Warren Avenue Bridge

FEASIBILITY STUDY WORKSHOP

Summary

BREMERTON
WASHINGTON

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A. INTRODUCTION

Project Overview

The Warren Avenue Bridge crosses the Port Washington Narrows and connects East Bremerton to West Bremerton. Consistent with the City of Bremerton's safety and mobility goals, a structural feasibility study was performed using a workshop format with the objective of evaluating options to construct bicycle and ADA compliant pedestrian facilities to provide a non-motorized alternative for non-motorized travel across the Warren Avenue Bridge. Design options were considered that would provide a shared use path for pedestrians and people on bicycles. The workshop evaluated widening the sidewalk inward and outward, providing bump-outs for passing, and building a new pedestrian bridge. Because the structural aspects were the main drivers to cost, the workshop focused primarily on the bridge structure to confirm project viability.

The overall project goal is to provide shared use access across the Warren Avenue Bridge. Exeltech was retained to perform the workshop to evaluate several options that would meet the goal of the project and be fundable. Each option was evaluated to ensure it met the overall project goal and to determine potential structural repair and modification impacts. The options that were deemed feasible were further examined, and opinions of probable costs were prepared.

Workshop Description

The workshop was performed over a four-day period. It primarily consisted of six participants, four bridge engineers and two civil engineers. Below is a list of the attendees.

1. Nate Brown – Senior Bridge Engineer
2. Evan Grimm – Structural Engineering Program Manager
3. Karl Kirker – Senior Bridge Project Manager
4. Josh Ranes – Civil Engineering Program Manager
5. David Talcott – Director of Engineering
6. Cheng Yang – Senior Bridge Engineer

Throughout the workshop the group collaborated and discussed a variety of options that would provide improved pedestrian and bicycle access across the bridge. See Appendix A for the workshop primer that was distributed to the group prior to meeting. As part of the primer and pre-workshop preparation the group was requested to prepare a Key Issues Memo. These can be found in Appendix B.

As the workshop progressed and the preferred options were identified, two contractors were requested to review the design concepts, provide constructability comments, and confirm construction costs. Both Granite Construction and PCL Construction were contacted, and responses were received from Granite Construction as shown in Appendix C.

B. PURPOSE AND NEED

In alignment with Bremerton's goal to increase bicycle and pedestrian travel and safety, the purpose of the Warren Avenue Bridge Shared Use Pathway Project is to provide a safe non-motorized option for pedestrian and bicycle users to cross the bridge.

The Warren Avenue Bridge is one of two options for non-motorized users to cross the Port Washington Narrows between East and West Bremerton. The existing sidewalks that are used by pedestrians, bicycles, and wheel chairs are extremely narrow (see Figure 1: Photo of Narrow Walkway) and do not meet the minimum width required by the Americans with Disabilities Act (ADA). The bridge is 1717 feet long, and a majority of the sidewalk is 3'-11" wide, narrowing at the ends to as little as 3'-2" (see Figure 2: Photo of Narrow Bridge End). There are no areas that allow non-motorized users to pass one another. The bridge is currently void of dedicated bicycle facilities forcing bicycles users to share the travel lanes with high speed vehicles or to share the narrow sidewalk with pedestrians. Providing a shared use path across the bridge will meet ADA requirements and solve these safety concerns.

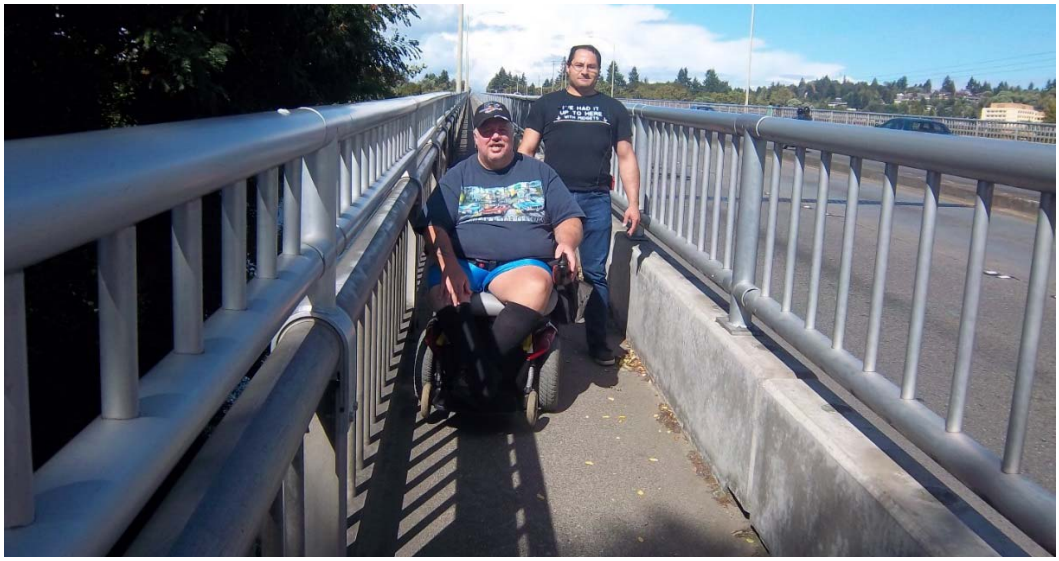


Figure 1: Photo of Narrow Walkway

Figure 2: Photo of Narrow Bridge End

C. EXISTING CONDITIONS

The Warren Avenue Bridge was constructed in 1958. Warren Avenue is classified as an urban principal arterial with a posted speed limit of 35mph. The average week day traffic on the bridge is approximately 38,000 vehicles based on a 2014 study.

Location

The Warren Avenue Bridge is located on State Route 303 (Warren Avenue) approx. MP 0.7 to MP 1.1 within the City of Bremerton and crosses over the Port Washington Narrows, connecting West Bremerton and East Bremerton (see Figure 3: Vicinity Map and Figure 4: Project Location Map). It is located within Kitsap County as part of Section 11, Township 24N, Range 01E. The latitude and longitude at the center of the bridge are approximately 47° 34' 48" north and 122° 37' 55" west. The bridge is owned and maintained by the Washington State Department of Transportation (WSDOT).

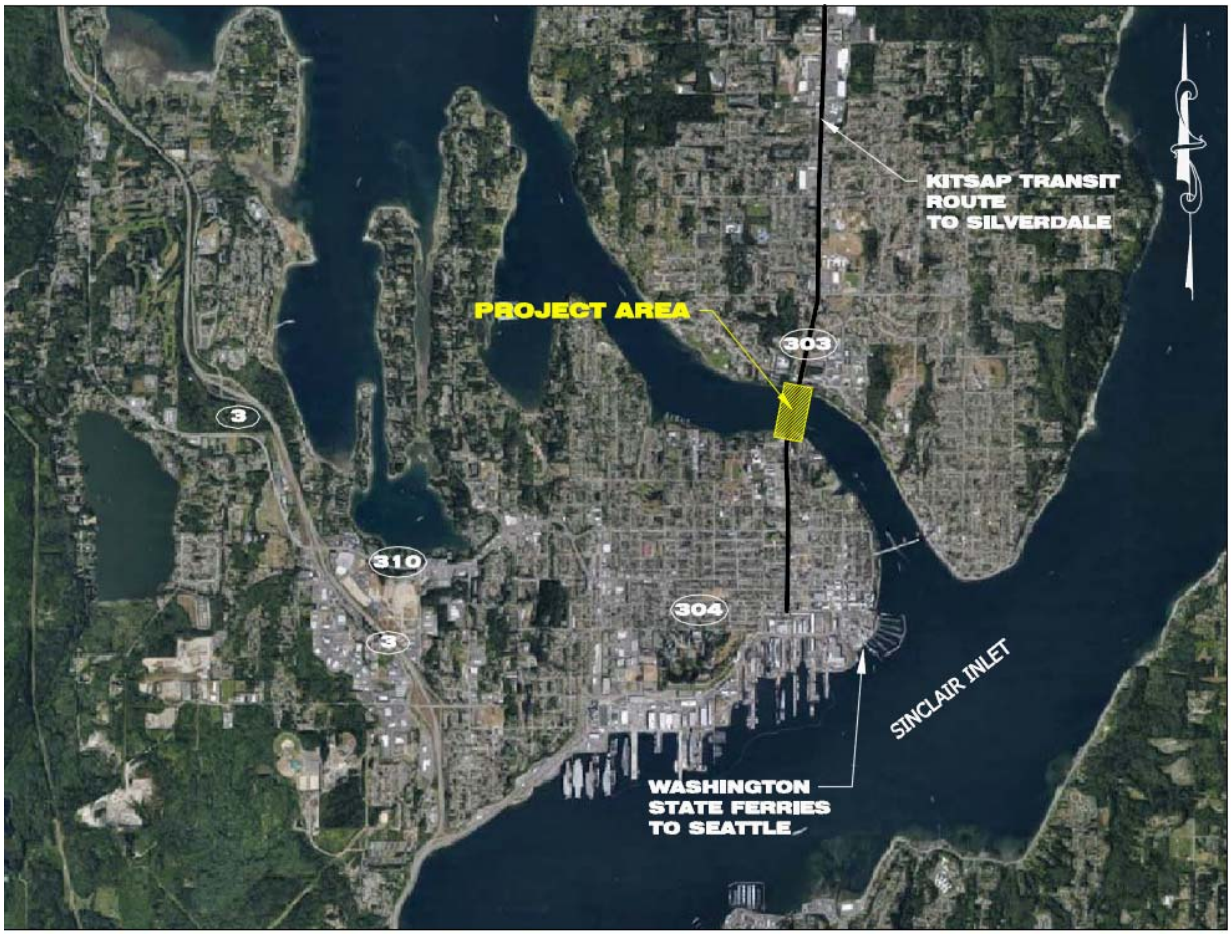


Figure 3: Vicinity Map

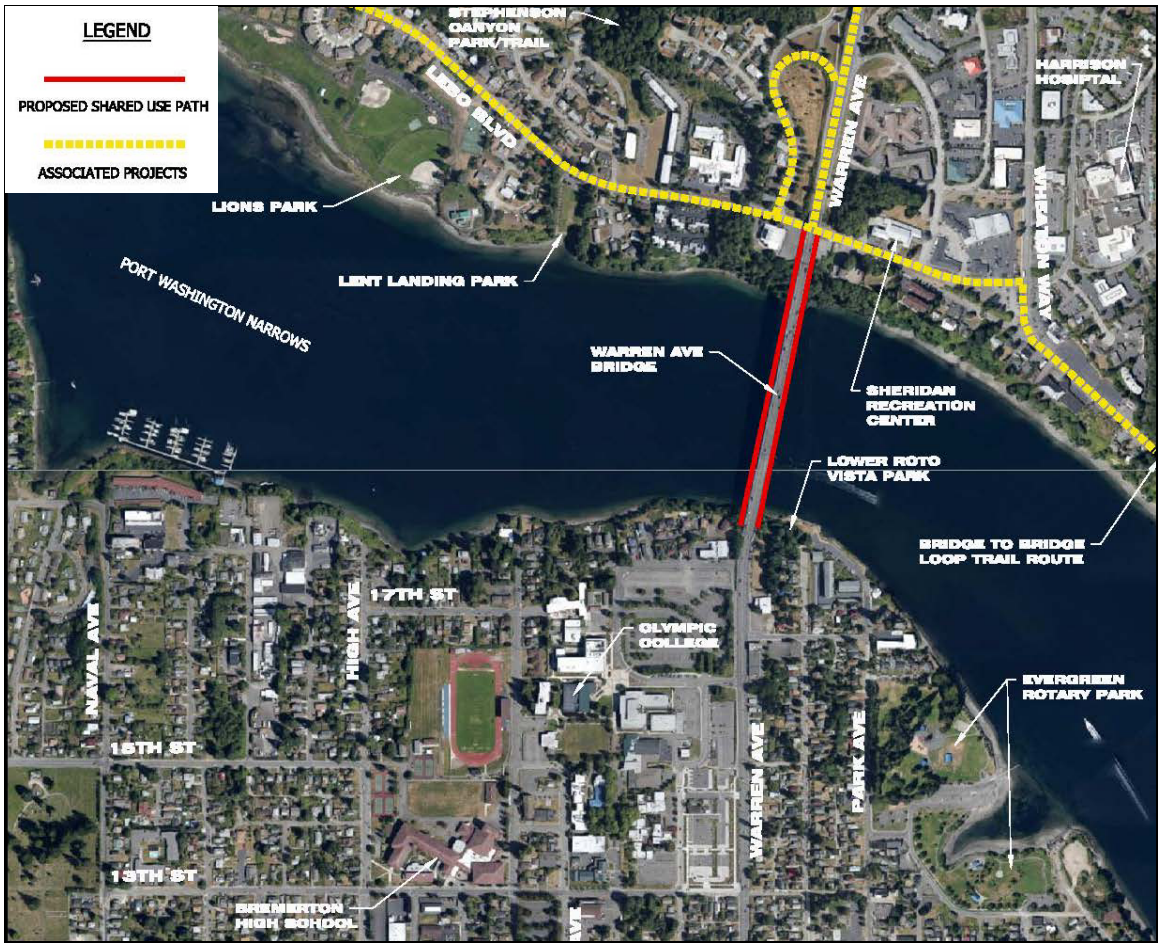


Figure 4: Project Location Map

Physical Description

The layout of the bridge consists of two 12-foot northbound lanes, two 12-foot southbound lanes, a 2-foot shoulder each side, and a 2-foot wide median curb with 1-foot shy each side for a total deck width of 56-feet (see Figure 5: Deck Layout Photo). The bridge also has a sidewalk on each side that is separated from the travel lanes by a concrete traffic barrier and contains an outer metal pedestrian railing. Along the outer side of the sidewalks are luminaires that are spaced approximately every 200-feet. The sidewalk along the bridge is 3'-11" wide and narrows down to 3'-2" at the ends.

The bridge carries a 20-inch steel watermain and 4-inch gas line beneath the sidewalk along the east side of the bridge (see Figure 6: Water and Gas) and a bank of electrical conduits beneath the sidewalk along the west side of the bridge (see Figure 7: Electrical Conduits). The bridge does not appear to have a drainage system in place. It appears that the water travels along the face of the barrier to the end of the bridge and likely drains through the expansion joints along the length of the bridge. There appear to be four small scupper holes in the concrete barriers near midspan of the bridge, but it is unknown how these minor elements tie into the drainage system.

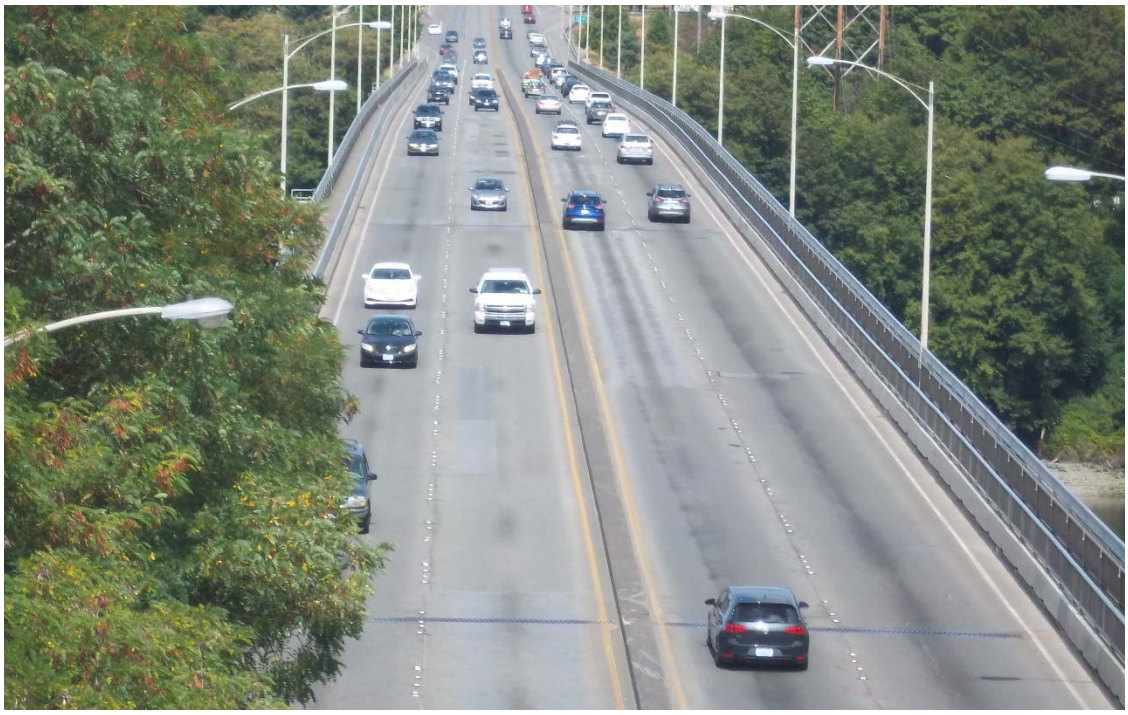


Figure 5: Deck Layout Photo

Figure 6: Water and Gas

Figure 7: Electrical Conduits

Pedestrian and Bicycle Connections

At the north end of the bridge, the existing sidewalks connect to existing sidewalks that connect to on/off ramps to Clare Avenue and Callahan Drive. At the south end of the bridge, the existing sidewalks connect to existing sidewalks that continue along Warren Avenue. There currently are no dedicated bicycle facilities on the bridge. The bridge is identified as a segment of the City's Bridge to Bridge urban trail (see Figure 8: Bremerton Trail Map).

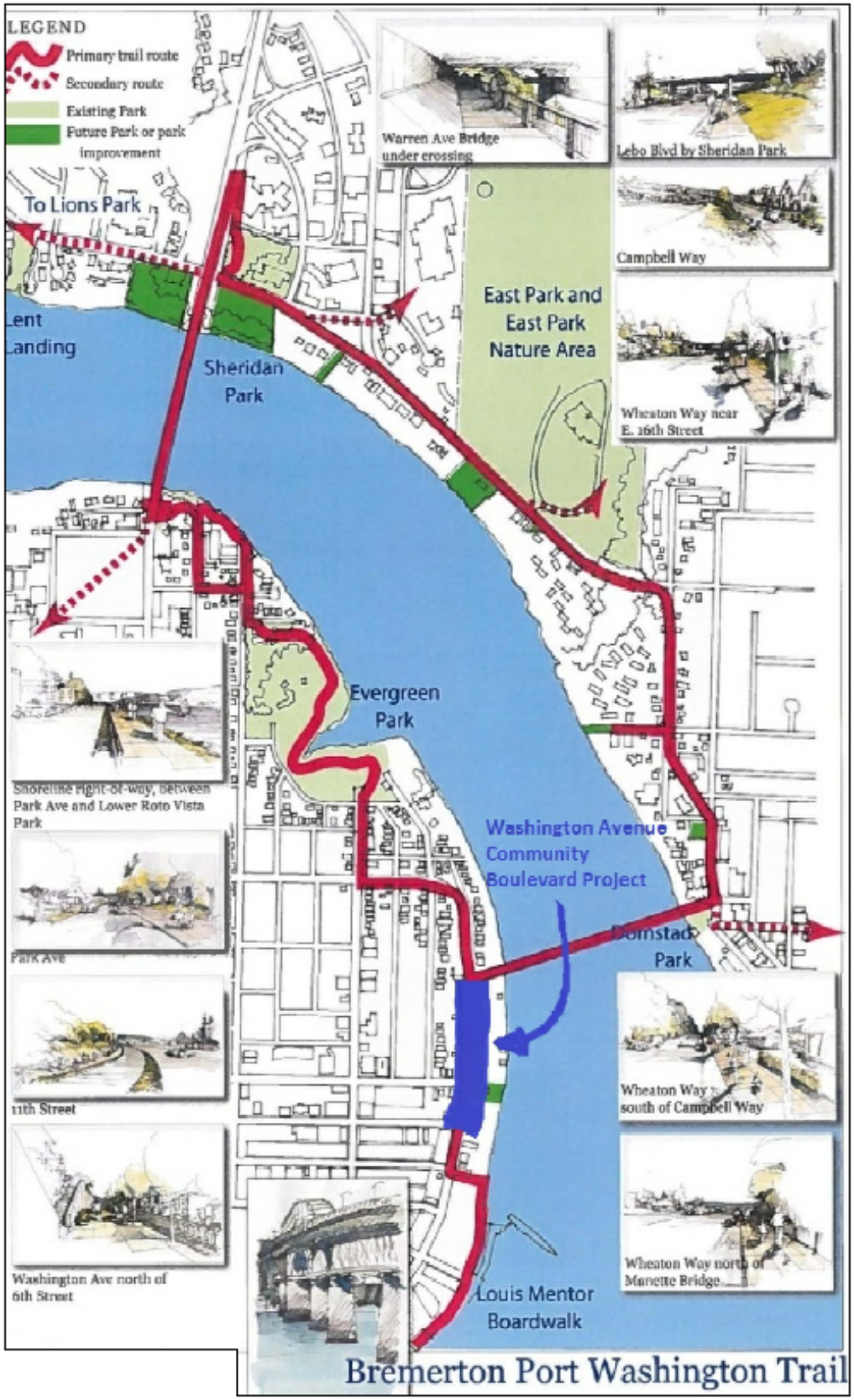


Figure 8: Bremerton Trail Map

Structural Overview

The Warren Avenue Bridge is approximately 1717 feet long and consists of three different superstructure types supported by concrete piers on spread footings. The below figure (see Figure 9: Span Types) shows the locations of the different types of superstructure along the length of the bridge. The bridge condition and load carrying capacity is summarized below, and these descriptions are limited to the level of investigation and analysis required for the workshop. The reader is referred to the most recent bridge inspection report, underwater inspection report, fracture critical inspection report, load rating calculations, and as-built plans for more in-depth information.

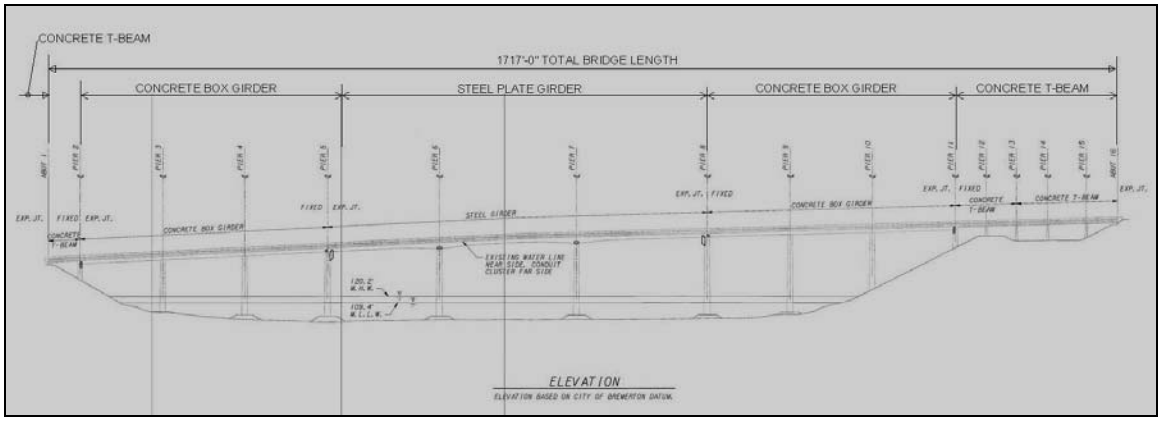


Figure 9: Span Types

Spans 1, 11, 12, 13, 14, and 15 consist of cast-in-place Concrete Tee-Beam superstructure. Figure 10: Concrete Tee-Beam Section shows a typical section, and Figure 11: Concrete Tee-Beam Photo shows the underside of the Tee-Beam portion of the bridge. The bottom of the superstructure is open, and underside of the deck can be seen. The Tee-Beam spans are near the ends of the bridge away from the in-water spans. The most recent inspection report states that the concrete beams are in good condition with some minor cracking and a few locations of exposed rebar. The bridge load rating performed in 2013 shows that the Tee-Beam superstructure rates above 1.0 for legal and permit loads for Operating conditions. The concrete bridge deck in the Tee-Beam spans appears to be functioning well, and significant deck repair work was not required in the past for these spans.

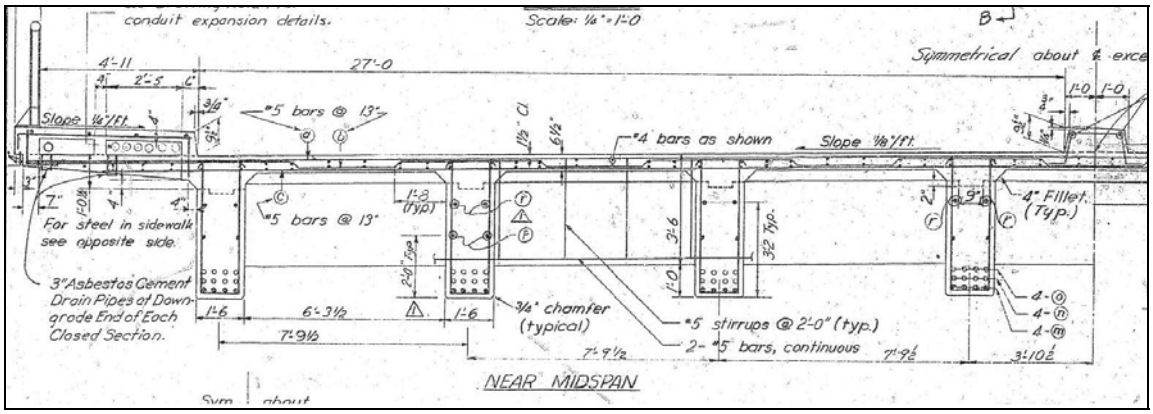


Figure 10: Concrete Tee-Beam Section

Figure 11: Concrete Tee-Beam Photo

Spans 2, 3, 4, 8, 9, and 10 consist of cast-in-place Concrete Box Girder superstructure. Figure 12: Concrete Box Section shows a typical section, and Figure 13: Concrete Box Photo shows a side view of the Box Girder portion of the bridge. The bottom of the superstructure is closed, and the underside of the deck cannot be seen from below. The Box Girder spans are on each side of the main steel girder spans and are approximately 80 ft to 100 ft above the water. The most recent inspection report states that the concrete box spans are generally in good condition with some cracking, concrete leaching, areas of concrete delamination, concrete repairs, and a few locations of exposed rebar. The bridge load rating performed in 2013 shows that the Box Girder superstructure rates well above 1.0 for legal and permit loads for both Inventory and Operating conditions. The concrete bridge deck in the Box Girder spans appears to be functioning generally well with some past deck repair work having been required in these spans.

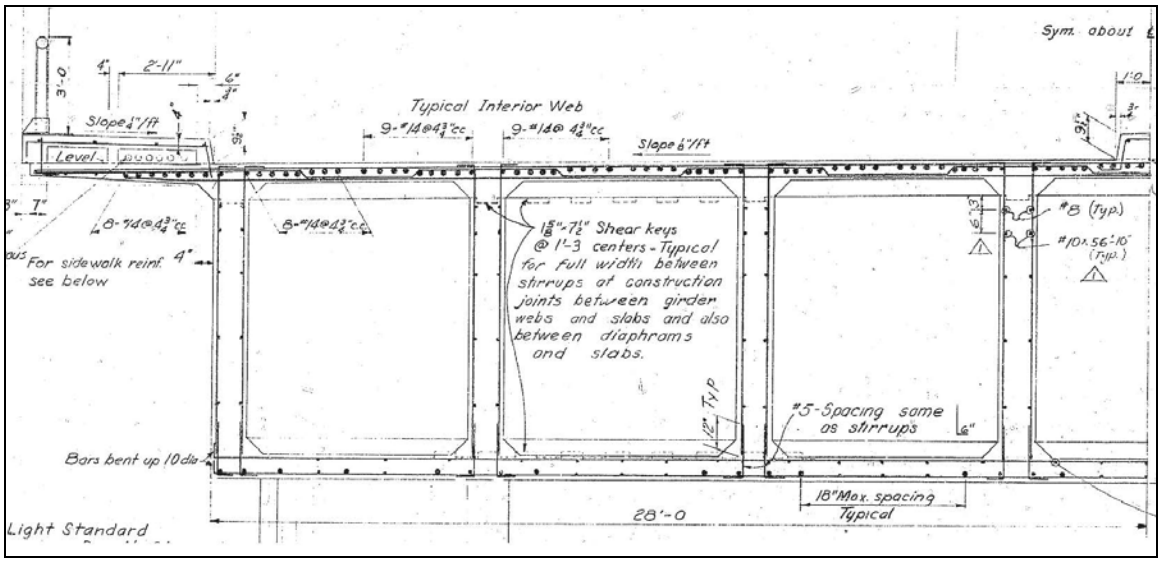


Figure 12: Concrete Box Section

Figure 13: Concrete Box Photo

Spans 5, 6, and 7 consist of Steel Plate Girder superstructure. Figure 14: Steel Plate Girder Section shows a typical section, and Figure 15: Steel Plate Girder Photo shows a side view of the Steel Plate Girder portion of the bridge. The bottom of the superstructure is open, and the underside of the deck and steel floor system can be seen from below. The Steel Plate Girders make up the main spans and are approximately 80 ft to 100 ft above the water. According to the most recent inspection reports the steel girders, stringers, and floorbeams are generally in good-to-fair condition with some rust, loose bolts, and minor section loss. Portions of the paint system have failed. The bridge load rating performed in 2013 shows that the Steel Plate Girder superstructure rates above 1.0 for legal and permit loads for Operating conditions. The concrete bridge deck in the Steel Plate Girder spans was constructed of lightweight concrete and appears to be in the worst

condition of all the bridge deck with most of the past deck repair work having been required in these spans.

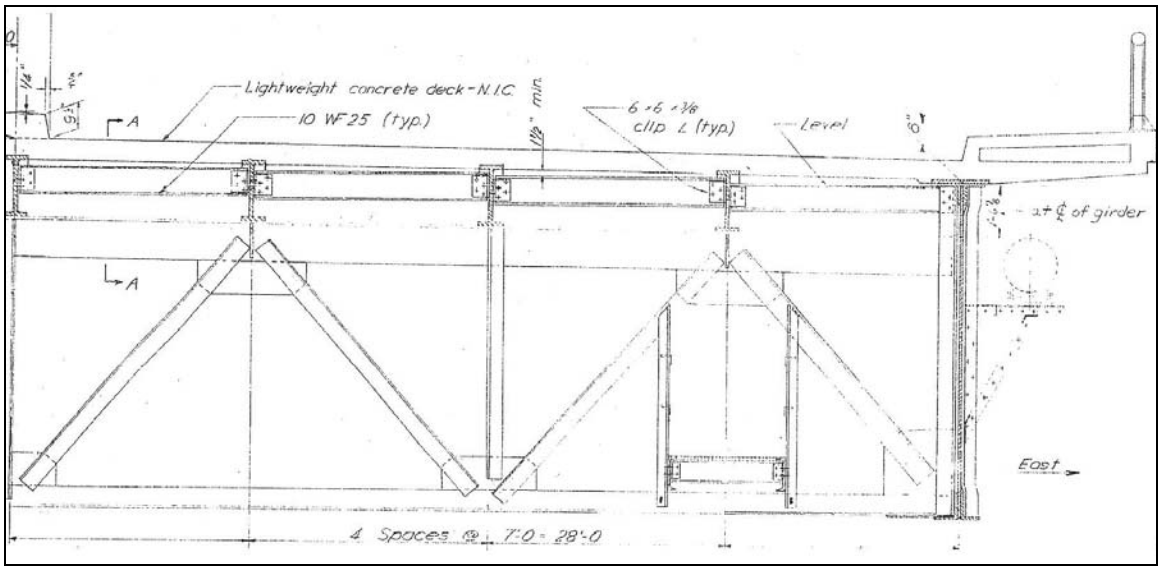


Figure 14: Steel Plate Girder Section

Figure 15: Steel Plate Girder Photo

Portions of the concrete substructure can be seen in the above superstructure photos. The top concrete crossbeam that supports the Concrete Box Girder spans was made integral with the superstructure and is loaded in shear and bending. As shown in the load rating calculations, the crossbeam has the lowest rating factors of all structural elements on the entire bridge.

Bridge Improvements

The below table provides a brief history of structural work on the Warren Avenue Bridge (see Table 1: History of Warren Avenue Bridge).

Table 1: History of Warren Avenue Bridge

1957/1958	Structure built
1972	Barrier curb placed on sidewalk
1991	Polyester membrane deck & expansion joints
1995	Seismic retrofit (superstructure restrainers)
2010	Traffic barrier retrofit / barrier placed above curb narrowing sidewalks
2015	Water main placed on eastern portion of structure

Bridge deck repairs, girder painting, and steel superstructure fatigue repairs will eventually be required as part of the ongoing maintenance and operation of the bridge. It is our understanding that WSDOT intends to perform a deck repair project in the next few years, and a significant overlay effort is not planned at this time.

D. Design Criteria and Considerations

Lane Widths/Clearances/Curbs

The shy distance to the existing barrier is currently 2-feet. This is the minimum per WSDOT 2015 Design Manual, Exhibit 1230-7 (minimum lateral clearance of 2-feet) and Section 1610.05(2) (provide 2-feet shy distance for barrier). Due to the existing bridge width limitations and to avoid significant structural impacts we are proposing a practical solution to reduce the shy distance to 1-foot. The additional foot gained will assist in the sidewalk widening. This will likely need to be approved through a deviation with WSDOT.

Per the WSDOT 2015 Design Manual, Section 1103.05(1), a low speed roadway is considered a roadway with a posted speed of 35 mph and below, intermediate speed roadway is considered 40-45 mph, and high speed roadway is considered 50 mph and above.

The existing lane widths of 12 feet are greater than the minimum required by WSDOT, per the WSDOT 2015 Design Manual, Section 1230. Based on the various cross sections suggested in the Design Manual and the low posted speed of the roadway, lane widths can vary 10 to 12 feet. However, due to the high traffic volume and transit use we are proposing 11-feet as the minimum. The 11-foot minimum also meets the previous WSDOT 2014 Design Manual, Exhibit 1140-6, minimum. The reduced lane width will assist in the sidewalk widening.

The existing bridge deck contains a 2-foot wide center curb separating the northbound and southbound traffic. Virtually all of Warren Avenue is void of the center curb median with the exception of the bridge and a couple spot locations to limit access. Based on crash data provided by WSDOT from beginning of 2011 to end of 2015 that includes approximately 0.7 miles south of the bridge and 2 miles north of the bridge, there were four head-on collisions, one of which

contained serious injuries and the others were potential injury. According to AASHTO 2011 A Policy on Geometric Design of Highways and Streets, Section 7.3.3 raised curb medians can present disadvantages and with high-speed traffic they do not prevent cross-median crashes unless a median barrier is also provided. It also goes on to say that if accidentally struck, the raised curb may cause drivers to lose control of their vehicles. However, there is a public perception that the center median curb provides protection and a level of comfort. At this time, we are proposing to maintain a median curb, but with reduced width. WSDOT will ultimately need to approve the reduction or complete removal of the median curb. The lane widths or shy distances could be increased depending on discussion and approval from WSDOT to remove the center curb entirely and not replace it. If removed and not replaced it would provide an additional 10-inches of deck width to be distributed in Option 1.

ADA / Shared Use Requirements

The existing sidewalks on the bridge are less than 4-feet wide and do not meet the minimum ADA requirements. Based on the proposed 2011 Public Rights-of-Way Accessibility Guidelines (PROWAG) the minimum clear path width is 4-feet (Section R302.3). If the width is less than 5-feet passing spaces shall be provided at 200-feet intervals minimum (Section R302.4). The goal of the project is to create a shared use path to provide safe travel to both pedestrians and bicycles, and for this reason, an option for sidewalks with passing spaces was not evaluated. According to WSDOT 2015 Design Manual, Section 1515.04, the minimum width of a shared use path is 10-feet excluding shoulders. It also goes on to say a reduced path width of 8-feet may be used at locations that present physical constraints. The bridge is structurally constrained to avoid major structural impacts to the bridge that may prohibit any improvements at all. The path also will not be subject to any maintenance or emergency vehicles due to being directly adjacent to traffic lanes. The WSDOT manual also requires a 2-foot shoulder or clearance to barrier, however due to the physical constraints of the bridge width and taking a practical approach to the design an 8-foot shared use path is proposed with no shoulders or clearances to barriers. This will likely need to be approved through a deviation with WSDOT. It should be noted that according to the AASHTO Guide for the Development of Bicycle Facilities 4th Edition, Section 5.2.10, under constrained conditions at bridge sites the 2-foot shoulders may be reduced and tapered to the pathway width at the bridge ends.

A concept to couple the sidewalks was brought to the City's attention prior to this study. Under this scenario, the existing sidewalk widths would remain, undercrossings would be built at the ends of the bridge, and the sidewalks would be restricted to one-way directional use. The feasibility study did not consider this concept because it did not meet the project's shared-use goals and because the existing sidewalks would remain non-compliant with ADA requirements.

Traffic Control

To assist in the development of the engineer's cost estimate, traffic control was loosely considered for each option to determine the potential impact for the individual options. To minimize traffic control impacts, different construction methods and sequences were explored; such as precast barrier, working one side at a time and with the direction of traffic, or removal of median curb to shift traffic. Maintaining traffic during construction and limiting lane closures to nights and weekends would have the least impact on traffic.

Option 1 would require extensive traffic control to provide space and protection for workers as they construct new concrete barrier within an existing lane. This would cause long term lane reconfigurations and many night lane closures. Option 4 would require minimal traffic control because all construction would occur behind the existing barrier. A majority of the time traffic would be able to operate under the existing conditions with little to no interruption.

Bridge Traffic Barriers

Section 10.2 of the WSDOT Bridge Design Manual (BDM) states that the design criteria for traffic barriers on structures shall be in accordance with Chapter 13 of the American Association of State Highway and Transportation Officials (AASHTO) LRFD Bridge Design Specifications. It is WSDOT Bridge Design Office policy to design barriers for new bridges to meet Test Level 4 (TL-4 criteria). TL-4 refers to a set of geometric and loading requirements for barrier crash test specimens. The AASHTO LRFD code requires new bridge decks to be designed to be strong enough to hold the barrier in place without breaking when the barrier is subjected to the TL-4 lateral traffic impact loading of 54,000 pounds.

One concern for the workshop was whether the existing bridge deck would be strong enough support the theoretical lateral impact force on the barrier, if a new barrier were to be installed on the deck out near the mid-span of the deck (see Figure 16: Option 1 Sketch). Hand calculations were performed that verified that the deck could not resist the impact force, and approximate construction costs were computed for strengthening the bridge deck. This became a significant issue during the workshop because of the high costs associated with deck strengthening.

A phone call was made to the WSDOT Bridge Design Office during the workshop to discuss the challenges associated with applying modern loading criteria to a bridge that was designed to older codes and criteria. It was explained that the WSDOT Bridge Design Office intends to make a policy revision that requires bridge barrier replacements on existing bridges to be designed to the same criteria as bridge barrier rehabilitation projects. BDM Section 10.4 states that existing traffic barriers are to be rehabilitated to provide resistance to a 10,000 pound lateral impact force, and it points out that this load provides a safe design without increasing "the retrofit cost due to expensive deck modifications."

Workshop calculations were performed using the 10,000-pound lateral load, and it was found that the existing bridge deck can resist this load without the need for deck strengthening modifications. Several Warren Avenue Bridge modification options in the workshop benefitted from the removal of the deck strengthening costs that had been associated with building new barriers inboard of the existing traffic barriers.

Earthquake

The Warren Avenue Bridge received seismic retrofit enhancements on or around 1995, and these retrofit items focused on the superstructure. The substructure elements were not retrofitted at that time, likely due to the prohibitive costs associated with column and foundation strengthening. Modifications to the superstructure presented in the workshop, such as changing the barrier size and location, would have an effect on the seismic performance of the bridge by changing the mass of the superstructure.

WSDOT's current bridge widening policy written in BDM Section 4.3 describes threshold values for triggering seismic analysis and retrofit requirements on existing structures. It states that, "in many cases, adding less than 10 percent mass without new substructure could be considered" to have an insignificant seismic effect on the existing structure elements. Therefore, if the Warren Avenue Bridge modifications add less than 10 percent mass to the structure, no seismic analysis will be required.

If seismic analysis were to be required, all of the seismically deficient details in the bridge substructure would need to be identified and strengthened. The substructure repairs would be so costly that it would begin to approach the order of magnitude of cost associated with complete bridge replacement. Although several seismic deficiencies would be overcome by building a new bridge, it is our understanding that the associated costs would be prohibitive to constructing any project improvements. For this reason, an approximate 10% threshold to bridge mass increase was considered to be a project constraint during the feasibility study workshop.

Load Rating

The existing load rating calculations for the bridge were performed in 2013, giving a sense that the calculations meet current rating standards and that they reflect the current condition and rating capacity of the bridge. The top concrete crossbeams in the concrete box girder spans are the controlling rating elements on the bridge. Several floorbeams in the steel plate girder spans have the next lowest rating factors.

As part of the workshop, hand calculations were performed to spot check a few elements on the bridge as a way to gain confidence in load rating and to therefore reduce risk and contingency in the cost estimates. This small effort was considered to have significant benefit when working within

the limited scope of the workshop. Since they rated lowest, the concrete crossbeams were checked, and the ratings were found to agree with the hand calculations.

Most options that keep four traffic lanes and that add sidewalk live and dead loads to the bridge will increase the demand on the bridge structure. The effects of the added load will need to be accounted for in the design. In Options 1 and 4 described below, it is likely that by adding vertical loads near the outsides of the bridge (near the sidewalks) most of the added load will be taken by the girders and columns, and it will not cause detrimental changes to the moment and shear effects in the crossbeams and floorbeams. Since the girders and columns appear to have some reserve capacity, the addition of loads near the outsides of the bridge should not require crossbeams and floorbeams to be strengthened. However, since no final design calculations were run, some costs for strengthening these elements were included in the cost estimates.

Metal Handrail

The existing metal handrail on the concrete traffic barrier and at the exterior of the sidewalk could be reused. Since the bridge is 1717 feet long, each handrail type has around 3434 linear feet to either be reused or replaced. The workshop found that reuse was possible in various design options, and this was found to have a significant cost savings.

Assumptions

The options that were developed were done so using standards and common practice that were in place at the time of the study. These standards and/or practices may change prior to the project being designed and constructed and could have a major impact on the options discussed within this summary.

Based on input from the City and limited discussions with WSDOT, it was assumed that the lane configurations and width, median curb, and shared use path width were acceptable or would be accepted with a deviation request.

During the study workshop there were several items that were either loosely considered or were not considered at all. Below is a summary of some of these items. Note that this is a limited list and is not inclusive of all items that will be required to be addressed as the project advances.

- Permitting – loosely considered as a small impact with minimal cost and schedule impacts
- Lighting – light distribution not evaluated against current requirements
- Stormwater – loosely considered due to limited understanding of the existing stormwater infrastructure; considered to be a low impact and assumed to have no additional treatment/detention requirements
- Structural Modeling – no structural modeling was performed; limited spot calculations and checks were performed

E. STUDY OPTIONS EVALUATED

Seven options were evaluated during the workshop. Only Option 1 and Option 4 were advanced to the end of the workshop because they were found to meet the project criteria, satisfy the goals of the City, and have a competitive cost compared to other options. Cost estimates, contractor input, and analysis were focused on these two options. The below discussion describes the main advantages and disadvantages of each option that was evaluated.

Option 1 – Widen to the Inside – Two 8-ft Shared-Use Paths

Option 1 was to shift the existing crash-rated barriers toward the inside of the bridge. This option provides an 8-ft shared use path on each side of the bridge. It provides 4 lanes having minimum 11-ft widths. The center median curb would be removed and replaced with a 1'-0" wide c-curb. Figure 16: Option 1 shows a half-section of the roadway.

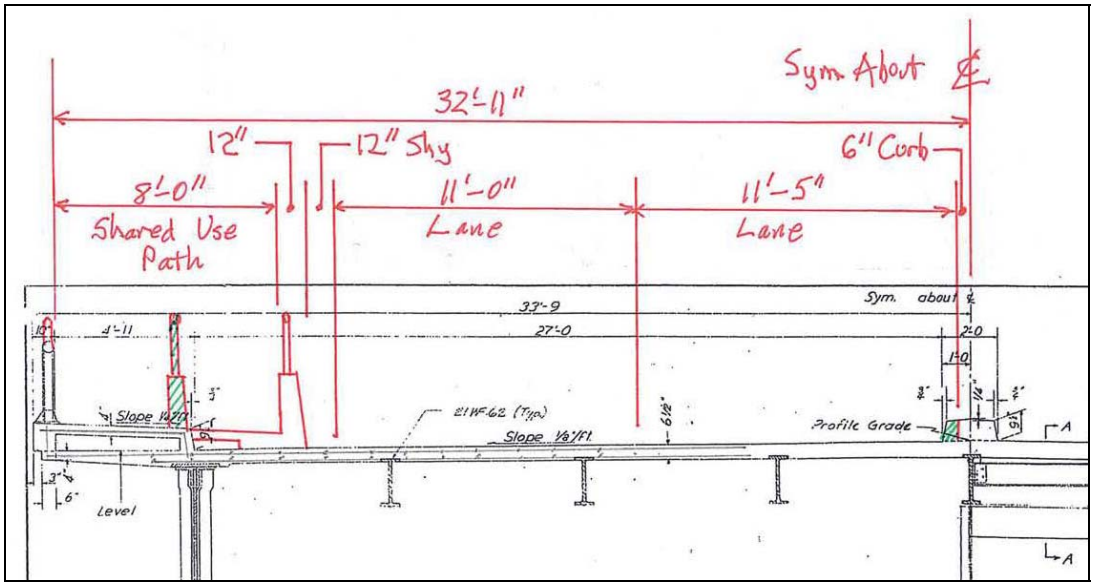


Figure 16: Option 1 Sketch

Benefits:

- Provides crash-tested barriers on bridge.
- Does not add significant seismic mass. Seismic retrofit not required.
- Provides shared-use paths on both sides of bridge. No need for over/undercrossing at bridge ends for ADA, bicycle, or pedestrians.
- Reduces lanes to 11 feet to encourage calming of traffic.
- Provides physical median curb at center of bridge.
- Separates non-motorized use from vehicle lanes using barrier.
- Deck strengthening at the location of new barrier is not required per recent WSDOT policy of lateral 10 Kip loading of traffic barriers on structures.

Challenges:

- Traffic control configuration may require temporary removal of center median. If night work is used the median could remain with a corresponding cost tradeoff.
- A drainage issue will be introduced where the outer curb locations are shifted inboard. The new curb locations may not tie into the existing drainage system if it exists under the bridge. Drainage system modifications may be required and are not well understood at this time. A barrier scupper with a sidewalk cover plate may solve this concern.
- There may be costs associated with strengthening the existing concrete crossbeam and steel floorbeams. Further analysis will be required during design.

Option 1 was advanced to the end of the workshop, and a cost estimate was created, which can be found in Appendix E.

Option 2 – Widen to the Inside – One 8-ft Shared-Use Path, Close One Sidewalk

Option 2 was to shift one of the existing crash-rated barriers toward the inside of the bridge. This option provides one 8-ft shared-use path on one side of the bridge and closes the sidewalk on the other side. It provides 4 lanes having minimum 11-ft widths. The center median curb would be replaced with a c-curb and shifted off center toward the side of the bridge having the closed sidewalk.

Benefits:

- Provides crash-tested barriers on bridge.
- Does not add significant seismic mass. Seismic retrofit not required.
- Provides one shared-use path across the bridge meeting all requirements for ADA, bicycle, and pedestrian use.
- Reduces lanes to 11 feet to encourage calming of traffic.
- Provides physical median curb near center of bridge.
- Keeps non-motorized use separate from vehicle lanes.
- Deck strengthening at the location of new barrier is not required per recent WSDOT policy of lateral 10 Kip loading of traffic barriers on structures.
- This option may provide an opportunity to remove significant superstructure dead weight from the side of the bridge having the closed sidewalk. However, this is likely to have limited impact on cost, since removing weight at the sidewalk will not significantly impact the loads on the crossbeams or floorbeams, which are the governing load rating members.

Challenges:

- Over/undercrossings would be required at both bridge ends for ADA, bicycle, and pedestrians. There is significant cost associated with this infrastructure, and the movement

of pedestrians is impeded. It could encourage unsafe behavior of non-motorized travelers who choose not to cross over the bridge as directed.

- Since costs for overcrossing structures at the ends of the bridge would be so much higher than for undercrossings, undercrossings would likely be used at the ends of the bridge. There are significant concerns and public perceptions related to safety of users crossing under the bridge out of the sight of the general public.
- A drainage issue will be introduced near the centerline of the roadway due to the offset of the crown, and some local build-up of asphalt will be required.
- A drainage issue will be introduced where the outer curb locations are shifted inboard. The new curb locations may not tie into the existing drainage system if it exists under the bridge. Drainage system modifications may be required and are not well understood at this time. A barrier scupper with a sidewalk cover plate may solve this concern.
- Traffic control will require temporary removal of center median curb.
- There may be costs associated with strengthening the existing concrete crossbeam and steel floorbeams. Further analysis will be required during design.

Option 2 was not advanced due to the associated cost; it appears the cost likely would exceed that of Option 1. This option likely would not be supported by WSDOT for shared-use width deviation and the width may need to be increased to 10-feet or 12-feet with increased structural impact and higher associated cost.

Option 3 – Widen to the Inside – One 8-ft Shared-Use Path, One 5-ft Sidewalk

Option 3 was to shift one of the existing crash-rated barriers toward the inside of the bridge. This option provides one 8-ft shared-use path on one side of the bridge and provides a 5-ft sidewalk on the other side. It provides 4 lanes having minimum 11-ft widths. The center median curb would be removed and replaced with a 1'-0" wide c-curb.

Benefits:

- Provides crash-tested barriers on bridge.
- Does not add significant seismic mass. Seismic retrofit not required.
- Provides one shared-use path across the bridge meeting all requirements for ADA, bicycle, and pedestrian use.
- Provides ADA access on both sides of bridge so that pedestrians do not need to cross under at the bridge ends.
- Reduces lanes to 11 feet to encourage calming of traffic.
- Provides physical median curb at center of bridge.
- Keeps non-motorized use separate from vehicle lanes.
- Deck strengthening at the location of new barrier is not required per recent WSDOT policy of lateral 10 Kip loading of traffic barriers on structures.

Challenges:

- Over/undercrossings would be required at both bridge ends for bicycle only. There is significant cost associated with this infrastructure, even though the cost would be less for a non-ADA bicycle undercrossing. It could encourage unsafe behavior of cyclists who choose not to cross over the bridge as directed.
- Since costs for overcrossing structures at the ends of the bridge would be so much higher than for undercrossings, undercrossings would likely be used at the ends of the bridge. There are significant concerns and public perceptions related to safety of cyclists crossing under the bridge out of the sight of the general public.
- Traffic control configuration may require temporary removal of center median curb. If night work is used the median could remain with a corresponding cost tradeoff.
- A drainage issue will be introduced where the outer curb locations are shifted inboard. The new curb locations may not tie into the existing drainage system if it exists under the bridge. Drainage system modifications may be required and are not well understood at this time. A barrier scupper with a sidewalk cover plate may solve this concern.
- There may be costs associated with strengthening the existing concrete crossbeam and steel floorbeams. Further analysis will be required during design.

Option 3 was not advanced due to the associated cost; it appears the cost likely would exceed that of Option 1.

Option 4 – Widen to the Outside – Two 8-ft Shared-Use Paths

Option 4 was to leave the existing crash-rated barriers and lane configuration in place while widening to the outside. 8-ft shared-use paths would be created at each side of the bridge by widening to the outside. Figure 17: Option 4 Sketch shows a view of the sidewalk widening.

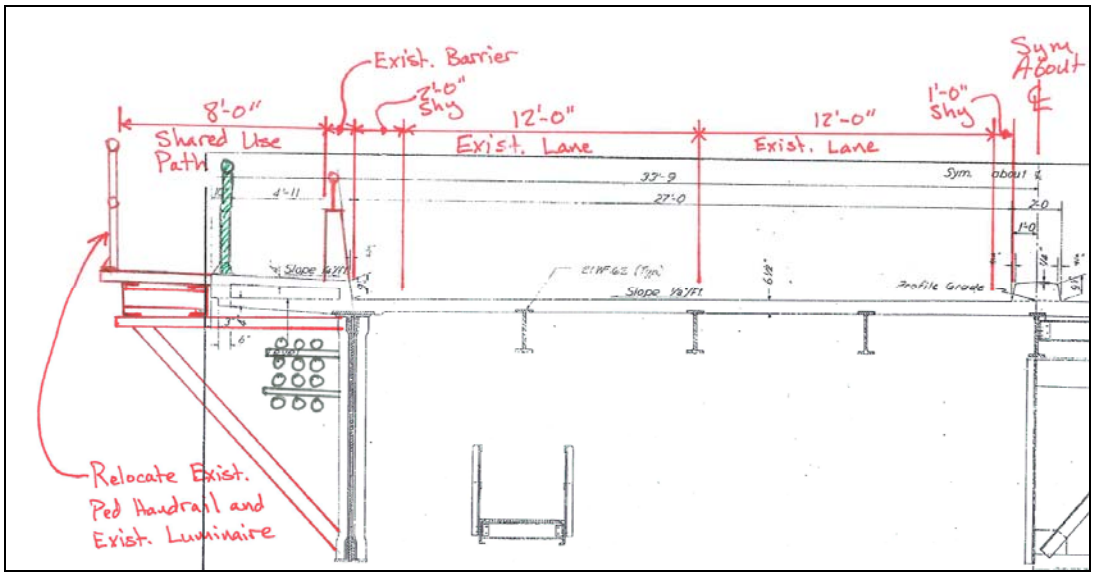


Figure 17: Option 4 Sketch

Benefits:

- Crash-tested barriers remain on bridge.
- Does not add significant seismic mass using lightweight exodermic deck and steel framing members. Seismic retrofit not required.
- Provides shared-use paths on both sides of bridge. No need for over/undercrossing at bridge ends for ADA, bicycle, or pedestrians.
- Center median curb and existing lane striping remain to match current condition.
- Separates non-motorized use from vehicle lanes using barrier.
- Traffic control is minimal and limited to night-time closures.
- Bridge drainage system is not modified.

Challenges:

- Significant space is taken up by the existing utilities hanging on the sides of the bridge, and the widening framing will need to be built around the utilities in order to avoid relocations.
- Costs associated with construction of the widening.

Option 4 was advanced to the end of the workshop, and a cost estimate was created, which can be found in Appendix E.

Option 5 – Separate Pedestrian Bridge – One Shared-Use Path

Option 5 was to build a new pedestrian bridge on its own foundations and separate from the existing bridge.

Benefits:

- Does not modify existing bridge. Seismic retrofit not required.
- Can be built to provide one full 10-ft shared-use path.
- Center median curb and existing lane striping remain to match current condition.
- Non-motorized users are separated from vehicle lanes.
- Traffic control is minimal during construction.
- Bridge drainage system is not modified.
- The user experience is enhanced by keeping the trail separated from traffic.
- The remaining service life of the newly constructed bridge would be much longer than the non-motorized facilities on the existing bridge.

Challenges:

- Cost associated with new bridge and associated approach construction.

Option 5 was not advanced due to the high cost associated with a new pedestrian bridge.

Option 6 – Pedestrian Path Under Bridge – One Shared-Use Path

Option 6 was to build a new pedestrian superstructure directly below the existing bridge superstructure. The new bridge would consist of lightweight prefabricated single spans supported off the existing bridge's lower crossbeam/brace. The spans would need to be tied to the existing structure to receive adequate lateral support. The approach paths to the main spans over the water would be built to approximately follow the approach embankments.

Benefits:

- Crash-tested barriers remain on bridge.
- Can be built to provide one full 10-ft shared-use path.
- Center median curb and existing lane striping remain to match current condition.
- Non-motorized users are separated from vehicle lanes.
- Traffic control is minimal during construction.
- Drainage system modifications are minimal.
- The user experience is enhanced by keeping the trail separated from traffic.

Challenges:

- It is unknown whether the additional mass would be enough to trigger the bridge seismic retrofit criteria. If this were the case, the option would be cost-prohibitive.
- Connections at the bridge ends would be required that would route pedestrians under the vehicle bridge. There are significant concerns and public perceptions related to safety of users crossing under the bridge out of the sight of the general public.
- Cost associated with new superstructure and associated approach construction.

- The vertical clearance under the bridge would be approximately 40 feet above the water, and this would restrict passage of some vessels, therefore Coastguard approval is not likely.

Option 6 was not advanced due to the pedestrian safety concerns and due to restriction of vessels under the bridge.

Option 7 – Modify Outer Railings and Restripe – Two 5-ft Sidewalks, Stripe Bike Lanes

Option 7 was to leave the existing crash-rated barriers and center median curb in place while widening the sidewalks to the outside by about 1 foot. 5-ft sidewalks would be created at each side of the bridge by widening to the outside. The lanes would be restriped to 11 feet to provide dedicated bike paths in the roadway, and this would require replacing the median curb with a 1'-0" wide c-curb.

Benefits:

- Crash-tested barriers remain on bridge.
- Does not add significant seismic mass. Seismic retrofit not required.
- Provides sidewalks on both sides of the bridge that meet all requirements for ADA and pedestrian use.
- Reduces lanes to 11 feet to encourage calming of traffic.
- Provides physical median curb near center of bridge.
- Keeps pedestrians separate from vehicle lanes.
- Keeping bicycles adjacent to the travel lanes can be considered a benefit to some commuter cyclists who prefer not to transition to sidewalk or to share the sidewalk with pedestrians.

Challenges:

- The bicycle lanes will not be separated from the travel lanes by a physical barrier. Although a potential benefit to commuter cyclists, this configuration is not as safe. This option would be dangerous for inexperienced cyclers or for small children on bikes who may be using the path.

Option 7 was not advanced because of the safety hazard for cyclists. This concern was clearly expressed at a recent public meeting by cyclists and drivers who were in attendance.

F. OPINION OF PROBABLE COST

Cost associated with Options 1 and 4 of the shared use path are summarized in the below table (see Table 2: Opinion of Probable Cost).

Table 2: Opinion of Probable Cost

	OPTION 1	*OPTION 4*
PROJECT ENGINEERING	$434,000	$599,000
CONSTRUCTION COSTS	$3,146,000	$4,340,000
CONSTRUCTION ENGINEERING	$347,000	$479,000
20% CONTINGENCY	$629,000	$868,000
2.5% INFLATION	$473,000	$653,000
TOTAL COSTS	$5,029,000	$6,939,000

G. CONCLUSIONS

The workshop evaluated the structural and economic feasibility of various options that would provide shared use access across the Warren Avenue Bridge. It was critical to determine viability prior to advancing the project to the subsequent phases of funding, design, and construction. While some coordination and discussions occurred with WSDOT there will need to be additional coordination and approval by WSDOT for traffic barrier and lane configuration.

Of the seven options assessed during the workshop, Options 1 and 4 were deemed most viable, and design concepts and opinions of probable cost were developed for both of these options. Both Options 1 and 4 would meet the project goals and would be favored by funding agencies over other options evaluated since they provide complete connectivity on both sides of the bridge. However, Option 1 was determined to have the lower construction costs and is the option that Exeltech recommends advancing into the funding phase. The below graphics show the recommended option (see Figure 18: Option 1 Configuration and Figure 19: Option 1 Rendering).

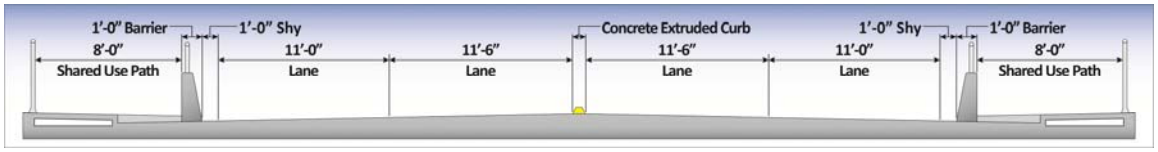


Figure 18: Option 1 Configuration

Figure 19: Option 1 Rendering

APPENDIX A:

Workshop Team Primer

To: Workshop Study Team Members

Re: Warren Ave. Bridge Feasibility Study Workshop

Thank you in advance for participating in the study workshop for the Warren Avenue Bridge Project. This will be a challenging project from an engineering and a funding standpoint. I am looking forward to your creative ideas you are able to identify and develop during the workshop.

The objective is to develop and recommend an alternative that will widen one or both sidewalks across the Warren Avenue Bridge. The challenge will be to develop an alternative that achieves this goal with a limitation of project funds at five million dollars.

Your role as a team member is to contribute your knowledge and expertise to identify and develop recommendations supporting this objective.

Project

The Warren Avenue Bridge along State Route 303, in Bremerton Washington, was constructed in 1958. It has four lanes of traffic and sidewalks on either side of the bridge. The existing sidewalks currently do not meet the minimum American with Disabilities Act (ADA) width requirements of five feet. The sidewalks on both sides of the bridge are generally 3'-11" wide with areas of constriction that reduce the open width to 3'-6".

Exeltech will host a feasibility study workshop that will primarily occur over a four day period and involve several engineers, including structural and civil. The goal of the study is to evaluate up to four (4) alternatives to provide improved bike and pedestrian access across the bridge. This will be accomplished through widening the sidewalks on one side or both sides of the bridge to at least 8'-0" wide. Each alternative will consider the structural impacts and improvements that may be required. However, no structural modeling will be performed as part of this study. Therefore all estimates will be based off assumptions that will be made and documented as the study progresses. As the alternatives are developed and evaluated, it will be the goal to provide an alternative with a construction estimate of five million dollars. At the end of the study, Exeltech will recommend one alternative that best meets the bike/ped access goal and is favorable for funding support.

Workshop Dates

Project Overview & Alternatives Discussion	March 7 (8:00 AM – 5:00 PM)
Explore Alternatives & Begin Sketches and Estimates	March 8 (8:00 AM – 5:00 PM)
Finalize Sketches and Estimates & Contractor Discussions	March 9 (8:00 AM – 5:00 PM)
Summary & Presentation	March 10 (8:00 AM – 12:00 PM)

The workshop will be held at Exeltech's Lacey office.

The project documents will be printed and provided at the beginning of the workshop. A link to download the plans is below. A link to the plan location on the P: Drive is also below.

Plans Download Link: https://exeltech.sharefile.com/d-sd140744268a4c4bb
Photos Download Link: https://exeltech.sharefile.com/d-s59a31e06f0f451ea

Plans on P: Drive: P:\2015\1528 Warren Ave Bridge\Bridge Workshop VE - March 2016\Workshop Packet\
Photos on P: Drive: P:\2015\1528 Warren Ave Bridge\Bridge Workshop VE - March 2016\Workshop Packet\photos\
All Project Information on P: Drive: P:\2015\1528 Warren Ave Bridge\

Please charge all time to Project #1528 – Task "Feasibility Study"

Issues Memo

Prior to the workshop, each team member should review the available information and prepare a Key Issues Memo (See end of this document for sample outline). In your Key Issues Memo you should outline the following: Observations/Issues, Potential Ideas, and additional information you might need or questions.

Estimated Construction Costs

Each of you will be expected to prepare the sketches and make the quantity take-offs and work on cost estimating for your alternatives.

If you have any questions in advance of the workshop please feel free to email me or contact me on my cell, 360-509-5108 (Josh Ranes).

Bremerton Warren Ave Bridge Workshop Agenda

(March 7 – March 10, 2016)

Participants: David Talcott, Evan Grimm, Josh Ranes, Cheng Yang, Karl Kirker, Nate Brown

Pre Workshop Tasks

- Participants to review background material
- Request Key Issues Memo from all participants at beginning of workshop

Day 1 (8:00 AM – 10:00 AM)

- Work independently to review project data & develop Key Issues Memo

Day 1 (10:00 AM – 12:00 PM)

- 45 min (Josh) - Project Overview – present overall scope of project to project team, discuss preliminary alternatives, recap discussions with Chal & Tom, and recap funding issues and options for obtaining funding
- 45 Min. (Evan) - Bridge Overview – review structure configuration (plans or pics), review inspection report and any load ratings that have been done
- 30 Min. (Josh) - Finalize project purpose and need

Day 1 (1:00 PM – 5:00 PM)

- 30 min (Evan & Josh) – Discuss alternatives reviewed up to this point
- 30 min (Karl) - Cost Estimate Review, and identify major rehab items and review current cost estimate
- 2 hr (Group) – Brainstorm ideas/alternatives
- 1 hr (Evan) – Determine which alternatives to review in more depth and make assignments

Day 2 (8:30 AM – 12:00 PM)

(Note: Evan and Josh out for the morning session due to training)

- 2 hr – Work individually on assignments from previous day
- 1.5 hr (David) – Discuss alternatives studied (pros, cons, challenges, etc)

Day 2 (1:00 PM – 5:00 PM)

(Note: Evan and Josh return approx. 1:30)

- 1 hr (David) - Explore cost savings ideas
- 3 hr (Group) - Develop write-ups, sketches and cost estimates for identified alternatives
- Send updated concepts to contractors

Day 3 (8:30 AM – 12:00 PM)

- 2 hr (Group) - Finish write-ups, sketches and cost estimates for identified alternatives

- 1.5 hr (Group) - QC and cross check each other

Day 3 (1:00 PM – 5:00 PM)

- Validate prelim costs with contractors
- Tie up any loose ends, sketches, estimates, etc

Day 4 (8:30 AM – 12:00 PM)

- 1 hr (Josh & Evan) – Summary Discussion, finalize thoughts, discuss contractor input
- 2.5 hr – Josh and Evan to package results together and prep for presentation to City

Day 4 (2:00 PM – 4:00 PM)

- (Josh, Evan, & David) Present to Chal and Tom (Bremerton)

Post Workshop Tasks

- Finalize Feasibility Study Workshop Report and Appendices (includes funding strategy), QC and submit to City

KEY ISSUES MEMO

Date: Date
To: City of Bremerton
From: Team

RE: Key Issues Memo, Warren Avenue Bridge Sidewalk Improvements Feasibility Workshop

The Feasibility Workshop Team has developed the following Issues/Observations, Design Concept Ideas and Information Requests for the Feasibility Workshop scheduled for March 7 – March 10. Initials follow each item indicating who input each idea.

Key Issues/Observations:

-
-
-

Concept Ideas:

-
-
-

Information Requests/Questions:

-
-
-

APPENDIX B:

Key Issues Memos

KEY ISSUES MEMO

Date: March 7, 2016
To: City of Bremerton
From: David Talcott

RE: Key Issues Memo, Warren Avenue Bridge Sidewalk Improvements Feasibility Workshop

The Feasibility Workshop Team has developed the following Issues/Observations, Design Concept Ideas and Information Requests for the Feasibility Workshop scheduled for March 7 – March 10. Initials follow each item indicating who input each idea.

Key Issues/Observations:

- Height of structure presents constructability challenges
- Warren Ave – a significant connection between east and west Bremerton supporting their trail network.
- Utilities present an unique challenge to construction. May want to replace with the project
- Access to / from Lebo. Access on east side and low level ped path on west side.

Concept Ideas:

- Narrow lanes by 1.5’ each side, rebuild barrier to get a 5’ sidewalk.
- Widen sidewalk
- Sidewalk on one side
- New pedestrian structure elsewhere
- No-build

Information Requests/Questions:

- Pedestrian volumes – existing / projected
- Approximate life span of existing bridge (WSDOT)
- Summary of seismic status
- Public involvement summary
- Illumination requirements?

KEY ISSUES MEMO

Date: 3/7/2016
To: City of Bremerton
From: Josh Ranes (JMR)

RE: Key Issues Memo, Warren Avenue Bridge Sidewalk Improvements Feasibility Workshop

The Feasibility Workshop Team has developed the following Issues/Observations, Design Concept Ideas and Information Requests for the Feasibility Workshop scheduled for March 7 – March 10. Initials follow each item indicating who input each idea.

Key Issues/Observations:

- Limited funding (JMR)
- Construction will be challenging due to limited access (JMR)
- Significant traffic (JMR)
- Sub-standard ADA access across bridge (JMR)
- Out of date lighting (JMR)
- WSDOT owned (JMR)
- Public perception (JMR)
- Lack of connectivity at bridge ends to opposite sides (JMR)
-

Concept Ideas:

- **Shared path both sides**
  - **Reconfigure lanes – maintain overall bridge width**
  - **Leave existing lane configuration and barriers in place – widen to outside**
- **Shared path one side**
  - **Reconfigure lanes – maintain overall bridge width**
  - **Leave existing lane configuration and barriers in place – widen to outside**
  - **Close or remove existing sidewalk one side – save on weight**
- **Shared path under bridge**
- **Separated new ped bridge**

Information Requests/Questions:

-
-
-

KEY ISSUES MEMO

Date: 3/7/16
To: City of Bremerton
From: Evan Grimm (EMG)

RE: Key Issues Memo, Warren Avenue Bridge Sidewalk Improvements Feasibility Workshop

The Feasibility Workshop Team has developed the following Issues/Observations, Design Concept Ideas and Information Requests for the Feasibility Workshop scheduled for March 7 – March 10. Initials follow each item indicating who input each idea.

Key Issues/Observations:

- A crash-tested bridge barrier of some kind is required on the bridge. Separation of the pedestrians from traffic with a crash-tested barrier may not be required by the civil design code, but it appears important to the public to provide this separation.
- The 3 steel superstructure spans are subject to fatigue-prone detailing due to the time period in which the bridge was designed. The deck in these spans consists of light-weight concrete. Fatigue issues may need to be addressed by the project in these spans. Dead Load and Live Load increases may be most critical in the steel span.
- Design criteria needs to be clearly identified. The AASHTO Manual for Bridge Evaluation (MBE) governs the load rating of existing bridges, and although it mentions the possibility of accounting for Pedestrian Live Load, it is not common to do so. The design criteria for the sidewalk project will need to clearly identify how to accoun for Pedestrian Live Load.
- The project would need to keep any dead load mass increase to less than 10% in order to avoid seismic analysis and design per the “Do No Harm” policy described under WSDOT Bridge Design Manual (BDM) 4.3.1. The bridge substructure has several details that do not meet modern seismic detailing practice and would be very expensive to address, likely pushing the construction cost into the $50M range.

Concept Ideas:

- Consider using a steel barrier, like the Oregon 2-tube rail or like the railing Exeltech used on the Raft Island bridge to separate traffic from peds and bikes. This will reduce weight compared to a single slope concrete barrier. This will help keep us away from the seismic analysis requirements.
- Consider a cost-effective way to widen to the outside of the sidewalks. This would enable the roadway lane widths and barriers to stay in place. It could reduce the traffic control burden.
- If widening one side only, pedestrians and bikes will need to have access to that widened side off the ends of the bridges. This could be done by sending a path down

under the superstructure near the abutments or by creating overhead pedestrian bridges at the bridge ends. Pedestrian bridges will be more costly, give a greater feeling of safety, and could be a visual obstruction when compared to going underneath the existing bridge.

Information Requests/Questions:

- Can the utilities on the exterior of the bridge be relocated to allow room for structure support when widening to the outside?

APPENDIX C:

Contractor Responses

From: Welch, Pete
To: Evan Grimm
Cc: Walken, Travis; Rohrbough, Carter
Subject: RE: Two new bridge projects
Date: Tuesday, February 23, 2016 3:30:43 PM
Attachments: Warren.xlsx
Hatches.pdf
QuikDeck.pdf

Evan,

Attached are my comments/review of the Warren project that you sent me.
Since you don't have details on the retrofit work yet – most of the value I can add is with regards to the access.
I've included some costs for dowels and access hatches from prior estimates
And a wild thought. – to reconfigure only one side of the bridge ???

Also I've left a message with Desere Winkler with the City of Lakewood at 253-983-7818
She may be able to provide us with the bid tabulations for the Madigan access improvement project – currently under way at the Freedom bridge VIC JBLM.
This along with a few plan sheets showing that design may be a starting point for you to evaluate the option of adding the extensions that you mention below.
Feel free to call her yourself if you like.

Hope this helps

Pete

From: Evan Grimm [mailto:egrimm@xltech.com]
Sent: Friday, February 19, 2016 11:34 AM
To: Welch, Pete
Cc: David Talcott; Josh Ranes
Subject: RE: Two new bridge projects

Pete,

Thank you for taking a look at the Warren Avenue Bridge for us. We have done a lot of back-and-forth with the client and internal discussions on various options. If you have any great ideas as you look through this, then we are all for it. I think that if I were to cut out one specific request for you if would be to look at our cost estimate numbers we made in January 2016.

I am sending a link to some documents. The current state of the City's thinking is shown in the file, "Warren Ave Bridge - Sep2015 White Paper with Corresponding Jan2016 Estimate.pdf". If we could get them a project that looks like what they have in the white paper but only do it for $5M, they would be happy campers. Our estimate is up to around $8M, and we did not document all of the background for our numbers for you. You'll see work items 4, 5, and 6, which refer to deck strengthening, and we took a guess at this since we have not even designed it. But the point of the deck strengthening is that when you move the barrier in-board, the barrier lands at midspan of the 6

½" deck between stringers, and the deck won't be strong enough to withstand the lateral impact force.

Another option that we have not shown anywhere, would be to leave the concrete bridge barriers and lane configurations as-is, remove the outer hand railing, and to widen out the overhangs by another 4 ft on each side. This did not seem to be an option that would get us down below $5M, but we did not spend a lot of time on it. If you have any great ideas on how to do this, there would be benefits to going that route.

I also put a few as-built plans in there for you so you can get an idea of what the structure looks like. There have been a few other projects in the life of the bridge to include seismic retrofit and overlay. I also have a bunch of steel fabrication and erection drawings. I wanted to keep the information manageable for you, but let me know if you want to see anything beyond what I sent.

https://exeltech.sharefile.com/d-s701bb6729704b58a

Thank you.
-Evan Grimm
cell 360-701-3520

From: David Talcott
Sent: Friday, February 19, 2016 10:48 AM
To: Welch, Pete <John.Welch@gcinc.com>
Cc: Evan Grimm <egrimm@xltech.com>
Subject: RE: Two new bridge projects

Pete:

The feasibility study for Warren Avenue in Bremerton will now occur on March 7-9. If possible we would like to send a few sketches up to you for verification of unit costs and constructability. The other project is further out in Issaquah where a new structure is planned on 62nd Avenue. It will likely be a several span structure where a redesign could save several million dollars.

Regards,

David Talcott, PE, PMP Director of Engineering Services
Exeltech Consulting, Inc.
Sustainable Engineering Solutions for a Changing World / People, Not Companies, Successfully Deliver Projects
8729 Commerce Place Drive NE, Suite A
Lacey, WA 98516
P. 360.357.8289 Cell 206.641.1667 dtalcott@xltech.com

Warren Ave Bridge widening
Constructability Review
comments/clarifications

A wild thought - can you provide compliant access on only one side of the bridge with ped/bike under bridge crossovers at the abutments??
- signage to direct bikes and wheelchairs to the proper route
- pedestrians only allowed on the narrow - unmodified side
- then move the new barrier farther so it lines up with the next girder line - and eliminate some (or all) of the requirement for deck strenghtening.
- If this were considered, it could have significant cost implications since the bridge is so long.

That being said, for your current concept:

Traffic control
- what work zone will be permitted on the bridge?
- i.e.number and timing of lane closures allowed
- days or nights?
- barrier protected or barrels

The answers to these questions not only effect the cost of the traffic control - but the labor and equipment that can be used to build the job
For example You've got a fair chunk of $ in the under deck access $770K
If you can get the deck area work zone to accommodate an under the deck snorkel lift or UBIT (under bridge inspection trailer)
And the work under the deck is the mere attachment of some light beams - might be a cheaper option

Obviously the cheapest for construction and traffic control is to close the bridge during construction but this is rarely possible

Will the 30% scope contingency cover tie in of the on grade existing sidewalks to the new configuration?

Will WSDOT bridge painting program cover for retro fit painting?
For steel spans (if lead painted) will require lead paint abatment for the connections of the new steel strenghening
field paint for finish paint after retrofit steel is installed

Drilling and doweling:
Most of the time bridge retrofit tries to stay away from core drilling in an effort to save all existing rebar
I've seen magnetic detection used succussfully to locate the surface rebar grid and then rotohammer the holes for new dowels to miss existing rebar
this may require field drill of steel end plate to match hole pattern achieved in the doweling operation
rotohammer can be less expensive than core drill and gives a rough surface profile in the hole for optimal epoxy bonding (cored holes may need roughening)
typical rotohammer drill and epoxy dowel # 5 rebar 9" embed in 3/4" hole about $ 30/ea (includes dowel and epoxy)

Added steel members:
With out seeing the design $2.00/lb for furn and install steel seems light.
It's likely you've got some fab on these relatively light members (i.e. end plates, holes, gussets)
For example, a recent steel bridge quote for 368,000 lbs of 4' tall girders and diaphragms = $1.75/lb furnish only - shop primed
comparatively this recent quote is a lesser amount of fab for the weight I believe than for what you're proposing
It may be simple to bolt a beam under the deck - but if you need to tie it somehow to the barrier (through deck bolts) - this may be a trick.
At this point - not sure what to suggest for install - need more detail

Clarify expansion joints are only modifications to accommodate new sidewalk shape and not complete replacements?

Under bridge work decks (3 types)-
1) for T-beam spans (roughly 312 LF x 2 sides say 8' wide work deck = 5000 Sf)
10 kip shoring dug into slopes and manlifts from grade (ie Lebo Blvd level)
if this scheme is possible - use $15/sf = $75K

2) for box girder spans-
2 each 8' wide deck x 790 lf = 12,640 SF
assume have to work out of UBIT at night with lane closure to install Quik Deck type hanging work deck
install 800 anchors(1 anch/16 SF deck) = $75K
concept hang quik deck at $15/sf rent, install, remove = $190K
rem/patch anchors = $50K
est $315K or $25/sf

3) for steel spans -
appears to be existing cat walk under first stringer behind main girder
from asbuilt appears quik deck will work with some modification
deck is discontinuous due to floorbeams and bracing break up into 56 each 16' long by 8' wide platforms
build deck above catwalk and use cat walk to access each platform
discontinous will slow production
also will have to come up with support at outside girder as std beam hangers would be below the level of the work deck
perhaps drill holes in deck at 8' O.C. next to girder that will be covered over with sidewalk extension pour.
problem could be washer plate and nut for this support next to girder in roadway gutter - may have to recess
night work (lane closures) to drill holes in deck and stage materials but then can work under bridge in day to assemble
56 each 16' x 8' platforms = 7,168 SF
for slower productions and deck hole supports (168 each) use $35/sf = $250 K

4) work access for items 10 and 11 figure to use Steel span unit cost of $35/sf
assume item 10 - 4 platforms at 56' x 16' = 3584 SF = $125K

2/23/16 Email: RE: Two new bridge projects

Warren.xlsx attachment

assume item 11 - 2 platforms at 56' x 16' = 1792 SF = $65K

Box girder manhole access doors:

for 6 Box girder spans - x 6 cells per span x 2 sides = 72 man hole access - Check to your 80

Assume there are not any access holes through the interior diaphragms??? No such luck

Last job I bid access manholes with permanent hatches was April 2013 - M st and I-705 overcrossings seismic retrofit Br 5/437

there were 76 each at a cost of ($118K for demo and $150 K rebuild) see attached plan sheet price was $4700/each MH access hatch

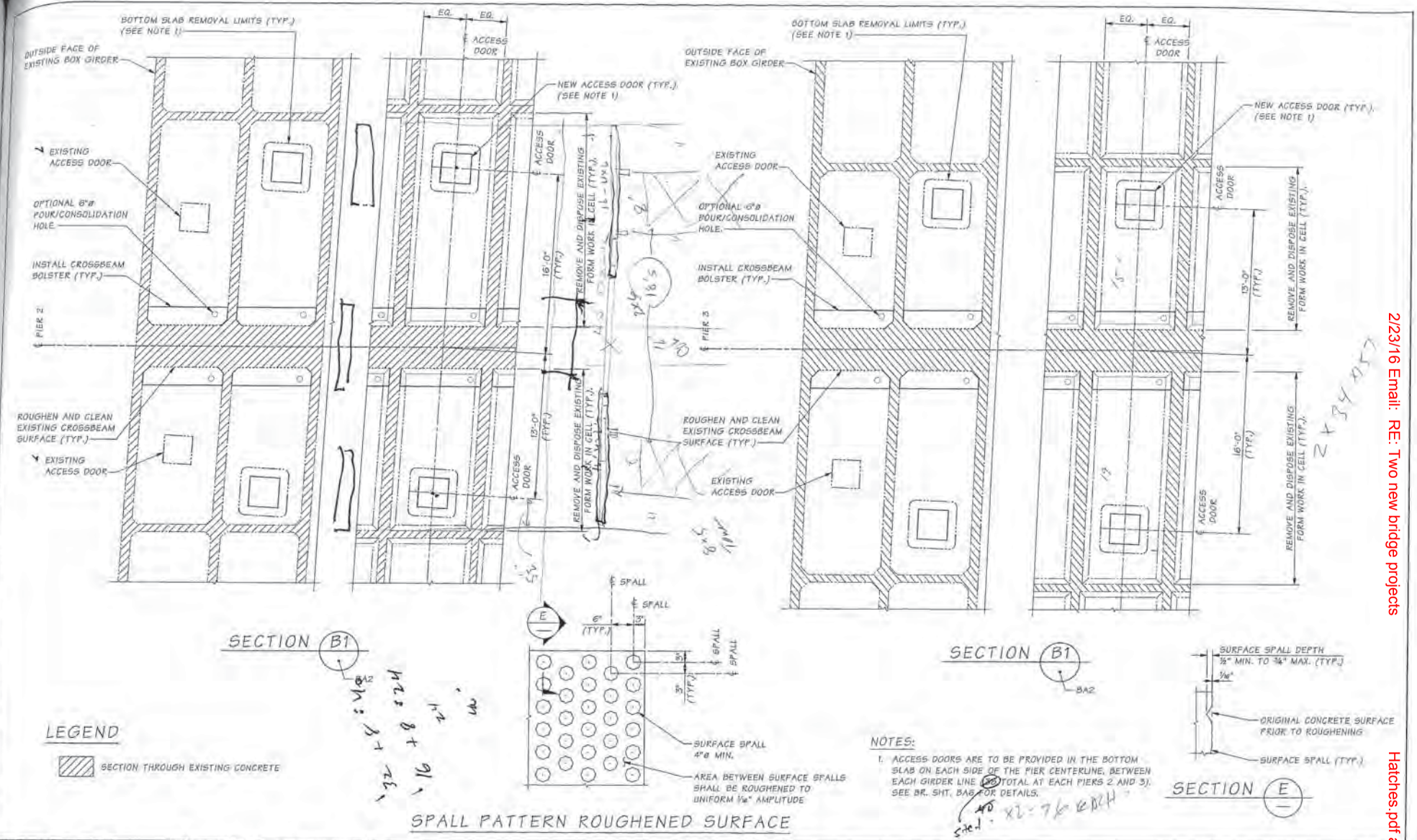
Rem existing traffic ped barrier and median curb OK

Unit prices for Single slope barrier and BP rail seem reasonable

Side walk extension cost to form/pour strip side walk extension reduce to $250/CY or about $35/SY sidewalk - rest looks fine

2/23/16 Email: RE: Two new bridge projects

Warren.xlsx attachment



LEGEND

SECTION THROUGH EXISTING CONCRETE

NOTES:

1. ACCESS DOORS ARE TO BE PROVIDED IN THE BOTTOM SLAB ON EACH SIDE OF THE PIER CENTERLINE, BETWEEN EACH GIRDER LINE (20 TOTAL AT EACH PIERS 2 AND 3). SEE BR. SHT. BA6 FOR DETAILS.

SPALL PATTERN ROUGHENED SURFACE

2/23/16 Email: RE: Two new bridge projects

Hatches.pdf attachment

Bridge Design Engr.	Khaleghi, B	M:\Y-Team\M STREET SEISMIC RETROFIT\Window Files\BOTTOMSLAB.wrd	
Supervisor	Khaleghi, B		
Designed By	Lee, CS 09/12		
Checked By	Frymoyer, ML 01/13		
Detailed By	Bontemps, W 09/12		
Bridge Projects Engr.			
Prelim. Plan By			
Architect/Specialist			

DATE	REVISION	BY	APP'D

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
10	WASH.	BH-0053 (966) IM-0053 (966)		
JOB NUMBER 12C818				

BRIDGE AND STRUCTURES OFFICE

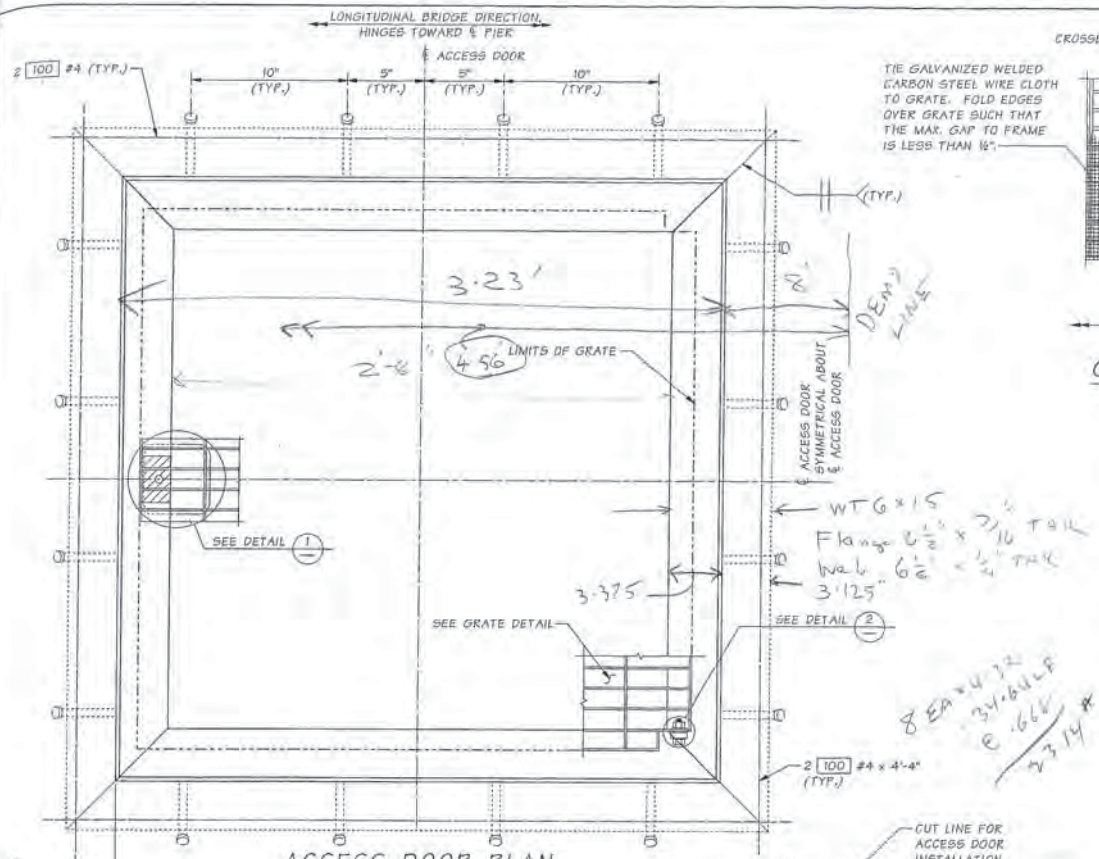
Washington State Department of Transportation

I-5
M ST AND I-705 OVERCROSSINGS
SEISMIC RETROFIT
BRIDGE NO. 5/437 I-5 OVER S M ST

NORTH AND SOUTH BRIDGES
CROSSBEAM BOLSTER DETAILS

BRIDGE DESIGN SHEET NO. BA5
SHEET NO. 52 OF 103 SHEETS

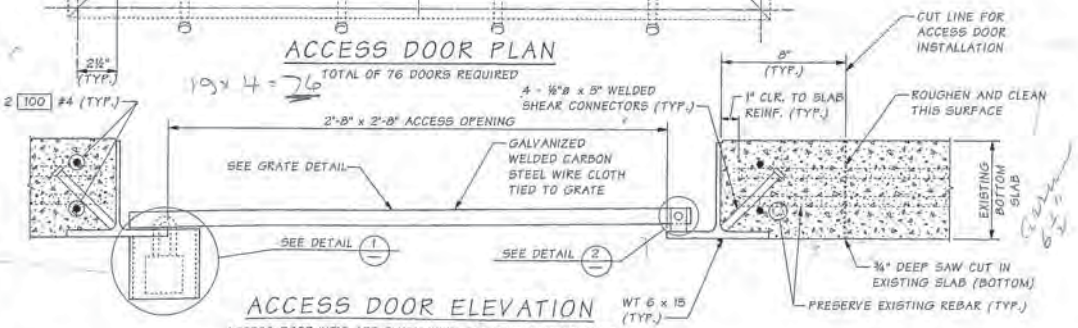
SR 5 FILE NO. SHEET BA5



ACCESS DOOR PLAN

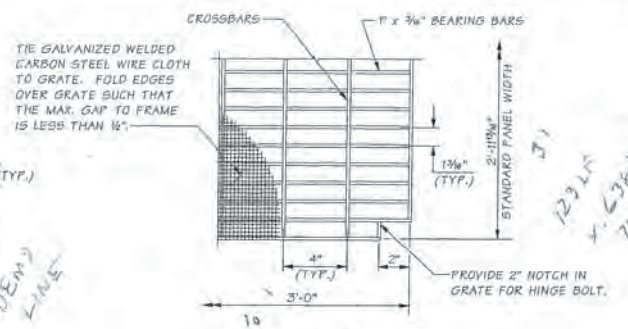
TOTAL OF 76 DOORS REQUIRED

19 x 4 = 76



ACCESS DOOR ELEVATION

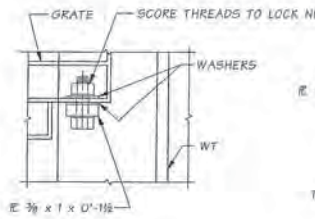
ACCESS DOOR WT'S ARE FLUSH WITH BOTTOM SLAB SURFACE



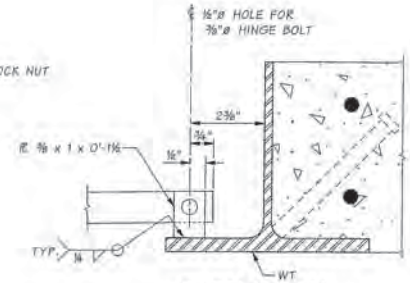
GRATE DETAIL

NOTES:

1. STEEL IN GRATES, STRUCTURAL SHAPES, AND ANCHORS FOR ACCESS DOOR SHALL CONFORM TO ASTM A 36, EXCEPT STRUCTURAL TUBE (HSS) SHALL CONFORM TO ASTM A 500, GRADE B. ALL STEEL MATERIALS SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH THE REQUIREMENTS OF AASHTO M 111. STEEL GRATING SHALL BE FABRICATED BY WELD CONNECTIONS. WELDS, WELDING PROCEDURES, AND WELDING MATERIALS SHALL CONFORM TO THE AWS D1.1, LATEST EDITION, STRUCTURAL WELDING CODE.
2. GALVANIZED WELDED WIRE CLOTH SHALL BE PLAIN CARBON STEEL WITH 0.063 INCH DIAMETER WIRES SPACED AT ¼ INCH ON CENTER.
3. FOR ACCESS DOOR LOCATIONS, SEE DETAIL BR. SHT. BA5.
4. ALL EXPOSED PARTS SHALL BE PAINTED TO MATCH COLOR OF CONCRETE.

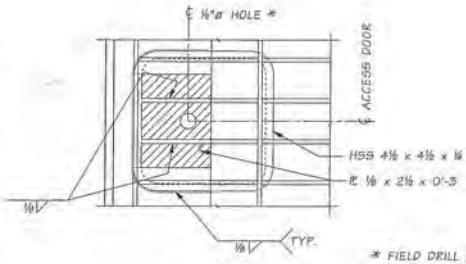


PLAN

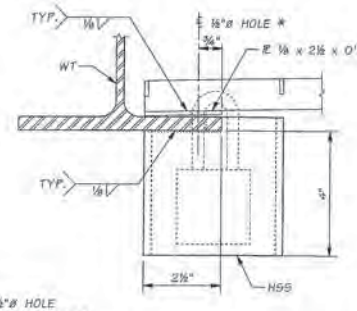


ELEVATION

DETAIL 2



PLAN



ELEVATION

* FIELD DRILL ½"ø HOLE THRU ℄ & WT FOR PADLOCK

DETAIL 1

Bridge Design Engr.	KhaTeghi, B	M:\V-Team\M STREET SEISMIC RETROFIT\Window Files\ACCESS HATCH 1-437.wnd	
Supervisor	KhaTeghi, B		
Designed By	Lee, CS	09/12	
Checked By	Frymoyer, ML	01/13	
Detailed By	Montemps, W	09/12	
Bridge Projects Engr.			
Prelim. Plan By			
Architect/Specialist			

Tue Feb 26 12:50:17 2013

DATE	REVISION	BY	APP'D

BRIDGE NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
10	WASH.	BH-0053 (966) IM-0053 (966)		
JOB NUMBER 12C816				

BRIDGE AND STRUCTURES OFFICE

2/26/2013

2/26/13

Washington State Department of Transportation

I-5
M ST AND I-705 OVERCROSSINGS SEISMIC RETROFIT
BRIDGE NO. 5/437 I-5 OVER S M ST

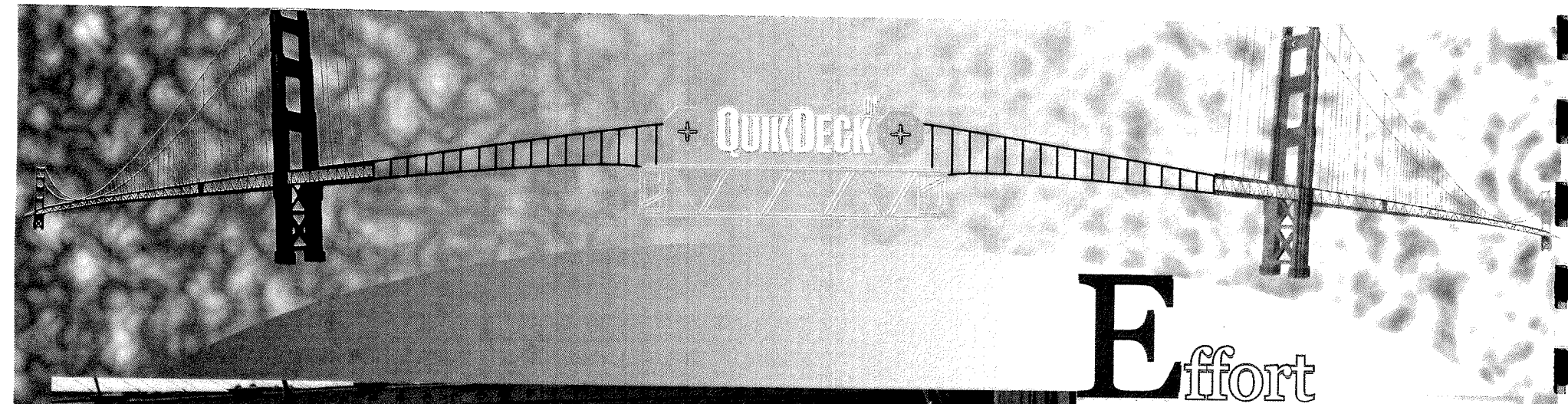
ACCESS DOOR DETAILS

BRIDGE SHEET NO. BA6

SHEET 53 OF 103 SHEETS

FILE NO. SHEET BA6 SR 5

2/23/16 Email: RE: Two new bridge projects Hatches.pdf attachment



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QuikDeck™ is **Easy**!

Simple components make assembling QuikDeck™ easy.

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QuikDeck™ can be assembled by your own crew – no specialized labor or "high wire" acts are required.

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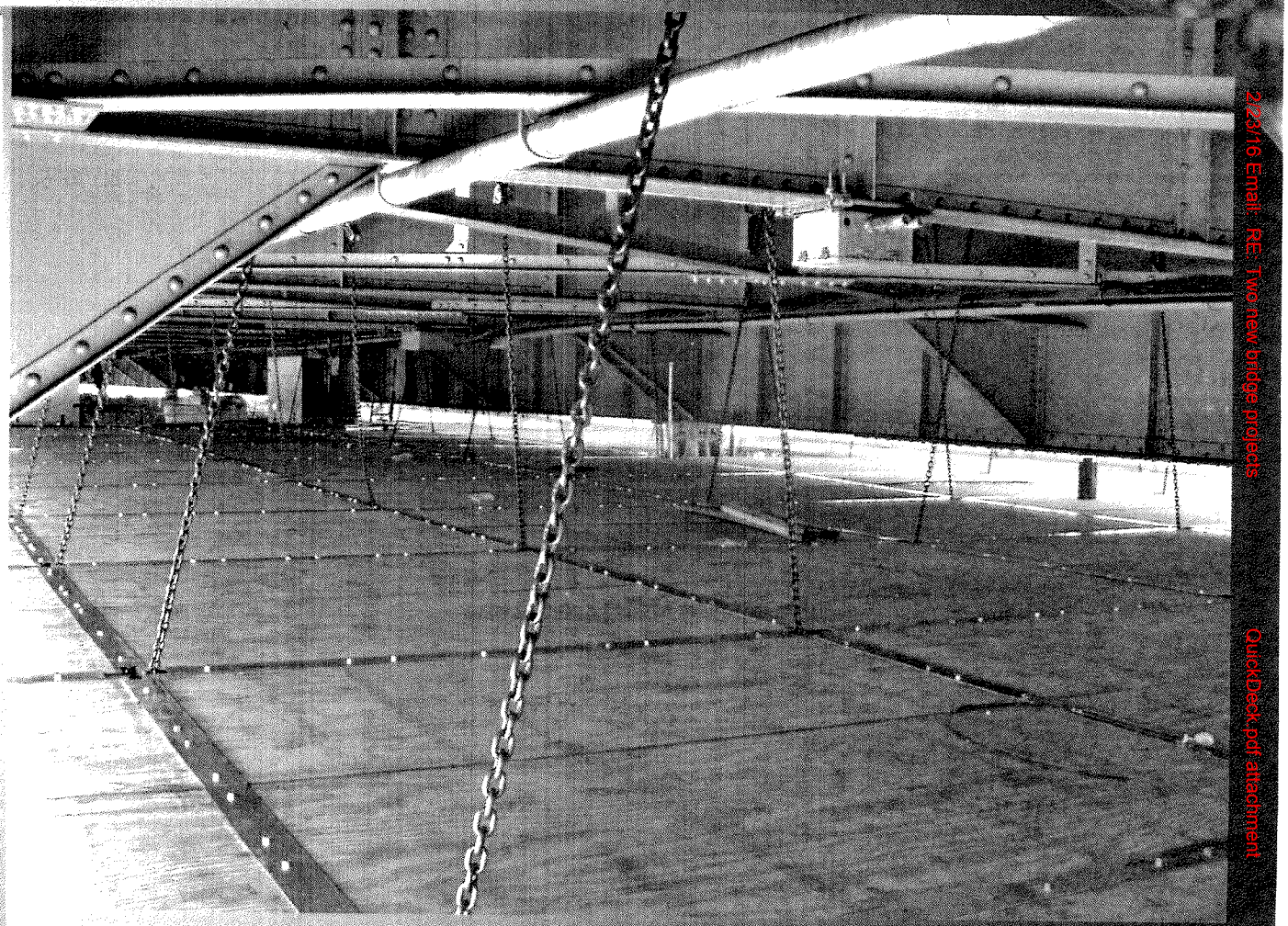
- Reduced costs through relocation of platform
- Increased worker productivity
- Enhanced worker safety

Do the math on your next job and realize the advantages of QuikDeck™.



QUICKDECK

JUDGE GRATH BRIDGE

QUIKDECK™

JUDGE GRATH
BRIDGE

From: Welch, Pete
To: Evan Grimm
Cc: Walken, Travis; Rohrbough, Carter
Subject: FW: Madigan Access Project
Date: Thursday, February 25, 2016 2:44:19 PM
Attachments: 18 - Plans 94-160.pdf
Bid Tab Madigan.pdf
Sketch.pdf

Evan,

Last thought on Warren:

Attached bid tabs and drawings for Madigan; City of Lakewood project.
Average about $1million for widenings (bid Items B-4, B-15, B-17, B-23 and B-24)
2 sides added 6.5' x 163.33' long = 2,123 SF or $470/SF for the structural widening

See attached concept sketch for Warren – non symmetrical widening of 1 side 1718' x 4' = 6,872 sf at $470/sf = $3.25 Mill.
Allows you to shift barrier on other side to the next girder line in attempt to eliminate under bridge work on that side.

PS Can you provide us with an hourly rate for structural engineering that we can use in preparing our bids (i.e. form design, shoring, hoisting plans)

Pete

From: Desiree Winkler [mailto:dwinkler@cityoflakewood.us]
Sent: Wednesday, February 24, 2016 10:44 AM
To: Welch, Pete
Subject: Madigan Access Project

Pete,

The bridge plans are in the set attached. Maybe more than you need – but it was already bundled like that.

Bid Tabs also attached.

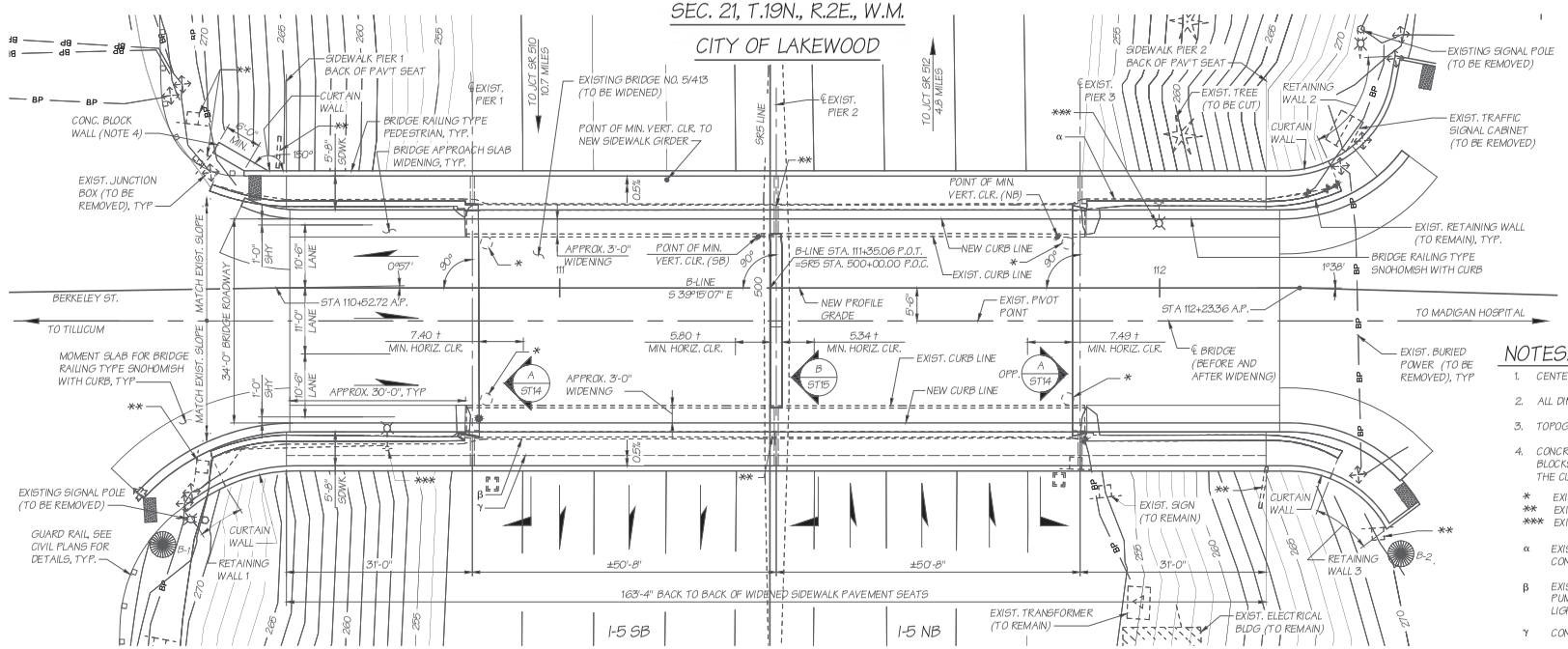
Let me know.

Desiree

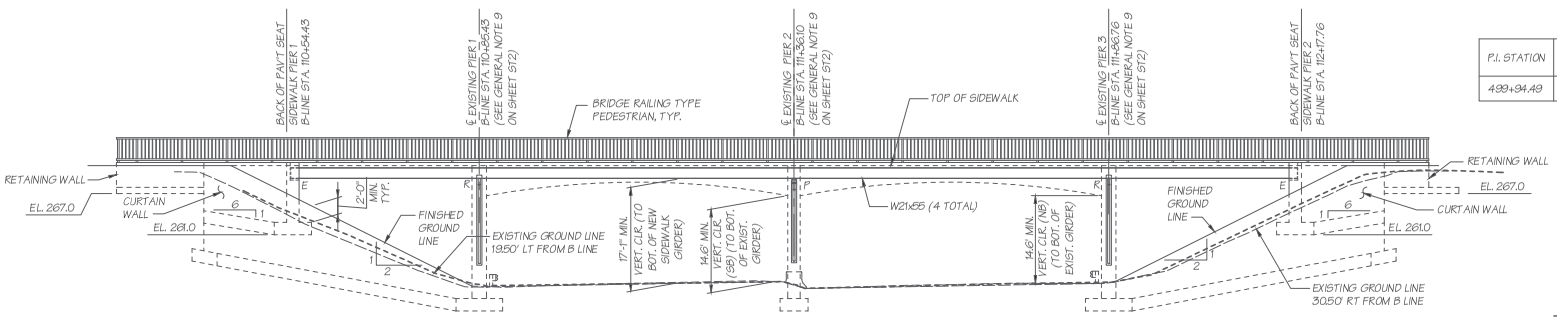
Desireé S. Winkler, P.E.
Transportation Division Manager
City of Lakewood
6000 Main Street SW
Lakewood, WA 98499-5027
253.983.7818 fx: 253.512.2268
dwinkler@cityoflakewood.us

SEC. 21, T.19N., R.2E., W.M.

CITY OF LAKEWOOD



PLAN



DATUM

NGVD 29

ELEVATION

NOTES:

1. CENTER LINE OF BEARING OF ALL PIERS SHALL MATCH EXISTING.
2. ALL DIMENSIONS SHALL BE FIELD MEASURED BY THE CONTRACTOR.
3. TOPOGRAPHIC CONTOURS SHOWN ARE FOR EXISTING CONDITION.
4. CONCRETE BLOCK WALL SHALL BE DESIGNED BY THE CONTRACTOR. BLOCKS SHALL BE TRIMMED TO ENSURE A SMOOTH CONNECTION TO THE CURTAIN WALL.

* EXISTING STORM DRAIN (TO BE PLUGGED)
** EXISTING SIGN (TO BE RELOCATED)
*** EXISTING LUMINAIRE (TO BE RELOCATED)

α EXISTING UTILITY LINES INCLUDING (1) 3"ø AND (2) 2"ø CONDUITS FOR SIGNAL WIRES (TO BE RELOCATED OR REMOVED)

β EXISTING UTILITY LINES INCLUDING (1) 3½" ø CONDUIT FOR PUMP STATION PRIMARY POWER AND (1) 1"ø CONDUIT FOR LIGHTING WIRE (TO BE RELOCATED OR REMOVED).

γ CONDUITS INCLUDING (4) 2"ø, (1) 3"ø AND (1) 4"ø CONDUITS

† BELOW BRIDGE FROM FOG LINE TO PIER OR ABUTMENT WALL

SR5 LINE CURVE DATA

P.I. STATION	Δ	RADIUS	TANGENT	LENGTH	BK. TANGENT BEARING
499+94.49	6°33'36" LT	5730.00'	303.30'	606.03'	N47°43'7"E

I-5

R.C. OVERHANG (8") WIDENING
LOADING: HL-93

STEEL GIRDER SIDEWALK
LOADING: 90 PSF

Bridge Design Engr.					REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
Supervisor					10	WASH			
Designed By J. XU/J. PETERSEN-GAUTHIER					JOB NUMBER				
Checked By T. WHITEMAN									
Detailed By H. TRAN									
Bridge Projects Engr.									
Prelim. Plan By									
Architect/Specialist	DATE	REVISION	BY	APP'D					

HARRY H. HASTAD — STATE OF WASHINGTON — 20053 — PROFESSIONAL ENGINEER — 5/19/14

kpff Consulting Engineers
1601 Fifth Avenue, Suite 1600
Seattle, Washington 98101
(206) 622-5822 Fax (206) 622-8130

Washington State Department of Transportation

CITY OF LAKEWOOD

MADIGAN ACCESS IMPROVEMENT PROJECT - PHASE 2

BRIDGE LAYOUT

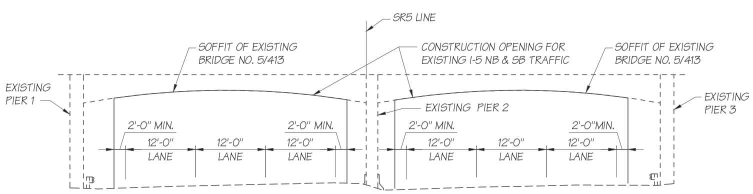
BRIDGE SHEET NO. 94 OF 96 SHEETS

Sep 18, 2014 - 1:16pm dlent V:\113096 (Madigan Access)\Design\MA-ST01.dwg Layout Name: Bridge Layout

02/25/16: FW: Madigan Access Project attachment 18 - Plans 94-160.pdf (excerpt of only 5 sheets)

EXISTING BRIDGE 5/413 ELEVATIONS						
	PIVOT POINT		EXISTING LEFT CURB		EXISTING RIGHT CURB	
B- LINE STA.	RT OFFSET	ELEVATION	LT OFFSET	ELEVATION	RT OFFSET	ELEVATION
110+30	5.50'	271.71	N/A	N/A	N/A	N/A
110+40	5.50'	271.91	N/A	N/A	N/A	N/A
110+50	5.50'	272.10	N/A	N/A	N/A	N/A
110+60	5.50'	272.24	N/A	N/A	N/A	N/A
110+70	5.50'	272.34	N/A	N/A	N/A	N/A
110+80	5.50'	272.44	8.49'	272.24	19.48'	272.36
110+90	5.50'	272.55	8.49'	272.49	19.48'	272.47
111+00	5.50'	272.61	8.49'	272.54	19.48'	272.53
111+10	5.50'	272.67	8.49'	272.59	19.48'	272.58
111+20	5.50'	272.70	8.49'	272.64	19.48'	272.63
111+30	5.50'	272.74	8.49'	272.65	19.48'	272.67
111+40	5.50'	272.77	8.49'	272.66	19.48'	272.66
111+50	5.50'	272.74	8.49'	272.63	19.48'	272.65
111+60	5.50'	272.69	8.49'	272.58	19.48'	272.63
111+70	5.50'	272.64	8.49'	272.53	19.48'	272.58
111+80	5.50'	272.61	8.49'	272.49	19.48'	272.52
111+90	5.50'	272.58	8.49'	272.46	19.48'	272.48
112+00	5.50'	272.43	N/A	N/A	N/A	N/A
112+10	5.50'	272.28	N/A	N/A	N/A	N/A
112+20	5.50'	272.13	N/A	N/A	N/A	N/A
112+30	5.31'	271.70	N/A	N/A	N/A	N/A
112+40	5.03'	271.04	N/A	N/A	N/A	N/A

EXISTING I-5 ROADWAY ELEVATIONS								
	SB I-5 RT SHOULDER		SB I-5 LT SHOULDER		NB I-5 LT SHOULDE		NB I-5 RT SHOULDER	
SR005 STA.	LT OFFSET	ELEVATION	LT OFFSET	ELEVATION	RT OFFSET	ELEVATION	RT OFFSET	ELEVATION
499+52.07	41.26'	252.71	5.72'	253.32	7.35'	252.47	42.96'	253.14
499+62.63	41.23'	252.70	5.63'	253.35	7.40'	252.46	43.01'	253.06
499+73.19	41.20'	252.86	5.61'	253.39	7.42'	252.45	43.01'	253.05
499+83.75	41.21'	252.89	5.70'	253.39	7.43'	252.44	42.99'	253.06
499+94.31	41.15'	252.81	5.79'	253.39	7.49'	252.45	42.91'	253.09
500+04.87	41.19'	252.74	5.86'	253.39	7.42'	252.45	42.82'	253.12
500+15.43	41.22'	252.91	5.86'	253.40	7.34'	252.48	42.74'	253.18
500+25.99	41.27'	252.93	5.77'	253.41	7.20'	252.49	42.60'	253.29
500+36.55	41.41'	252.96	5.90'	253.43	7.01'	252.50	42.04'	253.23



CONSTRUCTION OPENING DIAGRAM

* DIMENSION IS APPROXIMATE

GENERAL NOTES:

1. ALL MATERIAL AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR ROAD, BRIDGE AND MUNICIPAL CONSTRUCTION DATED 2014, SPECIAL PROVISIONS AND AMENDMENTS.
2. THE WIDENED PORTION OF THIS STRUCTURE HAS BEEN DESIGNED IN ACCORDANCE WITH THE REQUIREMENTS OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS SIXTH EDITION DATED 2012 WITH 2013 INTERIM REVISIONS AND THE WSDOT BRIDGE DESIGN MANUAL-2014.
3. THE WIDENED PORTION OF THIS STRUCTURE HAS BEEN DESIGNED IN ACCORDANCE WITH THE AASHTO GUIDE SPECIFICATIONS FOR LRFD SEISMIC BRIDGE DESIGN, 2ND EDITION, 2011. THE SEISMIC ANALYSIS OF THIS BRIDGE HAS BEEN COMPLETED BASED ON 1,000 YEAR RETURN PERIOD WITH THE FOLLOWING DESIGN PARAMETERS:
   - SITE CLASS C
   - PGA = 0.399
   - Ss = 0.871
   - S1 = 0.300
4. THE CONCRETE IN THE BRIDGE DECK, SIDEWALK BRIDGE DECK, AND BRIDGE RAILING CURBS SHALL BE CLASS 4000D. THE CONCRETE IN BRIDGE APPROACH SLABS SHALL BE CLASS 4000A. ALL OTHER CAST-IN-PLACE CONCRETE SHALL BE CLASS 4000, UNLESS NOTED OTHERWISE.
5. ALL REINFORCING STEEL SHALL BE DEFORMED BARS CONFORMING TO ASTM A706 UNLESS NOTED OTHERWISE.
6. THE BACKFILL BEHIND THE NEW SIDEWALK PIERS MAY BE PLACED PRIOR TO PLACEMENT OF THE SUPERSTRUCTURE.
7. UNLESS OTHERWISE SHOWN IN THE PLANS, THE CONCRETE COVER MEASURED FROM THE TOP OF THE BRIDGE DECK (EXCLUDING OVERLAY) TO THE FACE OF REINFORCING STEEL SHALL BE 1 ½", AND 2" AT THE TOP OF SIDEWALK BRIDGE DECK, 1" AT THE BOTTOM OF THE BRIDGE DECK AND SIDEWALK BRIDGE DECK, 3" AT THE BOTTOM OF FOOTINGS, AND 2" AT ALL OTHER LOCATIONS.
8. THE CONDUITS ARE SHOWN FOR REFERENCE ONLY. THE CONTRACTOR SHALL COORDINATE THESE PLANS WITH THE ELECTRICAL PLANS.
9. EXISTING FEATURES AND DIMENSIONS SHOWN ON THE PLANS ARE BASED ON INSPECTION REPORTS AND DESIGN PLANS TOGETHER WITH FIELD SURVEY DATA. THE WIDENED PORTION OF THE STRUCTURE IS INTENDED TO MATCH THE EXISTING BRIDGE. THEREFORE THESE DIMENSIONS AND ELEVATIONS SHALL BE FIELD MEASURED BY THE CONTRACTOR PRIOR TO ORDERING MATERIALS AND PROCEEDING WITH CONSTRUCTION.
10. NOMINAL BEARING RESISTANCE OF SPREAD FOOTINGS UNDER SIDEWALK PIERS SHALL BE TAKEN AS, IN KSF:

PIER NO.	SERVICE-I LIMIT STATE	STRENGTH AND EXTREME-I LIMIT STATES
1	5.4	7.4
2	5.4	7.4

11. CONCRETE SURFACE SHALL BE SCARIFIED AND APPLIED WITH ¾" POLYESTER CONCRETE OVERLAY FOR THE WHOLE WIDTH OF BRIDGE ROADWAY FROM END TO END OF WIDENED BRIDGE APPROACH SLABS.

STRUCTURAL STEEL NOTES:

1. ALL STRUCTURAL STEEL SHALL BE STRUCTURAL LOW ALLOY STEEL AASHTO M270 GRADE 50. FABRICATOR MAY SUBSTITUTE SECTIONS OF EQUAL OR GREATER STRENGTH AND STIFFNESS BASED ON AVAILABILITY, SUBJECT TO APPROVAL BY THE ENGINEER.
2. ALL FIELD AND SHOP CONNECTIONS SHALL BE MADE WITH HIGH STRENGTH BOLTS. WITH THE BOLT HEADS TOWARD THE OUTSIDE AND UNDERSIDE OF THE BRIDGE. HIGH STRENGTH BOLTS SHALL BE AASHTO M164. NUTS AND WASHERS SHALL CONFORM TO STANDARD SPECIFICATIONS SECTION 9-06.5(3). ALL CONNECTIONS SHOWN ARE FOR FIELD BOLTING. SHOP BOLTING MAY BE USED WHERE APPROVED IN THE SHOP PLANS.
3. WELDING SHALL BE EQUAL IN STRENGTH TO THE PARENT METAL AND SHALL CONFORM TO STANDARD SPECIFICATIONS SECTION 6-03.3(25). ALL WELDING, UNLESS PRE-APPROVED BY ENGINEER, SHALL BE PERFORMED IN THE SHOP. ALL WELDING SHALL BE DONE TO MINIMIZE DISTORTION. SIZE OF FILLET WELDS SHALL BE ¼" MINIMUM EXCEPT WHERE NOTED. THE WELDING SEQUENCES AND PROCEDURES TO BE USED SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL PRIOR TO THE START OF WELDING. WELDING SEQUENCE: (1) STIFFENERS TO WEBS AND FLANGES. (2) SHEAR CONNECTORS TO TOP FLANGE.
4. PIER CROSS FRAMES AND ALL BEARING AND JACKING STIFFENERS SHALL BE VERTICAL UNDER TOTAL DEAD LOAD. INTERMEDIATE CROSS FRAMES SHALL BE NORMAL TO THE FLANGES.
5. ALL WELDED SHEAR CONNECTORS SHALL BE ⅞"ø x 2".
6. MEMBERS MARKED (T) ARE MAIN LOAD CARRYING TENSILE MEMBERS OR TENSION COMPONENTS OF FLEXURAL MEMBERS AND SHALL MEET THE LONGITUDINAL CHARPY V-NOTCH TESTS AS DESCRIBED IN SECTION 6-03.2.
7. BOLT HOLES REMAINING IN GIRDER WEBS UPON REMOVAL OF DECK FORMWORK AND TEMPORARY BRACING SHALL BE TREATED IN ACCORDANCE WITH SECTION 6-023(17)K.
8. THE CONTRACTOR SHALL PROVIDE, AS REQUIRED, TEMPORARY BRACING AND/OR WEB STIFFENING AT LOCATIONS WHERE SLAB FORMS ARE ATTACHED TO UNBRACED OR UNSTIFFENED WEBS.
9. ALL STRUCTURAL STEEL SHALL BE PAINTED. PAINT SHALL BE APPLIED IN ACCORDANCE WITH SECTION 6-07.3(9). THE COLOR OF THE TOP COAT, WHEN DRY, SHALL MATCH "FEDERAL STANDARD 595 COLOR NO. 26420".

LEGEND

- (symbol) BORING HOLE LOCATION
- A/10 — IDENTIFIES SECTION, VIEW OR DETAIL; TAKEN OR SHOWN ON BRIDGE SHEET 10
- A/– — TAKEN OR SHOWN ON THE SAME SHEET
- E — EXPANSION JOINT
- P — PINNED JOINT
- R — ROLLER JOINT
- (hatched) — PORTION TO BE REMOVED

ABBREVIATIONS:

A/C	ASPHALT CONCRETE	CSBC	CRUSHED SURFACING BASE COURSE	MB	MAILBOX	SB	SOUTH BOUND
ABT	ABOUT	DIA	DIAMETER	MIN	MINIMUM	SDWK	SIDEWALK
A.P.	ANGLE POINT	EA	EACH	NB	NORTH BOUND	SHLDR	SHOULDER
BH	BORE HOLE PATCH	EL, ELEV	ELEVATION	NF	NEAR FACE	SIM	SIMILAR
BK	BACK	EP	EXISTING EDGE PAVED ROAD	NTS	NOT TO SCALE	SPA	SPACING
BM	BENCH MARK	EQ	EQUAL	OC	ON CENTER	SPEC	SPECIFICATION
BMP	BEST MANAGEMENT PRACTICE	ESC	EROSION SEDIMENT CONTROL	OHWM	ORDINARY HIGH WATER MARK	STA	STATION
BRG	BEARING	EXC	EXCAVATION	OPP	OPPOSITE	STD	STANDARD
BOT	BOTTOM	EXIST	EXISTING	PAV'T	PAVEMENT	STIFF	STIFFENER
CG	CENTER OF GRAVITY	FF	FAR FACE	PCF	POUNDS PER CUBIC FEET	STR	STRAIGHT
CIP	CAST-IN-PLACE	GIR	GIRDER	PEN	PENETRATION	SW	SIDEWALK
CJ	CONSTRUCTION JOINT	HMA	HOT MIX ASPHALT	PL	PLATE	SYM, SYMM	SYMMETRICAL
CL, ℄	CENTERLINE	HORIZ	HORIZONTAL	P.O.C.	POINT ON CURVE	TEMP	TEMPORARY
CLR	CLEAR	HWY	HIGHWAY	P.O.T.	POINT ON TANGENT	T.O.	TOP OF
CMP	CORRUGATED METAL PIPE	INCL	INCLUDING	P.S.	PRESTRESSED	TYP	TYPICAL
CO.	COUNTY	JT	JOINT	PSF	POUNDS PER SQUARE FOOT	UNO	UNLESS NOTED OTHERWISE
CONC	CONCRETE	LT	LEFT	PT	POINT	VERT	VERTICAL
CONST	CONSTRUCTION	MAT'L	MATERIAL	REINF	REINFORCEMENT	WHS	WELDED HEADED STUD
CONT	CONTINUOUS	MAX	MAXIMUM	ROW	RIGHT OF WAY	WP	WORK POINT
				RT	RIGHT	X-FRAME	CROSS FRAME

Bridge Design Engr.
Supervisor
Designed By J. XU/J. PETERSEN-GAUTHIER
Checked By T. WHITEMAN
Detailed By H. TRAN
Bridge Projects Engr.
Prelim. Plan By
Architect/Specialist
DATE | REVISION | BY | APP'D

REGION NO. 10 | STATE WASH | FED. AID PROJ. NO. | SHEET NO. | TOTAL SHEETS
JOB NUMBER

kpff Consulting Engineers
1601 Fifth Avenue, Suite 1600
Seattle, Washington 98101
(206) 622-5822 Fax (206) 622-8130

Washington State Department of Transportation

CITY OF LAKEWOOD

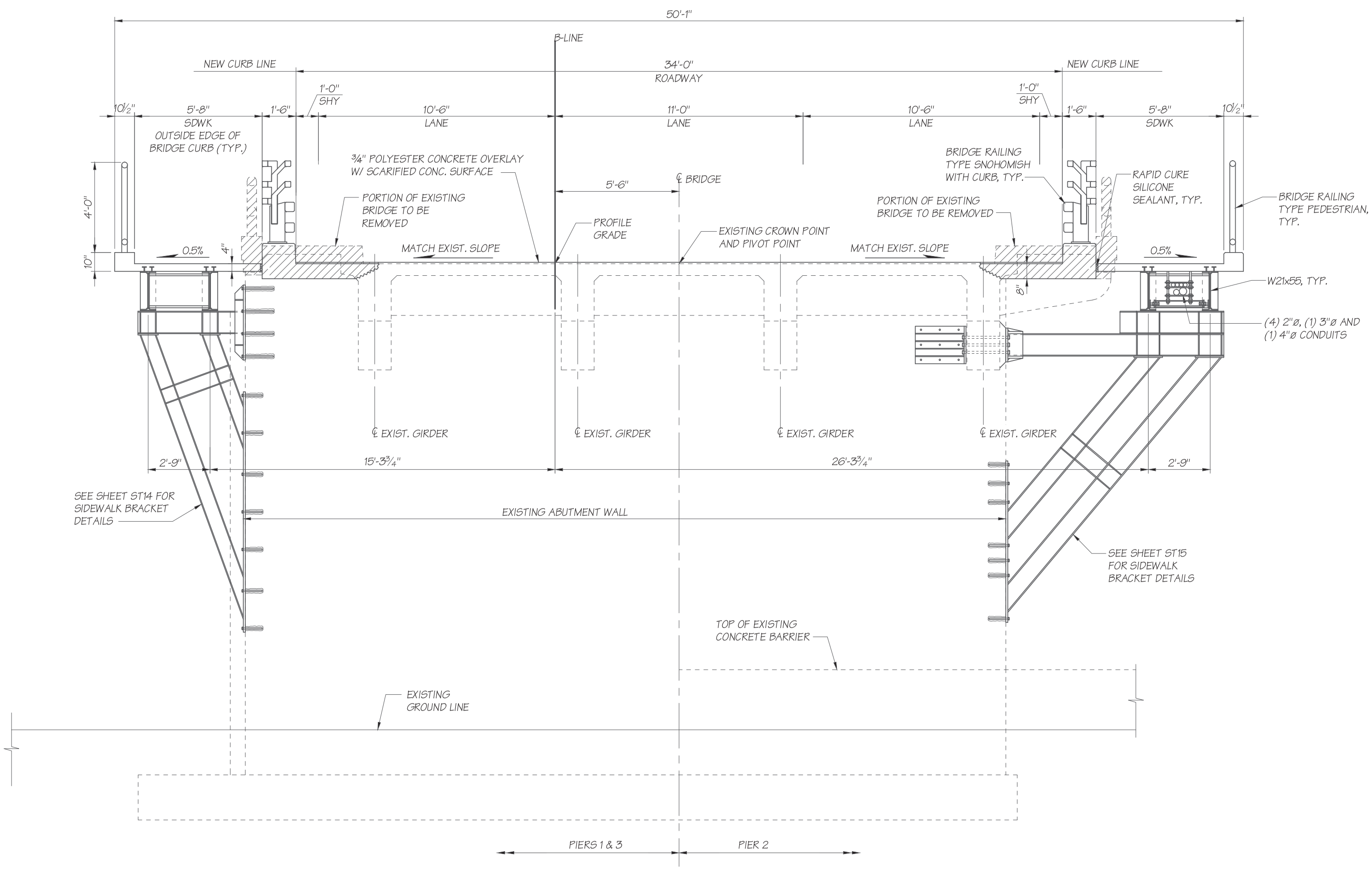
MADIGAN ACCESS IMPROVEMENT PROJECT - PHASE 2

ABBREVIATIONS AND GENERAL NOTES

ST2
95
160

02/25/16: FW: Madigan Access Project

18 - Plans 94-160.pdf attachment (excerpt of only 5 sheets)



TYPICAL SECTION

NOTE:
SEE SHEETS ST4 AND ST5 FOR SUGGESTED CONSTRUCTION SEQUENCE.

Bridge Design Engr.			
Supervisor			
Designed By	J. XU/J. PETERSEN-GAUTHIER		
Checked By	T. WHITEMAN		
Detailed By	H. TRAN		
Bridge Projects Engr.			
Prelim. Plan By			
Architect/Specialist	DATE	REVISION	BY / APP'D

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
10	WASH			
JOB NUMBER				

VIJAY H. HASAYEN — STATE OF WASHINGTON — 28033 — STRUCTURAL ENGINEER — PROFESSIONAL ENGINEER — 9/19/14

kpff Consulting Engineers
1601 Fifth Avenue, Suite 1600
Seattle, Washington 98101
(206) 622-5822 Fax (206) 622-8130

Washington State Department of Transportation

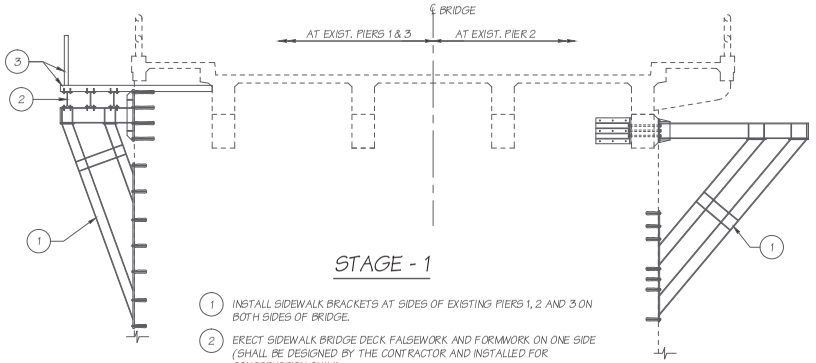
CITY OF LAKEWOOD

MADIGAN ACCESS IMPROVEMENT PROJECT - PHASE 2

TYPICAL SECTION

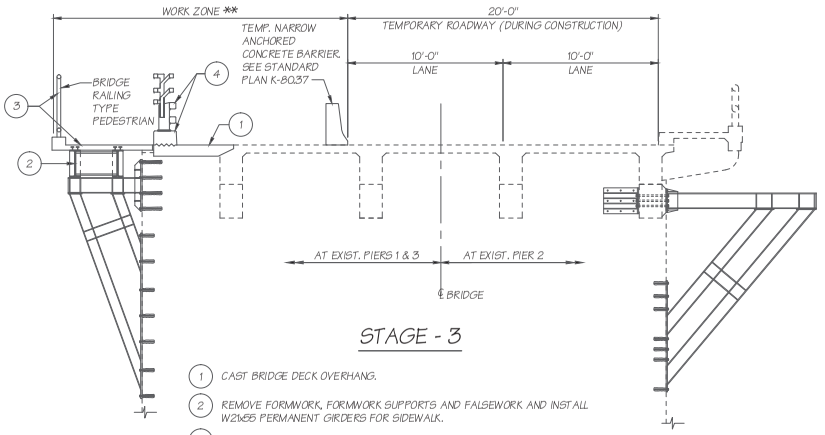
BRIDGE SHEET NO. ST3
SHEET 96 OF 160 SHEETS

Sep 18, 2014 - 11:05am dlemt V:\113096 (Madigan Access)\Design\MA-ST03.dwg Layout Name: Typ Section



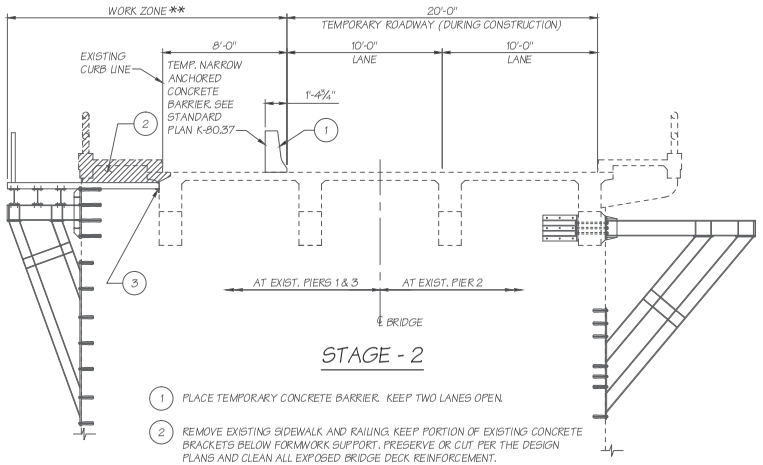
STAGE - 1

1. INSTALL SIDEWALK BRACKETS AT SIDES OF EXISTING PIERS 1, 2 AND 3 ON BOTH SIDES OF BRIDGE.
2. ERECT SIDEWALK BRIDGE DECK FALSEWORK AND FORMWORK ON ONE SIDE (SHALL BE DESIGNED BY THE CONTRACTOR AND INSTALLED FOR CONSTRUCTION ONLY).
3. PLACE CONSTRUCTION FORMWORK AND FALL PROTECTION ON ONE SIDE.



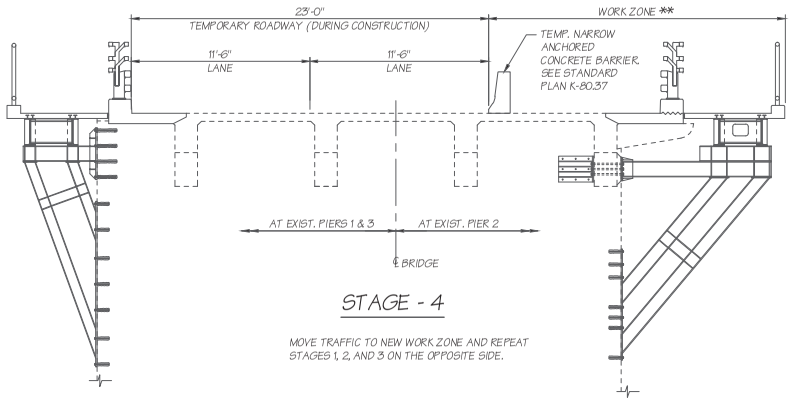
STAGE - 3

1. CAST BRIDGE DECK OVERHANG.
2. REMOVE FORMWORK, FORMWORK SUPPORTS AND FALSEWORK AND INSTALL W21x55 PERMANENT GIRDERS FOR SIDEWALK.
3. CAST SIDEWALK BRIDGE DECK AND CURB, AND INSTALL BRIDGE RAILING TYPE PEDESTRIAN.
4. CAST BRIDGE CURB AND INSTALL BRIDGE RAILING TYPE SNOHOMISH WITH CURB.



STAGE - 2

1. PLACE TEMPORARY CONCRETE BARRIER. KEEP TWO LANES OPEN.
2. REMOVE EXISTING SIDEWALK AND RAILING. KEEP PORTION OF EXISTING CONCRETE BRACKETS BELOW FORMWORK SUPPORT. PRESERVE OR CUT PER THE DESIGN PLANS AND CLEAN ALL EXPOSED BRIDGE DECK REINFORCEMENT.
3. CONNECT FORMWORK SUPPORT TO EXISTING EXTERIOR GIRDER. PLACE FORMWORK ON THE SUPPORT.



STAGE - 4

MOVE TRAFFIC TO NEW WORK ZONE AND REPEAT STAGES 1, 2, AND 3 ON THE OPPOSITE SIDE.

SUGGESTED CONSTRUCTION SEQUENCE

** NO TRAFFIC IS ALLOWED IN WORK ZONE BEFORE IT IS OPEN TO TRAFFIC.

Bridge Design Engr.					REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
Supervisor					10	WASH			
Designed By J. XU/J. PETERSEN-GAUTHIER					JOB NUMBER				
Checked By T. WHITEMAN									
Detailed By H. TRAN									
Bridge Projects Engr.									
Prelim. Plan By									
Architect/Specialist	DATE	REVISION	BY	APP'D					

HARRY H. HASTAD — STATE OF WASHINGTON — 20083 — PROFESSIONAL ENGINEER — 11/14/14

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(206) 622-5822 Fax (206) 622-8130

Washington State Department of Transportation

CITY OF LAKEWOOD

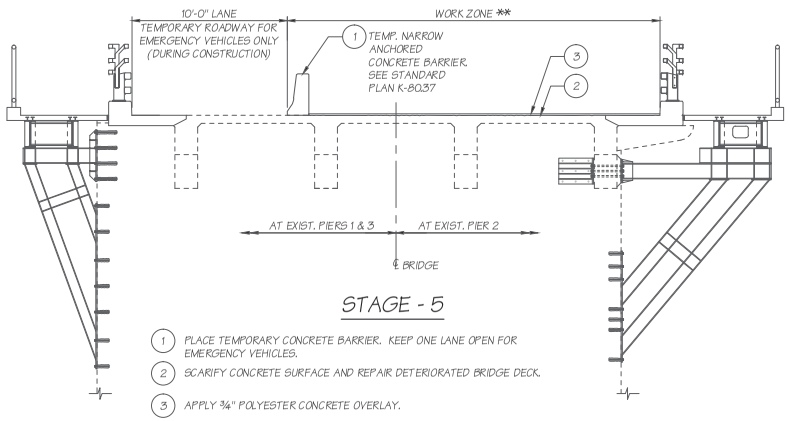
MADIGAN ACCESS IMPROVEMENT PROJECT - PHASE 2

SUGGESTED CONSTRUCTION SEQUENCE 1

BRIDGE SHEET NO. 57

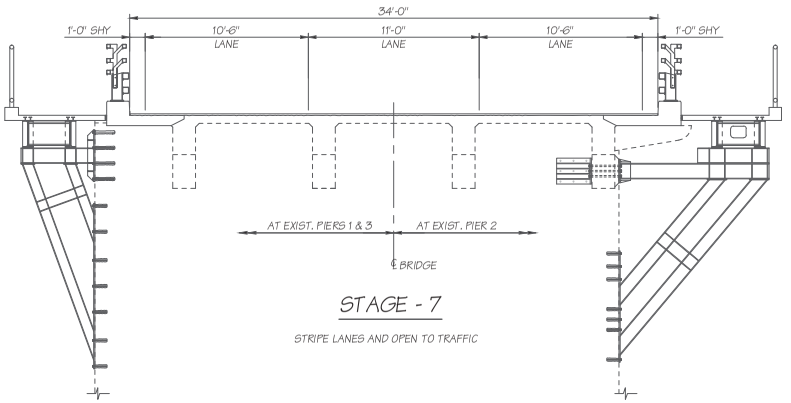
SHEET 17 OF 60 SHEETS

Sep 18, 2014 - 11:07am dlemt V:\113096 (Madigan Access)\Design\MA-ST04.dwg Layout Name: Staging Sequence



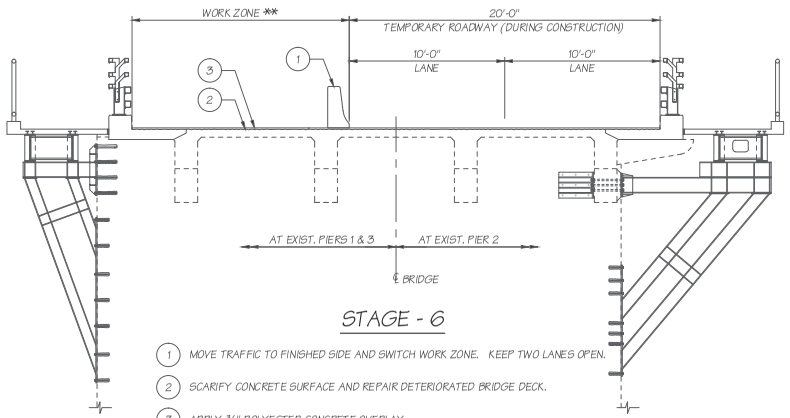
STAGE - 5

1. PLACE TEMPORARY CONCRETE BARRIER. KEEP ONE LANE OPEN FOR EMERGENCY VEHICLES.
2. SCARIFY CONCRETE SURFACE AND REPAIR DETERIORATED BRIDGE DECK.
3. APPLY ¾" POLYESTER CONCRETE OVERLAY.



STAGE - 7

STRIPE LANES AND OPEN TO TRAFFIC



STAGE - 6

1. MOVE TRAFFIC TO FINISHED SIDE AND SWITCH WORK ZONE. KEEP TWO LANES OPEN.
2. SCARIFY CONCRETE SURFACE AND REPAIR DETERIORATED BRIDGE DECK.
3. APPLY ¾" POLYESTER CONCRETE OVERLAY.

SUGGESTED CONSTRUCTION SEQUENCE

** NO TRAFFIC IS ALLOWED IN WORK ZONE BEFORE IT IS OPEN TO TRAFFIC.

Bridge Design Engr.					REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS	
Supervisor					10	WASH				
Designed By J. XU/J. PETERSEN-GAUTHIER					JOB NUMBER					
Checked By T. WHITEMAN										
Detailed By H. TRAN										
Bridge Projects Engr.										
Prelim. Plan By										
Architect/Specialist	DATE	REVISION	BY	APP'D						

HAZEL H. HASTAD — STATE OF WASHINGTON — 39083 — PROFESSIONAL ENGINEER — 5/14/14

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Washington State Department of Transportation

CITY OF LAKEWOOD

MADIGAN ACCESS IMPROVEMENT PROJECT - PHASE 2

SUGGESTED CONSTRUCTION SEQUENCE 2

BRIDGE SHEET NO. — SHEET 58 OF 60 SHEETS

Sep 18, 2014 - 11:11am dlemt V:\113096 (Madigan Access)\Design\MA-ST05.dwg Layout Name: Staging Sequence

02/25/16: FW: Madigan Access Project

18 - Plans 94-160.pdf attachment (excerpt of only 5 sheets)

BID TABULATIONS

Tuesday, June 16, 2015
Madigan Access Improvements - Phase II

Schedule A JBLM, Railroad, and City ROW				ENGINEER'S ESTIMATE		CECCANTI		PCL		C.A. CAREY		AVERAGE BID	
ITEM NO.	DESCRIPTION	QTY	UNIT	UNIT PRICE	AMOUNT	UNIT PRICE	AMOUNT	UNIT PRICE	AMOUNT	UNIT PRICE	AMOUNT	UNIT PRICE	AMOUNT
A-1	Mobilization	1	LS	$ 90,000.00	$90,000.00	$ 120,000.00	$120,000.00	$ 134,000.00	$134,000.00	$ 115,000.00	$115,000.00	$ 123,000.00	$123,000.00
A-2	Clearing and Grubbing	0.34	ACRE	$ 10,000.00	$3,400.00	$ 10,000.00	$3,400.00	$ 27,686.00	$9,413.24	$ 45,000.00	$15,300.00	$ 27,562.00	$9,371.08
A-3	Removing Chain Link Fence	425	LF	$ 5.00	$2,125.00	$ 3.00	$1,275.00	$ 4.50	$1,912.50	$ 5.00	$2,125.00	$ 4.17	$1,770.83
A-4	Roadway Excavation Incl. Haul	650	CY	$ 50.00	$32,500.00	$ 35.00	$22,750.00	$ 120.00	$78,000.00	$ 20.00	$13,000.00	$ 58.33	$37,916.67
A-5	Embankment Compaction	700	CY	$ 5.00	$3,500.00	$ 4.00	$2,800.00	$ 31.00	$21,700.00	$ 10.00	$7,000.00	$ 15.00	$10,500.00
A-6	Ballast	300	TON	$ 30.00	$9,000.00	$ 35.00	$10,500.00	$ 46.60	$13,980.00	$ 60.00	$18,000.00	$ 47.20	$14,160.00
A-7	Crushed Surfacing Base Course	200	TON	$ 30.00	$6,000.00	$ 25.00	$5,000.00	$ 95.00	$19,000.00	$ 45.00	$9,000.00	$ 55.00	$11,000.00
A-8	Planing Bituminous Pavement	450	SY	$ 10.00	$4,500.00	$ 6.00	$2,700.00	$ 50.00	$22,500.00	$ 20.00	$9,000.00	$ 25.33	$11,400.00
A-9	HMA Class 1/2" PG 64 -22	100	TON	$ 80.00	$8,000.00	$ 105.00	$10,500.00	$ 170.00	$17,000.00	$ 140.00	$14,000.00	$ 138.33	$13,833.33
A-10	HMA Class 1" PG 64 -22	75	TON	$ 90.00	$6,750.00	$ 105.00	$7,875.00	$ 340.00	$25,500.00	$ 280.00	$21,000.00	$ 241.67	$18,125.00
A-11	Commercial HMA	5	TON	$ 225.00	$1,125.00	$ 105.00	$525.00	$ 350.00	$1,750.00	$ 350.00	$1,750.00	$ 268.33	$1,341.67
A-12	Asphalt Cost Price Adjustment	625	CALC	$ 1.00	$625.00	$ 1.00	$625.00	$ 1.00	$625.00	$ 1.00	$625.00	$ 1.00	$625.00
A-13	ESC Lead	5	DAY	$ 50.00	$250.00	$ 15.00	$75.00	$ 100.00	$500.00	$ 100.00	$500.00	$ 71.67	$358.33
A-14	Inlet Protection	2	EA	$ 250.00	$500.00	$ 85.00	$170.00	$ 180.00	$360.00	$ 135.00	$270.00	$ 133.33	$266.67
A-15	Street Cleaning	10	HR	$ 100.00	$1,000.00	$ 120.00	$1,200.00	$ 170.00	$1,700.00	$ 200.00	$2,000.00	$ 163.33	$1,633.33
A-16	Silt Fence	70	LF	$ 5.00	$350.00	$ 4.00	$280.00	$ 8.00	$560.00	$ 25.00	$1,750.00	$ 12.33	$863.33
A-17	Cement Conc. Traffic Curb and Gutter	64	LF	$ 30.00	$1,920.00	$ 35.00	$2,240.00	$ 70.00	$4,480.00	$ 40.00	$2,560.00	$ 48.33	$3,093.33
A-18	Dual-Faced Cement Conc. Traffic Curb	110	LF	$ 35.00	$3,850.00	$ 35.00	$3,850.00	$ 90.00	$9,900.00	$ 40.00	$4,400.00	$ 55.00	$6,050.00
A-19	Mounted Raised Curb	50	LF	$ 150.00	$7,500.00	$ 35.00	$1,750.00	$ 85.00	$4,250.00	$ 40.00	$2,000.00	$ 53.33	$2,666.67
A-20	Cement Concrete Pedestrian Curb	158	LF	$ 25.00	$3,950.00	$ 35.00	$5,530.00	$ 60.00	$9,480.00	$ 45.00	$7,110.00	$ 46.67	$7,373.33
A-21	Precast Traffic Barrier Type 2	48	LF	$ 75.00	$3,600.00	$ 180.00	$8,640.00	$ 130.00	$6,240.00	$ 115.00	$5,520.00	$ 141.67	$6,800.00
A-22	Permanent Impact Attenuator	1	EA	$ 20,000.00	$20,000.00	$ 4,500.00	$4,500.00	$ 6,000.00	$6,000.00	$ 5,100.00	$5,100.00	$ 5,200.00	$5,200.00
A-23	Profiled Plastic Line	5833	LF	$ 2.00	$11,666.00	$ 2.00	$11,666.00	$ 2.10	$12,249.30	$ 3.00	$17,499.00	$ 2.37	$13,804.77
A-24	Profiled Plastic Wide Line	388	LF	$ 4.00	$1,552.00	$ 4.00	$1,552.00	$ 5.50	$2,134.00	$ 6.00	$2,328.00	$ 5.17	$2,004.67
A-25	Plastic Stop Line	107	LF	$ 15.00	$1,605.00	$ 10.00	$1,070.00	$ 12.50	$1,337.50	$ 10.00	$1,070.00	$ 10.83	$1,159.17
A-26	Plastic Crosswalk Line	352	SF	$ 10.00	$3,520.00	$ 4.00	$1,408.00	$ 8.50	$2,992.00	$ 6.00	$2,112.00	$ 6.17	$2,170.67
A-27	Portable Changeable Message Sign	80	HR	$ 5.00	$400.00	$ 4.00	$320.00	$ 20.90	$1,672.00	$ 130.00	$10,400.00	$ 51.63	$4,130.67
A-28	Other Temporary Traffic Control	1	LS	$ 9,375.00	$9,375.00	$ 100,000.00	$100,000.00	$ 9,600.00	$9,600.00	$ 45,000.00	$45,000.00	$ 51,533.33	$51,533.33
A-29	Flaggers and Spotters	250	HR	$ 50.00	$12,500.00	$ 49.00	$12,250.00	$ 80.00	$20,000.00	$ 70.00	$17,500.00	$ 66.33	$16,583.33
A-30	Other Traffic Control Labor	250	HR	$ 50.00	$12,500.00	$ 52.00	$13,000.00	$ 60.00	$15,000.00	$ 70.00	$17,500.00	$ 60.67	$15,166.67
A-31	Traffic Control Supervisor	1	LS	$ 7,500.00	$7,500.00	$ 50,000.00	$50,000.00	$ 8,000.00	$8,000.00	$ 15,000.00	$15,000.00	$ 24,333.33	$24,333.33
A-32	Construction Signs Class A	40	SF	$ 20.00	$800.00	$ 20.00	$800.00	$ 26.00	$1,040.00	$ 30.00	$1,200.00	$ 25.33	$1,013.33
A-33	Type B Progress Schedule	1	LS	$ 1,250.00	$1,250.00	$ 10,000.00	$10,000.00	$ 1.00	$1.00	$ 10,000.00	$10,000.00	$ 6,667.00	$6,667.00
A-34	Detectable Warning Surface	32	SF	$ 60.00	$1,920.00	$ 70.00	$2,240.00	$ 25.00	$800.00	$ 100.00	$3,200.00	$ 65.00	$2,080.00
A-35	Cement Conc. Sidewalk	84	SY	$ 50.00	$4,200.00	$ 40.00	$3,360.00	$ 125.00	$10,500.00	$ 50.00	$4,200.00	$ 71.67	$6,020.00
A-36	Chain Link Fence Type 4	525	LF	$ 25.00	$13,125.00	$ 15.00	$7,875.00	$ 14.00	$7,350.00	$ 15.00	$7,875.00	$ 14.67	$7,700.00
A-37	End, Gate, Corner, Pull Post for Chain Link Fence	12	EA	$ 250.00	$3,000.00	$ 200.00	$2,400.00	$ 160.00	$1,920.00	$ 200.00	$2,400.00	$ 186.67	$2,240.00
A-38	Roadside Cleanup	750	CALC	$ 1.00	$750.00	$ 1.00	$750.00	$ 1.00	$750.00	$ 1.00	$750.00	$ 1.00	$750.00
A-39	Minor Change	25000	CALC	$ 1.00	$25,000.00	$ 1.00	$25,000.00	$ 1.00	$25,000.00	$ 1.00	$25,000.00	$ 1.00	$25,000.00
A-40	Removing Existing Railway Signal Equipment	1	LS	$ 20,000.00	$20,000.00	$ 5,000.00	$5,000.00	$ 7,600.00	$7,600.00	$ 10,000.00	$10,000.00	$ 7,533.33	$7,533.33
A-41	Removing Existing Rail and Tie	400	LF	$ 40.00	$16,000.00	$ 40.00	$16,000.00	$ 55.00	$22,000.00	$ 100.00	$40,000.00	$ 65.00	$26,000.00
A-42	Underdrain Pipe	220	LF	$ 35.00	$7,700.00	$ 30.00	$6,600.00	$ 140.00	$30,800.00	$ 80.00	$17,600.00	$ 83.33	$18,333.33
A-43	Catch Basin Type 1	2	EA	$ 1,250.00	$2,500.00	$ 1,100.00	$2,200.00	$ 5,500.00	$11,000.00	$ 1,700.00	$3,400.00	$ 2,766.67	$5,533.33
A-44	Sch. A Storm Sewer Pipe 12-In. Diam.	70	LF	$ 80.00	$5,600.00	$ 50.00	$3,500.00	$ 220.00	$15,400.00	$ 150.00	$10,500.00	$ 140.00	$9,800.00
A-45	Concrete Rail Tie	16	EA	$ 175.00	$2,800.00	$ 140.00	$2,240.00	$ 190.00	$3,040.00	$ 170.00	$2,720.00	$ 166.67	$2,666.67
A-46	Wooden Rail Tie	234	EA	$ 100.00	$23,400.00	$ 70.00	$16,380.00	$ 120.00	$28,080.00	$ 85.00	$19,890.00	$ 91.67	$21,450.00
A-47	Precast Concrete Crossing Panel	80	LF	$ 200.00	$16,000.00	$ 300.00	$24,000.00	$ 490.00	$39,200.00	$ 375.00	$30,000.00	$ 388.33	$31,066.67
A-48	136 RE Rail	280	LF	$ 50.00	$14,000.00	$ 150.00	$42,000.00	$ 250.00	$70,000.00	$ 200.00	$56,000.00	$ 200.00	$56,000.00
A-49	Rail Transition	540	LF	$ 60.00	$32,400.00	$ 70.00	$37,800.00	$ 120.00	$64,800.00	$ 85.00	$45,900.00	$ 91.67	$49,500.00
A-50	Railroad Signal System Complete	1	LS	$500,000.00	$500,000.00	$ 500,000.00	$500,000.00	$ 438,000.00	$438,000.00	$ 450,000.00	$450,000.00	$ 462,666.67	$462,666.67
A-51	Power Service Connection - Rail Signal	1	LS	$ 50,000.00	$50,000.00	$ 40,000.00	$40,000.00	$ 13,100.00	$13,100.00	$ 10,000.00	$10,000.00	$ 21,033.33	$21,033.33
A-52	Ductile Iron Casing Pipe - 12" Diam.	120	LF	$ 150.00	$18,000.00	$ 60.00	$7,200.00	$ 145.00	$17,400.00	$ 100.00	$12,000.00	$ 101.67	$12,200.00
A-53	JBLM Gate Retrofit	1	LS	$ 15,000.00	$15,000.00	$ 10,000.00	$10,000.00	$ 10,400.00	$10,400.00	$ 9,000.00	$9,000.00	$ 9,800.00	$9,800.00
A-54	Power Service Connection - JBLM	1	LS	$ 50,000.00	$50,000.00	$ 85,000.00	$85,000.00	$ 100,000.00	$100,000.00	$ 90,000.00	$90,000.00	$ 91,666.67	$91,666.67
	Total Bid Schedule A			$ 1,094,508.00		$ 1,257,796.00		$ 1,380,016.54		$ 1,247,054.00		$ 1,294,955.51	

BID TABULATIONS

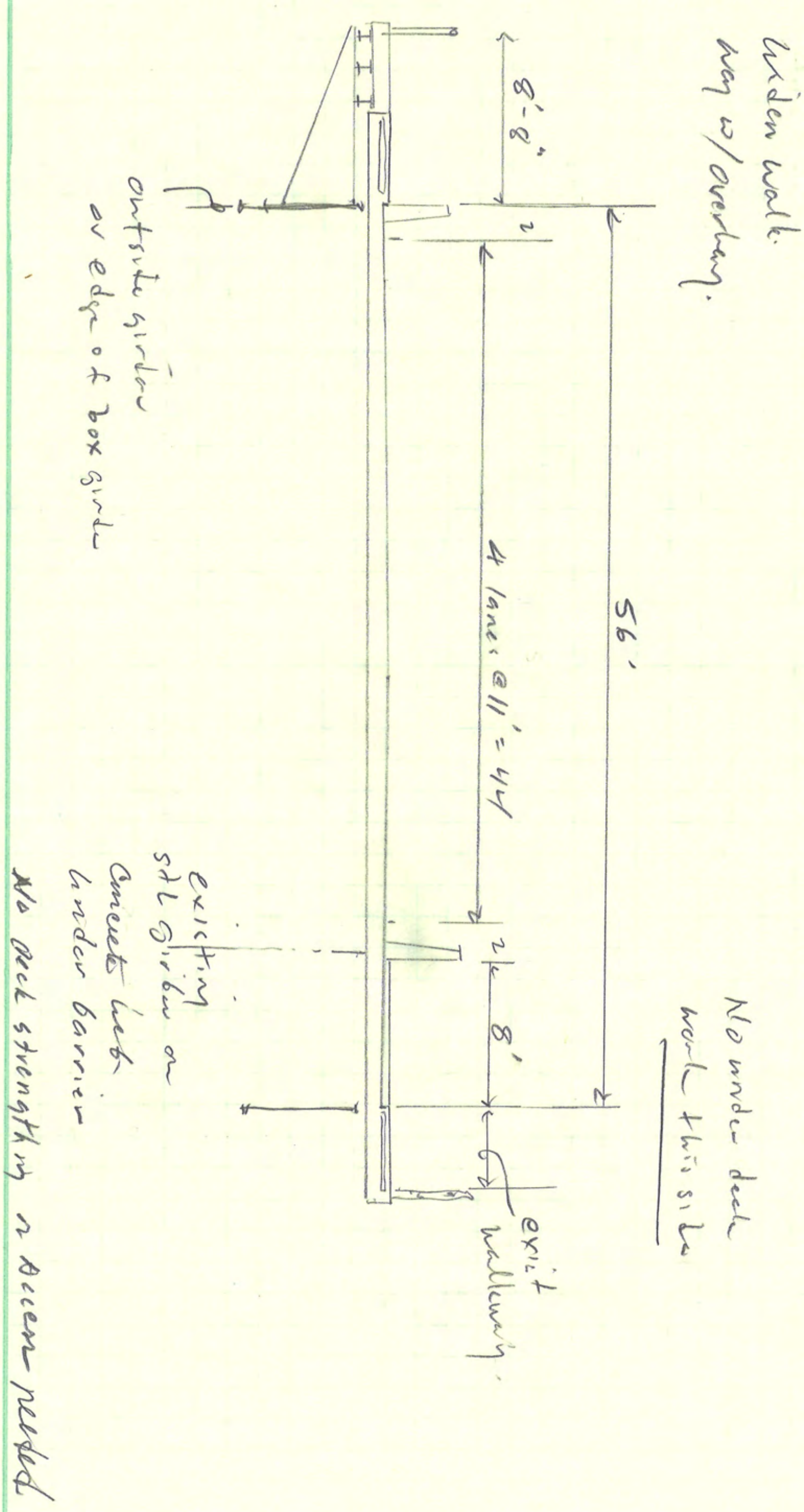
Tuesday, June 16, 2015
Madigan Access Improvements - Phase II

Schedule B WSDOT Right of Way				ENGINEER'S ESTIMATE		CECCANTI		PCL		C.A. CAREY		AVERAGE BID	
ITEM NO.	DESCRIPTION	QTY	UNIT	UNIT PRICE	AMOUNT	UNIT PRICE	AMOUNT	UNIT PRICE	AMOUNT	UNIT PRICE	AMOUNT	UNIT PRICE	AMOUNT
B-1	Mobilization	1	LS	$ 180,000.00	$ 180,000.00	$ 300,000.00	$ 300,000.00	$ 366,000.00	$ 366,000.00	$ 399,000.00	$ 399,000.00	$ 355,000.00	$ 355,000.00
B-2	Clearing and Grubbing	0.07	ACRE	$ 10,000.00	$ 700.00	$ 10,000.00	$ 700.00	$ 45,000.00	$ 3,150.00	$ 65,000.00	$ 4,550.00	$ 40,000.00	$ 2,800.00
B-3	Removing Drainage Structure	1	EA	$ 1,000.00	$ 1,000.00	$ 350.00	$ 350.00	$ 1,800.00	$ 1,800.00	$ 1,500.00	$ 1,500.00	$ 1,216.67	$ 1,216.67
B-4	Removing Portion of Existing Bridge	1	LS	$ 132,500.00	$ 132,500.00	$ 150,000.00	$ 150,000.00	$ 76,000.00	$ 76,000.00	$ 250,000.00	$ 250,000.00	$ 158,666.67	$ 158,666.67
B-5	Removing Plastic Line	95	LF	$ 10.00	$ 950.00	$ 3.00	$ 285.00	$ 7.00	$ 665.00	$ 6.00	$ 570.00	$ 5.33	$ 506.67
B-6	Removing Crosswalk Line	220	SF	$ 8.00	$ 1,760.00	$ 3.00	$ 660.00	$ 7.00	$ 1,540.00	$ 6.00	$ 1,320.00	$ 5.33	$ 1,173.33
B-7	Roadway Excavation	700	CY	$ 30.00	$ 21,000.00	$ 35.00	$ 24,500.00	$ 75.00	$ 52,500.00	$ 90.00	$ 63,000.00	$ 66.67	$ 46,666.67
B-8	Roadway Excavation Incl. Haul	1000	CY	$ 50.00	$ 50,000.00	$ 35.00	$ 35,000.00	$ 80.00	$ 80,000.00	$ 25.00	$ 25,000.00	$ 46.67	$ 46,666.67
B-9	Quarry Spalls	15	TON	$ 50.00	$ 750.00	$ 80.00	$ 1,200.00	$ 160.00	$ 2,400.00	$ 160.00	$ 2,400.00	$ 133.33	$ 2,000.00
B-10	Structure Surveying	1	LS	$ 5,000.00	$ 5,000.00	$ 30,000.00	$ 30,000.00	$ 30,500.00	$ 30,500.00	$ 60,000.00	$ 60,000.00	$ 40,166.67	$ 40,166.67
B-11	Structure Excavation Class A Incl. Haul	255	CY	$ 30.00	$ 7,650.00	$ 35.00	$ 8,925.00	$ 180.00	$ 45,900.00	$ 30.00	$ 7,650.00	$ 81.67	$ 20,825.00
B-12	Shoring or Extra Excavation Class A	1	LS	$ 12,200.00	$ 12,200.00	$ 30,000.00	$ 30,000.00	$ 15,000.00	$ 15,000.00	$ 60,000.00	$ 60,000.00	$ 35,000.00	$ 35,000.00
B-13	Gravel Backfill for Wall	76	CY	$ 50.00	$ 3,800.00	$ 35.00	$ 2,660.00	$ 215.00	$ 16,340.00	$ 90.00	$ 6,840.00	$ 113.33	$ 8,613.33
B-14	Gravel Backfill for Drain	101	CY	$ 70.00	$ 7,070.00	$ 35.00	$ 3,535.00	$ 200.00	$ 20,200.00	$ 90.00	$ 9,090.00	$ 108.33	$ 10,941.67
B-15	Steel Reinforcing Bar for Bridge	16148	LB	$ 1.50	$ 24,222.00	$ 2.00	$ 32,296.00	$ 2.00	$ 32,296.00	$ 2.00	$ 32,296.00	$ 2.00	$ 32,296.00
B-16	Steel Reinforcing Bar for Retaining Wall	1600	LB	$ 1.50	$ 2,400.00	$ 2.00	$ 3,200.00	$ 2.50	$ 4,000.00	$ 2.00	$ 3,200.00	$ 2.17	$ 3,466.67
B-17	Conc. Class 4000 for Bridge	56	CY	$ 550.00	$ 30,800.00	$ 1,000.00	$ 56,000.00	$ 1,700.00	$ 95,200.00	$ 1,470.00	$ 82,320.00	$ 1,390.00	$ 77,840.00
B-18	Conc. Class 4000 for Retaining Wall	16	CY	$ 550.00	$ 8,800.00	$ 1,000.00	$ 16,000.00	$ 2,800.00	$ 44,800.00	$ 1,950.00	$ 31,200.00	$ 1,916.67	$ 30,666.67
B-19	Deficient Strength Conc. Price Adjustment	1	FA	$ (1.00)	$ (1.00)	$ (1.00)	$ (1.00)	$ (1.00)	$ (1.00)	$ (1.00)	$ (1.00)	$ (1.00)	$ (1.00)
B-20	Polyester Concrete Trial Overlay	100	SF	$ 25.00	$ 2,500.00	$ 80.00	$ 8,000.00	$ 125.00	$ 12,500.00	$ 100.00	$ 10,000.00	$ 101.67	$ 10,166.67
B-21	Force Account Grinding Polyester Conc. Overlay	5000	CALC	$ 1.00	$ 5,000.00	$ 1.00	$ 5,000.00	$ 1.00	$ 5,000.00	$ 1.00	$ 5,000.00	$ 1.00	$ 5,000.00
B-22	Polyester Concrete Overlay	623	SY	$ 141.00	$ 87,843.00	$ 260.00	$ 161,980.00	$ 320.00	$ 199,360.00	$ 270.00	$ 168,210.00	$ 283.33	$ 176,516.67
B-23	Structural Low Alloy Steel	1	LS	$ 147,000.00	$ 147,000.00	$ 200,000.00	$ 200,000.00	$ 364,000.00	$ 364,000.00	$ 370,000.00	$ 370,000.00	$ 311,333.33	$ 311,333.33
B-24	Superstructure - Br. No. 5/413 Widening	1	LS	$ 194,200.00	$ 194,200.00	$ 470,000.00	$ 470,000.00	$ 305,000.00	$ 305,000.00	$ 425,000.00	$ 425,000.00	$ 400,000.00	$ 400,000.00
B-25	Bridge Railing Type Snohomish with Curb	440	LF	$ 220.00	$ 96,800.00	$ 250.00	$ 110,000.00	$ 430.00	$ 189,200.00	$ 300.00	$ 132,000.00	$ 326.67	$ 143,733.33
B-26	Bridge Railing Type Pedestrian	440	LF	$ 120.00	$ 52,800.00	$ 125.00	$ 55,000.00	$ 150.00	$ 66,000.00	$ 130.00	$ 57,200.00	$ 135.00	$ 59,400.00
B-27	Moment Slab for Bridge Railing Type Snohomish	93	LF	$ 329.00	$ 30,597.00	$ 24.00	$ 2,232.00	$ 380.00	$ 35,340.00	$ 430.00	$ 39,990.00	$ 278.00	$ 25,854.00
B-28	Bridge Deck Repair	25	SF	$ 120.00	$ 3,000.00	$ 150.00	$ 3,750.00	$ 170.00	$ 4,250.00	$ 200.00	$ 5,000.00	$ 173.33	$ 4,333.33
B-29	Scarifying Conc. Surface	623	SY	$ 50.00	$ 31,150.00	$ 52.00	$ 32,396.00	$ 30.00	$ 18,690.00	$ 65.00	$ 40,495.00	$ 49.00	$ 30,527.00
B-30	Bridge Approach Slab	60	SY	$ 511.00	$ 30,660.00	$ 350.00	$ 21,000.00	$ 950.00	$ 57,000.00	$ 600.00	$ 36,000.00	$ 633.33	$ 38,000.00
B-31	Crushed Surfacing Base Course	1080	TON	$ 30.00	$ 32,400.00	$ 25.00	$ 27,000.00	$ 55.00	$ 59,400.00	$ 38.00	$ 41,040.00	$ 39.33	$ 42,480.00
B-32	Planing Bituminous Pavement	900	SY	$ 10.00	$ 9,000.00	$ 6.00	$ 5,400.00	$ 25.00	$ 22,500.00	$ 15.00	$ 13,500.00	$ 15.33	$ 13,800.00
B-33	HMA Cl. 1/2", PG 64 -22	1875	TON	$ 90.00	$ 168,750.00	$ 105.00	$ 196,875.00	$ 120.00	$ 225,000.00	$ 140.00	$ 262,500.00	$ 121.67	$ 228,125.00
B-34	Commercial HMA	10	TON	$ 225.00	$ 2,250.00	$ 105.00	$ 1,050.00	$ 290.00	$ 2,900.00	$ 350.00	$ 3,500.00	$ 248.33	$ 2,483.33
B-35	Asphalt Cost Price Adjustment	4375	CALC	$ 1.00	$ 4,375.00	$ 1.00	$ 4,375.00	$ 1.00	$ 4,375.00	$ 1.00	$ 4,375.00	$ 1.00	$ 4,375.00
B-36	ESC Lead	125	DAY	$ 50.00	$ 6,250.00	$ 15.00	$ 1,875.00	$ 100.00	$ 12,500.00	$ 100.00	$ 12,500.00	$ 71.67	$ 8,958.33
B-37	Inlet Protection	2	EA	$ 250.00	$ 500.00	$ 85.00	$ 170.00	$ 180.00	$ 360.00	$ 135.00	$ 270.00	$ 133.33	$ 266.67
B-38	Street Cleaning	40	HR	$ 100.00	$ 4,000.00	$ 120.00	$ 4,800.00	$ 140.00	$ 5,600.00	$ 200.00	$ 8,000.00	$ 153.33	$ 6,133.33
B-39	Silt Fence	475	LF	$ 5.00	$ 2,375.00	$ 4.00	$ 1,900.00	$ 8.00	$ 3,800.00	$ 15.00	$ 7,125.00	$ 9.00	$ 4,275.00
B-40	Erosion/Water Pollution Control	1000	CALC	$ 1.00	$ 1,000.00	$ 1.00	$ 1,000.00	$ 1.00	$ 1,000.00	$ 1.00	$ 1,000.00	$ 1.00	$ 1,000.00
B-41	Seeding, Fertilizing, and Mulching	1250	SY	$ 5.00	$ 6,250.00	$ 2.00	$ 2,500.00	$ 1.20	$ 1,500.00	$ 3.00	$ 3,750.00	$ 2.07	$ 2,583.33
B-42	Cement Concrete Pedestrian Curb	12	LF	$ 25.00	$ 300.00	$ 80.00	$ 960.00	$ 140.00	$ 1,680.00	$ 50.00	$ 600.00	$ 90.00	$ 1,080.00
B-43	Precast Sloped Mountable Curb	140	LF	$ 30.00	$ 4,200.00	$ 50.00	$ 7,000.00	$ 35.50	$ 4,970.00	$ 40.00	$ 5,600.00	$ 41.83	$ 5,856.67
B-44	Beam Guardrail Type 31 - 8 Ft. Post	270	LF	$ 30.00	$ 8,100.00	$ 35.00	$ 9,450.00	$ 50.00	$ 13,500.00	$ 45.00	$ 12,150.00	$ 43.33	$ 11,700.00
B-45	Beam Guardrail Type 31 - 11 Ft. Post	638	LF	$ 35.00	$ 22,330.00	$ 35.00	$ 22,330.00	$ 60.00	$ 38,280.00	$ 50.00	$ 31,900.00	$ 48.33	$ 30,836.67
B-46	Beam Guardrail Transition Section Type 31	1	EA	$ 3,500.00	$ 3,500.00	$ 3,500.00	$ 3,500.00	$ 4,600.00	$ 4,600.00	$ 3,850.00	$ 3,850.00	$ 3,983.33	$ 3,983.33
B-47	Beam Guardrail Type 31 Non-Flared Terminal	3	EA	$ 2,500.00	$ 7,500.00	$ 2,200.00	$ 6,600.00	$ 4,000.00	$ 12,000.00	$ 3,350.00	$ 10,050.00	$ 3,183.33	$ 9,550.00
B-48	Beam Guardrail Anchor Type 10	3	EA	$ 1,000.00	$ 3,000.00	$ 1,000.00	$ 3,000.00	$ 1,100.00	$ 3,300.00	$ 900.00	$ 2,700.00	$ 1,000.00	$ 3,000.00
B-49	Temporary Concrete Barrier	200	LF	$ 15.00	$ 3,000.00	$ 20.00	$ 4,000.00	$ 40.30	$ 8,060.00	$ 35.00	$ 7,000.00	$ 31.77	$ 6,353.33
B-50	Temporary Impact Attenuator	2	EA	$ 2,000.00	$ 4,000.00	$ 2,000.00	$ 4,000.00	$ 5,000.00	$ 10,000.00	$ 4,200.00	$ 8,400.00	$ 3,733.33	$ 7,466.67
B-51	Profiled Plastic Line	4708	LF	$ 2.00	$ 9,416.00	$ 2.00	$ 9,416.00	$ 2.80	$ 13,182.40	$ 3.00	$ 14,124.00	$ 2.60	$ 12,240.80
B-52	Profiled Plastic Wide Line	421	LF	$ 5.00	$ 2,105.00	$ 4.00	$ 1,684.00	$ 7.00	$ 2,947.00	$ 6.00	$ 2,526.00	$ 5.67	$ 2,385.67
B-53	Plastic Crosswalk Line	576	SF	$ 6.00	$ 3,456.00	$ 4.00	$ 2,304.00	$ 8.50	$ 4,896.00	$ 7.00	$ 4,032.00	$ 6.50	$ 3,744.00
B-54	Plastic Stop Line	129	LF	$ 15.00	$ 1,935.00	$ 10.00	$ 1,290.00	$ 12.80	$ 1,651.20	$ 10.00	$ 1,290.00	$ 10.93	$ 1,410.40
B-55	Plastic Traffic Arrow	26	EA	$ 250.00	$ 6,500.00	$ 100.00	$ 2,600.00	$ 130.00	$ 3,380.00	$ 110.00	$ 2,860.00	$ 113.33	$ 2,946.67
B-56	Plastic Traffic Letter	24	EA	$ 150.00	$ 3,600.00	$ 65.00	$ 1,560.00	$ 90.00	$ 2,160.00	$ 75.00	$ 1,800.00	$ 76.67	$ 1,840.00
B-57	Plastic Railroad Crossing Symbol	3	EA	$ 1,000.00	$ 3,000.00	$ 325.00	$ 975.00	$ 460.00	$ 1,380.00	$ 380.00	$ 1,140.00	$ 388.33	$ 1,165.00
B-58	Temporary Pavement Marking	1200	LF	$ 2.00	$ 2,400.00	$ 1.00	$ 1,200.00	$ 1.40	$ 1,680.00	$ 4.00	$ 4,800.00	$ 2.13	$ 2,560.00
B-59	Permanent Signing	1	LS	$ 50,000.00	$ 50,000.00	$ 35,000.00	$ 35,000.00	$ 25,000.00	$ 25,000.00	$ 20,000.00	$ 20,000.00	$ 26,666.67	$ 26,666.67
B-60	Illumination System	1	LS	$ 50,000.00	$ 50,000.00	$ 75,000.00	$ 75,000.00	$ 55,000.00	$ 55,000.00	$ 55,000.00	$ 55,000.00	$ 61,666.67	$ 61,666.67
B-61	Traffic Signal System	1	LS	$ 550,000.00	$ 550,000.00	$ 480,000.00	$ 480,000.00	$ 355,000.00	$ 355,000.00	$ 395,000.00	$ 395,000.00	$ 410,000.00	$ 410,000.00
B-62	Temporary Traffic Signal System	1	LS	$ 25,000.00	$ 25,000.00	$ 233,000.00	$ 233,000.00	$ 295,000.00	$ 295,000.00	$ 325,000.00	$ 325,000.00	$ 284,333.33	$ 284,333.33
B-63	Communication Conduit System	1	LS	$ 25,000.00	$ 25,000.00	$ 60,000.00	$ 60,000.00	$ 45,000.00	$ 45,000.00	$ 115,000.00	$ 115,000.00	$ 73,333.33	$ 73,333.33
B-64	Portable Changeable Message Sign	640	HR	$ 5.00	$ 3,200.00	$ 4.00	$ 2,560.00	$ 32.60	$ 20,864.00	$ 15.00	$ 9,600.00	$ 17.20	$ 11,008.00
B-65	Other Temporary Traffic Control	1	LS	$ 65,625.00	$ 65,625.00	$ 200,000.00	$ 200,000.00	$ 24,900.00	$ 24,900.00	$ 175,000.00	$ 175,000.00	$ 133,300.00	$ 133,300.00
B-66	Flaggers and Spotters	2250	HR	$ 50.00	$ 112,500.00	$ 49.00	$ 110,250.00	$ 60.00	$ 135,000.00	$ 70.00	$ 157,500.00	$ 59.67	$ 134,250.00
B-67	Other Traffic Control Labor	875	HR	$ 50.00	$ 43,750.00	$ 52.00	$ 45,500.00	$ 60.00	$ 52,500.00	$ 70.00	$ 61,250.00	$ 60.67	$ 53,083.33
B-68	Traffic Control Supervisor	1	LS	$ 52,500.00	$ 52,500.00	$ 60,000.00	$ 60,000.00	$ 22,900.00	$ 22,900.00	$ 65,000.00	$ 65,000.00	$ 49,300.00	$ 49,300.00
B-69	Construction Signs Class A	176	SF	$ 20.00	$ 3,520.00	$ 20.00	$ 3,520.00	$ 29.20	$ 5,139.20	$ 35.00	$ 6,160.00	$ 28.07	$ 4,939.73
B-70	Sequential Arrow Sign	864	HR	$ 4.00	$ 3,456.00	$ 2.00	$ 1,728.00	$ 4.70	$ 4,060.80	$ 15.00	$ 12,960.00	$ 7.23	$ 6,249.60
B-71	Transportable Attenuator	5	EA	$ 6,500.00	$ 32,500.00	$ 1,000.00	$ 5,000.00	$ 1,700.00	$ 8,500.00	$ 8,000.00	$ 40,000.00	$ 3,566.67	$ 17,833.33
B-72	Operation of Transportable Attenuator	344	HR	$ 40.00	$ 13,760.00	$ 12.00	$ 4,128.00	$ 70.00	$ 24,080.00	$ 70.00	$ 24,080.00	$ 50.67	$ 17,429.33
B-73	Repair Transportable Attenuator	3700	EST	$ 1.00	$ 3,700.00	$ 1.00	$ 3,700.00	$ 1.00	$ 3,700.00	$ 1.00	$ 3,700.00	$ 1.00	$ 3,700.00
B-74	Type B Progress Schedule	1	LS	$ 8,750.00	$ 8,750.00	$ 10,000.00	$ 10,000.00	$ 1.00	$ 1.00	$ 10,000.00	$ 10,000.00	$ 6,667.00	$ 6,667.00
B-75	Plugging Existing Pipe	1	EA	$ 500.00	$ 500.00	$ 300.00	$ 300.00	$ 790.00	$ 790.00	$ 1,500.00	$ 1,500.00	$ 863.33	$ 863.33
B-76	Detectable Warning Surface	56	SF	$ 60.00	$ 3,360.00	$ 70.00	$ 3,920.00	$ 28.00	$ 1,568.00	$ 110.00	$ 6,160.00	$ 69.33	$ 3,882.67
B-77	Cement Concrete Sidewalk	30	SY	$ 50.00	$ 1,500.00	$ 40.00	$ 1,200.00	$ 110.00	$ 3,300.00	$ 50.00	$ 1,500.00	$ 66.67	$ 2,000.00
B-78	Roadside Cleanup	4250	CALC	$ 1.00	$ 4,250.00	$ 1.00	$ 4,250.00	$ 1.00	$ 4,250.00	$ 1.00	$ 4,250.00	$ 1.00	$ 4,250.00
B-79	Reimbursement for Third Party Damages	5000	CALC	$ 1.00	$ 5,000.00	$ 1.00	$ 5,000.00	$ 1.00	$ 5,000.00	$ 1.00	$ 5,000.00	$ 1.00	$ 5,000.00
B-80	Minor Change	50000	CALC	$ 1.00	$ 50,000.00	$ 1.00	$ 50,000.00	$ 1.00	$ 50,000.00	$ 1.00	$ 50,000.00	$ 1.00	$ 50,000.00
B-81	Steel Cost Adjustment	1	CALC	$ (1.00)	$ (1.00)	$ (1.00)	$ (1.00)	$ (1.00)	$ (1.00)	$ (1.00)	$ (1.00)	$ (1.00)	$ (1.00)
B-82	SPCC Plan	1	LS	$ 1,000.00	$ 1,000.00	$ 500.00	$ 500.00	$ 1,500.00	$ 1,500.00	$ 5,000.00	$ 5,000.00	$ 2,333.33	$ 2,333.33
B-83	Construction Geotextile for Soil Stabilization	150	SF	$ 3.00	$ 450.00	$ 1.00	$ 150.00	$ 14.20	$ 2,130.00	$ 10.00	$ 1,500.00	$ 8.40	$ 1,260.00
B-84	Generator System	1	LS	$ 50,000.00	$ 50,000.00	$ 45,000.00	$ 45,000.00	$ 65,000.00	$ 65,000.00	$ 45,000.00	$ 45,000.00	$ 51,666.67	$ 51,666.67
B-85	Casing	60	LF	$ 350.00	$ 21,000.00	$ 80.00	$ 4,800.00	$ 1,100.00	$ 66,000.00	$ 700.00	$ 42,000.00	$ 626.67	$ 37,600.00
B-86	Gravity Block Wall	25	SF	$ 80.00	$ 2,000.00	$ 50.00	$ 1,250.00	$ 170.00	$ 4,250.00	$ 170.00	$ 4,250.00	$ 130.00	$ 3,250.00
	Subtotal Bid Schedule B			$ 2,679,963.00		$ 3,539,237.00		$ 3,891,663.60		$ 4,442,621.00		$ 3,957,840.53
	Sales Tax Schedule B			$ 251,916.52		$ 332,688.28		$ 365,816.38		$ 417,606.37		$ 372,037.01
	Total Bid Schedule B			$ 2,931,879.52		$ 3,871,925.28		$ 4,257,479.98		$ 4,860,227.37		$ 4,329,877.54

TOTAL SCHEDULE A	$ 1,094,508.00	$ 1,257,796.00	$ 1,380,016.54	$ 1,247,054.00	$ 1,294,955.51
TOTAL SCHEDULE B	$ 2,931,879.52	$ 3,871,925.28	$ 4,257,479.98	$ 4,860,227.37	$ 4,329,877.54
TOTAL CONTRACT PRICE	$ 4,026,387.52	$ 5,129,721.28	$ 5,637,496.52	$ 6,107,281.37	$ 5,624,833.06

Warren Bridge
Excel tech

PW
Granite
2/25/16.



From: Welch, Pete
To: Evan Grimm
Cc: Walken, Travis; Rohrbough, Carter
Subject: RE: Two new bridge projects
Date: Wednesday, March 09, 2016 3:35:32 PM

Evan,

Re: Traffic control, I thought as much (night work lane closure – full closure not permitted) – but with the elimination of deck strengthening you've eliminated access decks and steel beam install. In Granite's experience, temporary barrier will be required to protect in process work and more importantly to protect the traveling public. This may require moving sections of temp barrier at night to gain access to the work and restoring barrier for day time traffic depending if all 4 lanes must be open during the day. If this is needed it will shorten the time each night that the crews can actually work on the retrofit. (1 to 2 hours moving and resetting barrier/shift depending on how much you need to move each night).
UBIT work for barrier bolting in the steel spans is a good way to go.
Sure, reuse existing railing if it can be removed without damage – easier to reuse if anchors can be drilled into barrier after barrier is cast – harder to match layout with items that need to be cast in.

Pete

From: Evan Grimm [mailto:egrimm@xltech.com]
Sent: Wednesday, March 09, 2016 1:26 PM
To: Welch, Pete
Cc: Walken, Travis; Rohrbough, Carter; Josh Ranes
Subject: RE: Two new bridge projects

Pete,

Please see attached file with answers to your questions. Thank you for your input. We have been making good progress during the internal workshop discussions and are refining the scheme and removing work items, so that has enabled me to get you some better answers and information.

Thank you for the Madigan Access Project plans and bid tabs. We are considering this in our widen-to-the-outside option.

To respond to your request in a previous email for hourly construction engineering rate, you can use $150/hr.

Thank you.
-Evan Grimm
cell 360-701-3520

From: Evan Grimm
Sent: Monday, February 29, 2016 4:55 PM
To: 'Welch, Pete' <John.Welch@gcinc.com>

Cc: Walken, Travis <Travis.Walken@gcinc.com>; Rohrbough, Carter <Carter.Rohrbough@gcinc.com>; Josh Ranes <jranes@xltech.com>
Subject: RE: Two new bridge projects

Pete,

This is very helpful. I can only answer of couple of the questions in your Excel file myself without getting further input. I'll reach out to Josh Ranes tomorrow to talk over the access and traffic control questions and get back to you.

Thank you.
-Evan

From: Welch, Pete [mailto:John.Welch@gcinc.com]
Sent: Tuesday, February 23, 2016 3:30 PM
To: Evan Grimm <egrimm@xltech.com>
Cc: Walken, Travis <Travis.Walken@gcinc.com>; Rohrbough, Carter <Carter.Rohrbough@gcinc.com>
Subject: RE: Two new bridge projects

Evan,

Attached are my comments/review of the Warren project that you sent me.
Since you don't have details on the retrofit work yet – most of the value I can add is with regards to the access.
I've included some costs for dowels and access hatches from prior estimates
And a wild thought. – to reconfigure only one side of the bridge ???

Also I've left a message with Desere Winkler with the City of Lakewood at 253-983-7818
She may be able to provide us with the bid tabulations for the Madigan access improvement project – currently under way at the Freedom bridge VIC JBLM.
This along with a few plan sheets showing that design may be a starting point for you to evaluate the option of adding the extensions that you mention below.
Feel free to call her yourself if you like.

Hope this helps

Pete

From: Evan Grimm [mailto:egrimm@xltech.com]
Sent: Friday, February 19, 2016 11:34 AM
To: Welch, Pete
Cc: David Talcott; Josh Ranes
Subject: RE: Two new bridge projects

Pete,

Thank you for taking a look at the Warren Avenue Bridge for us. We have done a lot of back-and-forth with the client and internal discussions on various options. If you have any great ideas as you look through this, then we are all for it. I think that if I were to cut out one specific request for you if would be to look at our cost estimate numbers we made in January 2016.

I am sending a link to some documents. The current state of the City's thinking is shown in the file, "Warren Ave Bridge - Sep2015 White Paper with Corresponding Jan2016 Estimate.pdf". If we could get them a project that looks like what they have in the white paper but only do it for $5M, they would be happy campers. Our estimate is up to around $8M, and we did not document all of the background for our numbers for you. You'll see work items 4, 5, and 6, which refer to deck strengthening, and we took a guess at this since we have not even designed it. But the point of the deck strengthening is that when you move the barrier in-board, the barrier lands at midspan of the 6 ½" deck between stringers, and the deck won't be strong enough to withstand the lateral impact force.

Another option that we have not shown anywhere, would be to leave the concrete bridge barriers and lane configurations as-is, remove the outer hand railing, and to widen out the overhangs by another 4 ft on each side. This did not seem to be an option that would get us down below $5M, but we did not spend a lot of time on it. If you have any great ideas on how to do this, there would be benefits to going that route.

I also put a few as-built plans in there for you so you can get an idea of what the structure looks like. There have been a few other projects in the life of the bridge to include seismic retrofit and overlay. I also have a bunch of steel fabrication and erection drawings. I wanted to keep the information manageable for you, but let me know if you want to see anything beyond what I sent.

https://exeltech.sharefile.com/d-s701bb6729704b58a

Thank you.
-Evan Grimm
cell 360-701-3520

From: David Talcott
Sent: Friday, February 19, 2016 10:48 AM
To: Welch, Pete <John.Welch@gcinc.com>
Cc: Evan Grimm <egrimm@xltech.com>
Subject: RE: Two new bridge projects

Pete:

The feasibility study for Warren Avenue in Bremerton will now occur on March 7-9. If possible we would like to send a few sketches up to you for verification of unit costs and constructability. The other project is further out in Issaquah where a new structure is planned on 62nd Avenue. It will likely be a several span structure where a redesign could save several million dollars.

Regards,

David Talcott, PE, PMP Director of Engineering Services
Exeltech Consulting, Inc.
Sustainable Engineering Solutions for a Changing World / People, Not Companies, Successfully Deliver Projects
8729 Commerce Place Drive NE, Suite A
Lacey, WA 98516
P. 360.357.8289 Cell 206.641.1667 dtalcott@xltech.com

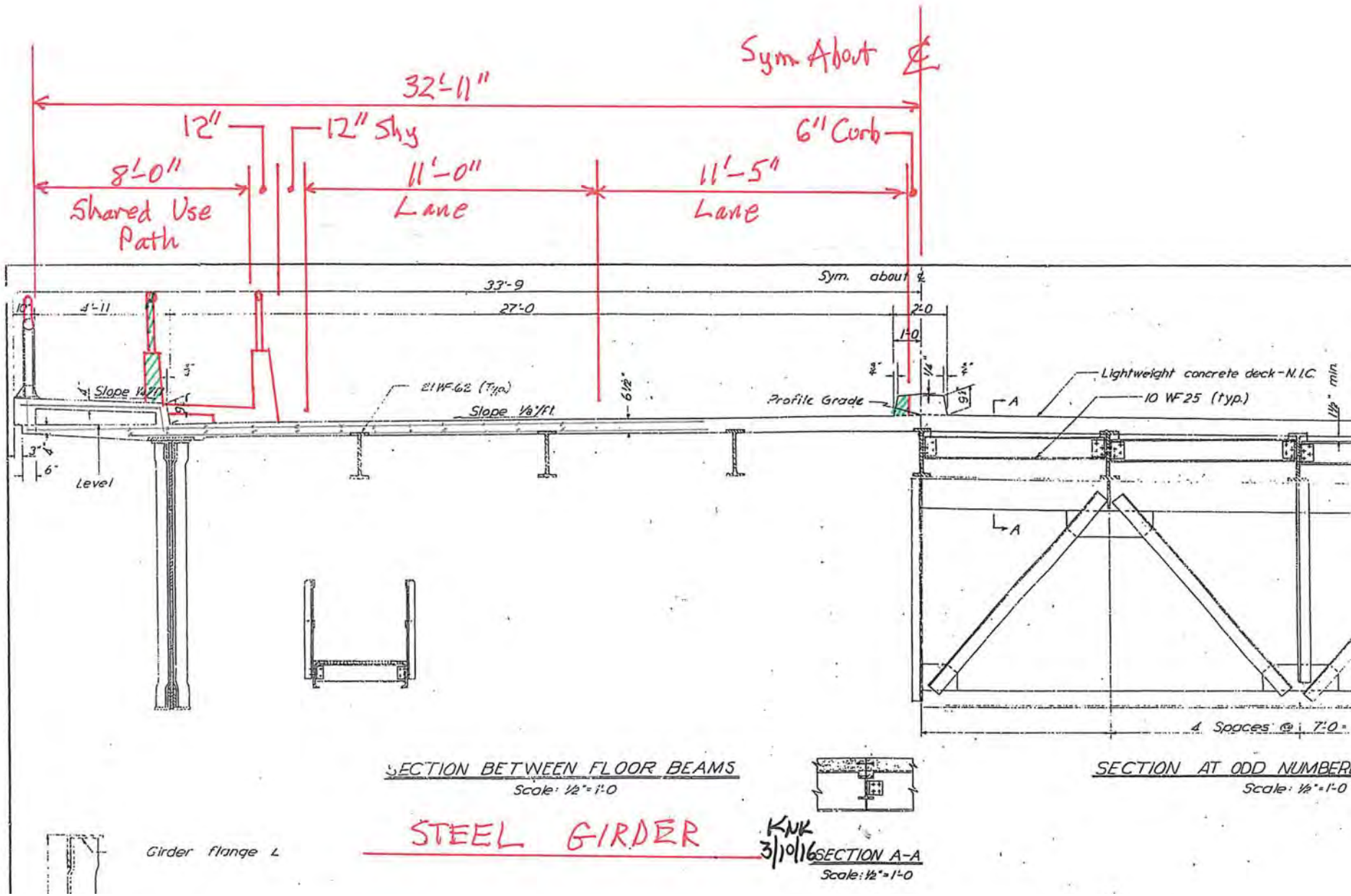
P *please consider the environment before printing this email*

APPENDIX D:

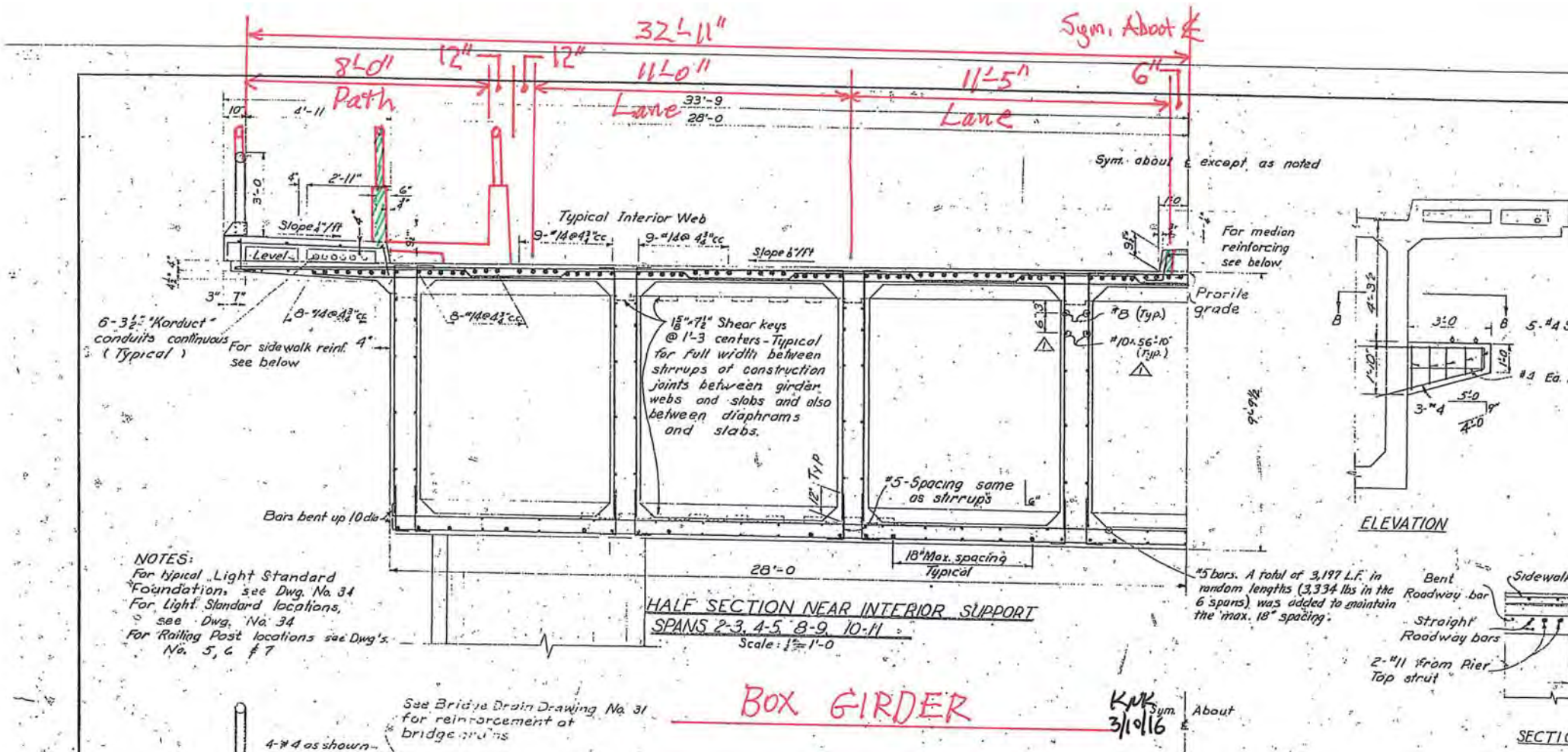
Design Option Concept Sketches

(Sketches Shown for Options 1, 4, and 7)

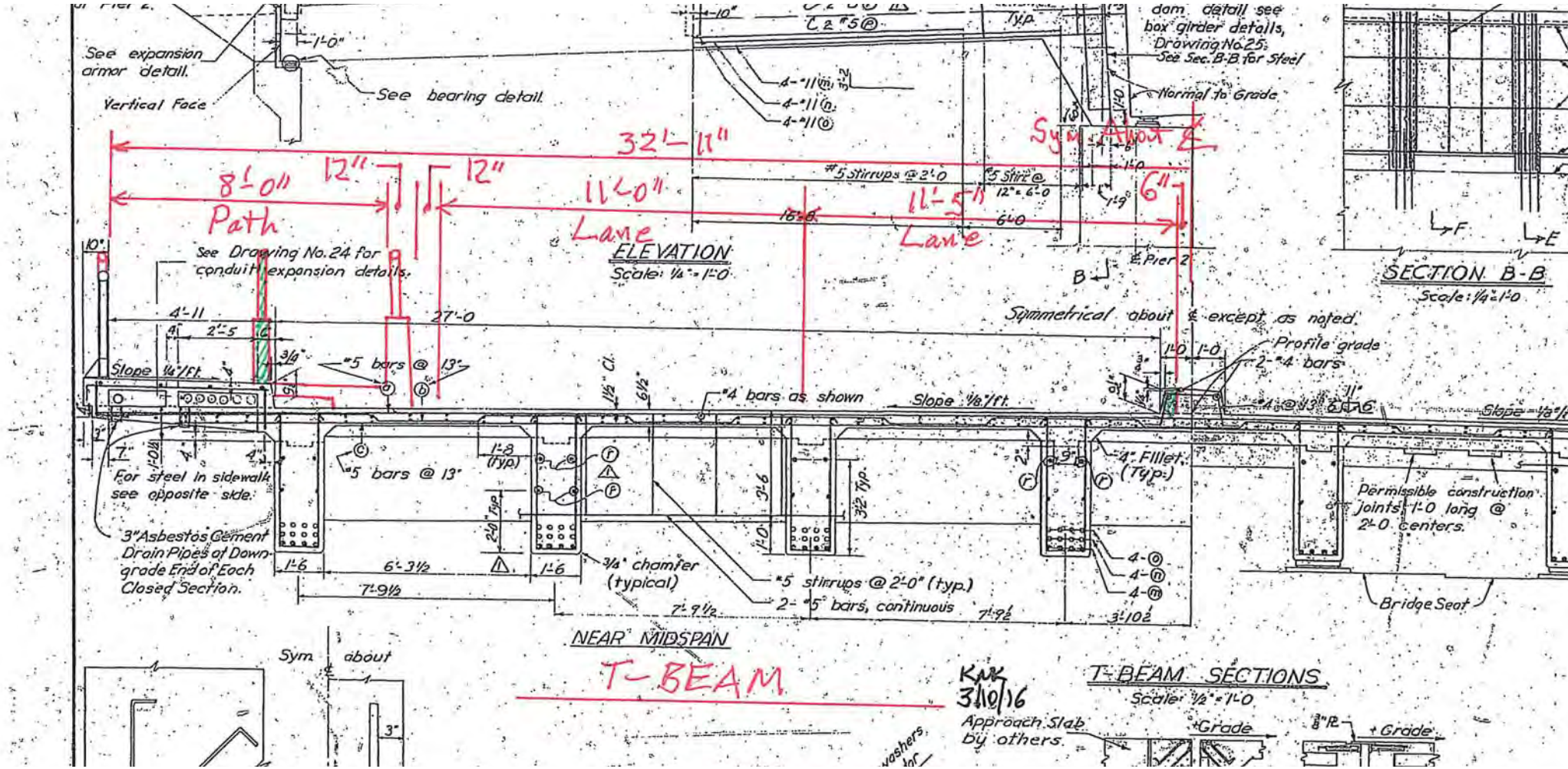
OPTION 1 - ROADWAY SECTION

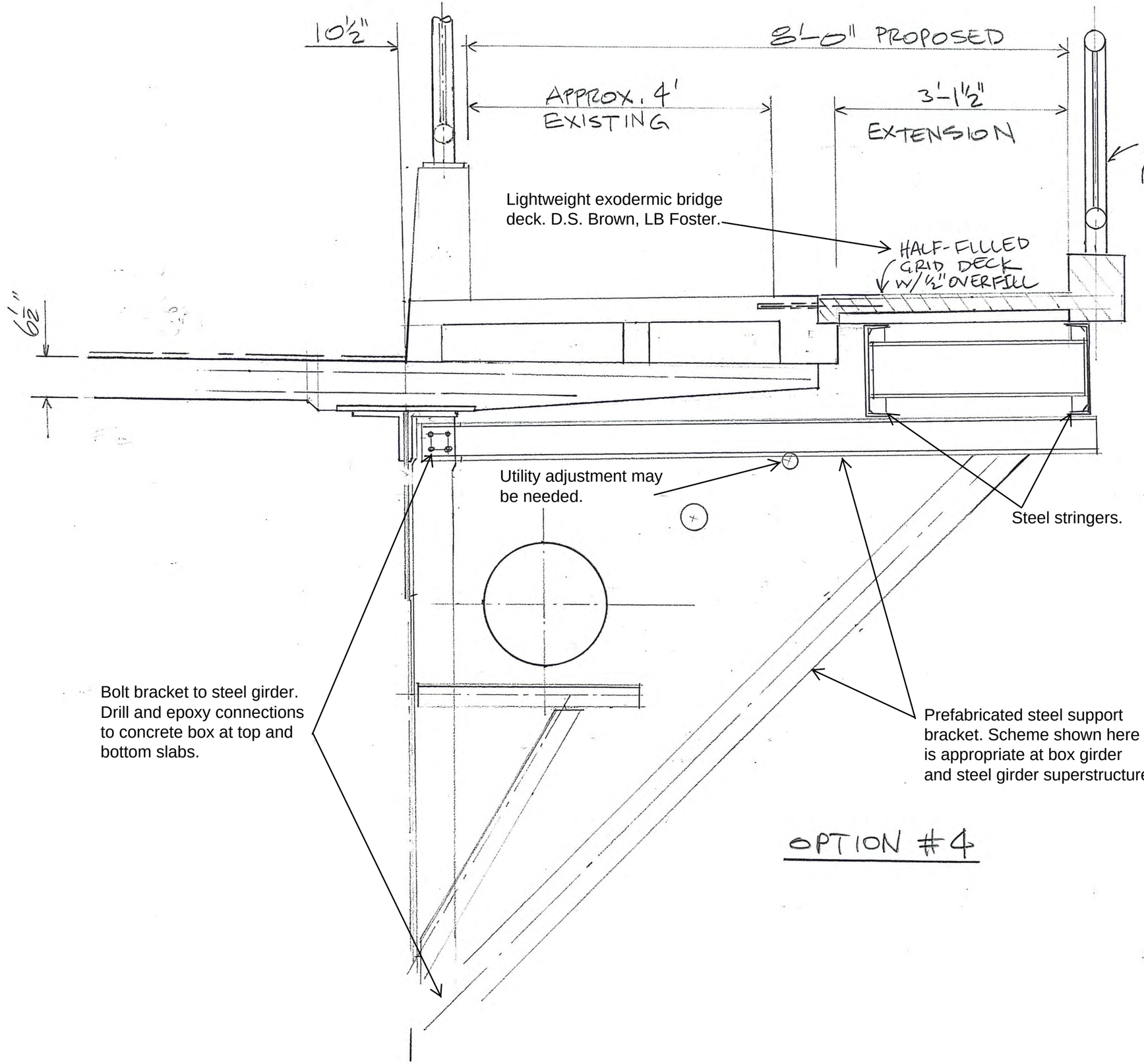


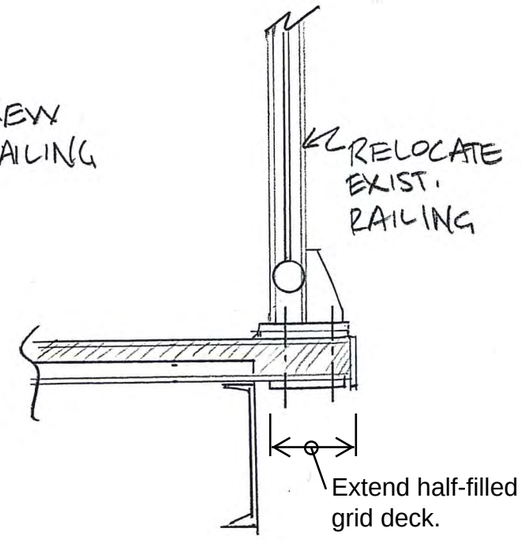
OPTION 1 - ROADWAY SECTION



OPTION 1 - ROADWAY SECTION

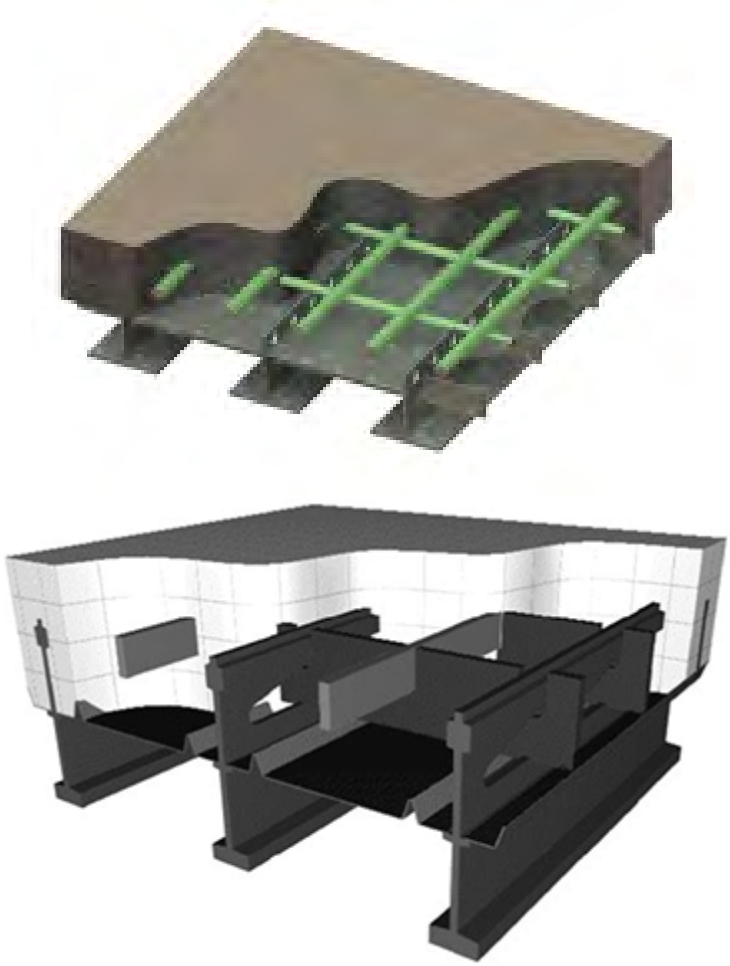






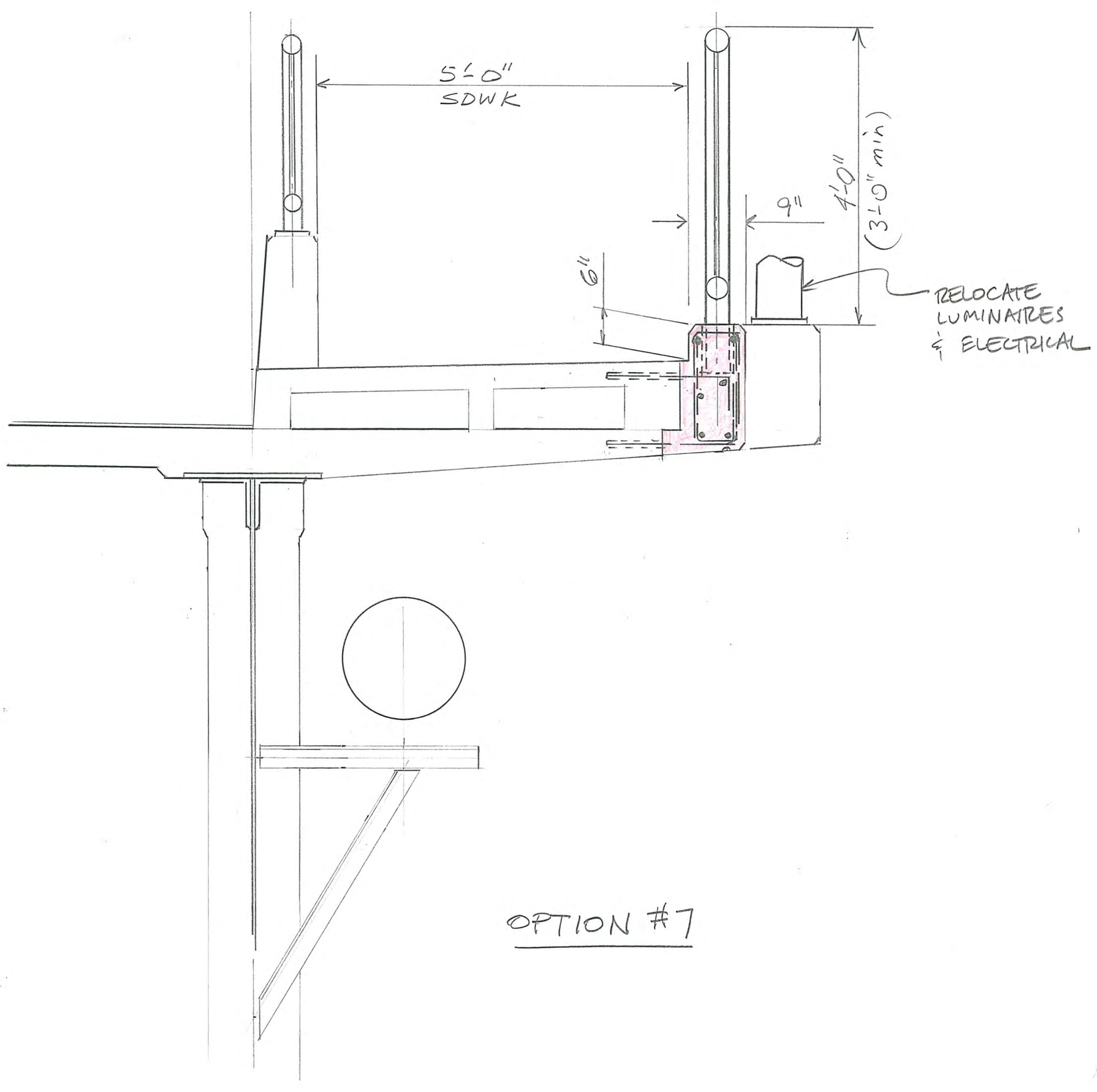
Preferred to relocate/reuse existing railing. Quantities are based on reusing existing.

OPTION #4



Exodermic Deck Renderings for Option 4

(copied from D.S. Brown and L.B. Foster websites)



OPTION #7

APPENDIX E:

Opinion of Probable Cost

(Options 1 & 4 Only)

CONCEPTUAL COST ESTIMATE - Feasibility Workshop

Warren Ave Bridge Sidewalk Widening Project

OPTION 1 - 8'- 0" SIDEWALKS WITH 11'- 0" LANES

exeltech

3/16/2016

Design: KNK/JMR

Check: EMG

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
1	**MOBILIZATION**				
	MOBILIZATION @ 10%	LS	1	LS	$263,100
2	**TRAFFIC CONTROL**				
	TRAFFIC CONTROL	LS	1	LS	$250,000
3	**REMOVAL OF EXISTING TRAFFIC/PEDESTRIAN BARRIER**				
	REMOVAL OF EXISTING TRAFFIC/PEDESTRIAN BARRIER	LF	3,542	$20.00	$70,800
4	**SINGLE SLOPE CONCRETE TRAFFIC BARRIER - PRECAST**				
	CORE DRILLING AND PREPARE CONCRETE SURFACES	LF	3,542	$25.00	$88,600
	SINGLE SLOPE CONCRETE TRAFFIC BARRIER	LF	3,542	$150.00	$531,300
	RELOCATE BRIDGE RAILING TYPE BP	LF	3,542	$30.00	$106,300
5	**SIDEWALK EXTENSION**				
	CORE DRILLING AND PREPARE CONCRETE SURFACES	LF	3,542	$50.00	$177,100
	EXPANSION JOINT (14) AND DRAIN (20) MODIFICATIONS	EA	34	$1,500.00	$51,000
	FURNISH AND INSTALL EPS 22 MATERIAL	CY	260	$200.00	$52,000
	EPOXY COATED REINFORCING BAR FOR SIDEWALK	LB	20,800	$1.75	$36,400
	CONCRETE CLASS 3000	CY	208	$400.00	$83,200
6	**REMOVAL OF EXISTING MEDIAN CURB**				
	REMOVAL OF EXISTING MEDIAN CURB	LF	1,717	$25.00	$42,900
7	**BRIDGE SPANS 5 TO 7 STRENGTHENING - FLOORBEAMS 1,3,5,&7**				
	TEMPORARY WORK ACCESS SCAFFOLDING	EA	8	$15,000.00	$120,000
	DRILLING AND PREPARE STEEL SURFACES	EA	272	$500.00	$136,000
	FURNISH AND INSTALL STEEL MEMBERS	LB	23,800	$2.00	$47,600
8	**BRIDGE PIERS 5 & 8 STRENGTHENING - TOP CROSSBEAM**				
	TEMPORARY WORK ACCESS SCAFFOLDING	EA	2	$25,000.00	$50,000
	PREPARE CONCRETE SURFACES	SF	1,850	$25.00	$46,300
	INSTALL FRP JACKET SYSTEM	SF	1,850	$230.00	$425,500
9	**REPLACE LUMINAIRES**				
	REMOVE EXISTING LUMINAIRES	EA	20	$1,000.00	$20,000

CONCEPTUAL COST ESTIMATE - Feasibility Workshop

Warren Ave Bridge Sidewalk Widening Project

OPTION 1 - 8'- 0" SIDEWALKS WITH 11'- 0" LANES

3/16/2016

Design: KNK/JMR

Check: EMG

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
	FURNISH AND INSTALL LUMINAIRES	EA	20	$10,000.00	$200,000
10	**REMOVE AND REBUILD EXISTING CONCRETE WINGWALLS**				
	DEMO TOP OF EXISTING WINGWALL	EA	4	$1,000.00	$4,000
	CONCRETE WINGWALL EXTENSION	EA	4	$1,500.00	$6,000
11	**PAVED CONNECTIONS TO EXISTING PEDESTRAIN FACILITIES**				
	CONCRETE BARRIER TRANSITIONS	LF	300	$75.00	$22,500
	CONCRETE CURB	LF	300	$25.00	$7,500
	CONCRETE SIDEWALK	SY	400	$50.00	$20,000
12	**NEW CONCRETE EXTRUDED CURB - PAINTED YELLOW**				
	NEW CONCRETE EXTRUDED CURB - PAINTED YELLOW	LF	1,718	$15.00	$25,800
	CORE DRILLING AND PREPARE CONCRETE SURFACES	EA	340	$30.00	$10,200
	SUBTOTAL W/O MOBILIZATION				$2,631,000
	SUBTOTAL W/ MOBILIZATION				$2,894,000
	8.7% SALES TAX				$252,000
	CONSTRUCTION PROJECT BID TOTAL				**$3,146,000**
	15% DESIGN ENGINEERING				$434,000
	12% CONSTRUCTION ENGINEERING				$347,000
	20% CONTINGENCY				$629,000
	Inflation Factor (2.5% per year based on 2020 construction)				$473,000
	PROJECT TOTAL				**$5,029,000**

CONCEPTUAL COST ESTIMATE - Feasibility Workshop

Warren Ave Bridge Sidewalk Widening Project

OPTION 1 - 8'- 0" SIDEWALKS WITH 11'- 0" LANES

3/16/2016

Design: KNK/JMR

Check: EMG

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
	ASSUMPTIONS:				
	1. Seismic retrofit cost for the bridge is not included, the bridge was seismic retrofitted by WSDOT in 1995.				
	2. Deck repair and overlay cost for the bridge is not included, cost captured within the WSDOT Bridge Deck Program.				
	3. Painting cost for the bridge is not included, cost captured within the WSDOT Bridge Painting Program.				
	4. Bridge piers and spans strengthening work, for added dead and live loads, will be performed from under deck scaffolding.				

CONCEPTUAL COST ESTIMATE - Feasibility Workshop

Warren Ave Bridge Sidewalk Widening Project

OPTION 4 - 8'-0" SIDEWALKS WITH CURRENT DECK FIGURATION

exeltech

3/16/2016

Design: KNK/JMR

Check: EMG

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
1	**MOBILIZATION**				
	MOBILIZATION @ 10%	LS	1	LS	$363,000
2	**TRAFFIC CONTROL**				
	TRAFFIC CONTROL	LS	1	LS	$40,000
3	**SIDEWALK EXTENSION**				
	DRILLING HOLES	EA	10,000	$30.00	$300,000
	EXPANSION JOINT (14) MODIFICATIONS	EA	14	$1,500.00	$21,000
	RELOCATE LUMINAIRES	EA	20	$2,500.00	$50,000
	LED CONVERSION	EA	20	$1,000.00	$20,000
	RELOCATE PEDESTRIAN RAILING	LF	3,436	$50.00	$171,800
	EPOXY COATED REINFORCING BAR FOR SIDEWALK	LB	15,000	$1.75	$26,300
	CONCRETE CLASS 4000	CY	200	$500.00	$100,000
	FURNISH AND INSTALL STEEL MEMBERS (INCLUDES EXODERMIC DECK)	LB	750,000	$3.00	$2,250,000
	ELECRICAL INSTALLATION TO NEW LUMINAIRE LOCATION	LS	1	$50,000.00	$50,000
	UTILITIES ADJUSTMENT	LS	1	$25,000.00	$25,000
4	**BRIDGE PIERS 5 & 8 STRENGTHENING - TOP CROSSBEAM**				
	TEMPORARY WORK ACCESS SCAFFOLDING	EA	2	$25,000.00	$50,000
	PREPARE CONCRETE SURFACES	SF	1,850	$25.00	$46,300
	INSTALL FRP JACKET SYSTEM	SF	1,850	$230.00	$425,500
5	**REMOVE AND REBUILD EXISTING CONCRETE WINGWALLS**				
	DEMO TOP OF EXISTING WINGWALL	EA	4	$1,000.00	$4,000
	CONCRETE WINGWALL EXTENSION	EA	4	$5,000.00	$20,000
6	**PAVED CONNECTIONS TO EXISTING PEDESTRAIN FACILITIES**				
	PAVED CONNECTIONS TO EXISTING PEDESTRAIN FACILITIES	LS	1	$30,000.00	$30,000

CONCEPTUAL COST ESTIMATE - Feasibility Workshop

Warren Ave Bridge Sidewalk Widening Project

OPTION 4 - 8'-0" SIDEWALKS WITH CURRENT DECK FIGURATION

exeltech

3/16/2016

Design: KNK/JMR

Check: EMG

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
	SUBTOTAL W/O MOBILIZATION				$3,630,000
	SUBTOTAL W/ MOBILIZATION				$3,993,000
	8.7% SALES TAX				$347,000
	CONSTRUCTION PROJECT BID TOTAL				**$4,340,000**
	15% DESIGN ENGINEERING				$599,000
	12% CONSTRUCTION ENGINEERING				$479,000
	20% CONTINGENCY				$868,000
	Inflation Factor (2.5% per year based on 2020 construction)				$652,600
	PROJECT TOTAL				**$6,939,000**
	ASSUMPTIONS:				
	1. Seismic retrofit cost for the bridge is not included, the bridge was seismic retrofitted by WSDOT in 1995.				
	2. Deck repair and overlay cost for the bridge is not included, cost captured within the WSDOT Bridge Deck Program.				
	3. Painting cost for the bridge is not included, cost captured within the WSDOT Bridge Painting Program.				
	4. Bridge piers and spans strengthening work, for added dead and live loads, will be performed from under deck scaffolding.				