

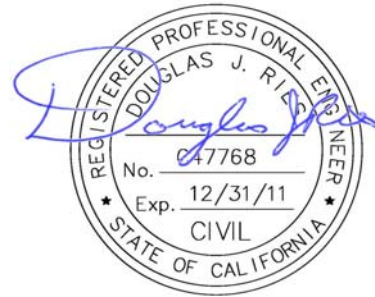
DESIGN EXCEPTION FACT SHEET

District: 4
City/County: Healdsburg/Sonoma

Date: February 11, 2011
Prepared by: Douglas J. Ries, PE
Project Principal
Omni Means Ltd

Route: Healdsburg Avenue
Description: Healdsburg Avenue Bridge Rehabilitation

Bridge Rehabilitation Cost: \$4,900,000 (CONSTRUCTION)



1. Existing Conditions:

Healdsburg Avenue is an important north/south road facility traversing through the City of Healdsburg, California and is designated as an arterial in the City's General Plan. It is predominantly a two-lane conventional road through the project limits with a posted speed limit of 25 mph just west of the bridge, 15 mph across the bridge and 30 mph east of the bridge. The 89-year old Healdsburg Avenue Bridge across the Russian River was completed in December 1921. The bridge provided a vital link for commerce and trade between northern California and the San Francisco Bay area (Old Redwood Highway). Since the construction of U.S. 101, the bridge now serves as an alternative route for local traffic and as an entry way into Healdsburg.

The existing bridge length is approximately 437 feet long with existing 9-foot and 10-inch wide lanes and a vertical clearance of 14.9 feet. The bridge is currently signed for a maximum truck weight limit of 17 tons and Healdsburg Avenue is not a designated truck route within the City.

On July 30, 2010, the State Office of Historic Preservation nominated the Healdsburg Avenue Bridge for listing on the National Register of Historic Places. Listing by the Keeper of the National Register in Washington, D.C. is pending.

2. Proposed Work and Non-Standard Features:

A. Proposed Work

The proposal is to rehabilitate the Healdsburg Avenue Bridge. The items involved with rehabilitation of the bridge include deck replacement, painting, damaged member repair, top chord strengthening, and fencing replacement. The bridge geometrics (width, height and size) will remain "as is".

B. Non-Standard Features

There are several design features associated with the existing structure that do not meet current design standards. An exception is proposed to allow the existing non-standard design features to remain. Standards for which deviations are requested include the following:

1. **Design speed**
2. **Lane width**
3. **Shoulder width**
4. **Horizontal alignment**
5. **Vertical alignment**
6. **Horizontal clearance**
7. **Vertical clearance**
8. **Stopping sight distance**
9. **Bridge width**

3. Standard for Which Exception is Required:

1. Per the American Association of State Highway and Transportation Officials (AASHTO) "A Policy on Geometric Design of Highways and Streets" ("Green Book") 2004 Edition, Chapter 2, page 72, paragraph 2, **Design Speed**, "It follows that the appropriate design speeds for arterials should range from 30 to 60 mph."

Under rehabilitation of the Healdsburg Avenue Bridge, the City proposes to maintain the existing design speeds as posted.

2. Per AASHTO's "Green Book", Chapter 7, page 472, **Lane Widths**, "The 12-ft lane widths are most desirable and should be used, where practical, on higher speeds, free-flowing, principal arterials."

Under rehabilitation of the Healdsburg Avenue Bridge, the City proposes to maintain the existing lane widths of 9' 10".

3. Per AASHTO's "Green Book", Chapter 7, page 448, **Widths (Shoulder)**, "Exhibit 7-3 provides values for the width of traveled way and usable shoulder that should be considered for the volumes indicated." The minimum shoulder width per Exhibit 7-3 for volumes over 2000 veh/day is 8 feet with a corresponding minimum width of traveled way of 24 feet.

Under rehabilitation of the Healdsburg Avenue Bridge, the City proposes to maintain the existing condition with no shoulders provided.

4. Per AASHTO's "Green Book", Chapter 9, page 716, paragraph 3, **Tapers (Horizontal Alignment)**, "Straight-line tapers are frequently used, as shown in Exhibit 9-95A. The taper rate may be 8:1 [L:T] for design speeds up to 30 mph and 15:1 [L:T] for design speeds of 50 mph."

Under rehabilitation of the Healdsburg Avenue Bridge, the City proposes to maintain the existing condition 6:1 taper on the west end of the structure (limiting to the existing speeds as posted).

5. Per AASHTO's "Green Book", Chapter 3, page 269, paragraph 3, **Crest Vertical Curves/ Design Controls – Stopping Sight Distance**, "To recognize the distinction in design speed and to approximate the range of current practice, minimum lengths of vertical curves are expressed as about three times the design speed in mph, [$L_{min}=3V$], where V is in miles per hour and L is in feet." With a desired maximum design speed of 35 mph for east of the bridge, the minimum length for a vertical curve would be 105 feet (3x35mph).

Under rehabilitation of the Healdsburg Avenue Bridge, the City proposes to maintain the existing profile grade of Healdsburg Ave which provides a 50-ft vertical curve at the end of the bridge, limiting the sight distance requirement.

6. A. Per AASHTO's "Green Book", Chapter 7, page 481, paragraph 3, **Horizontal Clearance to Obstructions**, "Clear roadside design is recommended for urban arterials whenever practical. On curbed street sections, clear roadsides are often impractical, particularly in restricted areas. In such areas, a clearance between curb face and object of 1.5 ft (or wider where practical) should be provided."

Under rehabilitation of the Healdsburg Avenue Bridge, the City proposes to maintain the minimum existing condition horizontal clearance measured from the face of curb to the face of the existing steel truss members of 1.2 feet.

- B. Per AASHTO's "Green Book", Chapter 7, page 482, paragraph 3, **Horizontal Clearance to Obstructions**, "Where pedestrians are not a factor, obstructions should be set well back, protected, or provided with breakaway features."

Under rehabilitation of the Healdsburg Avenue Bridge, the City proposes to maintain the existing 1-ft tall curb without placing a guardrail (protection) at the face of curb to shield the existing steel truss members.

7. Per AASHTO's "Green Book", Chapter 7, page 472, **Vertical Clearances**, "New or reconstructed structures should provide 16-ft vertical clearance over the entire roadway width. Existing structures that provide clearance of 14-ft, if allowed by local statute, may be retained."

Under rehabilitation of the Healdsburg Avenue Bridge, the City proposes to maintain the existing bridge vertical clearance of 14.9 feet.

8. Per AASHTO's "Green Book", Chapter 7, page 471, **Sight Distance**, "The provision of adequate sight distance is important in urban arterial design. Sight distance affects normal operational characteristics, particularly where roadways carry high traffic volumes. The sight distance values given in Exhibit 7-1 are also applicable to urban arterial design." Per Exhibit 7-1, the minimum stopping sight distance for a design speed of 35 mph is 250 feet.

Under rehabilitation of the Healdsburg Avenue Bridge, the City proposes to maintain the existing sight distance provided which is approximately 178 feet at the west end of the bridge corresponding to the existing 50-ft vertical curve and an algebraic grade difference of 3.4%.

9. Per AASHTO's "Green Book", Chapter 7, page 481, **Roadway Width for Bridges**, "The minimum clear width for new bridges on arterial streets should be the same as the curb-to-curb width of the street. On long bridges, defined as bridges with overall lengths in excess of 200 ft, the offsets to parapets, rails, or barriers may be reduced to 4 feet where shoulders or parking lanes are provided on the arterial." The existing roadway width is 40 feet.

Under rehabilitation of the Healdsburg Avenue Bridge, the City proposes to maintain the existing roadway bridge width of 19.7 feet as measured from bottom face of curb to bottom face of curb.

4. Accidents:

The accident history for this segment of Healdsburg Avenue in the 3-year period from 1/1/2008 to 12/31/2010 was provided by the California Highway Patrol (CHP) Statewide Integrated Traffic Records System (SWITRS) and the Healdsburg Police Department. The following table presents a summary of the accidents and significance.

**ACCIDENT SUMMARY TABLE
(1/1/2008 through 12/31/2010)**

Location (PM)	Number of Accidents			Total
	Fatal (F)	Injury (I)	Property Damage Only (PDO)	
Healdsburg Ave (between University St & Bailhache Ave)	0	2	4	6

As indicated in the table above, Healdsburg Avenue experienced 6 accidents between University Street and the entrance to Veterans Memorial Beach Park. One (1) of the six (6) accidents involved a collision between a bicycle and a vehicle. Two (2) of the accidents involved injuries and four (4) involved property damage only. The collision type for the accidents involving injuries were as follows: one was a broadside and the other one was hit an object. The collision type for the accidents involving property damage only were head on, side swipe, hit object and broadside. The primary collision factors were: influence of alcohol (17%), failure to yield (50%) and inattention (33%).

5. Design Year Traffic Volumes:

The following table presents the Future (Year 2035) AADT's and PM peak hour traffic volumes for Healdsburg Ave within the bridge limits.

YEAR 2035 TRAFFIC VOLUMES	
HEALDSBURG AVE	
AADT	PM PEAK
11,100	1,110

6. Added Cost to Make Standard:

In order to eliminate the non-standard features listed above, the existing bridge would have to be replaced with a standard box girder bridge. The total cost for a new bridge has been estimated to be \$10,800,000, resulting in an additional cost to make standard of **\$5,900,000**.

7. Description of Any Additional Work to Enhance Safety:

Under rehabilitation of the Healdsburg Avenue Bridge, the existing bridge railing at the west end of the bridge will be modified to increase sight distance for southbound vehicles turning left to eastbound Healdsburg Avenue.

Seismic Retrofitting of the existing bridge is being evaluated and proposes to address the existing seismic and scour vulnerabilities associated with the bridge foundation and substructure. It is currently anticipated that Seismic Retrofitting will be completed by fall 2011. This work will result in significant safety improvements to the existing structure and the general public.

Currently, the City Engineer has directed that the structure be posted at 15 MPH in order to reduce the impact loads created by trucks and due to the inherent safety concerns associated with narrow travel lanes along with a load limit posting of 17 tons. Although this reduced speed limit and load limit would not be needed after the seismic retrofit and rehabilitation are completed, it is recommended that the reduced speed limit posting be continued, in addition to the placement of a "No Trucks" sign. The purpose for the placement of these signs would be to provide enhanced safety and provide a means to mitigate the design exceptions noted above, especially the exceptions associated with reduced lane widths, lack of shoulders and alignment.

Additionally, signalization of the Healdsburg Avenue/Front Street/Kennedy Lane intersection is being recommended to provide acceptable Levels of Service for future traffic and will potentially provide enhanced safety.

8. Reason for Requesting Exception:

The reason for requesting the exception include minimizing impacts to environmentally sensitive areas, minimizing impacts to public lands (Veterans Memorial Beach Park), avoiding other right of way impacts, and the excessive cost to make standard which would increase the cost of rehabilitating the bridge by 120%.

Other significant factors for requesting the exception to the design standards include:

- Preserving the bridge "as is" is the purest form of historic preservation.
- From March 2010 through September 2010, the City undertook a public outreach effort which included two open house type forums, three public meetings and one city council meeting. The overwhelming response voiced at these public meetings was to preserve the existing structure.
- On September 7, 2010, after hearing public comment and considering all the facts presented by the City staff and the consulting team, the City Council of Healdsburg voted to select "Preservation of the historic structure" as the locally preferred alternative for the purposes of conducting environmental studies.

9. Other Considerations:

A. Sufficiency Rating (SR)

Section 11.4, "Design Exceptions", of the Caltrans Local Assistance Procedures Manual (LAPM), states "design exceptions that would result in the construction of a federally funded new bridge that would result in a Sufficiency Rating (SR) of less than 80 are not allowed."

After rehabilitation, the Sufficiency Rating (SR) of this structure will be approximately 74.7. This is noted as an informational item only and we are not seeking a design exception for this item because the above noted standard applies only to "new" structures, not rehabilitated structures.

B. Bridge Structural Capacity

Section 11.4, "Design Exceptions", of the Caltrans Local Assistance Procedures Manual (LAPM) states "Deviations from the criteria contained herein for the structural capacity of bridges and other structures are not allowed." The current 2010 AASHTO "LRFD Bridge Design Specifications", 5th Edition requires the application of the HL-93 loading for new bridges. Seismic retrofit and rehabilitation projects use the traditional Load Factor Design (LFD) using HS20-44 truck loading (2000 AASHTO with amendments by Caltrans).

It is proposed to use the HS20-44 loading criteria to rehabilitate this existing historical bridge that will remain in place. This is noted as an informational item only and we are not seeking a design exception for this item because the load rating utilized is consistent with current standards for a rehabilitation project.

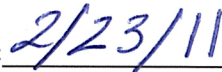
10. Attachments:

- A. Location Map
- B. Existing Facility Layout and Profile
- C. Preliminary Cost Data

EXCEPTION APPROVED:

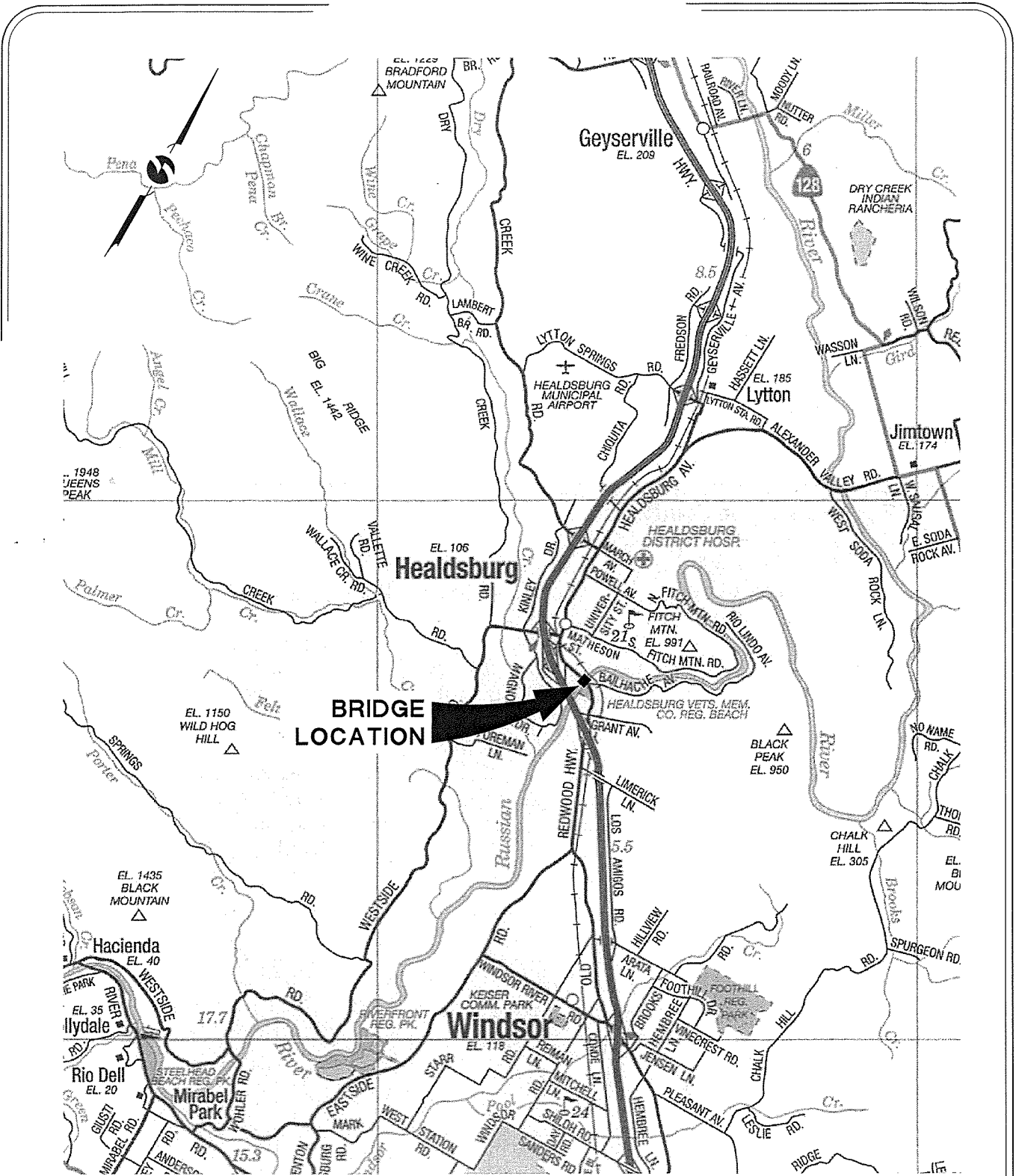

PUBLIC WORKS DIRECTOR

DATE:



Attachment A

Location Map



Healdsburg Avenue Bridge

Attachment A

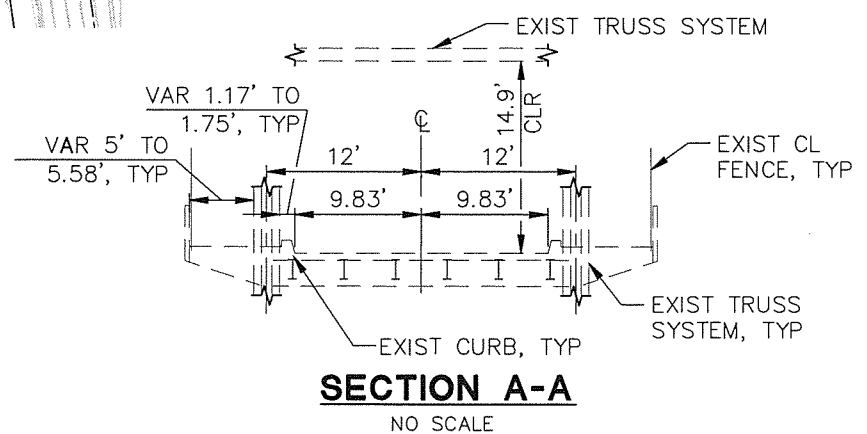
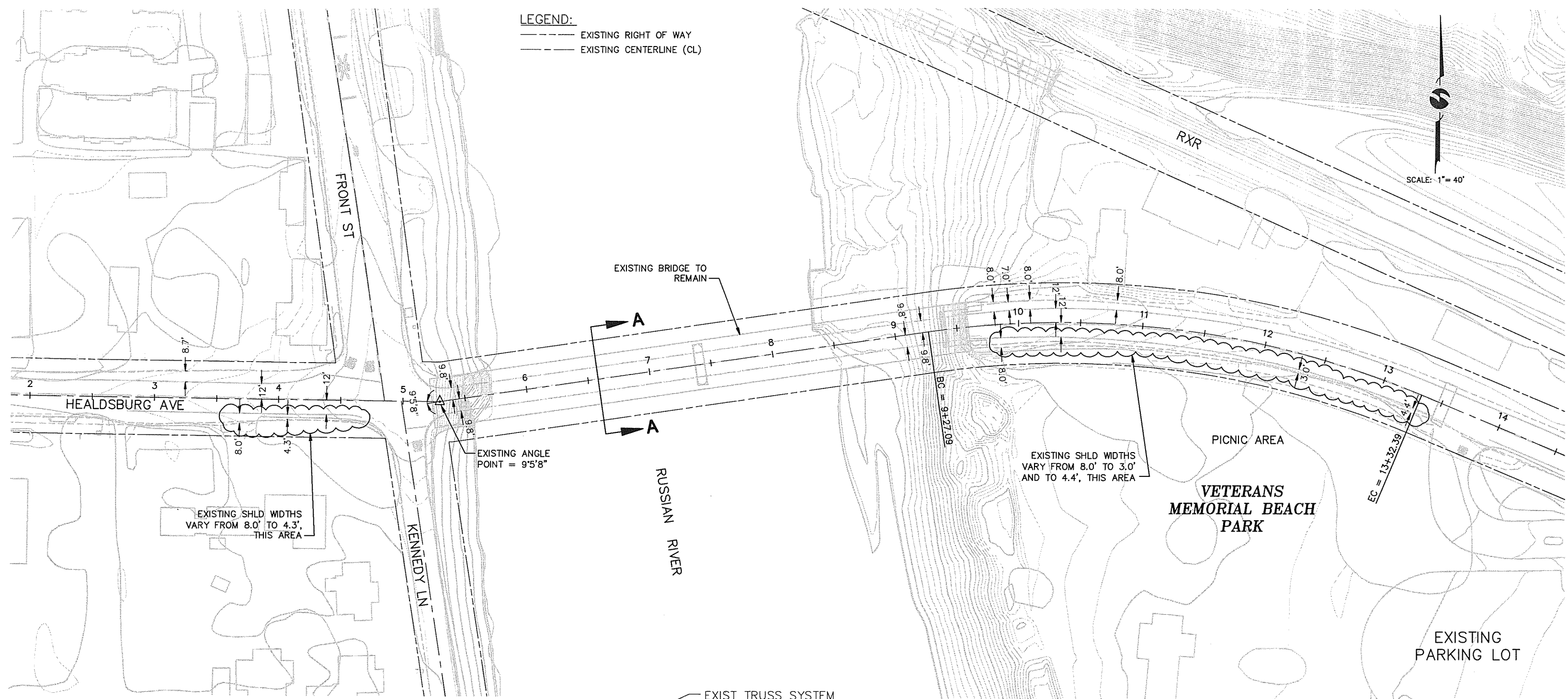
Location Map

Attachment B

Existing Facility Layout and Profile

LEGEND:
 - - - - - EXISTING RIGHT OF WAY
 - - - - - EXISTING CENTERLINE (CL)

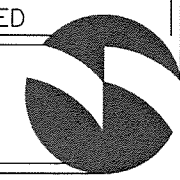
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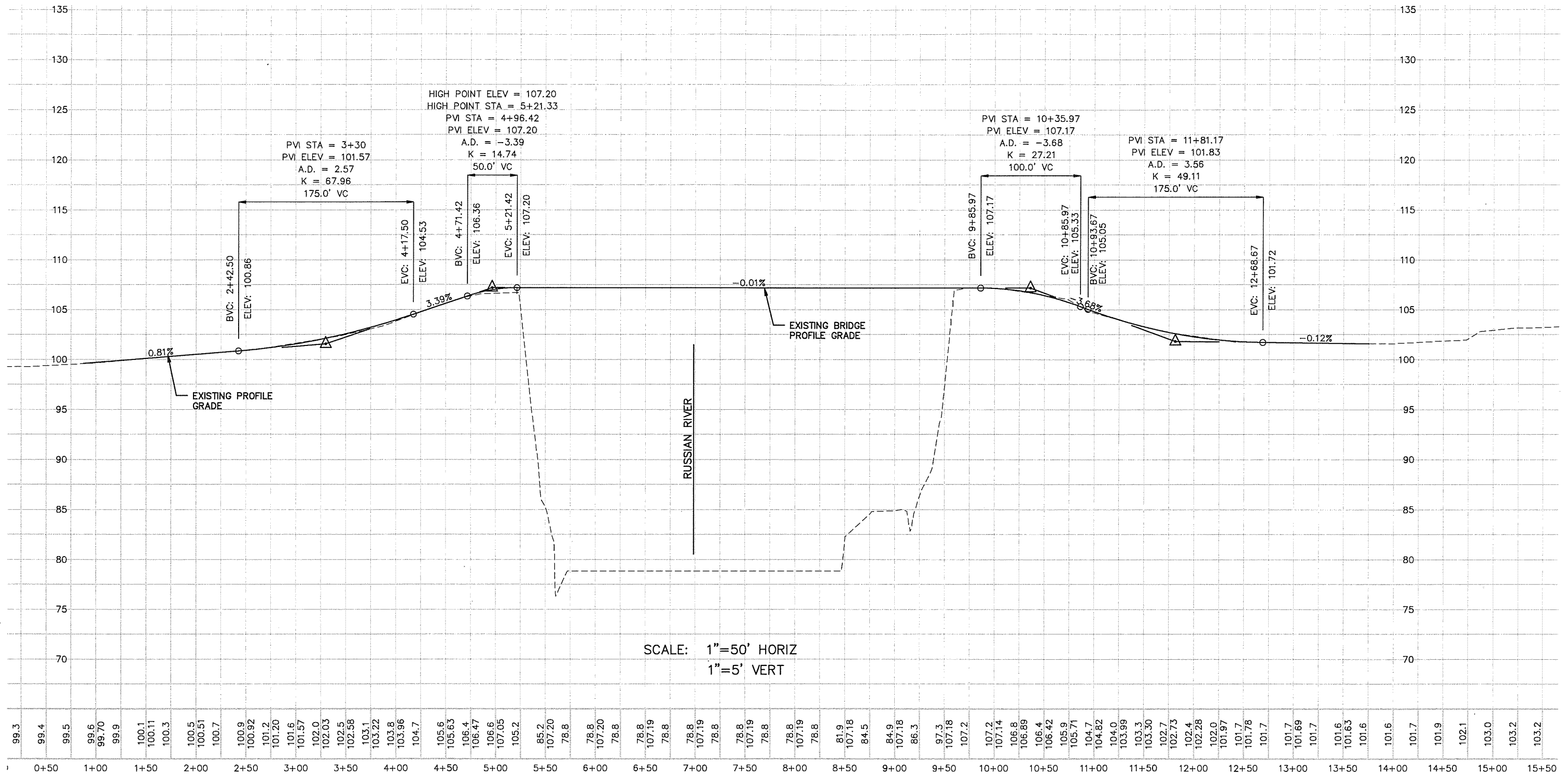


HEALDSBURG AVENUE BRIDGE REHABILITATION

SCALE AS NOTED

EXISTING FACILITY LAYOUT





HEALDSBURG AVENUE BRIDGE REHABILITATION

EXISTING FACILITY PROFILE

SCALE AS NOTED



Attachment C

Preliminary Cost Data

