FEASIBILITY STUDY (Revision 1)
for
Willamette River (Springfield)
Bicycle-Pedestrian Pathway
City of Springfield, Oregon

January 4, 2010

REGISTERED PROFESSIONAL ENGINEER
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OREGON
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BRIAN S. NICHOLAS
EXPIRES: 12/31/

Prepared by:
Brian S. Nicholas, P.E.

Reviewed by:
Gary E. Rayor, P.E., S.E.

Corporate Office:
OBEC Consulting Engineers
920 Country Club Road, Suite 100B
Eugene, Oregon 97401
541.683.6090

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FEASIBILITY STUDY
for
Willamette River (Springfield) Bicycle-Pedestrian Pathway
Connecting Glenwood and Downtown Springfield
City of Springfield, Oregon

Introduction

The City of Springfield has undertaken the Glenwood Refinement Plan Update project to effect the revitalization of the Glenwood area located between Eugene and downtown Springfield. The updated refinement plan is expected to promote mixed-use development in which the connectivity of primary and alternate transportation modes will be key avenues of growth and revitalization leading to a reconnection with the Willamette River and improved quality of life.

As a key element of this connectivity, the City's planning consultant team is developing land use and circulation concepts for Glenwood's North Riverfront Corridor, and has identified the need to provide a multi-use bicycle/pedestrian pathway over the Willamette River between Glenwood and downtown Springfield. The planning consultant team has suggested that the walkway could take one of three forms:

- **Alternative A** – New walkway installed beneath existing Main Street Bridge
- **Alternative B** – Widened sidewalks on the Main Street or South A Street Bridges
- **Alternative C** – New multi-use bicycle/pedestrian bridge crossing the Willamette River to the north of the existing Main Street Bridge

The City of Springfield has requested OBEC Consulting Engineers to evaluate the feasibility of these three river crossing alternatives.

Current Studies, Purpose, and Need

City of Springfield is currently studying land use and long-term planning for downtown Springfield and Glenwood. The purpose of this study is to broadly define future land use in the area, including bicycle/pedestrian circulation. This OBEC study provides the City, planning consultant team and stakeholders necessary feasibility analysis and cost data for leading multi-use bicycle/pedestrian pathway alternatives. The current concept plan for the Glenwood North Riverfront Corridor includes a new, conceptual pedestrian bridge running westward in alignment with North A Street, bisecting Island Park, as depicted in Figure 1. This alignment is used in the initial evaluation of Alternative C.

Design Criteria

The multi-use bicycle/pedestrian pathway design should follow the current American Association of State Highway and Transportation Officials (AASHTO) *Guide for the Development of Bicycle Facilities,* AASHTO *Guide for the Planning, Design, and Operation of Pedestrian Facilities*, and Oregon Department of Transportation (ODOT) *Oregon Bicycle and Pedestrian Plan,* except as noted. It is further recommended that all proposed improvements meet current *Americans with Disabilities Act* (ADA) requirements. If federal funding is used for the improvement of multi-use bicycle/pedestrian structures, the submission of a Design Exception Request to ODOT may be required for multi-use path widths not meeting preferred minimums.

The design of new pedestrian/bicycle structures should comply with the current AASHTO LRFD *Bridge Design Specifications, Guide Specifications for Design of Pedestrian Bridges,* and ODOT *Bridge Office Practice Manual.*

For the assessment of existing structures, the load capacity of the bridge or structural element supporting the multi-use bicycle/pedestrian pathway improvements must be evaluated in accordance with the current AASHTO *Manual for Condition Evaluation of Bridges* and the ODOT *Load Rating Manual.* Actual load rating of the existing bridges for proposed pathway improvements is beyond the scope of this study. OBEC has used its professional judgment as to the feasibility of the proposed improvement, with final verification to be confirmed in a later, more detailed phase of study.

Existing Site Conditions

The area of study is shown in Figure 1, and ranges upstream from the south edge of the existing Willamette River (South A Street) Bridge downstream to the northern edge of Island Park. The study area encompasses the Willamette River (Main Street) Bridge north of and parallel to the South A Street Bridge.

Descriptions of Existing Bridges

Willamette River (South A Street) Bridge

The South A Street Bridge is owned by ODOT and consists of three main steel deck girder spans of 175', 200', and 175' with three 55-foot-long cast-in-place concrete approach spans on the west (Glenwood) end of the bridge and one 47-foot-long cast-in-place concrete approach span on the east (downtown Springfield) end of the bridge. The overall bridge length is 765 feet (see Figure 2 for the Plan and Elevation of this bridge). The bridge typical section consists of a 30-foot roadway carrying two 12-foot eastbound lanes with 3-foot shoulders and one 5-foot-wide sidewalk located on the upstream side of the bridge. On the downstream side of the bridge there a 1.5-foot-wide curb and no sidewalk. The bridge was constructed in 1957; therefore, it is eligible for recognition by the Oregon State History Preservation Office (SHPO) and listing on the National Register of Historic Places (NRHP).

The lowest point, or soffit, of the bridge in the main deck girder spans is approximately Elevation (El.) 447.6 and the approximate Federal Emergency Management Agency (FEMA) Flood Insurance Study (FIS) 100-year flood surface elevation beneath the bridge is approximately El. 439.4, leaving approximately 5.2 feet of flood free board to the bridge soffit.

The bridge was load rated for ODOT in 2003, and the rating factor for HS 20 truck loading for controlling members is 1.43 for girder X-braces supporting roadway stringers and 2.08 for main span longitudinal girders. Evaluation of the load rating as it relates to the ability of this structure to support Alternatives A and B is discussed later in this report.

Willamette River (Main Street) Bridge

The Main Street Bridge is owned by ODOT and consists of a three-span continuous steel through truss with a 177', 198', and 177' span configuration with three 50-foot-long cast-in-place concrete approach spans on the west (Glenwood) end of the bridge and four 50-foot-long and one 40-foot-long cast-in-place concrete approach spans on the east (downtown Springfield) end of the bridge. The overall bridge length is 940 feet (see Figure 3 for the Plan and Elevation of this bridge). The bridge typical section of the truss spans consists of a 27-foot-wide roadway carrying two 12-foot westbound lanes with 1.5-foot shoulders and 5'-0 nominal width sidewalks located on both sides of the bridge outside of the trusses. The bridge was constructed in 1929; therefore, it is eligible for recognition by the Oregon SHPO and listing on the NRHP.

The lowest point of the bridge in the main truss span located near Pier 1 is approximately El. 453.7, and the FEMA FIS 100-year flood surface elevation beneath the bridge is approximately El. 439.2, leaving approximately 11.5 feet of flood free board to the bridge soffit.

The bridge was load rated for ODOT in 1996, and the rating factor for HS 20 truck loading for controlling members is 1.03 for the main span truss floor beams, 1.03 for the main span truss stringers, and 1.47 for the truss. Evaluation of the load rating as it relates to the ability of this structure to support Alternatives A and B is discussed later in this report.

Bridge Hydraulics

River hydraulic conditions at the site are reasonably well defined from the FEMA FIS. The proposed bicycle/pedestrian crossing on the South A Street and Main Street Bridges are located at approximately River Mile 185.29 and 185.25, respectively; and the alignment for a new pedestrian bridge in alignment with the westward extension of North A Street is located at approximately River Mile 185.11. River gage 14158000 was located near the proposed bridge site in the City of Springfield, providing a 50-year history of hydraulic data. From this gage, other adjacent gages, and FEMA data the approximate flood water elevation for various return intervals were calculated as follows:

Table 1: Gage Data

Interval	River Flow (cfs)	Water Surface Elev. at South A St. Br.	Water Surface Elev. at Main St. Br.	Water Surface Elev. at Proposed New Ped. Br. Crossing
2-year	-	433.3	432.9	432.0
10-year	47,000	435.4	435.1	433.9
50-year	69,000	437.9	437.7	436.2
100-year	88,500	439.4	439.2	437.8
500-year	174,900	443.4	443.3	441.8

Applicable FEMA and gage data are included in Appendix A.

Based on the existing Main Street Bridge plans and the FEMA flood data, the free board between the bridge main span soffit elevation of 453.7 and the 100-year flood elevation of 439.2 is approximately 14.5 feet, and the free board between the bridge main span soffit elevation and the 500-year flood elevation of 443.3 is 10.4 feet. Using the reference design criteria, 8 feet is the minimum design headroom clearance for a suspended walkway and 10 feet is the desirable design headroom clearance. The structure depth of the walkway itself would be on the order of 1 to 2 feet. Therefore, if a minimum structure depth of 1 foot is assumed in addition to 10 feet of headroom to avoid the requirement for a Design Exception Request, the suspended alternative is not feasible hydraulically because it provides neither positive clearance to the 500-year flood nor the required drift clearance to the 100-year flood.

Environmental Issues

Environmental issues for the project include work in and over Willamette River. The Willamette River provides habitat for steelhead trout, and Chinook and coho salmon. Chinook salmon and steelhead trout are listed as threatened under the federal Endangered Species Act (ESA). Anadromous fish species listed under the ESA are regulated by the National Marine Fisheries Service (NMFS), while listed resident freshwater fish species are regulated by the U.S. Fish and Wildlife Service (USFWS).

A Biological Assessment (BA) for threatened or endangered species will likely be required for the final design phase of Alternatives A and C, in accordance with Section 7 of the ESA. The BA would be prepared to assess potential impacts to fish species under the ESA. The goal of the BA, which will include consultation with environmental regulators, is to obtain a determination of "not likely to adversely affect" and "no taking" of ESA species by the project.

Available environmental data, including riparian setback and known wetlands, is contained in Appendix B. The placement of a new bridge bent on a semi-permanent island in the Willamette River has been discussed in association with Alternative C (westward extension of the North A Street alignment). From the National Wetlands Inventory (NWI) map, the island labeled PFOA is Palustrine Forested, Temporarily Flooded Wetlands. The blue area on the NWI map represents the Willamette River, which is defined as Riverine, Lower Perennial, Unconsolidated Bottom, Permanently Flooded Waters. Because the island is entirely in the river it is considered wetland. Therefore, both temporary and permanent impacts to the island are subject to full environmental permitting requirements.

The construction of Alternatives A or C may be expected to generate permanent impacts to the Willamette River, including the construction of new bridge bents and abutment fills below ordinary high water or within riparian zones, widening of existing bents below ordinary high water, and the construction and removal of temporary work platforms within the regulated work area of the river proper. The minimum anticipated permit acquisition requirements for Alternatives A and C are shown in Table 2. It should be noted that Alternative B can be constructed without any anticipated permitting challenges, which is a significant advantage of Alternative B.

Table 2: Description of Local, State and Federal Permits

Permits Likely Required	Required By
1. Section 404 Joint Permit Application 2. Fish Passage 3. Bridge Permit 4. DEQ Stormwater Management Plan 5. HAZMAT Compliance 6. NPDES 1200-C 7. Bridge Easement over Waters of the State	U.S. Army Corps of Engineers (ACOE)/ Oregon Dept. of State Lands (ODSL) Oregon Dept. of Fish & Wildlife (ODFW) U.S. Coast Guard (USCG) Oregon Dept. of Environmental Quality ODEQ ODEQ ODEQ ODSL
8. Land Use – Floodplain Permit 9. Principal River Conservation Area Review or equivalent 10. Building Permit (Requirement TBD)	City of Springfield/Lane County (TBD) City of Springfield City of Springfield
11. Development Application 12. Erosion Control Permit 13. Building Permit (Abutments) 14. Grading Permit (Removal/Fill)	City of Springfield City of Springfield City of Springfield City of Springfield

Evaluation of Alternatives

Alternative A – New Walkway Installed Beneath Existing Main Street Bridge

This alternative consists of installing a walkway under the existing Main Street Bridge, as depicted in the rendering to the right. There are two potential options for supporting the walkway: (1) suspend the walkway from the overhead structure, or (2) use a structural system capable of spanning from bridge bent to bridge bent without support from the structure above. In Option 2, the pedestrian bridge would use the existing bridge bents for support. Both options would require the partial removal of an existing full-height concrete web wall at up to four bents, as illustrated in the rendering, to allow the pedestrian structure to pass through the bent.

Crandal Arambula PC, taken from November 18, 2009, Citizen and Technical Advisory Committee Mtg. presentation.

The following is a list of parameters that have been evaluated in assessing the feasibility of Alternative A:

1. <u>Multi-Use Pedestrian Path Vertical Clearance</u> – ODOT Bicycle and Pedestrian Program standards list a preferred total vertical clearance of 10 feet for multi-use paths, which may be reduced to 8 feet in certain circumstances. The vertical clearance is

the total vertical height between the path surface and any overhead obstruction, such as the structural elements of the existing overhead bridge. Vertical clearances less than 8 feet may pose a significant hazard to cyclists. Using these standards and a reasonable estimate of the structure depth below the surface of the path, the low chord of the pedestrian structure should be expected to extend a minimum of about 11 to 13 feet below the underside of the existing bridge truss.

2. Hydraulic Clearance – ODOT standards require new bridges to provide a minimum of 3 feet of free board between the bridge low chord and the design flood elevation. The standard design flood for this site is the 100-year flood—the maximum flood elevation that is expected to occur, on average, once every 100 years. Additionally, it is advisable to ensure that the low chord is no lower than the 500-year flood elevation, the maximum credible flood. These vertical clearances are essential to prevent the accumulation of floating debris during a flood event, which can overload the structure and lead to damage or catastrophic collapse. Because of the Multi-Use Pedestrian Path Vertical Clearance standard discussed in Item 1, above, there is insufficient vertical height available to provide 3 feet of free board over the 100-year flood nor clear the 500-year flood.

3. Navigation Clearance – This alternative would provide less navigation clearance than the adjacent South A Street Bridge, which should be assumed to be the required minimum navigation clearance at this site, subject to verification by U.S. Coast Guard (USGC) Permit.

4. Seismic Resistance – The removal of the upper web wall at the existing bents would likely weaken the bridge's resistance to seismic loading. Review of the as-constructed drawings for this bridge suggests the remaining columns were not designed to act as stand-alone elements without the bracing provided by the web wall, and are inadequately reinforced to satisfactorily resist modern design loading. Alteration of the bents is expected to trigger the need for costly retrofitting of the entire bent.

The following, additional parameter applicable to Option 1 was identified and further assessed:

5. Suspension Loads – Review of the most recent load rating analysis for the Main Street Bridge indicates that extensive strengthening of the existing bridge floor beams and, most likely, the truss itself will be required to support all but the most trivial pedestrian structure loads.

The following parameter is applicable to Option 2:

6. Aesthetics – It should be noted that the shallow beam type of pedestrian bridge depicted in the preceding rendering is not capable of economically achieving the span lengths required of Option 2, which range from 175 feet to 198 feet, without encroaching several more feet below the design flood elevation. Steel trusses and shallow suspension bridge structures have been used to economically span these distances in the past. The use of a steel truss or suspension bridge will produce a user experience very different from the open feeling depicted the rendering.

Due to parameters 1 through 5, above, Alternative A does not appear to be a feasible design concept. There does not appear to be sufficient height available to construct a multi-use pathway with minimum recommended vertical clearance that can adequately span the 100-year and 500-year floods. Alternative A would necessitate costly strengthening and retrofit of the existing bridge. Furthermore, hydraulic loading resulting from encroachment of the pedestrian bridge below the design flood elevation poses a significant risk to the pedestrian spans, as well as the existing structure. It is anticipated that ODOT would be highly resistant to this design alternative and, therefore, Alternative A should be eliminated from further consideration.

Alternative B – Widened Sidewalks on the Main Street or South A Street Bridge

Crandal Arambula PC, taken from November 18, 2009, Citizen and Technical Advisory Committee Mtg. presentation.

Alternative B consists of widening the existing bridge sidewalks on either the Main Street or South A Street Bridges to provide the required bicycle-pedestrian connection. The photo to the right depicts the existing Main Street Bridge, which has 5-foot-wide sidewalks on both sides of the bridge. The existing South A Street bridge has a 5-foot-wide sidewalk on the down-stream side of the bridge, only. ODOT Bicycle and Pedestrian Program standards require multi-use pathway widths of 12 feet (minimum) to 16 feet (preferred) for two-way traffic, and 8 feet (minimum) to 10 feet (preferred) for one-way traffic. In addition, high demand multi-use paths adjacent to roadways require the installation of a traffic separation barrier between the roadway and the multi-use path to provide user safety and comfort. The following techniques are generally used to widen existing bridge structures, and are discussed here:

<u>Option 1 – Widen the existing sidewalk slab and supporting members; install a new bridge rail and separation barrier</u>

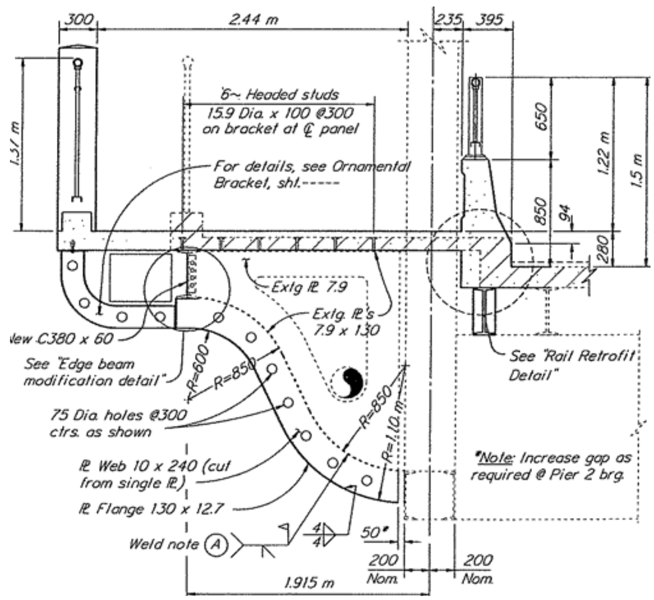
This technique is suitable for minor structural widening of roughly 1 to 4 feet. The width that can be added using this technique is limited by the load carrying capacity of the existing structure because adding width to the structure can increase both dead and live loading. Therefore, a thorough analysis of existing structural capacity is required to determine the maximum allowable widening. Lightweight materials, such as thin, high-strength concrete sidewalk slabs, lightweight decking and lightweight bridge rails can be used to control additional dead load.

This option has several advantages. It is among the least expensive multi-use path alternatives considered in this study and can be constructed with no in-water impacts or environmental, land use, or USCG permits. It can be constructed from the bridge deck under a single-lane closure and requires no modification to the bridge bents or foundations. The notable disadvantages with this option are that the bridge location is immobile and the multi-use path structure life is limited to the remaining life of the original bridge. Based on OBEC's experience on past projects and a detailed review of the as-constructed plans, it appears to be feasible to widen the existing Main Street and South A Street Bridge overhangs by 3 to 4 feet, increasing the sidewalk width to approximately 8 to 9 feet.

Option 2 – Add longitudinal concrete girder lines and truss lines

This technique adds longitudinal bridge elements to support the weight of the wider overhang and associated live loads. Using this technique the maximum structure widening is not limited to existing bridge capacity, enabling the construction of full two-way, 16-foot multi-use path widths. However, this technique requires the widening of foundations and substructure elements, resulting in in-water work and the need for environmental permits. As a result, this technique tends to be more costly than Option 1 and can result in a truss structure that is not typically represented in the ODOT existing bridge inventory.

For the purposes of this project, Option 1 appears to be a feasible alternative with several practical advantages. It is a cost-effective solution that makes improved use of an underutilized resource. It can be implemented quickly and has already been used by ODOT in numerous locations throughout the state. The use of Option 1 is expected to limit the maximum multi-use path width to approximately 9 feet, which will require the implementation of one-way multi-use paths on both sides of the bridge. It should be noted, however, that overhang widening should be symmetric on the Main Street Bridge because it will reduce unbalanced load effects in the truss.

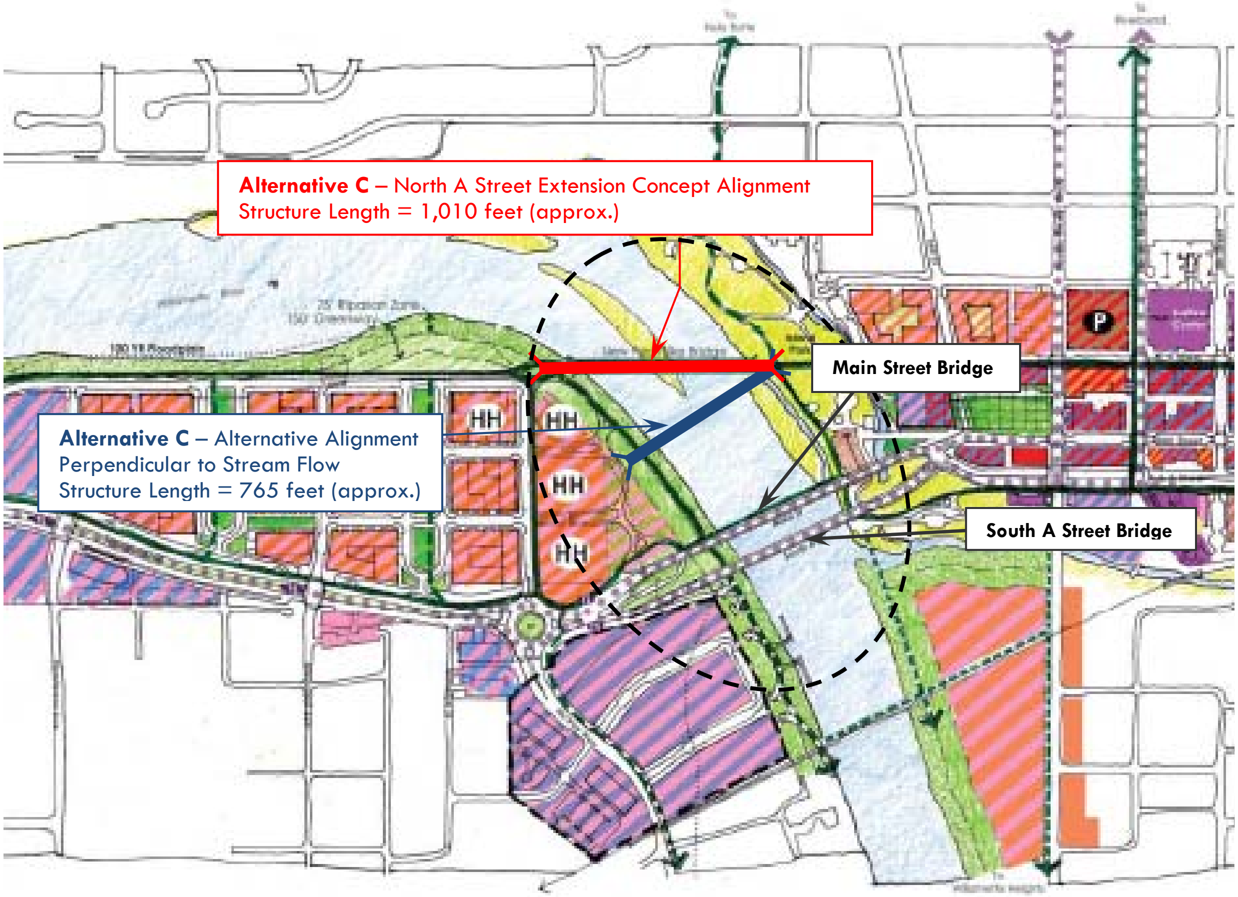


OBEC Consulting Engineers, sidewalk overhang widening detail implemented at Ferry Street Bridge, Eugene, Oregon

The figure above depicts the overhang widening design implemented on the Ferry Street Bridge in Eugene, Oregon. The Ferry Street Bridge sidewalk was widened from approximately 5 feet to 8 feet, replacing the existing 6-inch-thick sidewalk with a 4-inch-thick high-strength concrete sidewalk, architecturally enhanced bridge rail, and separation barrier. The work required lengthening existing steel cantilever beams supporting the sidewalk. Since similar conditions exist at the Main Street Bridge, a similar design solution could be implemented.

Alternative C – New Multi-Use Pedestrian/Bicycle Bridge Crossing the Willamette to the North of the Existing Main Street Bridge

The figure below depicts the current, draft Glenwood North Riverfront Corridor land use concept. As currently envisioned, the construction of a new multi-use pedestrian/bicycle bridge would be placed on an alignment extending from the existing North A Street alignment, bisecting Island Park, and crossing the Willamette River at an angle. This alignment has the advantage of providing a straight-line connection between downtown Springfield and existing bicycle facilities to the west of Glenwood. A significant reduction in bridge cost may be realized by rotating the proposed bridge alignment perpendicular to the river. Both the North A Street Extension alignment and the Perpendicular alignment are discussed further in this report.



Crandal Arambula PC, taken from November 18, 2009, Citizen and Technical Advisory Committee Mtg. presentation.

Hydraulic Opening and Minimum Bridge Length

Hydraulic performance in this stretch of the river is constrained by the hydraulic opening of the South A Street Bridge, which is roughly equivalent to the overall South A Street Bridge length of 765 feet. To prevent further hydraulic restriction and an increase in backwater elevation during flood events, the proposed pedestrian/bicycle bridge should have an overall bridge length of at least 765 feet, which is the approximate length of the Perpendicular bridge alignment. Since the North A Street alignment crosses the river at an angle, a minimum bridge length of approximately 1,010 feet is required to provide the same hydraulic opening, an increase in overall bridge length of nearly 33 percent compared to the Perpendicular alignment.

Bridge Options

Figure 4 provides a summary of bridge types that are expected to be well matched to the physical and regulatory constraints of the site. The summary includes specific data for representative structures, including the square foot cost at the time of construction and current estimated cost reflecting the current bidding climate. The summary reflects a trend toward long-span structures that minimize short- and long-term impacts to the river and surrounding riparian areas, features that are expected to minimize permitting issues and cost risks during preliminary bridge design and construction.

Prefabricated Truss – This bridge type is suitable for both the North A Street and Perpendicular alignments, and is among the most cost-effective bridge alternatives available. Pedestrian bridge spans of 300 feet or greater are achievable using steel trusses. A wide array of truss styles and shapes are available to meet aesthetic requirements. Prefabricated trusses are constructed off site, then erected in large sections on site, minimizing the overall length of on-site construction. These structures typically have a very shallow depth from the walkway surface to the water below, which generally reduces the need for steep approach grades, a notable benefit for bicycle/pedestrian bridges. At least one in-water bent should be anticipated on the Perpendicular alignment with at least two in-water bents on the North A Street alignment. Temporary in-water work bridges would be required for in-water bent construction and truss erection.

Cable-Stayed – This bridge type is suitable for both the North A Street and Perpendicular alignments. The Perpendicular alignment might use either one large stay tower located in the center of the river or two smaller paired stay towers located near the river banks. Two stay towers should be anticipated for the North A Street alignment because a single stay tower is likely to appear very large and out of place in its surroundings. This bridge type has a very shallow span depth, providing the same grade advantages as the prefabricated truss. Temporary in-water work bridges would be required for in-water construction of the stay towers and erection of the cable-stayed walkway.

Through Arch – A through arch with conventional cast-in-place approach spans or a bridge consisting of multiple through arches are feasible on both the North A Street and Perpendicular alignments. Arches tend to be dramatic structures with very wide appeal. Maximum span lengths of up to 300 feet are typical for pedestrian/bicycle bridges, although longer spans are possible. The shallow span depth of these structures provides the same grade benefits as the prefabricated truss and cable-stayed structures. One to two in-water bents should be anticipated on the Perpendicular alignment, depending on the configuration of the arch spans, while at least three in-water bents should be anticipated on the North A Street alignment. Temporary in-water work bridges would be required for in-water construction of the bents and erection of the arch and suspended walkway.

Suspension – The suspension bridge is a classic bridge type that has been constructed multiple times in the Eugene area and is suitable for both the Perpendicular and North A Street alignments. This bridge type can be constructed entirely outside of ordinary high water, although clearance must be afforded for the construction of large suspension cable anchor blocks on the landward side of the suspension towers. The excavation needed for the construction of anchor blocks can be extensive. Given

the industrial nature of Glenwood's historic land use, a subsurface investigation is warranted prior to selection of this bridge type to confirm that contaminated soils or ground water will not be encountered during construction. The shallow span depth of these structures provides the same grade benefits as the previously discussed bridge types. Suspension bridges can be built without the use of temporary in-water work bridges.

Estimated Project Costs

The estimated construction and project costs included in this report are solely applicable to bridge construction and include items such as staging, work access, and falsework. This cost data does not include acquisition of right-of-way/easements; approach paths and trails to the bridge; and improvements not specifically related to bridge construction.

A summary of construction and overall project costs is shown in Table 3 on the following page. Estimated bridge costs are on a price-per-square-foot basis due to the high-level nature of this preliminary feasibility study. For planning cost purposes, 30 to 40 percent of the estimated construction cost should be added to represent total project overhead costs including design, environmental study and permitting, construction administration, field engineering, and construction cost contingency. Project environmental costs include Biological Assessment and compliance, hazardous materials compliance, and permit preparation. The 30 to 40 percent project overhead costs are in line with the percentage typically used for scoping Federal-aid bridge projects, and reflect the complications of hazardous materials issues.

The estimated square foot bridge construction cost data is based on representative conventional and long-span specialty (cable-supported) bridge projects. A preliminary, planning-level bridge construction cost estimate of $300/sf is recommended for conventional bridges, which includes prefabricated trusses and precast concrete bridges. A preliminary, planning-level bridge construction cost estimate of $500/sf to $550/sf is recommended for specialty bridges. Total estimated construction costs are based on an assumed path width of 14 feet, unless otherwise noted. The planning estimates in Table 3 include typical contingencies to account for uncertainty and changes that may arise during project development, design, and construction. Contingencies are included to avoid underfunding during the initial stages of project development. It may be possible to reassess requirements and adjust the estimate as the project develops.

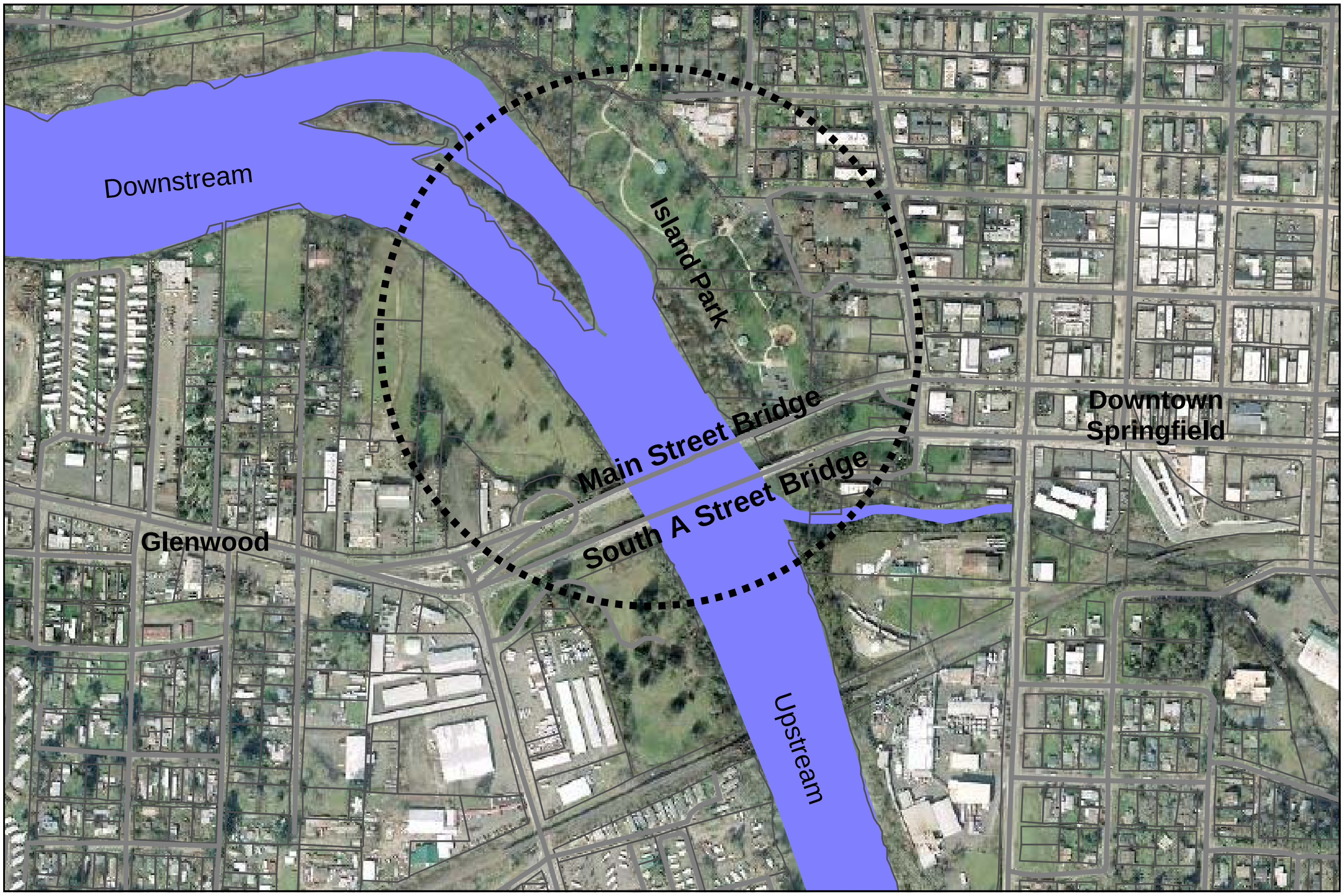
Table 3: Estimated Project Costs

Alternative B – *Widened sidewalks on the Main Street or South A Street Bridges*			
Option	**Estimated Cost/Sq. Ft. ($/sf)**	**Estimated Construction Cost ($)**	**Project Planning Costs (2009 Dollars)**
Two 8' Paths, Main Street Bridge	205	3,080,000	$4,310,000
Two 8' Paths, South A Street Bridge	205	2,510,000	$3,510,000
One 14' Path	350	4,600,000	$6,440,000
Alternative C – *New Multi-Use Pedestrian/Bicycle Bridge Crossing the Willamette to the North of the Existing Main Street Bridge*			
North A Street Alignment	**Estimated Cost/Sq. Ft.($/sf)**	**Estimated Construction Cost ($)**	**Project Planning Costs (2009 Dollars)**
Prefabricated Truss	350	4,950,000	$6,930,000
Cable-Stayed	500	7,070,000	$9,900,000
Through Arch	500	7,070,000	$9,900,000
Suspension	550	7,780,000	$10,900,000
Perpendicular Alignment			**Project Planning Costs (2009 Dollars)**
Prefabricated Truss	350	3,750,000	$5,240,000
Cable-Stayed	500	5,360,000	$7,500,000
Through Arch	500	5,360,000	$7,500,000
Suspension	550	5,890,000	$8,240,000

Notes:

1. Cost of Alternative A not considered due to determination of non-feasibility.
2. Alternative C square footage estimates based on assumed 14-foot-wide walkway width on bridge.

FIGURES


Downstream
Island Park
Main Street Bridge
South A Street Bridge
Glenwood
Downtown Springfield
Upstream

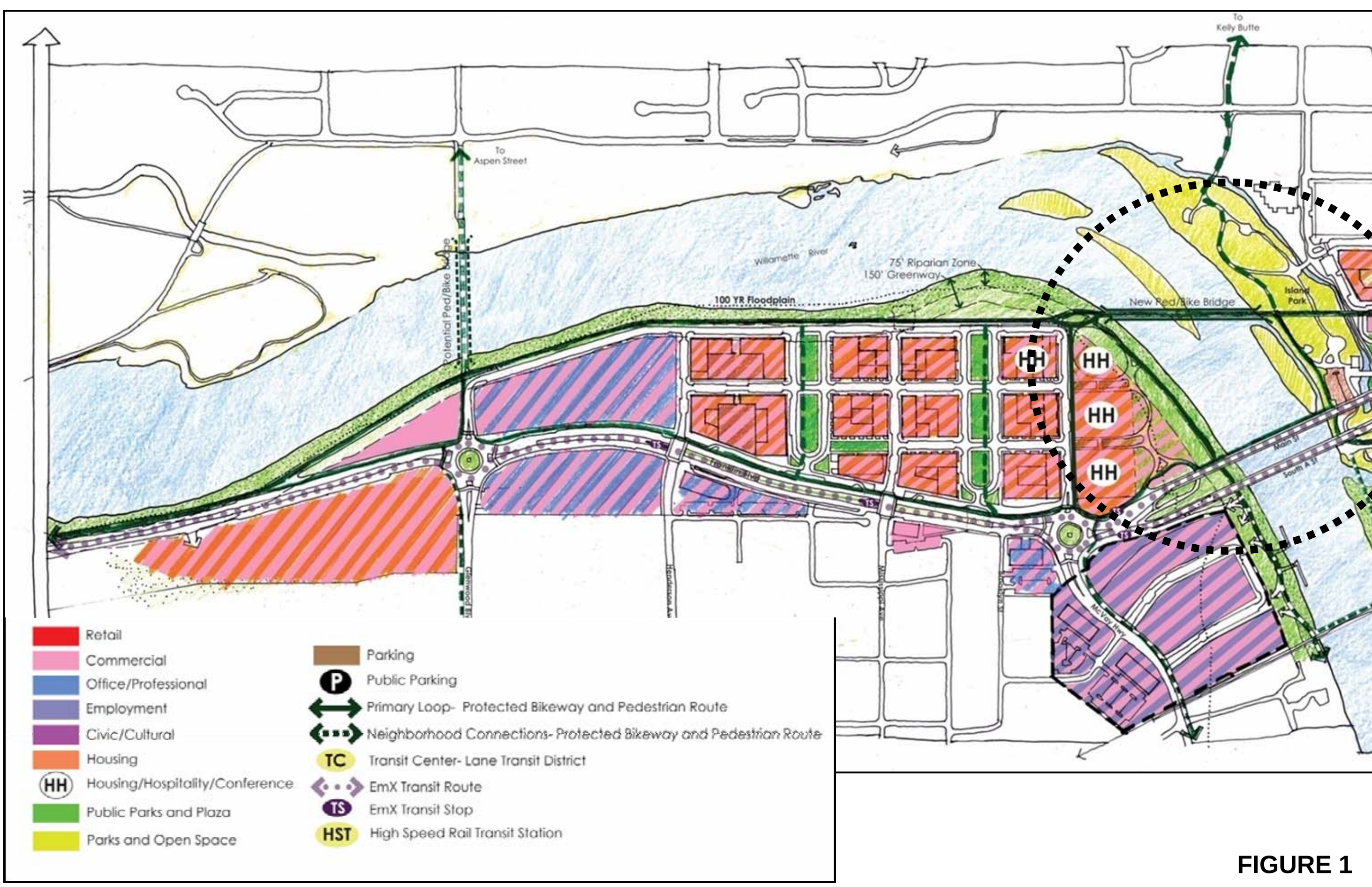
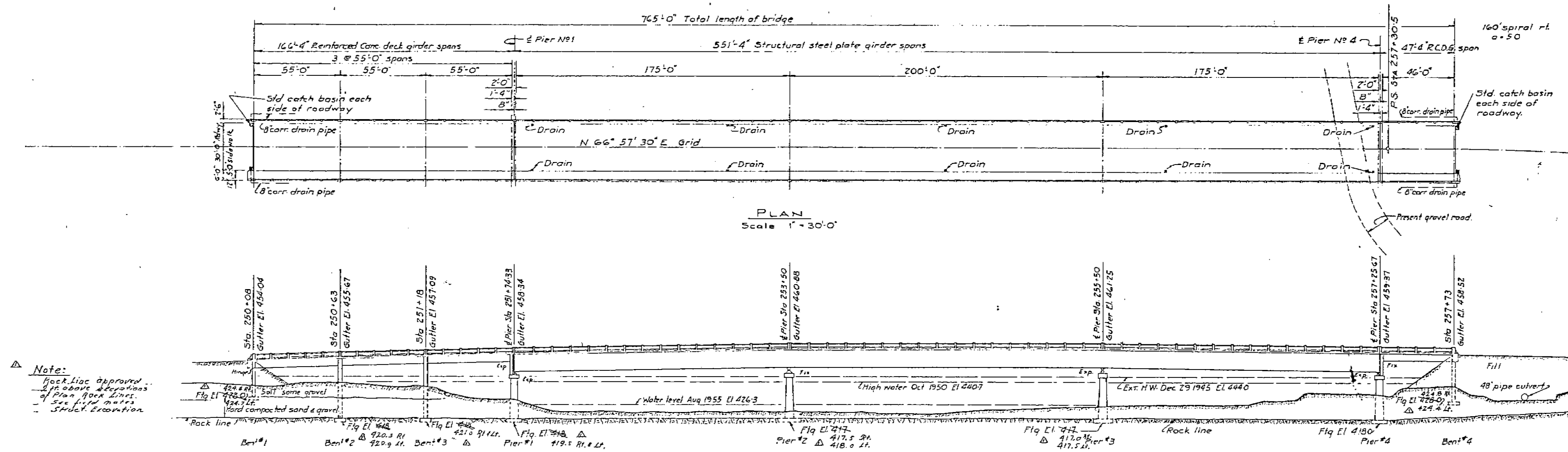
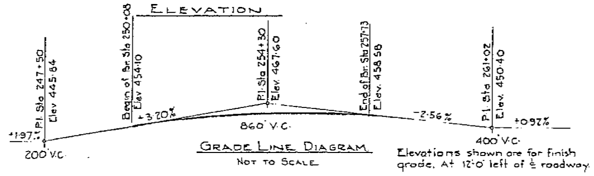
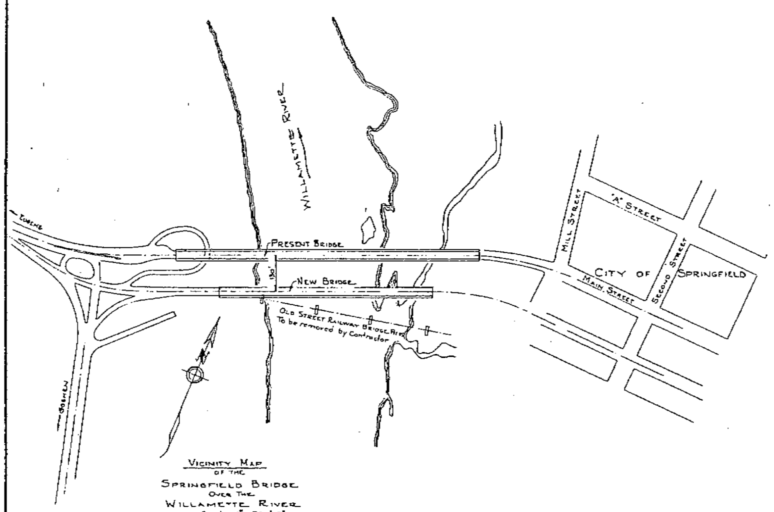

To Kelly Butte
To Aspen Street
Willamette River
75' Riparian Zone
150' Greenway
100 YR Floodplain
New Ped/Bike Bridge
Potential Ped/Bike Bridge
HH
Retail
Commercial
Office/Professional
Employment
Civic/Cultural
Housing
Housing/Hospitality/Conference
Public Parks and Plaza
Parks and Open Space
Parking
Public Parking
Primary Loop- Protected Bikeway and Pedestrian Route
Neighborhood Connections- Protected Bikeway and Pedestrian Route
Transit Center- Lane Transit District
EmX Transit Route
EmX Transit Stop
High Speed Rail Transit Station

FIGURE 1







△ Revised as constructed 1.13.59.

General Notes:—

Bridge designed for H20 S16-44 loading without 15# wearing surface.

All concrete shall be Class 'A' and shall have a minimum breaking strength of 3300 lbs per square inch in 28 days (f_c = 1320 p.s.i.)

All reinforcing steel shall be intermediate grade deformed bars. Bars from number 3 to 11 inclusive shall conform to A.S.T.M. specification A305-50T and shall be lapped 20 diameters at all splices unless noted or shown otherwise. All bars shall be placed 2" clear of nearest face of concrete unless noted or shown otherwise. (f_s = 20,000 p.s.i.)

All structural steel shall be either 'Carbon' or 'Low Alloy' as designated below. 'Carbon' steel shall conform to A.S.T.M. specification A7-51T; 'Low Alloy' to A.S.T.M. specification A 242-46.

"Low Alloy" structural steel shall be used for:

All girder flange angles, cover plates, web, gusset plates connected to girder flanges, and splice material.

'Carbon' structural steel shall be used for:

All stringers, stiffener angles, gusset plates, "X" frames, lateral system, shoes, rockers and pins unless shown or noted otherwise.

Change in shop splices of built up girders will be permitted at option of the fabricator except that location and splice material shall be approved by Engineer before materials are ordered.

All rivets shall be 7/8" diam. 'carbon' rivets and shall conform to A.S.T.M. specification A141-39.

Girders shall be cambered to provide for dead load deflection and grade line.

Footing design bearing loads are shown on detail drawings.

Footing elevations are subject to change depending on foundation material encountered. Reinforcing steel for columns and piers shall not be fabricated until final footing elevations have been determined.

All workmanship and materials shall conform to the specifications for bridges of the Oregon State Highway Commission.

APPROVED: [signature] BRIDGE ENGINEER	OREGON STATE HIGHWAY DEPARTMENT BRIDGE DIVISION
[signature] ASST. STATE HIGHWAY ENGINEER	SPRINGFIELD BRIDGE OVER THE WILLAMETTE RIVER
STATE HIGHWAY ENGINEER	PLAN AND ELEVATION
DESIGNED T.C.R. / DRAWN ✓ / CHECKED / CALC. BOOK 368	DATE Dec. 5 1955 BRIDGE NO. 8051 SHEET 1 OF 15 ACCOMPANIED BY DWGS. 5226, 12607-12616 incl. 9233, 12457 & 583 DRAWING NO. 12606

FIGURE 2

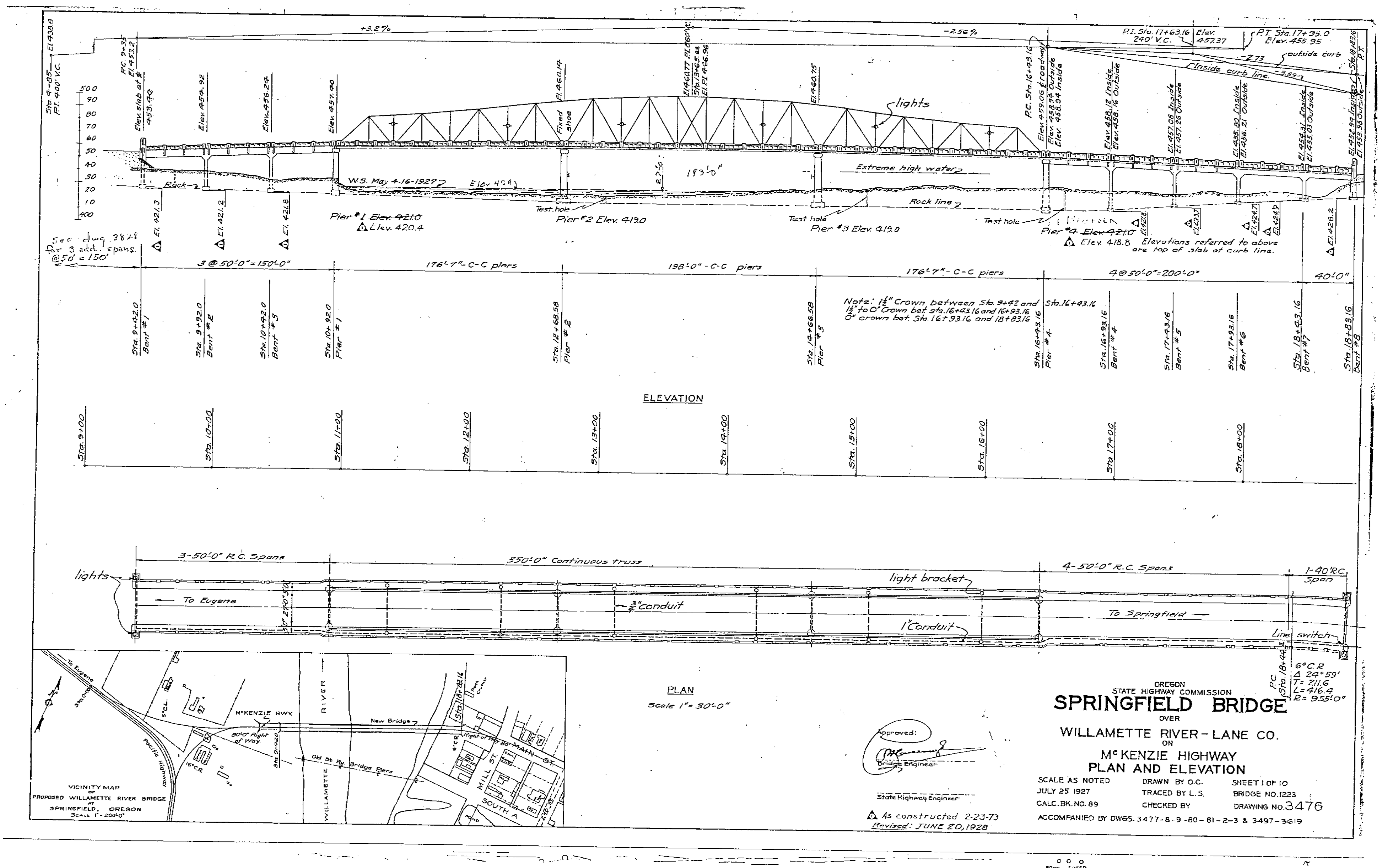

ELEVATION
PLAN
Scale 1" = 30'-0"
3 @ 50'-0" = 150'-0"
176'-7" - C-C piers
198'-0" - C-C piers
176'-7" - C-C piers
4 @ 50'-0" = 200'-0"
40'-0"
3-50'-0" R.C. Spans
550'-0" Continuous truss
4-50'-0" R.C. Spans
1-40' R.C. Span
lights
light bracket
To Eugene
To Springfield
3/4" Conduit
1" Conduit
Line switch
Extreme high water
Rock line
W.S. May 4-16-1927
Test hole
Fixed shoe
Pier #1 Elev. 421.0
Elev. 420.4
Pier #2 Elev. 419.0
Pier #3 Elev. 419.0
Pier #4 Elev. 421.0
Elev. 418.8
Elevations referred to above are top of slab at curb line.
Note: 1 1/2" Crown between Sta. 9+42 and Sta. 16+43.16
1 1/2" to 0" Crown bet. sta. 16+43.16 and 16+93.16
0" crown bet. Sta. 16+93.16 and 18+83.16
See dwg. 3828 for 3 add. spans. @ 50' = 150'
Sta. 9+42.0 Bent #1
Sta. 9+92.0 Bent #2
Sta. 10+42.0 Bent #3
Sta. 10+92.0 Pier #1
Sta. 12+68.58 Pier #2
Sta. 14+66.58 Pier #3
Sta. 16+43.16 Pier #4
Sta. 16+93.16 Bent #4
Sta. 17+43.16 Bent #5
Sta. 17+93.16 Bent #6
Sta. 18+43.16 Bent #7
Sta. 18+83.16 Bent #8
P.I. Sta. 17+63.16 Elev. 457.37 240' V.C.
P.T. Sta. 17+95.0 Elev. 455.95
outside curb
Inside curb line
6° C.R.
Δ 24° 59'
T = 211.6
L = 416.4
R = 955'-0"
VICINITY MAP OF PROPOSED WILLAMETTE RIVER BRIDGE AT SPRINGFIELD, OREGON
Scale 1" = 200'-0"
McKENZIE HWY.
New Bridge
WILLAMETTE RIVER
Old St. Ry. Bridge Piers
MAIN ST.
MILL ST.
SOUTH A
Pacific Highway
OREGON STATE HIGHWAY COMMISSION
SPRINGFIELD BRIDGE
OVER
WILLAMETTE RIVER - LANE CO.
ON
McKENZIE HIGHWAY
PLAN AND ELEVATION
SCALE AS NOTED
JULY 25 1927
CALC. BK. NO. 89
DRAWN BY O.C.
TRACED BY L.S.
CHECKED BY
SHEET 1 OF 10
BRIDGE NO. 1223
DRAWING NO. 3476
ACCOMPANIED BY DWGS. 3477-8-9-80-81-2-3 & 3497-3619
Approved:
Bridge Engineer
State Highway Engineer
As constructed 2-23-73
Revised: JUNE 20, 1928

FIGURE 3

OBEC Consulting Engineers
Oregon Long-Span Pedestrian Bridge Data
December 2009

Name	Springwater Trail (UPRR) Pedestrian Bridge	I-5 Beltline (Gateway) Pedestrian Bridge	Springwater Trail (McLoughlin Blvd.) Pedestrian Bridge	McKenzie River (Wildish) Bridge	DeFazio (Willamette River) Pedestrian Bridge
Owner	City of Portland	ODOT	City of Portland	Wildish Companies	City of Eugene
Type	Prefabricated Truss	Cable-Stayed	Through-Arch	Suspension	Suspension
Funding	Federal Aid	Federal Aid	Federal Aid	Private D/B	Federal Aid
Picture					
Overall Length	175'	503'	302'	670'	606'
Main Span	175'	203'	241'	430'	338'
Net Deck Width	12'	14'	12'	18.5'	14'
Net Deck Area	2100 SF	7,042 SF	3,624 SF	12,395 SF	8,484 SF
Bid/Completion	2004/2006	2006/2008	2004/2006	1999/2001	1997/2000
Bid (Structure + Mobilization) (Bridge Only)	$607,000	$2,035,000	$1,350,000	$2,500,000	$2,645,000
Bid SF Price	$285	$289	$370	$202	$312
2009 SF Price	$325	$365	$470	$365	$540

FIGURE 4

APPENDIX A

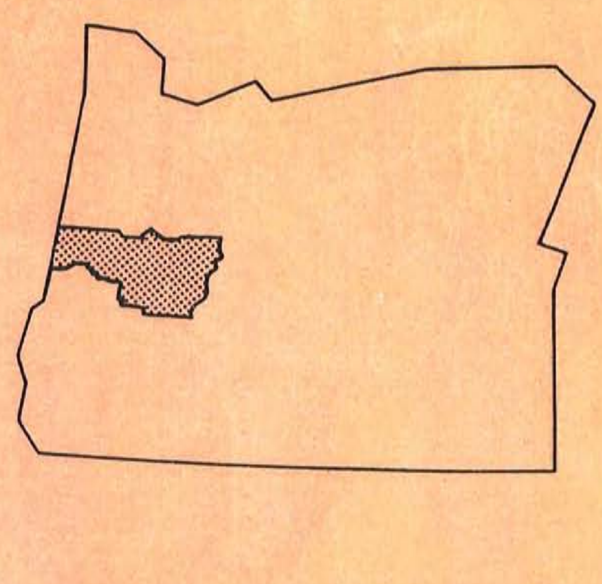
C3

FLOOD INSURANCE STUDY

LANE COUNTY, OREGON AND INCORPORATED AREAS

VOLUME 1 OF 3

COMMUNITY NAME	COMMUNITY NUMBER
COBURG, CITY OF	410119
COTTAGE GROVE, CITY OF	410120
CRESWELL, CITY OF	410121
DUNES CITY, CITY OF	410262
EUGENE, CITY OF	410122
FLORENCE, CITY OF	410123
JUNCTION CITY, CITY OF	410124
LOWELL, CITY OF	410125
OAKRIDGE, CITY OF	410126
SPRINGFIELD, CITY OF	415592
VENETA, CITY OF	410128
WESTFIR, CITY OF	410289
LANE COUNTY, UNINCORPORATED AREAS	415591



JUNE 2,1999

Federal Emergency Management Agency

Table 1. Recorded Peak Flows

USGS Gage No.	USGS Gage Location	Prior to Regulation			Since Regulation		
		Flow (cfs)	Date	Frequency	Flow (cfs)	Date	Frequency
14145500	Middle Fork Willamette River, above Salt Creek	34,000	December 1954	16-Year[1]	11,800	December 1964	90-Year[2]
14146500	Salmon Creek, near the City of Oakridge	11,600	December 1964	50-Year[1]	No Regulation		
14148000	Middle Fork Willamette River, below North Fork Middle Fork Willamette River	81,800	December 1945	35-Year[1]	55,800	December 1964	90-Year[2]
14150000	Middle Fork Willamette River, near the community of Dexter	62,600	January 1953	10-Year[1]	29,500	December 1964	540-Year[2]
14151000	Fall Creek, below Winberry Creek	24,700	December 1956	40-Year[1]	4,640	January 1972	22-Year[2]
14152000	Middle Fork Willamette River, at community of Jasper	94,000	November 1909	14-Year[1]	43,500	December 1964	161-Year[2]
14153500	Coast Fork Willamette River, below Cottage Grove Dam	No Record Prior to Regulation			5,910	December 1964	52-Year[2]
14155500	Row River, near City of Cottage Grove	21,400	December 1945	7-Year[1]	17,200	December 1964	77-Year[2]
14157000	Coast Fork Willamette River, at community of Saginaw (discontinued in 1951)	32,500	February 1927	4-Year[1]	32,900	December 1945	40-Year[2]
14157500	Coast Fork Willamette River, near community of Goshen	58,500	November 1909	18-Year[1]	32,100	December 1964	22-Year[2]
14158000	Willamette River, at City of Springfield (discontinued in 1957)	140,000[3]	December 1945	22-Year[1]	60,400[4]	December 1964	55-Year[2]

[1]Estimated return period based on natural frequency curves
[2]Estimated return period based on regulated frequency curves
[3]Regulated by Cottage Grove Reservoir only
[4]Flow estimated by USACE

Table 4. USGS Stream Gage Locations and Years of Record		
USGS Gage No.	Location	Years of Record
14144800	Middle Fork Willamette River, near City of Oakridge	20
14144900	Hills Creek, above Hills Creek Lake near City of Oakridge	20
14145500	Middle Fork Willamette River, above Salt Creek	44
14146500	Salmon Creek, near City of Oakridge	51
14147500	North Fork Middle Fork Willamette River, near City of Oakridge	49
14148000	Middle Fork Willamette River, below North Fork Middle Fork Willamette River	56
14150000	Middle Fork Willamette River, near community of Dexter	32
14150300	Fall Creek, near City of Lowell	15
14150800	Winberry Creek, near City of Lowell	15
14151000	Fall Creek, below Winberry Creek near Fall Creek	43
14152000	Middle Fork Willamette River, at community of Jasper	35
14152500	Coast Fork Willamette River, at community of London	43
14153500	Coast Fork Willamette River, below Cottage Grove Dam	39
14154500	Row River, above Pitcher Creek near community of Dorena	43
14155500	Row River, near City of Cottage Grove	39
14156500	Mosby Creek, at mouth near City of Cottage Grove	32
14157000	Coast Fork Willamette River, at community of Saginaw	28
14157500	Coast Fork Willamette River, at community of Goshen	34
14158000	Willamette River, at City of Springfield	40
14158500	McKenzie River, at outlet of Clear Lake	34
14158790	Smith River, above Smith Reservoir	18
14158850	McKenzie River, below Trail Bridge Dam	19

Table 5. Summary of Discharges

Flooding Source and Location	Drainage Area (Square Miles)	Peak Discharges (cfs) 10-Year	50-Year	100-Year	500-Year
Amazon Creek					
At USGS Gage No. 14169500	21.3	3,380	4,510	5,050	6,200
At SPRR	19.3	3,200	4,270	4,780	5,610
Below confluence with Willow Creek	19.3	3,100	3,390	3,530	5,610
At Beltline Highway	--[1]	2,330	3,110	3,480	--[2]
At Garfield Street	9.0	1,550	2,060	2,310	2,840
At 19th Avenue	6.8	1,200	1,500	1,590	1,930
At Snell Avenue	1.3	200	260	290	360
Berkshire Slough					
At State Highway 58	--[2]	4,200	11,200	15,500	30,000
Cedar Creek					
At confluence with McKenzie River	11.2	--[1]	--[1]	1,895	--[1]
At 62nd Street	10.4	--[1]	--[1]	1,755	--[1]
At Weaver Road	6.5	--[1]	--[1]	1,125	--[1]
At Highway 126	5.6	--[1]	--[1]	980	--[1]
Channel A3					
At confluence with Amazon Creek	2.6	502	676	757	935
At Bertelson Road	1.7	416	547	609	740
Coast Fork Willamette River					
At confluence with Middle Fork Willamette River	665.0	26,800	43,400	52,200	79,900
At USGS Gage No. 14157500	642.0	25,500	41,500	50,000	77,000
At Camus Swale Creek	578.0	21,100	35,600	43,500	69,100
At USGS Gage No. 14157000	529.0	17,500	30,800	38,200	62,700
At Row River	154.0	5,900	10,800	13,600	22,300
At Silk Creek	133.0	3,900	7,600	9,800	20,500[3]
At USGS Gage No. 14153500	104.0	2,900[3]	5,600[3]	8,400[3]	20,500[3]

[1]Data not available
[2]Data not applicable
[3]Peak flow resulting from reservoir releases after the regulated natural peak

Table 5. Summary of Discharges (Cont'd)

Table 5. Summary of Discharges (Cont'd)

Flooding Source and Location	Drainage Area (Square Miles)	Peak Discharges (cfs) 10-Year	50-Year	100-Year	500-Year
McKenzie River - East Channel					
At confluence with Mill Creek	--[1]	10,200	13,600	14,800	17,900
McKenzie River - North Channel					
At convergence with McKenzie River main channel	--[2]	--[2]	--[2]	34,500	--[2]
Middle Fork Willamette River (Near Oakridge)					
At USGS Gage No. 14148000	924	26,300	46,000	57,000	95,000
At Deception Creek	895	24,900	43,900	54,600	91,800
At North Fork Middle Fork Willamette River	649	12,500	25,100	33,000	62,900
At Salmon Creek	507	6,000[3]	13,400[3]	19,500[3]	44,800[3]
At USGS Gage No. 14145500	392	6,000[3]	8,500[3]	12,500[3]	33,000[3]
Middle Fork Willamette River (Near Springfield)					
At confluence with Coast Fork Willamette River	1,354.0	20,700	25,900	36,300	81,700
At USGS Gage No. 14152000	1,340.0	20,000	25,100	35,500	81,000
At Hills Creek	1,322.0	19,300	23,700	33,800	78,600
At Fall Creek	1,065.0	13,400	15,000	20,500	55,300
At USGS Gage No. 14150000	1,001.0	12,000[3]	14,100[3]	20,300[3]	53,000[3]
Middle Fork Willamette River Overflow					
At Mahogany Lane	--[1]	1,000	2,500	5,000	17,000
Mohawk River					
At confluence with McKenzie River	178.7	14,520	20,980	23,900	31,260
At USGS Gage No. 14165000	177.0	14,400	20,800	23,700	31,000
At Allison Creek	146.7	12,210	17,630	20,090	26,280
At Cartwright Creek	115.0	9,850	14,230	16,220	21,210
At Cash Creek	78.5	7,040	10,170	11,590	15,160

[1]Data not applicable
[2]Data not available
[3]Peak flow resulting from reservoir releases after the regulated natural peak

Table 5. Summary of Discharges (Cont'd)

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Willamette River (Cont'd)								
AA	121,480	587	8,885	8.0	419.5	419.5	420.3	0.8
AB	123,250	575	9,010	7.9	422.7	422.7	423.1	0.4
AC	124,250	875	9,486	7.5	424.3	424.3	424.5	0.2
AD	126,030	800	9,290	7.6	426.1	426.1	426.7	0.6
AE	127,540	812	10,759	6.6	428.5	428.5	429.5	1.0
AF	129,020	503	8,080	8.8	430.7	430.7	431.4	0.7
AG	130,330	503	8,755	8.1	432.8	432.8	433.3	0.5
AH	132,080	626	8,097	8.8	435.3	435.3	435.7	0.4
AI	133,190	627	8,382	8.5	437.5	437.5	437.7	0.2
AJ	134,090	590	8,345	8.5	439.1	439.1	439.1	0.0
AK	134,140	590	8,402	8.4	439.2	439.2	439.3	0.1
AL	134,230	590	8,503	8.4	439.3	439.3	439.4	0.1
AM	134,280	590	8,556	8.3	439.3	439.3	439.4	0.1
AN	135,050	427	6,888	10.3	440.4	440.4	440.5	0.1
AO	135,090	427	6,933	10.2	440.5	440.5	440.6	0.1
AP	136,730	500	7,891	9.0	443.1	443.1	443.4	0.3
AQ	139,130	800	10,035	7.1	446.5	446.5	446.8	0.3
AR	140,280	925	8,747	8.1	447.9	447.9	448.3	0.4
AS	142,530	1,530	17,047	4.2	450.2	450.2	451.2	1.0

[1]Feet above approximately 11,850 feet downstream of U.S. Highway 99E

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

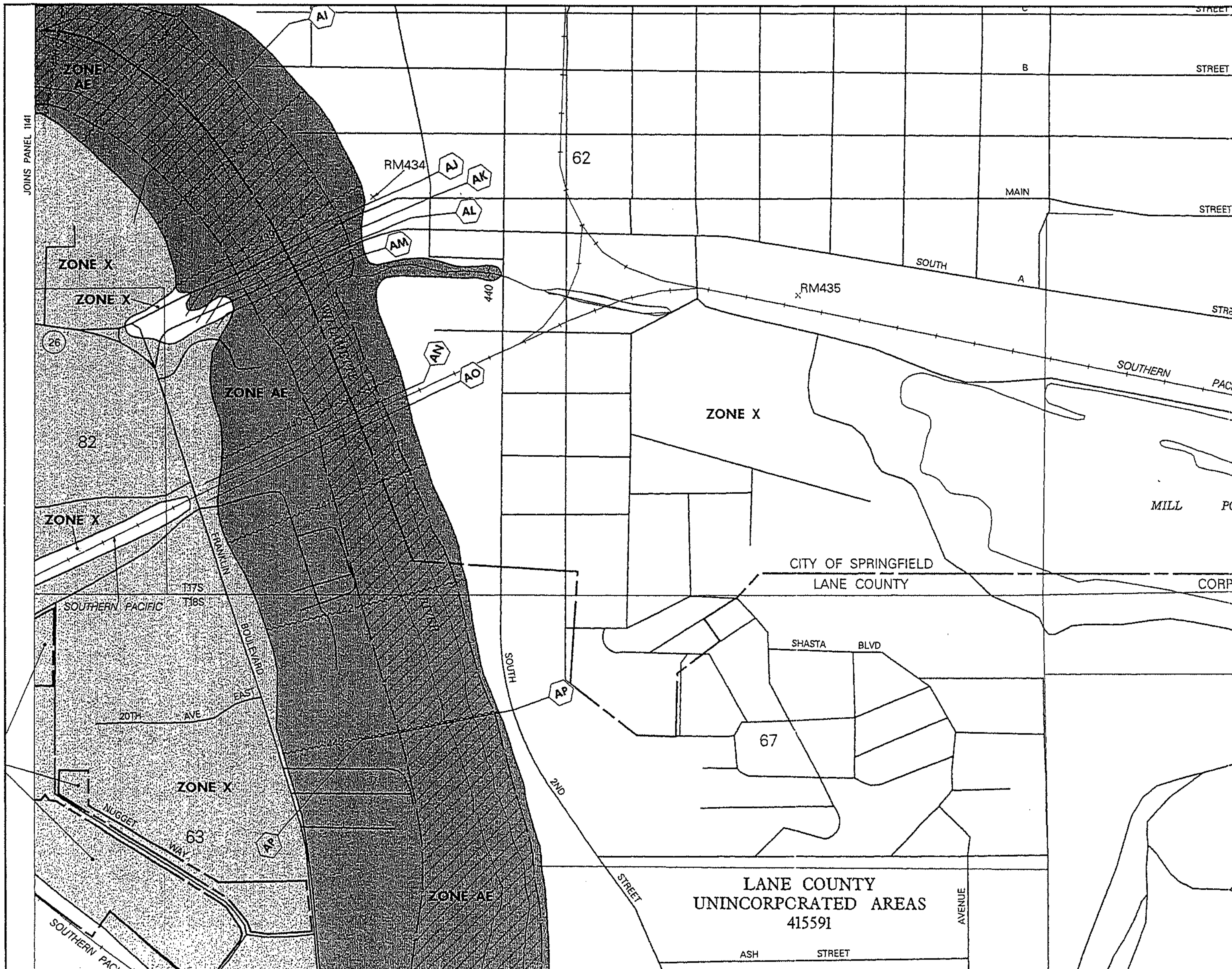
LANE COUNTY, OR AND INCORPORATED AREAS

FLOODWAY DATA

WILLAMETTE RIVER

Table 5. Summary of Discharges (Cont'd)

Flooding Source and Location	Drainage Area (Square Miles)	Peak Discharges (cfs) 10-Year	50-Year	100-Year	500-Year
Willamette River					
At USGS Gage No. 14166000 at City of Harrisburg	3,420	80,000	104,000	121,000	172,000
At McKenzie River	2,049.2	40,000	59,000	71,000	111,000
At USGS Gage No. 14158000 at State Highway 126, near City of Springfield	2,030.0	40,000	59,000	71,000	111,000



APPROXIMATE SCALE IN FEET

500 0 500

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

LANE COUNTY, OREGON AND INCORPORATED AREAS

PANEL 1142 OF 2975

(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
EUGENE, CITY OF	410122	1142	F
SPRINGFIELD, CITY OF	415592	1142	F
LANE COUNTY, UNINCORPORATED AREAS	415591	1142	F

MAP NUMBER 41039C1142 F

EFFECTIVE DATE: JUNE 2, 1999

Federal Emergency Management Agency

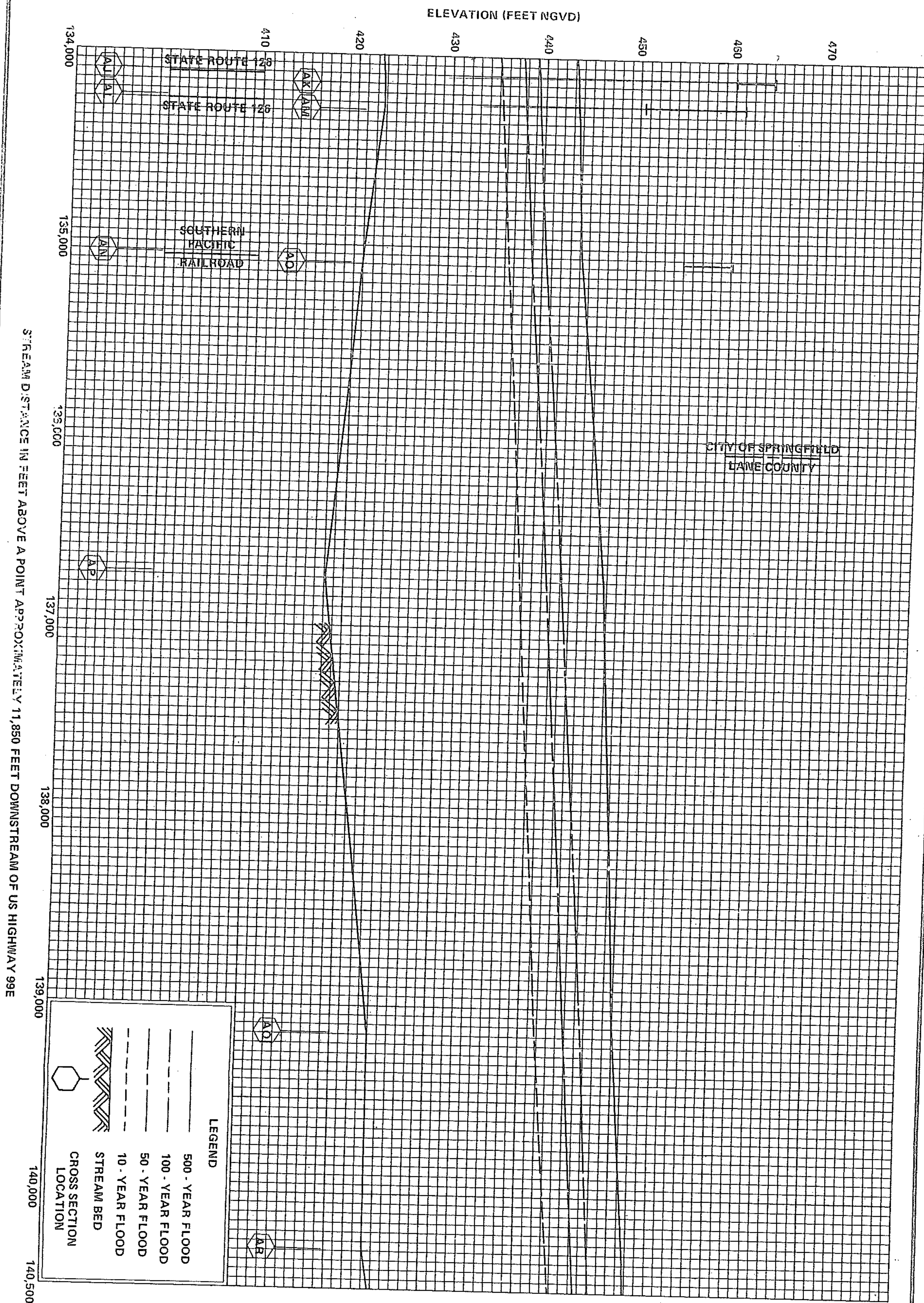
This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

FEDERAL EMERGENCY MANAGEMENT AGENCY

LANE COUNTY, OR
AND INCORPORATED AREAS

FLOOD PROFILES

WILLAMETTE RIVER



FEDERAL EMERGENCY MANAGEMENT AGENCY

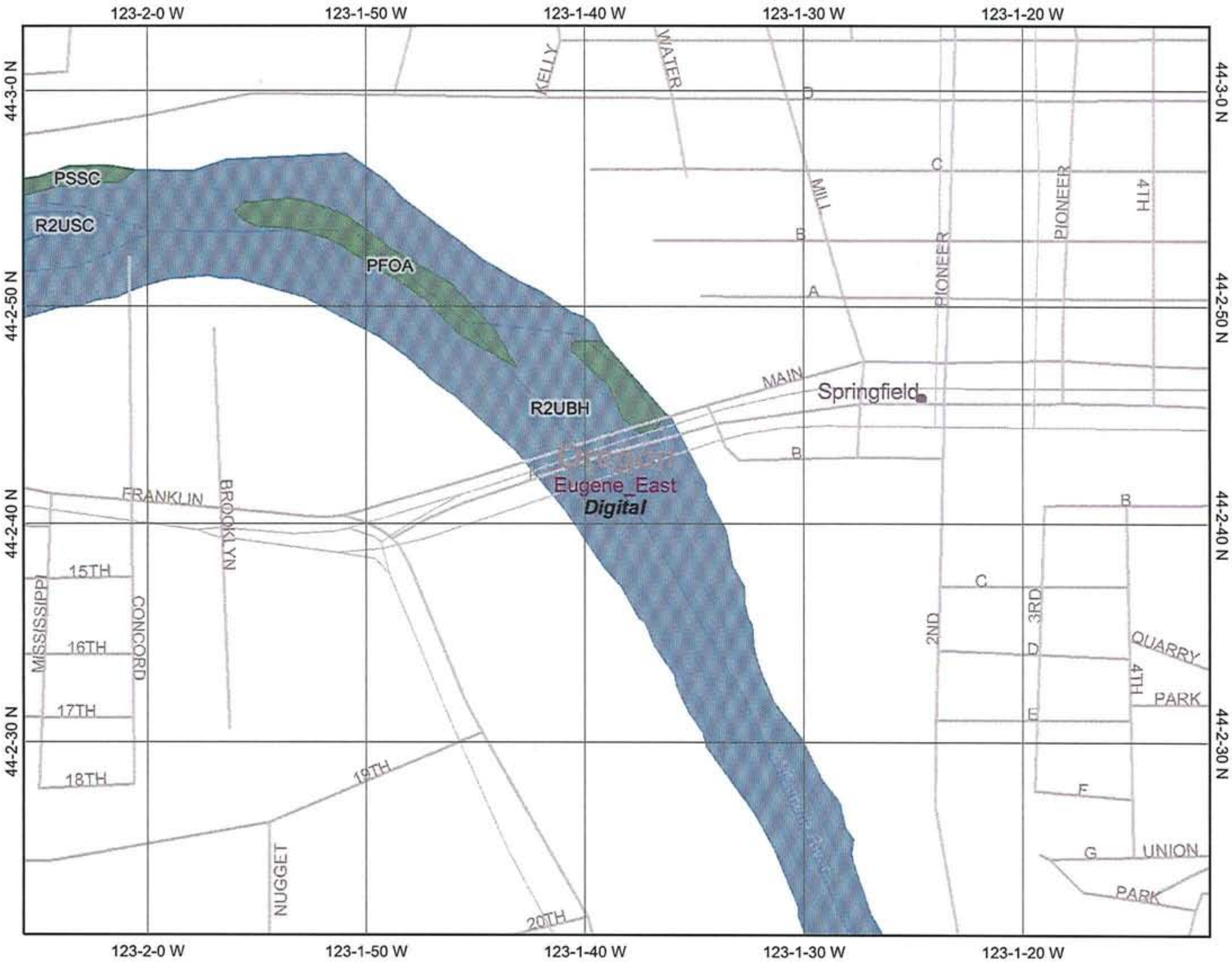
LANE COUNTY, OR
AND INCORPORATED AREAS

FLOOD PROFILES

WILLAMETTE RIVER

APPENDIX B

National Wetland Inventory



Legend

Ohio_wet_scan
- 0
- 1
- Out of range

Interstate
Major Roads
- Other Road
- Interstate
- State highway
- US highway

Roads
Cities
USGS Quad Index 24K
Lower 48 Wetland Polygons
- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

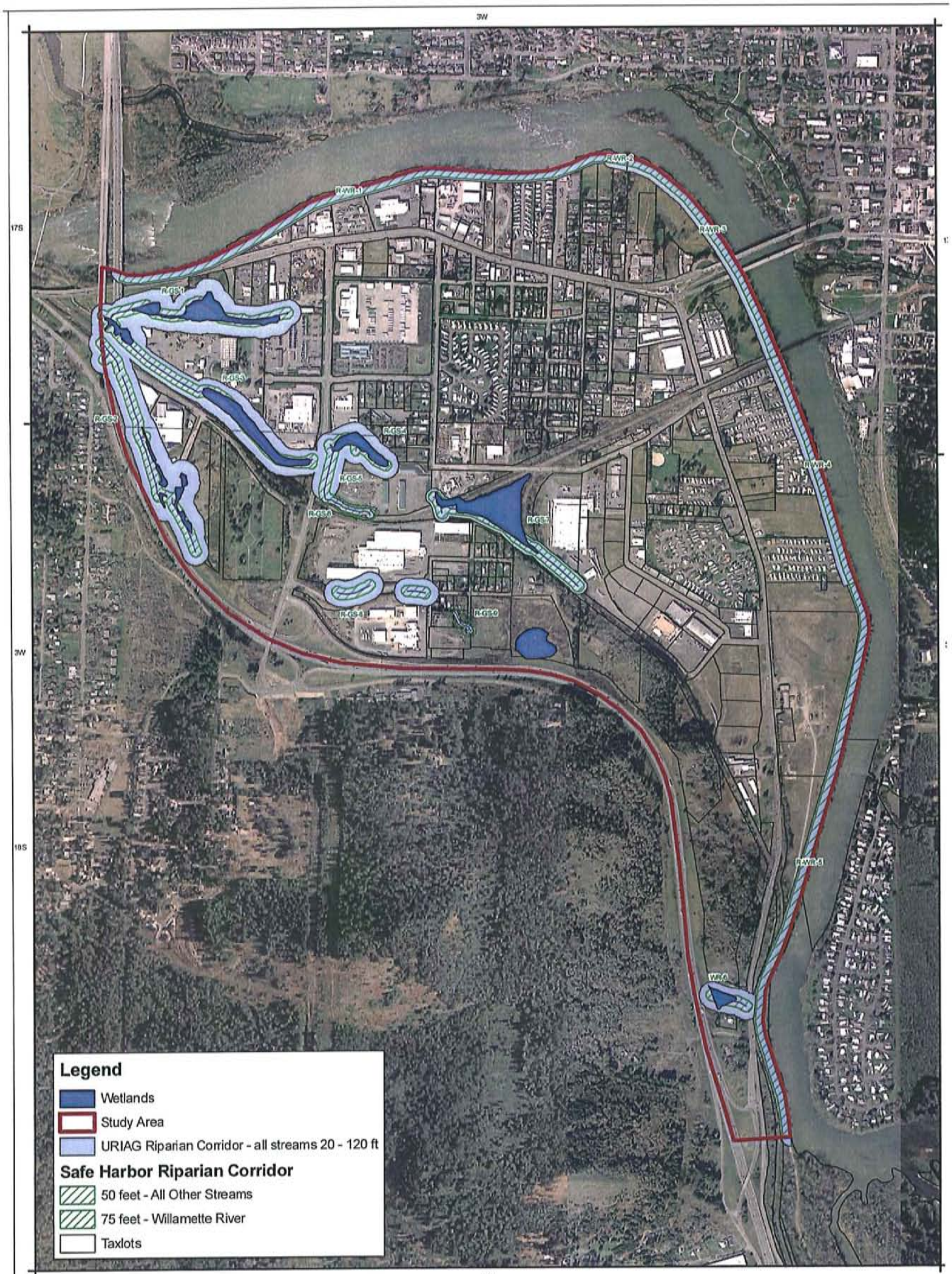
Lower 48 Available Wetland Data
- Non-Digital
- Digital
- No Data
- Scan

NHD Streams
Counties 100K
States 100K
South America
North America

Scale: 1:9,040

Map center: 44° 2' 42" N, 123° 1' 39" W

This map is a user generated static output from an Internet mapping site and is for general reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable. THIS MAP IS NOT TO BE USED FOR NAVIGATION.



Glenwood Area of Springfield Riparian Corridors

Information shown on this map is for planning purposes, represents the conditions that exist at the map date, and is subject to change. The location and extent of wetlands and other waters is approximate. There may be unmapped wetlands and other waters preset that are subject to regulation. A current Oregon Department of state Lands-approved wetland delineation is required for state removal-fill permits. You are advised to contact the Department of State Lands and the U.S. Army Corps of Engineers with any regulatory questions.

1 inch = 800 feet

N

0 0.125 0.25 0.5 Miles

Date of Final Map preparation: 10/29/09

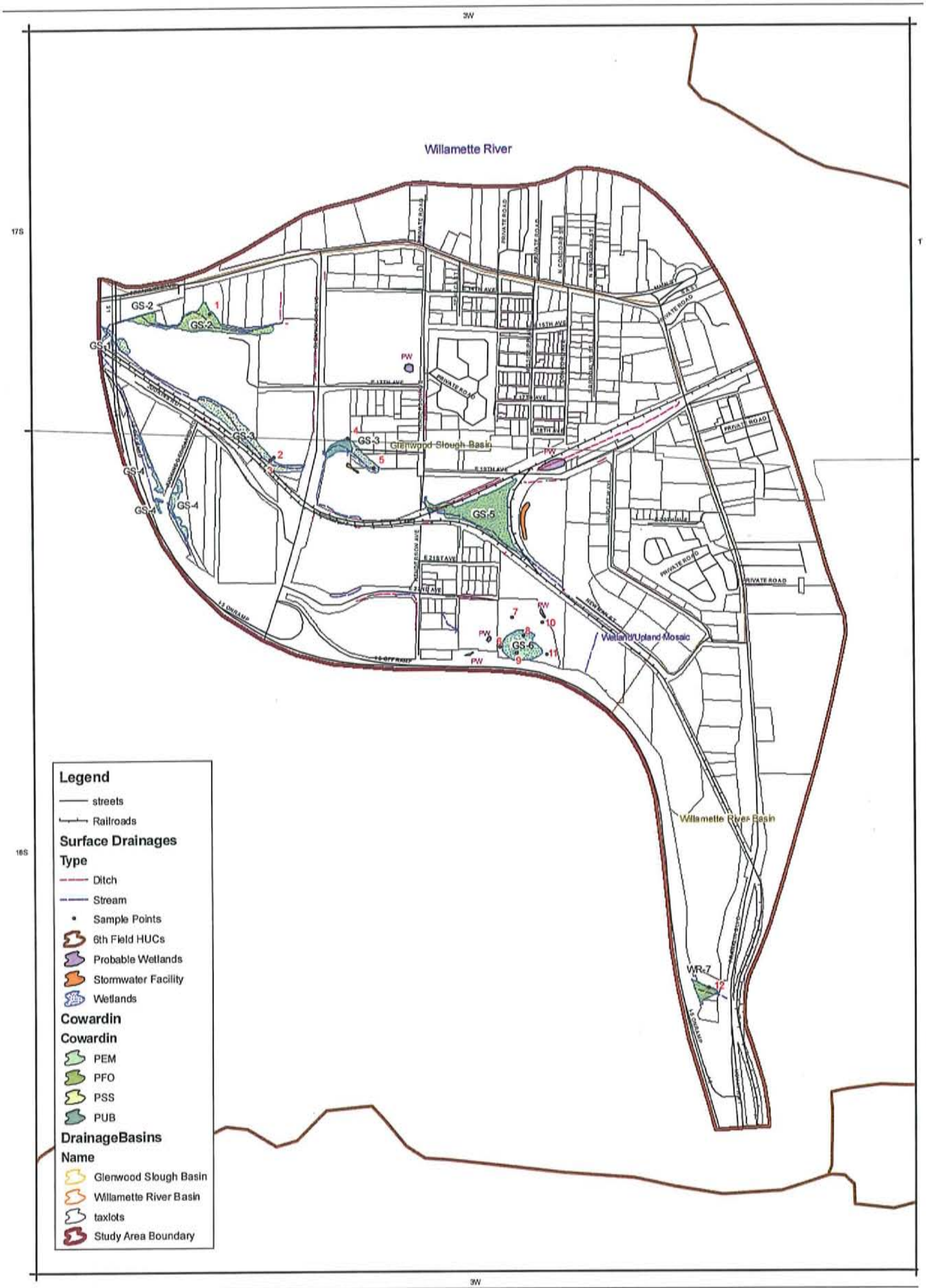


Figure 4 - Glenwood Area of Springfield Local Wetlands Inventory

Information shown on this map is for planning purposes, represents the conditions that exist at the map date, and is subject to change. The location and extent of wetlands and other waters is approximate. There may be unmapped wetlands and other waters preset that are subject to regulation. A current Oregon Department of state Lands-approved wetland delineation is required for state removal-fill permits. You are advised to contact the Department of State Lands and the U.S. Army Corps of Engineers with any regulatory questions.

1 inch = 800 feet

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0 0.125 0.25 0.5 Miles

Date of Final Map preparation: 10/29/09