

Appendix D: Planning Level Cost Calculator

Network Costs by Facility Type

Facility Type	Total Miles of Facility	Total Number of Intersections	Cost per feature or per mile	Total Cost
Bicycle Boulevard (base cost)	52.14		\$35,200	\$1,835,328
Bike Boulevard Type I Intersections		19	\$75,000	\$1,425,000
Bike Boulevard Type II Intersections		10	\$100,000	\$1,000,000
Bike Boulevard Type III Intersections		0	\$300,000	\$0
Bike Lane	42.28		\$77,600	\$3,280,928
Bike Lane (requiring roadway enhancement)*	3.44		Varies from \$1,000,000 to \$7,000,000	\$9,776,045
Climbing Lane	7.34		\$60,480	\$443,923
Climbing Lane (requiring roadway enhancement)*	0.56		\$1,070,000	\$600,000
Buffered Bike Lane	4		\$117,680	\$470,720
Cycle Track	0.83		\$1,647,450	\$1,367,384
Shared Lane Marking	6.89		\$43,300	\$298,337
Marked Route	7.79		\$4,300	\$33,497
Further Study Needed**	9.44		\$0	\$0
Total	134.71			\$20,531,162

*Project requires significant roadway enhancements in order to implement the recommended bicycle facility.

**Further study needed projects require additional analysis City staff before a specific facility type can be identified.

Facility Cost Assumptions

	Facility Unit Cost (per feature or per mile)	Calculation	Assumptions
Bicycle Boulevard (base cost)	\$35,200	80 shared lane markings at \$225 each) + (80 sign assemblies at \$215 each)	Bike Boulevard Base - Signage and shared lane markings (80/mile) - No allowance for additional curb work, stormwater, ROW, etc.
Bike Boulevard Type I Intersection (lower volume street crossing)	\$75,000		Bulb outs & Crosswalk
Bike Boulevard Type II Intersection (medium volume street crossing)	\$100,000		Flashing crossing or HAWK
Bike Boulevard Type III Intersection (higher volume street crossing)	\$300,000		Full traffic signal
Add bike lanes (with parking)	\$77,600	Facility Unit Cost = \$3.25/LF * 5280 feet * 2 lines * 2 sides + \$225 per bike symbol * 20 symbols/mile * 2 sides	Assumes 2 bicycle lane lines and 20 bike and arrow symbols per mile are added on each side of the roadway to create the bicycle lane. \$225 per bike and arrow symbol includes the material (thermoplastic) and installation costs.
Add buffered bike lane (with parking)	\$117,680	Facility Unit Cost = (3 lines*5280*\$3.25/LF * 2 sides)+(880 LF diagonal lines*2*\$3.25/LF)+(20 symbols/mile*\$225 * 2 sides)	Assumes a 30" diagonal stripe every 15 feet between two continuous parallel lines both sides of street plus inside bike lane/parking lane stripe, 20 bike and arrow symbols per mile both sides. \$225 per bike and arrow symbol includes the material (thermoplastic) and installation costs.
Add bike lanes (no parking)	\$43,300	Facility Unit Cost = \$3.25/LF * 5280 feet * 1 line * 2 sides + 20 symbols/mile*\$225 * 2 sides	Assumes 2 bicycle lane lines and 20 bike and arrow symbols per mile are added on each side of the roadway to create the bicycle lane. \$225 per bike and arrow symbol includes the material (thermoplastic) and installation costs.

Add buffered bike lane (no parking)	\$83,360	Facility Unit Cost = (2 lines*5280*\$3.25* 2 sides)+(880 LF diagonal lines*2*\$3.25)+(20 symbols/mile*\$225 * 2 side)	Assumes a 30" diagonal stripe every 15 feet between two continuous parallel lines both sides of street, 20 bike and arrow symbols per mile both sides. \$225 per bike and arrow symbol includes the material (thermoplastic) and installation costs.
Climbing lane (with parking)	\$60,480	Facility Unit Cost = \$3.25/LF * 5280 feet * 3 lines + \$225 per bike symbol * 20 symbols/mile*\$225 + \$225 per shared lane marking symbol * 20 symbols/mile	Assumes 2 bicycle lane lines and 20 bike and arrow symbols per mile are added on one side of the roadway to create the bicycle lane. \$225 per bike and arrow symbol includes the material (thermoplastic) and installation costs. Assumes parking lane lines added to one side of street and 20 shared lane marking symbols per mile are added on each side of the roadway to create the shared lane pavement marking facility. \$225 per bike and arrow symbol includes the material (thermoplastic) and installation costs.
Climbing Lane (no parking)	\$26,160	Facility Unit Cost = \$3.25/LF * 5280 feet * 1 line + \$225 per bike symbol * 20 symbols/mile + \$225 per shared lane marking symbol * 20 symbols/mile	Assumes 1 bicycle lane line and 20 bike and arrow symbols per mile are added on one side of the roadway to create the bicycle lane. \$225 per bike and arrow symbol includes the material (thermoplastic) and installation costs. Assumes 20 shared lane marking symbols per mile are added on one side of the roadway to create the shared lane pavement marking facility. \$225 per shared lane pavement marking includes the material (thermoplastic) and installation costs.
Add shared lane markings (no parking)	\$9,000	Facility Unit Cost = \$225 per shared lane marking symbol * 20 symbols/mile * 2 sides	Assumes 20 shared lane marking symbols per mile are added on each side of the roadway to create the shared lane pavement marking facility. \$225 per bike and arrow symbol includes the material (thermoplastic) and installation costs.
Add shared lane markings (with parking)	\$43,300	Facility Unit Cost = \$3.25/LF*5280 feet*2 lines + \$225 per shared lane marking symbol *20 symbols/mile * 2 sides	Assumes parking lane lines added to both sides of street and 20 shared lane marking symbols per mile are added on each side of the roadway to create the shared lane pavement marking facility. \$225 per bike and arrow symbol includes the material (thermoplastic) and installation costs.

Cycle Track (midrange cost)	\$1,647,450	Facility Unit Cost = (1 line*5280*\$3.25* 2 sides)+(20 symbols*\$225 * 2 side) + full curb (\$250,000 * 2 sides) + signal upgrades (4 x \$150,000)+25% miscellaneous	Assumes a one-way separated bikeway both sides of street, 20 bicycle symbols per mile both sides. \$225 per bike and arrow symbol includes the material (thermoplastic) and installation costs. Continuous curb at \$250,000 per mile. Four signal upgrades at \$150,000 each. Add 20% for miscellaneous additional costs, e.g. landscaping, traffic control, utility adjustments.
Bike Route Signing	\$4,300	Facility Unit Cost = \$215 per sign assembly*10*2 sides	Spacing of bike signs is flexible based on engineering judgment and current practices. This calculation assumes up to 10 bike route/wayfinding signs per mile installed on both sides of bicycle route. In some cases the number of signs per mile may be more or less than 10. Unit cost includes one sign, post and installation. Some wayfinding sign assemblies may have more than one sign, and therefore would be higher cost.

Global Assumptions

- 1) Cost calculations assume that bicycle facility improvements are made on both sides of the street. Assumes any pavement costs are independent of bicycle facility.
- 2) Bike lane, buffered bike lane, climbing lane, and shared lane marking cost calculations include parking lane striping.
- 3) Further study needed projects require additional analysis by City staff before a specific facility type (and cost) can be identified.
- 4) Cost estimates do not include design unless specifically stated in assumptions. Design costs, which include construction planning, public process, facility design, and other background work required to implement the project, can generally be estimated at 15% to 20% of the facility construction cost. Projects requiring a higher level of public process may have higher design costs.
- 5) Cost estimates involving major construction do not include contingency costs, which typically are estimated at 15 to 25% of the construction costs.

Individual Project Costs

Individual planning level project costs are listed in Appendix B. They were generated using the costs provided in the assumptions table above. These numbers were provided by the City of Bellingham at the time of the draft plan. To generate costs per bicycle boulevard project, the number of arterial intersection crossings for each project was identified. A cost was then assigned based on the type of

intersection improvement(s) needed (Type 1, 2, 3) plus a base cost per mile for signage and shared lane markings. For other facility types the assumptions outlines the calculations used. For the mixed projects, the cost for each facility type was applied. Specific project costs were identified for four projects that received preliminary engineering estimates by Public Works Engineering. These projects (listed below) require significant roadway enhancements in order to implement the recommended bicycle facilities.

Preliminary Engineering Cost Estimates for Projects Requiring Significant Roadway Enhancements

Street	From	To	Improvement	Cost per mile	Total cost
Samish Way	Elwood	48 th	Bike lanes	\$1,000,000	\$2,159,000
James Street	Sunset	Orchard	Mixed	\$1,000,000	\$666,500
Northshore Road	Britton	Eagle Ridge	Bike lanes	\$7,000,000	\$7,000,000
Douglas Avenue	30 th	21 st	Climbing lane	\$1,070,000	\$600,000

Summary Costs for Recommended Network

On-Street Facilities	Total Recommended Miles	Total Cost
Bike lanes	45.72	\$13,056,973
Buffered Bike Lanes	4	\$470,720
Shared lane markings	6.89	\$298,337
Climbing Lanes	7.9	\$1,043,923
Bicycle Boulevard	52.14	\$4,260,328
Cycle Track	0.83	\$1,367,384
Marked Route	7.79	\$33,497
Further Study	9.44	\$0
TOTAL	134.71	\$20,531,162

Maintenance Costs

Maintenance Cost Calculations

Shared lane markings	\$9,000.00	Facility Unit Cost = \$225 per shared lane marking * 20 shared lane markings per mile * 2 sides	Assumes thermoplastic. All SLM symbols generally replaced every five years at \$225 per shared lane marking
Bicycle lanes	\$43,320.00	Facility Unit Cost = \$3.25 per linear foot * 5280 feet * 1 line * 2 sides + \$225 per bike and arrow symbol * 20 bike and arrow symbols per mile * 2 sides	Assumes thermoplastic for striping and symbols. Outside striping marking generally replaced every six years at \$3.25 per linear foot and bike lane symbols replaced every ten years at \$225 per symbol.
Buffered bike lane	\$9,372.00	Facility Unit Cost = 2 lines*5280*\$3.25* 2 sides)+(880 LF diagonal lines*2*\$3.25)+(20 bike and arrow symbols per mile* 2 sides*\$225)	Assumes thermoplastic for striping and symbols. All striping markings generally replaced on average every 7.5 years* at \$3.25 per linear foot and bike lane symbols replaced every ten years at \$225 per symbol.
Bicycle Boulevard	\$9,000.00	Facility Unit Cost = 40 shared lane markings * \$225	Assumes thermoplastic shared lane markings. SLMs generally replaced every six years at \$225 per marking.
Spot improvements (5 per year)	\$75,000.00	TBD	Assumes 5 spot improvements per year at an average cost of \$15,000. Spot improvements may range in scope and scale.

Maintenance Item	Assumptions	Estimated Annual Network Maintenance Cost
Replace Damaged/Missing Signs	<i>Cost represents replacement of all signs on network times 10 (average number of signs per mile) at \$215 per sign. All signs will generally need to be replaced every 10 years.</i>	\$34,894
Sweep bicycle lanes (annually at full build-out)	<i>Assumes bike lanes only (at full build-out) sweeping twice per month at \$50 per mile.</i>	\$102,516
Shared Lane Markings (average annual cost for network)	<i>Assumes replacement of SLMs on the network every six years at 20 per mile X 2 sides.</i>	\$16,403

Bicycle Lanes (estimated annual cost for network)	<i>Assumes replacement of bike symbols on the network every ten years and striping replaced on average every 7.5 years.*</i>	\$21,630
Buffered Bicycle Lanes (estimated annual cost for network)	<i>Assumes replacement of bike symbols on the network every ten years and striping replaced on average every 7.5 years.*</i>	\$27,493
Bicycle boulevard (estimated annual cost for network)	<i>Assumes replacement of SLM symbols on the network every six years.</i>	\$117,315

*Bicycle lane and buffered bicycle lane striping shall occur every 5 years (outside line marking) and every ten years (inside line marking).

Other Facility Costs

Item	Assumptions	Unit Cost
Install Full Traffic Signal	<i>Assumes that the full cost of the traffic signal is applied as a bicycle facility improvement (no cost shared by pedestrian, transit, motor vehicle, or other budgets)</i>	\$300,000
Install Pedestrian Crossing Signal	<i>Assumes that the full cost of the pedestrian crossing signal is applied as a bicycle facility improvement (no cost shared by pedestrian budgets)</i>	\$100,000
Install Pedestrian Crossing Island	<i>Design specifications (size, number of islands, etc.) may vary. Assumes that the full cost of the pedestrian crossing islands will be applied as a bicycle improvement (no cost shared by pedestrian budgets)</i>	\$15,000 - \$40,000
Upgrade Existing Pedestrian Crossing Signal to Accommodate Bicycles	<i>Assumes 4 special-order bicycle traffic signal heads will be needed at the intersection. Assumes no other hardware or software upgrades, but such upgrades may be necessary.</i>	\$12,000
Traffic Island		\$10,000
Bicycle-Activated Signal Push Button		Varies
Bicycle Detection Pavement Markings		\$75
Signs	<i>The number of signs installed per mile along a bicycle route will vary depending on intersection density, number of intersecting routes, parking restrictions and other factors.</i>	\$215
Bike Racks	<i>Assumes standard inverted U rack and includes installation.</i>	\$400

Calibrate bicycle detection at traffic signals (on-street facilities)	<i>Assumes four approaches per intersection calibrated at man-hour per approach, \$100 per man hour</i>	\$1,500
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Disclaimer:

These costs are intended to be general and used for long-range planning purposes. The construction estimates do not include costs for planning, surveying, engineering design, right-of-way acquisition, mobilization, maintenance of traffic during construction, landscaping/aesthetics, utility adjustments, lighting, drainage, storm water management, erosion and sediment control, significant grading, bridges, retaining walls, significant changes in vehicular traffic patterns, or contingency costs. Maintenance costs are based on estimates from a variety of sources including the City of Bellingham. Construction costs will vary based on the ultimate project scope (i.e. combination with other projects) and economic conditions at the time of construction.