

Memorandum Date: January 29, 2008
Order Date: February 13, 2008

W. G. A.

TO: Board of County Commissioners

DEPARTMENT: Public Works

PRESENTED BY: Bill Morgan, County Engineer

AGENDA ITEM TITLE: REPORT BACK-PERKINS CREEK BRIDGE ON BIGGS ROAD
(A LOCAL ACCESS ROAD).

I. MOTION

None requested, discussion only.

II. AGENDA ITEM SUMMARY

As directed by the Board, Public Works staff is reporting to the Board and seeking direction as to any further action concerning this bridge.

III. BACKGROUND/IMPLICATIONS OF ACTION

A. Board Action and Other History

By a letter dated November 20, 2007, Lane County was informed that the State Bridge Engineer had recommended the Perkins Creek Bridge (Bridge No. 18752) be posted for load limits of 4 tons, 7 tons and 6 tons, based on the results of an inspection which indicated decreased load-carrying capacity due to deterioration in the bridge decking and pile caps. The State Bridge Engineer recommended that the signage indicating the recommended posting be in place no later than January 1, 2008.

Public Works staff met with the Board on December 12, 2007, to inform it of the receipt of the recommendation and to ask direction from the Board regarding to what action it might want staff to take with regard to this potential hazard in accordance with the Board's previous direction to staff concerning expenditure of Road Funds on Local Access Roads.

Pursuant to the direction from the Board, the signs informing of the recommended posting were installed on December 13, 2007. The Public Works Director's action in posting the bridge was confirmed by Order 08-1-2-13 on January 2, 2008.

The Board also directed staff to investigate means to assist the residents of Biggs Road in determining potential cost of the needed repairs or replacement, what permit(s) will be needed, potential material sources, how many property owners will be directly affected by the reduced posting and potential closure of the bridge in the future if it is not repaired or replaced, and what funding sources may be available to pay for the cost of the work. The board directed staff to investigate and prepare an analysis with regard to these issues and report back as soon as the investigation and analysis has been completed.

B. Policy Issues

Pursuant to Order 06-1-18-8, expenditures of Road funds on Local Access Roads are not authorized unless the Board adopts an Order or Resolution authorizing the work and designating the work to be either a single project or a continuing program.

Lane Code 15.636(3) provides that when the Board determines the public interest requires improvement to bridges on Local Access Roads, the direct cost shall be assessed to the specially benefiting property owners on a uniform basis as determined by the Board.

If the Board authorizes the expenditure of Road funds for the repair or replacement, it can choose to assess the benefitting owners for the cost of the work plus the cost of engineering and administration or up to 25 percent, or it can waive the assessments.

C. Board Goals

This project is related to the County Goal of ensuring the public's safety.

D. Financial and/or Resource Considerations

The County is not required to take any action with regard to improvement, repair or maintenance of Local Access Roads, but may exercise jurisdiction over them through Board Action. The funds thus far expended have come from the Road Fund.

E. Analysis

The Regional Land Information Database (RLID) shows 8 site addresses on Biggs Road, and a review of Assessor's Map 18-05-05 indicates that at least 5 properties containing 6 dwelling units need to cross the bridge in order to reach the respective properties from Perkins Road. In addition to normal daily traffic generated by the residents, this bridge carries delivery and service traffic generated by the dwellings, some agricultural-related uses and potentially some log truck traffic. Captain Thompson, of Lane County Fire District No. 1, informed Public Works staff that the District's equipment that would respond to a structure fire or wildfire would require a bridge with no less than a 56,000 pound (28 tons) load rating for a Type 3 vehicle to accommodate the 3,000 gallon water tender truck that would accompany the fire engine (20 tons, Type 3 loading). He added that the District would prefer a bridge with 60,000 pound load rating for an additional margin of safety.

The attached Options Analysis prepared by Engineering and Construction Services Division staff presents a detailed analysis of the bridge in light of the State Bridge Engineer's recommendation for a reduced Load Posting. As the analysis leading up to this report progressed, it became apparent that there were several possible options with regard to providing a crossing with increased load-carrying capacity to serve the Biggs Road residents. They are:

- 1. Install a 9-foot Diameter Round Culvert-** Based on hydrologic and hydraulic analysis, it was determined that this option would not carry the runoff from a 100-year flood event and that the flow would overtop the banks of the stream. This option was therefore not considered viable and accordingly, no cost estimate was developed.
- 2. Install Multiple Culverts-** To carry the flow from a 100-year flood event would require 4- 142" wide x 91" high x 70' foot-long corrugated metal pipe arch culverts installed parallel. This option would require that the stream channel be widened from 22' to 56' at the bottom of the channel, and the total cost of this option is estimated at approximately **\$335,000.**
- 3. Rehabilitate the Existing Bridge-** This option would correct the deficiencies noted on the State Bridge Engineer's Report that resulted in the reduced load rating. The cost of

this option is estimated at approximately \$70,000.

4. Remove the Existing Bridge and Install a New Flatcar Bridge Crossing- This would be very similar to the bridge recently constructed by County Maintenance staff on Green Creek Road, (a Local Access Road) but slightly shorter in length. The cost of this option is estimated at about \$135,000.

Options 3 and 4 seem to be the most viable due to their cost relative to the number of potential users of the bridge. The remaining useful life of a timber pile bridge is difficult to estimate even with replacement of some of the key load bearing components. Although the steel components of the flatcar bridge typically have a longer useful life when compared to a timber structure, the anticipated life of the new flatcar bridge as a whole is dependent upon the continued maintenance of the decking as well as the pier supports. The anticipated life cycle of Option 3 is unknown, but it is anticipated that the service life of the bridge could be extended up to 5 to 10 years. The anticipated service life of Option 4 is 20 to 30 years for Option 4, although the decking would probably need replacement after about 15 to 20 years.

Both Options 3 and 4 would require that the bridge be load rated upon completion of the rehabilitation or replacement. Staff at Oregon Department of Transportation (ODOT) believes that Option 3 would be able to carry emergency vehicles upon completion, but this will only be known after the repairs are completed and ODOT performs an updated load rating. The flatcar Option may need to be modified to handle HS 15 (27 ton) loading and Oregon legal permit truck load at operating stress levels, similar to what was needed for the Green Creek Bridge, and it is estimated that this cost will not exceed \$10,000. The Green Creek Bridge was load rated at HS 15 (27 tons) loading upon completion.

F. Alternatives/Options

If the Board directs, staff will either return with an item for the Consent Agenda authorizing one of the options listed above or will take no further action as the Board directs. Public works staff will have hosted a meeting with affected residents during the week of February 4, 2008 to inform them of the results of the analysis and of the opportunity to present comments at the meeting of February 13th 2008.

IV. TIMING/IMPLEMENTATION

If directed, staff will return to the Board at the meeting of March 12, 2008.

V. RECOMMENDATION

None, Discussion only.

VI. FOLLOW-UP

N. A.

VII. ATTACHMENTS

Attachment 1-Preliminary Options Analysis-Biggs Road Bridge



Lane County Public Works Department

3040 North Delta Highway, Eugene, Oregon 97408

Preliminary Options Analysis

Biggs Road Bridge MP 0.20

Background:

Biggs Road is a Local Access Road (LAR) off of Perkins Road southeast of Veneta. A Local Access Road is a road that has been dedicated to the public, but has not been accepted by the Board of County Commissioners into the County Road system.

The bridge at MP 0.20 was inspected by ODOT in March 2007. The ODOT State Bridge Engineer has determined that the bridge substructure has deteriorated to the point where it needs to be posted for restricted load limits. In addition, the bridge deterioration is such that it may need to be closed in the near future. It is believed that the existing bridge was constructed by the abutting landowners in the mid-1960's, and repaired in 1987.

The bridge crosses West Fork Coyote Creek. The portion of West Fork Coyote Creek in the vicinity of the bridge was altered in about 1965 as part of a flood control and irrigation project. This project was constructed by the Central District Improvement Company with technical assistance provided by the Soil Conservation Service (SCS), now known as the National Resource Conservation Service (NRCS), an agency within the United States Department of Agriculture (USDA). The project consisted of straightening the channel alignment, reshaping the channel cross-section, and installing a number of weirs. The weirs are used to divert water for irrigation during the growing season.

Lane County staff has received direction from the Board of County Commissioners to explore options to replace or repair the bridge.

Options to be considered are replacing the bridge with a culvert, rehabilitating the existing bridge and replacing the existing bridge with a flat car bridge.

Project Area Description:

The channel was constructed in the shape of a trapezoid, with a top dimension of about 56 feet wide, bottom of about 22 feet wide and a depth of about 10 feet. The channel side-slopes are about 2H:1V. The stream profile in the project vicinity, determined from USGS topo maps, is about 0.6%.

The Ordinary High Water Mark (OHWM) is about 1.5 feet above the stream bottom, and the stream is about 24 feet wide at the OHWM. There may be a 3 foot to 5 foot band of jurisdictional wetlands adjacent to the stream.

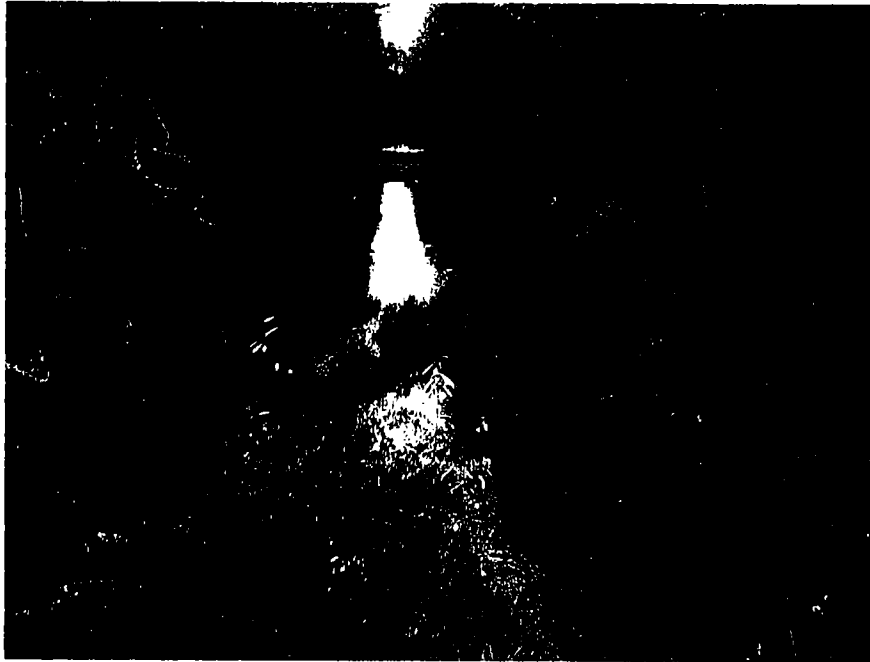
The project site is within the 100-year flood zone as shown on Flood Insurance Rate Map (FIRM) No. 41039C1087 F. The 100-year flood zone at the bridge is about 270 feet wide. A flood study was not conducted for this stream reach, and no base flood elevation for the 100-year flood has been calculated. It is likely that the 100-year flood zone boundary (Base Flood) was determined from aerial photos taken during a flood event, prior to the construction of the channel improvements in 1965. See Appendix 1 – Flood Zone Map.

There does not appear to be any state or federally listed species within the project area. But, here are probably cutthroat trout and/or other game fish species present in West Fork Coyote Creek during all or a portion of the year.

West Fork Coyote Creek is not designated as a Class I Stream by Lane County Land Management Division (LMD).



View Looking Upstream of Bridge



View Looking Downstream of Bridge

Applicable Rules and Regulations:

Impacts to Waters and/or Wetlands of the United States:

Placement of fill in Waters and/or Wetlands of the United States requires a permit from the United States Army Corps of Engineers (USACE).

Impacts to Waters and/or Wetlands of the United States:

Placement of fill, or removal in Waters and/or Wetlands of the State in, excess of 50 cubic yards (CY) requires a permit from the Oregon Department of State Lands (DSL).

Construction in the Flood Zone:

Lane Code prohibits any new construction or substantial improvements unless certification by a registered professional engineer is provided that there will be no increase in flood levels during the occurrence of the base flood discharge (100-year flood event).

Fish Passage:

Oregon law requires that new structures constructed in fish bearing streams not be a barrier to fish passage. This is normally accomplished by installing a structure that is at least as wide as the width of the stream at the OHW. However, a smaller opening is acceptable if the structure is not a barrier to fish passage (water velocity and depth) during 90% of expected stream flows throughout the year.

Preliminary Hydrology Analysis:

The base flood discharge (100-year flood event) was calculated using the methodology outlined in the United States Geologic Survey (USGS) Open-file Report 79-553 "Magnitude and Frequency of Floods in Western Oregon". The basin area upstream of the project is 3.27 square miles. The discharge for the 100-year flood was calculated to be 637 cfs. See Appendix 2 – Preliminary Hydrology Calculations.

Preliminary Hydraulic Analysis of the Stream for the 100-year Flood Event:

Existing Conditions:

The hydraulic characteristics of the stream were modeled using the HEC-RAS v. 4 beta River Analysis software developed by the USACE Hydrology Engineering Center. Profile data was taken from the USGS topo map (Veneta Quad). Channel cross-section data at the bridge was obtained from the ODOT bridge inspection report. This cross-section data was also used up and down stream of the project. No other on the ground survey data was obtained or used.

The purpose of this analysis was to establish the 100-year flood elevation. The water surface elevation was estimated to be 93.9' at the upstream face of the bridge. This is about two feet below the top of bank elevation.

Design Options:

Option 1 - Proposed 9' Diameter Culvert:

A Biggs Road resident stated during the comment period of a recent Board of Commissioners meeting that he can purchase a surplus 9' diameter culvert at a low price. Based on staff's analysis, if this culvert was installed the 100-year flood event flow would overtop the banks of the stream.

Based on this, this option was not considered to be viable and no cost estimate was prepared.

Option 2 - Proposed Multiple Culverts:

To pass the 100-year flood event flow without a rise in the 100-year flood elevation, four 142" wide x 91" high x 66' long pipe-arch CMP culverts, installed parallel, are required. This would require the channel bottom at the culvert crossing to be widened from 22' wide to 56' wide.

It is estimated that the culverts will have a service life of approximately 50 years.

This option will likely meet fish passage requirements and require Federal and State removal/fill permits and a County flood zone modification permit.

The total cost of Option 2 is estimated to be about \$335,000. As the construction cost of this project, \$245,000, exceeds \$125,000, it may not be eligible to be constructed by County personnel and should be put out for bid and be constructed by a licensed contractor.

Cost Estimate

Option 2 - Multiple Culverts

ITEM NO	ITEM	UNIT	QUANT	UNIT PRICE	COST
MOBILIZATION AND TRAFFIC CONTROL					
1	Mobilization	LS	1	\$10,000.00	\$10,000.00
2	Temporary Protection And Direction Of Traffic	LS	1	\$2,000.00	\$2,000.00
3	Temporary Signs	Sq Ft	25	\$3.00	\$75.00
4	Temporary Plastic Drums	Each	10	\$40.00	\$400.00
6	Erosion Control	LS	1	\$2,000.00	\$2,000.00
7	Sediment Fence, Unsupported	Foot	200	\$4.00	\$800.00
8	Pollution Control Plan	LS	1	\$500.00	\$500.00
9	Work Containment Plan And System	LS	1	\$3,000.00	\$3,000.00
10	Temporary Pedestrian Bridge and Parking	LS	1	\$10,000.00	\$10,000.00
ROADWORK					
10	Removal Of Structures And Obstructions	LS	1	\$5,000.00	\$5,000.00
11	Embankment In Place	Cu Yd	1,076	\$11.00	\$11,836.00
12	Excavation	Cu Yd	1,680	\$9.00	\$15,120.00
BASES					
13	Aggregate Base	Ton	120	\$11.00	\$1,320.00
DRAINAGE					
14	142" Wide x 91" High x 66' Long Pipe Arch Corrugated Metal Culverts	Foot	264	\$575.00	\$151,800.00
RIGHT-OF-WAY DEVELOPMENT AND CONTROL					
15	Fertilizing	lb	1	\$2.00	\$2.00
16	Permanent Seeding, Control Mix	lb	3	\$20.00	\$60.00
				Construction Cost	\$213,913.00
				15% Contingency	\$32,086.95
				25% Engineering cost	\$53,478.25
				15% Permitting cost	\$32,086.95
				<u>Total Cost</u>	<u>\$331,565.15</u>

Option 3 – Bridge Rehabilitation:

This option is to rehabilitate the existing wooden bridge based upon the information provided in the ODOT bridge inspection report. The existing substructure of the bridge would be retained, with the replacement of one wood piling with a steel piling. The existing wood pile caps and decking would be removed and replaced in kind.

ODOT believes that after the bridge is repaired that it would be able to carry emergency vehicles. However, this will only be known after the repairs are completed and ODOT performs an updated load rating.

It is unknown what the service life of the bridge after the rehabilitation will be. But, it is anticipated that the service life of the bridge could be extended up to 5 to 10 years.

This option will likely meet fish passage requirements and will not require Federal, State or County permits. This option will not result in a rise in the 100-year flood elevation.

The total cost of Option 3 is estimated to be about \$70,000.

Cost Estimate

Option 3 - Bridge Rehabilitation

ITEM NO	ITEM	UNIT	QUANT	UNIT PRICE	COST
1	Materials	LS	1	\$7,000.00	\$7,000.00
2	Labor - County	LS	1	\$35,000.00	\$35,000.00
3	Pedestrian Bridge Rental	LS	1	\$5,200.00	\$5,200.00
4	Rock For Temporary Parking Pad	LS	1	\$1,200.00	\$1,200.00
5	Equipment - County	LS	1	\$3,000.00	\$3,000.00
Construction Cost					\$51,400.00
15% Contingency					\$7,710.00
15% Engineering Cost					\$7,710.00
<u>Total Cost</u>					<u>\$66,820.00</u>

Option 4 – Flat Car Bridge:

This option is to replace the existing wooden bridge with a flat car bridge. A flat car bridge is a railroad flat car with the wheels removed and onto which a wood deck and felloes (low profile railing) are constructed. The flat car would be placed by crane onto prefabricated concrete abutments.

The flat car is used train car and is no longer suitable for rail operations. The cars can vary in size, type of construction and condition. The load carrying capacity of each particular car would be determined following an inspection at the owners' site and load rating by a licensed Professional Engineer prior to installation. The existing "as-is" flat car may need to be modified to handle HS15 (27 ton) loading and the Oregon legal permit truck loads at operating stress levels. It is estimated that this cost will not exceed \$10,000.

It is estimated that the service life of the flat car will be about 20 to 30 years and that the bridge deck will have a service life of about 15 to 20 years. The approximate cost to replace the deck alone in today's dollars is about \$8,000.

This option will meet fish passage requirements. Although this option will not result in a rise in the 100-year flood elevation, a County flood zone modification permit will be required as this new construction is within the mapped 100-year flood hazard zone.

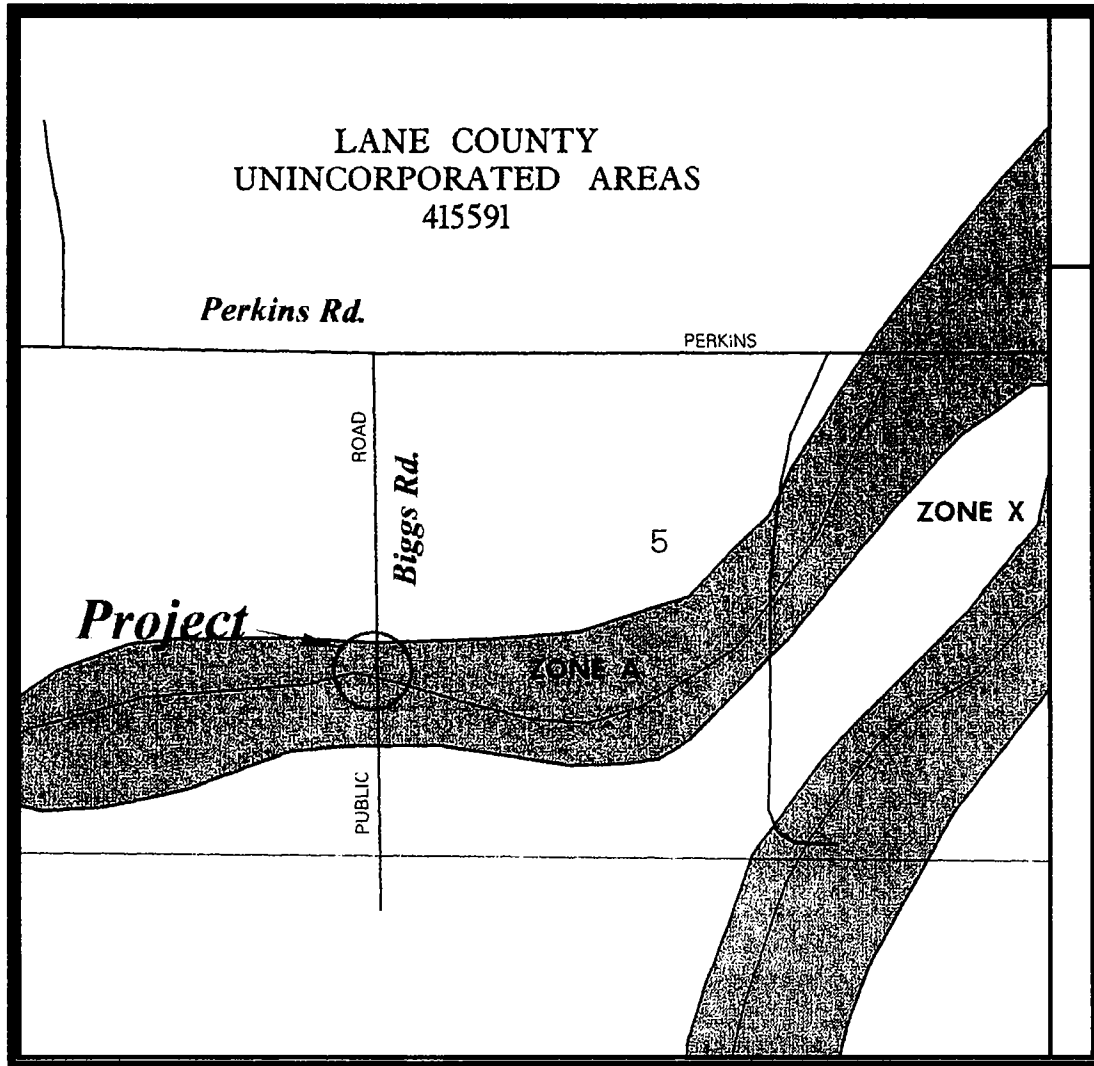
The total cost of Option 4 is estimated to be about \$135,000.

Cost Estimate

Option 4 - Flat Car Bridge

ITEM NO	ITEM	UNIT	QUANT	UNIT PRICE	COST
1	Flat Car	LS	1	\$25,000.00	\$25,000.00
2	Prefabricated Abutments	LS	1	\$3,000.00	\$3,000.00
3	Pedestrian Bridge Rental	LS	1	\$5,200.00	\$5,200.00
4	Crane	LS	1	\$5,000.00	\$5,000.00
5	Rock For Temporary Parking Pad	LS	1	\$1,200.00	\$1,200.00
6	Labor - County	LS	1	\$25,000.00	\$25,000.00
7	Equipment - County	LS	1	\$5,000.00	\$5,000.00
8	Update Rail car To Handle Legal Loads	LS	1	\$10,000.00	\$10,000.00
9	Load Rating	LS	1	\$6,000.00	\$6,000.00
Construction Cost					\$85,400.00
15% Contingency					\$12,810.00
25% Engineering Cost					\$21,350.00
15% Permit Cost					\$12,810.00
<u>Total Cost</u>					<u>\$132,370.00</u>

Appendix 1 – Flood Zone Map



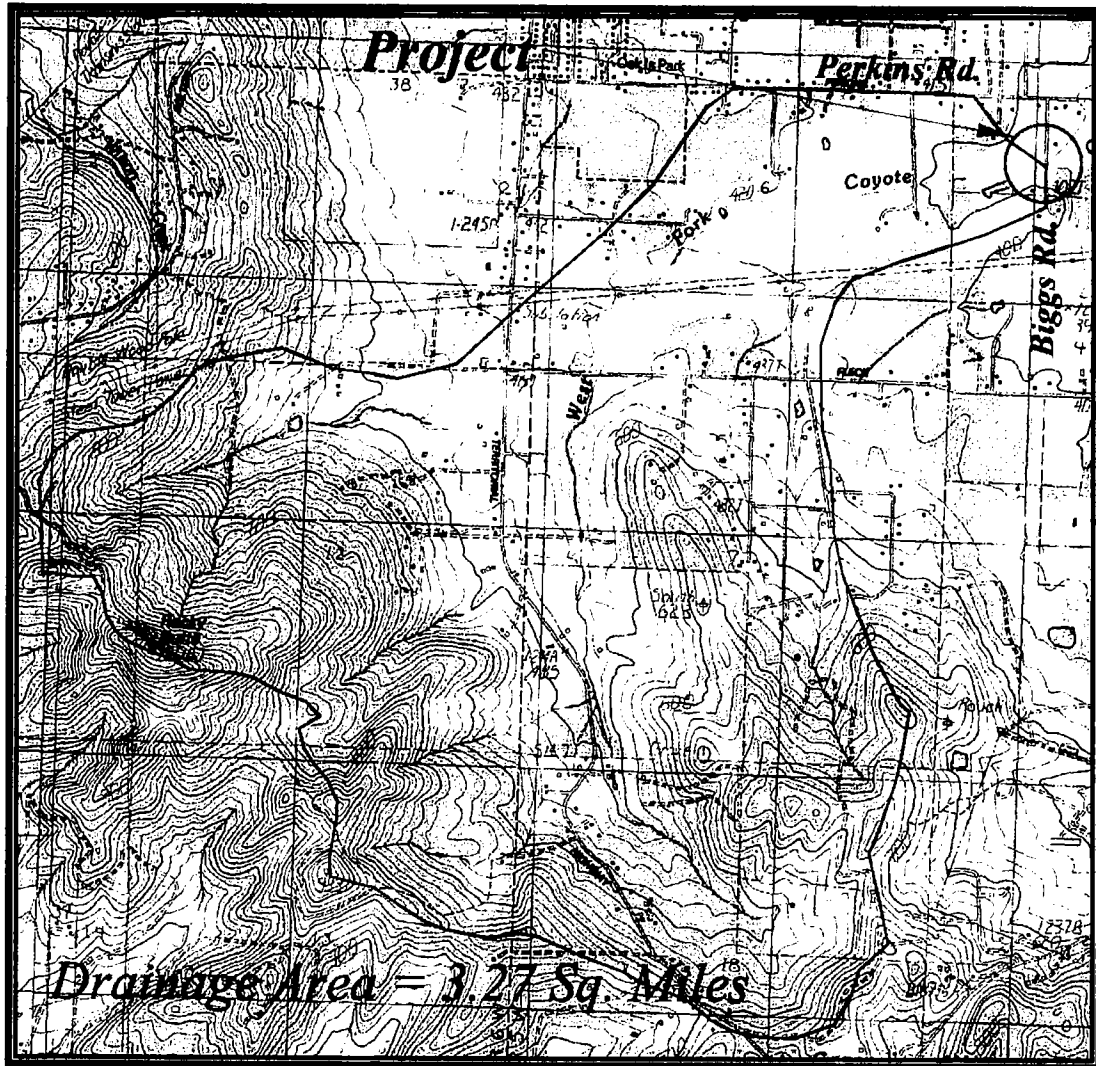
Vicinity Map

0' 400'

Biggs Road, MP 0.2
Bridge Repair/Replacement

FIRM No. 41039C1087 F

Appendix 2 – Hydrology Calculations



Vicinity Map

0' 2000'

Biggs Road, MP 0.2
Bridge Repair/Replacement

USGS 7.5' Quad, VENETA
Scale: 1:24000

**Peak Discharges For Selected Design Storm Frequencies
Using The USGS Methodology From "Magnitude
Frequency Of Floods In Western Oregon" as shown in Table 1**

Given:

Project Name: Biggs Willamette Region
Project No. 8043-2
USGS Quad Name Veneta
Drainage Area, A= 3.27 Square Miles
Precipitation Intensity, I= 3.5 Inches

Peak Discharge for 2 year storm:

$$Q_{2YR} = 8.70A^{0.87}I^{1.71} = 208 \text{ cfs}$$

Peak Discharge for 5 year storm:

$$Q_{5YR} = 15.6A^{0.88}I^{1.55} = 308 \text{ cfs}$$

Peak Discharge for 10 year storm:

$$Q_{10YR} = 21.5A^{0.88}I^{1.46} = 380 \text{ cfs}$$

Peak Discharge for 25 year storm:

$$Q_{25YR} = 30.3A^{0.88}I^{1.37} = 478 \text{ cfs}$$

Peak Discharge for 50 year storm:

$$Q_{50YR} = 38.0A^{0.88}I^{1.31} = 556 \text{ cfs}$$

Peak Discharge for 100 year storm:

$$Q_{100YR} = 46.9A^{0.88}I^{1.25} = 637 \text{ cfs}$$

