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DATE: November 12, 2014 **ECO Project #: 21827**

TO: Salem River Crossing Project Management

FROM: Nick Popenuk

SUBJECT: SALEM RIVER CROSSING - REVENUE PROJECTIONS

1. Introduction

The Oregon Department of Transportation (ODOT) asked ECONorthwest, as part of the CH2M Hill team, to evaluate the revenue generating potential of several funding mechanisms under consideration for the Salem River Crossing locally preferred alternative (LPA).

The LPA was selected for study in the Salem River Crossing Final Environmental Impact Statement by the project Oversight Team on February 6, 2014. The LPA may be built in sequential construction phases and would connect Hope Ave at Wallace Rd on the west, cross Wallace Marine Park at its northern tip, cross the Willamette River and McLane Island, cross over a realigned Front St, and connect to Pine and Hickory St at Commercial St on the east. The bridge could be a single structure or two side-by-side structures.[1]

This memorandum presents preliminary revenue projections for the purpose of allowing stakeholders to make decisions about which local funding sources should be used to fund the Salem River Crossing project.

This memorandum has the following sections:

- **Framework** provides a context for thinking about transportation funding as it relates to the Salem River Crossing project, and describes the evaluation criteria for local funding sources.
- **Revenue projections** describes potential local funding mechanisms that could be used to help fund the Salem River Crossing project, and estimates the funding capacity of these sources over a 20-year period.
- **Implications** summarizes how the key findings of our analysis are relevant to the Salem River Crossing project.

2. Framework

Transportation infrastructure projects such as the Salem River Crossing can be funded through a mix of federal, state, and local sources. There are dozens of mechanisms, each with their own requirements, and there are many ways that revenue sharing and cooperation among multiple jurisdictions on individual projects can occur. The options for funding bridge infrastructure and

[1] Modifications to the design and alignment may occur as the project is refined to accommodate the needs of pedestrians, bicycles, and transit vehicles, as well as address refined analysis of traffic performance.

surface transportation projects are many: identifying them and describing all their pros and cons, individually and in combination, is not a small exercise.

In this memo we identify a small subset of local funding sources that could be potentially useful for funding the Salem River Crossing project: motor fuels tax, vehicle registration fee, property tax, and tolls. These funding mechanisms are recommended as the four sources that are most likely to be applicable to the Salem River Crossing project, based on four evaluation criteria: legal authority, efficiency, fairness, and political acceptability. These evaluation criteria are described later in this section. The tools considered in our analysis have at least some political viability, have been used to fund similar projects in the past, and have the potential to raise significant revenues. We describe how they work and forecast their revenue generation potential across a common set of geographies.

Funding vs financing

Note that in this memorandum, we make a distinction between the terms "funding" and "financing," which often are incorrectly used interchangeably. Providing transportation facilities and services costs money, and somebody has to pay for these costs. The ultimate source of revenue for these costs is funding. Funding comes from households and businesses that pay taxes and fees that give the various levels of government money to build and maintain the surface transportation system. Examples of funding mechanisms are tolls, fuel taxes, registration fees, and property taxes. For each of these mechanisms, one can determine who is paying.

When the funds for transportation costs are borrowed and paid back over time, then these costs have been financed. Public agencies finance costs for the same reasons that households and businesses do—to reduce the current out-of-pocket costs by spreading out payments over time (e.g., financing a housing purchase with a home mortgage; the funding to pay the mortgage over time typically comes from the homebuyer from income received from a job). The ultimate source of funding for financed costs is not the financing instrument itself—e.g., bonds—but rather the revenue sources used to repay the borrowed funds.

Note that we assume bonds would be required to finance the Salem River Crossing LPA, and all of the revenue sources considered in our analysis could be used as security to repay those bonds. Investors may view different revenue sources as providing different levels of security, which could result in different financing terms (i.e., interest rates, reserve requirements, coverage ratio requirements) for different revenue sources. It was beyond the scope of our analysis to evaluate the potential financing terms associated with each of these revenue sources.

Since financed costs must be paid back over time, financing the costs cannot increase the total amount of funding available for a project over a long period of time. Financing the costs merely makes future funding available earlier, at the cost of the interest charged to borrow the funds.

A conceptual complication related to reporting the "revenue-generating capacity" of a funding source derives the fact that annual funding can be used to pay back bonds that deliver up-front

capital. If a funding source has an annual expected revenue of about $1 million, a local government might be able to pledge that revenue to pay back bonds that would give the government up-front around $14 million. How should one report the revenue-generating capacity of that funding source? For consistency, this memorandum reports the annual revenue.

This memorandum is about funding. A consideration of funding provides some realism for what otherwise could become a wonderful but unachievable plan. Once a jurisdiction has some clear notion of where it plans to get funding, it can move to the details of implementation and financing.

Evaluation of funding sources

Although revenue generating potential is the focus of this memorandum, it is not the only criterion for evaluating potential local funding sources. Typically, local funding sources are evaluated using the following criteria:

- **Legal authority.** A funding source must not be prohibited by State statute, or it must become legal within a desired timeframe. Even for legal funding sources, complicated legal requirements could result in legal challenges, extra administrative costs, and political uncertainty.
- **Efficiency.** An efficient funding source creates and maintains net revenues (net of collection costs) by providing sufficient revenue generating capacity, stability, and flexibility of use while minimizing administrative costs (i.e., the costs of collecting on the source).
- **Fairness.** In the context of transportation funding, fairness is achieved when infrastructure improvement charges are tied to the users who receive benefits from (or impose costs on) the transportation system. Definitions of fairness can be modified to allow for special dispensation of certain groups (e.g., low-income families, the elderly, people with disabilities). In other cases people may benefit from transportation improvements that they do not use, such as through more efficient (and cheaper) freight routes. Geography can also play a role in evaluating fairness, for example, if residents in one county pay all of the cost for a project that benefits residents in multiple counties.
- **Political acceptability.** Political acceptability considers whether elected officials and the public at large are likely to support the funding source. This depends to a large extent on the issues above: if a revenue source is legal, efficient, and fair, then it should get political support from the public, advisory groups, and decision makers. Generally, public opinion is against most new or increased taxes and fees. But, if the public believes the services or projects to be funded by these taxes and fees are important, then their opinion of the revenue source may change. In this memorandum, we cannot definitively state that a local gas tax is any more or less politically acceptable than tolls. These are questions that local policy-makers will ultimately need to answer.

3. Revenue projections

For each of the four revenue sources considered in this analysis, we describe how the source works, what geographies the source would likely be applied to, and the annual revenue generating potential at various rates over a 20-year period (2015 to 2035). All of the values presented in this memorandum are in nominal (i.e., current) dollars.

3.1 Motor fuels tax

A local motor fuels tax is a tax on the sale of gasoline and other fuels, levied as a fixed dollar amount per gallon. Local governments must seek voter approval for any new or increased local gas taxes. Cities and counties in Oregon have adopted local fuel taxes as high as $0.03 per gallon at the county level (Multnomah) and $0.05 per gallon at the city level (Eugene). Typically, the use of local gas tax revenues are limited to transportation projects.[2]

Fuel taxes are attractive, because administrative ease and revenue stability is high: gas stations can collect local gas tax revenues in addition to state and federal gas tax revenues they already collect, and revenues tend to be predictable, though subject to broader economic trends. Fuel taxes are also viewed as resulting in a high level of fairness: Local gas tax revenue is paid only by users of the transportation system, and the amount of tax paid is generally proportional to the amount of use. However, non-motorized users (e.g. bicycles and pedestrians) do not pay any tax. Also, the amount of fuel purchased in and around Salem is not directly proportional to the amount of trips a person may take across the Salem River Crossing LPA. Some external trips will cross the bridge without purchasing any fuel in the Salem area, and some Salem area residents will purchase lots of fuel, while taking few trips over the bridge.

We calculated future fuel consumption by estimating fuel consumption per capita. These revenue forecasts are based on historical statewide trends in population growth and per capita fuel consumption for the past ten years. In 2013, statewide fuel consumption per capita was 375.6 gallons per person. Our analysis assumed tax rates ranging from $0.01 to $0.05 per gallon, which represent the range of rates adopted by other local jurisdictions in Oregon.

Table 1 shows estimates of fuel tax revenues for 2015 to 2035 for Marion and Polk Counties. Note that because the rate of fuel consumption is declining more rapidly than the rate of population is increasing, the forecast calls for a gradual decline in tax revenues. The decline in fuel consumption per capita observed over the past decade is due to trends in greater fuel efficiency in vehicles and fewer miles driven per capita. In 2015, a local fuel tax rate of $0.01 per gallon would generate $1.2 million per year in Marion County, and an additional $288,000 per year in Polk County, for a total of $1.5 million if enacted for both counties. At a rate of $0.05 per

[2] Fuel tax in Oregon is levied at the State, and County and City level (for select jurisdictions that have passed enabling legislation) by the Fuels Tax Group, a division of ODOT. Two other types of fuel are taxed only at the State level (Use Fuel and Aviation Fuel).

gallon, these annual revenue projections increase to $6.0 million for Marion County, $1.4 million for Polk County, and $7.5 million for the two-county region.[3]

Table 1. Fuel tax revenue projection for Marion and Polk Counties, 2015 – 2035

	$0.01 per gallon			$0.03 per gallon			$0.05 per gallon		
Year	Marion County	Polk County	Total	Marion County	Polk County	Total	Marion County	Polk County	Total
2015	$ 1,205,924	$ 287,830	$ 1,493,754	$ 3,617,771	$ 863,490	$ 4,481,261	$ 6,029,619	$ 1,439,149	$ 7,468,768
2016	$ 1,199,100	$ 286,201	$ 1,485,302	$ 3,597,301	$ 858,604	$ 4,455,905	$ 5,995,502	$ 1,431,006	$ 7,426,508
2017	$ 1,192,316	$ 284,582	$ 1,476,898	$ 3,576,947	$ 853,746	$ 4,430,693	$ 5,961,578	$ 1,422,910	$ 7,384,488
2018	$ 1,185,569	$ 282,972	$ 1,468,541	$ 3,556,708	$ 848,915	$ 4,405,623	$ 5,927,847	$ 1,414,858	$ 7,342,705
2019	$ 1,178,861	$ 281,371	$ 1,460,232	$ 3,536,583	$ 844,112	$ 4,380,695	$ 5,894,306	$ 1,406,853	$ 7,301,159
2020	$ 1,172,191	$ 279,779	$ 1,451,969	$ 3,516,573	$ 839,336	$ 4,355,908	$ 5,860,955	$ 1,398,893	$ 7,259,847
2021	$ 1,165,558	$ 278,195	$ 1,443,754	$ 3,496,675	$ 834,586	$ 4,331,262	$ 5,827,792	$ 1,390,977	$ 7,218,770
2022	$ 1,158,964	$ 276,621	$ 1,435,585	$ 3,476,891	$ 829,864	$ 4,306,755	$ 5,794,818	$ 1,383,107	$ 7,177,925
2023	$ 1,152,406	$ 275,056	$ 1,427,462	$ 3,457,218	$ 825,169	$ 4,282,386	$ 5,762,029	$ 1,375,281	$ 7,137,311
2024	$ 1,145,885	$ 273,500	$ 1,419,385	$ 3,437,656	$ 820,500	$ 4,258,156	$ 5,729,427	$ 1,367,500	$ 7,096,926
2025	$ 1,139,402	$ 271,952	$ 1,411,354	$ 3,418,205	$ 815,857	$ 4,234,062	$ 5,697,009	$ 1,359,762	$ 7,056,771
2026	$ 1,132,955	$ 270,414	$ 1,403,368	$ 3,398,864	$ 811,241	$ 4,210,105	$ 5,664,774	$ 1,352,068	$ 7,016,842
2027	$ 1,126,544	$ 268,884	$ 1,395,428	$ 3,379,633	$ 806,651	$ 4,186,284	$ 5,632,722	$ 1,344,418	$ 6,977,140
2028	$ 1,120,170	$ 267,362	$ 1,387,532	$ 3,360,510	$ 802,087	$ 4,162,597	$ 5,600,851	$ 1,336,811	$ 6,937,662
2029	$ 1,113,832	$ 265,849	$ 1,379,681	$ 3,341,496	$ 797,548	$ 4,139,044	$ 5,569,160	$ 1,329,247	$ 6,898,407
2030	$ 1,107,530	$ 264,345	$ 1,371,875	$ 3,322,589	$ 793,036	$ 4,115,625	$ 5,537,649	$ 1,321,726	$ 6,859,375
2031	$ 1,101,263	$ 262,849	$ 1,364,113	$ 3,303,789	$ 788,548	$ 4,092,338	$ 5,506,316	$ 1,314,247	$ 6,820,563
2032	$ 1,095,032	$ 261,362	$ 1,356,394	$ 3,285,096	$ 784,087	$ 4,069,183	$ 5,475,160	$ 1,306,811	$ 6,781,971
2033	$ 1,088,836	$ 259,883	$ 1,348,719	$ 3,266,508	$ 779,650	$ 4,046,158	$ 5,444,180	$ 1,299,417	$ 6,743,597
2034	$ 1,082,675	$ 258,413	$ 1,341,088	$ 3,248,026	$ 775,239	$ 4,023,264	$ 5,413,376	$ 1,292,065	$ 6,705,441
2035	$ 1,076,549	$ 256,951	$ 1,333,500	$ 3,229,648	$ 770,852	$ 4,000,500	$ 5,382,746	$ 1,284,754	$ 6,667,500
TOTAL	$ 23,941,563	$ 5,714,372	**$ 29,655,935**	$ 71,824,688	$ 17,143,117	**$ 88,967,805**	$ 119,707,813	$ 28,571,862	**$ 148,279,675**

[3] Note that these revenue estimates do not take into the negative impact on gas consumption that this local tax would cause (i.e., price elasticity). However, the magnitude of the potential tax increases considered for this analysis ($0.01 to $0.05 per gallon) are relatively small compared to the average price of gasoline in Oregon ($3.21 per gallon as on October 27, 2014). With taxes at these relatively low rates, and applied to a relatively large area, the impact on consumption would likely be minimal. Higher rates, applied to smaller geographies would result in more significant reduction in consumption, as consumers choose to purchase fuel outside of the region where prices would be lower.

3.2 Vehicle registration fee

In Oregon, counties (but not cities) can implement a local vehicle registration fee. Counties of fewer than 350,000 people (which includes both Marion and Polk counties) must refer such an ordinance to voters.[4] Fees are currently limited to $86 per vehicle, charged every two years.[5] This would be in addition to the State vehicle registration fee of $86, charged every two years. The fee would operate similar to the state vehicle registration fee. A portion of a county's fee could be allocated to local jurisdictions. Because the fee is collected once every two years, a fee of $86 per registration is the equivalent of a $43 per year charge.

Vehicle registration fees have the advantage of being flexible, stable, and easy to administer. There is already a system in place to collect statewide vehicle registration fees, which could be used to collect local fees as well, and there are no restrictions on the use of vehicle registration fee revenues. The fee, however, may be less fair than a fuel tax because there is no direct ratio of vehicles owned and registered to the amount of benefits received from the transportation system. Moreover, a vehicle registration fee raises the question of equity of charging the same registration fee to households of disparate abilities to pay.[6]

In 2013, there were 394,269 registered vehicles in Marion and Polk Counties. With this many registered vehicles, a fee of $5 per biennium would be required to raise roughly $1 million. Table 2 shows estimates of vehicle registration fee revenue for 2015 to 2035 for Marion and Polk Counties, assuming the historical statewide 10-year growth rate in vehicle registrations and a fee ranging from $10.00 to $40.00 per biennium. In 2015, a fee of $10.00 would generate $1.6 million per year in Marion County, and $380,000 in Polk County, for a total of $2.0 million per year in the two-county region. A fee of $40.00 would generate $6.4 million per year in Marion County, and $1.5 million in Polk County, for a total of $7.9 million in the two-county area.

[4] See ORS 801.041.

[5] ORS 801.041(4) establishes that counties and certain districts can establish additional fees but they cannot exceed the fees that the state charges by vehicle class (e.g., passenger vehicle fees are $86, therefore counties cannot charge more than $86 in additional fees); some classes are exempt from additional county fees.

[6] An alternative to vehicle registration fees is the levy of a personal property or excise tax on a vehicle's market value each assessment period. This mechanism is employed in our sister states of California and Washington, but Oregon law specifically exempts licensed vehicles other than fixed load/mobile equipment (ORS 801.285) from personal property taxation. Thus, we do not discuss further the revenue potential of this mechanism.

Table 2. Vehicle registration fee revenue projection for Marion and Polk Counties, 2015 – 2035

	$10.00 per biennium			$20.00 per biennium			$40.00 per biennium		
Year	Marion County	Polk County	Total	Marion County	Polk County	Total	Marion County	Polk County	Total
2015	$ 1,599,374	$ 379,617	$ 1,978,990	$ 3,198,747	$ 759,233	$ 3,957,980	$ 6,397,495	$ 1,518,466	$ 7,915,961
2016	$ 1,605,576	$ 381,089	$ 1,986,665	$ 3,211,152	$ 762,177	$ 3,973,330	$ 6,422,305	$ 1,524,355	$ 7,946,660
2017	$ 1,611,803	$ 382,567	$ 1,994,369	$ 3,223,606	$ 765,133	$ 3,988,739	$ 6,447,211	$ 1,530,267	$ 7,977,478
2018	$ 1,618,054	$ 384,050	$ 2,002,104	$ 3,236,107	$ 768,101	$ 4,004,208	$ 6,472,215	$ 1,536,201	$ 8,008,416
2019	$ 1,624,329	$ 385,540	$ 2,009,868	$ 3,248,657	$ 771,079	$ 4,019,737	$ 6,497,315	$ 1,542,159	$ 8,039,473
2020	$ 1,630,628	$ 387,035	$ 2,017,663	$ 3,261,256	$ 774,070	$ 4,035,326	$ 6,522,512	$ 1,548,139	$ 8,070,652
2021	$ 1,636,952	$ 388,536	$ 2,025,488	$ 3,273,904	$ 777,072	$ 4,050,975	$ 6,547,807	$ 1,554,143	$ 8,101,951
2022	$ 1,643,300	$ 390,043	$ 2,033,343	$ 3,286,600	$ 780,085	$ 4,066,686	$ 6,573,201	$ 1,560,170	$ 8,133,371
2023	$ 1,649,673	$ 391,555	$ 2,041,228	$ 3,299,346	$ 783,111	$ 4,082,457	$ 6,598,692	$ 1,566,221	$ 8,164,913
2024	$ 1,656,071	$ 393,074	$ 2,049,145	$ 3,312,142	$ 786,148	$ 4,098,289	$ 6,624,283	$ 1,572,295	$ 8,196,578
2025	$ 1,662,493	$ 394,598	$ 2,057,091	$ 3,324,986	$ 789,196	$ 4,114,183	$ 6,649,973	$ 1,578,393	$ 8,228,366
2026	$ 1,668,941	$ 396,128	$ 2,065,069	$ 3,337,881	$ 792,257	$ 4,130,138	$ 6,675,762	$ 1,584,514	$ 8,260,276
2027	$ 1,675,413	$ 397,665	$ 2,073,078	$ 3,350,826	$ 795,329	$ 4,146,155	$ 6,701,652	$ 1,590,659	$ 8,292,311
2028	$ 1,681,910	$ 399,207	$ 2,081,117	$ 3,363,821	$ 798,414	$ 4,162,235	$ 6,727,642	$ 1,596,828	$ 8,324,469
2029	$ 1,688,433	$ 400,755	$ 2,089,188	$ 3,376,866	$ 801,510	$ 4,178,376	$ 6,753,733	$ 1,603,020	$ 8,356,753
2030	$ 1,694,981	$ 402,309	$ 2,097,290	$ 3,389,962	$ 804,619	$ 4,194,581	$ 6,779,924	$ 1,609,237	$ 8,389,161
2031	$ 1,701,554	$ 403,869	$ 2,105,424	$ 3,403,109	$ 807,739	$ 4,210,848	$ 6,806,218	$ 1,615,478	$ 8,421,696
2032	$ 1,708,153	$ 405,436	$ 2,113,589	$ 3,416,307	$ 810,871	$ 4,227,178	$ 6,832,613	$ 1,621,743	$ 8,454,356
2033	$ 1,714,778	$ 407,008	$ 2,121,786	$ 3,429,556	$ 814,016	$ 4,243,572	$ 6,859,111	$ 1,628,032	$ 8,487,143
2034	$ 1,721,428	$ 408,587	$ 2,130,014	$ 3,442,856	$ 817,173	$ 4,260,029	$ 6,885,712	$ 1,634,346	$ 8,520,058
2035	$ 1,728,104	$ 410,171	$ 2,138,275	$ 3,456,208	$ 820,342	$ 4,276,550	$ 6,912,415	$ 1,640,684	$ 8,553,100
TOTAL	$ 34,921,948	$ 8,288,838	**$ 43,210,785**	$ 69,843,896	$ 16,577,675	**$ 86,421,571**	$ 139,687,791	$ 33,155,350	**$ 172,843,141**

3.3 Property tax

Property tax is a relatively broad funding mechanism that could be applied through a variety of options: (1) local option levy, (2) committing local property taxes to general obligation bond(s), and (3) creating a new taxing district.

Local option levies are temporary property tax increases, approved by voters, to fund operations of local government services. Local option levies cannot exceed six years, though they can be renewed and extended indefinitely at six-year intervals, if the public continues to vote in favor of the levies. The temporary nature of local option levies does not align well with the needs of the Salem River Crossing project, which will likely need to issue long-term bonds to finance the project, requiring a stable revenue source for 20 years or more.

Similar to local option levies are general obligation (GO) bonds, which are supported by a temporary voter-approved obligation to repatriate GO debt through property tax revenues. GO bonds are issued by an existing government entity with property tax authority. GO bond levies typically last for 15 to 30 years for transportation projects. GO bonds must be approved by a public vote. The effective property tax rate levied to support GO bond obligations can vary over time, based on the total assessed value of property within the jurisdiction that issued the bonds and the scheduled GO bond payment obligations.

If there is no existing taxing district with the right boundary for issuing GO bonds to fund the Salem River Crossing project, or if there is a desire for a permanent source of transportation funding, rather than a temporary source dedicated solely to the repayment of the Salem River Crossing project, then a new taxing district could potentially be formed, levying a permanent tax rate. Oregon allows for a variety of types of "special" taxing districts to be created, ranging from cemeteries, to vector control, to libraries. Some of these types of special districts can be used to fund transportation projects, including: mass transit districts, metropolitan service districts, special road districts, road assessment districts, and transportation districts. However there are specific legal requirements for each of these types of special districts, and it is likely that creating a special district to fund the Salem River Crossing project would face significant political and legal hurdles.

Given the challenges with both local option levies and a permanent special district to fund the Salem River Crossing, our analysis assumes the most likely method for applying property tax revenues to the project would be through general obligation bonds issued by one or more existing taxing districts in the area. Although this property tax could be levied by any combination of local taxing districts in the area, the analysis in this memorandum focuses on the revenue potential of Marion and Polk counties.

The forecast of property tax revenue assumes annual growth in assessed value of 3.0% per year, which is the maximum rate of appreciation allowed by Oregon Revised Statutes. Note that over the long-term, most jurisdictions experience more than 3.0% growth per year, as new development adds value to the tax rolls in addition to annual appreciation of existing property. Thus the forecasts shown in Table 3 may be somewhat conservative. However, there have also

been brief periods of time (like the recent recession), in which annual growth dropped below 3.0% per year in some jurisdictions.

Table 3 shows estimates of property tax revenue for Marion and Polk counties from 2015 to 2035. In 2015, a tax rate of $0.25 per $1,000 of assessed value would generate $5.2 million per year in Marion County and $1.3 million per year in Polk County, for a total of $6.5 million if the tax rate were applied to both counties. Annual revenue potential for this two-county region increases to $25.8 million per year, if the rate were as high as $1.00 per $1,000.

Table 3. Property tax revenue projection for Marion and Polk Counties, 2015 – 2035

	$0.25 per $1,000 of assessed value			$0.50 per $1,000 of assessed value			$1.00 per $1,000 of assessed value		
Year	Marion County	Polk County	Total	Marion County	Polk County	Total	Marion County	Polk County	Total
2015	$ 5,183,340	$ 1,267,189	$ 6,450,529	$ 10,366,679	$ 2,534,379	$ 12,901,058	$ 20,733,359	$ 5,068,757	$ 25,802,116
2016	$ 5,338,840	$ 1,305,205	$ 6,644,045	$ 10,677,680	$ 2,610,410	$ 13,288,090	$ 21,355,359	$ 5,220,820	$ 26,576,180
2017	$ 5,499,005	$ 1,344,361	$ 6,843,366	$ 10,998,010	$ 2,688,722	$ 13,686,733	$ 21,996,020	$ 5,377,445	$ 27,373,465
2018	$ 5,663,975	$ 1,384,692	$ 7,048,667	$ 11,327,950	$ 2,769,384	$ 14,097,334	$ 22,655,901	$ 5,538,768	$ 28,194,669
2019	$ 5,833,894	$ 1,426,233	$ 7,260,127	$ 11,667,789	$ 2,852,466	$ 14,520,255	$ 23,335,578	$ 5,704,931	$ 29,040,509
2020	$ 6,008,911	$ 1,469,020	$ 7,477,931	$ 12,017,823	$ 2,938,040	$ 14,955,862	$ 24,035,645	$ 5,876,079	$ 29,911,724
2021	$ 6,189,179	$ 1,513,090	$ 7,702,269	$ 12,378,357	$ 3,026,181	$ 15,404,538	$ 24,756,715	$ 6,052,362	$ 30,809,076
2022	$ 6,374,854	$ 1,558,483	$ 7,933,337	$ 12,749,708	$ 3,116,966	$ 15,866,674	$ 25,499,416	$ 6,233,932	$ 31,733,348
2023	$ 6,566,100	$ 1,605,238	$ 8,171,337	$ 13,132,199	$ 3,210,475	$ 16,342,674	$ 26,264,398	$ 6,420,950	$ 32,685,349
2024	$ 6,763,083	$ 1,653,395	$ 8,416,477	$ 13,526,165	$ 3,306,789	$ 16,832,955	$ 27,052,330	$ 6,613,579	$ 33,665,909
2025	$ 6,965,975	$ 1,702,997	$ 8,668,972	$ 13,931,950	$ 3,405,993	$ 17,337,943	$ 27,863,900	$ 6,811,986	$ 34,675,887
2026	$ 7,174,954	$ 1,754,086	$ 8,929,041	$ 14,349,909	$ 3,508,173	$ 17,858,082	$ 28,699,817	$ 7,016,346	$ 35,716,163
2027	$ 7,390,203	$ 1,806,709	$ 9,196,912	$ 14,780,406	$ 3,613,418	$ 18,393,824	$ 29,560,812	$ 7,226,836	$ 36,787,648
2028	$ 7,611,909	$ 1,860,910	$ 9,472,819	$ 15,223,818	$ 3,721,821	$ 18,945,639	$ 30,447,636	$ 7,443,641	$ 37,891,277
2029	$ 7,840,266	$ 1,916,738	$ 9,757,004	$ 15,680,533	$ 3,833,475	$ 19,514,008	$ 31,361,065	$ 7,666,950	$ 39,028,016
2030	$ 8,075,474	$ 1,974,240	$ 10,049,714	$ 16,150,949	$ 3,948,480	$ 20,099,428	$ 32,301,897	$ 7,896,959	$ 40,198,856
2031	$ 8,317,739	$ 2,033,467	$ 10,351,205	$ 16,635,477	$ 4,066,934	$ 20,702,411	$ 33,270,954	$ 8,133,868	$ 41,404,822
2032	$ 8,567,271	$ 2,094,471	$ 10,661,742	$ 17,134,541	$ 4,188,942	$ 21,323,483	$ 34,269,083	$ 8,377,884	$ 42,646,967
2033	$ 8,824,289	$ 2,157,305	$ 10,981,594	$ 17,648,578	$ 4,314,610	$ 21,963,188	$ 35,297,155	$ 8,629,220	$ 43,926,376
2034	$ 9,089,017	$ 2,222,024	$ 11,311,042	$ 18,178,035	$ 4,444,048	$ 22,622,083	$ 36,356,070	$ 8,888,097	$ 45,244,167
2035	$ 9,361,688	$ 2,288,685	$ 11,650,373	$ 18,723,376	$ 4,577,370	$ 23,300,746	$ 37,446,752	$ 9,154,740	$ 46,601,492
TOTAL	$ 148,639,966	$ 36,338,538	**$ 184,978,504**	$ 297,279,932	$ 72,677,076	**$ 369,957,008**	$ 594,559,864	$ 145,354,152	**$ 739,914,016**

3.4 Tolls

The relationship between toll revenue and toll rates is not linear. Rather, as toll rates increase, revenue typically rises at first, but then declines as traffic volumes decrease more sharply in response to progressively higher toll rates. Put differently, there is a point where higher toll rates cause such a decrease in traffic volumes that the net effect on toll revenue is negative. The point at which increasing toll rates will begin to decrease toll revenues is the revenue-maximizing toll rate. These effects are a consequence of the user behavior that is embedded in the regional travel model. That is, users react to the tolls by reducing the number of trips they make, carpooling or taking transit, selecting a different route that avoids the tolls or changing their trip destination altogether.[7]

Future hourly volumes are obtained from SKATS' 2035 "Preferred Alternative" regional model run, with imposed additional delays of 0, 1.5, 2, 6, and 18 minutes per bridge crossing on each bridge. These five different imposed delays represent an additional cost of crossing the bridge, and can be converted to a dollar toll level by applying information on the value that travelers apply to travel time. For example, a three-minute delay is equivalent to a $0.50 toll, if the average value of delay is $10.00 per hour.[8]

Using hourly volumes at the five imposed delays (corresponding to five toll amounts), we derived the relationship between the toll amount and paying vehicles, imposing a mathematical formulation that is part of ECONorthwest's Toll Optimization modules. This allows us to estimate revenue at any arbitrary toll amount, and identify the toll rate that maximizes revenue. In other settings, where optimization of some other quantity is desired (such as minimizing the total value of the time spent by vehicles traveling a route), other optimization rules are applied. Here, the focus is on revenue potential.

The relationship between toll rate and revenue is calculated for each bridge, direction, and time of day, and then aggregated to show the relationship between a single toll and total revenue. We can then look at a range of tolls to see total revenue at different toll levels.

3.4.1 Toll Policy Assumptions

The following assumptions are used in this analysis:

- Both bridges are tolled at the same rate, since the bridges are close enough to act as substitutes for each other. In other words, tolling only one of the bridges would result in would result in a substantial diversion of traffic from the tolled bridge to the untolled

[7] In modeling terms, these types of changes reflect behaviors in the Trip Generation, Mode Choice, Assignment, and Trip Distribution steps of the regional model.

[8] That is, Toll in Dollars = Delay in Hours x Dollar Value of Time per Hour. In our example, the three-minute delay equals a delay of 0.05 hours. Multiplying 0.05 hours times the $10 per hour equals $0.50.

bridge, which would significantly reduce the toll revenue potential, and would cause substantial traffic delays on the untolled facility.

- The toll policy that we have been asked to assume is that tolls per vehicle crossing are constant across all times of the day and across all vehicle classes.
- The value of time is constant throughout the day and across vehicle classes. The average value of time is assumed to be $10.00 per hour in 2014 dollars.[9]
- Diurnal traffic patterns (relative to AM and PM peak volumes) remain constant from 2011 to 2035.
- External trips (trips either originating or ending outside of SKATS' model area) respond to tolls with the same behavior as internal trips. If they do not, then revenues would be larger than reported here. Thus, the estimates presented in Table 3 are possibly conservative.
- Traffic is assumed to grow at a constant rate of 1.97% between 2015 and 2035, based on the rate of growth between observed volumes in 2011 and 2035 model volumes.

3.4.2 Tolling Technology Assumptions

It is not necessary to identify a detailed approach or a particular technology vendor at this time but, the use of electronic toll collection (ETC) techniques is now widely recognized as the most cost-effective way to levy tolls. ETC implementations have the following characteristics:

- An overhead span or "gantry" is used to display toll rates, and to carry sensors that implement toll collection, payment compliance, and payment enforcement technologies. An example of such a gantry is depicted in Figure 1.
- Regular users of the bridge place electronic cards or tags ("transponders") on or inside their vehicles that can be activated by a radio signal emitted by equipment on the gantry. That signal causes the transponders to send back a code that identifies the pre-established billing account that will be charged for the toll.
- Irregular and out-of-region users are dealt with by having special cameras and character-recognition capability that recognizes and captures the license plate number and state of the user if no transponder response occurs. This information is used to send a bill by regular mail to the licensed owner of the vehicle.
- The gantry data can also be made available in real time to law enforcement officers such as highway patrols if the plate is unable to be read, or if other types of evasion occur.

[9] This is consistent with the widely-held view that in-vehicle travel time has a value equal to approximately one-half the wage. In 2013, according to the American Community Survey, Salem household wage income was $47,232. Assuming approximately 260 work and paid holiday days per year, and hours worked per day of 9 hours (see http://www.gallup.com/poll/175286/hour-workweek-actually-longer-seven-hours.aspx) yields an average wage of $20 per hour, and one-half that value yields the $10 value of time per hour assumed herein.

Figure 1: A typical tolling gantry installation[10]

Depending upon the particular technology employed and the nature of the bridge traffic, the cost of effecting a transaction (collection of a toll) will vary, from a few cents, to the cost of mailing a bill, to extraordinary costs for those (less frequent) cases of noncompliance.

Compliance and revenue productivity can be improved in numerous ways. Coordination of transponder technologies with sister states can improve convenience of use by non-residents and improve collections. Although Oregon has no tolling technology in place relevant to the Salem bridge, the State of Washington's SR-520 bridge tolling approach may be a useful model.[11] Rental car agencies can provide transponders for use by visitors.

3.4.3 Results

Table 4 shows annual revenues from 2015 to 2035 at several toll levels. Rounding tolls to the nearest $0.50 increment, revenue is maximized at a $2.50 toll in each direction. Total annual revenue in 2015 varies from $22.2 million with a toll of $1.00 to $36.3 million with a toll of $2.50. Over a 20-year forecast period, the cumulative revenue potential of tolls on these two bridges varies from $573 million with a toll of $1.00 to $934 million with a toll of $2.50.

[10] From D.S. Fleming, et al., "**Dispelling the Myths: Toll and Fuel Tax Collection Costs in the 21st Century**," Reason Foundation, 2012.

[11] See: http://www.wsdot.wa.gov/Tolling/520/FAQ.htm

It should be emphasized that the sums presented here are gross of any collection costs or compliance losses. Based on our experience with tolling systems for similar facilities across the country, for planning purposes it is reasonable to assume these collection costs and compliance losses would be approximately $0.30 per vehicle, though there are certainly examples of systems with higher or lower operating costs.

Table 4. Total annual gross revenues by toll amount 2015-2035

	Toll Amount (2014 dollars)					
Year	**No Toll**	**$1.00**	**$2.00**	**$2.50**	**$3.00**	**$4.00**
2015		$22,242,519	$34,093,999	$36,291,256	$36,002,859	$31,399,027
2016		$22,684,223	$34,771,055	$37,011,947	$36,717,823	$32,022,565
2017		$23,134,698	$35,461,557	$37,746,949	$37,446,984	$32,658,485
2018		$23,594,119	$36,165,770	$38,496,548	$38,190,626	$33,307,035
2019		$24,062,663	$36,883,969	$39,261,032	$38,949,035	$33,968,463
2020		$24,540,512	$37,616,430	$40,040,698	$39,722,505	$34,643,026
2021		$25,027,850	$38,363,437	$40,835,847	$40,511,335	$35,330,985
2022		$25,524,866	$39,125,278	$41,646,786	$41,315,830	$36,032,606
2023		$26,031,752	$39,902,248	$42,473,830	$42,136,301	$36,748,161
2024		$26,548,704	$40,694,647	$43,317,297	$42,973,066	$37,477,925
2025	NA	$27,075,922	$41,502,783	$44,177,514	$43,826,447	$38,222,181
2026		$27,613,610	$42,326,966	$45,054,814	$44,696,776	$38,981,217
2027		$28,161,975	$43,167,517	$45,949,536	$45,584,387	$39,755,326
2028		$28,721,230	$44,024,760	$46,862,026	$46,489,626	$40,544,808
2029		$29,291,591	$44,899,027	$47,792,636	$47,412,841	$41,349,967
2030		$29,873,279	$45,790,655	$48,741,727	$48,354,390	$42,171,116
2031		$30,466,518	$46,699,989	$49,709,666	$49,314,636	$43,008,572
2032		$31,071,538	$47,627,382	$50,696,826	$50,293,952	$43,862,659
2033		$31,688,572	$48,573,191	$51,703,590	$51,292,715	$44,733,706
2034		$32,317,860	$49,537,783	$52,730,347	$52,311,312	$45,622,051
2035		$32,959,645	$50,521,530	$53,777,493	$53,350,138	$46,528,038
20 Year Total	NA	$572,633,646	$877,749,971	$934,318,366	$926,893,584	$808,367,918

Table 5 shows total annual traffic volumes on both bridges at several toll levels. Volumes decrease predictably as tolls increase. With no toll in place, total traffic on both bridges is forecast to be 30.5 million vehicles per year in 2015, growing to 45.2 million vehicles per year in 2035. Even with a toll as low as $1.00 per vehicle, traffic volumes are forecast to drop by 27%. A toll of $2.50 per vehicle, the rate that maximizes toll revenue, would result in a 52% reduction in traffic volumes. And, a toll as high as $4.00 per vehicle, would result in a 74% reduction in traffic volumes.

Table 5. Total bi-directional annual traffic volume by toll amount, 2015 to 2035

Year	Toll Amount (2014 Dollars)					
	No Toll	$1.00	$2.00	$2.50	$3.00	$4.00
2015	30,500,826	22,242,519	17,046,999	14,516,502	12,000,953	7,849,757
2016	31,106,527	22,684,223	17,385,527	14,804,779	12,239,274	8,005,641
2017	31,724,256	23,134,698	17,730,778	15,098,780	12,482,328	8,164,621
2018	32,354,253	23,594,119	18,082,885	15,398,619	12,730,209	8,326,759
2019	32,996,761	24,062,663	18,441,985	15,704,413	12,983,012	8,492,116
2020	33,652,027	24,540,512	18,808,215	16,016,279	13,240,835	8,660,757
2021	34,320,307	25,027,850	19,181,718	16,334,339	13,503,778	8,832,746
2022	35,001,857	25,524,866	19,562,639	16,658,715	13,771,943	9,008,152
2023	35,696,942	26,031,752	19,951,124	16,989,532	14,045,434	9,187,040
2024	36,405,831	26,548,704	20,347,324	17,326,919	14,324,355	9,369,481
2025	37,128,797	27,075,922	20,751,391	17,671,006	14,608,816	9,555,545
2026	37,866,119	27,613,610	21,163,483	18,021,926	14,898,925	9,745,304
2027	38,618,084	28,161,975	21,583,759	18,379,815	15,194,796	9,938,831
2028	39,384,982	28,721,230	22,012,380	18,744,810	15,496,542	10,136,202
2029	40,167,110	29,291,591	22,449,513	19,117,055	15,804,280	10,337,492
2030	40,964,769	29,873,279	22,895,327	19,496,691	16,118,130	10,542,779
2031	41,778,269	30,466,518	23,349,995	19,883,866	16,438,212	10,752,143
2032	42,607,923	31,071,538	23,813,691	20,278,730	16,764,651	10,965,665
2033	43,454,053	31,688,572	24,286,596	20,681,436	17,097,572	11,183,427
2034	44,316,986	32,317,860	24,768,891	21,092,139	17,437,104	11,405,513
2035	45,197,056	32,959,645	25,260,765	21,510,997	17,783,379	11,632,009
20 Year Total	785,243,737	572,633,646	438,874,985	373,727,347	308,964,528	202,091,979

4. Implications

Our analysis yields the following implications for the Salem River Crossing project:

- **Tolls are the fairest option**. One of the criteria that will likely be included in the evaluation of potential funding sources is fairness, and tolls are certainly the fairest option. Tolls are the only tool that charge users proportionately based on the benefits they receive from the Salem River Crossing project. While fuel taxes and vehicle registration fees are transportation-related tools, they are not directly proportional to use of the Salem River Crossing, and property taxes have no direct link to benefits from the project.
- **Revenue generation is only half of the equation**. To create a feasible funding plan, one must consider both the revenues that can be generated and the cost of the project. Because the project will almost certainly use some financing mechanism, like bonds, to amortize the costs over a longer period of time, the ultimate funding plan will need to compare the annual revenues against the annual debt service payments. These payments will depend on numerous factors, including the credit rating of the entity issuing the bonds, the quality of the resources pledged as security, the amortization period of the proposed borrowing, and other conditions affecting the municipal bond market in general. Ultimately, the utility of these potential revenue sources depends on the annual amount of revenue needed to finance the Salem River Crossing project costs.
- **Property tax and tolls have higher revenue potential than fuel tax and vehicle registration fees**. Reasonable rates for each of these funding sources (defined as rates that other jurisdictions in Oregon have adopted for similar projects) result in revenue streams that are measured in millions per year for fuel taxes and vehicle registration fees, and tens of millions per year in property taxes and tolls.
- **Other criteria need to be evaluated**. Revenue potential is an important factor in evaluating potential revenue sources, but not the only factor. Ultimately decision makers need to weigh the results of this revenue analysis against other criteria like: legal authority, efficiency, fairness, and political acceptability.
- **Multiple sources may be needed**. It is possible that it may not be feasible or desirable to fund the entire Salem River Crossing project with a single revenue source. Some funding sources have either a legal or practical limit on the maximum tax rate or fee that can be charged, that may prevent them from generating sufficient revenue during the needed timeframe. Even if one single source could generate sufficient revenue to pay for the entire project, it may be politically desirable to use a combination of tools, to more broadly distribute the financial burden.