Newberg-Dundee Bypass Phase 1 Benefit: Cost Factors

The baseline is a “no-build” scenario. The project analyzed is the initial portion of a much larger, long-range project. There are no other obvious alternatives. The planning horizon extends 20 years past project completion. Bicycle and pedestrian improvements are a major part of the initial project.

This $230 million capital project (in year-of-expenditure dollars) has a net present value of $193.1 million, and a benefit: cost ratio of 1.99. These calculated values exclude the social benefits of improved safety. Safety benefits are believed to be significant, but require a major study to quantify; which has not yet been done. This is difficult because the project will replace multiple, medium and low speed, urban segments having widely varying safety records, with a single, modern, high speed, rural segment. The most common crash type on the existing route is the rear-end crash typical of congested facilities. Seven fatal crashes occurred in the study area during 2003-2007.

The project is in an economically distressed area, and partially as a result, is expected to have a relatively large transportation disadvantaged population. This group in particular is likely to benefit from the bicycle and pedestrian facility improvements that are part of the project.

The FEIS preliminary results have modeled peak hour vehicle hours of travel (VHT) with and without the project. However, off-peak VHT has not been modeled. Other modeling data indicate the new bypass would reduce travel time by five minutes per trip during off-peak periods. Therefore, the value of time saved as a result of the project is shown in two separate categories on two separate lines in the analysis: a) Reduced peak vehicle hours of delay; and b) Reduced off-peak vehicle hours of delay for through traffic.

Induced travel in terms of trips is expected to be minimal. When traffic volumes for the bypass and existing roads are combined, the models in use indicate the traffic volumes on some segments will have higher traffic volumes, while other segments will have lower traffic volumes. As the new route is longer, additional VMT will occur, and is reflected in the fuel consumption and greenhouse gas emissions figures.

The value of reduced vehicle operating costs (fuel is considered separately) is normally substantial for a new project. However, the existing facility is in need of reconstruction and will likely be reconstructed by the time the new facility opens. Therefore, reductions in vehicle operating costs resulting from improved pavement conditions are expected to be minimal.

Finally, as this is an application for capital funds, the present value of maintenance costs (a set of operating expenses) was treated as a negative benefit rather than as another investment cost. Either way, the effect on the benefit: cost ratio is minimal.
The factors used to make the benefit: cost calculations are stated below; along with their sources. As this will be a public investment, the discount rate is three percent; as recommended in the August 12, 2011 Federal Register notice.

**Average mileage of new, alternative mode trips**: 1.75. **Source**: Estimate based on one-half the length of the new primary bicycle/pedestrian facilities plus one-quarter mile for access to and from the facility (secondary facilities will also be built).


**Average price of gasoline in Oregon** 10/11/11: $3.75. **Source**: AAA Oregon/Idaho survey data.

**Greenhouse gas (GHG) emissions per gallon**: 20 pounds. **Source**: *Transportation Energy Data Book*, Edition 30, Table 11.11. Figure for gasoline is rounded upward to reflect some light vehicle use of diesel.

**GHG social cost per metric ton**: Figures in Table 4 of *Appendix 15A. Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866*, using the 3% discount rate column (for internal consistency with the overall analysis).

**Improved peak hour reliability**: Equivalent to the reduction in peak vehicle hours of delay. **Source**: Estimates of the value of reliability have a wide range. Note that no benefits are assumed for off-peak reliability improvements.

**Light vehicle operating costs per mile**: $0.51. **Source**: U.S. General Services Administration. Last reviewed by GSA 07/28/11.

**New trip background rate of growth**: Under the build scenario, 0.5% on the existing route and 1.2% on the new bypass. **Source**: Preliminary model results for the FEIS.

**Number of bicyclists and pedestrians diverted from privately operated vehicles**: Varies by year. **Source**: ACS data indicate an “other means” share of one percent, which is believed to be almost all bicycle. As distances from the existing route are longer than preferred by pedestrians, no diversion to pedestrian travel is expected for non-recreational trips. The figures are one percent of the combination of the remaining traffic on the existing route and Dayton Avenue where the new facilities will actually be located.

**Ongoing maintenance cost**: $106,200 per year beginning in year 4. **Source**: Based on statewide averages, assumed annual maintenance cost per lane mile of the new facilities will be $8,000, and the average annual maintenance cost of each new structure (13) will be $3,000.
Proportion of new bicyclists and pedestrians that are transportation disadvantaged: 50%. **Source:** Estimate calculated for a separate transit project.

**Proportion of vehicle types:** a) Passenger vehicles – 80.4%; b) Light commercial vehicles – 14.1%; and c) Heavy trucks – 5.5%. **Source:** Newberg Automatic Traffic Recorder (2005).

**Reduced cost of rebuilding the existing roadway:** $6,800,000. **Source:** Estimates of reconstruction cost. The existing roadway is substandard and in need of reconstruction. Reconstruction to serve today’s heavy vehicle traffic loads is estimated to cost $3,000,000 per mile. However, under conditions where the majority of heavy vehicles shift to a new route, this reconstruction cost will decline to $1,000,000 per mile. This is a savings of $2,000,000 per mile for 3.4 miles.

**Reduced Fuel costs:** Varies by year. **Source:** Calculation based on 2030 base case emissions and VMT shift (from Tier 2 DEIS), the estimated VMT growth rate, the estimation that highway VMT consumes 33 percent less fuel than city VMT, and the October 2011 average price of gasoline in Oregon.

**Reduced non-fuel vehicle operating costs:** $0. **Source:** As a result of the assumption that the existing roadway will be rebuilt at about the same time as the new facility is completed, wear and tear on vehicles will not be noticeably reduced.

**Reduced off-peak vehicle hours of delay for through traffic:** Varies by year. **Source:** Off-peak time savings is about 5 minutes per trip (Tier 2 DEIS). Approximately 86.2% of traffic on the new route will take place during off-peak hours (internal traffic analysis). Traffic is estimated to total 15,700 in 2016 and grow by an average of 1.2% per year. This is all intercity travel.

**Reduced peak vehicle hours of delay:** Varies by year. **Source:** Preliminary FEIS model results for 2016 and 2035, multiplied by the recommended hourly values of travel time savings, the average vehicle occupancy figures above, and for heavy trucks, the value of capital and the time value of cargo.

**Reduction in GHG emissions:** Varies by year. **Source:** Calculation based on 2030 base case emissions and VMT shift (from Tier 2 DEIS), the estimated VMT growth rate, the estimation that highway VMT consumes 33 percent less fuel than city VMT, GHG emissions per gallon, and the GHG social cost per metric ton.

**Residual value of project:** $87.7 million. **Source:** Amount is the present value of the depreciated amount of the total investment. Previous asset management experience indicates only about 30% of roadway construction depreciates or depreciates in a way that would affect the next 20 year planning horizon, and a $4.9 million pavement preservation project is included in 2030. New structures have an expected life of 75-100 years, and right-of-way does not depreciate at all. New structures account for about 40% of total construction costs.
Social cost of a traffic fatality: $6.2 million. Source: 
http://ostpxweb.dot.gov/policy/reports.htm

Social value of reduced dependence on petroleum and petroleum imports: Varies by year. Source: Assumed to be equivalent to 90% of the value of fuel unused as a result of the project.

Social value of transportation to disadvantaged populations: $0.51 per mile. Source: Assumed value to society of enabling people who have great difficulty traveling because of lack of a vehicle or poverty (this is an economically distressed area) to travel. Amount is equal to (and in addition to) the standard amount.

BENEFIT: COST ANALYSIS SUMMARY DATA

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<tr>
<th>Description</th>
<th>Value</th>
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<td>PV of Capital Costs</td>
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