Historic Columbia River Highway: Viento State Park to Perham Creek Benefit-Cost Analysis

Executive Summary

The Viento State Park to Perham Creek project is a portion of the Historic Columbia River Highway State Trail. The project benefit-cost analysis reflects construction of 1.7 miles of multi-use trail connecting Viento State Park to Perham Creek and nearing the Mitchell Point trailhead, the addition of a bike hub at the Viento State Park trailside, and associated parking and circulation improvements. The project matrix (on page 3) identifies the project baseline, changes associated with this project, impacts of the changes and the population affected, analysis results, and workbook tab locations for the associated calculations.

The concept of total economic value recognizes that the economic value of cultural heritage and recreational sites, such as this project, are composed of different parts – some of which are tangible and directly used and some of which are intangible or very remote. These include use values, where cultural/recreational goods and services provide tangible things that the present generation uses; and what economists call non-use values, usually defined as bequest values (what you leave to your children or future generations) and existence values (the value of knowing something exists, even if you don't use it). Somewhere in between use values and non-use values is option value or the value to a person of having the option for future use.

The benefit cost analysis (BCA) for this project is focused on benefits (and disbenefits) that are easily monetized: use value, residual value, and the disbenefit of emissions (social cost of carbon) from vehicle trips from additional users. Given the trail's national historic and scenic significance, it is likely the option, bequest, and existence values of the project are strong. However, they are essentially impossible to quantify or monetize. There are also other project benefits not quantified or monetized but listed on the next page by Long Term Outcome. If all the additional benefits could be included, the BCA ratio would be notably higher.

Long Term Outcome	Types of Societal Benefits	In BCA
Quality of Life	Use value - facilities and services provide tangible things that the present generation	Yes
	Bequest value - hat you leave to your children or future generations	No
	Existence value - the value of knowing something exists, even if you don't use it	No
	Option value - the value to a person of having the option for future use	No
	Residual value - beyond the twenty year span included in the analysis	Yes
	Value of an affordable and convenient active transportation option to and between desirable developed destinations along the HCRH State Trail	No
	Time savings from improved overall reliability of the multi modal transportation system by removing pedestrians and cyclists from the shoulder on Interstate 84	No
	Use value for active transportation users staying at hiker/biker campground	Yes
Safety	Reduced maintenance and emergency service time	No
	Savings from reduction in injuries or reduced loss of life	No
	Time savings due to reduction of delay related to rockfall on Interstate 84	No
	Reduction in property damage due to wildfire mitigation	No
Environmental Sustainability	Environmental benefits from stormwater, runoff, and erosion management improvements	No

Benefit and cost information is presented for the period from 2016-2039. A 24-year period is presented to show the costs associated with the construction and the benefits of 20-years of operation of the cultural heritage and recreation site.

	Discount Rate	
	3%	**7%**
Life-Cycle Costs (mil. 2016$)	10.08	9.00
Benefits (mil. 2016$)	11.33	6.57
Net Present Value (mil. 2016$)	**1.25**	**-2.43**
Benefit: Cost Ratio	**1.12**	**0.73**

The project shows a net benefit, with a **benefit-cost ratio of 1.12** when a 3% discount rate is applied. The fact the alternative use of funds currently dedicated to the TIGER grant program would be other public expenditures justifies this discount rate as the most relevant for this project.

Historic Columbia River Highway: Viento State Park to Perham Creek - Project Matrix

HISTORIC COLUMBIA RIVER HIGHWAY: VIENTO STATE PARK TO PERHAM CREEK
PROJECT MATRIX

Current Status/Baseline & Problem to be Addr	Change to Baseline/Alternatives	Type of Impacts	Population Affected by Impacts	Economic Benefit	Summary of Results	Page Reference in BCA
Ten miles of the Historic Columbia River Highway remain to be reconstructed and connected to the rest of the 73 mile corridor. These miles are in the middle of the corridor. Five miles of the ten are already under construction. This project would reconstruct another 1.7 miles, and reconnect the corridor with another 0.5 mile segment.	The project proposed to be funded by TIGER 8 would extend the trail another 1.7 miles to Perham Creek, leaving only 3.3 miles awaiting reconstruction as a trail to complete the 73 mile corridor for both recreation and transportation purposes. The 2010 Historic Columbia River Highway State Trail Plan evaluated a series of alternative alignments for 10.3 miles of State Trail and proposed an alignment that would have a minimum impact on natural, scenic, cultural and historic resources. This approach will be significantly less costly than constructing a completely new alignment. This project will bring a portion of the abandoned Historic Columbia River Highway to a state of good repair and repurpose the road as a multi-use trail.	Use values as goods and services provide tangible things that the present generation uses; and what economists call non-use values, usually defined as bequest values (what you leave to your children or future generations) and existence values (the value of knowing something exists, even if you don't use it). Somewhere in between use values and non-use values is option value or the value to a person of having the option for future use. In addition, the resource also has residual value beyond the twenty year span included in the analysis. Because additional users create additional miles of travel, the added social cost of carbon has been deducted as a disbenefit.	Beneficiaries of the HCRH State Trail include local and U.S. residents, and international visitors. Persons with disabilities and the aging population will be served by the State Trail as grades are kept below 5% whenever possible and the trail is paved with asphalt.	Monetized use value benefits estimated using the travel cost method including fuel costs, travel times, and user fees. Monetized residual value. Monetized Social Cost of Carbon disbenefit. Option, bequest, and existence values are likely strong given the national significance of the project area, but are not possible to quantify or monetize.	The present value of use value benefits estimated using the travel cost method including fuel costs, travel times, and day use fees is $6.7 million over 20 years in 2016 $s using a 3% discount rate. The present value of the Residual Value is $4.7 million. The Social Cost of Carbon represents a disbenefit of -$0.1 million. These compare to a Life Cycle cost of $10.1 million (discounted at 3%).	Tab 6 Visitor Impacts; Tabs 4a Use Benefit (Fuel & Time) and 4b Use Benefit (User Fees); disbenefit of the social cost of carbon is detailed in Tab 5 Cost of Carbon; elements are included as part of totals in Tab 2 Summary of Benefits & Costs and Tab 3 Life Cycle Project Costs (Residual Values are included in this Tab also). Details of other calculations and reference tables are identified in Tab 7 Ref. & Calculations.
In this mountainous area, many natural hazards exist including downed trees, rockfalls, culvert plugging, and wildfires. When I-84 is closed due to crashes or rockfalls, there is no alternative route available for emergency responders.	This project provides pavement sections designed to accommodate service, emergency and construction vehicles, and includes or is proximate to a sufficient gated access point to Interstate 84 for fire fighting and other emergency purposes. This project will allow for improved circulation for fire or emergency response vehicles. Rockfall treatment ensures safety for trail users and improves existing rockfall protection along Interstate 84.	Reduced emergency service time, potential savings from reduction in injuries or reduced loss of life, potential reduction of delay related to rockfall on Interstate 84, and potential reduction in property damage due to wildfire.	HCRH State Trail user; emergency service providers; Interstate 84 users; and to the degree that area wildfires are supressed earlier, residents, business and property owner owners in the area.	Unfortunately data was insufficient to monetize or quantify the economic benefits which could have included travel time savings, reduction in injuries and/or lives saved, and reductions in property damage.	None calculated.	N/A
The alternative route for bicycles and pedestrians is I-84 - presenting a safety problem and discouraging tourism.	The project provides a paved muti-use trail between the developed day use sites at upper Viento State Park and Perham Creek. The existing parking area will be reconfigured for improved vehicular, bicycle, and pedestrian circulation.	Value of an affordable and convenient active transportation option between desirable developed destinations along the HCRH State Trail. This will improve overall reliability of the multimodal transportation system by removing pedestrians and cyclists from the shoulder of I-84.	Beneficiaries of the HCRH State Trail and hiker/biker campground will include additional local and U.S. residents, and international visitors. Persons with disabilities and the aging population will be well served by the State Trail as grades are kept below 5% whenever possible and the trail is paved with asphalt.	Monetized use value benefit of hiker/biker campground based on hiker/biker user fees. Monetized residual value. Data was insufficient to estimate active transportation value and improved reliability of transportation system.	Additional user fees for hiker/biker campground are conservatively estimated at $37,000 over 20 years in constant 2016 $s. Discounted benefits were not calculated separately for this item (only for the user fee total).	Tab 6 Visitor Impacts; Tab 4b Use Benefit (User Fees); included as part of totals in Tab 2 Summary of Benefits & Costs.
The abandonment of sections of the HCRH may have resulted in conditions that leave some environmental resources vulnerable (such as near culverts and where there is no guidance away from sensitive areas).	Wherever possible, stormwater will be managed as "sheet flow" rather than concentrated in ditches. Vegetated filter strips will be used to clean and disperse run off wherever practical. Woody material will be chipped and spread on disturbed areas to reduce erosion and capture pollutants if any. Additionally, the trail enhancement will restrict use near sensitive resource areas through design.	Environmental benefits from stormwater, runoff, and erosion management improvements.	Those impacted by storm water, run off, erosion or other environmental impacts described.	Detail was insufficient to quantify or monetize specific benefits of environmental protections/improvements.	None calculated.	N/A

Worksheet by Worksheet Detail

The remainder of this document focuses on assumptions and sources used in the analysis organized by worksheet to be used in tandem (if desired) with the workbook.

Worksheet 1 Project Matrix houses the project matrix provided earlier in this document. It describes the project baseline, changes associated with the project, impacts of the changes and population affected, analysis results, and workbook tab locations for the associated calculations.

Worksheet 2 Summary of Benefits & Costs summarizes the life-cycle cost, benefits, and net present value of the project in 2016 dollars using both a 3% and 7% discount rate. The benefit-cost ratio at each discount rate 1.12 and 0.73 respectively are also noted. Additional detail summarizing the itemized benefit and disbenefit totals are provided here and nowhere else in the workbook.

Worksheet 3 Project Costs reflect preliminary engineering (aka *Project Support*) occurring during 2017 and 2018, and construction expenditures occurring in 2019.

The annually occurring maintenance and operating costs detailed in Worksheet 7 are also included here as life cycle costs. The maintenance and operating costs details reflect 2011 costs converted to 2016 dollars for trail maintenance for all three existing HCRH trail segments.

Cost totals by year are provided in constant dollars and discounted at 3% and 7%, as are totals for the full analysis period.

Estimates of the Residual Value are also provided in present value terms. These estimates reflect previous asset management experience, which suggests that only the paving is likely to depreciate significantly over the analysis period. For multi-use paths paving is expected to last 20 years. Construction costs and depreciated paving estimates are detailed in Worksheet 7.

Worksheet 4a Use Benefit (Fuel & Time) provides a year by year breakdown of the estimated use values for the project based on round trip travel time and fuel costs to new users.

The travel cost method (TCM) has had widespread use in valuing cultural and recreational assets. It uses differences in the travel costs of individuals making use of the site to infer the value of the site. Travel cost for each zone is assumed to be the marginal travel cost only.

This BCA uses a simplified travel cost method to estimate the use or visitation value of the proposed project. It is simplified in the sense that rather than deriving a demand curve, additional site use as a result of the new trail is assumed to reflect the before and after counts from the addition of the trail between Starvation Creek and Viento State Park. See Worksheet 6 Visitor Impacts for detail.

The miles of travel and person hours of travel are derived in part from the visitor survey of day-use visitors at Starvation Creek State Park (2012). See details in Worksheet 7 Ref. & Calculations and Worksheet 6 Visitor Impacts for more information. These calculations are the same as those made for a larger project in 2014. The reasons are the base data have not been updated, and the impacts of population growth and a smaller project are believed to be offsetting.

The miles of travel are divided by EIA Energy Outlook 2015 Reference Case fuel efficiency projections for combined "on-the-road" estimate for all cars and light trucks miles per gallon to create an estimate of gallons of fuel used by visitors for each year. The AAA estimate of current fuel price (April 2016) is multiplied by the EIA Annual Energy Outlook 2015 Reference Case real growth rate, and then multiplied by the estimated gallons to determine the visitor fuel cost in constant 2016 dollars.

Similarly, Person Hours of Travel (see Worksheet 7 for derivation) are multiplied by the *Intercity Personal Surface Mode* value of travel time provided in the *TIGER Benefit-Cost Analysis (BCA) Resource Guide* (adjusted to match the 2016 $s analysis year) to arrive at an estimate of the value of visitor travel time.

Round trip travel time and fuel costs are summed to estimate the use/recreation/visitation value. These annual totals are identified in constant dollars and present value terms using both discount rates.

The travel cost method has limitations; it can only estimate visitor values and assumes that the visit to the site is the sole purpose of the trip. The further a zone is from the site, the greater the chance that other recreation opportunities play a role in visitors coming from that zone. There is however no apportionment approach with broad acceptance. As a result TCM can overestimate the net benefit to some consumers from their visit. On the other hand, the costs of food, clothing and equipment required to recreate have not been included.

Worksheet 4b Use Benefit (User Fees) provides a year by year breakdown of the estimated use values for the project based on the user fees (day use and hiker/biker campground charges) for new users. Day use fees are only charged at Viento State Park. So, only users expected to enter this way are reflected. Similarly, only users of the new hiker/biker campground are reflected in the hiker/biker fees. See Worksheet 6 Visitor Impacts for detail on added visitor demand estimates. Some additional consumer surplus should be expected from both existing and new users, but is not included.

Hiker/biker campers are currently charged $5.00 per person per day. Day use parking fees are $5.00 per vehicle.

Worksheet 5 Cost of Carbon reflects the understanding that in assuming new visitor demand and trips, the social cost of carbon should be included as a disbenefit.

The same miles of travel, EIA mpg efficiencies, and gallons of fuel from Worksheet 4a are coupled with EPA's equation for estimating the metric tons of carbon dioxide per gallon of gasoline to estimate the metric tons of carbon dioxide per year resulting from new travel demand. This is then multiplied by the social cost of carbon provided in the *TIGER Benefit-Cost Analysis (BCA) Resource Guide* (adjusted to 2016 $s) to create a social cost of carbon disbenefit. The result is provided only in discounted 2016 dollars (the discount rate is 3%). Some of the referenced resources and related calculations occur in Worksheet 7 Ref. & Calculations.

Worksheet 6 Visitor Impacts details the calculations behind the estimated additional visitor demand. The projected annual use (and difference from baseline) for the build scenario reflects the assumption that the additional visitor demand resulting from this project [construction of 1.7 miles of

multi-use trail connecting upper Viento State Park to Perham Creek] would resemble the additional demand that occurred after completion of the trail between Starvation Creek and Viento State Park (in 2008). Specifically, that use would experience a significant increase in the first two years after completion of the trail, then settle at a new level (somewhat lower than the first two years, but higher than before the trail was in place – this is called out as "difference of averages"). Use was not grown over the analysis period in recognition that some substitution effect is likely to occur, and growth cannot be discerned from available HCRH visitor counts.

Statewide the hiker/biker person day counts are 1% to 8% above the number of camp site rentals, with a state average of 3.3%. Because the facility that is part of this project is the first trailside exclusive hiker/biker campground and there will be a bike hub nearby (including a repair station and cell phone charging area), demand for this facility is estimated conservatively at 8% above current camp site rentals at Viento. This would result in a 7.8% annual occupancy rate for the hiker/biker campground (note that hiking and biking is highly seasonal in nature).

Worksheet 7 Ref. & Calculations provides a spot for many of the input sources and calculations. The ones likely to be of primary interest are the miles of travel and person hours of travel based on visitor zone and visitor impacts (from Worksheet 6). Here the Visitor Zones and distribution derived from the visitor survey of day-use visitors at Starvation Creek State Park (2012) are multiplied by the assumed new visitor demand (in cars) to get a zonal visitor demand (in cars). This is then multiplied by the average distance traveled (by zone respondents) converted to a round trip figure. The result is the total miles of travel by zone which when summed provides a primary input for worksheets 4a and 5.

The cars by zone are multiplied by the average number of people per vehicle from the survey to get visitors in persons by zone. Free flow speeds from the most frequently cited locations by zone are used to determine hours of travel by zone, which when multiplied by persons give us person hours of travel; an important input to worksheet 4a.

This sheet is otherwise a holding place for information used to make dollar year adjustments, the adjustments themselves, and other misc. items previously discussed (such as Residual Value estimate and maintenance and operating cost estimate details).