CLACKAMAS COUNTY BOARD OF COUNTY COMMISSIONERS

Planning Session Worksheet

Presentation Date: March 12, 2019 **Start Time**: 1:30 PM **Approx Length:** 30 minutes

Presentation Title: Update and Findings of the Canby Ferry Alternatives Feasibility Study

Department: Department of Transportation and Development

Presenters: Mike Bezner, Assistant Director – Transportation; Randy Harmon- Transportation Operations Manager

Other Invitees: Dan Johnson, Director; Steve Williams, Principal Transportation Planner

WHAT ACTION ARE YOU REQUESTING FROM THE BOARD?

Direct Staff on whether to explore measures to cut the cost and/or increase the revenue of operating the Canby Ferry.

EXECUTIVE SUMMARY:

Each year, a fiscal decision is made to continue operation of the Canby Ferry, even though the revenue brought in from the ferry does not cover the costs. Although the Canby Ferry is an important part of the identity of the Canby area, it costs the county an average of approximately $400,000 more per year than is received in revenue from the $5 per trip toll. This shortfall is funded by the Road Fund.

DTD has completed the Canby Ferry Alternatives Feasibility Study (final report attached) to determine whether building a new bridge constructed and maintained using revenues from tolls would be feasible. While it is financially feasible, the potential traffic impacts to the surrounding communities resulted in an overwhelming negative reaction from the public and the Board decided not to consider the bridge option further. The Board also does not want to continue operating with the current shortfall and has discussed considering other options.

Staff have begun to consider possible ways to close the ferry's current operating shortfall. Ideas include:

- Decrease the number of ferry operators required from 2 to 1
- Increase cost of punch card from $3 a trip to $4 a trip (still a $1 discount)
- Decrease weekday operating hours at non-peak times
- Close operations during winter months
- Decrease weekend operating hours and open at 10 AM
- Form a funding district to supplement fares
- Seek contributions from the neighboring cities
- Eliminate cash sales
- Advertise and market the Canby Ferry
- Increase fares for bikes/pedestrians and/or vehicles

Staff intends to continue analyzing these options and can begin implementing some of them relatively quickly. Others, like forming a new district, would require much longer to implement.

FINANCIAL IMPLICATIONS (current year and ongoing):

Not taking action will result in an average of $400,000 of Road Fund continuing to fund the ferry's shortfall after fare revenue.

STRATEGIC PLAN ALIGNMENT

This aligns with the County Performance Clackamas Goals of:

- Build a Strong Infrastructure
- Ensure Safe, Healthy and Secure Communities

This aligns with the DTD Strategic Business Plan purpose for Transportation Maintenance:

- The purpose of the Transportation Maintenance program is to provide repair, maintenance, preservation and emergency response services to the public so they can live, work, recreate and travel safely on a well-maintained County transportation system.

LEGAL/POLICY REQUIREMENTS:

None at this time.

PUBLIC/GOVERNMENTAL PARTICIPATION:

This project has included a very active public participation process including three public meetings, post card announcements for the meetings, project website and spoken, written and online comments that have been received.

OPTIONS:

1. Direct staff to explore and/or implement one or more of the above options to decrease the funding shortfall.
2. Close the ferry.

RECOMMENDATION:

Direct staff to explore and/or implement one or more of the above options to decrease the funding shortfall, and ask Staff to give the Board an update on progress in six months.

ATTACHMENTS:

- Canby Ferry Alternatives Feasibility Study: Final Report

SUBMITTED BY:

Division Director/Head Approval _____

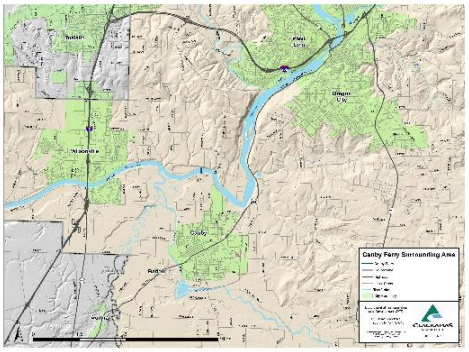
Department Director/Head Approval _____

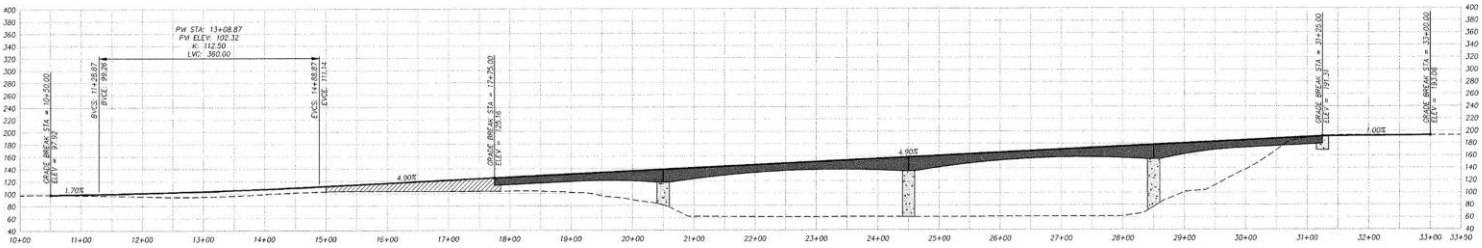
County Administrator Approval _____

For information on this issue or copies of attachments, please contact Mike Bezner @ 503-742-4651

Canby Ferry Alternatives Feasibility Study

Final Report





March 6, 2019

CLACKAMAS COUNTY

Department of Transportation and Development

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Canby Ferry Alternatives Feasibility Study

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Canby Ferry Alternatives Feasibility Study

I. EXECUTIVE SUMMARY

The Canby Ferry Alternatives Feasibility Study is the result of a year-long process to identify potential alternatives to the Canby Ferry for a crossing of the Willamette River at the existing ferry location. The study incorporates findings from technical reports for bridge design, cost and revenue estimates, bonding scenarios, traffic impacts, and tolling considerations. The study also documents public input received.

The Canby Ferry has been in operation for over 100 years. However, the ferry service has limitations that reduce its reliability as a transportation link. The ferry's limitations include that it cannot be safely operated in inclement weather or when the river is above 70 feet, limiting it to about 225 days of operations per year. In addition, capacity is limited to 6 cars and the length of a trip including loading and unloading limits the ferry to an average of 74 trips per day across the river. Due to these limitations and the relatively high cost of maintenance and personnel in recent years the ferry's expenses have exceeded revenue by about $400,000 per year.

Due to these issues Clackamas County decided to study the feasibility of alternatives to the Canby Ferry to provide information for consideration by the Board of County Commissioners as they make decisions regarding the ferry. Four alternatives were studied to identify costs/revenues and traffic in the 25-year period from 2025 to 2049:

Alternative #1 – Continue Ferry Operations without any changes to the mode of operation. This alternative assumed that fares would be increased at the rate of inflation and that the current ferry would be replaced between 15 and 25 years in the future. Traffic was assumed to continue at current levels, between 45,000 and 50,000 per year or an average of 200 vehicles per day. Total cost in excess of fares to continue ferry operation from 2025 to 2049 was estimated to be $16,452,986.

Alternative #2 – Discontinue ferry operations. This alternative analyzed the costs involved in decommissioning the ferry and removing or changing signs and landside facilities that are currently in place to support the ferry. Also included was the anticipated cost of reimbursing Federal Highway Administration for a proportional share of a previous grant. It was estimated the total cost to discontinue ferry operations would be $1,860,000.

Alternative #3 – Build a bridge using existing funding sources such as state and federal grants, and county road funds. The bridge that was analyzed for this alternative connected Mountain Road at the top of the bluff on the north side of the Willamette River with Locust Street at the top of the bluff on the south side of the river. The bridge as analyzed had 2 travel lanes, 2 shoulder/bike lanes, and a sidewalk for a total deck width of 50 feet. The bridge was estimated to have a span of 1,350 feet. The estimated cost for this alternative included all costs for the planning, design, permitting and construction of a bridge, a contingency and the estimated cost of maintaining the bridge from 2025 to 2049. These costs were determined to be far in excess of the county's ability to pay for the bridge from existing funding sources. The total of all costs was $56,472,423.

Alternative #4 – Build a toll bridge. In this alternative the bridge described in Alternative #3 would be funded and built using bonds, and tolls would be implemented on the bridge to provide an on-

going revenue source and also to manage traffic. Total cost for the bridge - including all development and construction costs, maintenance, and debt service - was $106.8 million. Three toll scenarios were analyzed: Low traffic resulting in no more than 3,000 vehicles per day across the bridge; moderate traffic resulting in no more than 4,000 vehicles per day across the bridge; high traffic resulting in no more than 6,000 vehicles per day across the bridge. The toll revenue analysis showed that the low traffic scenario was a "break-even" scenario generating about $100,000 more revenue than expenses incurred over 25 years. The moderate traffic scenario resulted in revenue in excess of expenses of $13.9 million over 25 years. The high traffic scenario resulted in revenue in excess of expenses of $36.9 million over 25 years.

The following describes in greater detail the study approach, findings and public input that was received.

II. STUDY PURPOSE, PROCESS, AND ASSUMPTIONS

Purpose

Clackamas County undertook a feasibility study of potential alternatives for crossing the Willamette River between West Linn and Wilsonville due to three primary limitations of the Canby Ferry as a transportation mode:

- The ferry can't operate in inclement weather or when the Willamette River level is above 70 feet. As a result of these limitations and maintenance needs the ferry has operated for an average of 224 days per year in the last 5 years.
- The ferry has limited capacity and can hold only six vehicles at a time, depending on the size of the vehicle. In addition, the time required to load, cross the river and unload has limited the ferry to an average of 75 river crossings per day. Due to these functional limitations the ferry has only served an average of 200 vehicles per day.
- The ferry is currently not financially sustainable. **Table #1**, below, shows ferry expenses and revenue for the most recent three years. Under current operations and funding, the ferry's expenses have exceeded revenue by about $400,000 per year.

Table #1: Canby Ferry Expenses and Revenues for the Past Three Years

Expenses/Revenue	2014/2015	2015/2016	2016/2017	Annual Average
Ferry Operating Expenses	$107,044	$109,012	$92,852	$102,969
Ferry Labor Expenses	$385,604	$364,657	$324,576	$358,279
20 Year Avg Maintenance Expenses	$99,005	$99,005	$99,005	$99,005
Total Annual Expenses	$591,653	$572,674	$516,433	$560,253
Fare Revenue	$167,197	$158,524	$152,945	$159,555
Revenue Shortfall	-$424,456	-$414,150	-$363,488	-$400,698

Process

The purpose of the Canby Ferry Alternatives Feasibility Study was to identify and analyze alternatives using a consistent approach that would provide comparable information on all the alternatives that the Board of County Commissioners could use in making decisions regarding the future of the Canby Ferry. The issues of financial feasibility and traffic were identified as the most important issues. The study was not intended to be a step towards the implementation of any of the alternatives, and was not intended

to comprehensively study all issues related to any of the alternatives. The process used for the study was to make the best use of existing county resources while using consultant services to analyze specific technical questions.

1. **Technical Reports by Consultants:** Clackamas County retained consulting firms in four areas of specialization:
   - Harper Houf Peterson Righellis Inc. identified bridge design options and preliminary cost estimates for a bridge
   - GeoDesign reviewed existing records to identify geotechnical issues that could affect bridge design or cost
   - DKS Associates performed traffic forecasting and analysis
   - EcoNorthwest evaluated tolling scenarios for revenue generation and traffic management

2. **Clackamas County Role:** Clackamas County staff took on several roles in the study:

   - Traffic data collection using on-call data collection firms
   - Supplemental traffic analysis of traffic forecasting data provided by DKS Associates
   - Analysis of Canby Ferry ridership, cost and revenue data
   - Bonding analysis by the Clackamas County Finance Department and their bond counsel PiperJaffray & Co.
   - Public engagement including the project website, social media, three public meetings which were streamed on Facebook Live. A summary of public input received through the study process is presented in Section IV.

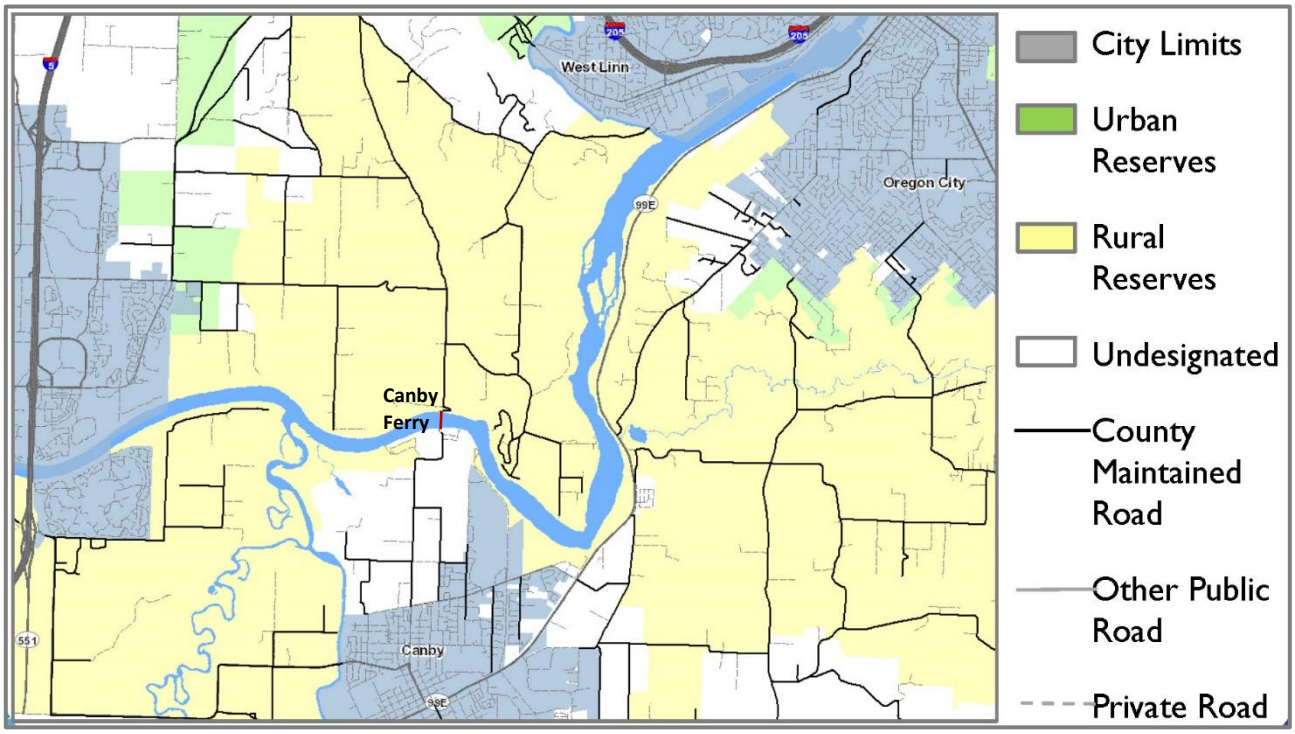
3. **Board of County Commissioners Review:** The Board of County Commissioners was engaged throughout the course of the study. Policy sessions were held with the Board of County Commissioners at the beginning of the study and prior to each of the public meetings. The study findings were presented to the Board on January 30, 2019 and a policy session is being held on March 12, 2019 to receive Board direction based on the study findings and public input.

Assumptions

Certain assumptions were made in analyzing the alternatives such that all would be developed on a consistent basis and would be comparable.

- **Analysis Horizon:** A 25-year time frame (2025 to 2049) was selected to apply to the three options for crossing the Willamette River (continue operation of Canby Ferry, provide a bridge from existing funding sources, provide a bridge funded by bonds with revenue from tolls) to provide like-for-like comparisons of the alternatives.
- **Future Costs/Revenues** – Costs and revenues were inflated in the future years at an annual rate of 1.75% across all the alternatives.
- **Location:** It was originally anticipated that if the decision was made to proceed with a bridge that further studies would analyze possible bridge locations other than the present location of the Canby Ferry. During the course of the study, it was determined that the Canby Ferry location is the only one meeting current requirements of Oregon land use law as the surrounding area is a designated "rural reserve" in which new roads are not permitted. As any other bridge location between Oregon City and Wilsonville would require such new roads, no alternative bridge sites were considered. **Map #1** below depicts the location of designated rural and urban reserves surrounding the Canby Ferry.

Map #1: Rural and Urban Reserves



Finding: The current location is the only location at which a new bridge could be built without requiring new roads and without the requirement of a Goal Exception.

III. ALTERNATIVES

Four alternatives were identified as described below, three of which would entail a crossing of the Willamette River at the present ferry location, and one of which would remove a river crossing at this location entirely.

Alternative #1 – Continue Ferry Operations

Alternative #1 analyzed the cost of continued operation of the Canby Ferry through the period from 2025 to 2049. Inflation is assumed for both annual costs and revenues at a rate of 1.75%. The fares are assumed to be increased from current rates ($5 for a single trip, $3 with the purchase of a punch card, $2 per bicycle or pedestrian) due to inflation. It was also assumed that costs for personnel and benefits, and annual operating costs would also increase at the rate of inflation, as would the maintenance costs. In addition, it is assumed that if ferry operations continue, that the ferry will reach of the end of its life during this 25-year period and require replacement. The current ferry was put into service in 1996, is currently 23 years old and will be 54 years old by the end of the period. The lifecycle of the ferry is not known, but Marion County recently replaced a similar ferry that was 50 years old. For the purposes of this analysis it was assumed that the ferry would be replaced in 2035 at a cost of $2.5 million. However, the year when a replacement ferry is required could be sooner or later in the period. **Table #2**, below, shows the forecast of annual revenue, operating/personnel expenses, maintenance expenses, and ferry replacement.

Table #2: 2025 to 2049 Forecast of Canby Ferry Annual Revenue and Costs

Year	Annual Revenue	Operating / Personnel Cost	Maintenance Cost	Total Annual Cost	Net
2025	$159,555	-$510,248	-$99,005	-$609,253	-$449,698
2026	$162,347	-$519,177	-$100,738	-$619,915	-$457,568
2027	$165,188	-$528,263	-$102,500	-$630,763	-$465,575
2028	$168,079	-$537,508	-$104,294	-$641,802	-$473,723
2029	$171,020	-$546,914	-$106,119	-$653,033	-$482,013
2030	$174,013	-$556,485	-$107,976	-$664,461	-$490,448
2031	$177,059	-$566,223	-$109,866	-$676,089	-$499,031
2032	$180,157	-$576,132	-$111,789	-$687,921	-$507,764
2033	$183,310	-$586,215	-$113,745	-$699,960	-$516,650
2034	$186,518	-$596,473	-$115,736	-$712,209	-$525,691
2035	$189,782	-$606,912	-$117,761	-$724,673	-$534,891
2036	$193,103	-$617,533	-$119,822	-$737,354	-$544,251
2037	$196,482	-$628,339	-$121,919	-$750,258	-$553,776
2038	$199,921	-$639,335	-$124,052	-$763,388	-$563,467
2039	$203,419	-$650,524	-$126,223	-$776,747	-$573,328
2040	$206,979	-$661,908	-$128,432	-$790,340	-$583,361
2041	$210,601	-$673,491	-$130,680	-$804,171	-$593,570
2042	$214,287	-$685,277	-$132,966	-$818,244	-$603,957
2043	$218,037	-$697,270	-$135,293	-$832,563	-$614,526
2044	$221,853	-$709,472	-$137,661	-$847,133	-$625,281
2045	$225,735	-$721,888	-$140,070	-$861,958	-$636,223
2046	$229,685	-$734,521	-$142,521	-$877,042	-$647,357
2047	$233,705	-$747,375	-$145,015	-$892,390	-$658,686
2048	$237,795	-$760,454	-$147,553	-$908,007	-$670,213
2049	$241,956	-$773,762	-$150,135	-$923,897	-$681,941
	$4,950,586	-$15,831,699	-$3,071,874	-$18,903,573	-$13,952,986
			Ferry Replacement (2035)		-$2,500,000
			Total Revenue - Costs		**-$16,452,986**

Finding: 1) Continued current operations of Canby Ferry without any modification or additional revenue sources will result in a cost of $13,952,986 for the period between 2025 and 2049 that must be subsidized from the county Road Fund. 2) If operation of the Canby Ferry continues the current ferry boat must be replaced at some point in the 25-year period between 2025 and 2049 at an estimated cost of $2.5 million.

Alternative #2 – Discontinue Ferry Operations

Alternative #2 would stop ferry operations by the year 2025 and not replace it with any other option for crossing the Willamette River. Although this is the least expensive of the four alternatives that were studied, there are costs including decommissioning the ferry vessel, removing associated facilities, and changing or removing ferry signage. This alternative could also result in a requirement to reimburse some grant funds Clackamas County received from the Federal Highway Administration (FHWA) in 2011/12. **Table #3**, below, summarizes the costs to stop ferry operations.

Table #3: Cost to Discontinue Ferry Operations

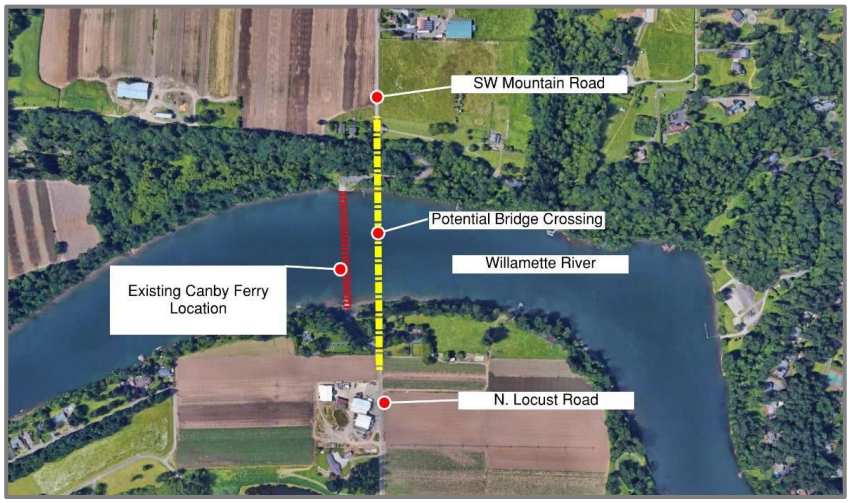
Expense	Cost
Decommission vessel, remove facilities and signage:	-$1,500,000
Reimburse FHWA (6 years at $60,000)	-$360,000
Total Cost	**-$1,860,000**

Finding: Discontinuing operation of Canby Ferry without replacing it with any other crossing of the river would require the lowest investment on the part of the county.

Alternative #3 – Build Bridge using Existing Funding Sources

Alternative #3 analyzed the development of a new bridge using existing funding sources at a location adjacent to the Canby Ferry. Alternative #3 is based on preliminary conceptual design alternatives and is intended to provide a planning level cost estimate to establish capital construction costs and long term maintenance costs of a potential bridge.

Location



Location and existing conditions are critical components of planning and estimating the cost of a bridge. The bridge as evaluated for this study would connect Locust Street at the top of the bluff on the south side of the Willamette River with Mountain Road at the top of the bluff on the north side of the river. Since Locust Street and Mountain Road are offset from the actual location of the Canby Ferry landings on either side of the river, the bridge as evaluated would be about 200 feet east of the ferry location. The bridge would be approximately 70-100 feet tall and have a span of 1,350 feet over the Willamette River from bluff top to bluff top. The bridge would have up to two supporting piers in the river and would be built to withstand a major earthquake.

Typical Section

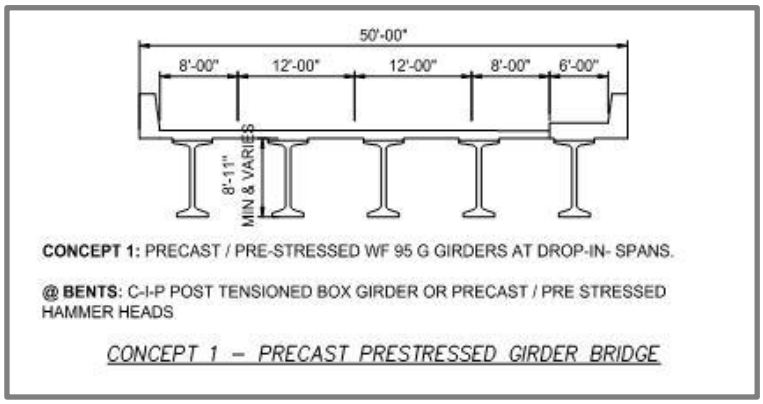
A 50-foot typical section was used as a basis of the conceptual design and the cost estimate for the analysis. The 50-foot section used for this analysis is based upon input from Clackamas County engineering staff. The section includes two 12-foot lanes; two 8-foot should/bike lanes, a six-foot sidewalk on one side of the bridge and 2 feet on each side of the section for a railing.

Bridge Alternatives

Working with Clackamas County staff, the consultant team developed alternative bridge concepts for crossing the Willamette River utilizing the preliminary plan and profile that was completed. These

options were solely developed to help estimate the cost of a potential bridge crossing. These alternatives are conceptual and further field investigation and data would be necessary to advance either option. However, if the option to construct a bridge would be moved forward, two concepts that could be considered are briefly described as follows:

Concept 1: Precast Prestressed Girder Bridge: As shown at right, this concept is a five span bridge using precast prestressed girders as drop in spans between cast-in-place post tensioned box girders cantilevered over the supports. The concept requires two instream supports (**Diagram #1**, following page).



The precast prestressed girder bridge is economical for spans up to 250 feet with deeper sections. To take advantage of these spans, a hybrid structure would be proposed to take advantage of the maximum girder lengths with cast-in-place post-tensioned box girder and the precast girders as drop-in spans. A few advantages of this option include:

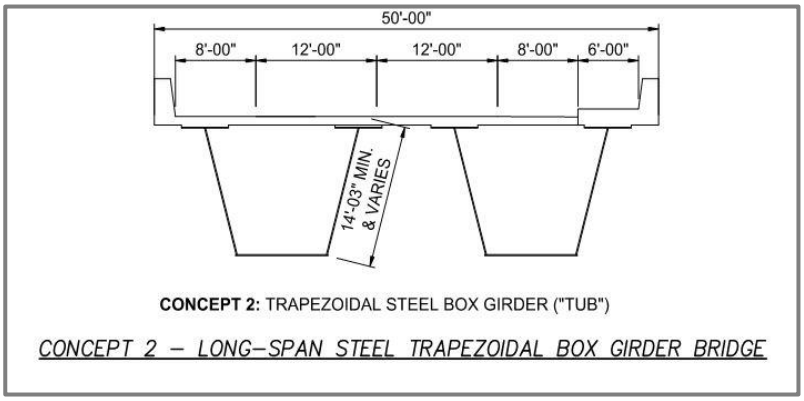
- Girders are cast in highly controlled environment ensuring high quality
- Comparatively cheaper than steel
- Low maintenance

Potential disadvantages of this option include:

- Heavier girders and more expansive transportation costs
- More bents would be required and therefore could limit available navigable envelope for commercial and recreational usage
- Needs formwork to support the cast-in-place box girder
- Limited method of erection; girders must be picked up off barges with heavy lifting cranes
- Longer construction time waiting for concrete to cure
- Post tensioning of the entire bridge could be required for continuity

Concept 2: Long-Span Steel Trapezoid Box Girder Bridge - As shown to the right, this concept calls for the two center spans being constructed using trapezoidal steel box girders. The approach spans could be constructed with either prestressed concrete girders or steel girders. The concept requires one instream support (**Diagram #1**, following page)

In general, steel box girders are economical for span lengths greater than 300 feet. In this particular location, there will be only one support in the river which offers the following advantages:



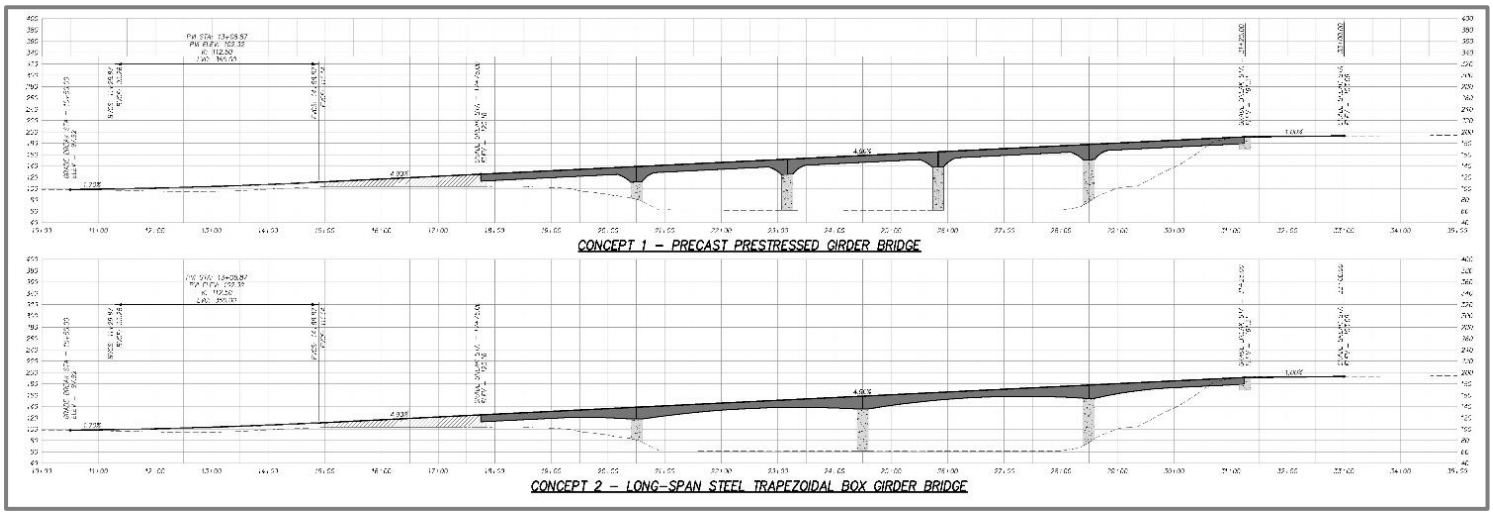
- Wider envelope for ships and boats for navigational purposes
- Limited environmental impact to the river
- Minimize very expensive substructure costs
- Erection can be easily accomplished, i.e. pushing the girders from the upper head
- Members are easily transported and assembled onsite

Disadvantages include:

- Greater degree of inspection required
- Higher maintenance costs

Diagram #1, below shows the elevation view of the two bridge concepts that were evaluated by the consultant team.

Diagram #1: Bridge Concepts



Geotechnical Considerations:

Several high-level geotechnical considerations were identified by the consultant team as follows:

- The foundation loads for the structure would be high; deep foundations would be required. Given the soil conditions and liquefaction susceptibility of the shallow sandy soil and non-plastic silt (if present below groundwater level), 5- to 6-foot-diameter drilled caissons (shafts) would likely be required for foundation support.
- The preliminary work indicates that the abutments on the south bank would be up to approximately 20 feet high. The alluvial silts are moderately compressible, and surcharging or other type of ground improvement would likely be needed to control settlement with 20-foot-tall embankments.
- There are mapped landslides in the area. While none is shown in the proposed bridge location, further reconnaissance and research would be needed. This is particularly true on the north bank of the river, where existing grades are steep. These steep slopes on the north bank may affect designs for the structures.

Planning Level Cost Estimate:

The planning level cost estimate for a bridge at Canby Ferry is shown below. The cost of the structure is $400 per square foot. This would assume a precast prestressed girder bridge with two instream supports and five total spans as shown in Concept 1. Final design of the bridge would be needed to refine the alternatives once the geotechnical field investigations were complete, as the substructure of the bridge

Planning Level Cost Estimate

Construction Phase

Roadway Sections

	Width (ft)	Length (ft)	Calculated Area (sf)	Estimated Unit of Roadway	Estimated Unit Cost of Roadway	Estimated Cost
SW Mountian Road Approach	40	400	16,000	$ 10	$ 400	$ 320,019
N. Locust Street Approach	40	800	32,000	$ 10	$ 400	$ 640,037
		Total	1,200	48,000		
					Subtotal	**$960,056**

Bridge Section

	Width (ft)	Length (ft)	Calculated Area (sf)	Estimated Unit of Bridge		Estimated Cost
Precast Prestressed Girder Bridge	50	1,350	67,500	$ 400.00		$ 27,000,000
					Subtotal	**$ 27,000,000**

Miscellaneous Potential Budget Items

		Quantity	Unit	Unit Price	Estimated Cost
Mobilization Costs	Budget Item Only	1	LS	2,000,000	$ 2,000,000
Traffic Control	Budget Item Only	1	LS	300,000	$ 300,000
Stormwater Treatment Facilities	Budget Item Only	1	LS	200,000	$ 200,000
Wetland Mitigation (Banking Fund)	Assume 0.5 acre	0.5	Acre	185,000	$ 92,500
MSE Retaining Walls		600	S.Y.	450	$ 270,000
Reconstruct SW Mountain Road Frontage Road	Budget Item Only	1	LS	50,000	$ 50,000
SW Mountain Road Turnaround	Budget Item Only	1	LS	30,000	$ 30,000
N. Locust Street Turnaround	Budget Item Only	1	LS	30,000	$ 30,000
Holly Street/Terrritorial Road Intersection Improvements	Budget Item Only	1	LS	600,000	$ 600,000
Mountain Road/Advance Road Intersection Improvements	Budget Item Only	1	LS	600,000	$ 600,000
Erosion Control	Budget Item Only	1	LS	100,000	$ 100,000
Demolition of Structures and Obstructions	Budget Item Only	1	LS	50,000	$ 50,000
Signing and Striping	Budget Item Only	1	LS	185,000	$ 185,000
				Subtotal:	**$ 4,507,500**

Construction Phase Subtotal: $ 32,467,556

Right-of-Way (Budget Purposes Only)

		Quantity	Unit Price	Estimated Cost
Potential ROW Costs		1	1,600,000	$ 1,600,000
			Right-of-Way Total	**$ 1,600,000**

Subtotal Project Cost (Construction and ROW) $ 34,067,556

30% Contingency $ 10,220,267

Total Project Cost with Contingency $ 44,287,823

Design Phase Services

						Estimated Cost
Engineering	9.00%					$ 3,066,080
Surveying	1.00%					$ 340,676
Right-of-Way Services	0.50%					$ 170,338
Construction Project Management	10.00%					$ 3,406,756
					Design Total:	**$ 6,983,849**

Total Project Estimate: $ 51,271,672

system would have an impact on the overall cost, and Concept 2, which includes the steel box girder with less supports could be cost competitive. The cost estimate methodology used to estimate construction costs is based upon a unit cost basis and general budgetary assumptions at the planning level of development similar to a scoping type estimate for a TSP or other programmatic estimating tool. Design phase costs include engineering, surveying, right of way acquisition services and construction project management.

Finding: A new bridge at Canby Ferry would cost $51.3 million including all design, environmental/permitting, right-of-way and construction including a 30% contingency. If the bridge project moves forward at some point the development process would result in refined cost estimates and identification of right-of-way needs.

Bridge Maintenance Cost

Maintenance costs of the bridge were considered in the overall feasibility analysis of the project. A 30-year period was used to forecast maintenance costs for the analysis. The bridge could be designed with a life span of 75-100 years, but the maintenance costs are ongoing. For the planning level estimate, it was assumed that the capital costs of the initial construction would be satisfied in the first 30-year period and a second reconstruction cost of some elements might be required at the 20-year mark of the bridge. Reviewing a Life Cycle Cost Analysis summary completed by PennDOT, the 20-year cost was estimated in the range of 12 percent of the original construction cost of the structure. Using an estimated initial cost of $35.1 million for the bridge structure ($27 million plus a 30% contingency), the consultant team estimated the present day cost of the future 20-year maintenance at $4.2 million. Bridges can last 75 – 100 years or even longer today. The maintenance costs during the initial 20 years of bridge life are very low. For cost analysis purposes, an annual contribution to a reserve fund of $210,000 was included in the cost of the bridge to create a fund sufficient to pay for the reconstruction that would be needed around the 20-year point of the bridge life.

Finding: Annual maintenance cost of a new bridge at Canby Ferry might be expected to cost about $4.2 million for the first 20 years of bridge use with most of that cost being for rehabilitation/reconstruction at about 20 years.

Bridge Planning, Environment/Permitting and Design Process

There are a number of required studies and design steps that must be completed before construction can begin on a bridge. The following is a list of the most significant of these:

1. Planning
    a. Amend Clackamas County Transportation System Plan
2. Environmental Review and Permitting
    a. Oregon Department of Land Conservation & Development Review
    b. US Coast Guard: River Users Survey and Navigation Baseline Report
    c. Oregon Department of State Lands: Section 401 permit
    d. US Corps of Engineers: Section 404 permit
    e. Oregon Department of Fish & Wildlife: Review under Fish Passage Law
    f. Oregon Department of Environmental Quality: Endangered Species & Migratory Bird Treaty Acts
    g. Oregon Department of Environmental Quality: 1200c Stormwater Permit
    h. Oregon Historic Preservation: Historic and Cultural Review
    i. Native American Tribes coordination

3. Design/Engineering
    a. Type, size and location study (Preliminary Engineering)
    b. Final Plan preparation and review
    c. Bid Letting

Finding: Steps needed for the construction of a new bridge at Canby Ferry would require between 5 and 7 years to complete.

Financing Bridge Development

The funding sources available to Clackamas County to pay for the bridge described in this alternative are very limited. Three main sources are available:

> **Clackamas County Road Fund** – The Clackamas County Road Fund comes from three sources: 1) State gas tax revenue, 2) Vehicle registration fees, 3) Weight-mile taxes on heavy trucks. Altogether the county receives about $25 million per year from those sources. A large majority of those funds are used to maintain the 1,400 miles of roads in the Clackamas County road network.
>
> **Grants or Special Funds** – Clackamas County is eligible to apply for several types of grants or special funds to pay for capital transportation system improvements. Sources are primarily from either the State of Oregon or from US Department of Transportation. This location is outside the Metro area and so this project is not eligible for any of the funds administered by Metro. The main limitation on the use of grant funds for a project of this type is it is far too expensive. Most grants are limited to projects costing less than $10 million and in many cases there is a required match of at least 50% of the total project cost.
>
> **Bonding and Tolling** – The third approach to paying for a new bridge would be to bond for costs associated with development and construction, and implement toll collection to pay-off the bonded indebtedness and all maintenance and operating costs. Alternative #4 focuses on this funding source.

Finding: Existing revenue sources or grants/special funds would not be sufficient to fund construction of a new bridge at Canby Ferry. Tolling is the only source studied that would be sufficient to fund bridge development, construction, maintenance and operations.

Traffic Use of a New Bridge at Canby Ferry

The travel demand model was used by the consultant team to analyze traffic across a bridge at the Canby Ferry if that bridge was free for any user of the road. That analysis showed that demand would exceed 16,200 vehicle trips per day with many hours in the morning and afternoon peak periods exceeding 1,000 vehicle trips per hour. This very high level of traffic would exceed the safe capacity of Holly Street/Locust Street and Mountain Road, and would result in very high traffic levels on other connecting roads. As a result, staff does not recommend that a bridge be built at Canby Ferry without the use of traffic management that would limit traffic to lower levels.

Finding: Traffic on a new bridge at Canby Ferry without traffic management, such as tolling, would exceed the safe capacity of the road.

Alternative #4 – Build a Toll Bridge

Alternative #4 analyzes the feasibility of constructing the bridge analyzed in Alternative #3 through bonding and implementation of tolls to provide a revenue stream to cover the cost of bonded indebtedness as well as the maintenance of the bridge and operating costs for the toll system.

Cost of a Toll Bridge

The bridge concept that was analyzed as a toll bridge is the same bridge concept described previously in Alternative #3. The process for planning, environmental assessment/permitting, design and construction for the bridge would be the same as the cost of the bridge previously shown in Alternative #3: $51.2 million. However, additional costs for construction and for annual operations and maintenance result from the addition of the toll system, and those addition cost depend on the type of toll collection system that would be selected. There are two primary methods of toll collection in use today that were evaluated for this project.

Toll transactions can be cash or electronic. There are variations on each approach to toll collection, each with implications for design, hardware requirements, software, staffing, enforcement, customer services and other aspects of toll system implementation. The many design decisions must mesh with the operating environment and the physical constraints of the facility. These planning-level concepts cannot substitute for more detailed engineering-based estimates of toll system design that would be required as part of final bridge design. The following summarizes the analysis of toll collection systems prepared by the study consultant team:

All Cash Toll Collection - In the case of an all cash toll system the transactions would be handled through a physically staffed toll station with a point-of-sale system. Regular users might be offered pre-sale books of tickets at a discounted value. Tickets would speed up the transaction process by eliminating the handling of cash. A toll station and enough right-of-way at the bridge approaches would be required to manage vehicle queues during high use periods.

All cash transactions result in less capital outlay for toll technology and supporting infrastructure with a capital cost of about $1.3 million. The trade-off is that staffing levels are higher in order to support the handling of cash transactions. Based on research into the costs of toll system operations of other toll systems the average per-transaction cost to handle the cash transactions would be expected to be $1.06. Total estimated cost to operate an all cash toll collection system with one million transactions would be $1,060,000.

Electronic Toll Collection (ETC) - An electronic toll collection scenario eliminates cash transactions entirely. This approach eliminates a physical toll station where users stop to pay tolls, and all vehicles can use the bridge without slowing or queuing. In ETC, regular users would make use of inexpensive in-vehicle toll tags that are linked to pre-paid or debit-based accounts. Less frequent users could simply drive across the bridge and video tolling and license plate matching technology would identify the vehicle for mail-based fee processing. This approach is currently implemented for the SR 520 Bridge in the greater Seattle area and is the direction being pursued for future operations on the Bridge of the Gods in Cascade Locks and the Hood River Bridge. Since this involves both toll tags and video tolling, the technology requirements are greater than for cash only transactions. The average cost of equipment for ETC that includes video toll collection is $3.74 million for two lanes, including right-of-way, equipment and extension of power and fiber optic communications to the bridge.

The total cost for the bridge including the toll equipment and related expenses is estimated to be $55,006,823. However, the cost per transaction for ETC including video tolling is much less than the cost per transaction of all cash tolling. The cost of an electronic toll transaction using a toll tag is only about $0.18. Processing of video-based transactions is a more costly than toll tags at about $0.57 per transaction. Data from other toll systems shows that when tolls are collected only with ETC/video tolling, 60% of all user will be charged via a transponder, 35% of users will be charged using video tolling and 5% of users will not be able to be charged using either system. This 5% of users are those without a toll transponder, and also without a license plate or whose license plate was obscured or unreadable by the video toll system. The 5% of users who could not be charged with either system would have the same transaction cost of video toll collection since those users would be analyzed by the video system before determining that they could not be charged. Based on those rates, total cost for toll collection for one million transactions would be (600,000 transaction X $0.18/ETC transaction) + (400,000 transactions X $0.57/video toll transactions) or $336,000. The cost per million transactions for ETC would be 31.7% of the cost of all cash toll collection.

For the purposes of this feasibility analysis, ETC including video tolling was identified as the toll collection option that would provide the best customer experience because there would be no delay when passing through the toll collection. It was also identified as the most financially sustainable due to the fact that ETC toll collection would only cost 31.7% of the cost of all cash toll collection.

Finding: If tolling were to be implemented on a bridge at the Canby Ferry, the recommended toll collection method would be Electronic Toll Collection, including video tolling, due to much lower costs for annual operations.

Cost of Bond Financing

In many cases, governments that own and operate bridges use bond financing to pay for the development and construction of the bridge, with tolls collected to pay the costs of the bond financing as well as annual operating and maintenance costs. The total cost of principal and interest can have a very large effect on the financial feasibility of a toll bridge project and represent up to 80% of annual costs. As a result, the cost of the bond financing is one of the most critical issues for determining the financial feasibility of a bond funded bridge. For this feasibility analysis staff from the Clackamas County Department of Transportation and Development worked with the Director of the Clackamas County Department of Finance and PiperJaffray, Co, the county's bond counsel, to evaluate approaches to bond financing of the Alternative #4 toll bridge. Four types of bonds were analyzed:

- **Full Faith and Credit Bonds:** A general obligation municipal bond that is payable from the municipality's general funds and backed by the full faith and credit of the municipal issuer.
- **Double Barreled Full Faith and Credit Bond:** A municipal bond in which the interest and principal payments are pledged by two distinct entities – revenue from a defined project and the issuer and its taxing power. In the event that the project cash flow falls short, the issuer covers the payments promised to the bond's lenders and investors.
- **Revenue bonds:** Bonds backed by the revenue generated by the specific project being financed by the bond issue. In other words, the money raised by the bond offering finances the project and the project – once complete - generates the revenues to pay the interest and principal on the bonds.

Bond alternatives were analyzed by calculating all costs for each of the four types of bonds, for four terms (20 years, 25 years, 30 years and 40 years) and incorporated all other costs typically assessed in the issuance for each type of bond. In all cases it was assumed that the bonds would be offered in 2022 and the interest rate used was 2.00% above the current market for that type of bond. **Table #4,** below, depicts the type of bond, term, true interest cost, cost of insurance, capitalized interest fund, debt service reserve fund and net debt service for the full bond term for all bond alternatives considered for this project.

Table #4: Bonding Alternatives

Type of Bonding	Length of Bonding (years)	True Interest Cost	Estimated Cost of Insurance	Capitalized Interest Fund	Debt Service Reserve Fund	Net Debt Service over Full Term
Full Faith and Credit	20	5.29%	624,400	9,614,560	-	99,460,253
Full Faith and Credit	25	5.47%	628,850	10,052,405	-	115,721,298
Full Faith and Credit	30	5.58%	632,000	10,366,598	-	133,232,136
Full Faith and Credit	40	5.72%	635,650	10,726,351	-	168,610,913
Revenue Bonds	20	5.29%	709,250	10,921,366	7,092,500	105,889,553
Revenue Bonds	25	5.47%	714,950	11,428,922	7,149,500	124,421,488
Revenue Bonds	30	5.59%	713,950	11,710,521	6,768,768	143,730,482
Revenue Bonds	40	5.72%	712,200	12,081,121	6,286,123	182,628,180
Double Barrel Full Faith and Credit	20	5.46%	589,100	6,118,566	-	97,525,397
Double Barrel Full Faith and Credit	25	5.68%	592,600	6,466,307	-	113,528,561
Double Barrel Full Faith and Credit	30	5.81%	595,050	6,707,329	-	130,766,854
Double Barrel Full Faith and Credit	40	5.97%	597,650	6,964,396	-	166,663,397
Double Barrel Full Faith and Credit	20	5.50%	527,300	-	-	92,770,881
Double Barrel Full Faith and Credit	**25**	**5.68%**	**527,300**	**-**	**-**	**106,776,741**
Double Barrel Full Faith and Credit	30	5.81%	527,300	-	-	121,813,750
Double Barrel Full Faith and Credit	40	5.97%	527,300	-	-	153,184,776

The Double Barrel Full Faith and Credit bonds with a 25 year term and no capitalized interest (boldface) was identified as the best option. Capitalized interest fund is interest that would accrue in the period after the bonds are offered but before revenue generation supports debt service payments. While removing the capitalized interest fund decreases both the average annual debt service, and the net debt service over the full term, it means the county would have to fund all construction costs through some other means and then offer the bonds once the toll bridge is open and generating revenue. This could be done by either financing construction from county reserves and then paying off those reserves with the proceeds from the bonds, or borrowing to pay for construction from the Oregon Transportation Infrastructure Bank operated by Oregon Department of Transportation. The full amortization table for the selected alternative is shown below in **Table #5.**

Table #5: Amortization Table for Double Barreled, Full Faith and Credit Bonds, No Capitalized Interest, 25-year Term, Current Market Rates plus 2.0% (5.68% true interest cost)

Period Ending	Principal	Interest	Total Debt Service	Net Debt Service
2025	-	2,811,602.78	2,811,603	2,811,603
2026	-	2,942,375.00	2,942,375	2,942,375
2027	270,000	2,942,375.00	3,212,375	3,212,375
2028	470,000	2,931,818.00	3,401,818	3,401,818
2029	690,000	2,912,689.00	3,602,689	3,602,689
2030	800,000	2,883,847.00	3,683,847	3,683,847
2031	920,000	2,849,607.00	3,769,607	3,769,607
2032	1,045,000	2,809,311.00	3,854,311	3,854,311
2033	1,180,000	2,762,390.50	3,942,391	3,942,391
2034	1,330,000	2,708,110.50	4,038,111	4,038,111
2035	1,485,000	2,645,600.50	4,130,601	4,130,601
2036	1,655,000	2,566,895.50	4,221,896	4,221,896
2037	1,845,000	2,477,691.00	4,322,691	4,322,691
2038	2,045,000	2,376,585.00	4,421,585	4,421,585
2039	2,260,000	2,263,496.50	4,523,497	4,523,497
2040	2,490,000	2,137,388.50	4,627,389	4,627,389
2041	2,735,000	1,997,201.50	4,732,202	4,732,202
2042	3,000,000	1,841,853.50	4,841,854	4,841,854
2043	3,235,000	1,669,953.50	4,904,954	4,904,954
2044	3,485,000	1,483,294.00	4,968,294	4,968,294
2045	3,750,000	1,280,815.50	5,030,816	5,030,816
2046	4,035,000	1,061,815.50	5,096,816	5,096,816
2047	4,340,000	824,961.00	5,164,961	5,164,961
2048	4,660,000	569,769.00	5,229,769	5,229,769
2049	5,005,000	295,295.00	5,300,295	5,300,295
	52,730,000	54,046,741.28	106,776,741	106,776,741

For the purposes of this feasibility study, it was determined that this bonding analysis was sufficient to establish approximate costs for both the annual debt service and net debt service over the full term of the bonding. There are many variables that would have to be considered in a bonding analysis that could only be approximated at this point. For example, any variation of the net interest cost from the rate assumed in this analysis would greatly impact both the annual debt service and net debt service over the full term of the bonds. This analysis is only a starting point of a full analysis of the approaches to bonding that could be used if the county were to decide to proceed with a toll funding bridge, and shows that it would be possible for the county to fund this bridge through bonding based on reasonable assumptions. If the county were to decide to proceed, a fuller analysis of bond funding would be conducted after the majority of the environmental and design process was complete. This would provide much better information on the estimated costs and expected interest rates and other terms for the bonding.

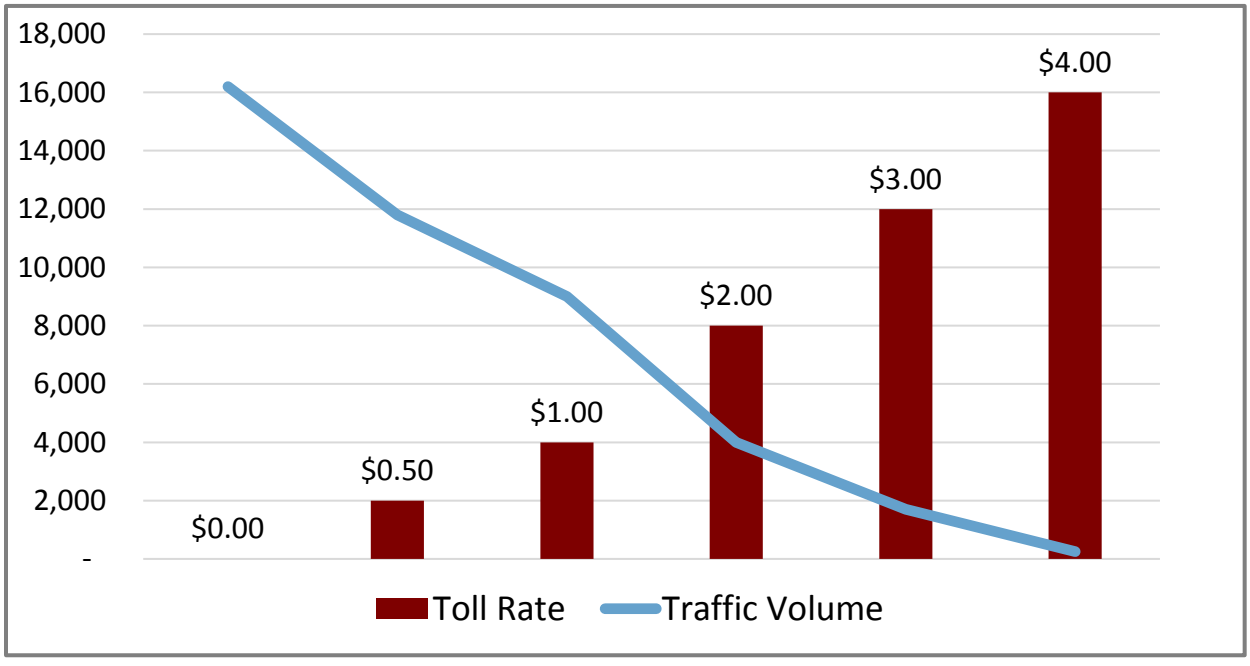
Finding: Based on the planning level cost estimates for the bridge and bonding analysis, the optimum bonding scenario would take 25 years to pay off the bonds, and payment of $54,046,741 in interest.

Toll Bridge Costs and Revenues Analysis

Analysis of the costs and revenues for a toll bridge is complex. Some of the costs, such as annual debt service and annual maintenance costs, would be fixed. However, the cost of toll operations and the toll revenue would vary based on the level of traffic on other parallel routes, the travel time savings gain by users of the toll bridge, and the sensitivity of users to the additional cost of the tolls. Annual use and revenue of a possible toll bridge at Canby Ferry was analyzed using two models by the consultant team: The current Metro regional travel demand model for 2027, and ECONorthwest's Toll Optimization Model.

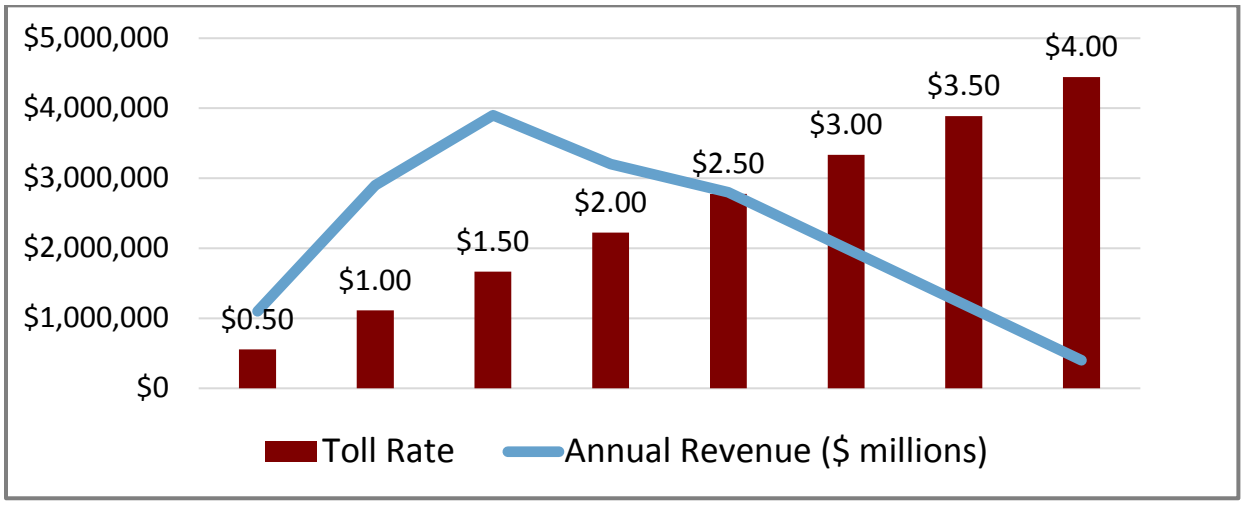
As a first step, a bridge at Canby Ferry was added into the Metro model so that the use of the bridge could be modeled. The sensitivity of users to the additional cost of tolls is analogous to increasing the travel time for the toll bridge. For this analysis, the toll sensitivity was determined by running the 2027 model for a base case (no-toll) and for levels of increased travel time at the toll bridge that equaled tolls of $0.50, $1.00, $2.00 and $3.00. The resulting traffic estimate for each model run was provided to ECONorthwest for incorporating into the Toll Optimization Model. Using the regional travel demand model and the toll optimization modeling tools in tandem permitted measurement of the effects of many more toll scenarios than is possible or economical using the regional model. This approach also allowed extrapolation and interpolation of toll effects for other toll scenarios. **Chart #1**, below, shows the forecast daily traffic at a Canby Ferry bridge for each toll rate. **Chart #2,** on the following page shows the expected annual revenue in 2027 for toll rates from $0.50 to $4.00.

Chart #1: 2027 Effect of Toll Rate on Traffic Volume



As shown in **Chart #2**, below, as the toll rate increased, revenue would increases only up to a point. In this analysis, it was found that a toll rate of $1.50 would result in the maximum revenue generated. As the toll rate increased over $1.50, overall revenue would decrease as fewer motorists would choose to use a toll bridge.

Chart #2: 2027 Annual Revenue by Toll Rate



The objectives for toll collection have an important impact on the tolling strategy that is developed. Some agencies may use toll collection to fund construction and on-going maintenance/operations of a bridge. Other agencies use toll collection exclusively to manage traffic. The objective established for the toll collection analyzed in the study is as follows:

> *Identify a toll rate structure that would provide sufficient toll revenue to pay all costs of the toll bridge, including debt service, maintenance and annual operations, while minimizing hourly and daily traffic.*

Based on data from the toll optimization model, three toll/traffic scenarios were tested to determine both the annual toll revenue and hourly/daily traffic volumes that would be expected.

Low Traffic Scenario

- Increase over existing 2018 traffic counts of no more than 200 vehicles per hour or 3,000 vehicles per day
- Toll rate in peak hours (7 – 9 am and 3 – 6 pm) of $3.50
- Toll rate in mid-day (9 – 3 pm) of $2.50
- Toll rate overnight (6 pm to 7 am) of $1.50

Moderate Traffic Scenario

- Increase over existing 2018 traffic counts of no more than 300 vehicles per hour or 4,000 vehicles per day
- Toll rate in peak hours (7 – 9 am and 3 – 6 pm) of $3.00
- Toll rate in mid-day (9 – 3 pm) of $2.00
- Toll rate overnight (6 pm to 7 am) of $1.25

High Traffic Scenario

- Increase over existing 2018 traffic counts of no more than 600 vehicles per hour or 6,000 vehicles per day
- Toll rate in peak hours (7 – 9 am and 3 – 6 pm) of $2.00
- Toll rate in mid-day (9 – 3 pm) of $1.25

- Toll rate overnight (6 pm to 7 am) of $1.25

The three scenarios were then analyzed using data from the toll optimization model to determine the hourly traffic volumes that could be expected to use a toll bridge at Canby Ferry in all 24 hours of the average weekday. The results of that traffic analysis are shown below in **Table #6**.

Table #6: 2027 Hourly/Daily/Annual Traffic for Low, Moderate and High Traffic Scenarios

	Low Traffic Scenario	Moderate Traffic Scenario	High Traffic Scenario
12 AM	36	42	42
1 AM	30	35	35
2 AM	27	31	31
3 AM	18	33	33
4 AM	78	91	91
5 AM	113	113	279
6 AM	108	216	465
7 AM	197	336	558
8 AM	231	203	420
9 AM	194	307	307
10 AM	131	230	230
11 AM	161	215	241
12 PM	172	202	257
1 PM	180	210	267
2 PM	166	226	305
3 PM	189	249	425
4 PM	209	257	518
5 PM	243	332	581
6 PM	163	103	103
7 PM	144	256	256
8 PM	140	193	193
9 PM	125	163	163
10 PM	103	120	120
11 PM	73	85	85
Daily Weekday Volume	3,231	4,248	6,004
Daily Weekend Volume	2,617	3,441	4,864
Total Annual Trips	1,115,470	1,466,450	2,072,972

Using the optimum bonding scenario, the annual maintenance cost, annual toll operating costs, and toll revenues based on the low, moderate and high toll rates, the costs and revenues were calculated for the full 25-year bonding period: 2025 to 2049. Table #7a shows the full costs and revenues for the Low Traffic Scenario; Table #7b shows the full costs and revenues for the Moderate Traffic Scenario; Table #7c shows the full costs and revenues for the High Traffic Scenario.

Table #7a: Low Traffic Scenario Annual Costs and Revenues: 2025 to 2049

Year	Annual Principal & Interest	Annual Operations and Maintenance	Total Annual Expenses	Total Annual Toll Revenue	Annual Revenue +/-
2025	$2,811,603	$481,157	$3,292,760	$3,295,567	$2,807
2026	$2,942,375	$503,537	$3,445,912	$3,448,850	$2,938
2027	$3,212,375	$549,743	$3,762,118	$3,765,325	$3,207
2028	$3,401,818	$582,163	$3,983,981	$3,987,377	$3,396
2029	$3,602,689	$616,538	$4,219,227	$4,222,824	$3,597
2030	$3,683,847	$630,427	$4,314,274	$4,317,952	$3,678
2031	$3,769,607	$645,104	$4,414,711	$4,418,474	$3,763
2032	$3,854,311	$659,599	$4,513,910	$4,517,758	$3,848
2033	$3,942,391	$674,672	$4,617,063	$4,620,999	$3,936
2034	$4,038,111	$691,053	$4,729,164	$4,733,195	$4,031
2035	$4,130,601	$706,881	$4,837,482	$4,841,606	$4,124
2036	$4,221,896	$722,505	$4,944,401	$4,948,616	$4,215
2037	$4,322,691	$739,754	$5,062,445	$5,066,761	$4,316
2038	$4,421,585	$756,679	$5,178,264	$5,182,678	$4,414
2039	$4,523,497	$774,119	$5,297,616	$5,302,132	$4,516
2040	$4,627,389	$791,898	$5,419,287	$5,423,907	$4,620
2041	$4,732,202	$809,835	$5,542,037	$5,546,761	$4,724
2042	$4,841,854	$828,600	$5,670,454	$5,675,288	$4,834
2043	$4,904,954	$839,398	$5,744,352	$5,749,249	$4,897
2044	$4,968,294	$850,239	$5,818,533	$5,823,493	$4,960
2045	$5,030,816	$860,937	$5,891,753	$5,896,776	$5,023
2046	$5,096,816	$872,233	$5,969,049	$5,974,137	$5,088
2047	$5,164,961	$883,895	$6,048,856	$6,054,012	$5,156
2048	$5,229,769	$894,986	$6,124,755	$6,129,976	$5,221
2049	$5,300,295	$907,054	$6,207,349	$6,212,641	$5,292
	$106,776,747	$18,273,005	$125,049,752	$125,156,354	$106,602

Table #7b: Moderate Traffic Scenario Annual Costs and Revenues: 2025 to 2049

Year	Annual Principal & Interest	Annual Operations and Maintenance	Total Annual Expenses	Total Annual Toll Revenue	Annual Revenue +/-
2025	$2,811,603	$648,563	$3,460,166	$3,733,504	$273,338
2026	$2,942,375	$662,354	$3,604,729	$3,907,156	$302,427
2027	$3,212,375	$676,440	$3,888,815	$4,265,687	$376,872
2028	$3,401,818	$690,824	$4,092,642	$4,517,246	$424,604
2029	$3,602,689	$705,515	$4,308,204	$4,783,981	$475,777
2030	$3,683,847	$720,518	$4,404,365	$4,891,750	$487,385
2031	$3,769,607	$735,840	$4,505,447	$5,005,630	$500,183
2032	$3,854,311	$751,488	$4,605,799	$5,118,108	$512,309
2033	$3,942,391	$767,468	$4,709,859	$5,235,068	$525,209
2034	$4,038,111	$783,789	$4,821,900	$5,362,174	$540,274
2035	$4,130,601	$800,456	$4,931,057	$5,484,991	$553,934
2036	$4,221,896	$817,478	$5,039,374	$5,606,221	$566,847
2037	$4,322,691	$834,862	$5,157,553	$5,740,066	$582,513
2038	$4,421,585	$852,616	$5,274,201	$5,871,387	$597,186
2039	$4,523,497	$870,747	$5,394,244	$6,006,715	$612,471
2040	$4,627,389	$889,264	$5,516,653	$6,144,672	$628,020
2041	$4,732,202	$908,174	$5,640,376	$6,283,852	$643,476
2042	$4,841,854	$927,487	$5,769,341	$6,429,458	$660,118
2043	$4,904,954	$947,210	$5,852,164	$6,513,248	$661,084
2044	$4,968,294	$967,353	$5,935,647	$6,597,358	$661,711
2045	$5,030,816	$987,924	$6,018,740	$6,680,379	$661,639
2046	$5,096,816	$1,008,932	$6,105,748	$6,768,020	$662,272
2047	$5,164,961	$1,030,387	$6,195,348	$6,858,510	$663,161
2048	$5,229,769	$1,052,299	$6,282,068	$6,944,568	$662,500
2049	$5,300,295	$1,074,676	$6,374,971	$7,038,218	$663,247
	$106,776,747	$21,112,663	$127,889,410	$141,787,969	$13,898,559

Table #7c: High Traffic Scenario Annual Costs and Revenues: 2025 to 2049

Year	Annual Principal & Interest	Annual Operations and Maintenance	Total Annual Expenses	Total Annual Toll Revenue	Annual Revenue +/-
2025	$2,811,603	$913,919	$3,725,521.68	$4,526,500	$800,979
2026	$2,942,375	$926,895	$3,869,270.21	$4,737,036	$867,766
2027	$3,212,375	$940,056	$4,152,431.00	$5,171,718	$1,019,287
2028	$3,401,818	$953,404	$4,355,221.65	$5,476,710	$1,121,488
2029	$3,602,689	$966,941	$4,569,629.82	$5,800,099	$1,230,469
2030	$3,683,847	$980,968	$4,664,814.55	$5,930,758	$1,265,944
2031	$3,769,607	$992,245	$4,761,852.24	$6,068,826	$1,306,974
2032	$3,854,311	$1,006,739	$4,861,049.74	$6,205,194	$1,344,144
2033	$3,942,391	$1,019,854	$4,962,244.61	$6,346,997	$1,384,752
2034	$4,038,111	$1,027,172	$5,065,283.16	$6,501,099	$1,435,816
2035	$4,130,601	$1,040,117	$5,170,717.89	$6,650,003	$1,479,285
2036	$4,221,896	$1,056,605	$5,278,500.87	$6,796,983	$1,518,482
2037	$4,322,691	$1,065,491	$5,388,181.62	$6,959,256	$1,571,075
2038	$4,421,585	$1,078,755	$5,500,340.30	$7,118,470	$1,618,129
2039	$4,523,497	$1,091,301	$5,614,797.60	$7,282,541	$1,667,743
2040	$4,627,389	$1,104,264	$5,731,652.87	$7,449,800	$1,718,148
2041	$4,732,202	$1,118,805	$5,851,007.45	$7,618,542	$1,767,534
2042	$4,841,854	$1,130,878	$5,972,731.89	$7,795,075	$1,822,343
2043	$4,904,954	$1,194,321	$6,099,275.22	$7,896,662	$1,797,386
2044	$4,968,294	$1,260,218	$6,228,512.28	$7,998,637	$1,770,124
2045	$5,030,816	$1,329,733	$6,360,548.88	$8,099,292	$1,738,743
2046	$5,096,816	$1,398,427	$6,495,242.51	$8,205,548	$1,710,305
2047	$5,164,961	$1,467,753	$6,632,714.19	$8,315,257	$1,682,543
2048	$5,229,769	$1,543,510	$6,773,279.49	$8,419,595	$1,646,315
2049	$5,300,295	$1,616,283	$6,916,577.83	$8,533,136	$1,616,558
	$106,776,747	$28,224,653	$135,001,400	$171,903,733	$36,902,334

Finding: Assessing tolls on a bridge at Canby Ferry could generate sufficient revenue to cover all costs for the bridge (annual principal and interest, maintenance and operations) at any traffic level above 3,000 vehicles per day or 200 additional vehicles in any single hour.

Toll Bridge Traffic Analysis

In addition to revenue generation, one of the benefits of tolling is that it is a mechanism for managing traffic. As a general rule, users will avoid paying a toll and will only do so when paying the toll and using the toll facility results in a travel time savings. Increasing the toll will lead to fewer people choosing to use the toll facility while decreasing the toll will result in a larger number of people choosing to use the toll facility. Traffic changes due to changes in the toll that is charged not only affect the toll bridge, but also affect the surrounding roads that convey traffic to the toll bridge.

The traffic analysis for the toll bridge focused on four changes in traffic patterns in the Canby area:

1. Traffic changes on roads in the area both north and south of the bridge,
2. Changes in travel time and traffic for trips between Canby and surrounding locations,
3. Cut-through traffic from I-5 or I-205 using the Canby Ferry Bridge,
4. Changes in traffic using the Canby Ferry Bridge in situations when an incident on I-5 or I-205 several reduces travel speeds on the interstate highways.

Changes in Traffic on Surrounding Roads

Changes in traffic on surrounding roads was determined by comparing the travel model traffic forecasts for continued operation of the ferry with the travel model traffic forecasts that assumed addition of a toll bridge. The comparison was carried out using the 2027 travel model in both cases so that the population and employment forecasts and other roadway improvements would be the same in both cases. In all cases the analysis was conducted for the 5 to 6 pm hour due to the fact that it is the highest traffic hour of the day. The travel model traffic forecast that included Canby Ferry was limited to current ridership for the ferry. This was done because analysis of several years of ridership trends showed that the ferry has reached maximum demand based on its capacity and the limits of ferry operations. For the model run that included the toll bridge, the model runs used were those that corresponded to the toll rate in the 5 to 6 pm hour for each of the toll scenarios. **Table #8**, below, shows the changes in traffic on the local roads both north and south of the Willamette River that could be used to access the ferry/bridge.

Table #8: Change in Traffic on Surrounding Roads with the Addition of a Toll Bridge at Canby Ferry

Road Segment	2018 Current Traffic	Additional Traffic with Bridge		
		Low Traffic	Moderate Traffic	High Traffic
Canby Bridge		200	300	650
Holly St N of Territorial	50	200	300	650
Holly St S of Territorial	475	150	250	550
Territorial E of Holly St	575	0	0	100
Mtn Rd S of Hoffman	25	200	300	650
Mtn Rd N of Hoffman	150	200	300	650
Advance Rd	75	50	100	150
Pete's Mountain Rd	125	0	25	25
Stafford Rd S of I-205	1,450	100	200	250
Willamette Falls Dr	600	0	0	0
Knight's Bridge Rd	650	-100	-200	-350
Arndt Rd	1,350	-150	-300	-375
Barlow Rd	750	-150	-200	-175

Finding: Assessing tolls on a bridge at Canby Ferry could be used to manage traffic and limit traffic increases to less than 200 additional vehicles per hour for the Low Traffic scenarios and 300 additional vehicles per hour for the Moderate Traffic Scenario.

Change in Travel Time to Surrounding Communities

Changes in travel time to surrounding communities was analyzed in a similar manner. In this case the travel time to surrounding communities for the 2027 travel model with the Canby Ferry was compared to the travel time to surrounding communities for the 2027 travel model for the toll bridge Low Traffic Scenario. In both cases the 5 – 6 pm peak hour was used for analysis. In all cases travel time was measured from the surrounding communities to the intersection of OR99E/Ivy Rd. The analysis showed a very distinct pattern for the travel to surrounding communities with the addition of a toll bridge at Canby Ferry:

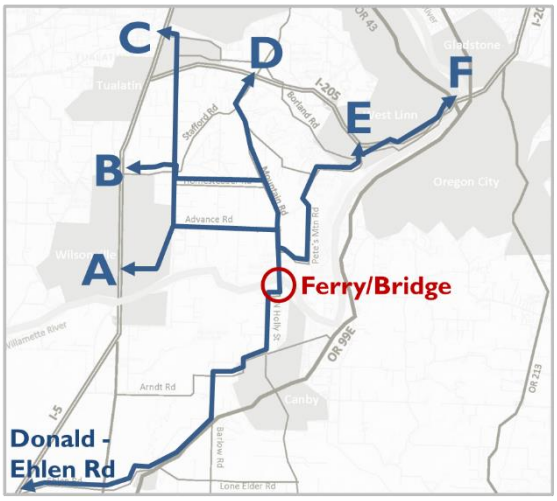
- **Locations East/Northeast of Canby** – For trips to locations east/northeast of Canby, including Oregon City, West Linn, Gladstone or Happy Valley, the use of a toll bridge at Canby Ferry increases travel time by at least 5 minutes in the 5 – 6 pm peak hour. For such destinations OR 99E continues to be the route with the shortest travel time.
- **Wilsonville** - Travel time was analyzed for trips to Wilsonville locations such as the intersection of Wilsonville Road/Town Center Loop, Boeckman Road/Boones Ferry Road or Elligsen Road/I-5 interchange. In all three cases use of a toll bridge at Canby Ferry resulted in a decrease in travel time of 2 minutes to the intersection of OR99E/Ivy Rd in the center of Canby. Although trips between the three Wilsonville locations and other locations in Canby may show decreases in travel time that are more or less than 2 minutes depending on conditions, it is clear that a toll bridge at Canby Ferry would provide only a marginal benefit for travel between Wilsonville locations and Canby. Roads serving the trip between a toll bridge at Canby Ferry and those Wilsonville locations would experience a traffic volume increase of less than 50 vehicles per hour, or less than one vehicle per minute in the 5 – 6 pm peak hour.
- **Locations Northwest of Canby** – The travel time analysis showed the greatest benefit for travel between Canby and locations north or west of Canby in the I-5 or OR 217 corridor such as Tualatin, Tigard, Beaverton or Hillsboro. Such trips during the 5 – 6 pm peak hour showed travel time benefits of more than 10 minutes. The reason for this large travel time benefit is that trips would be shifted off the current route that follows I-5 to OR551 (Hubbard Cutoff) to Arndt Road, and shifts trips onto I-205 to Stafford Rd to Mountain Road and then across the Willamette River on the toll bridge an into Canby. The volume of traffic that would be shifted is about 150 vehicles per hour during the 5 to 6 pm peak hour or an average of 2½ vehicles every minute.

Finding: Addition of a toll bridge at Canby Ferry provides a travel time benefit in the 5 – 6 pm peak hour of 2 minutes for trips between Wilsonville and Canby, and 10 minutes or more for trips between locations in Tualatin, Tigard, Beaverton or Hillsboro and Canby.

Cut-Through Traffic Avoiding I-5/I-205

A large concern on the part of staff and members of the public was the amount of traffic that would use a possible toll bridge at Canby Ferry to avoid congestion on I-5 and/or I-205. Such cut-through traffic was analyzed by comparing travel times between locations on I-5 and/or I-205, and travel time between those same locations using the Canby Ferry bridge. In all cases travel time was analyzed for trips between locations on I-5 or I-205 and the Donald/Ehlen Road interchange on I-5. Six routes were identified that could use a possible toll bridge at Canby Ferry to travel between a location on I-5 or I-205 north of the Willamette River to the I-5/Donald-Ehlen Road interchange as shown in **Map #2** below. In all cases the travel time on the cut-through route was between 7 minutes and 15 minutes longer than

Map #2: I-5/I-205 Cut-through Routes



the travel time between the same locations using I-5 and/or I-205. Further analysis showed that this travel time difference was primarily due to consistent delay on OR99E at Barlow Road and in Aurora, and on Ehlen Road at OR551 and at the I-5 interchange.

An additional analysis was conducted to determine if the cut-through routes identified above provided any travel time reduction in cases when an incident occurs on I-5 and/or I-205 resulting in very slow travel on the interstates. That analysis showed that travel on the interstates remained faster than the use of the cut-through routes. This was because incidents on I-5/I-205 force traffic off the interstates onto other routes, greatly increasing traffic on those routes and creating higher than usual levels of congestion and traffic delay. The analysis showed that in the case of an incident on I-5/I-205 traffic volume across a toll bridge at Canby Ferry would be higher than under typical conditions, but that increase was due to additional travel between Canby and other locations shifted to the Arndt Road/OR551 (Hubbard Cut-off)/I-5 route. There was no additional cut-through traffic using a toll bridge at Canby Ferry to avoid travel on I-5.

Finding: Using a toll bridge at Canby Ferry to cut-through between locations on I-5 and I-205 takes between 7 minutes and 15 minutes longer than staying on the interstates in both normal 5 – 6 pm travel and highly congested 5 – 6 pm travel resulting from an incident. There would be no travel time benefit to cut-through using a toll bridge at Canby Ferry to travel between locations on I-5 and I-205.

IV. PUBLIC ENGAGEMENT

The Canby Ferry is an important tradition to many people in the Canby area, so even though the purpose of this project was a feasibility study of options for crossing the Willamette River at the ferry location, extensive efforts were made to inform people about the study, and what might or might not happen as a result of the study.

Since this feasibility study focused on gathering information to provide to the Board of Could Commissioners on financial and traffic impacts of continuing the ferry (or not) and/or constructing a bridge at the ferry location, public engagement focused on the first three stages in the IAP2 (International Association of Public Participation) Spectrum of Public Participation:

- Inform – Provide the public with balanced and objective information to assist them in understanding the problem, alternatives, opportunities and/or solutions
- Consult – Obtain public feedback on analysis, alternatives and/or decisions
- Involve – Work directly with the public throughout the process to ensure that public concerns and aspirations are consistently understood and considered.

Inform

From the beginning, the study focused on sharing information not only on what the study was about, but also on what the study was *not* about. Knowing that it was likely people some people would jump to

the conclusion that the county had already decided to close the ferry, an attempt was made to be very clear and straightforward about the fact that the purpose of the study was to gather data to provide the Board with information, not to make any recommendations. Initial public outreach efforts included:

- Postcard mailing to over 6,000 addresses in Canby and the area surrounding the ferry crossing. The purpose was to let people know that the study was going to begin and the purpose of the study, and to inform them about a public meeting they could attend to learn more about the study components, meet the staff involved and ask questions, the project website, and the chance to give input through an online survey.
- A website was created including an overview of the study components and timeline, information about upcoming meetings and materials from past meetings, and the opportunity to provide input and ask questions.
- Meetings were held with City of Canby staff and other stakeholders to provide a more in-depth look at the plans for the study and learn about the perspectives of different stakeholders.
- Public meeting/open house #1 (June 2018) - The meeting was publicized by a mailing to area addresses, a news release, website information, social media, and contacts with government and community organizations. More than 250 people attended the meeting and received a handout on the planned study and information boards with details on the history and status of the Canby Ferry, the components of planned traffic analysis, and plans to research the possibilities of a bridge and of tolling.
- Email updates were sent to those who provided their email address and requested to be included on the email list, either online, by email or at a public meeting. Information was provided to keep them informed about the progress of the study and encourage their feedback and questions.

Consult

While no final decisions or recommendations were to be made as a result of this study, there was an expectation that people interested in the Canby Ferry and transportation in the Canby/West Linn/Wilsonville area of the county would share ideas, concerns and suggestions to help make sure that the study addressed the variety of issues of interest. Several opportunities for the submission of such suggestions were made available:

- Online questionnaire – Before and after the first Public Meeting in June 2018 a questionnaire was posted the project website requesting that people tell staff their three major questions were about the upcoming study. More than 400 people responded with extensive and sometimes detailed comments that provided a great deal of insight into the issues and questions of people in the area of the Canby Ferry.
- Information in the media, in county publications and at events such as the County Fair, included messages encouraging people to respond to the questionnaire described above.
- A presentation to the Canby Chamber of Commerce was made to provide information and to gain perspective from the business community regarding the issues addressed in the study.
- Public meeting #2 was held in January 2019 to share the finding of the study. The focus of the meeting was a detailed review of the findings followed by questions and comments. Once again a large number of people attended (more than 175) to hear about the findings and share concerns. In addition, the meeting was streamed on Facebook Live so that people who were not able to attend could watch and ask questions, and the video was posted online for viewing later.

Involve

Throughout the process the public was encouraged to ask questions, share concerns and make suggestions. This was especially important in the latter part of the project when the preliminary results of the analysis were reviewed at a public meeting in January 2019.

- Board of Commissioners policy sessions and a planning session were held both to inform the commissioners and allow them to ask questions, discuss and provide direction, and also to demonstrate to the public that the process was transparent, that no decisions were made in advance and that public sentiment can make a difference.
- News releases, social media and emails sent to everyone on the interested parties list were used to let them know about the various meetings, information available online and next steps.
- The Board of Commissioners conducted a Listening Session in Canby to give the public a chance to share comments and ask questions about the study and the future of the Canby Ferry with the Board of County Commissioners. More than 75 people attended to discuss ideas for how to reduce ferry expenses and/or increase revenue. Once again, the meeting was streamed on Facebook Live and the video is posted online for those who were unable to attend.

Summary of Public Input

There were several issues raised throughout the process:

- A very large percentage of those that participated were opposed to a bridge at Canby Ferry. The people that expressed this view were primarily concerned about the additional traffic that would occur on Holly Street, Locust Street, Mountain Road and other connecting roads if a bridge were to be built. Traffic related concerns that were expressed included increased traffic noise, safety and loss of property value.
- A large percentage of those that participated expressed support for continued operation of the Canby Ferry and suggested various methods for either increasing revenue or decreasing the cost of ferry operations.
- A somewhat smaller group of people expressed that the county should close Canby Ferry due to the on-going expense, but not replace it with a bridge.
- A small group of people expressed support for a bridge at Canby Ferry due to perceived benefits for Canby.

V. Summary of Findings

The following findings represent the conclusions of this Canby Ferry Alternatives Feasibility Study

- The current location of the Canby Ferry is the only location at which a new bridge could be built without requiring new roads and without the requirement of a Goal Exception.
- Continued current operations of Canby Ferry without any modification or additional revenue sources would result in a cost of $13,952,986 for the period between 2025 and 2049 that would have to be subsidized from the county Road Fund.
- If operation of the Canby Ferry continued, the current ferry boat will have to be replaced at some point in the 25 year period between 2025 and 2049 at an estimated cost of $2.5 million.
- Discontinuing operation of Canby Ferry without replacing it with any other crossing of the river would require the lowest investment on the part of the county.

- A new bridge at Canby Ferry would cost $51.3 million including all design, environmental / permitting, right-of-way and construction including a 30% contingency. As the bridge project moved forward the development process will refine cost estimates and identification of right-of-way needs.
- Total maintenance cost of a new bridge at Canby Ferry would cost about $4.2 million for the first 20 years of bridge use with most of that cost being for rehabilitation/reconstruction at about 20 years.
- Steps needed for the construction of a new bridge at Canby Ferry would require between 5 and 7 years to complete.
- Existing revenue sources or grants/special funds would not be sufficient to fund construction of a new bridge at Canby Ferry. Tolling is the only funding source studied that would be sufficient to fund all costs of development, construction, maintenance and operations of a bridge.
- If tolling were to be implemented to generate revenue and/or manage traffic on a bridge at Canby Ferry the toll collection method used should be Electronic Toll Collection including video tolling due to much lower costs for annual operations.
- Traffic on a new bridge at Canby Ferry without traffic management, such as tolling, would exceed the safe capacity of the road.
- If tolling were to be implemented on a bridge at Canby Ferry, the Electronic Toll Collection including video tolling should be used due to much lower costs for annual operations.
- Capital costs for Electronic Toll Collection including video tolling would be $3.74 million.
- Based on the planning level cost estimates for the bridge and bonding analysis, the optimum bonding scenario would take 25 years to pay off the bonds, and payment of $54,046,741 in interest.
- Assessing tolls on a bridge at Canby Ferry could generate sufficient revenue to cover all costs for the bridge (annual principal and interest, maintenance and operations) at any traffic level above 3,000 vehicles per day or 200 additional vehicles in any single hour.
- Assessing tolls on a bridge at Canby Ferry could be used to manage traffic and limit traffic increases to less than 200 additional vehicles per hour for the Low Traffic scenarios and 300 additional vehicles per hour for the Moderate Traffic Scenario.
- Addition of a toll bridge at Canby Ferry provide would a travel time benefit in the 5 – 6 pm peak hour of 2 minutes for trips between Wilsonville and Canby, and 10 minutes or more for trips between locations in Tualatin, Tigard, Beaverton or Hillsboro and Canby.
- Using a toll bridge at Canby Ferry to cut-through between locations on I-5 and I-205 would take between 7 minutes and 15 minutes longer than staying on the interstates in both normal 5 – 6 pm travel and highly congested 5 – 6 pm travel resulting from an incident. There would be no travel time benefit to cut-though using a toll bridge at Canby Ferry to travel between locations on I-5 and I-205.

Table 9, on the following page, summarizes the financial analysis of the Canby Ferry alternatives that were the subject of this study. All costs and revenues are cumulative for the 25 year period from 2025 to 2049.

Table #9: Summary of Financial Analysis for Canby Ferry Alternatives Studied over 25 years

Alternative	Cost (debt service + operations + maintenance)	Revenue	Net Revenue
1. Continue operation of Canby Ferry	($21,403,573)	$4,950,586	($16,452,986)
2. Stop operations of Canby Ferry	($1,860,000)	-	($1,860,000)
3. Build a Bridge using existing funding sources	($51,271,672)	-	($51,271,672)
4. Bridge funded by Tolling			
a. Low Traffic Toll Bridge	($125,049,752)	$125,156,354	$106,602
b. Moderate Traffic Toll Bridge	($127,889,410)	$141,787,969	$13,898,559
c. High Traffic Toll Bridge	($135,001,400)	$171,903,733	$36,902,334