

# Appendix G

Engineering Cost Analysis



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## TECHNICAL MEMORANDUM INFRASTRUCTURE COSTS

The following memorandum provides a brief summary of the estimated infrastructure costs and right of way impacts for each alternative, Alternative A – Enhanced Bus and Alternative B – Bus Rapid Transit (BRT).

### Infrastructure Costs

Conceptual level cost estimates have been developed for each alternative in order to provide an order of magnitude cost. The estimates are preliminary and are based on current material costs. The estimates include a 30 percent construction contingency and a 25 percent design and engineering contingency.

The following is a brief description of each alternative, a breakdown of the elements included in each alternative, and assumptions made for costing purposes.

#### Enhanced Bus - Alternative A

For Alternative A there are three elements that have been included as part of the infrastructure costs; improvements of the stops, modifications to traffic signals, and the addition of concrete stop pads at signalized intersection.

Amenities at each Enhanced Bus stop include:

- (1) Passenger Shelter
- (1) Pedestal Light
- 12’x80’ Concrete Bus Pad
- (2) Benches
- Fare Vending Kiosk
- Landscape
- (1) Trash Can
- Real Time Bus Signage
- Branding/Signage

There are a total of 14 new stop locations as part of Alternative A; 11 bi-directional stops and three one-directional stop totaling 25 new stop platforms. Each stop is 10’ wide by approximately 30 feet long and includes the amenities listed above. The cost for the stops only is estimated to be:

Cost per Stop:	\$150,000 Each
Total cost:	\$3,750,000

Also included in Alternate A are modifications to each signalized intersection to provide traffic signal priority to the buses. Additionally, removal of existing asphalt and replacement with a concrete stop pad is proposed for the outside lane at each signalized intersection. The cost for the intersection modifications is estimated to be:

Traffic Signal Priority (19 intersections):	\$350,000
Concrete approach slabs (2 per intersection):	\$1,300,000

The total estimated infrastructure cost for Alternative A – Enhanced Bus, excluding right-of-way cost, is estimated at **\$5,430,000**.

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### Bus Rapid Transit (BRT) - Alternative B

For Alternative B there are four elements that have been included as part of the infrastructure costs; exclusive guideway BRT lanes, improvements of the stops, modifications to traffic signals, and the addition of concrete stop pads at signalized intersection.

The BRT will operate in one of two configurations, either mixed flow or in exclusive center guideway lanes. The center guideway portion of the BRT route will run from 1500 S to 400 W with the exception of in the area of US 89/Main Street where the route follows the existing ramp alignments from 1800 S to approximately 2300 S.

Where the BRT is operating in the mixed flow condition, limited infrastructure improvements are proposed. For the exclusive guideway sections of BRT, full curb to curb replacement is only proposed when the existing roadway is in poor condition. Since much of the route appears to be relatively new pavement, the 24' concrete exclusive BRT lanes would be cut into the existing roadway, and curb and sidewalk removed and replaced on one or both sides to allow for the necessary widening of the road section. The cost for the exclusive guideway BRT lanes and associated road widening is estimated to be:

Exclusive Guideway BRT Lanes	
24' wide concrete lanes including road widening:	\$28,000,000

Two types of stations are proposed for Alternate B, center median platform stations and side running platform stations. While the location of the stations differs, the amenities for each are generally the same.

Amenities at each BRT Station include:

- |                            |                      |                         |
|----------------------------|----------------------|-------------------------|
| - (2) Passenger Shelter    | - (2) Benches        | - (1) Trash Can         |
| - (1) Pedestal Light       | - Fare Vending Kiosk | - Real Time Bus Signage |
| - 12'x80' Concrete Bus Pad | - Landscape          | - Branding/Signage      |
| - Handrail                 | - (1) Bike Rack      |                         |

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For the BRT alternative there are a total of 17 new stations locations; 5 center median stations, 8 bi-directional side platform stations and a single one-directional platform station totaling 27 new platform stations. Each station is 10' wide by approximately 60 feet long and includes the amenities listed above. The cost for the stations is estimated to be:

Total Median Stations:	5
Cost per Station:	\$1,250,000 (includes both platforms)
Total cost:	\$6,250,000

Total Side Stations:	17 (8 bi-directional, 1 one way)
Cost per Station:	\$235,000 Each
Total cost:	\$4,000,000

As with Alternate A, modifications to each signalized intersection are proposed to provide traffic signal priority to the BRT buses and removal of existing asphalt and replacement with a concrete stop pad. The concrete stop pads would be installed at intersections where the BRT is running in mix flow lanes. The cost for the intersection modifications is estimated to be:

Traffic Signal Priority (19 intersections):	\$350,000
Concrete approach slabs (14 intersections, 2 per int.):	\$1,000,000

The total estimated infrastructure cost for Alternative B – Bus Rapid Transit (BRT), excluding right-of-way cost, is estimated at **\$39,625,000**.

## Right of way Impacts

Each alternative has been evaluated for potential property impacts and additional right of way needs. Estimated impacts were determined based on available GIS parcel and right of way data for the proposed corridors.

### Enhanced Bus - Alternative A

For the majority of the Enhanced Bus stops it appears the proposed improvements will fit within existing right of way. In most locations, existing planter strips would be removed and the sidewalks widened to accommodate the shelters and stop amenities. Based on preliminary analysis, sliver takes of additional right of way may be needed at three stop locations, 400W, 2600S, and Center Street.

Estimated additional Right of way needed:	1,800 Square Feet
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Assessor land values per square foot have been used to estimate the potential cost impact for additional right of way. While assessor's estimates are intended to reflect market pricing, actual sales price could differ substantially.

Estimated value of property takes needed:	\$20,000
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### Bus Rapid Transit (BRT) - Alternative B

Where BRT is operating in a mixed flow condition, there are minimal property impacts. As with the Enhanced Bus alternative, the majority of the BRT side running platforms will fit within existing right of way by removing the existing planter strips. The majority of right of way impacts for BRT are a result of the additional width needed to accommodate the exclusive BRT lanes and intersection platforms.

The following provides a brief summary of the property impacts and right of way takes:

- 400 W Station: Sliver takes for the station platforms (approx. 800 sf)
- 1700 S Center Station: Additional ROW take from the west side to accommodate center median station (approx. 4,800 sf)
- Main/1800 S Intersection: Additional ROW take from the west side to accommodate southbound left turn lane (approx. 1,600 sf)
- 1800 S between Main and 500 W: Additional ROW take from the north side needed for exclusive bus lanes and east/westbound left turn lanes at intersections (approx. 11,000 sf)
- 500 W/ 1800 S Intersection: Additional ROW take from the west side to accommodate northbound left turn lane (approx. 2,000 sf)
- 2600 S Station: Additional ROW needed on NW, NE, and SE corners for median stations (approx. 8,500 sf)
- 3800 S Intersection: Additional ROW needed to accommodate north/south bound left turn lanes (approx. 4,000 sf)
- Main from 3800 S to Center Street: Additional ROW needed for widening of route (approx. 19,000 sf)
- Center Street Station: Additional ROW needed on each corner to allow for center median stations and left turn lanes (approx. 8,000 sf)
- Main from Center Street to South Main: Additional ROW needed for road widening (approx. 3,700 sf)
- Eaglewood Station: Additional ROW needed on west side. Also, one business impacted and will likely require acquisition of the total parcel (approx. 20,000 sf including full parcel, 3,500 square foot building)
- Everett/89 Intersection: Additional ROW needed to accommodate traffic turn lane (approx. 5,700 sf)
- Victory/89 Intersection: Additional ROW needed to accommodate double traffic turn lanes onto Victory (approx. 9,000 sf)

Using the existing GIS data and proposed corridor configurations, it is estimated that approximate 96,000 square feet of additional right of way will be needed to accommodate the proposed improvements (includes 10,000 sf parcel at Eaglewood Station).

The total value of the right of way take needed has been determined based on the assessed land values at each of the take locations.

Estimated value of property takes needed:

\$700,000

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### Summary

The following table provides a brief summary of the infrastructure costs, right of way impacts, and estimated right of way costs.

	Enhanced Bus	Bus Rapid Transit (BRT)
Stops/Stations	\$3,750,000	\$10,250,000
Intersection Improvements	\$1,650,000	\$1,350,000
Route Improvements	\$0	\$28,000,000
<b>Total Infrastructure</b>	<b>\$5,400,000</b>	<b>\$39,600,000</b>
Right of Way Take	1,800 sf	96,000 sf
Right of Way Costs	\$20,000	\$700,000