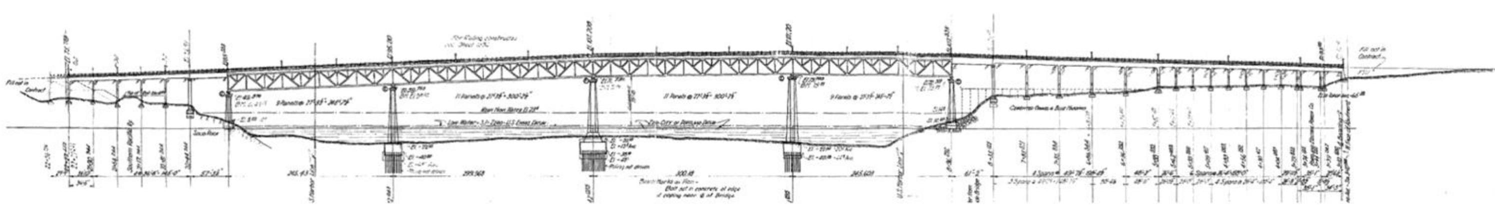
ADDENDUM TO
SELLWOOD BRIDGE
HISTORIC AMERICAN ENGINEERING RECORD
HAER NO. OR-103

PREPARED BY

JAMES A. MCNETT, AIA
AARON LEMCHEN





HERITAGE RESEARCH ASSOCIATES, INC.
1997 GARDEN AVENUE
EUGENE, OREGON

OCTOBER 2011

HISTORIC AMERICAN ENGINEERING RECORD

SELLWOOD BRIDGE

This report is an addendum to a 67-page report previously transmitted to the Library of Congress in 2000 (Wortman and Wortman 2000).

<u>Location:</u> Spanning the Willamette River at S.E. Tacoma Street, Multnomah County, Oregon. USGS Lake Oswego 7.5' quadrangle (1961, revised 1984). UTM Zone 10, 5 26 145E, 50 34 585N (updated to NAD83) or 5 26 220E, 50 34 380N (NAD 27)

<u>Date opened:</u> December 15, 1925

<u>Structural type:</u> Steel four-span continuous riveted Warren Deck Truss with Verticals (subdivided).

<u>Engineer(s):</u> Gustav Lindenthal, New York City, and Ira G. Hedrick, Kansas City

<u>Prime Contractor:</u> Gilpin Construction Co., Portland and Astoria, Ore.

<u>Steel Fabricator:</u> Judson Manufacturing Co., San Francisco and Emeryville, Ca.

<u>Owner:</u> County of Multnomah, Portland, Oregon

<u>Present Use:</u> Vehicular, pedestrian and bicycle traffic

<u>Significance:</u> Significance remains as stated in the original HAER report (following Wortman and Wortman 2000:1-2):

The Sellwood Bridge, the busiest two-lane bridge in Oregon, is the southern-most bridge in an ensemble of twelve monumental highway bridges across the lower Willamette River at Portland, Oregon. The only four-span continuous truss bridge in the state, it appears to be an extremely rare bridge type anywhere. The Sellwood Bridge is also:

1. One of only 215 known highway truss bridges surviving in Oregon as of 2000, and one of 153 highway truss bridges surviving in Oregon in 2011 according to ODOT records.
2. One of only five known continuous highway trusses in Oregon.
3. The state's only known highway continuous deck truss.

4. One of five Portland spans associated with Gustav Lindenthal during the period 1924-1928. Of these five bridges, Lindenthal designed three (Ross Island Bridge, Sellwood Bridge, and Burnside Bridge), with the Sellwood Bridge among the last bridges of this master American bridge designer's career.
5. A rare example of a Lindenthal highway-only deck truss.
6. An unusually finely subdivided Warren Truss with Verticals designed by Kansas City engineer Ira G. Hedrick, a one-time partner of famed lift bridge designer J.A.L. Waddell.
7. Portland's first Willamette River bridge to open without a movable span, and built without trolley tracks and with only one under-sized sidewalk. It was the first major Portland bridge designed almost exclusively for the automobile.

Except for its west end approaches, the Sellwood Bridge remains as constructed, with both ends of its superstructure incorporating girders from the 1894 Burnside Bridge, an early example of recycling. Opened in December 1925, the same month and year as the birth of the modern discipline of geotechnical engineering in the United States, the Sellwood Bridge suffered extensive damage from movement of its west end approach due to lack of proper geotechnical data for the design of the pier footings. The bridge remains the sole vehicular crossing of the Willamette between the Ross Island Bridge in Portland and the Abernethy Bridge (also known as the Oregon City or I-205 bridge) between the cities of Oregon City and West Linn. The structurally and functionally obsolete bridge is slated for replacement as early as 2012. This addendum documents the changes to the bridge from 1999 to its planned demolition in 2012.

Project Information:

Primary documentation of the Sellwood Bridge was part of the Willamette River Bridges Recording Project, conducted during the summer of 1999 under the co-sponsorship of HAER and the Oregon Department of Transportation in cooperation with Multnomah County. It extended preliminary work conducted under the Oregon Historic Bridge Recording Project with the same co-sponsors in the summer of 1990. Sharon Wood Wortman, HAER Historian, and Edward J. Wortman, Multnomah County Engineering Services Administrator, researched and wrote the documentation in 1999-2000 (Wortman and Wortman 2000). This mitigation addendum was written and researched in 2011 by Jim McNett, Architect, and Aaron Lemchen, Historic Preservation Specialist, through Heritage Research Associates, Inc.

Scope of the Addendum

The purpose of this report is to document changes to the bridge since the original 1999 Historic American Engineering Record (HAER) Survey of the Sellwood Bridge was made as part of the Willamette River Bridges Project (Wortman and Wortman 2000). The present addendum is part of the mitigation required under the Memorandum of Agreement (MOA) between the Federal Highway Administration (FHWA), Oregon State Historic Preservation Office (SHPO), and the Oregon Department of Transportation (ODOT) that was executed in June and July of 2010.

The purpose of the MOA is to mitigate the expected impact from the Sellwood Bridge Project to the historical resources within the area of potential effect through documentary and interpretive actions. The resources are the Sellwood Bridge, the River View Cemetery, and the Superintendent's House at River View Cemetery. This report fulfills the bridge requirement, section II-1 (ODOT Obligations – Archival Recordation and Documentation). Along with the materials gathered for the report, this addendum is intended to be distributed to local repositories including ODOT, University of Oregon Architecture and Allied Arts Library, the Multnomah County archives, the Central and Sellwood-Moreland branches of the Multnomah County library system, the City of Portland archives, the Oregon Historical Society, and the Library of Congress Prints and Photographs Division, if they choose to accept the copies.[1]

Changes Since 1999

Very few changes beyond routine maintenance and repair have been made on the bridge since 1999. The following noticeable changes have occurred since 1999:

1. Design and work performed by Multnomah County for steel band-aids on the concrete girders at the west approach to the bridge required the closing of the bridge for the day during August 23, 2003. The band-aids are external steel plates and rods intended to reinforce crack-damaged reinforced concrete girders.[2]
2. Epoxy grout repairs of the reinforced concrete structure on the west and east approaches were conducted during June of 2008. The work was designed by Multnomah County in May of 2008.[3]

[1] "Agreement Among the Federal Highway Administration (FHWA), Oregon State Historic Preservation Office (SHPO), and Oregon Department of Transportation (ODOT) For Mitigation For the Sellwood Bridge Project: Portland, Multnomah County, Oregon" Misc. Contracts & Agreements, No. 26809. Key No. 13762.

[2] Multnomah County, Oregon. News Release. "Sellwood Bridge closed Saturday August 23 for repairs." August 22, 2003.

[3] Multnomah County, Oregon. Engineering Plans. "Epoxy Crack Injection Project: Sellwood Bridge – SE Tacoma." May 2008.

3. Other recent changes to the bridge include spalling and the use of netting/wire mesh to hold together damaged precast concrete guard rail balusters along the bridge deck.

The proposed design for the replacement bridge will shift the steel truss crossing northwards to temporary piers, allowing for a new, higher capacity span to be constructed on the same alignment. While Alternative D Refined originally proposed the new bridge to be built in halves, maintaining traffic on the existing bridge until the south half of the new bridge was built, during Final Design it was determined that the existing bridge could be shifted approximately 40' northward, opening the work area for new bridge construction in a single stage.

Rationale for Replacement

Deficiencies have driven the need for a significant rehabilitation or replacement of the bridge. Landslides and settlement on the west approach of the bridge require significant repair or replacement of the structure. The bridge was not originally designed to support streetcars, trolleys, or present-day trucks, and the bridge can no longer support buses and other heavy vehicles in its current condition. The bridge also doesn't meet current safety and capacity requirements (lane width standards) for vehicular, bike and pedestrian traffic. In addition, the current structure does not meet current seismic code standards.[4]

From 2008 through 2009, five design alternatives for the Sellwood Bridge were examined in the draft environmental impact statement for the project; two alternatives included rehabilitation of the existing bridge structure and three alternatives replaced the bridge. After a comprehensive process including meetings with local, state, and federal agencies as well as scheduled public comment sessions, Alternative D Refined was chosen because it will maintain traffic across the river during construction without the social and environmental impacts of a new temporary detour bridge.[5] Alternative D Refined was estimated to cost approximately 337 million dollars with the rehabilitation alternatives ranging from 347 million to 373 million dollars depending upon staging alternatives, land acquisition costs, and interchange improvements chosen for the project. While Alternative D Refined originally proposed the new bridge to be built in halves, maintaining traffic on the existing bridge until the south half of the new bridge was built, during Final Design it was determined that the existing bridge could be shifted approximately 40 feet northward, opening up the work area for new bridge construction in a single stage. This detour, using the existing bridge, is expected to reduce the construction cost of Alternate D Refined by $5 million.

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[4]Multnomah County. "Why is it needed?" http://www.sellwoodbridge.org/?p=why-is-it-needed. Accessed 7/21/2011.

[5] *Final Technical Report Addendum: Sellwood Bridge Project Cultural Resources Technical Report Addendum.* CH2M Hill, Portland, Oregon, 2010, pp. 1-2.

The rehabilitation options would have required either the addition of a separate bike and pedestrian bridge at the crossing or a new wider roadway on top of the existing bridge structure. Those options would have also required either the construction of an entirely new temporary detour bridge or a total traffic closure during the reconstruction of the existing bridge. All these considerations were costly and inconvenient, and would also have resulted in considerable alteration to the historic integrity of the existing bridge.

Alternative D Refined requires the removal of the existing bridge as it will utilize the same alignment. The new roadway will be significantly wider at its narrowest point (64' compared to the current bridge's 30'-9" [6]) and allows for improved motor vehicle, bike and pedestrian paths over the current bridge. The structure for the preferred Alternative D Refined is steel deck arches spanning between piers. During construction the existing warren truss structure will be moved to temporary piers and traffic will use temporary approaches to access the shoofly crossing while the existing piers and approaches in the crossing alignment are demolished to make way for the new bridge.[7]

Addendum to Bibliography

CH2M Hill, Portland, Oregon. Final Technical Report Addendum: Sellwood Bridge Project Cultural Resources Technical Report Addendum. Prepared for Multnomah County, Oregon. Submitted to Oregon Department of Transportation, Salem. April 2010.

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Wortman, Sharon Wood, and Edward J. Wortman, P.E. *Historic American Engineering Record, Sellwood Bridge.* HAER No. OR-103. 2000. Report on file at the Library of Congress.

Wortman, Sharon Wood, and Ed Wortman. *The Portland Bridge Book.* Urban Adventure Press. Third Edition. 2006.

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[6] Sheet L1 "General Elevations & Plan". Lindenthal, Gustav. *Plans for Sellwood Bridge Over The Willamette River at Portland, Ore. 1924.*

[7] pp. 4-6. *Final Technical Report Addendum; "Detour Bridge," http://sellwoodbridge.org/?p=detour-bridge-approach2 and "Recommendation: Steel Deck Arch", http://sellwoodbridge.org/?p=recommendation-steel-deck-arch, accessed July 22, 2011.*

Addendum to Appendix 1 – "Engineering Drawing History, Sellwood Bridge 1924-2000, Original Drawings."

2003 – As-Builts of Exterior Steel Reinforcement Project could not be located at the time of this report, however they should be similar to those for Sauvie Island Bridge

2008 – Willamette River (Sellwood) Bridge, Epoxy Crack Injection Project (Portland) Sec. (Sellwood Bridge) CAD dated June 20, 2008.

Addendum to Appendix 2 – "Summary of Significant Events, Sellwood Bridge from 1925"

2003 – Exterior steel reinforcement was added to the concrete girders on the west approach to the bridge to repair the severe damage that had occurred on this side due to settling.

2008 – Epoxy grout injection repairs were carried out on the concrete approach structures at the East and West ends of the bridge. Epoxy grout was injected through drilled holes to fill internal voids and cracks within the concrete structural elements.

2012 – Expected commencement of construction of the replacement bridge will begin along with the demolition of the existing bridge.[8]

[8] Multnomah County. *Current Phase.* http://www.sellwoodbridge.org/?p=current-phase. Accessed July 21, 2011.

HISTORIC AMERICAN ENGINEERING RECORD

ADDENDUM TO INDEX TO PHOTOGRAPHS

SELLWOOD BRIDGE HAER No. OR-103

Spanning the Willamette River on SE Tacoma Street
Portland
Multnomah County
Oregon

John Toso, Photographer, summer 2011
Note: scans from 4x5 negatives

HAER OR-103-19 Interior of truss structure looking east along the catwalk. This view shows the deck construction of lateral elements (floor beams and bracing) lining up with the truss verticals.

HAER OR-103-20 Pier 18 and south truss expansion bearing from the catwalk. This bearing and its twin under the north truss allow for longitudinal expansion and contraction of the truss structure.

HAER OR-103-21 Pier 21 and south truss bearing on the west end of the truss structure. This pier has been heavily repaired and the bearing/pads modified. This bearing and its twin under the north truss allow for expansion and contraction of the truss structure.

HAER OR-103-22 Fixed bearing at the center point of the truss structure, Pier 19. The bearing and its twin under the north truss allow for some rotation of the truss at this point, but do not allow for longitudinal movement of the truss at Pier 19.

HAER OR-103-23 Steel “band-aid” repairs to severe cracks in the concrete girders on the west approach of the bridge.

HAER OR-103-24 View of structural concrete frame on the west approach to the bridge looking west from the catwalk. Light horizontal lines on the columns show some of the locations where epoxy grout was injected to repair and reinforce damaged columns.

HAER OR-103-25 View of west approach and bridge deck looking east from River View Cemetery.

HAER OR-103-26 General perspective view of Sellwood Bridge, view from the southwest (2011 view of HAER OR-103-1 taken in 1999).

HAER OR-103-27 General view of Sellwood Bridge, looking northeast, south side of structure (2011 view of HAER OR-103-2 taken in 1999).

HAER OR-103-28 General perspective view of Sellwood Bridge, view from west looking east across the Willamette River, north side of structure (2011 view of HAER OR-103-3 taken in 1999).

HAER OR-103-29 General perspective view of Sellwood Bridge, north side of structure, view from east, looking west across the Willamette River (2011 view of HAER OR-103-4 taken in 1999).

HAER OR-103-30 Detail view of reinforced concrete pier and east end of steel truss structure (2011 combined view of HAER OR-103-11 and OR-103-12 taken in 1999).

HAER OR-103-31 Detail view of reinforced concrete approach span with bracing at west end of the Sellwood Bridge (2011 view of HAER OR-103-14 taken in 1999).

HAER OR-103-32 Detail view showing temporary repair of Sellwood Bridge precast concrete guard rail baluster (see HAER OR-103-16 for 1999 view of intact railing).

SELLWOOD BRIDGE: FIELDNOTES

HAER NO. OR-103
ADDENDUM 2011

Location:	Spanning the Willamette River at S.E. Tacoma Street, Multnomah County, Oregon. USGS Lake Oswego 7.5' quadrangle (1961, revised 1984). UTM Zone 10, 5 26 145E, 50 34 585N (updated to NAD83) or 5 26 220E, 50 34 380N (NAD 27)
Date opened:	December 15, 1925
Structural type:	Steel four-span continuous riveted Warren Deck Truss with Verticals (subdivided).
Engineer(s):	Gustav Lindenthal, New York City, and Ira G. Hedrick, Kansas City
Owner:	County of Multnomah, Portland, Oregon
Present Use:	Vehicular, pedestrian and bicycle traffic
Prepared by:	Aaron Lemchen and James McNett
Visit Date:	June 23 and August 4, 2011

These notes were generated from a site visit to the Sellwood Bridge which spans the Willamette River midway between downtown Portland and Lake Oswego. The bridge connects Oregon 43 on the West and the old Pacific Highway, 99E, on the East. The notes follow the 1999 HAER report and visually associate the written notes with what we saw on the site. The notes give an overall view of the extant bridge; the digital images are informational.

The bridge consists of three parts--the eastern approach, the western approach, and the central truss structure over the river. The most noteworthy aspect of the bridge is the center four-span continuous Warren Truss structure that rests on bearings located on five piers set in and alongside the Willamette River. An unusual aspect of the bridge is that the truss structure slopes from an elevation of 107 feet on the eastern (high) end to an elevation of 85 feet on the western (low) end. More accurately, the truss structure slopes upward to the high point in Span 18, then down to the west end. The bridge was built quickly and cheaply during an economic growth period that saw many bridges built over the Willamette; it even incorporated some pieces from the recently demolished Burnside Bridge (1894). The bridge served its purpose well and remains the busiest 2-lane bridge in Oregon; however, new code regulations and planning requirements call for a new wider bridge with greater carrying capacity to be built in the same location.

The bridge began having problems with ground movements on the west side shortly after construction, which eventually led to major design revisions for Pier 21 and the western approach. The pier was put on a firm foundation and enlarged in 1960. This was the single largest repair/modification done to the bridge. Later additions and changes included new bearings, a new maintenance catwalk, new surfaces, expansion joints, parapet repair, and structural reinforcement.

LINDENTHAL DRAWINGS

The original bridge structure designed by Gustav Lindenthal and built in 1925 remains essentially intact. The south elevation is taken from the original drawings for the bridge (Fig. 1 and 2). The piers are numbered 1 to 28 from east to west. Piers 17-21 carry the large four-span steel Warren Truss structure. Piers 16-17 and 21-22 are spanned by recycled steel girders from the 1894 Burnside Bridge. The rest of the spans on both approaches are cast-in-place reinforced concrete girders spanning from 26 to 49 feet.

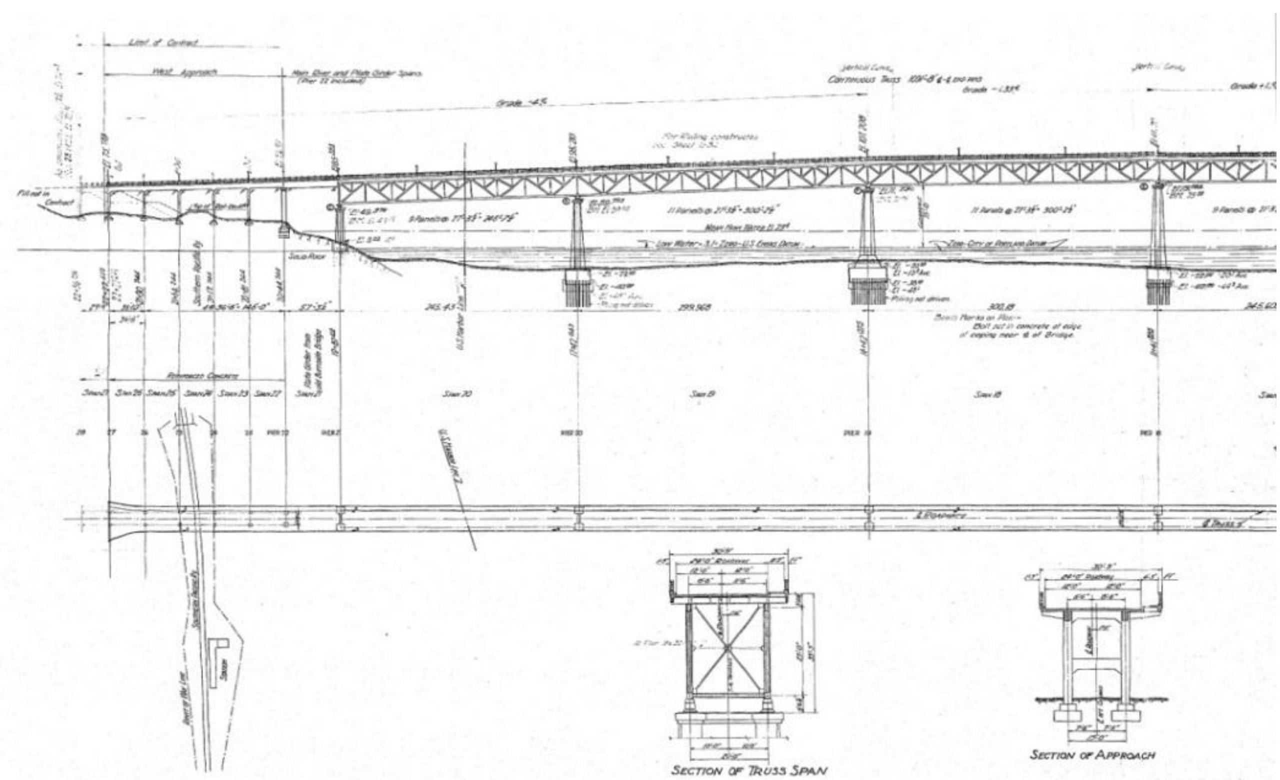

Fig. 1: South Elevation - West side (Lindenthal 1924).

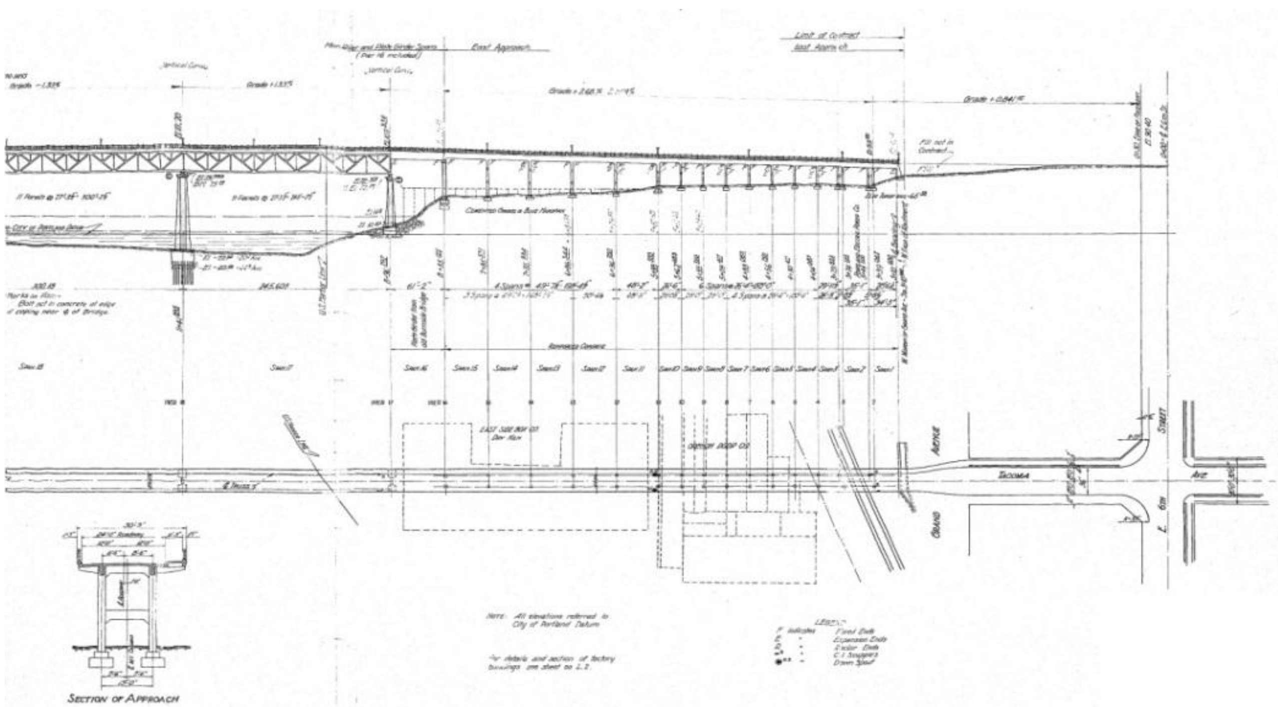

Fig. 2: South Elevation - East side (Lindenthal 1924).

CHARACTER-DEFINING ELEMENTS

The following sheets describe and illustrate the character-defining bridge elements that were discussed in the HAER report. The elements include the truss structure, the roadway, and the approaches to the bridge. The new catwalk allowed the team to familiarize themselves with the truss structure and piers and to see if any changes had been made since 1999. These notes document the bridge as it was in 2011.

1: REINFORCED CONCRETE PIERS

The five piers that support the four spans of the continuous truss structure use reinforced concrete construction to reduce the overall amount of material in the piers. The Sellwood Bridge piers are made of two tapered rectangular columns joined by a shear wall. All the piers remained stable except Pier 21 (Fig. 4) on the west end of the truss. Pier 21 was redesigned and reconstructed in 1960/61. The trace outline of the original pier can be seen (Fig. 4) within the massive new construction of Pier 21.

Fig. 3. Looking west, Piers 18-21. Rittergrup Photo

Fig. 4. Reconfigured Pier 21 Rittergrup Photo

2: 4-SPAN CONTINUOUS WARREN DECK TRUSSES

The bridge (Fig. 5) over the Willamette River consists of a continuous 4-span Warren deck truss structure 1091'-8" long. Each of the four spans has two exterior steel trusses 20 feet apart and 25 feet deep. The roadway consists of transverse floor beams 24" deep at approximately 13 feet on center and 15" deep longitudinal stringers 5 feet on center (Fig. 6). The truss structure rises and falls from the east to the west and rests on 5 pairs of bearings. The structure is entirely assembled with rivets as shown by the gusset plate connection (Fig. 7). A catwalk (Fig. 8) was rehabilitated in 1999/2000 to facilitate maintenance and inspection.

Fig. 5. North Elevation, Warren Truss. Rittergrup Photo

Fig. 6. Internal view of Bridge Structure Rittergrup Photo

Fig. 7. Bottom Chord Gusset. Rittergrup Photo

Fig. 8. Maintenance Catwalk Rittergrup Photo

3: BEARINGS

Each of the five main piers that support the Warren truss structure has a pair of steel bearing shoes that tie the trusses to the piers and allow for longitudinal expansion. Pier 19 (Fig. 9), the central pier, has fixed bearings, allowing expansion to the east and to the west of the center of the 4-span structure. This means the two truss spans to the west have bearings on Piers 20 and 21 that expand in the westerly direction, and the two truss spans to the east have bearings on Piers 18 (Fig. 10) and 17 that expand in the easterly direction. Pier 17 and Pier 21, the two end piers (Figs. 11, 12), transition to the steel girders which in turn transition to the cast-in-place piers and girders on the approaches.

Fig. 9. Bearing, Pier 19. Rittergrup Photo

Fig. 10. Bearing, Pier 18 Rittergrup Photo

Fig. 11. Bearing, Pier 17. Rittergrup Photo

Fig. 12. Bearing, Pier 21 Rittergrup Photo

4: BURNSIDE GIRDERS

Two pairs of girders from the 1894 Burnside Bridge in Portland were recycled for use on the 1925 Sellwood Bridge. They provide the transition spans on both the east and west sides between the cast-in-place concrete girder system and the four-span steel Warren truss structure. The west side connection between Pier 21 and Pier 22 (Figs. 13, 14) experienced more movement due to the unanticipated ground movements and underwent major reconstruction in 1961. The connection on the east side between Pier 16 and Pier 17 (Figs. 15, 16) is much higher than the lower west side connection; Pier 17 also was repaired in 1961. The rest of the spans on both approaches are cast-in-place reinforced concrete. Both of the spans with the Burnside girders are fixed at the approach end.

Fig. 13. Pier 21, Burnside Girder Rittergrup Photo

Fig. 14. Pier 22, Burnside Girder Rittergrup Photo

Fig. 15. Burnside Girder Rittergrup Photo

Fig. 16. Pier 17, Burnside Girder Rittergrup Photo

5: EAST APPROACH

The eastern approach to the bridge on Tacoma Avenue is approximately seventeen feet higher than the western entrance (Lindenthal, Sellwood Bridge, Sheet L. I, 1924). The bridge slopes up from the east entry approximately 20 feet to the high point of the roadway (111.7' elevation). The northeast corner entry has been reworked and a new stairwell connects the bridge walkway with commercial and residential areas located adjacent to the river and literally below the bridge. This corner has a new or reconditioned ninety degree return designed to resemble the original, as well as a new steel railing which connects the stair and the return. A dedication plaque (Fig. 17), a replica of the western plaque, has been inserted in the return.

The southeast corner return (Fig. 18) is as shown in the original Lindenthal drawings (Sheet L. 32) and transitions from an angled cast concrete portion to a grouted rock wall. The different patinas of the northeast and southeast entries clearly show which portions are original and which have been altered or renovated.

Some of the piers (Figs. 19, 20) on the eastern approach to the span are actually within commercial spaces. This arrangement will change when the new bridge is built and areas below and to the immediate sides of the structure will be cleared. It appears the structures built around Pier 6 and Pier 7 are already unoccupied.

Fig. 17. Northeast Corner. Rittergrup Photo

Fig. 18. Southeast Corner Rittergrup Photo

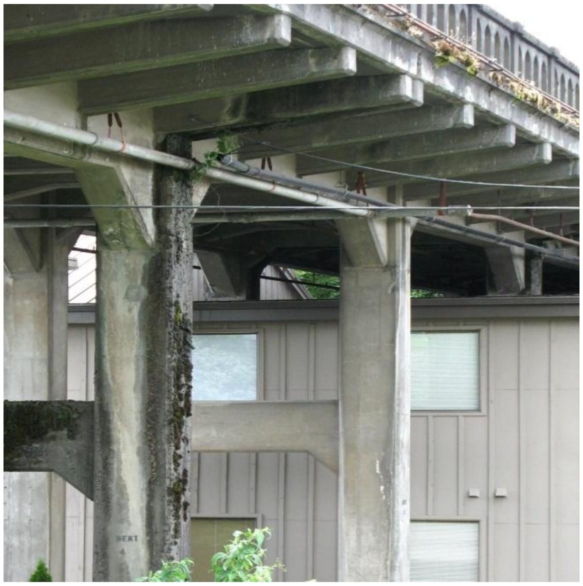
Fig. 19. Pier 6 Rittergrup Photo


Fig. 20. Pier 7 Rittergrup Photo

Some of the housing units (Fig. 21) along the river that encroach on the setback limits for the new widened bridge will be removed. Part of the work done on the east bank of the river included gabion retaining walls (Fig. 22) which have been incorporated into the landscape of the residential developments built since then on the north and south sides of the bridge.


Fig. 21. Townhouse Rittergrup Photo

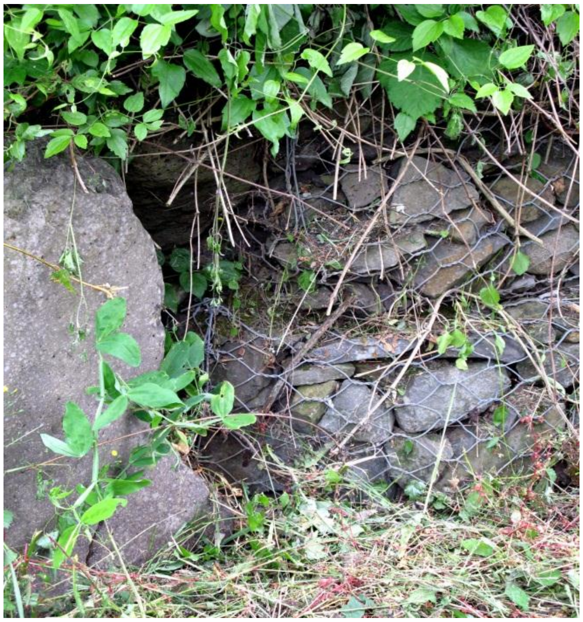
Fig. 22. Gabion Rittergrup Photo

6: THE ROADWAY

The concrete roadway with surfacing is supported by the steel trusses over the central four spans and the cast-in-place concrete structures on both approaches. According to the Lindenthal drawings (L. 17) the roadway is cantilevered approximately 5 feet beyond the centerline of the south truss and the sidewalk is cantilevered approximately 6 feet beyond the centerline of the north truss. The concrete parapet guardrail replaced an earlier design which was a combination of horizontal steel pipes and concrete posts (L. 19). The parapet has had segments repaired (Fig. 23) and replaced over time and maintains the original integrity of the design, which allowed easy replacement of damaged or destroyed portions.

The original bridge design had lights placed on top of the guardrail posts on the north side of the roadway; aluminum goose neck street lights with no relationship to the original design esthetic have been placed within the already-narrow sidewalk (Fig. 26) on the north side of the roadway. Conduit for the lights runs outside the north face of the guardrail. Signage has been applied to the lights and to the parapet in various ways. A sign structure that spans over the roadway at approximately the high point of the bridge has attachments (Fig. 24) that bolt through the parapet posts.

Fig. 23.Repaired Baluster Rittergrup Photo

Fig. 24. Connector Plate Rittergrup Photo

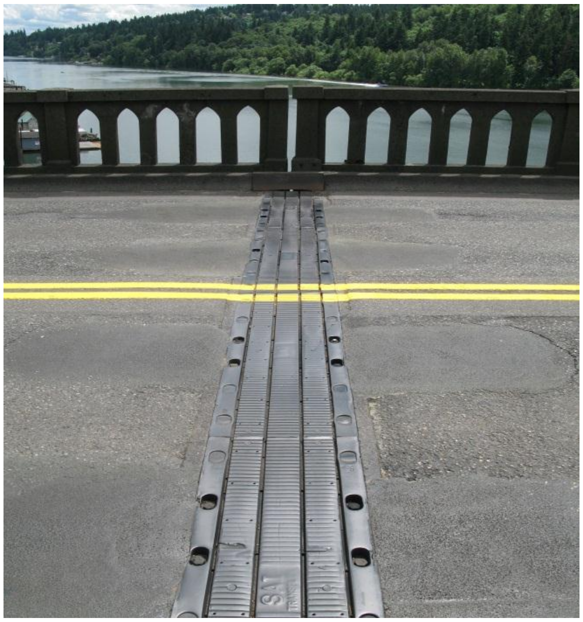

Fig. 25.Eastern Expansion Joint Rittergrup Photo

Fig. 26. Signage and Lighting Rittergrup Photo

The two expansion joints, at Pier 21 and Pier 17, clearly show how the bridge is divided and moves. The four-span Warren truss is fixed at Pier 19, and the roadways are fixed on the approach sides of the Burnside girders at Pier 22 and Pier 16. The guardrails are designed to follow the expansion joint, and metal plates attached on one side protect openings in the curb or walkway guardrail.

7: THE WEST APPROACH

While the east approach clearly sweeps over the Willamette, the west approach seems to access the bridge in spite of itself. All the clarity and openness of the east is lost on the tight west side, which is pushed against a steep hillside and which has to accommodate a transition (Fig. 28) from north-south to east-west travel, a railroad right-of-way and pedestrian access. This section of the bridge has also been reworked the most due to increased traffic volumes, roadway standards and the exceedingly poor ground conditions. The reworking of the entire area was completed in 1961.

The original plaque (Fig. 27) is in the same position as designed. A series of pathways (Fig. 29) allows pedestrians and cyclists to cross over the bridge and go under the highway. The northbound lane of Highway 43 becomes a viaduct (Fig. 30) for the short section around the bridge entry. The reworking of the west bridge approach included the addition of braces (Fig. 31) in 1960 - 61 at Span 27. In the early 21st century additional exterior steel reinforcement and epoxy grout injections of the reinforced concrete structure (Fig. 32) were carried out in 2003 and 2008 respectively.

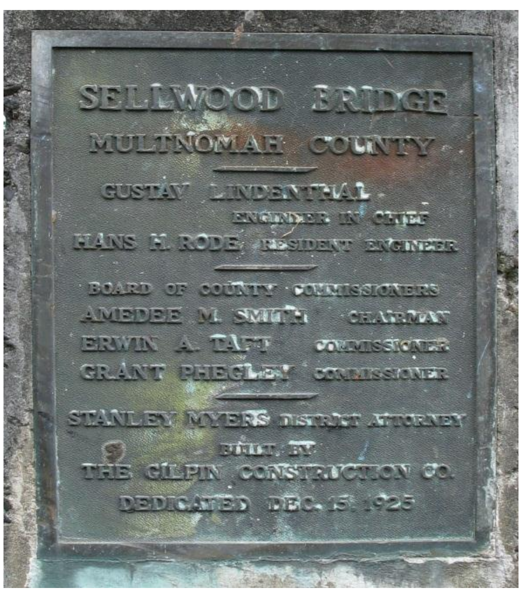

Fig. 27.Original Plaque Rittergrup Photo

Fig. 28. Intersection Rittergrup Photo

Fig. 29. Pathways Rittergrup Photo

Fig. 30. Hwy 43 Northbound Lane Rittergrup Photo

Fig. 31.Bracing at Span 27 Rittergrup Photo

Fig. 32. Span 27 Reinforcement Rittergrup Photo

MULTNOMAH COUNTY OREGON

PLANS

FOR

SELLWOOD BRIDGE

OVER THE WILLAMETTE RIVER

AT

PORTLAND, ORE.

GUSTAV LINDENTHAL

CONSULTING ENGINEER
NEW YORK; PORTLAND, ORE.

1924

INDEX

CONSTRUCTION CHANGES IN RED.

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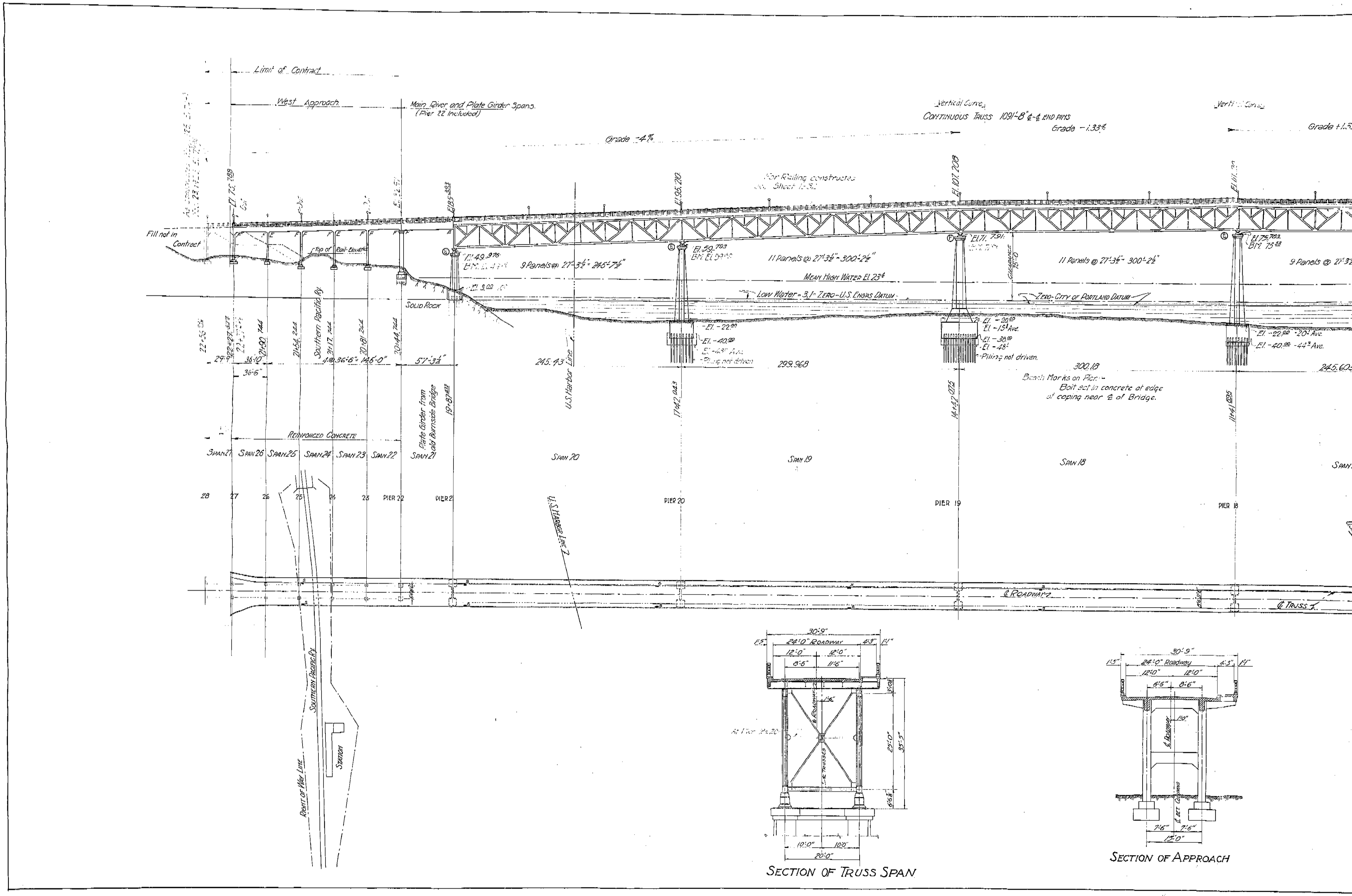
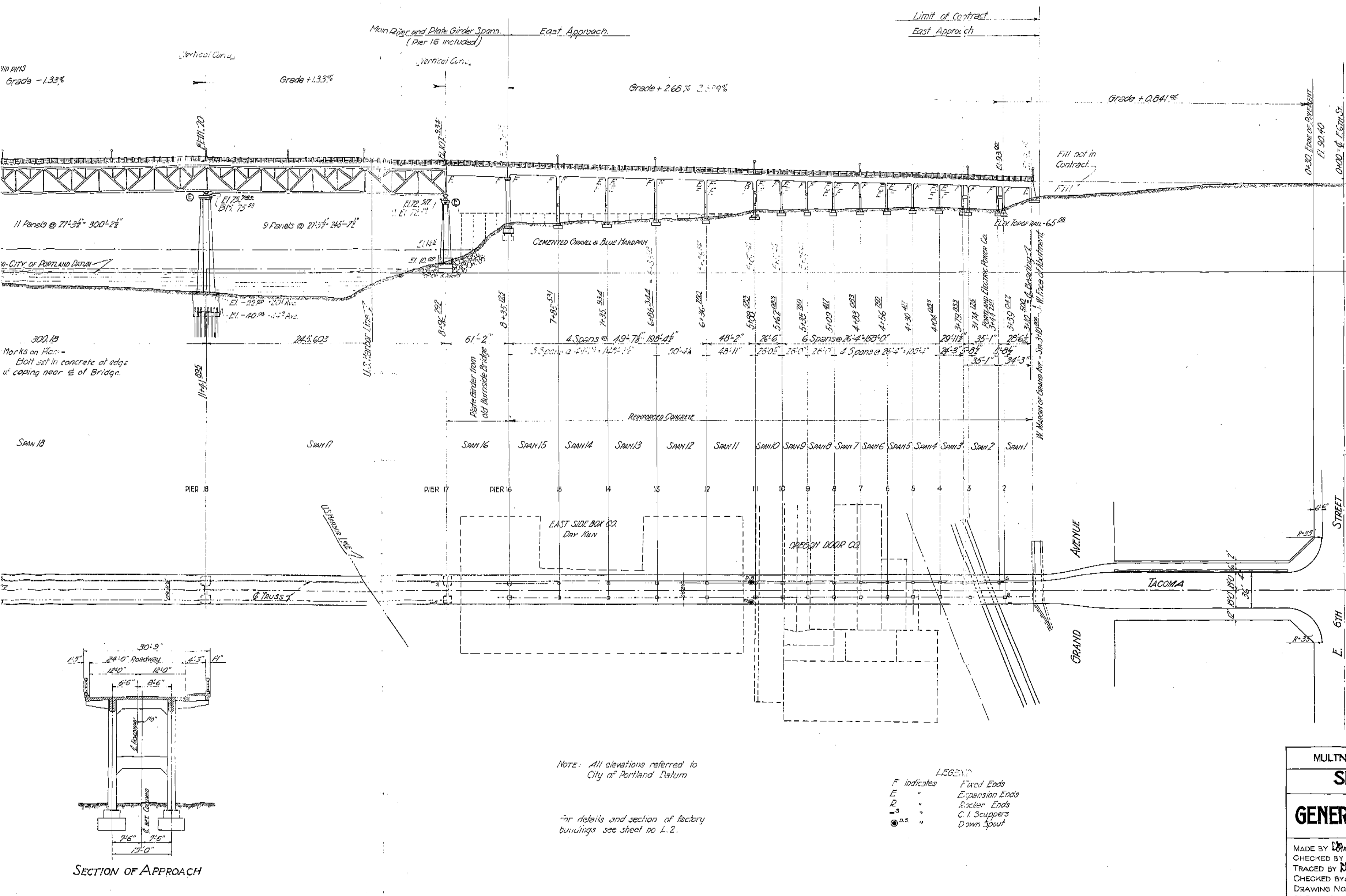
L.[illegible] - L.33 - L.34



Limit of Contract
West Approach
Main River and Plate Girder Spans. (Pier 22 Included)
Vertical Curve
Continuous Truss 1091'-8" ℄-℄ End Pins
Grade -1.33%
Grade -4%
Grade +1.5
For Railing construction see Sheet 12-32
Fill not in Contract
Top of Rail Elev.
Solid Rock
9 Panels @ 27'-3½" = 245'-7½"
11 Panels @ 27'-3½" = 300'-2½"
9 Panels @ 27'-3½"
Mean High Water El. 23±
Low Water = 3.1' Zero - U.S. Engrs Datum
Zero - City of Portland Datum
Piling not driven
Southern Pacific Ry.
4 @ 36'-6" = 146'-0"
36'-6"
57'-3½"
245.43
299.968
300.18
245.605
Bench Marks on Piers - Bolt set in concrete at edge of coping near ℄ of Bridge.
U.S. Harbor Line
Plate Girder from old Burnside Bridge
Reinforced Concrete
Span 27
Span 26
Span 25
Span 24
Span 23
Span 22
Span 21
Span 20
Span 19
Span 18
Pier 22
Pier 21
Pier 20
Pier 19
Pier 18
U.S. Harbor Line
℄ Roadway
℄ Truss
Right of Way Line
Southern Pacific Ry.
Station
30'-9"
24'-0" Roadway
12'-0"
25'-0"
10'-0"
20'-0"
Section of Truss Span
24'-0" Roadway
15'-0"
Section of Approach



MULTNOMAH COUNTY, — OREGON

SELLWOOD BRIDGE

PORTLAND, OREGON

GENERAL ELEVATION & PLAN

Made by
Checked by
Traced by
Checked by
Drawing No. GE 100 S
20 Sheets

GUSTAV LINDENTHAL
CONSULTING ENGINEER
PORTLAND, OREGON
Date Aug. 28th, 1924

Scale 1"=40'
Sheet L 1

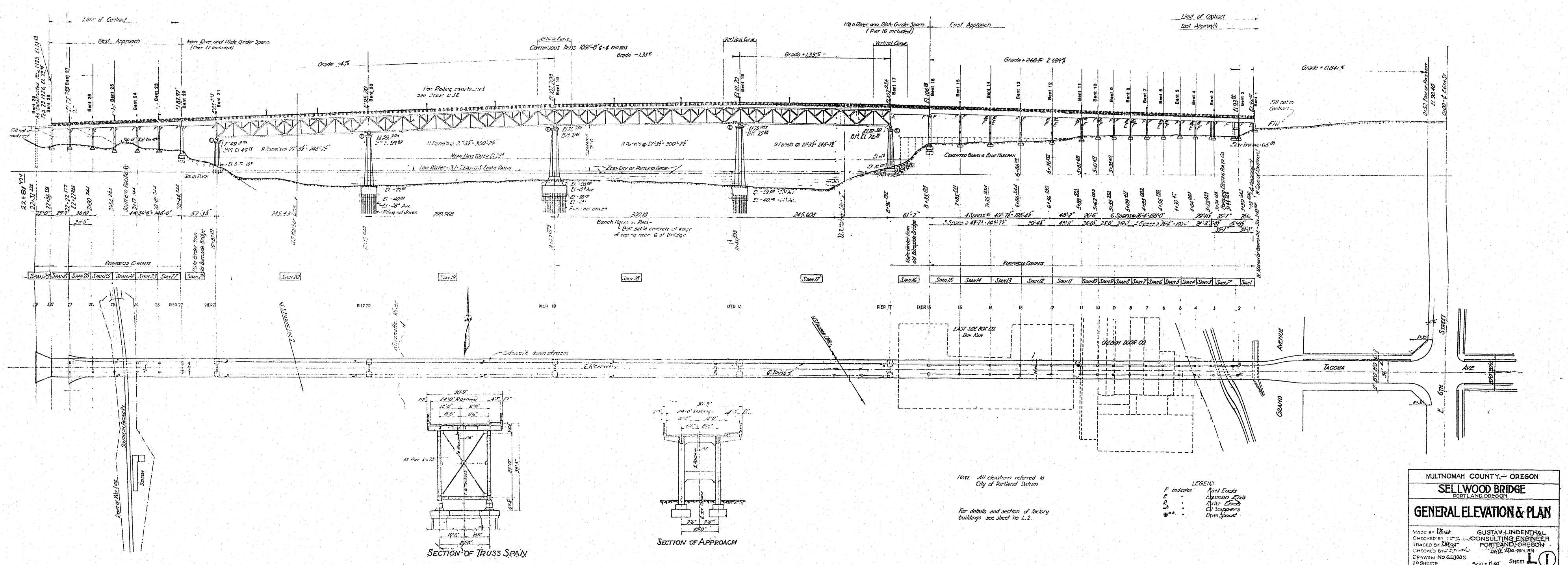


FIGURE 1

A1
2A