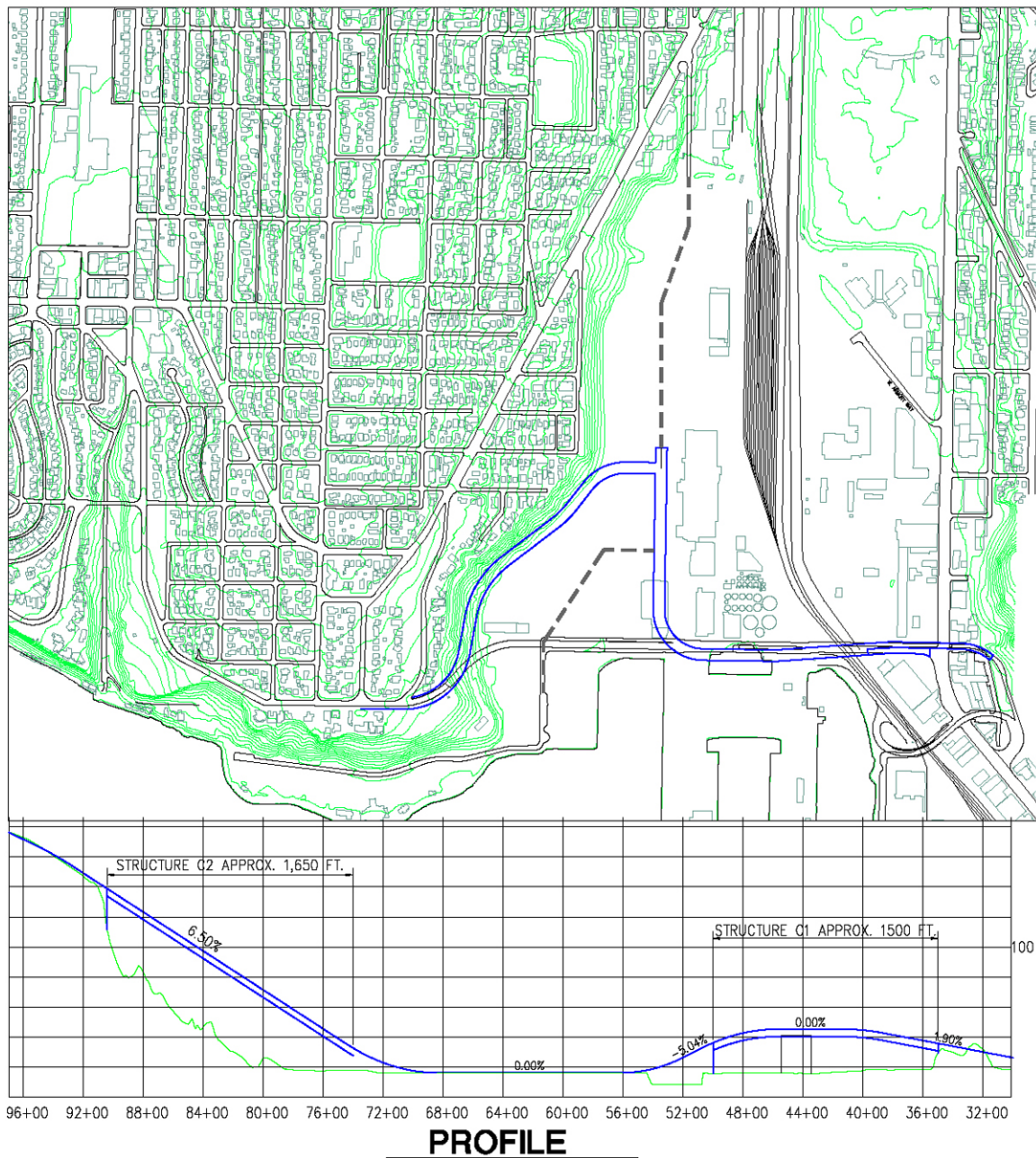
Figure 26
Alternative A



Source: KPFF, 2002



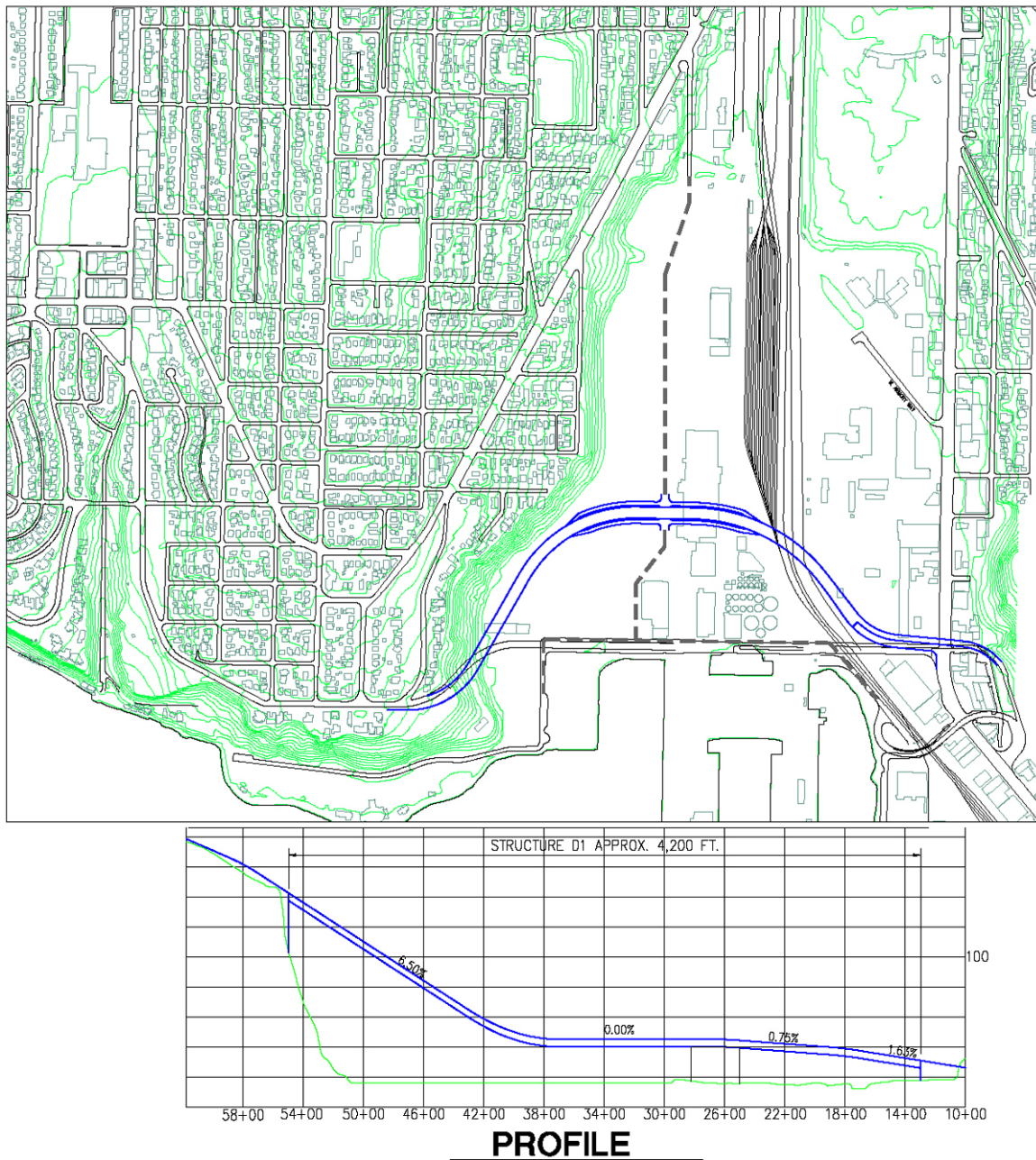
Figure 27
Alternative B



Source: KPFF, 2002



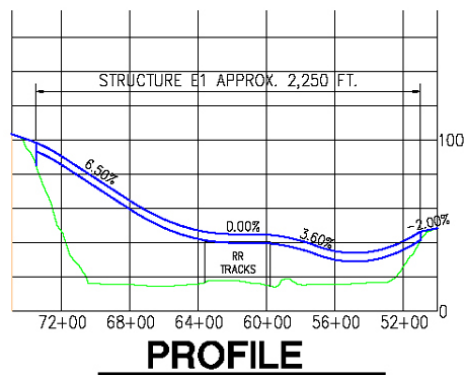
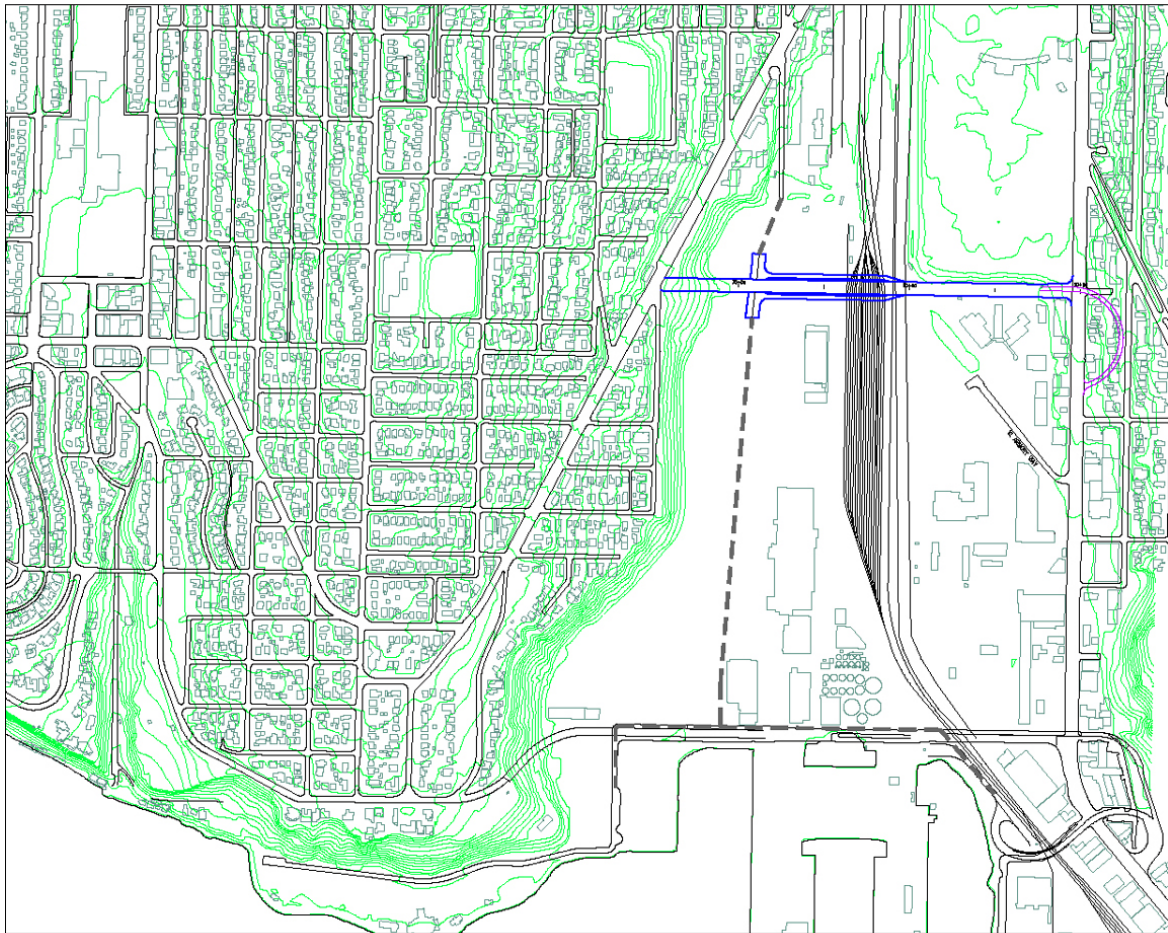
Figure 28
Alternative C



Source: KPFF, 2002



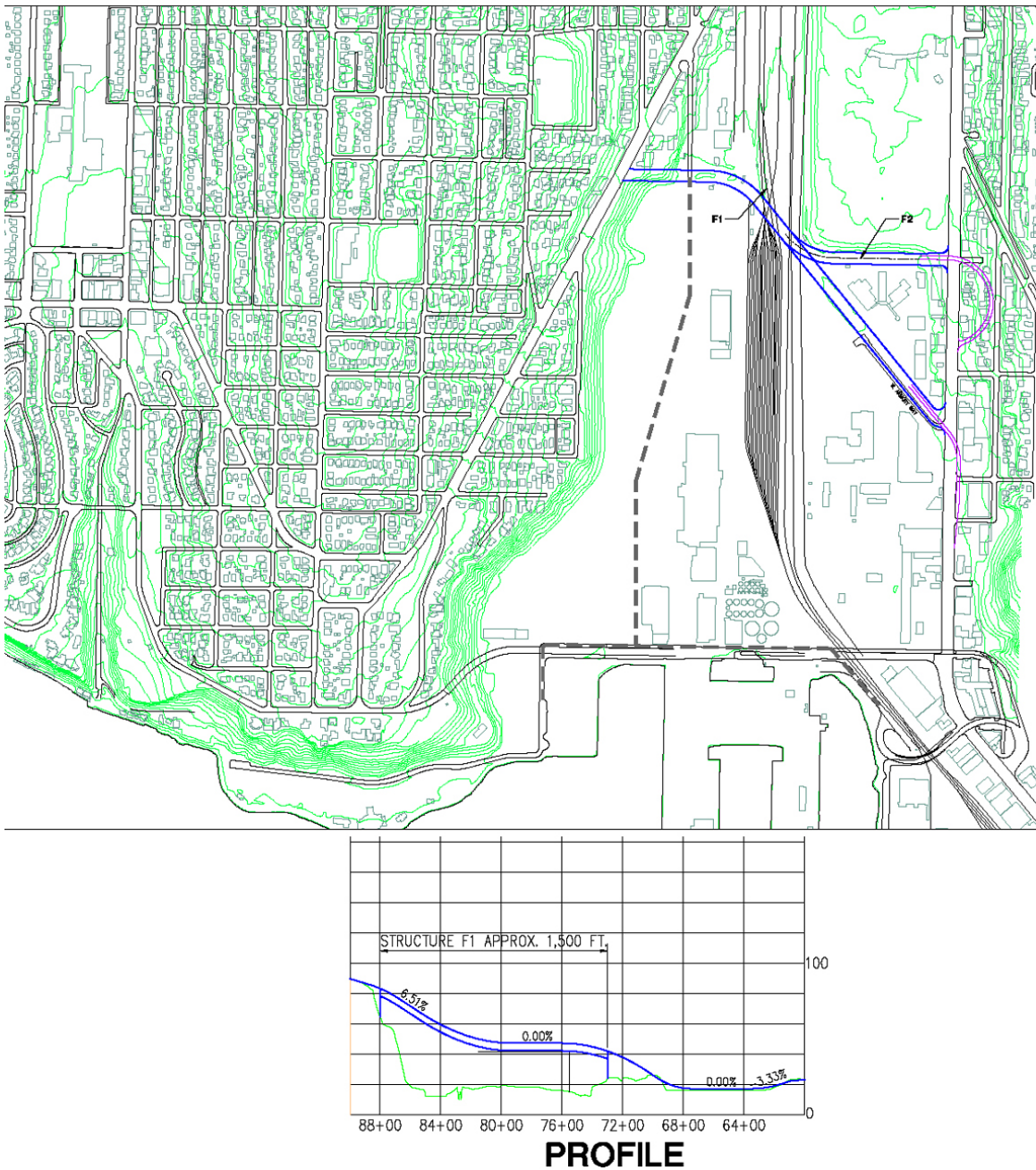
Figure 29
Alternative D



Source: KPFF, 2002



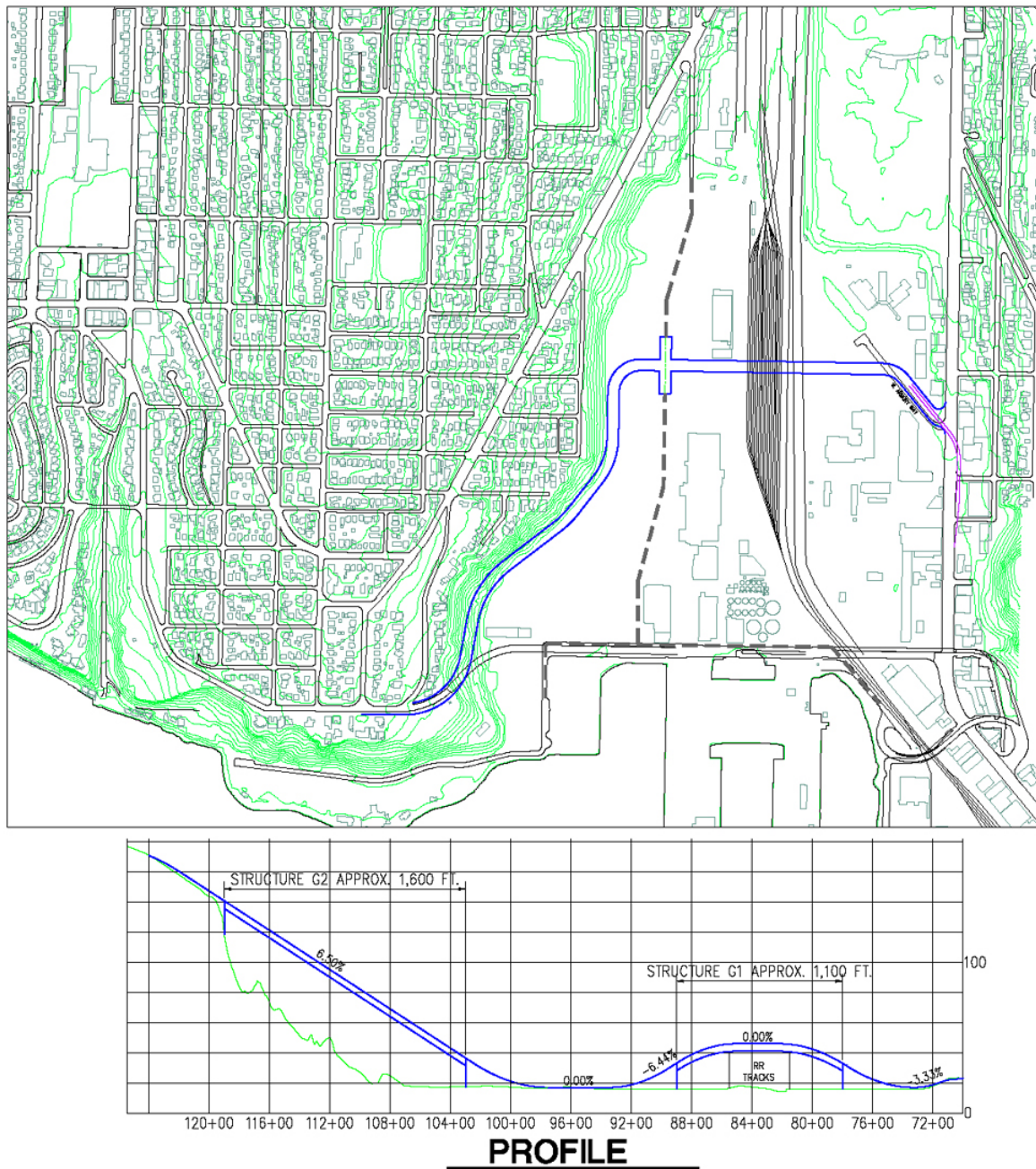
Figure 30
Alternative E



Source: KPFF, 2002



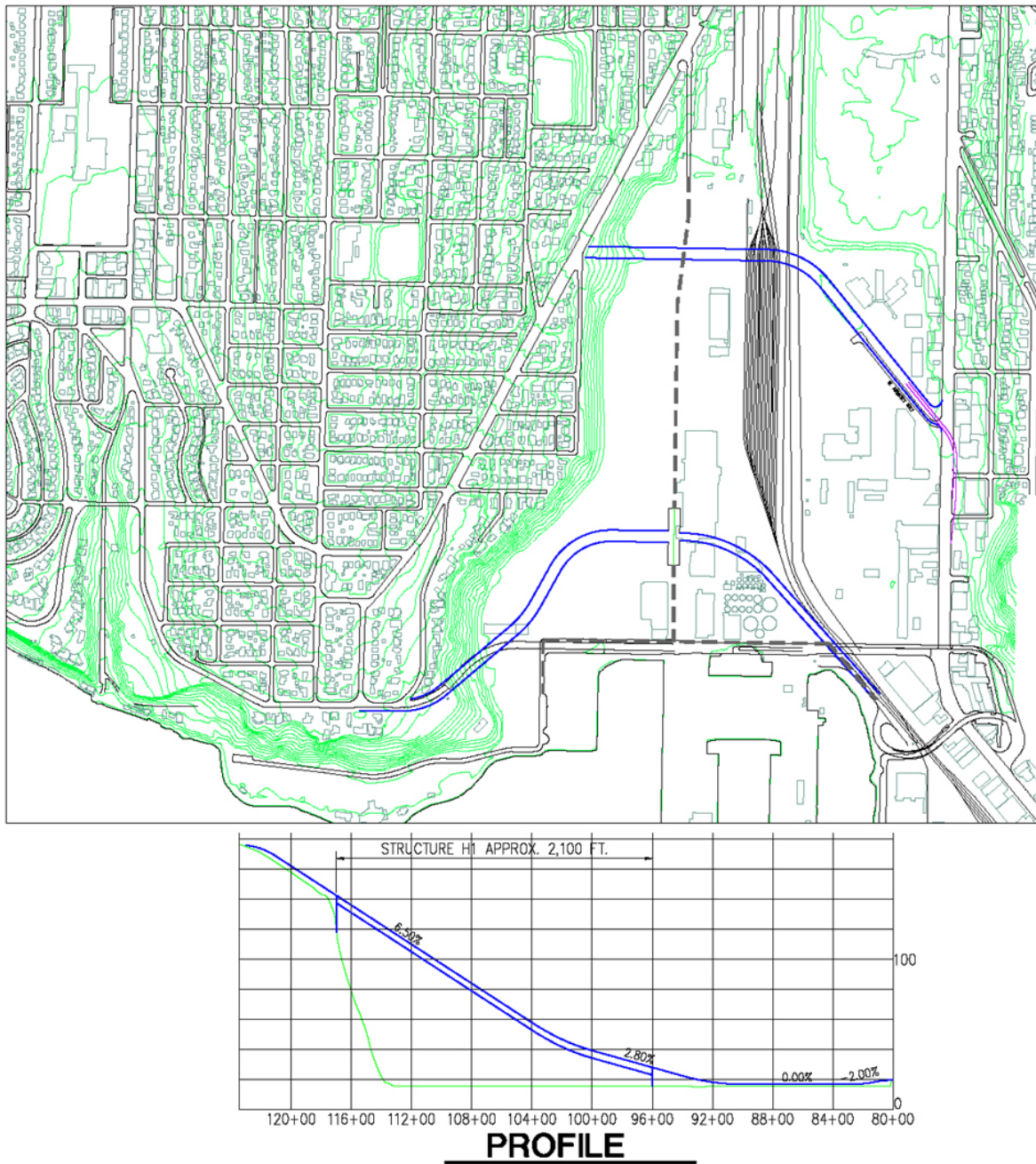
Figure 31
 Alternative F



Source: KPFF, 2002



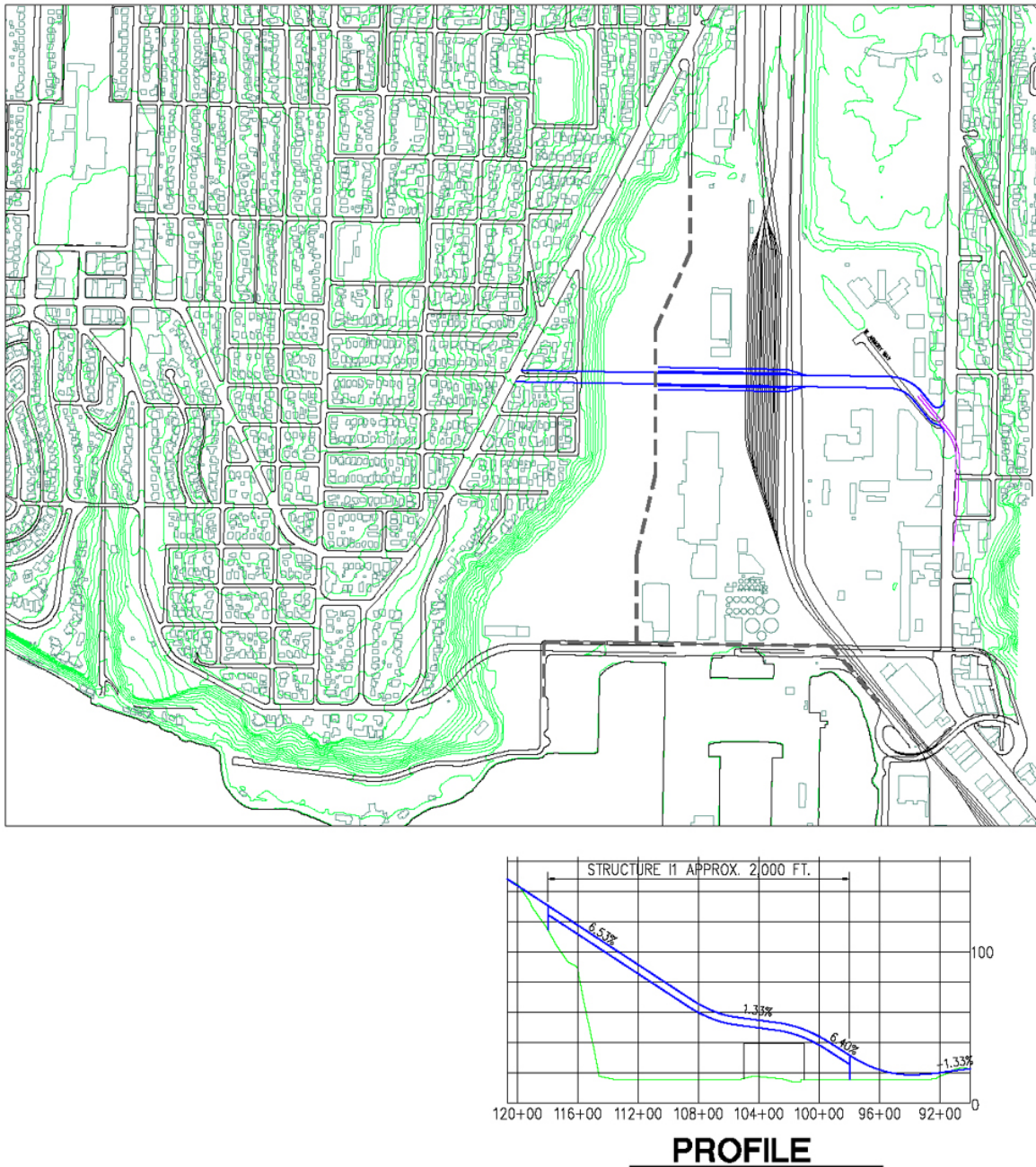
Figure 32
Alternative G



Source: KPFF, 2002



Figure 33
Alternative H



Source: KPFF, 2002



Figure 34
Alternative I

**Appendix A
to
Alignment Study Report**

Magnolia Bridge Replacement Project

**Second Level Screening
First Evaluation**

Prepared by

**Environmental - Shapiro and Associates, Inc.
Transportation - Mirai Associates
Urban Design – Weinstein Copeland Architects
Costs – HNTB Corporation and KPFF Engineers**

November 29, 2002

MAGNOLIA BRIDGE REPLACEMENT FIRST EVALUATION SUMMARY

Alternative	COMMENTS		EVALUATIONS				RESULTS
	Advantages	Disadvantages	Environmental	Transportation	Urban Design	Cost	Recommended Alternatives for Further Development
A	<ul style="list-style-type: none"> No business or residential displacements identified. Good access to Magnolia. Retains dramatic views and entry into Magnolia. Lowest right-of-way costs. 	<ul style="list-style-type: none"> Requires construction adjacent to or over shoreline. Existing bridge shut down for extended periods. Interbay property separated from water. High construction costs. 	**	*		*	
B	<ul style="list-style-type: none"> No business displacements identified. Improved access to waterfront and Magnolia center. Could create a beautiful route into Magnolia. Medium construction, right-of-way & relocation costs. 	<ul style="list-style-type: none"> Potential direct impacts to aquatic shoreline and relatively high geological hazard impacts. Less direct route to Galer and Thorndike areas. Much more compatible with a second access route. Highest mitigation costs. 		**	**	**	√
C	<ul style="list-style-type: none"> No residential displacements identified. Improved access to waterfront from Magnolia. Low relocation and right-of-way costs. 	<ul style="list-style-type: none"> Requires construction adjacent to or over shoreline. Less direct and slower route to Magnolia. All Magnolia traffic comes through center of Port property. High construction and mitigation costs 	*	*		*	
D	<ul style="list-style-type: none"> No residential displacements identified. Improved access to waterfront, Magnolia, and Port property. Allows land to be connected to water. Low mitigation and right-of-way costs 	<ul style="list-style-type: none"> Potential displacement of businesses on Port of Seattle properties. Some bridge closures during construction. Some view blockage of water from Port uplands. Highest construction costs. 	**	**	**		√

**** = Best Alternatives**

*** = Good Alternatives**

Blank = Not Recommend Alternatives

MAGNOLIA BRIDGE REPLACEMENT FIRST EVALUATION SUMMARY

Alternative	COMMENTS		EVALUATIONS				RESULTS
	Advantages	Disadvantages	Environmental	Transportation	Urban Design	Cost	Recommended Alternatives for Further Development
E	<ul style="list-style-type: none"> No shoreline impacts. Possible traffic benefits along 15th Ave. Include Thorndyke improvement per Olmsted plan. Medium construction costs. 	<ul style="list-style-type: none"> Business and residential displacements. No direct access from Magnolia to waterfront. Ramps impact land use along 15th Avenue corridor. Highest relocation and right-of-way costs. 					
F	<ul style="list-style-type: none"> No shoreline impacts. Possible traffic benefits along 15th Ave. Original Olmsted route: include Thorndyke improvement per Olmsted plan. Highest relocation costs. 	<ul style="list-style-type: none"> Business and residential displacements. No direct access from Magnolia to waterfront. Does not adequately support development on Port property. Highest relocation costs. 				**	
G	<ul style="list-style-type: none"> No shoreline impacts. Improved access to waterfront and Port property. Central access for Port property. Medium construction costs. 	<ul style="list-style-type: none"> Requires significant construction in steep slope areas. Less direct route to Magnolia. Ramps impact land use along 15th Avenue corridor. High mitigation and right-of-way costs. 	*			**	
H	<ul style="list-style-type: none"> No shoreline impacts. Two access points to Magnolia. <p>Choices will reduce unnecessary traffic on bluff and Thorndyke. Lowest mitigation costs.</p>	<ul style="list-style-type: none"> Business displacements on Port of Seattle properties. Worse access to waterfront and port property from 15th Ave. Ramps impact land use along 15th Avenue corridor. High construction costs. 	**	**	**		✓
I	<ul style="list-style-type: none"> No shoreline impacts. Good access to Magnolia. Parcelization of Port property is workable. Medium construction costs. 	<ul style="list-style-type: none"> Business and residential displacements. No direct access from Magnolia to waterfront. Neighborhood has heavy localized impacts along Boston. High relocation costs. 					

** = Best Alternatives

* = Good Alternatives

Blank = Not Recommend Alternatives

MAGNOLIA BRIDGE REPLACEMENT FIRST ENVIRONMENTAL EVALUATION

Alternative	Air Quality	Geologic Hazards	Habitat	Wetlands	Shorelines	Water Quality/Stormwater	Cultural and Historic Resources	Hazardous and Problem Waste	Business Displace/Relocation	Residential Displace/Relocation	Public Lands	Noise	Best Ranked Alternatives for Environmental Evaluation
A	U	-	++	++	-	+	++	O	++	++	+	O	**
B	U	--	-	++	--	-	-	O	++	-	-	+	
C	U	-	++	++	O	O	++	O	O	++	O	-	*
D	U	-	++	++	++	+	++	O	-	++	+	-	**
E	U	O	++	++	++	O	++	O	-	--	+	-	
F	U	O	++	++	++	O	++	O	-	--	+	-	
G	U	-	++	++	++	O	++	O	-	++	-	-	*
H	U	-	++	++	++	O	++	O	-	++	+	-	**
I	U	O	++	++	++	+	++	O	-	--	+	--	

LEGEND:

- Heavy Impact
- High Impact
- O** Moderate Impact
- +** Low Impact
- ++** No Impact
- U** Unknown

MAGNOLIA BRIDGE REPLACEMENT FIRST ENVIRONMENTAL EVALUATION

Alternative	Air Quality		Alternative	Geologic Hazards	
	Rating	Note		Rating	Note
A	U	Transportation system air quality impacts are often associated with emissions of idling vehicles at roadway intersections or in slow-moving traffic.	A	-	Alternative A would require construction along the shoreline in the liquefaction zone.
B	U		B	- -	Alternative B would require construction within potential landslide hazard areas and steep slopes along the shoreline and 32 nd Ave W.
C	U		C	-	Alternative C is affected by the liquefaction zone and requires significant construction in steep slope areas.
D	U		D	-	Alternative D is affected by the liquefaction zone and somewhat greater impacts to steep slope areas.
E	U	At this time traffic modeling has not been completed and a comparison of air quality impacts among the alternatives cannot be made. Generally, those alternatives that result in greater delay at intersections and slower moving traffic would be more likely to result in higher pollutant emissions. If the alternatives improve traffic flow and prevent congestion on or around the Magnolia Bridge, air quality could be improved in the localized area compared to existing conditions.	E	o	Alternative E is affected by the liquefaction zone impacts to the potential landslide and steep slope areas at Wheeler – Thorndyke connection.
F	U		F	o	Alternative F is affected by the liquefaction zone and impacts to the potential landslide and steep slope areas at Wheeler – Thorndyke connection.
G	U		G	-	Alternative G is affected by the liquefaction zone and requires significant construction in steep slope areas.
H	U		H	-	Alternative H is affected by the liquefaction zone and moderate impacts to steep slopes from the second bridge.
I	U		I	o	Alternative I is affected by the liquefaction zone with moderate impacts to landslide and steep slopes at the Boston – Thorndyke connection.

MAGNOLIA BRIDGE REPLACEMENT FIRST ENVIRONMENTAL EVALUATION

Alternative	Habitat		Alternative	Wetlands	
	Rating	Note		Rating	Note
A	++	No designated wildlife habitat areas for terrestrial wildlife species have been identified along any of the alignments. All or portions of most of the proposed alignments are within 1000 feet of Puget Sound, which is designated critical habitat for the listed threatened Puget Sound Endangered Species Unit of the chinook salmon. Based on preliminary engineering drawings, Alternative B is the only alignment that appears to have potential direct impacts on potential habitat for chinook salmon. There are no known occurrences of other listed species within 1 mile of any of the proposed alignments.	A	++	No wetlands are known to exist along any of the proposed alignments, based on City of Seattle GIS data.
B	-		B	++	
C	++		C	++	
D	++		D	++	
E	++		E	++	
F	++		F	++	
G	++		G	++	
H	++		H	++	
I	++		I	++	

MAGNOLIA BRIDGE REPLACEMENT FIRST ENVIRONMENTAL EVALUATION

Alternative	Shorelines		Alternative	Water Quality/Stormwater	
	Rating	Note		Rating	Note
A	-	Alternative A would require construction adjacent to or over approximately 1,600 feet of Smith Cove shoreline.	A	+	Net changes to impervious surfaces; minimal impacts to water quality or stormwater.
B	- -	Same impacts as Alternative A plus additional 1,000 feet of aquatic shoreline west of Elliott Bay Marina, where roadway would have to be supported on fill or pilings.	B	-	Alternative B would add impervious surface in shoreline areas. Concerns include water quality impacts from roadway stormwater runoff.
C	o	Alternative C would require construction adjacent to or over approximately 800 feet of Smith Cove shoreline.	C	o	Alternative C would add impervious surface along the east slope of Magnolia with potential impacts to stormwater runoff along the hillside.
D	+ +	No shoreline impacts.	D	+	Net impervious surface changes would be minimal and unlikely to significantly affect water quality/stormwater.
E	+ +	No shoreline impacts	E	o	Net impervious surface changes would be minimal; potential for construction – related impacts at Wheeler flyover.
F	+ +	No shoreline impacts	F	o	Net impervious surface changes would be minimal; potential for construction – related impacts at Wheeler flyover.
G	+ +	No shoreline impacts	G	o	Alternative G would add impervious surface along the east slope of Magnolia and require careful control of stormwater runoff along the hillside.
H	+ +	No shoreline impacts	H	o	Second bridge in Alternative H would add impervious surface; potential for construction – related impacts at Wheeler – Thorndyke connection.
I	+ +	No shoreline impacts	I	+	Net impervious surface changes would be minimal; potential for construction – related impacts at Boston – Thorndyke connection.

MAGNOLIA BRIDGE REPLACEMENT FIRST ENVIRONMENTAL EVALUATION

Alternative	Cultural and Historic Resources		Alternative	Hazardous and Problem Waste	
	Rating	Note		Rating	Note
A	++	<p>No archaeological sites or sites listed on the National Register of Historic Places were identified within the study area. A number of sites on or near the study area were identified on Historic Property Inventory forms, but none of those sites were listed on the National Register. Inventoried sites included the Magnolia Bridge (which is inherently affected by all alignments), warehouses on Pier 91, and Pier 90. In addition, single family residences in the Magnolia neighborhood were listed on the forms. At this time, it appears that all inventoried historic structures, other than the Magnolia Bridge itself, are outside of potential bridge construction areas and would not be affected.</p>	A	o	<p>Detailed analysis identifying specific sites requiring cleanup under each Alternative has not been performed. However, based on total disturbed area for each Alternative, preliminary evaluation of the potential for hazardous waste issues was conducted.</p> <p>All alignments would result in disturbance of land historically used for industrial purposes and could encounter hazardous waste requiring remediation.</p> <p>Alternatives E, F, G, H, and I would require construction within the 1,000-foot methane buffer for the Interbay Landfill.</p>
B	-		B	o	
C	++		C	o	
D	++		D	o	
E	++		E	o	
F	++		F	o	
G	++		G	o	
H	++		H	o	
I	++		I	o	

MAGNOLIA BRIDGE REPLACEMENT FIRST ENVIRONMENTAL EVALUATION

Alternative	Business Displacement/Relocation*		Alternative	Residential Displacement/Relocation*	
	Rating	Note		Rating	Note
A	++	No business displacements identified.	A	++	No residential displacements identified.
B	++	No business displacements identified.	B	-	Alternative B could displace up to 9 single-family residential structures along the shoreline west of the Elliott Bay Marina.
C	o	Displace at least 1 existing business on Port of Seattle properties	C	++	No residential displacements identified.
D	-	Displace 1 major business (City Ice) on Port properties and portions of 2 businesses east of the rail yard.	D	++	No residential displacements identified.
E	-	Wheeler Street ramp would displace at least 1 business fronting the east side of 15th Avenue W between Boston and Wheeler Streets.	E	--	The Wheeler Street ramp would displace approximately 15 single-family residences and 3 multifamily residential buildings east of 15th Avenue W.
F	-	Wheeler Street ramp would displace at least 1 business fronting the east side of 15th Avenue W. Armory Street ramp may displace 2 businesses fronting the east side of 15th Avenue W.	F	--	The Wheeler Street ramp would displace approximately 15 single-family residences and 3 multifamily residential buildings east of 15th Avenue W.
G	-	The Armory Street ramp may displace 2 businesses fronting the east side of 15th Avenue W. near Newton and Howe Streets.	G	++	No residential displacements identified.
H	-	Potential to displace 2 existing businesses on Port properties. Armory Street ramp may displace 2 businesses fronting the east side of 15th Avenue W.	H	++	No residential displacements identified.
I	-	The Armory Street ramp may displace 2 businesses fronting the east side of 15th Avenue W near Newton and Howe Streets.	I	--	Potential for full or partial displacement of 7 multifamily buildings along Boston Street, east of Thorndyke Avenue.

* Estimates based only on review of aerial photos and land use maps; to be refined for the final study phase using City of Seattle GIS database.

MAGNOLIA BRIDGE REPLACEMENT FIRST ENVIRONMENTAL EVALUATION

Alternative	Public Lands		Alternative	Noise*	
	Rating	Note		Rating	Note
A	+	West bridge approach places bridge closer to Smith Cove Park; net amount of affected lands would not increase	A	o	Approximately 250 residences affected by existing corridor from west approach to Galer . No net change in operational noise; potential improvement because west bridge approach farther from existing residences.
B	-	Bridge would cross surplus Navy land being considered for acquisition by City of Seattle; cross City-owned aquatic lands west of marina; affect greenbelt parcels in 32 nd Ave. W. corridor; potential at-grade crossing of existing bike routes.	B	+	Approximately 140 residences affected by operational noise; includes 45 residences not currently affected, 95 currently affected (net improvement of 110 residences over Alternative A).
C	o	Potential crossing of 9 designated greenbelt parcels along the east Magnolia hillside.	C	-	Approximately 75 additional residences (over Alternative A) affected by operational noise.
D	+	Minimal impacts to greenbelt and bike routes due to elevated crossings.	D	-	Approx. 30 additional residences (over Alternative A) affected by operational noise.
E	+	Construction adjacent to the south boundary of the Interbay Golf Course.	E	-	Approx. 140 residences at Wheeler ramp; and approx. 60 residences at Thorndyke terminus affected by operational noise.
F	+	Construction adjacent to the south boundary of the Interbay Golf Course.	F	-	Approx. 140 residences at Wheeler ramp; and approx. 60 residences at Thorndyke terminus affected by operational noise.
G	-	Potential crossing of 9 designated greenbelt parcels and potential impacts to bike route at base of Magnolia hillside.	G	-	Minimum 100 additional residences (over Alternative A) affected by operational noise.
H	+	Potential at-grade crossing of existing bike route adjacent to rail yard.	H	-	Approx. 10 additional residences (over Alternative A) at southern alignment; and approx. 60 residences at Thorndyke terminus affected by operational noise.
I	+	Minimal impacts to bike routes due to elevated crossings.	I	- -	Approx. 350 residences in the vicinity of Boston – Thorndyke intersection potentially affected by operational noise.

* Estimates based only on review of aerial photos and land use maps; to be refined for the final study phase using City of Seattle GIS database.

MAGNOLIA BRIDGE REPLACEMENT FIRST TRANSPORTATION EVALUATION

Alternative	Traffic Impacts			Access				Emergency Service Impacts	Bicycle & Pedestrian Connection	Transit Connection	Impacts to Railroad	Best Ranked Alternatives for Transportation Evaluation
	Magnolia Street Motor Vehicle Traffic Impacts	15 th W/Elliott W Corridor Motor Vehicle Traffic Impacts	Traffic Impacts during Construction	Motor Vehicular Access to Magnolia	Motor Vehicular Access to Waterfront from 15 th W/Elliott W	Motor Vehicle Access to Waterfront from Magnolia	Motor Vehicle Access to Port Property					
A	o	o	- -	+	o	+	-	o	o	o	+	*
B	-	o	-	o	+	++	+	+	++	-	+	**
C	o	o	-	-	-	+	+	o	o	o	+	*
D	o	o	-	+	o	+	++	+	o	o	o	**
E	-	+	o	o	-	o	++	-	-	-	-	
F	-	+	o	o	- -	o	- -	-	-	-	o	
G	+	+	-	-	-	+	+	o	o	-	-	
H	+	+	-	++	--	+	-	+	++	+	-	**
I	-	+	o	+	o	o	++	-	-	-	-	

LEGEND:

- -** Considerably Worse Than Existing
- Somewhat worse Than Existing
- o** Minimal Change From Existing
- +** Minor Improvement From Existing
- ++** Substantial Improvement From Existing
- U** Unknown

MAGNOLIA BRIDGE REPLACEMENT FIRST TRANSPORTATION EVALUATION

Alternative	Magnolia Street Motor Vehicle Traffic Impacts		Alternative	15 th W/Elliott W Corridor Motor Vehicle Traffic Impacts	
	Rating	Note		Rating	Note
A	o	The use of existing alignment will not change traffic movements within Magnolia	A	o	Little change from the existing conditions
B	o	Traffic volumes will decrease near the Bridge but will increase on other streets, including on Dravus St.	B	o	Little change from the existing conditions
C	o	As the bridge access point (W Galer St) is same, little change in traffic movements in Magnolia	C	o	Little change from the existing conditions
D	o	As the bridge access point (W Galer St) is same, little change in traffic movements in Magnolia	D	o	Little change from the existing conditions
E	-	The narrow, steep east-west streets will increase traffic volumes; some decrease along Galer.	E	+	Better intersection spacing and possible reduced congestion at the Galer Overpass/Elliott intersection
F	-	The narrow, steep east-west streets will increase traffic volumes; some decrease along Galer.	F	+	Better intersection spacing and possible reduced congestion at the Galer Overpass/Elliott intersection
G	+	The additional N-S access street (21 st Ave) will reduce traffic on W Galer and other streets	G	+	Better intersection spacing and reduced congestion at the Galer Overpass/Elliott intersection
H	+	The additional access combined with N-S access street (21 st Ave) will reduce traffic on W Galer and other streets	H	o	Better intersection spacing along Elliott but possible to overload the Galer Overpass
I	-	The narrow, steep east-west streets will have increased traffic volumes	I	o	Better intersection spacing and reduced congestion at the Galer Overpass/Elliott intersection

MAGNOLIA BRIDGE REPLACEMENT FIRST TRANSPORTATION EVALUATION

Alternative	Traffic Impacts During Construction	
	Rating	Note
A	--	Existing bridge requires complete closure during construction of the east one-third, for the tie-in at west end and one lane closure for construction required for middle one third. Entrance ramp from 23 rd requires closure during construction
B	-	Existing bridge requires complete closure during construction of replacement over railroad.
C	-	Existing bridge requires complete closure during construction of replacement over railroad and tie-in at west end.
D	-	Existing bridge requires complete closure during construction of replacement for tie-in at west end.
E	o	Minor traffic impacts on Wheeler at 15 th and on Thorndyke and 15 th at replacement tie-in.
F	o	Minor traffic impacts on Armory Way and on Thorndyke and 15 th at replacement tie-in.
G	-	Existing bridge requires complete closure during construction of replacement for tie-in at west end. Minor traffic impacts on Wheeler at 15 th and on 15 th at replacement tie-in.
H	-	Existing bridge requires complete closure during construction of replacement for tie-in at west end. Minor traffic impacts on Armory Way and on Thorndyke and 15 th at replacement tie-in.
I	o	Minor traffic impacts on Armory Way and on Thorndyke and 15 th at replacement tie-in.

MAGNOLIA BRIDGE REPLACEMENT FIRST TRANSPORTATION EVALUATION

Alternative	Motor Vehicular Access to Magnolia		Alternative	Motor Vehicular Access to Waterfront from 15 th W/Elliott W	
	Rating*	Note		Rating**	Note
A	+	Positive on added access but no change in directness and quality of travel	A	o	Similar to existing conditions
B	o	Reduced quality of travel due to at-grade intersections but positive on added access	B	+	Route goes directly to Smith Cove
C	-	Reduced directness and quality of travel	C	-	Similar to existing conditions but additional intersections
D	+	No change to directness and quality of travel, added additional access is positive	D	o	Similar to existing conditions
E	o	Reduced directness offsets additional access	E	-	Less direct from south using Galer overpass; ok from north
F	o	Reduced directness offsets additional access	F	- -	Less direct from north and south using Galer overpass
G	-	Reduced directness and quality of travel with at-grade intersections	G	-	Less direct from south using Galer overpass; ok from north
H	++	Additional access better than others and increased directness	H	- -	Less direct from north and south using Galer overpass
I	+	Positive on added access but little change in directness and quality of travel	I	o	Good access from north; less direct from south using Galer overpass

* The ratings represent summaries of detailed rating categories. Please see Attachment A* (page 17) and Attachment B** (page 18) for more detailed evaluation on these criteria.

**MAGNOLIA BRIDGE REPLACEMENT
FIRST TRANSPORTATION EVALUATION**

Alternative	Motor Vehicle Access to Waterfront from Magnolia		Alternative	Motor Vehicle Access to Port Property	
	Rating	Note		Rating	Note
A	+	Improves access from Magnolia	A	-	Tight interchange design limits access to north
B	+ +	Provides most direct access from Magnolia	B	+	Additional port access points along alignment; at-grade intersections with signals on the port property is less desirable
C	+	Improves access from Magnolia	C	+	Additional access points; at-grade intersections with signals on the port property is less desirable
D	+	Improves access from Magnolia	D	+ +	Improved interchange access design; centrally located
E	o	Circuitous access via N-S street (21 st Ave W) and travel time is same as the existing condition	E	+ +	Provides second access point to north; improved interchange access design
F	o	Circuitous access via N-S street (21 st Ave W) and travel time is same as the existing condition	F	--	Reduced accessibility at south end; no direct access to the new bridge
G	+	Improves access from Magnolia	G	+	Provides second access point to north; At-grade intersections with signals on the port property is less desirable; slightly worse than Alt E
H	+	Improves access from Magnolia	H	-	Additional port access points along alignment; at-grade intersections with signals on the port property is less desirable; reduced accessibility at south end.
I	o	Circuitous access via N-S street (21 st Ave W) and travel time is same as the existing condition	I	+ +	Provides second access point to north; improved interchange access design

MAGNOLIA BRIDGE REPLACEMENT FIRST TRANSPORTATION EVALUATION

Alternative	Emergency Service Impacts		Alternative	Bicycle & Pedestrian Connection	
	Rating	Note		Rating ***	Note
A	o	Minimal change from existing	A	o	Added ramp connections from Magnolia but high speed ramp crossings
B	+	Some emergency travel time savings for Engine Co 41 (Magnolia) to Smith Cove and Pier 90-91	B	++	Good connections to trail system and lower grades to the existing trails
C	o	Slight emergency travel time savings for fire and medic services	C	o	Good connections to trail system possible, but longer distance and relocation of the trail is negative
D	+	Emergency travel time savings for fire and medic services	D	o	Adds ramp connections from Magnolia but high speed ramp crossings
E	-	Longer travel times for Engine Co. 41 and Medic from Harbor View than existing	E	--	No easy connection to the trails; longer distance for South Magnolia
F	-	Longer travel times for Engine Co. 41 and Medic from Harbor View than existing	F	-	No easy connection from east or west; safe connection but longer distance
G	o	Slightly negative travel times for emergency vehicles	G	o	Good connections to trail system possible; some longer distance; long grade, and relocation of trail needed
H	+	Some emergency travel time savings for Engine Co 41 (Magnolia)	H	++	Good connections to trail system possible; multiple options to the N-S trails
I	-	Longer travel times for Engine Co. 41 and Medic from Harbor View than existing	I	-	No easy connections from Magnolia to trail system; good E-W connections from Magnolia

*** The ratings represent summaries of detailed rating categories. Please see Attachment C (page 19) for more detailed evaluation on this criterion.

**MAGNOLIA BRIDGE REPLACEMENT
FIRST TRANSPORTATION EVALUATION**

Alternative	Transit Connections		Alternative	Impacts to Railroad	
	Rating	Note		Rating ***	Note
A	o	No change to bus routes is needed	A	+	Minor operational impacts during construction.
B	-	Coverage in SE Magnolia on Rt. 19 and 24 is reduced	B	+	Minor operational impacts during construction.
C	o	Minimal change to bus routes is needed	C	+	Minor operational impacts during construction.
D	o	Minimal change to bus routes is needed	D	o	Minor operational impacts during construction. Requires a pier between tracks that may limit track location in the future.
E	-	Increases bus travel time	E	-	Crossing switching yard will require closing three adjacent tracks for one month to allow room for falsework during steel erection.
F	-	Increases bus travel time	F	o	May interfere with sight line from switching control room. Requires a pier between tracks that may limit track location in the future.
G	-	Increases bus travel time	G	-	Crossing switching yard will require closing three adjacent tracks for one month to allow room for falsework during steel erection.
H	+	Maintains the existing routes and add service flexibility	H	-	Crossing switching yard will require closing three adjacent tracks for one month to allow room for falsework during steel erection.
I	-	Increases bus travel time	I	-	Crossing switching yard will require closing three adjacent tracks for one month to allow room for falsework during steel erection.

MAGNOLIA BRIDGE REPLACEMENT FIRST TRANSPORTATION EVALUATION

Attachment A

Alternative	Motor Vehicle Access to Magnolia						
	Directness		Quality of Travel		Added Access		Overall Rating
	Rating	Note	Rating	Note	Rating	Note	
A	o	Similar to the existing conditions	o	Similar to the existing conditions	+	North-south street connection increases access options	+
B	o	Similar to the existing conditions	-	At-grade intersection adds time	+	North-south street connection increases access options	o
C	-	Circuitous route	-	At-grade intersection adds time	+	North-south street connection increases access options	-
D	o	Similar to the existing conditions	o	Similar to the existing conditions	+	North-south street connection increases access options	+
E	-	Out of direction travel for some	o	No at-grade intersection	+	North-south street connection increases access options	o
F	-	Out of direction travel for some	o	No at-grade intersection	+	North-south street connection increases access options	o
G	-	Circuitous route	-	At-grade intersection adds time	+	North-south street connection increases access options	-
H	+	Direct 4 th access	o	Added access provides flexibility; south access has at-grade intersections	++	Provides direct 4 th access	++
I	o	Out of direction travel for some but direct connection provided	o	No at-grade intersection	+	North-south street connection increases access options	+

MAGNOLIA BRIDGE REPLACEMENT FIRST TRANSPORTATION EVALUATION

Attachment B

Alternative	Motor Vehicle Access to Waterfront from 15 th Ave West						
	Directness		Quality of Travel		Driver Understanding of Route		Overall Rating
	Rating	Note	Rating	Note	Rating	Note	
A	o	Similar to the existing conditions	o	Similar to existing conditions	o	Similar to existing conditions	o
B	o	Similar to existing conditions	-	At-grade intersections add time	++	Road goes directly to Smith Cove	+
C	o	Similar to the existing conditions	-	At-grade intersection adds time	o	Similar to existing conditions	-
D	o	Similar to the existing conditions; slightly longer	o	Similar to existing conditions	o	Similar to existing conditions	o
E	-	Similar from north; less direct from south	-	More at-grade intersections	--	Separate routes from north and south	-
F	-	Galer St connection less direct	--	Several at-grade intersections	--	Separate routes from north and south; Galer St circuitous	--
G	o	Similar to existing conditions; slightly longer from south	-	More at-grade intersections	-	Separate routes from north and south	-
H	-	Galer St connection less direct	-	More at-grade intersections	--	Most access through Galer St; more circuitous	-
I	o	Similar to existing conditions; better from north; slightly longer from south	+	Access improved at main interchange	-	Separate routes from north and south	o

**MAGNOLIA BRIDGE REPLACEMENT
FIRST TRANSPORTATION EVALUATION**

Attachment C

Alternative	Pedestrian and Bicycle Connections				
	North-South Trail Connections		East-West Trail Connections		Overall Rating
	Rating	Note	Rating	Note	
A	+	Adds ramp connections from Magnolia to trail system	-	High speed ramp crossings	O
B	++	Good connections to trail system	+	Lower grades but less convenient for south Magnolia residents	++
C	+	Good connections possible	-	Longer distance; relocate portion of trail	O
D	+	Adds ramp connections from Magnolia to trail system	-	High speed ramp crossings	O
E	--	No easy connections from Magnolia	-	Longer distance for South Magnolia residents	--
F	--	No easy connections from east or west	O	Safe connection but longer distance	-
G	+	Good connections possible	-	Multiple options; some longer distance; long grade; relocate trail	O
H	+	Good connections possible	++	Multiple options	++
I	-	No easy connections from Magnolia to trail system	O	Good connections, slightly longer	-

MAGNOLIA BRIDGE REPLACEMENT FIRST URBAN DESIGN EVALUATION

Alternative	Effects on Magnolia Neighborhood	Effects on Magnolia Village	Effects on Interbay	Effects on 15 th Avenue Corridor	Views	Effects on Quality of Shoreline	Effects on Olmsted Legacy	Effects on Parks	Support for Transit Oriented Development	Best Ranked Alternatives for Urban Design Evaluation
A	o	o	-	o	+/-	-	o	o	-	
B	+/-	+	+	o	+	+/-	+	+/-	+	**
C	-	o	o	o	-	o	-	-	+	
D	+	o	+	o	+	+	o	o	+	**
E	-	-	o	-	o	o	+	o	-	
F	-	-	-	-	o	-	+	-	-	
G	-	o	o	-	-	+	-	-	+	
H	+	o	o	-	+	+	+	+	++	**
I	-	-	o	-	o	o	+	o	o	

LEGEND:

- Considerably Worse Than Existing
- Somewhat worse Than Existing
- o** Minimal Change From Existing
- +** Minor Improvement From Existing
- ++** Substantial Improvement From Existing
- U** Unknown

MAGNOLIA BRIDGE REPLACEMENT FIRST URBAN DESIGN EVALUATION

Alternative	Effects on Magnolia Neighborhood		Alternative	Effects on Magnolia Village	
	Rating	Note		Rating	Note
A	o	Same as existing, with good entry and identity for neighborhood	A	o	Similar to existing.
B	+/-	Could provide beautiful entry into Magnolia if designed well. Too large a road would be detrimental.	B	+	Most direct route for finding the Village. Entry via Clise supports pedestrians
C	-	Loss of entry sequence into Magnolia, and diminished neighborhood identity.	C	o	Similar to existing, but less appealing.
D	o	Similar to existing conditions. Retains entry sequence and emphasizes dramatic views.	D	o	Similar to existing.
E	-	Less dramatic entry into Magnolia. More cars come through neighborhood on Thorndyke.	E	-	Longer route; less visible. Increases traffic on McGraw
F	-	Less dramatic entry into Magnolia. More cars come through neighborhood on Thorndyke	F	-	Longer route; less visible. Increases traffic on McGraw
G	-	Entry to Magnolia through Interbay; diminished sense of entry and identity.	G	o	Similar to existing. Longer and less visible.
H	+	Weaker gateway, but better connects Magnolia and improves choice of destinations	H	o	Similar to existing. Longer and less visible.
I	-	Less dramatic entry into Magnolia. Traffic redirection would impact neighborhood character on Boston.	I	-	Longer route; less visible. Increases traffic on McGraw

**MAGNOLIA BRIDGE REPLACEMENT
FIRST URBAN DESIGN EVALUATION**

Alternative	Effects on Interbay		Alternative	Effects on 15 th Avenue Corridor	
	Rating	Note		Rating ***	Note
A	-	Impacts connection of property to water. Location of access not ideal.	A	o	Similar to existing.
B	+	Leaves site contiguous, without visual blockage. Flexible surface access.	B	o	Similar to existing.
C	o	Brings all Magnolia through center of Interbay. Builds part of internal street network.	C	o	Similar to existing.
D	+	Allows more land to be associated with water. Leaves most of site contiguous.	D	o	Similar to existing.
E	o	Much of site contiguous; no division from water. Half intersection limits access.	E	-	Ramps on east side of 15 th detrimental to properties and character.
F	-	Leaves of the site contiguous, but poor access	F	-	Ramps on east side of 15 th detrimental to properties and character.
G	o	Access is central to the Interbay site, but all Magnolia traffic comes through.	G	-	Ramps on east side of 15 th detrimental to properties and character.
H	o	Allows land to be associated with the water, but brings Magnolia traffic through.	H	-	Ramps on east side of 15 th detrimental to properties and character.
I	o	Bisects site, but better parcelization. Access central, but only half intersection.	I	-	Ramps on east side of 15 th detrimental to properties and character.

**MAGNOLIA BRIDGE REPLACEMENT
FIRST URBAN DESIGN EVALUATION**

Alternative	Views		Alternative	Effects on Quality of Shoreline	
	Rating	Note		Rating ***	Note
A	+/-	Good from above; major view blockage from grade to water.	A	-	Bridge underside near shoreline detracts.
B	+	Good views from road, without an elevated structure to block views	B	+/-	If designed well, allows motorists to enjoy shoreline. Could impact bike and ped character.
C	-	Road through winds through Interbay; views good up hill, but impacts the greenbelt.	C	o	Road pulled back from water, but could conflict with bike route to Smith Cove.
D	+	Dramatic views on road, less impact on ground level than A.	D	+	More land becomes part of waterfront. Allows trail along greenbelt to Smith Cove.
E	o	Less dramatic views from bridge, but less impact at grade	E	o	No structured impediments along water. Magnolia's route to water through full length of Interbay.
F	o	Less dramatic views from bridge, but less impact at grade	F	-	No structured impediments along water. Poor route for Magnolia to water.
G	-	Road through winds through Interbay; views good up hill, but impacts the greenbelt.	G	+	No structured impediments along water.
H	+	Retains views up hill, and relatively low amount of at-grade view blockage	H	+	Reduces structure along the water.
I	o	Less dramatic views from bridge, but less impact at grade	I	o	No structured impediments along water. Poor route for Magnolia to water.

MAGNOLIA BRIDGE REPLACEMENT FIRST URBAN DESIGN EVALUATION

Alternative	Effects on Olmsted Legacy		Alternative	Effects on Parks	
	Rating	Note		Rating	Note
A	o	No improvements, but visibility of bluff route retained.	A	o	Proximity of bridge to the water detracts. May require Park property at bluff. Similar to existing conditions
B	+	Could have a character modeled on Olmsted system along Lake Washington	B	+/-	May bring more people to Smith Cove. Adds noise to shoreline and park above.
C	-	Does not utilize Olmsted boulevards or capture Olmsted spirit	C	-	More visibility of Smith Cove. Requires Park property along greenbelt.
D	o	No improvements, but visibility of bluff route retained.	D	o	May require Park property at bluff.
E	+	Could incorporate improvements to Thorndyke. Need improvements to retain visibility of existing bluff road	E	o	Park access not very visible. May use Park property at west connection
F	+	This alignment shown in original plan, perhaps due to water line at the time. Improve Thorndyke.	F	-	Limited access to Smith Cove
G	-	Not in Olmsted spirit, and no related improvements	G	-	Park property at greenbelt.
H	+	Could incorporate improvements to Thorndyke. Need improvements to retain visibility of existing bluff road	H	+	Good connection of Magnolia and Smith Cove. Reduces traffic on Olmsted route headed for east slope
I	+	Could incorporate improvements to Thorndyke. Need improvements to retain visibility of existing bluff road	I	o	Few impacts, but little access increase

MAGNOLIA BRIDGE REPLACEMENT FIRST URBAN DESIGN EVALUATION

Alternative	Support for Transit Oriented Development	
	Rating	Note
A	-	Inhibits cluster development near water and dense Amgen site
B	+	Surface route could serve multimodal development near water and Amgen
C	+	Surface route could serve multimodal development near water and Amgen
D	+	Encourages clustering near water.
E	-	Bus connections too far north for pedestrian oriented cluster near Amgen and water.
F	-	Does not encourage cluster at south of site.
G	+	Access south and north of potential cluster; surface connection in Interbay is flexible.
H	++	Surface route could serve multimodal cluster; some Magnolia traffic bypasses pedestrian oriented area
I	o	Access south and north of potential cluster; but only half intersection

MAGNOLIA BRIDGE REPLACEMENT FIRST COST EVALUATION

Alternative	Replacement Construction Costs	Right-of-Way Costs	Business Relocation Costs	Residential Relocation Costs	Mitigation Costs	Fourth Access Costs	Protection of Infrastructure Costs	Secondary Impacts on Business Relocation Costs	Best Ranked Alternatives for Cost Evaluation
A	-	++	++	++	+	O	U	U	*
B	O	-	++	-	--	O	U	U	**
C	-	+	+	++	O	+	U	U	*
D	--	++	O	++	+	O	U	U	
E	O	--	+	--	++	O	U	U	
F	++	++	-	--	++	O	U	U	**
G	O	--	O	++	O	O	U	U	**
H	-	-	--	++	++	++	U	U	
I	O	+	O	--	++	O	U	U	

LEGEND:

- Highest Potential Costs
- High Potential Costs
- O Average Potential Costs
- + Low Potential Costs
- ++ Lowest Potential Costs
- U Unknown

MAGNOLIA BRIDGE REPLACEMENT FIRST COST EVALUATION

Alternative	Replacement Construction Costs		Alternative	Right-of-Way Costs	
	Rating	Note		Rating	Note
A	-	Long bridge, short roadway and a temporary bridge & roadway during construction. Relative construction cost is 2.0 as compared to Alt. F.	A	+ +	Lowest estimated right-of-way costs along with Alt. F.
B	o	Medium length bridge, long roadway and a temporary bridge & roadway during construction. Relative construction cost is 1.6 as compared to Alt. F.	B	-	Relative estimated right-of-way cost is 1.4 as compared to Alternatives A & F.
C	-	Medium length bridge, long roadway and a temporary bridge & roadway during construction. Relative construction cost is 1.9 as compared to Alt. F.	C	+	Relative estimated right-of-way cost is 1.3 as compared to Alternatives A & F.
D	- -	Long bridge, medium length roadway and a temporary bridge & roadway during construction. Relative construction cost is 2.3 as compared to Alt. F.	D	+ +	Relative estimated right-of-way cost is 1.1 as compared to Alternatives A & F.
E	o	Medium length bridge and short roadway. Relative construction cost is 1.7 as compared to Alt. F.	E	- -	Relative estimated right-of-way cost is 1.7 as compared to Alternatives A & F.
F	+ +	Medium length bridge and short roadway. Least expensive construction cost alternative.	F	+ +	Lowest estimated right-of-way costs along with Alt. A.
G	o	Medium length bridge and roadway. Relative construction cost is 1.7 as compared to Alt. F.	G	- -	Relative estimated right-of-way cost is 1.7 as compared to Alternatives A & F.
H	-	Medium length bridge and long roadway. Relative construction cost is 1.9 as compared to Alt. F.	H	-	Relative estimated right-of-way cost is 1.5 as compared to Alternatives A & F.
I	o	Medium length bridge and short roadway. Relative construction cost is 1.6 as compared to Alt. F.	I	+	Relative estimated right-of-way cost is 1.3 as compared to Alternatives A & F.

**MAGNOLIA BRIDGE REPLACEMENT
FIRST COST EVALUATION**

Alternative	Business Relocation Costs		Alternative	Residential Relocation Costs	
	Rating	Note		Rating	Note
A	++	No business displacements identified.	A	++	No residential displacements identified.
B	++	No business displacements identified.	B	-	Could displace up to 9 single-family residential structures along the shoreline west of the Elliott Bay Marina.
C	+	Displace at least 1 existing business on Port of Seattle properties	C	++	No residential displacements identified.
D	o	Displace 1 business on Port properties and portions of 2 businesses east of the rail yard.	D	++	No residential displacements identified.
E	+	Wheeler Street ramp would displace at least 1 business fronting the east side of 15th Avenue W.	E	--	The Wheeler Street ramp would displace approximately 15 single-family residences and 3 multifamily residential buildings east of 15th Avenue W.
F	-	Wheeler Street ramp would displace at least 1 business fronting the east side of 15th Avenue W. Armory Street ramp may displace 2 businesses fronting the east side of 15th Avenue W.	F	--	The Wheeler Street ramp would displace approximately 15 single-family residences and 3 multifamily residential buildings east of 15th Avenue W.
G	o	The Armory Street ramp may displace 2 businesses fronting the east side of 15th Avenue W.	G	++	No residential displacements identified.
H	--	Potential to displace 2 existing businesses on Port properties. Armory Street ramp may displace 2 businesses fronting the east side of 15th Avenue W.	H	++	No residential displacements identified.
I	o	The Armory Street ramp may displace 2 businesses fronting the east side of 15th Avenue W.	I	--	Potential for full or partial displacement of 7 multifamily buildings along Boston Street, east of Thorndyke Avenue.

MAGNOLIA BRIDGE REPLACEMENT FIRST COST EVALUATION

Alternative	Mitigation Costs		Alternative	Fourth Access Costs	
	Rating	Note		Rating	Note
A	+	Medium environmental mitigation costs due to limited earthwork on Port and Railroad property.	A	o	Requires approximately 4400 feet of north-south surface roadway on Port property.
B	- -	Highest environmental mitigation costs due to extensive earthwork on Port and Railroad property plus work along the shoreline.	B	o	Requires approximately 4400 feet of north-south surface roadway on Port property.
C	o	Higher environmental mitigation costs due to extensive earthwork on Port and Railroad property.	C	+	Requires approximately 1800 feet of north-south surface roadway on Port property.
D	+	Medium environmental mitigation costs due to limited earthwork on Port and Railroad property.	D	o	Requires approximately 4400 feet of north-south surface roadway on Port property.
E	++	Lower environmental mitigation costs due to limited earthwork on Port and Railroad property.	E	o	Requires approximately 4400 feet of north-south surface roadway on Port property.
F	++	Lower environmental mitigation costs due to limited earthwork on Port and Railroad property.	F	o	Requires approximately 4400 feet of north-south surface roadway on Port property.
G	o	Higher environmental mitigation costs due to extensive earthwork on Port and Railroad property	G	o	Requires approximately 4400 feet of north-south surface roadway on Port property.
H	++	Lowest environmental mitigation costs due to limited earthwork on Port and Railroad property.	H	+ +	Alternative provides a fourth access without additional costs.
I	++	Lower environmental mitigation costs due to limited earthwork on Port and Railroad property.	I	o	Requires approximately 4400 feet of north-south surface roadway on Port property.

MAGNOLIA BRIDGE REPLACEMENT FIRST COST EVALUATION

Alternative	Protection of Infrastructure Costs		Alternative	Secondary Impacts on Business Relocation Costs	
	Rating	Note		Rating	Note
A	U	Insufficient information available to rate alternative for this category.	A	U	Insufficient information available to rate alternative for this category.
B	U	Insufficient information available to rate alternative for this category.	B	U	Insufficient information available to rate alternative for this category.
C	U	Insufficient information available to rate alternative for this category.	C	U	Insufficient information available to rate alternative for this category.
D	U	Insufficient information available to rate alternative for this category.	D	U	Insufficient information available to rate alternative for this category.
E	U	Insufficient information available to rate alternative for this category.	E	U	Insufficient information available to rate alternative for this category.
F	U	Insufficient information available to rate alternative for this category.	F	U	Insufficient information available to rate alternative for this category.
G	U	Insufficient information available to rate alternative for this category.	G	U	Insufficient information available to rate alternative for this category.
H	U	Insufficient information available to rate alternative for this category.	H	U	Insufficient information available to rate alternative for this category.
I	U	Insufficient information available to rate alternative for this category.	I	U	Insufficient information available to rate alternative for this category.

MAGNOLIA BRIDGE REPLACEMENT FIRST EVALUATION CRITERIA

ENVIRONMENTAL CRITERIA

Air Quality Transportation system air quality impacts are often associated with emissions of idling vehicles at roadway intersections or in slow-moving traffic. Based on the results of the preliminary traffic analyses in Task 2.D, qualitative estimates of air quality impacts will be made for each alternative.

Geologic Hazards Potential earth and soils impacts associated with each alternative will be evaluated based on a qualitative estimate of the amount of proposed right-of-way that would be located in steep slope hazard areas, erosion hazard areas, seismic hazard areas, or other geotechnically sensitive areas (as defined by the City of Seattle).

Habitat Potential impacts to plant and animal species will be evaluated for each alternative based on Threatened, Endangered and Sensitive Species occurrence information obtained through consultation with USFWS, NMFS, WDFW, and DNR. Information to be evaluated will include the number and type of Threatened, Endangered, Candidate, Priority, or other sensitive plant or animal species known to occur in or use the project area, and whether the project would be located in or near any designated critical habitat.

Wetlands Potential impacts to wetlands will be evaluated based on the number, size, and quality of affected wetlands, and the corresponding mitigation requirements that would be imposed for each alternative. The wetland evaluation will include a review of City of Seattle critical area maps, US Fish and Wildlife Service NWI maps, aerial photographs, and a reconnaissance-level site visit.

Shorelines Shoreline impacts will be evaluated based on a qualitative estimate of the extent of physical alteration of shorelines, and the consistency of the alternative alignment with regulations for shorelines as designated in the City of Seattle's Shoreline Master Program and SMC 23.60.

Water Quality/Stormwater Potential impacts to water quality associated with stormwater runoff during project construction and operation will be evaluated for each alternative. The evaluation of potential water quality effects will be based on a qualitative estimate of the amount of impervious surface generated for each alternative within the project termini.

MAGNOLIA BRIDGE REPLACEMENT FIRST EVALUATION CRITERIA

Culture and Historic Resources Potential impacts to archaeological, historical and cultural resources will be evaluated for each alternative based on a review of the National Register of Historic Places, and information obtained in consultation with the State Historic Preservation Officer (SHPO), the City of Seattle, and appropriate Indian Tribes. Potential impacts will also be assessed in terms of the effects to usual and accustomed tribal fishing grounds in aquatic areas.

Hazardous and Problem Waste Based on consultation with WSDOT Environmental Affairs, Department of Ecology, the WSDOT Environmental GIS Workbench, and available maps from the City of Seattle, parcels containing identified CERCLA (Superfund) sites, RCRA sites, and Toxic Cleanup Program sites will be identified. Project alternatives will be evaluated based on a) a qualitative estimate of the area of designated sites that would be disturbed by project construction, and b) collective judgment of the Design Team as to the potential extent of required remediation.

Displacements Based on a review of aerial photos and alternative alignment drawings, the number of residential, commercial and community facility displacements (existing uses within the alternative ROW) will be estimated. Potential displacement impacts will be based on a qualitative estimate of the number, type and size of such uses within the ROW that would require relocation.

Public Lands The number, approximate acreage and type of facility will be evaluated for any publicly owned parks, recreation areas, wildlife and waterfowl refuges; sites that are on or eligible for the National Register of Historic Places; historic bridges; and bikeways as identified in Section 4(f) of the Transportation Act of 1966 and/or 23 CFR 771.135. Potential impacts to 4(f) resources will be evaluated for each alternative based on a qualitative estimate of the number and/or approximate area of any resources located within or adjacent to the proposed ROW.

Noise The noise evaluation will use "Proximity Effects" criteria to evaluate the potential for disruptive impacts to existing uses and activities during project operation as a result of being located near the proposed project. While it is not possible to fully evaluate the nature or degree of proximity effects during the screening phase of alternatives analysis, the relative potential for disruptive impacts can be estimated based on the number of existing uses that would be located within a fixed distance from the roadway. Based on a review of aerial photos and alternative alignment drawings, a qualitative estimate of the number of existing uses (residences, businesses, civic and community facilities) that are located within 500 feet of the roadway edge of pavement (EOP), will be made for each alternative. The 500-foot distance is consistent with the effective distance for transportation noise modeling as recognized by FHWA.

MAGNOLIA BRIDGE REPLACEMENT FIRST EVALUATION CRITERIA

TRANSPORTATION CRITERIA

Magnolia Street Motor Vehicle Traffic Impacts Relative impacts to existing street circulation based on the degree of change required for the alignment. This is a measure of the potential of an alignment to shift traffic to/or from arterial routes such as Magnolia Boulevard to other street, particularly local access streets.

15th W/Elliott W Corridor Motor Vehicle Traffic Impacts Relative impacts to existing 15th Avenue W/Elliott Avenue W traffic and freight mobility based on modeled effects on traffic flow on 15th Avenue W., Elliot Avenue W, and connecting arterials. Changes in traffic volumes will be evaluated at intersections operating at or near capacity. [Note: Current traffic counts have been made with the W. Galer Street at-grade crossing of the BNSF tracks open between 15th Avenue W. and Alaskan Way W. This crossing will close in early 2003 and traffic using this crossing will shift to the Galer Flyover ramp.]

Traffic Impact During Construction Relative disruption of existing traffic on the existing bridge during construction of the bridge replacement. This criterion assumes the existing Magnolia Bridge will remain in operation during most of the construction of the replacement bridge. The evaluation will consider the duration of any periods of temporary route closure, the location of the closures, and the use of the affected roadway(s).

Motor Vehicular Access to Magnolia Provisions for enhanced access to/from Magnolia. Consideration is given to the directness of travel between Magnolia and 15th Ave/Elliott, the quality of travel (e.g. grade separations vs. signalized intersections); and the provision for additional access routes. The number and quality of access routes will be considered.

Motor Vehicular Access to Waterfront From the 15th W/Elliott W Relative service of vehicular traffic to the waterfront (Smith Cove Park and marina area) to and from the east. Alternatives will be evaluated on the directness of the access (estimated travel distance), the quality of travel (e.g. grade separations vs. signalized intersections), and how clear the route is likely to meet driver expectations.

Motor Vehicular Access to Waterfront From Magnolia Relative service of vehicular traffic to the waterfront (Smith Cove Park and marina area) to and from the west. There is no current direct access from Magnolia Bluff to the park and marina. The Magnolia Bridge has a pair of ramps to and from the east that provide access to park and marina. These ramps can only be accessed from the west by going to 15th Avenue W and then back west on the Magnolia Bridge. This evaluation criterion will measure the effectiveness of an alternative in providing park and marina access from the bluff. Effectiveness will be determined by travel time.

MAGNOLIA BRIDGE REPLACEMENT FIRST EVALUATION CRITERIA

Motor Vehicular Access to Port Property Relative service of freight and general vehicular traffic to and from Port property to the 15th Avenue W/Elliott Avenue W corridor. This evaluation will assume the W Galer Street at-grade crossing of the BNSF Railway has been closed (scheduled for early 2003). Effects of project alternatives on Port access will primarily consider Terminal 91 facilities, but will also consider access to Port facilities south of W Galer Street. Access evaluation will consider shared use of all or portions of the Galer Flyover and any other access project by or affected by a bridge replacement alternative.

Emergency Service Impacts Relative impacts to access for service emergency vehicles including police, fire and medical services. Impacts will be evaluated based on directness of travel and expected response time.

Bicycle & Pedestrian Connections Relative service of connections for bicycles and pedestrians. The criterion will address the directness and ease of travel of new non-motorized facilities provided by the project and project effect on and connections to the existing trails along the east and west sides of the Terminal 91 property, the Magnolia signed bicycle route (on Magnolia Boulevard, Thorndyke Avenue W, 20th Avenue W, and other streets), and the north-south trail connecting North Magnolia through Interbay.

Transit Connections The alignment alternatives effect on transit operations will be determined by reviewing existing use of the Magnolia Bridge by King County Metro Routes 19, 24, and 33, and 15th Avenue W/Elliott Avenue W by Routes 15 and 18, and estimating potential transit travel time impact. Travel time impacts will be considered for vehicles (operating costs) and transit riders. Compatibility with the proposed Green Line monorail, waterfront street car, and potential commuter rail access will be considered.

Impacts to the Railroad Relative impacts to the railroad operations and capacity of the alignment. This criterion will consider potential impacts to BNSF Railway facilities from project roadway alignments and structure crossings. Crossings will consider bridge column placement and the required clearances between structure protection crash walls and yard and mainline tracks. The acceptability of facility impacts (track displacement or relocation) will be considered.

MAGNOLIA BRIDGE REPLACEMENT FIRST EVALUATION CRITERIA

URBAN DESIGN CRITERIA

Effects on Magnolia Neighborhood Includes increases and decreases of traffic on neighborhood streets, any need to take properties, changes (positive or negative) to street character, ability to serve areas with growth potential in the future.

Effects on Magnolia Village Increase or decrease in accessibility and visibility of the Village for vehicles. Impacts on pedestrian character in the Village.

Effects on Interbay Providing access to undeveloped parcels in order to support future desired job opportunities and economic development. Consideration of impacts on existing uses and phasing, the contiguous nature of parcels, and connections to an internal circulation system in the Interbay properties. Effects of the transportation system on the best use of property in relationship to the water, the greenbelt, and the railroad.

Effects on 15th Avenue Corridor Impact on the land use potential and the character of the 15th Avenue corridor.

View View impacts from ground level and from the nearby neighborhoods, as well as view potential from the bridge deck and as an entry into Magnolia.

Effects on Quality of Shoreline Impact on the character of the Elliott Bay shoreline. Location, safety and character of connections along the waterfront for all modes. Ability of new infrastructure to support public uses along the shoreline in terms of both access and configuration.

Effects on Olmsted Legacy Degree to which the alternative supports the spirit of Olmsted's planning for this important piece of the original plan. Clarifying and improving Olmsted linkages for the public benefit.

Effects on Parks Ability of new infrastructure to support new and existing park uses in terms of both access and configuration. (Environmental issues considered elsewhere).

Support for Transit Oriented Development Ability of transportation infrastructure to support future multi-modal use, connect between potential modes, and create a functional pedestrian realm in future development.

MAGNOLIA BRIDGE REPLACEMENT FIRST EVALUATION CRITERIA

COST CRITERIA

Replacement Construction Costs Relative construction costs of bridges and retaining walls based on areas and lengths with consideration of long span and deep foundations plus relative construction costs of surface roadways based on areas and lengths with consideration of depth of embankments plus relative costs of provide an alternative route during construction for those alternatives that require removal of existing bridge prior to completion of new replacement facility.

Right-of-Way Costs Relative cost of acquiring required right-of-way based on area with consideration of commercial and residential property.

Business Relocation Costs Relative costs for relocating businesses based on the number of displacements.

Residential Relocation Costs Relative costs for relocating residents based on the number of displacements.

Mitigation Costs Relative mitigation costs based on items identified in the Environmental Evaluation such as wetlands mitigation, hazardous material disposal, etc. but excluding business/residential relocation costs.

Fourth Access Costs Relative costs for providing a fourth access to Magnolia from the 15th/Elliott Ave corridor based on area of surface roadway and structure.

Protection of Infrastructure Costs Relative costs for protection of existing public infrastructure plus private utility infrastructure such as protection or relocation of utilities including power, water, sewer, etc.; and protection or relocation of streets, bicycle paths, and sidewalks based on type, length and size of affected facility.

Secondary Impacts on Business Relocation Costs Relative costs associated with cost impacts to existing businesses within a cluster economy such as additional costs for transportation, time and inconvenience. This cost will be measured based on the number of businesses remaining in the existing cluster group per relocated business.

APPENDIX B

ADDENDUM TO THE ALIGNMENT STUDY REPORT

FINAL ALTERNATIVE SCREENING

Introduction

This addendum documents the evaluation process for selection of one or more access options for each of the three build alternatives recommended to be carried forward in the environmental impact statement (EIS) process by the June 2003 “Alignment Study Report.” This addendum also documents the screening of two additional alternatives that were identified in the environmental scoping process begun in May 2003. Finally, the addendum describes the alternatives and their access options that are recommended for analysis in the Draft EIS.

Alternatives Access Option Screening

Following selection of three build alternatives to carry forward in the environmental evaluation process, the Project Team developed and evaluated options for access to Port of Seattle (POS) property in the Terminal 91 (North Bay) area. The connection points at the east and west ends and the general routing of the three proposed alternatives remain the same as described in the Alignment Study Report.

The Project Team met on June 17, 2003 to evaluate various access options for each of the three build alternatives. These options offered differing methods of accessing the Port of Seattle North Bay property. The criteria that were used to screen these options are shown in Table 1. During the design development of the access options, a number of configurations were investigated and rejected as not constructible. Many configurations were refined in the process. All of the early configurations were numbered and when rejected or revised, the number was not used again. The remaining viable access options were evaluated by the Project Team and are discussed below.

Access Options Considered but not Advanced

Alternative A

Four access options were evaluated for Alternative A. These options are shown in Figure 1 through Figure 4:

- | | | |
|----------|------|---|
| Figure 1 | A5 | A full-diamond interchange; |
| Figure 2 | A6 | A signalized intersection mid-span on the bridge; |
| Figure 3 | A6-2 | A signalized intersection, east of A6; and |
| Figure 4 | A7 | A half-diamond interchange providing access only from the east. |

The results of the evaluation for these access options are shown in Table 2. The reasons for not recommending A5 and A6-2 are discussed below.

Option A5

- Pedestrian/bicycle access would be difficult and would not separate this traffic from industrial areas.
- Would impact existing POS tenants and future use of North Bay area
- Would impact access between piers and POS tenants.
- Would impact waterfront and shoreline.

Option A6-2

- Is a design variation of A6. Location of roadway to be determined during DEIS process.

Table 1
Access Option Screening Criteria

Traffic Connection - Magnolia to/from 15th/Elliott

Relative ranking of the vehicular connection between Magnolia and the 15th Avenue West/Elliott Avenue West corridor from the point of view of a traveler following the provided route.

Bike & Pedestrian Access between Magnolia, North Bay, Waterfront and 15th Avenue West

Relative ranking of the quality of the pedestrian and bicycle connections between Magnolia, North Bay, the public waterfront, and the 15th Avenue West/Elliott Avenue West corridor from the perspective of a pedestrian or bicyclist traveling on the new facility.

Traffic Connection - Magnolia to Waterfront

Relative ranking of the vehicular connection between Magnolia and the public waterfront areas from the point of view of a traveler following the provided route. Options that do not provide the connection via the new facility received the lowest relative ranking.

Traffic Connection - North Bay to 15th/Elliott

Relative ranking of the vehicular connection between the North Bay Area and the 15th Avenue West/Elliott Avenue West corridor from the point of view of a traveler following the provided route.

Impact to Future Land Use

Relative ranking of the flexibility to adjust the location of access points to the North Bay Area, minimizing constraint to future development possibilities within the North Bay Area.

Impact to Access between Piers and Port Tenants

Relative ranking of the interference with industrial traffic between the Port waterfront facilities and the existing waterfront related Port tenants. This ranking assesses the interference with the access route created by both the structure of the new facility and the at-grade traffic routes required to connect to the new facility.

Impact to Rail, Permanent and During Construction

Relative ranking assessing the degree of impact to the BNSF rail lines, both during construction impact and permanent impact.

Separation of Bike-Pedestrian Traffic from Industrial Areas

Relative ranking assessing the degree to which the option requires pedestrians and bicyclists to travel through industrial areas to access Magnolia and the public waterfront areas.

Waterfront and Shoreline Impact

Relative ranking assessing the impact to waterfront and shoreline areas.

Visual Impact to Public Properties

Relative ranking assessing the visual impact to or from public lands, primarily at the waterfront.

Visual Impact to the Quality of the Entry to Magnolia

Relative ranking assessing the impact to views from the point of view of a traveler entering and departing Magnolia.

Impact to Existing Businesses in North Bay

Relative ranking of the impact to existing businesses in the North Bay area.

Impact to Existing Businesses and Uses on 15th/Elliott

Relative ranking of the impact to existing businesses, residences and land uses on the 15th Ave and Elliott Corridor.

Relative Right of Way Cost

Relative ranking based on a square foot comparison of the new right-of-way needs.

Relative Construction Cost

Relative ranking based on a square foot comparison of the new structure to be constructed.

Source: Magnolia Bridge Replacement Design Team, 2003

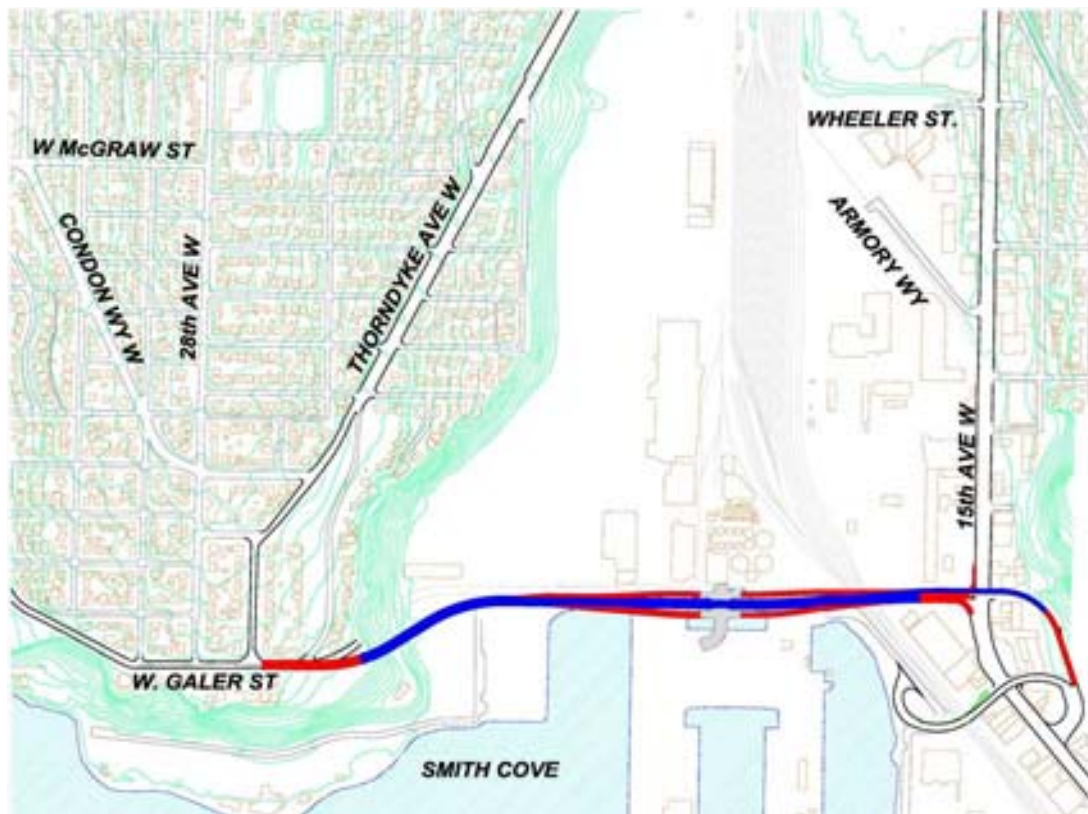


Figure 1 – Access Option A5

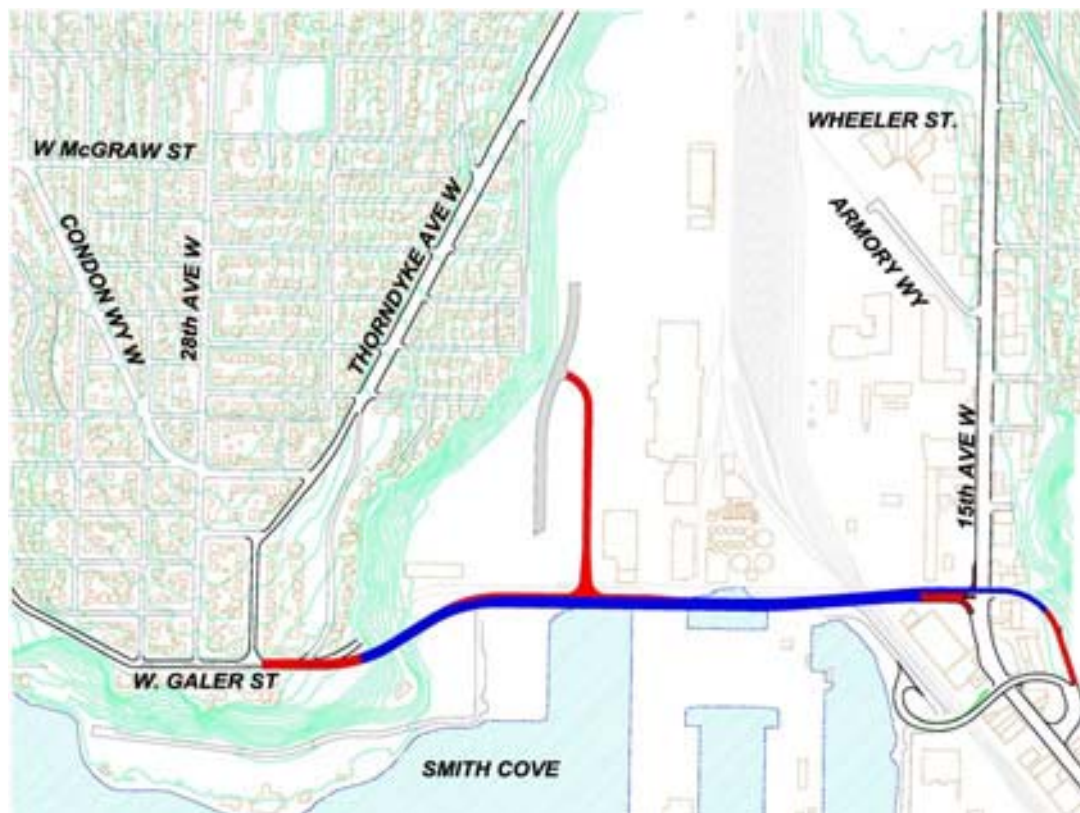


Figure 2 – Access Option A6



Figure 3 – Access Option A6-2

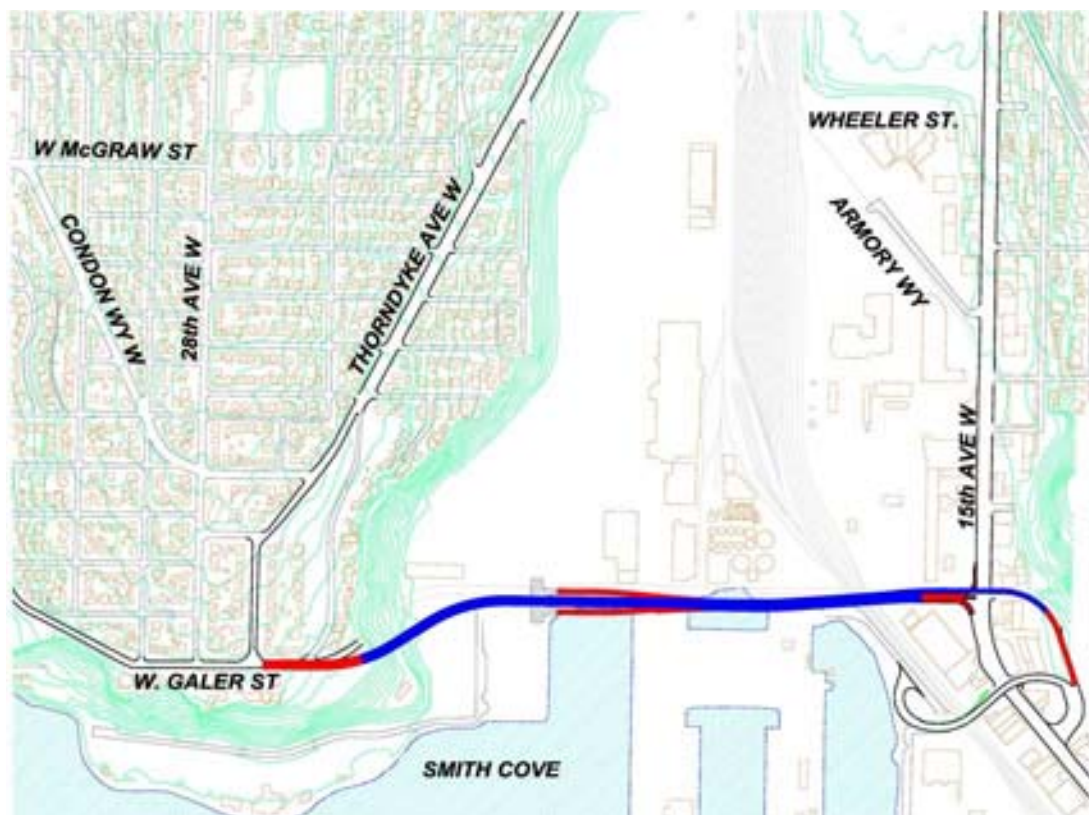


Figure 4 – Access Option A7

Table 2
Alternative A Access Options

Evaluation Criteria	A5	A6	A6-2	A7
Traffic connection - Magnolia to/from 15 th /Elliott	0	0	0	0
Bike & pedestrian access between Magnolia, North Bay, waterfront and 15 th	–	+	+	–
Traffic connection - Magnolia to waterfront	+	+	+	0
Traffic connection - North Bay to 15 th /Elliott	0	+	+	0
Impact to future use	–	0	0	+
Impact to access between piers and Port tenants	–	0	0	–
Impact to rail, permanent and during construction	–	0	0	0
Compatibility with Monorail plans	0	0	0	0
Separation of bike/pedestrian traffic from industrial areas	–	0	0	+
Waterfront and shoreline impact	–	0	0	–
Visual impact to public properties	0	+	+	–
Visual impact to the quality of the entry to Magnolia	0	0	0	0
Impact to existing businesses in North Bay	–	+	0	+
Impact to existing businesses and uses on 15 th /Elliott	0	0	0	0
Relative right-of-way cost	0	–	–	+
Relative construction cost	0	–	0	+
Recommended for Analysis		✓		✓

Notes: – = negative impact 0 = no impact + = positive impact

Source: Magnolia Bridge Replacement Design Team, 2003

Alternative D

Four access options were evaluated for Alternative D. These options are shown in Figure 5 through Figure 8.

- Figure 5 D6 A full-diamond interchange.
- Figure 6 D8 A full-diamond interchange with one loop ramp.
- Figure 7 D9 A signalized intersection mid-span on the bridge.
- Figure 8 D10 A half-diamond interchange providing access only from the east.

The results of the evaluation for these access options are shown in Table 3. The reasons for not recommending D6 and D8 are discussed below.

Option D6

- Pedestrian/bicycle access would be difficult and would not separate this traffic from industrial areas.
- Would impact existing POS tenants and future use of North Bay area
- Would impact access between piers and POS tenants.
- Would have more business displacement impacts than other D options.

Option D8

- Pedestrian/bicycle access would be difficult.
- Would impact future use of North Bay area
- Would have a negative visual impact from public properties.

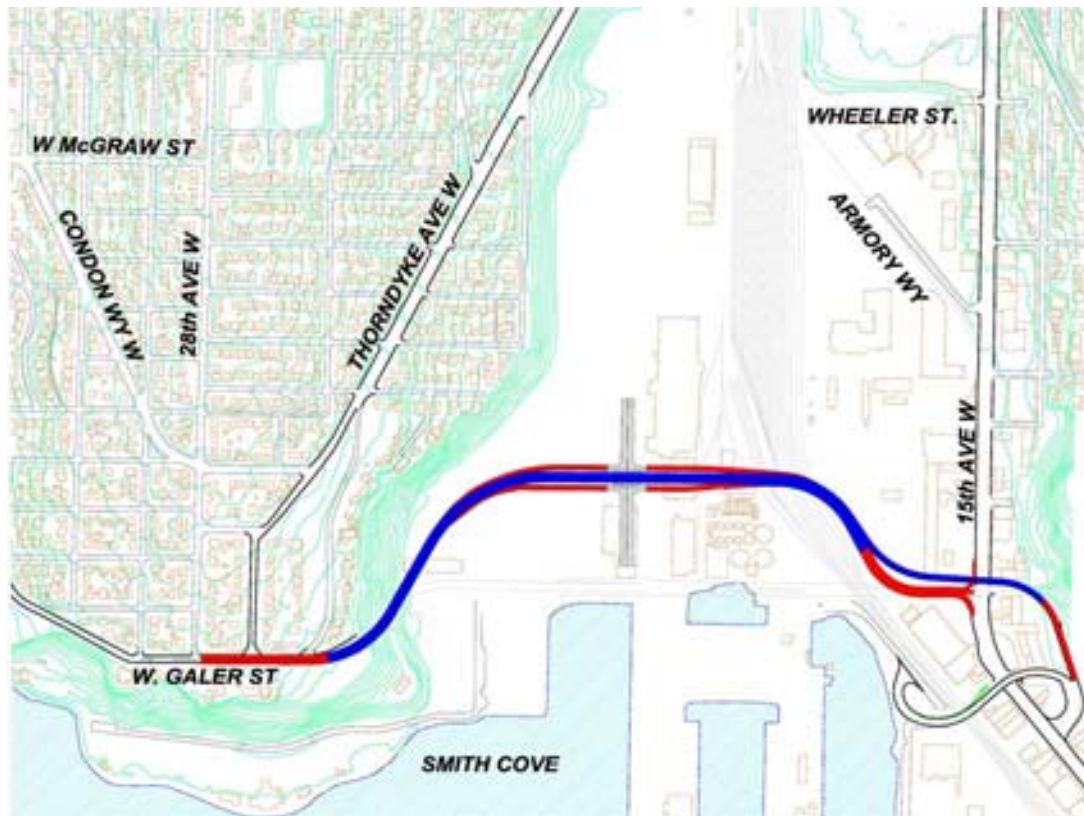


Figure 5 – Access Option D6

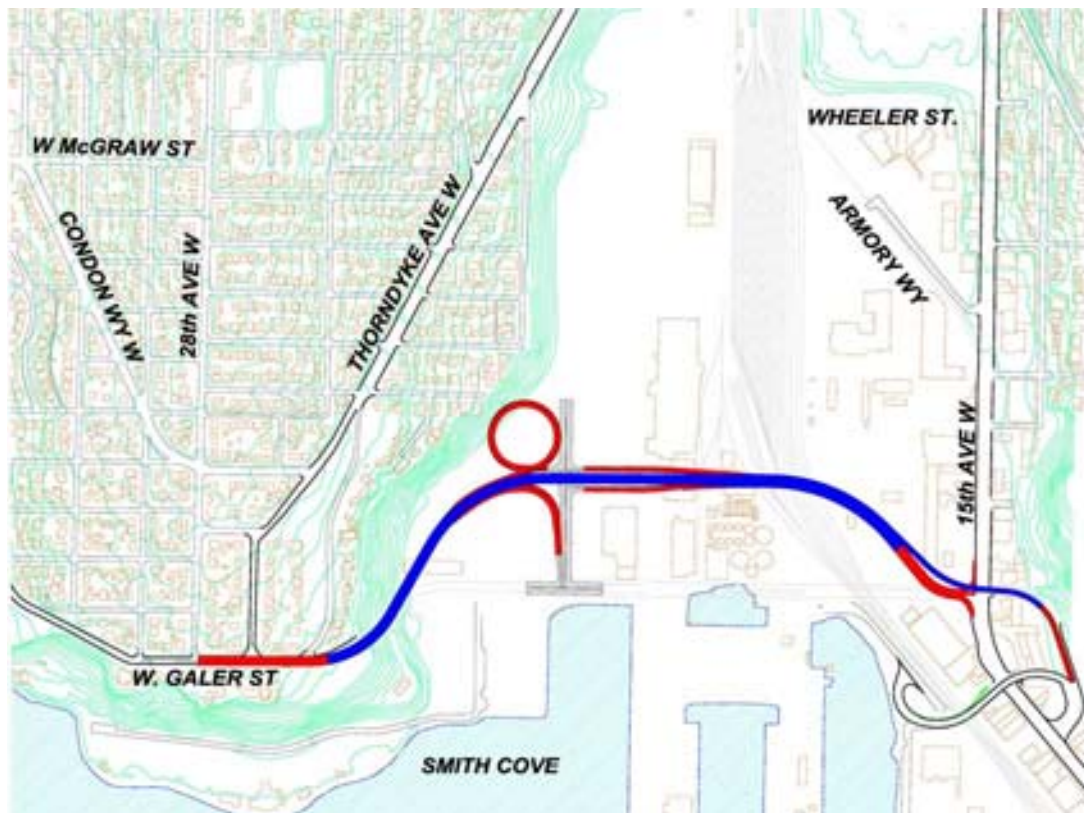


Figure 6 – Access Option D8

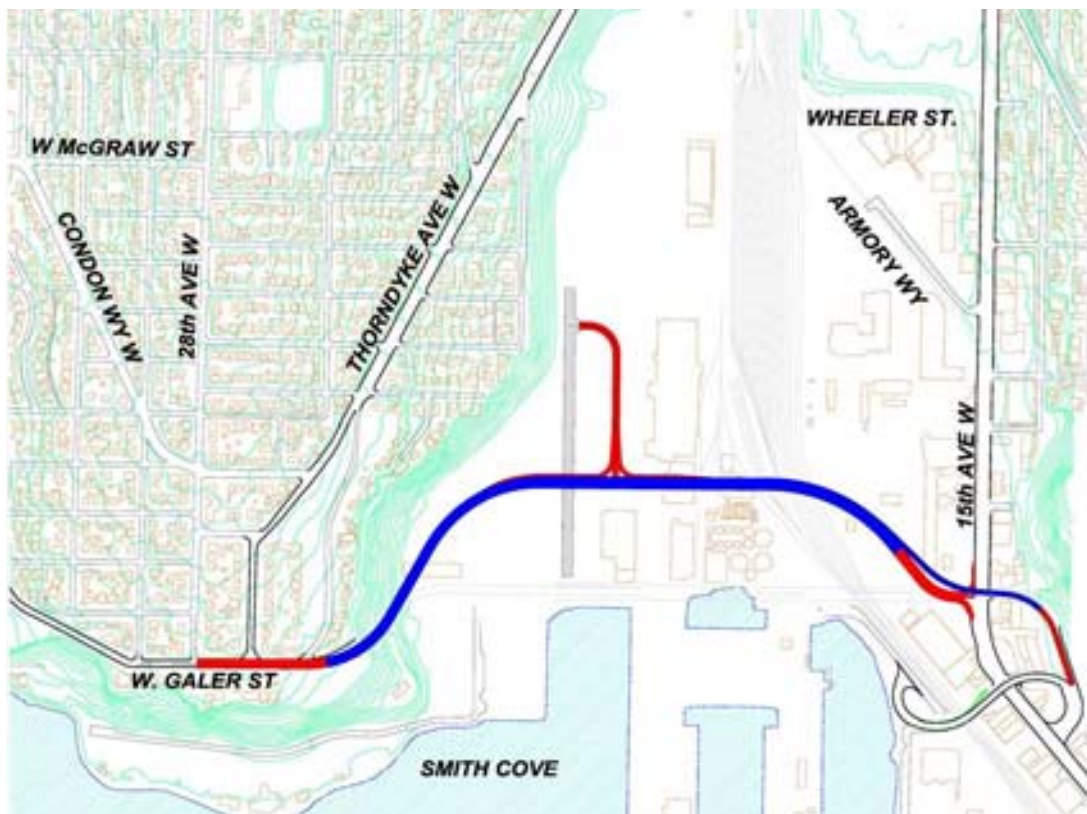


Figure 7 – Access Option D9

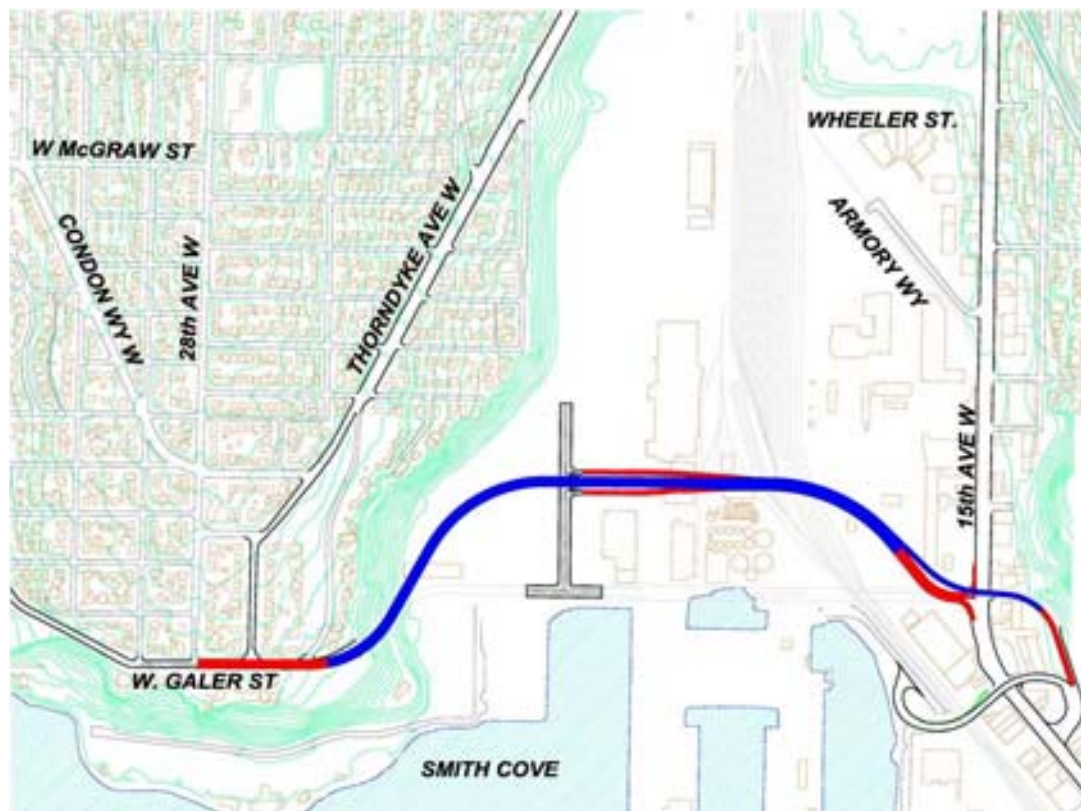


Figure 8 – Access Option D10

Table 3
Alternative D Access Options

Evaluation Criteria	D6	D8	D9	D10
Traffic connection - Magnolia to/from 15 th /Elliott	0	0	0	0
Bike & pedestrian access between Magnolia, North Bay, waterfront and 15 th	–	–	+	–
Traffic connection - Magnolia to waterfront	+	+	+	0
Traffic connection - North Bay to 15 th /Elliott	+	+	+	+
Impact to future use	–	–	0	0
Impact to access between piers and Port tenants	–	–	+	0
Impact to rail, permanent and during construction	–	0	0	0
Compatibility with Monorail plans	0	0	0	0
Separation of bike/pedestrian traffic from industrial areas	–	0	0	0
Waterfront and shoreline impact	0	0	0	0
Visual impact to public properties	0	–	+	0
Visual impact to the quality of the entry to Magnolia	0	0	0	0
Impact to existing businesses in North Bay	–	0	0	0
Impact to existing businesses and uses on 15 th /Elliott	0	0	0	0
Relative right-of-way cost	–	–	+	0
Relative construction cost	0	–	0	+
Recommended for Analysis			✓	✓

Notes: – = negative impact 0 = no impact + = positive impact

Source: Magnolia Bridge Replacement Design Team, 2003

Alternative H

Four south and three north access options were evaluated for Alternative H. These options are shown in Figure 9 through Figure 15:

- Figure 9 H1S A surface road from the Galer Flyover crossing North Bay north of the existing bridge with a new bridge up to West Galer Street;
- Figure 10 H2S A surface road from the Galer Flyover crossing North Bay at the existing bridge location then north to a new bridge up to West Galer Street;
- Figure 11 H4S A surface road from the Galer Flyover north to a new bridge up to West Galer Street at the existing bridge location;
- Figure 12 H5S A variation of H4S;
- Figure 13 H5N A new bridge crossing at West Wheeler Street, a tunnel under 15th Avenue West for northbound to westbound traffic and ramps down to West Armory West for eastbound traffic, and an added turn lane for southbound to westbound traffic;
- Figure 14 H6N A variation of H5N with a new bridge crossing at West Wheeler Street angling up to West Halladay Street; and
- Figure 15 H6N-2 A variation of H6N without the added turn lane for southbound to westbound traffic.

The results of the evaluation for these access options are shown in Table 4.

Table 4
Alternative H Access Options

Evaluation Criteria	H1 S	H2 S	H4 S	H5 S	H5 N	H6 N	H6N- 2
Traffic connection - Magnolia to/from 15 th /Elliott	–	–	0	0	0	0	0
Bike & pedestrian access between Magnolia, North Bay, waterfront and 15 th	+	+	+	–	0	0	0
Traffic connection - Magnolia to waterfront	+	+	0	–	N/A	N/A	N/A
Traffic connection - North Bay to 15 th /Elliott	0	0	0	0	N/A	N/A	N/A
Impact to future use	+	0	0	0	–	0	0
Impact to access between piers and Port tenants	0	–	–	–	N/A	N/A	N/A
Impact to rail, permanent and during construction	N/A	N/A	N/A	N/A	–	0	0
Compatibility with Monorail plans	0	0	0	0	0	0	0
Separation of bike/pedestrian traffic from industrial areas	–	–	0	0	0	0	0
Waterfront and shoreline impact	0	0	–	–	0	0	0
Visual impact to public properties	0	0	–	–	0	0	0
Visual impact to the quality of the entry to Magnolia	0	0	+	+	+	0	0
Impact to existing businesses in North Bay	–	0	0	0	–	0	0
Impact to existing businesses and uses on 15 th /Elliott	0	0	0	0	–	–	0
Relative right-of-way cost	–	0	–	+	–	0	0
Relative construction cost	0	0	–	–	–	0	0
Recommended for Analysis	✓						✓

Notes: – = negative impact 0 = no impact + = positive impact
Source: Magnolia Bridge Replacement Design Team, 2003

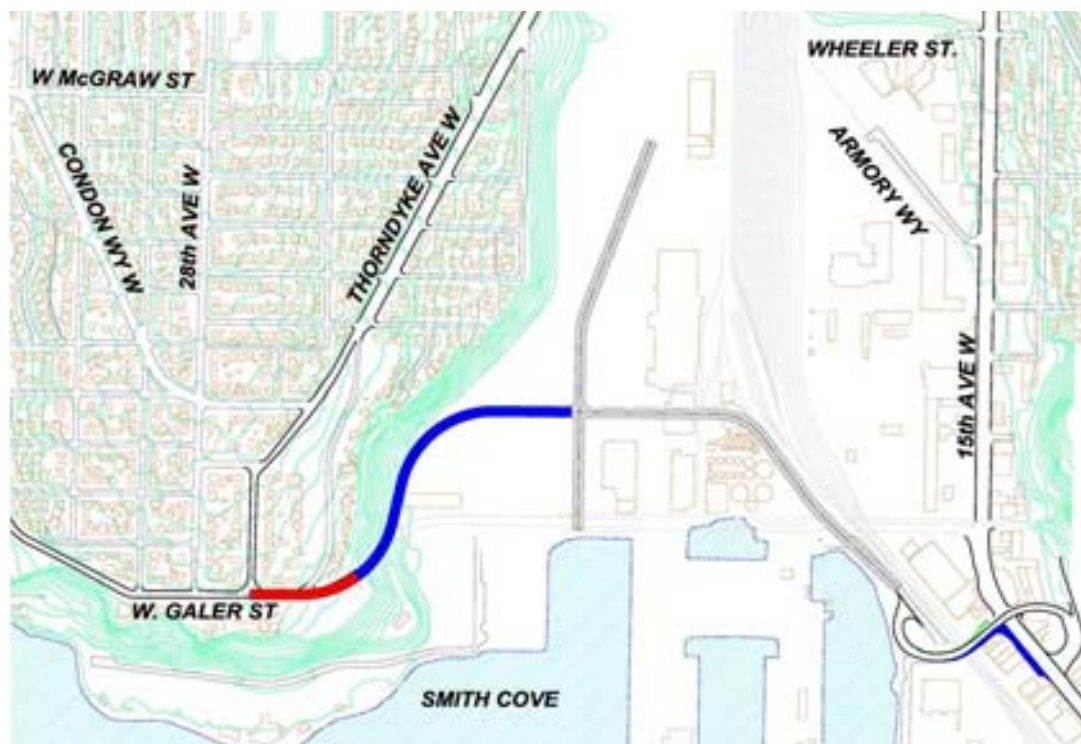


Figure 9 – Access Option H1S

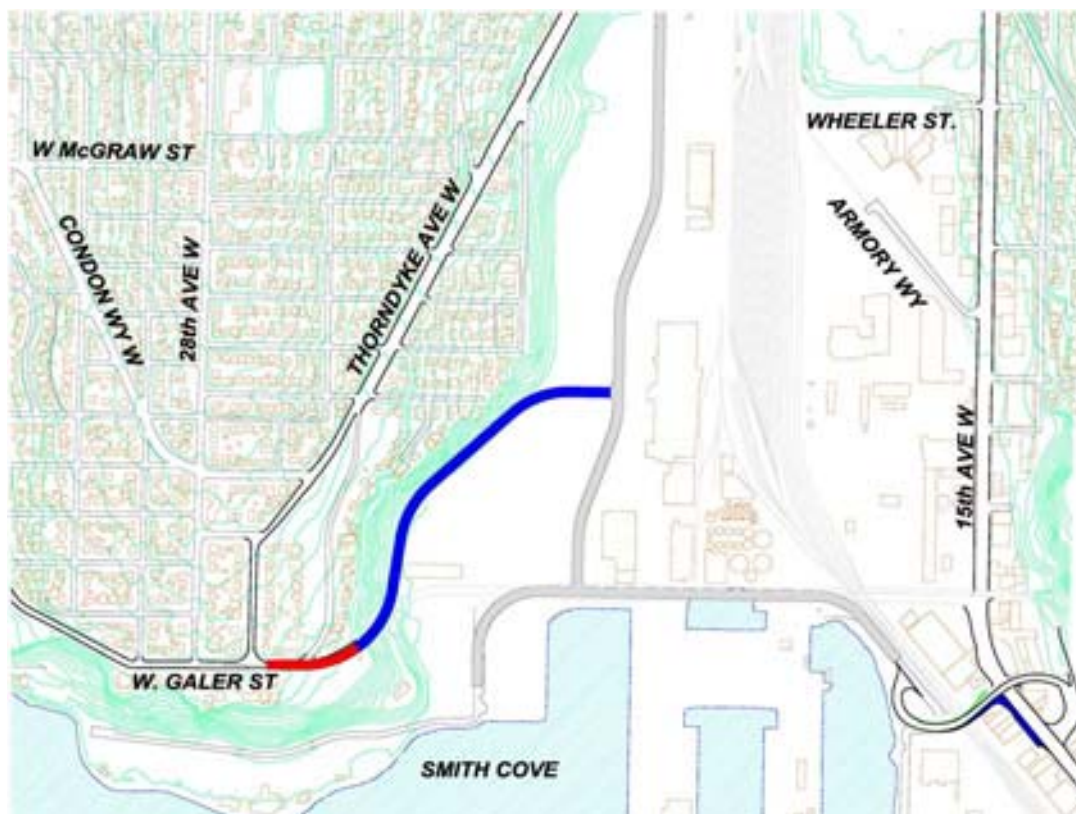


Figure 10 – Access Option H2S

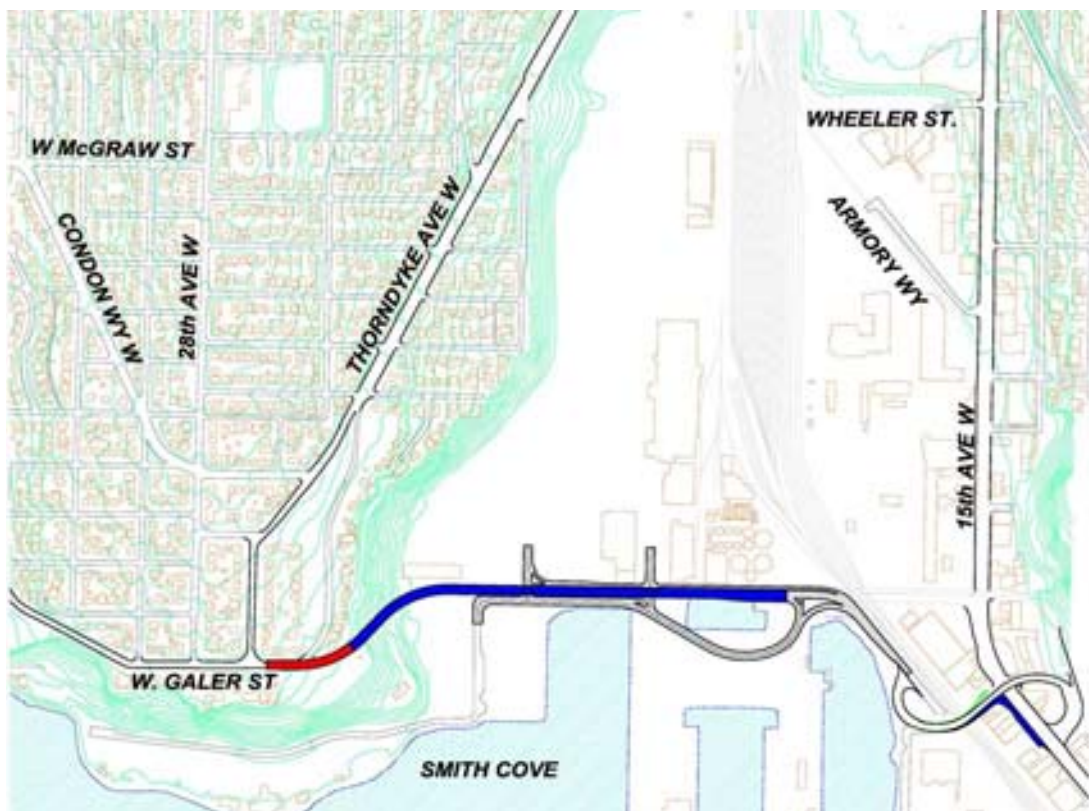


Figure 11 – Access Option H4S



Figure 12 – Access Option H5S

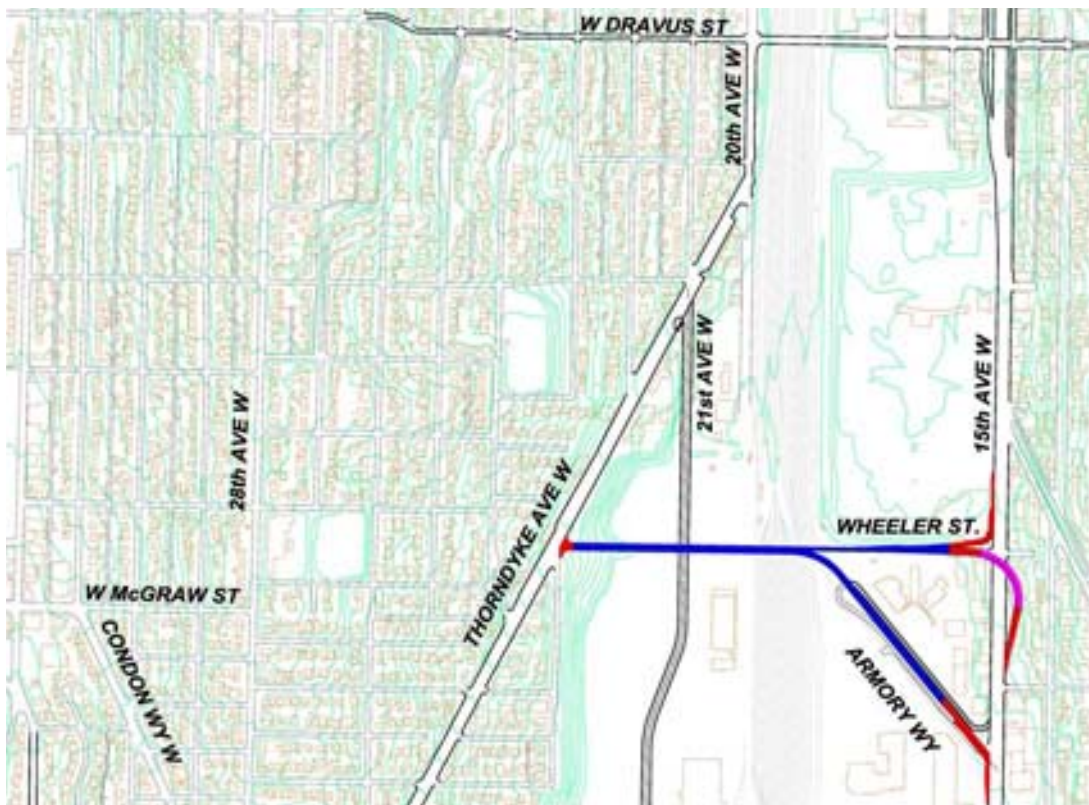


Figure 13 – Access Option H5N

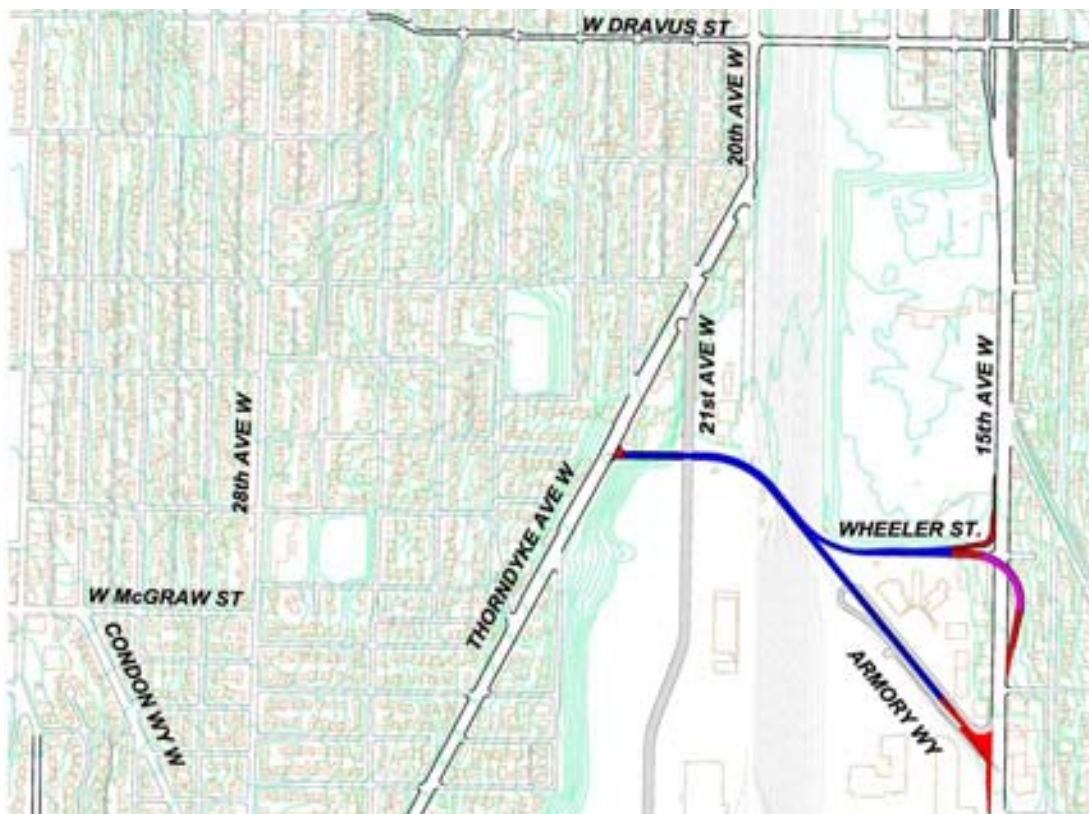


Figure 14 – Access Option H6N

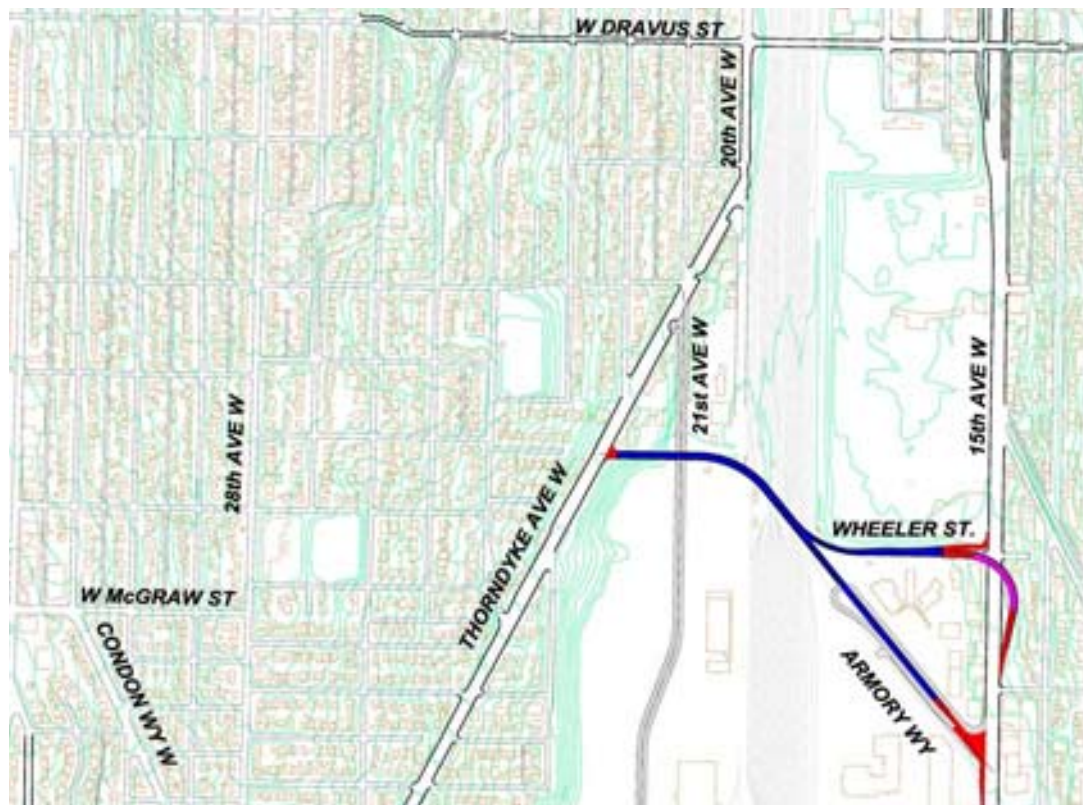


Figure 15 – Access Option H6N-2

The reasons for not recommending H2S, H4S, H5S, H5N, and H6N are discussed below.

Option H2S

- The traffic connection would be circuitous.
- Would impact access between piers and POS tenants.
- Could have greater impacts to east slope of Magnolia due to proximity.

Option H4S

- Would impact access between piers and POS tenants.
- Would impact waterfront and shoreline.
- Would have a negative visual impact from public properties.

Option H5S

- Would not connect Magnolia to the Waterfront.
- Would impact access between piers and POS tenants.
- Would impact waterfront and shoreline.
- Would have a negative visual impact from public properties.

Option H5N

- Difficult crossing this area of railroad yard.
- Would impact existing park property on 15th Avenue West.

Option H6N

- Would impact existing park property on 15th Avenue West.

Other Alternatives/Options Considered but not Advanced

Alignment C (revisited)

An alternative similar to Alignment C, originally developed and evaluated in late 2002 and early 2003, was re-examined at the request of the Port of Seattle during the environmental scoping process. The Port requested that an alternative be developed that placed a maximum length of roadway on grade, rather than on overhead structure, through the North Bay property. The Project Team developed three alignments that were variations of the earlier Alignment C.

The length of structure across Port property is determined by the grade differences between the North Bay property surface and Magnolia Bluff to the west, and required clearance over the railroad tracks to the east. About 500 feet of structure on Port property would be needed to obtain adequate clearance over the railroad track. From Magnolia Bluff to the surface would require 2,300 feet of structure from the West Galer Street terminus. There would only be about 150 feet of surface roadway between these two structures. Any attempt to increase the amount of surface roadway would compromise design standards. The length of structure or elevated roadway over Port property would not be significantly reduced compared to other alternatives. Consequently, this alternative was rejected.

Option HN-Dravus

In response to comments received from members of the public during the scoping process, a West Dravus Street option was considered for the North component of Alternative H. The Dravus structures over the railroad and at 15th Avenue West would have to be rebuilt and the option would

not pull enough traffic from the Galer Flyover to allow its intersection with Elliott Avenue West to operate at better than LOS F with forecast design year (2030) traffic demands. This alternative option would degrade the level of service of an existing intersection. This degradation combined with the impacts listed below caused this alternative to be rejected.

- 2030 traffic volumes on the Galer Flyover would increase from approximately 20,000 vehicles per day (vpd) to 23,000 vpd compared to having a north crossing at West Wheeler Street.
- 2030 traffic volumes on West Dravus Street would increase from approximately 22,000 vpd to 25,000 vpd compared to the No Build, A, and D alternatives.
- The existing West Dravus Street bridge does not have capacity to handle all forecast traffic.
- Out-of-direction travel to Magnolia would increase with traffic having to use the surface street alignment via the Galer Flyover or an improved West Dravus Street connection.
- Existing West Galer Street interchange with 15th Avenue West geometry is limiting: ramp spacing is 160 feet; narrow lanes; limited truck turning radii; and some ramps have on-street parking.
- A new bridge to handle forecast traffic volumes would need an 86-foot-width. 15th Avenue West would have to be depressed to provide clearance under the wide structure.
- Could require displacement of businesses to the west of 15th Avenue West.
- Existing driveways are closely spaced and access to businesses in the southwest quadrant of the intersection would be impacted.
- Existing bridge over railroad tracks would need to be widened to 5 lanes with modifications to West Dravus Street /20th Avenue West intersection.
- Increased truck traffic would be attracted to West Dravus Street from the North Bay area via 21st Avenue West and Thorndyke Avenue West.
- Providing additional capacity on West Dravus Street would require lane reductions and possible lane closures on both West Dravus Street and 15th Avenue West during construction.

Alternatives Carried Forward

The following alternatives and access options are recommended for analysis in the Draft EIS. The environmental impacts of these alternatives will be analyzed and evaluated, and a preferred alternative will be identified for the Final EIS.

No Build Alternative

The No Build alternative would maintain the existing bridge structure in place with the existing connections at the east and west ends. Long term strategies for maintaining the existing structure would be required for the No Build alternative. To keep the existing bridge in service for over ten years, the following would need to be accomplished:

- An in-depth inspection of the bridge would be required to determine needed repairs and a long-term maintenance program.
- Concrete repairs would be required. These repairs could include injection of cracks with epoxy grout, repair of spalled concrete, and replacement of deficient concrete and grout.
- Preservation measures to slow corrosion of the reinforcement would be required. These measures could include a cathodic protection system.
- Any structural elements that lack the capacity to carry a tractor-trailer truck with a 20-ton gross trailer weight would need to be identified, modeled, and strengthened.

A new surface street would be constructed on Port of Seattle property connecting 21st Avenue West at the north end of North Bay with 23rd Avenue West near Smith Cove Park. In addition, a southbound ramp would be added to the Galer Flyover to accommodate eastbound to southbound Elliott Avenue West traffic movements. The Galer Flyover ramp has been identified as a needed improvement for later construction phases in environmental studies for the Amgen (Immunex) project accessed by Alaskan Way West and the Galer Flyover. New surface streets through Port of Seattle property would be located through the Port's master planning process for the North Bay property. The surface street and Galer Flyover ramp would be included in any alternative, but are not part of this environmental process.

Alternative A

Replace the existing bridge with a new structure immediately south of the existing bridge. The alternative would construct a signalized elevated intersection (Alternative A – Intersection) in the bridge's mid-span to provide access to the waterfront and the Port of Seattle North Bay property from both the east and the west. Connections at the east and west ends of the bridge would be similar to the existing bridge.

An optional half-diamond interchange (Alternative A – Ramps) could be constructed in lieu of the elevated intersection to provide access to the waterfront and the Port of Seattle North Bay property from the east.

Pros

- Signalized intersection would provide access to the waterfront from Magnolia.
- Half-diamond would allow free-flow traffic on the bridge.

Cons

- Signalized intersection would require traffic to stop on the bridge.
- Half-diamond would not provide access to the waterfront from Magnolia.

Alternative D

Construct a new bridge in the form of a long arc north of the existing bridge. A new ramp would be constructed to connect with 15th Avenue West at the existing connection location. This alternative would construct a signalized elevated intersection in the bridge mid-span (Alternative D – Intersection) to provide access to the waterfront and Port of Seattle North Bay property from both the east and the west.

An optional half-diamond interchange (Alternative D – Ramps) could be constructed in lieu of the elevated intersection to provide access to the waterfront and the Port of Seattle North Bay property from the east.

Pros

- Signalized intersection would provide access to the waterfront from Magnolia.
- Half-diamond would allow free-flow traffic on the bridge.

Cons

- Signalized intersection would require traffic to stop on the bridge.
- Half-diamond would not provide access to the waterfront from Magnolia.

Alternative H

South Crossing

A surface road from the west end of the Galer Flyover would cross under the existing Magnolia Bridge, run north along the west side of the railroad tracks for approximately 1,700 feet and turn west to connect with a new structure ascending to Magnolia at West Galer Street (the existing bridge connection locations). Access to the waterfront and Port of Seattle North Bay property would be provided at an intersection along the surface road.

No improvements would be made to the Galer Flyover other than a southbound ramp to accommodate eastbound to southbound traffic movements. This construction is already planned and would be included in any build alternative. This ramp is not part of this environmental process.

Pros

- Would use existing Galer Flyover to cross the railroad tracks. The flyover would have no improvements other than the planned eastbound to southbound ramp described in the No Build alternative.

Cons

- The Galer Flyover does not have capacity to handle all forecast traffic. Traffic volumes would be constrained and would reroute to the north.
- Would not separate pedestrian/bicycle traffic from industrial areas.
- 2030 traffic volumes would increase from approximately 8,000 vpd to 20,000 vpd on the Galer Flyover compared to the No Build, A, and D alternatives.
- The surface street connection provided by the south crossing would result in out-of-direction travel between 15th Avenue West and Magnolia.
- Would impact access between piers and Port of Seattle tenants.
- The narrow width between the retaining wall on the western end of the Galer Flyover and the adjacent bike trail may not allow sufficient lanes and turning radii to carry the projected truck traffic.

North Crossing

Traffic bound for Magnolia from 15th Avenue West would use a bridge at West Wheeler Street. Southbound motorists on 15th Avenue West would turn right onto West Wheeler Street. Northbound motorists would cross under 15th Avenue West and connect with West Wheeler Street using a tunnel ramp. The alignment would continue on an elevated structure and connect to Thorndyke Avenue West at West Halladay Street. Eastbound traffic from Magnolia would use the western portion of the West Halladay/West Wheeler Street alignment, but would veer to the south at West Armory Way to connect with 15th Avenue West.

Pros

- Would provide a fourth access to Magnolia
- The north crossing would reduce traffic volumes on West Dravus Street from approximately 22,000 vpd to 18,000 vpd compared to the No Build, A, and D alternatives.

Cons

- Trucks would be prohibited from turning left onto Thorndyke Avenue West.
- Trucks from the Port's North Bay area would have to use Thorndyke Avenue West and West Dravus Street or the Galer Flyover.

APPENDIX C

ADDENDUM TO THE ALIGNMENT STUDY REPORT

ALTERNATIVE C SCREENING

Introduction

This addendum documents the evaluation process for selection of one alignment alternative for a Magnolia Bridge Replacement alternative that is partially a surface roadway within the Port of Seattle's North Bay master planning area (Terminal 91 uplands).

Alternative C was one of the nine alternatives considered by the project team in fall 2002. Three of the nine alternatives were selected in early 2003 for analysis in discipline reports and a Draft Environmental Impact Statement (DEIS). These were Alternatives A, D, and H. Alternative H was dropped in March 2004 for containing a fatal flaw in traffic operations. Alternative C was the next highest ranking alternative of the nine and is distinct from Alternatives A and D by providing a section of surface roadway in the Terminal 91 upland area rather than being entirely on structure.

Similar to the process documented in Appendix B for Alternatives A and D, several alignment and access options were developed for Alternative C for evaluation and selection of a single Alternative C alignment for evaluation in the discipline reports and DEIS.

Alternative C Alignment Options

The Seattle Department of Transportation (SDOT) eliminated Alternative H from further evaluation and consideration as a Magnolia Bridge Replacement alternative in March 2004. In April 2004, SDOT directed the project team to develop alignment options to be considered for an alternative providing some surface roadway in the Port of Seattle Terminal 91 uplands. The alternative would be a refinement of Alternative C (see Figure 28, page 54 of the Alignment Study Report). Alignment options were developed by the project team with input from the Port of Seattle North Bay team. Input from the Port of Seattle is necessary to develop an alignment alternative meeting the project goal to support redevelopment of vacant or underutilized Interbay properties. Since Alternative C was originally developed in late 2002, the Port of Seattle began a master planning process in the fall of 2003 for the North Bay area including the Terminal 91 uplands. Coordination with Port redevelopment plans is further necessary since the City of Seattle does not have any public right-of-way across Port property. The existing structure is within an easement and any new structure or roadway outside of this easement will require acquisition of right-of-way from the Port.

An initial meeting between the Magnolia Bridge Replacement project team (SDOT) and the North Bay team was held on May 4, 2004 to initiate project coordination. A second meeting between the two groups was held on May 27 to review five alignment concepts prepared by the SDOT team and two alignment options prepared by the North Bay team. From the options reviewed at that May 27 meeting, the five SDOT options (Options 1 through 5) and one North Bay option (Option 6) were presented to the Magnolia Bridge Replacement Project Design Advisory Group at their June 2, 2004 meeting. These six alignment options were screened by Magnolia Bridge Replacement Project Team members at a June 8, 2004 meeting.

All alignment options would provide two travel lanes in each direction from 15th Avenue West, over the BNSF railroad, and to a connection with a future surface road in the Terminal 91 uplands. The active Terminal 91 marine/industrial area would remain fenced with gated access at or in the vicinity of the existing East Gate connection to Alaskan Way West. From the surface road intersection, the alignment options would provide two lanes uphill to West Galer Street on Magnolia Bluff, and one lane downhill. The grade between Magnolia Bluff and the Terminal 91

surface would be 6-1/2 percent for all options, the same as the grade on the existing Magnolia Bridge.

Option 1

Alignment Option 1 (Figures C-1 and C-2) would descend from Magnolia Bluff on a structure running north-northeast along the toe of the bluff slope. The alignment would turn to the east and southeast on a 350-foot radius curve pulling away from the bluff and would reach grade about 150 feet east of the existing fence line along the west boundary of the Trident Seafood property. This would also be the location of the intersection with a future north-south surface road within the Terminal 91 uplands portion of North Bay.

After running as a surface roadway for about 400 feet, the alignment would turn to the east-southeast through the tank farm site, climbing on fill and structure over the BNSF railroad. The Terminal 91 access to the industrial property north of the bridge would be maintained by locating an access roadway under the Option 1 alignment in the vicinity of Pier 90.

Option 2

Alignment Option 2 (Figures C-3 and C-4) would intersect the north-south surface road similar to Option 1, but would open up the curve at the base of the grade from Magnolia Bluff. A curve radius of 480 feet would be obtained and the surface roadway segment, including the surface street intersection, would be about 500 feet long. The Terminal 91 industrial property access modification would be the same as Option 1.

Option 3

Option 3 (Figures C-5 and C-6) would increase the developable North Bay area south of the alignment by shifting the surface street intersection farther southeast compared to Options 1 and 2, and keeping the surface road between the alignment and waterfront farther east. The 400-foot curve radius at the base of the bluff would still be on the 6-1/2 grade. The surface section of the Option 3 alignment would be about 450 feet long. The Terminal 91 industrial property access modification would be the same as Option 1.

Option 4

Option 4 (Figures C-7 and C-8) would be similar to the original Alternative C alignment in that it would have a 90-degree intersection with the future north-south surface road running west of the Trident Seafood property fence line. The Port of Seattle intends to remove the tanks from the tank farm site. By utilizing the tank farm area, Option 4 would have a higher speed, larger radius curve between the north-south section and the east-west section connecting over the BNSF Railway to 15th Avenue West than the original Alternative C alignment. Option 4 would have about 800 feet of surface roadway. The Terminal 91 industrial property access modification would be the same as Option 1. As shown, there would be no access from the waterfront to Magnolia Bluff. This would require a second intersection with the north-south surface road north of the Option 4 intersection.

Option 5

Option 5 (Figures C-9 and C-10) would locate the surface street intersection east of the Trident Seafood property fence line and would provide a 650-foot radius curve at the base of the bluff. This would be accomplished by bringing the alignment south of the existing bridge before turning to the east-northeast to cross the BNSF Railway. There would be less than 300 feet of alignment on the surface with this option. This alignment would require relocation of the Terminal 91 East Gate to north of the new structure.

Option 6

Option 6 (Figures C-11 and C-12) would place the alignment north and east of the Trident Seafoods operations. The structure descending from Magnolia Bluff would touch down on the surface while still along the bluff and before turning east to an intersection with the future north-south surface road west of the Trident Seafood property fence line. The alignment would continue east from the intersection and turn south along the BNSF Balmer rail yard property line. The alignment would rise on fill and structure at the north side of the tank farm site while turning east to cross the BNSF Railway and would connect to 15th Avenue West. About 2,200 feet of this alignment would be on the surface.

Alternative C Alignment Option Screening

The six alignment options were evaluated to select one option for analysis as Alternative C in the discipline reports. The criteria that were used to screen these options are shown in Table C-1. These criteria are the same criteria used in Appendix B in the selection of access options for Alternatives A, D, and H.

Fatal Flaw Review

Before evaluating the options against the screening criteria, any options that could not meet the project design criteria were eliminated. Options 1 and 3 would have stopping sight distances requiring a 25 mile-per-hour design speed on the structure from Magnolia Bluff. This would result from a barrier on the inside of the curve and would be difficult to mitigate on the structure. These two options were eliminated from further consideration.

Option Screening

Alignment options 2, 4, 5, and 6 were evaluated by the team against the criteria in Table C-1. This evaluation screened the four options relative to each other, not relative to any other alternative. The impact of each option was subjectively scored based on each criteria as shown in Table C-2. In Table C-3, numeric values were assigned to the scores and the values were summed for each option. The options were ranked by their scores both with and without the cost criteria.

Results

Option 4 ranked lowest with a value of 26, Option 5 scored next with 28, and Options 2 and 6 scored 30. The team agreed that Option 4 was the weakest of the four and should be dropped. Because Alternative C is intended to provide a surface roadway rather than being entirely on structure, the three remaining options were evaluated based on compatibility with future land use and access between the piers and tenants.

The team agreed that Option 6 had the least impact on future land use and access between the piers and Port tenants. The longer length of Option 6 would increase right-of-way and construction costs relative to the other options, but much of this would be offset by lower business relocation costs. Option 6 would also locate the intersection with the north-south surface road farther from the bottom of the 6½ percent grade off the Magnolia Bluff than the other options. The curve to the west of the intersection would have sight distance limitations, but since the roadway would be on-grade, no sight-obstructing pedestrian barrier would be needed and the required sight distance could be maintained.

Conclusion

Option 6 will be carried forward as the Alternative C alignment for discipline report analysis. The railroad spur alignment on the east side of the Trident and City Ice building would have to decrease

the length of the lead track to the north where it crosses the Trident building service access. This could be accomplished by using a tighter track radius where the track comes in from the southeast and moving the track switches farther south. Alternative C would use a railroad crossing alignment similar to Alternative D. This would avoid the need to relocate the Terminal 91 East Gate farther south.

Table C-1
Alignment Screening Criteria

Traffic Connection - Magnolia to/from 15th/Elliott

Relative ranking of the vehicular connection between Magnolia and the 15th Ave./Elliott Ave. corridor from the point of view of a traveler following the provided route.

Bike & Pedestrian Access between Magnolia, North Bay, Waterfront and 15th Avenue W

Relative ranking of the quality of the pedestrian and bicycle connections between Magnolia, North Bay, the public waterfront, and the 15th Ave./Elliott Ave. corridor from the perspective of a pedestrian or bicyclist traveling on the new facility.

Traffic Connection - Magnolia to Waterfront

Relative ranking of the vehicular connection between Magnolia and the public waterfront areas from the point of view of a traveler following the provided route. Options that do not provide the connection via the new facility received the lowest relative ranking.

Traffic Connection - North Bay to 15th/Elliott

Relative ranking of the vehicular connection between the North Bay Area and the 15th Ave./Elliott Ave. corridor from the point of view of a traveler following the provided route.

Impact to Future Land Use

Relative ranking of the flexibility to adjust the location of access points to the North Bay Area, minimizing constraint to future development possibilities within the North Bay Area.

Impact to Access between Piers and Port Tenants

Relative ranking of the interference with industrial traffic between the Port waterfront facilities and the existing waterfront related Port tenants. This ranking assesses the interference with the access route created by both the structure of the new facility and the at-grade traffic routes required to connect to the new facility.

Impact to Rail, Permanent and During Construction

Relative ranking assessing the degree of impact to the BNSF rail lines, both during construction impact and permanent impact.

Separation of Bike-Pedestrian Traffic from Industrial Areas

Relative ranking assessing the degree to which the option requires pedestrians and bicyclists to travel through industrial areas to access Magnolia and the public waterfront areas.

Waterfront and Shoreline Impact

Relative ranking assessing the impact to waterfront and shoreline areas.

Visual Impact to Public Properties

Relative ranking assessing the visual impact to (from?) public lands, primarily at the waterfront.

Visual Impact to the Quality of the Entry to Magnolia

Relative ranking assessing the impact to views from the point of view of a traveler entering and departing Magnolia.

Impact to Existing Businesses in North Bay

Relative ranking of the impact to existing businesses in the North Bay area.

Impact to Existing Businesses and Uses on 15th/Elliott

Relative ranking of the impact to existing businesses, residences and land uses on the 15th Ave and Elliott Corridor.

Relative Right of Way Cost

Relative ranking based on a square foot comparison of the new right-of-way needs.

Relative Construction Cost

Relative ranking based on a square foot comparison of the new structure to be constructed.

Source: Magnolia Bridge Replacement Design Team, 2003

Table C-2
Alignment Options Evaluations

Evaluation Criteria	Alignment Option					
	C1	C2	C3	C4	C5	C6
Fatal Flaw - Project Design Criteria	Yes	No	Yes	No	No	No
Traffic Connection - Magnolia to/from 15th/Elliott		0		-	0	-
Bike & Pedestrian Access between Magnolia, North Bay, Waterfront and 15th Avenue West		0		-	0	-
Traffic Connection - Magnolia to Waterfront		0		-	0	0
Traffic Connection - North Bay to 15th/Elliott		0		-	0	0
Impact to Future Land Use		-		0	-	+
Impact to Access between Piers and Port Tenants					-	+
Impact to Rail, Permanent and During Construction					0	0
Separation of Bike-Pedestrian Traffic from Industrial Areas					0	0
Waterfront and Shoreline Impact		+		+	-	+
Visual Impact to Public Properties		+		+	0	+
Visual Impact to the Quality of the Entry to Magnolia		+		0	+	-
Impact to Existing Businesses in North Bay		-		-	0	+
Impact to Existing Businesses and Uses on 15 th /Elliott		0		0	0	0
Relative Right of Way Cost		0		0	0	-
Relative Construction Cost		0		0	0	-

Notes: - = negative impact 0 = no impact + = positive impact
Ratings are relative among the alignment options and are not comparisons with the No Build Alternative or other build alternatives.

Source: Magnolia Bridge Replacement Design Team, 2004

Table C-3
Alignment Options Scoring and Ranking

Evaluation Criteria	Alignment Option					
	C1	C2	C3	C4	C5	C6
Fatal Flaw - Project Design Criteria	Yes	No	Yes	No	No	No
Traffic Connection - Magnolia to/from 15th/Elliott		2		1	2	1
Bike & Pedestrian Access between Magnolia, North Bay, Waterfront and 15th Avenue West		2		1	2	1
Traffic Connection - Magnolia to Waterfront		2		1	2	2
Traffic Connection - North Bay to 15th/Elliott		2		1	2	2
Impact to Future Land Use		1		2	1	3
Impact to Access between Piers and Port Tenants		1		1	1	3
Impact to Rail, Permanent and During Construction		2		2	2	2
Separation of Bike-Pedestrian Traffic from Industrial Areas		2		2	2	2
Waterfront and Shoreline Impact		3		3	1	3
Visual Impact to Public Properties		3		3	2	3
Visual Impact to the Quality of the Entry to Magnolia		3		2	3	1
Impact to Existing Businesses in North Bay		1		1	2	3
Impact to Existing Businesses and Uses on 15th/Elliott		2		2	2	2
Relative Right of Way Cost		2		2	2	1
Relative Construction Cost		2		2	2	1
Score	0	30	0	26	28	30
Rank	5	1	5	4	3	1
Without Considering Cost						
Score	0	26	0	22	24	28
Rank	5	2	5	4	3	1

Notes: From Table C-2: - = 1 0 = 2 + = 3
Source: Magnolia Bridge Replacement Design Team, 2004

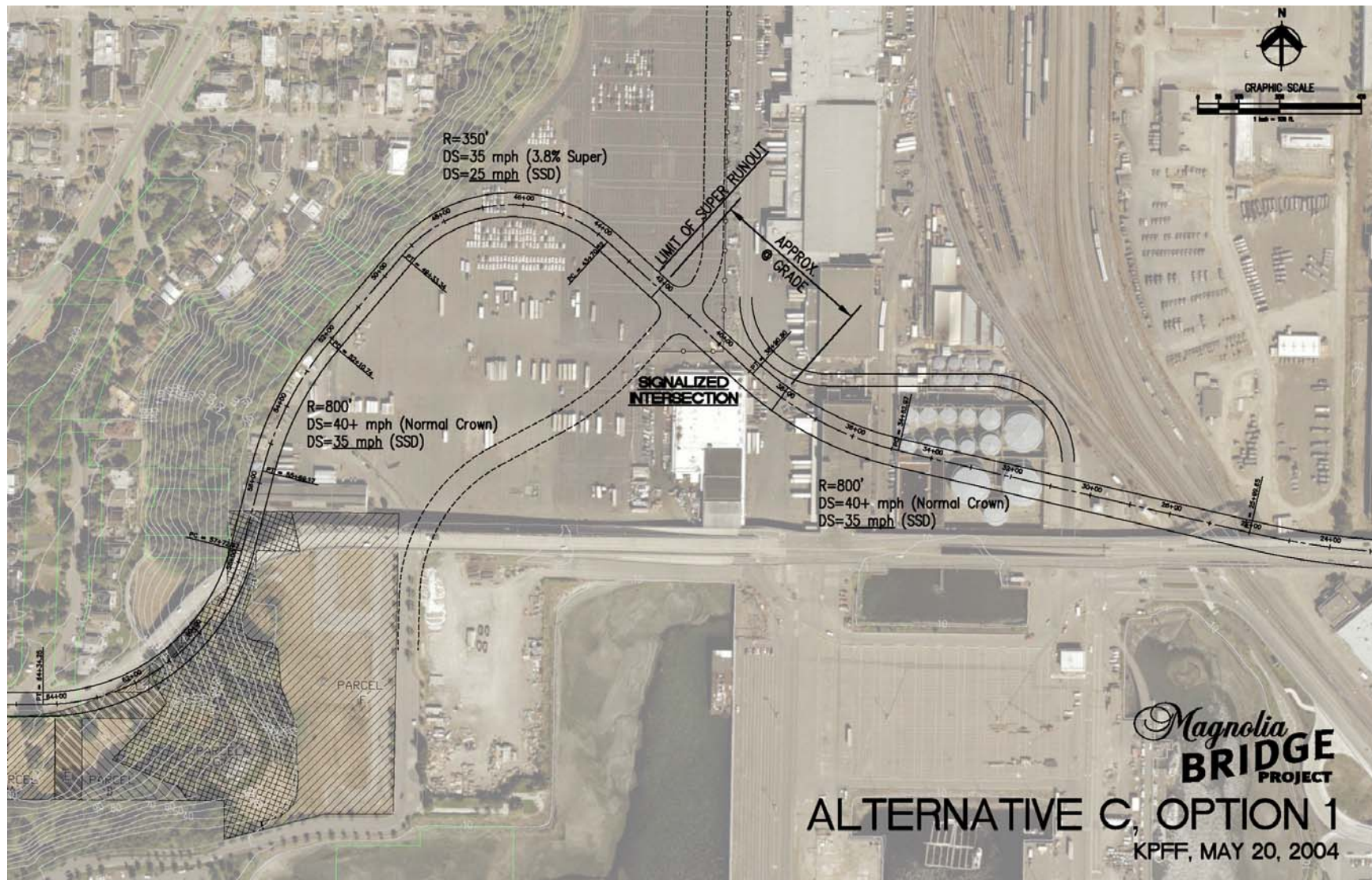


Figure C-1
Option 1 Plan

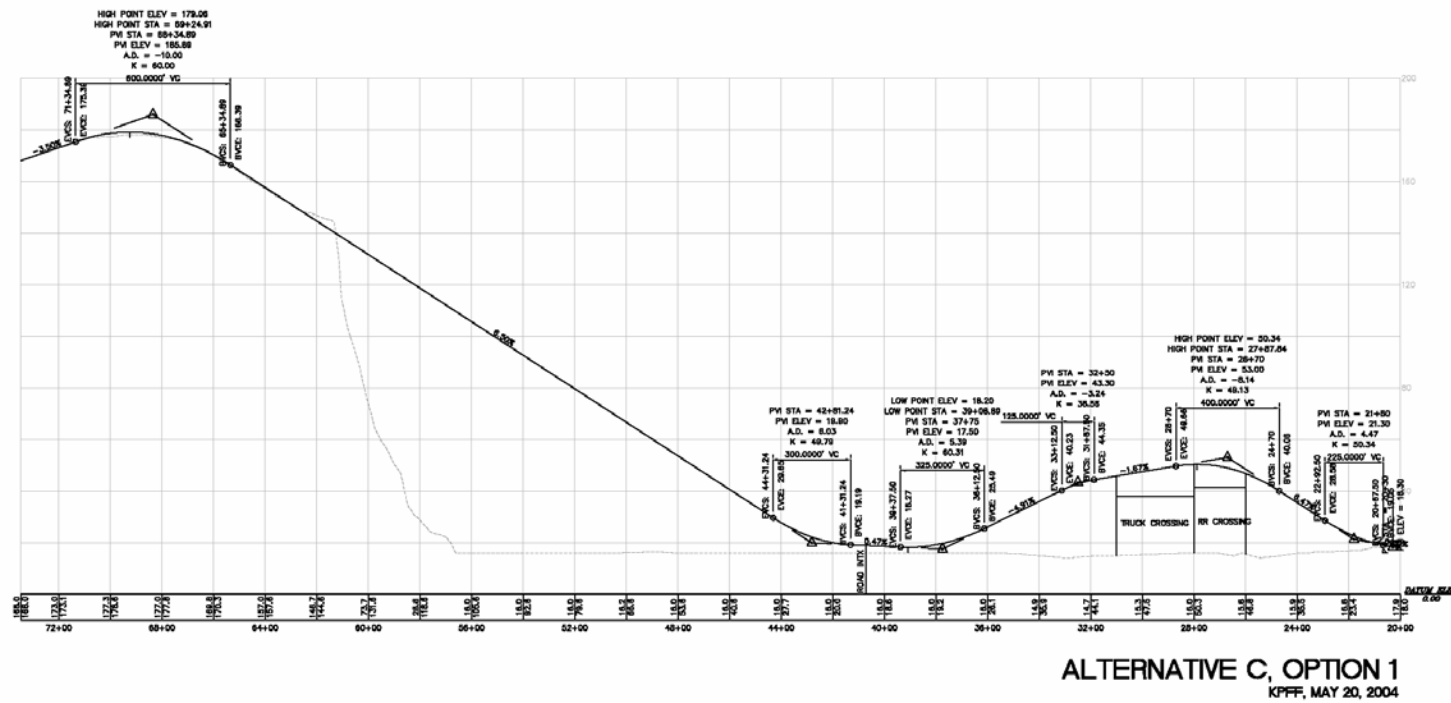


Figure C-2
 Option 1 Profile

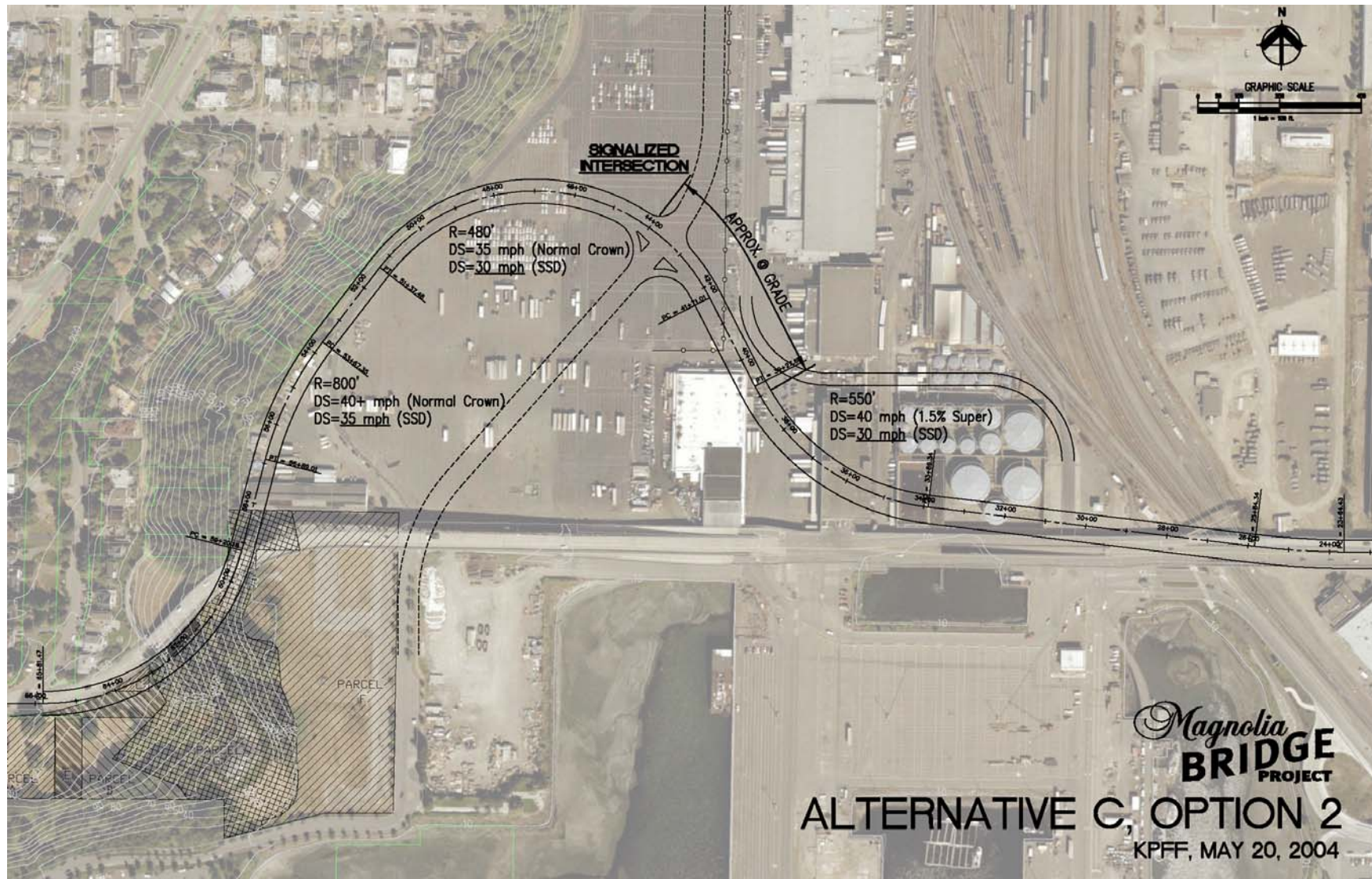


Figure C-3
Option 2 Plan

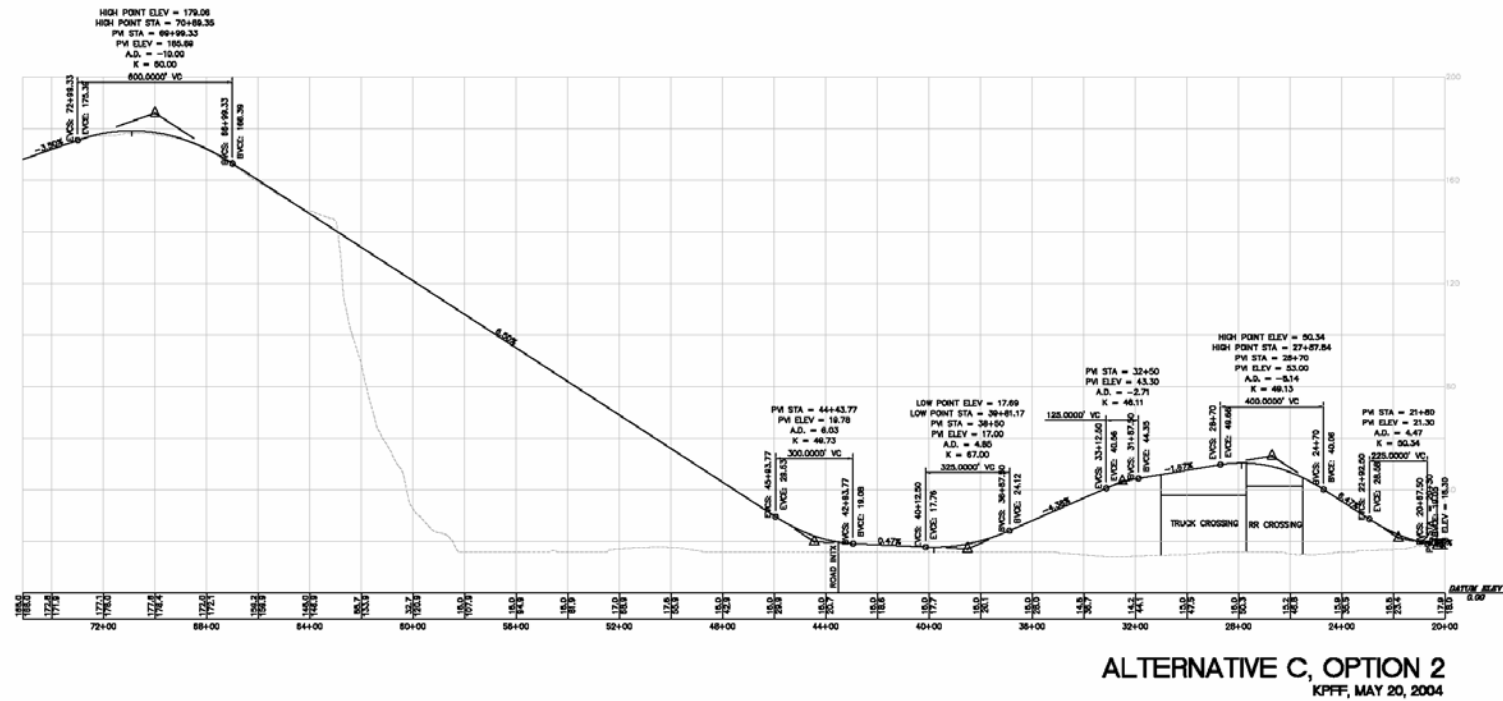


Figure C-4
Option 2 Profile

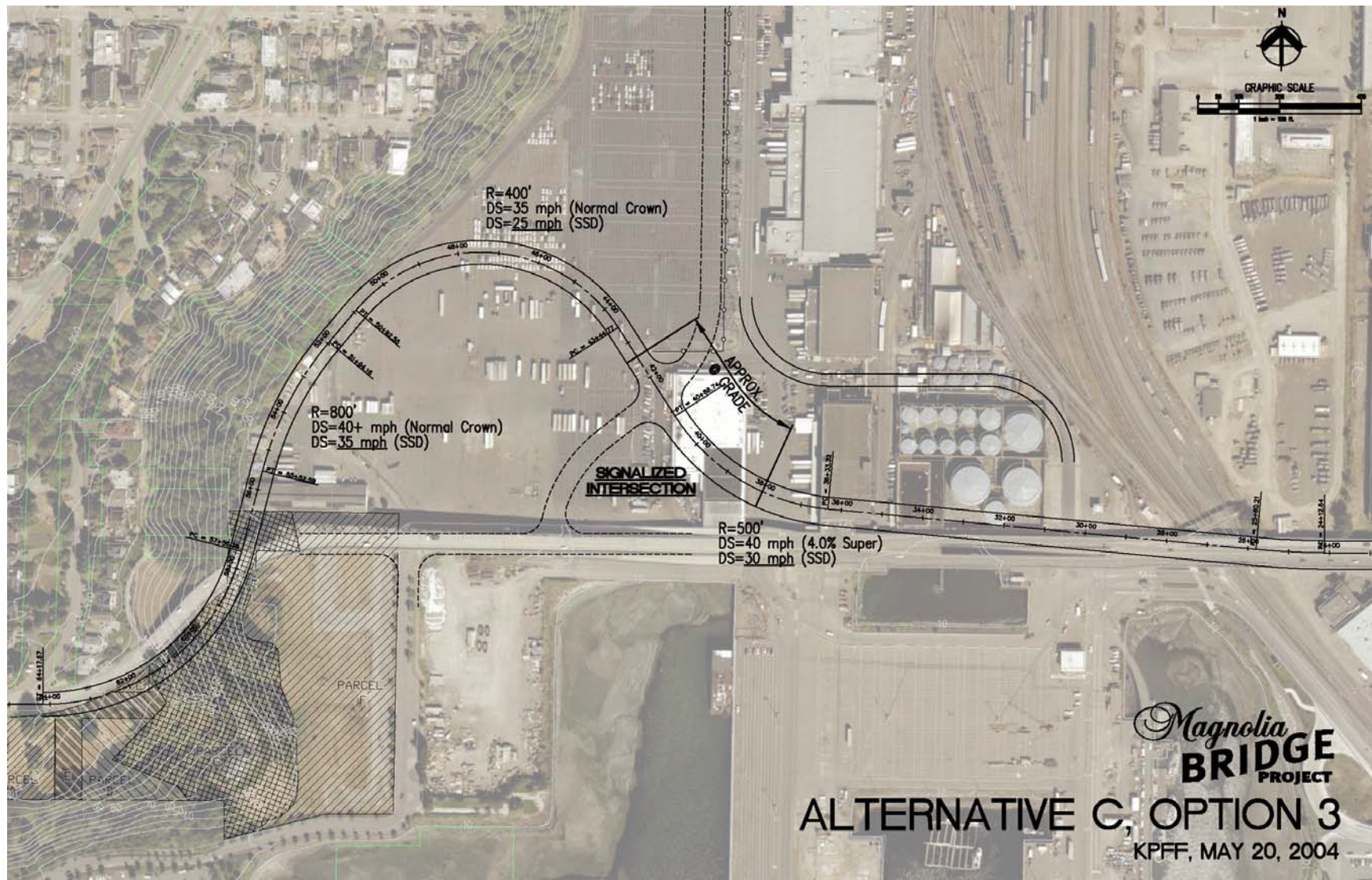


Figure C-5
Option 3 Plan

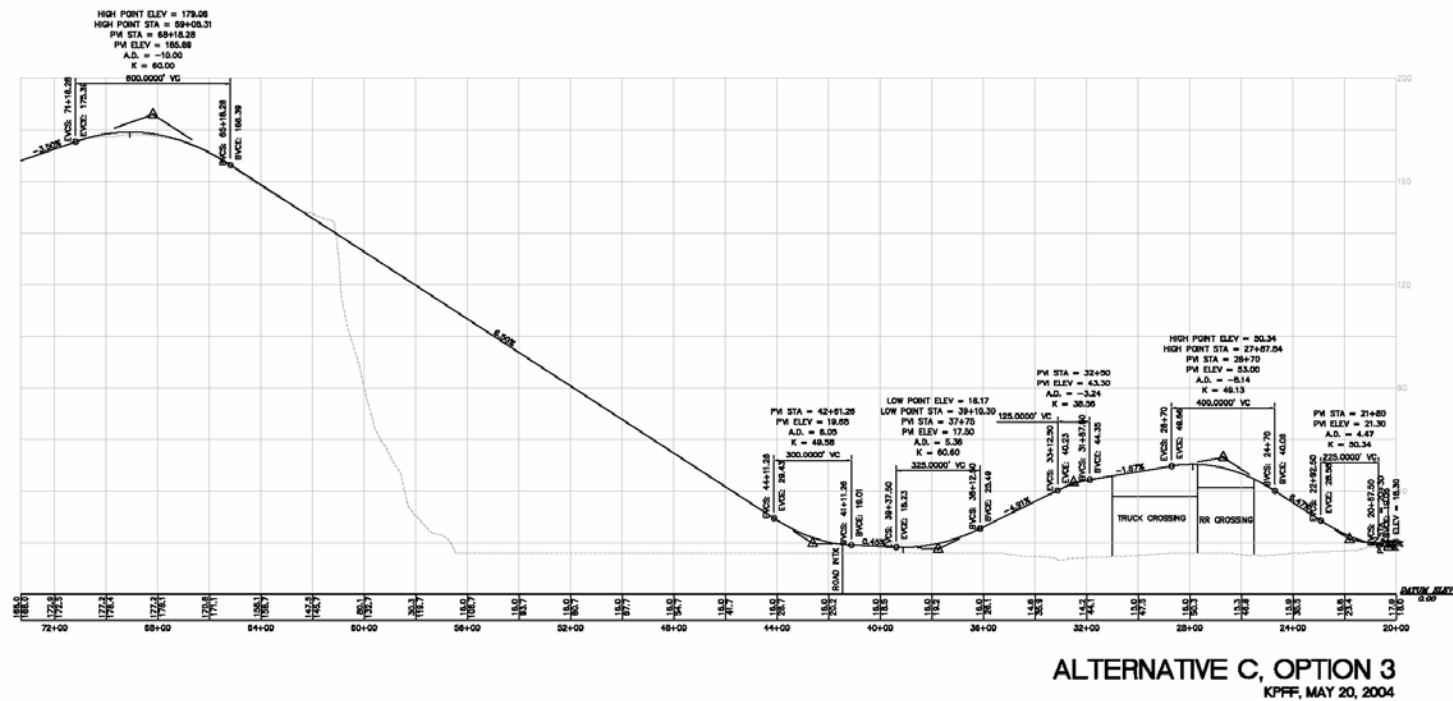


Figure C-6
Option 3 Profile

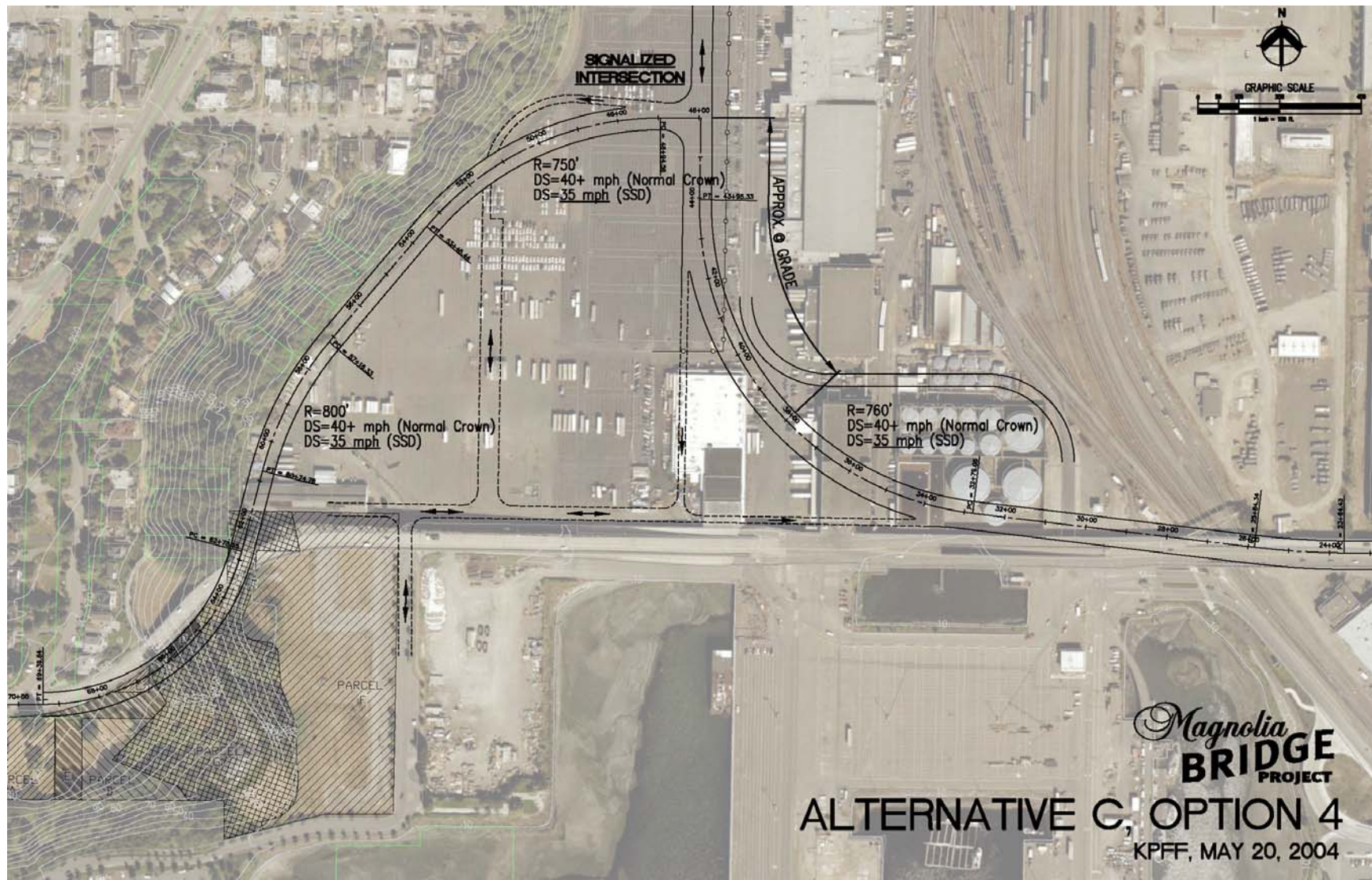
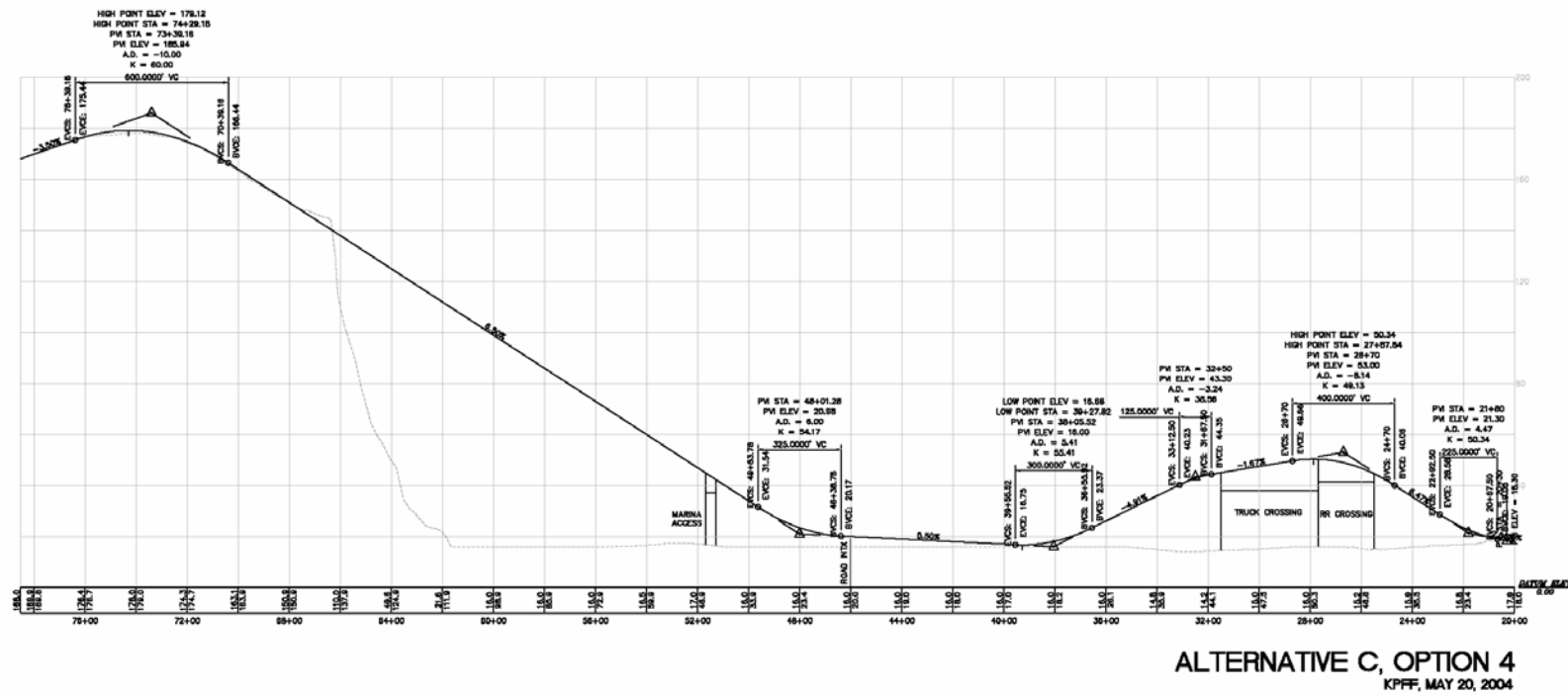


Figure C-7
Option 4 Plan



**Figure C-8
Option 4 Profile**

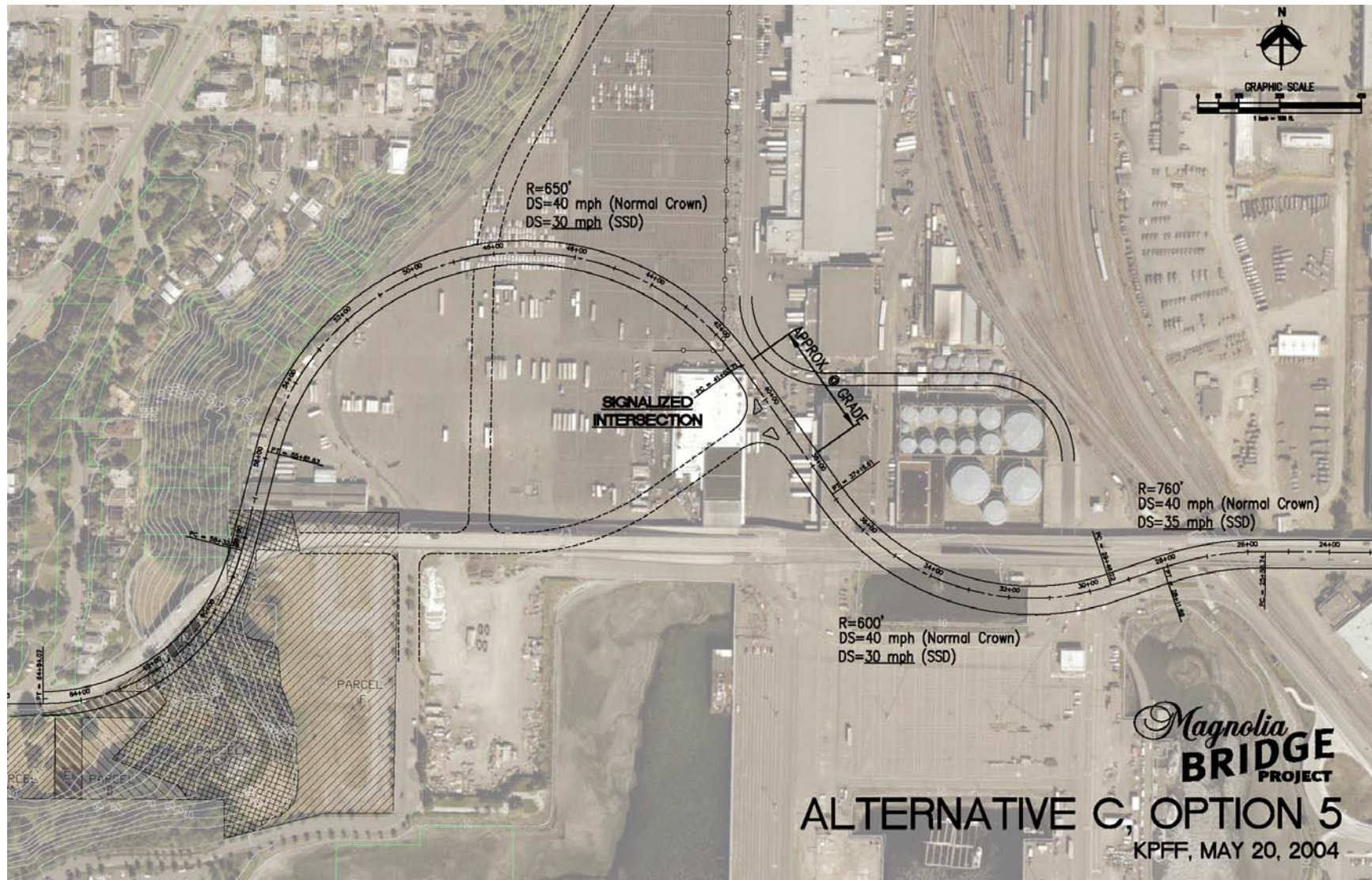


Figure C-9
Option 5 Plan

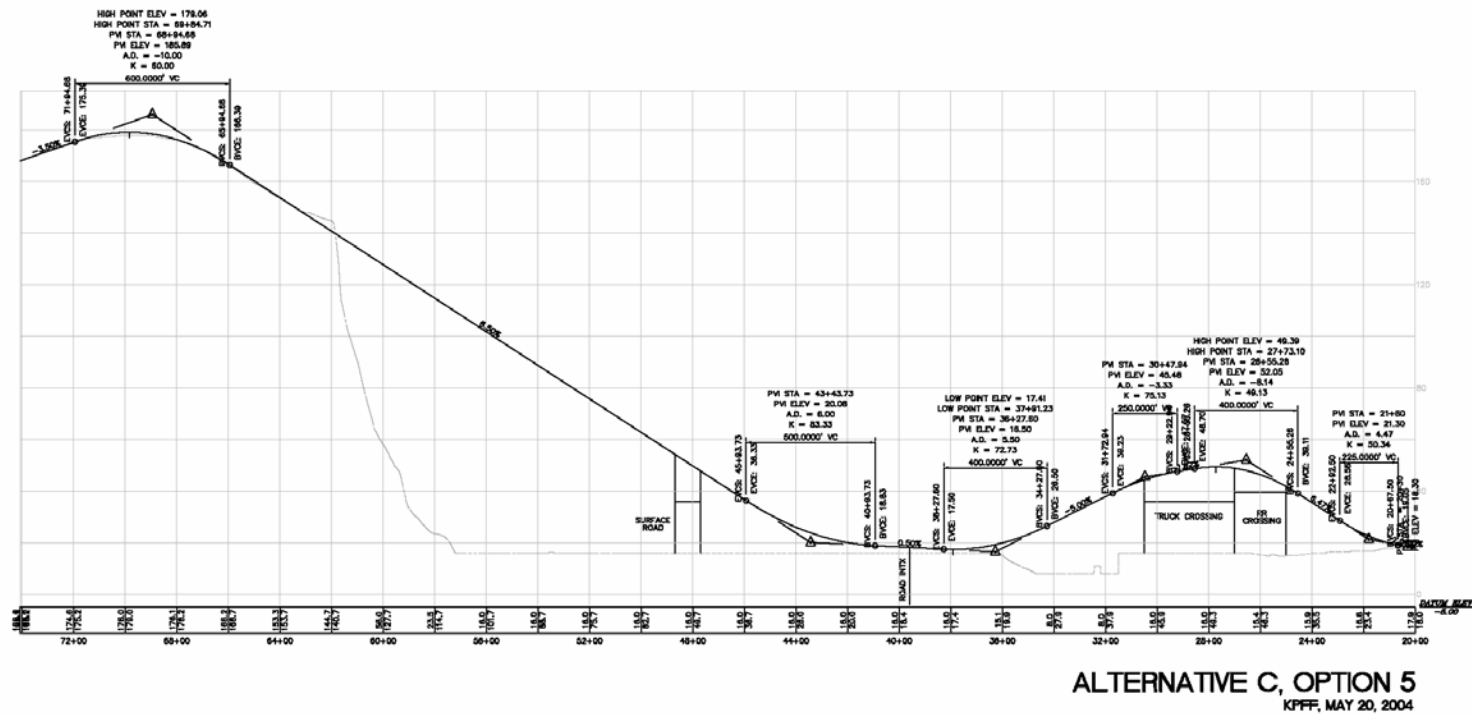
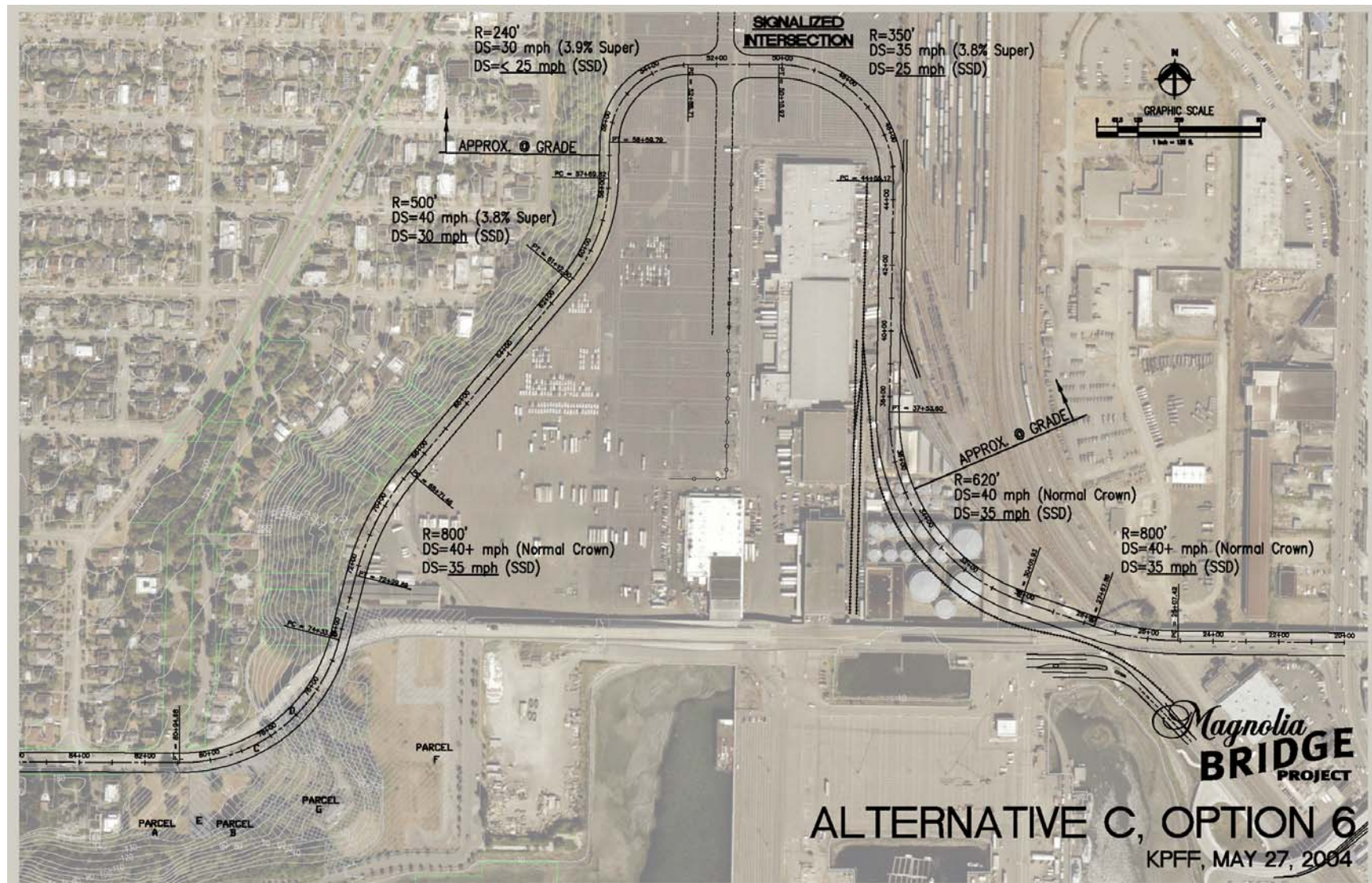


Figure C-10
 Option 5 Profile



**Figure C-11
Option 6 Plan**

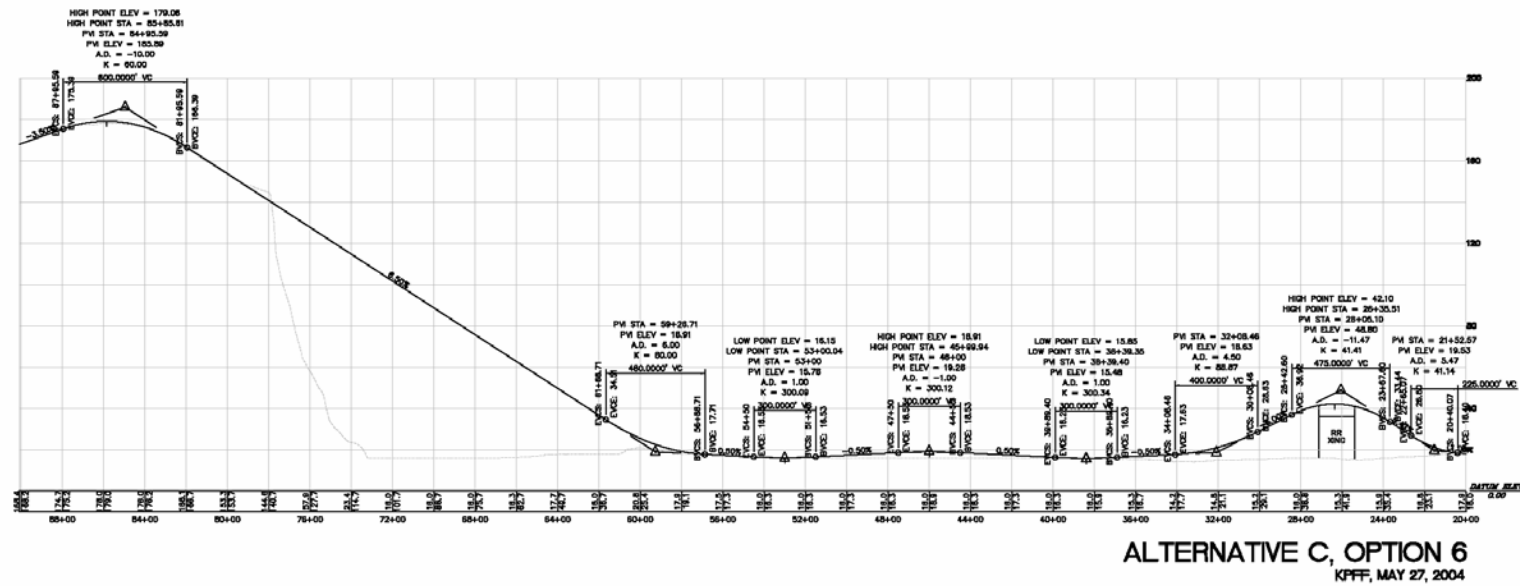


Figure C-12
 Option 6 Profile