

SAN GABRIEL VALLEY COG TRANSIT FEASIBILITY STUDY

Cost Estimates Summary Memorandum

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Introduction

The purpose of this memorandum is to summarize the rough-order-of-magnitude (ROM) capital cost estimates prepared for the initial project concepts as part of Task 6.2. The estimates were prepared in accordance with the Cost Estimate Methodology Report developed in Task 6.1 and will be considered as part of the Feasibility Analysis in Task 7. The screening analysis resulted in the recommendation to carry forward three east-west concepts and four north-south concepts for cost estimate:

East-West Concepts

- Concept 1 – Downtown Los Angeles to Downtown Pomona via Valley Blvd
- Concept 2 – Atlantic Station to Downtown Pomona via SR-60
- Concept 5 – Atlantic Station to Downtown Pomona via Valley Blvd & Colima/Golden Springs

North-South Concepts

- Concept 10 – Sierra Madre Villa Station to CSLB via Rosemead Blvd & Lakewood Blvd
- Concept 11 – Monrovia Station to Whittier via Peck & Beverly
- Concept 12 – Azusa Downtown Station to Newport Beach via Azusa Ave & Harbor Blvd
- Concept 13 – APU/Citrus College Station to Anaheim via Citrus & Grand

Route Analysis

The concepts described above were each analyzed on a turn-by-turn basis to identify the main segments within each route. The following relevant measurements and data for each segment were then identified and documented within a spreadsheet database:

- | | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> • Segment length and street limits • Right-of-way width • Pavement width (curb-to-curb) • Number and width of travel lanes • Presence of a median / turn lanes • Presence of bike lanes | <ul style="list-style-type: none"> • Presence of on-street parking • Existing sidewalk widths • Signalized and unsignalized intersections • Proposed stations • Proposed length of BRT lanes by type (center running, side running, curb running) |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Each segment of each concept was considered for the three different configurations of BRT lanes: Center-Running with island platforms; Side-Running with “bulb out” platforms; and Curb-Running with platforms incorporated into the sidewalk area. Some segments were not conducive to implementing dedicated BRT lanes, primarily due to lack of available width, but also when BRT lanes would not produce a significant benefit to travel time. These configurations are discussed in more detail in the following section.

Once the type of BRT treatment was determined for each segment, costs for each type of configuration were applied to the route as described in the following section. **Attachment 1 – Concept Configuration by Segment** presents the results of the route analysis.

Proposed On-Street Bus Lane Configurations

BRT services can be operated along on-street bus lanes in a variety of configurations. Depending upon the specific needs for travel lanes, bicycle lanes, parking, and landscaping, numerous design options are potentially feasible, subject to the available roadway width. Principal configurations include:

- Center-Running Bus Lanes
- Side-Running Bus Lanes
- Curb-Running Bus Lanes

Generally, center-running bus lanes provide the most benefit to bus operations with buses proceeding in their own lane concurrent with parallel through traffic and conflicting pedestrian traffic turning movements held. With side-running bus lanes, general purpose traffic is allowed to weave across the bus lane to access curb uses including driveways, parking and loading zones, and right-turn bays where present. Curb-running bus operation precludes parking and loading zones, and driveway movements need to cross the bus lane. Also, if separate right-turn pockets cannot be provided at intersections, curb-running buses may need to wait behind right-turning traffic in the bus lane, which may not clear until pedestrians using the parallel crosswalk have traversed.

Because localized opportunities and constraints vary along the length of a BRT route, different treatments may be provided, including mixed-flow segments where bus lanes do not provide a time savings benefit, are infeasible due to geometric constraints, or where transitions occur.

Center-Running Bus Lanes

Center-running bus lanes typically provide a two-lane “busway” in the median, which often requires full reconstruction and potential widening of the roadway. Center-running bus lanes may be physically separated from adjacent traffic by short raised-curbs, channelization devices, rumble strips, or by pavement markings alone to provide an exclusive guideway for buses, as shown in Figures 1 and 2, which depict typical mid-block and intersection/station conditions, respectively. This type of running-way can be generally applied in streets with 80-foot or greater curb-to-curb width to provide two bus lanes along with two lanes for general purpose traffic. Cross-street and turning traffic is usually limited to signalized intersections; pedestrian crossings are signal-controlled as well, using traffic signals or hybrid pedestrian beacons. Left-turns across the busway are usually signal-controlled with turns made from left-turn pockets outboard from the center bus lanes – “split far side” loading zones can be provided on islands in the “shadow” of the left-turn pockets on the downstream side of the intersection. At mid-block locations where left-turns are not required, parking can be provided.

Figure 1 - Center-Running Configuration (Mid-Block)

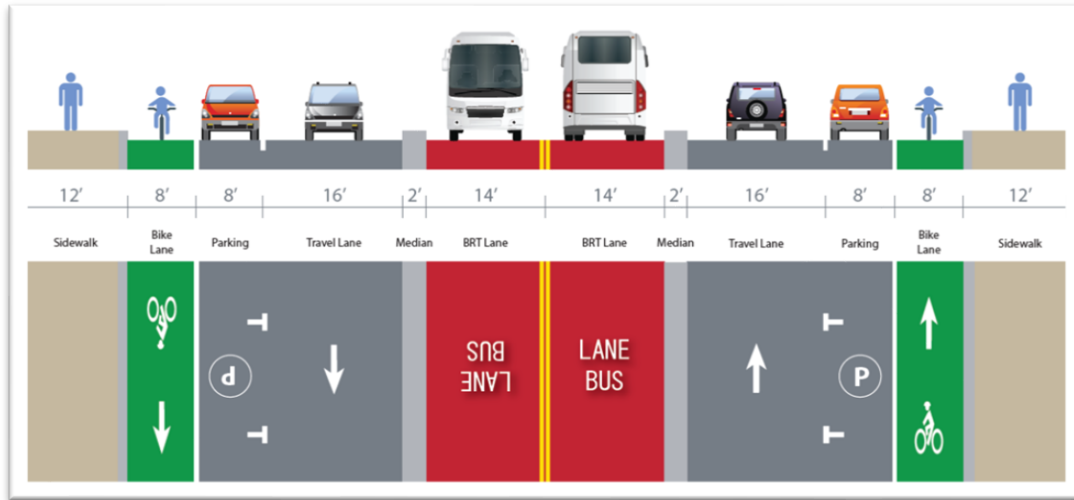
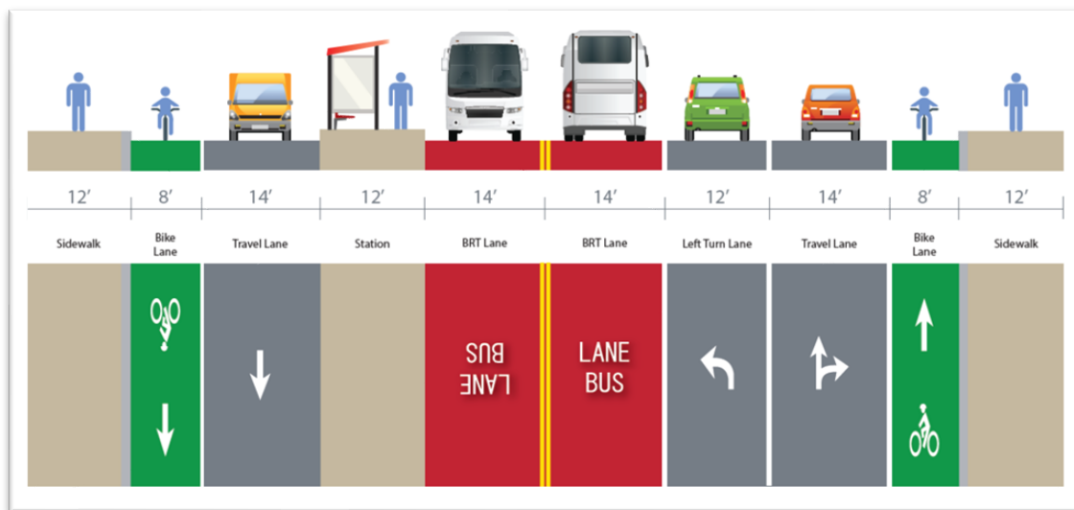


Figure 2 - Center-Running Configuration at Intersection or Station



Side-Running Bus Lanes

Side-running bus lanes may be provided by widening and/or converting the outside travel lane to bus-only operation. Side-running bus lanes are separated from the curb by bicycle lanes, parking lanes, or both (see Figure 3 for a typical mid-block condition.) General purpose traffic is allowed to weave across the bus lanes to access driveways, loading zones, and to make right-turn maneuvers at intersections. Space permitting, right-turn bays may be provided outboard from the bus lanes at intersections to eliminate operational interference with turning vehicles, which may need to yield to pedestrians utilizing crosswalks parallel to the bus route. Stations are typically placed along the sidewalk, which may be widened through the loading zone using “curb extensions” or “bulb-outs” enhancing walkability and the pedestrian environment (refer to Figure 4.) Bike lanes, where present, may be routed between the loading zone and sidewalk area to minimize conflicts with bus patrons.

Figure 3 - Side-Running Configuration Mid-Block

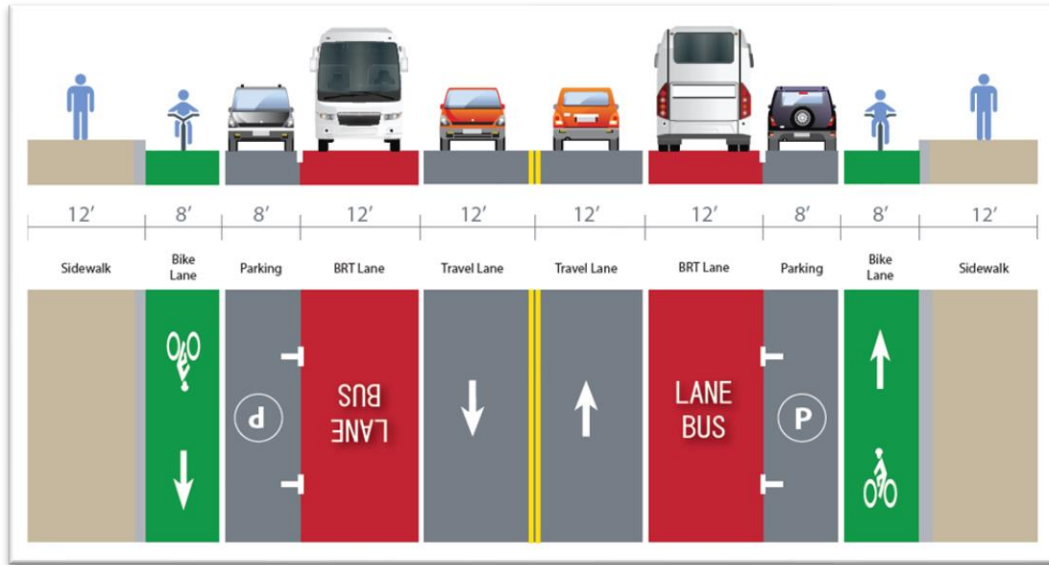
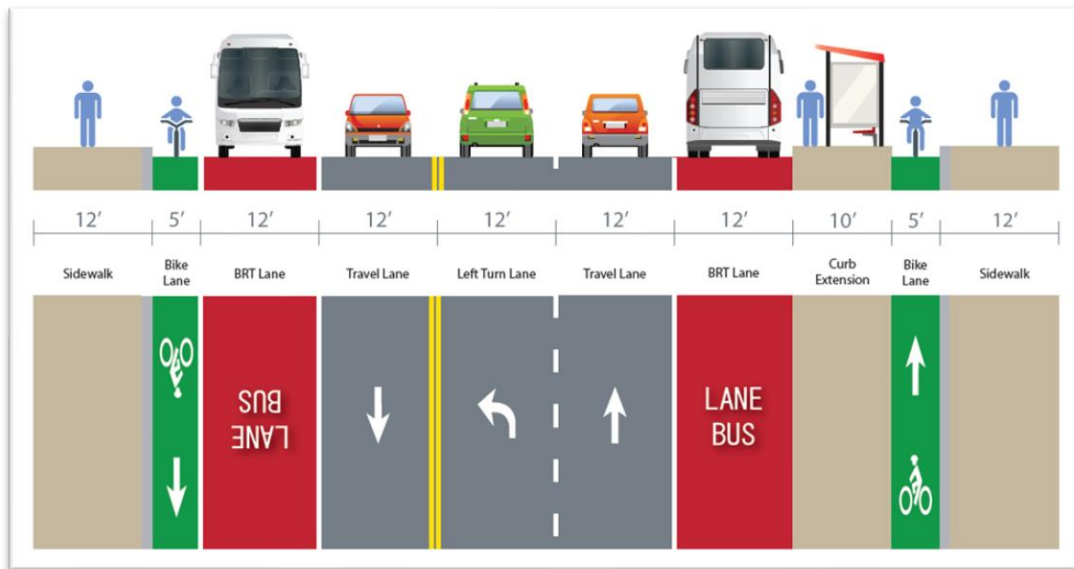


Figure 4 - Side-Running Configuration at Intersection or Station



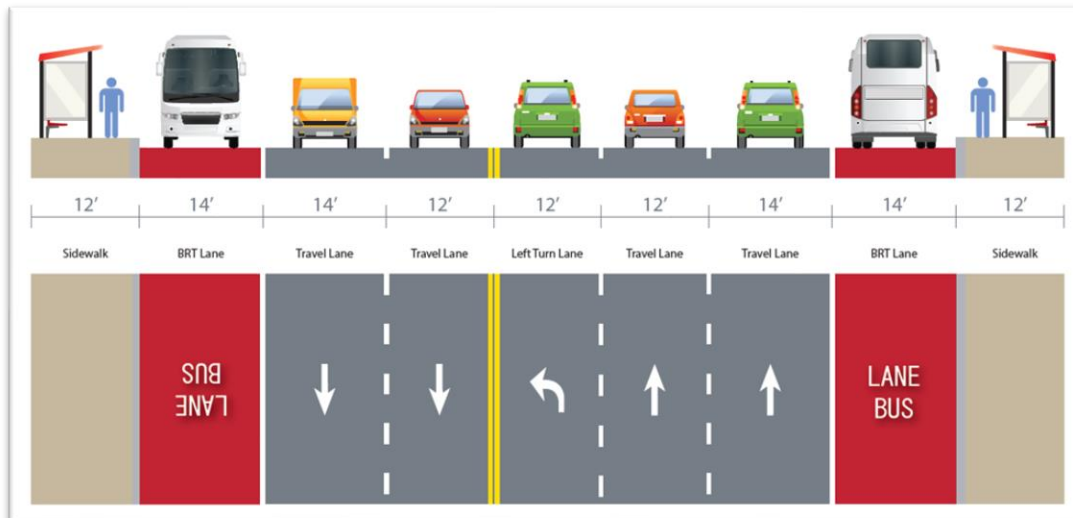
Curb-Running Bus Lanes

Curb-running bus lanes dedicate the right-most travel lane along a curb to buses, as shown in Figure 5, which delineates a typical cross section (near-side or far-side stations are feasible at intersections.) Such lanes may be provided by roadway widening, by removal of parking, or conversion of the curb lane where no bike lanes or parking is present.

Curb-running bus lanes place the dedicated bus lane immediately adjacent to the curb, as shown in Figure 5, which eliminates parking or restricts parking to time periods when the bus lane is not operational. Like the side-running bus lanes configuration, a curb extension may be

provided; however, operation along the curb may preclude development of a bulb out. This type of running-way can experience friction or interaction with cyclists, parked vehicles, commercial loading zones/vehicles, and right-turning traffic, which typically merges into the bus lane prior to turning.

Figure 5 - Curb-Running Configuration



Mixed-Flow Operation

Mixed-flow operation may be provided along the BRT route where buses need to transition from one busway configuration to another such as from center-running to side-running, where buses may need to weave into another lane to make a turn, or where traffic operational or geometric constraints make provision of a dedicated lane impractical. In mixed-flow sections, transit priority at intersections may still be provided to facilitate BRT operations,

Proposed BRT Station Amenities and Configurations

The proposed stations consist of two 10-foot-wide by 100-foot-long concrete platforms with the following amenities: shelters with seating (four per platform), trash receptacles, bicycle racks, advertising kiosk, station marker, wayfinding signage, lighting, detectable warning surfaces and pedestrian railings. The cost per station considers demolition and reconstruction of existing adjacent roadway pavement, sidewalk, and curbs to accommodate the proposed platforms and concrete bus pads (full lane width along the platform face).

Communications and Passenger Information System elements include Nextbus-type dynamic message display, public address system, emergency phone, cabinets, conduits, and pullboxes. Allowances are included for electrical and fiber optic service connections and cabinets for each platform.

The platforms in the Center Running configuration will be island platforms situated on the far side of intersections with access via new or replaced crosswalk markings.

The platforms in the Side Running configuration will have a curb extension “bulb-out” to meet the edge of the dedicated bus lane, displacing on street parking spaces. The platform will

extend a couple feet into the sidewalk area to maintain the 10-foot width, requiring the reconstruction of a portion of the adjacent sidewalk and curbs to accommodate the improvements.

The platforms in the Curb Running configuration will be accommodated into the existing sidewalk area, requiring the reconstruction of a portion of the adjacent sidewalk and curbs. A clear path will be provided behind the proposed platform.

Cost Estimate Buildup

Component costs were developed for the three types of BRT and platform configurations described above and applied as a cost-per-mile for the required roadway work, cost per station for the three types of stations, and costs for new and modified traffic signals. Component costs for all three BRT configurations assume improvements will occur within the curbs (no road widening), and that the dedicated bus lanes will be delineated with pavement markings and full width red paint rather than a raised guideway or curbing. The distinctions between the configuration types are:

- Center-running BRT assumes curb-to-curb reconstruction of the existing roadways and new pavement markings.
- Curb-running BRT assumes milling and resurfacing of only the outside 20-feet of roadway and new pavement markings.
- Side-running BRT assumes only removal and replacement of pavement markings.

Other project costs included in each concept consist of:

- Transit Center improvements allowance at four different locations (\$10,000,000 each) including but not limited to: enhanced seating and shelter for passengers, additional bus bays, upgraded digital signage, and driver facilities.
- Indirect construction costs such as traffic and pedestrian control, stormwater pollution prevention measures, and contractor mobilization, general conditions, and insurance
- Buses based on the service plan and route length (\$1,000,000 each)
- Professional services and other soft costs as a percentage of the construction cost
 - 6% Project Development
 - 8% Final Design
 - 10% Project Management for design and construction
 - 5% Construction Administration and Management
 - 1% Professional liability and other non-construction insurance
 - 4% Legal, permits, review fees by other agencies
 - 2% Surveys, testing, investigations, inspections
 - 1% Start up and commissioning
- Contingency
 - 20% Allocated contingency on construction cost items and professional services
 - 10% Allocated contingency on bus vehicles
 - 15% Unallocated contingency

The detailed component cost buildup is presented in **Attachment 2**. The base year for the cost estimate is 2022 dollars, inflation is not considered.

Cost Comparison by Concept

Table 1 below summarizes the important elements and results of the ROM cost estimates for each of the proposed alternative concepts. At this stage of the project the configuration of BRT treatment throughout each concept is unknown. This will be determined as the selected concepts progress through design development and coordination with the cities and stakeholders of each segment. Therefore, **Table 1** presents ranges of different BRT configurations that are probable for each concept (e.g., 4-miles of center-running, 10-miles of side-running, and 3-miles of curb running). The cost estimate for each segment corresponds to the “medium” scenario.

Due to the uncertainty of the type and extent of BRT treatment that will be provided throughout the San Gabriel Valley, **Table 2** below presents program-wide cost estimates by type of anticipated improvement. These program-wide elements include improvements at transit centers and the bus operations center, roadway work to accommodate dedicated bus lanes and stations, specific transit signal priority treatments at intersections to facilitate the high-frequency bus lines, and the new bus vehicles.

Based on the current level of project development and design, the intended use of this cost estimate for strategic planning and screening of conceptual alternatives, and the American Association of Cost Engineers (AACE) guidelines for road and transportation infrastructure projects, this is a Class 4 estimate. Per AACE, the expected accuracy range of a Class 4 estimate is -15% to -30% on the low side and +20% to +50% on the high side. Given the anticipated complexity of construction for this project and the use of contingency in the estimate, we have determined that the low- and high-end accuracy range of this estimate to be -15% to +25%.

Next Steps

The next steps will be to incorporate comments and feedback on the draft ROM cost estimates from SGVCOG and finalize the numbers to be used in the upcoming Feasibility Analysis. The cost estimates will inform the selection and final screening of alternatives to advance.

Table 1 – Cost Comparison by Concept

	BRT Configuration (miles)					Stations	Vehicles	Class 4 Cost Estimate Accuracy Range		
	Total Length	Bus Lane Length	Center	Curb	Side			Total Project Cost	Low (- 15%)	High (+ 25%)
Concept 1 - Valley Boulevard	35.4	29.2				27	30	\$ 428,000,000	\$ 363,800,000	\$ 535,000,000
High Cost			12.6	15.1	1.5					
Medium Cost			6.3	14.1	8.9					
Low Cost			0.0	13.0	16.2					
Concept 2 - SR-60	29.6	11.6				16	25	\$ 245,000,000	\$ 208,250,000	\$ 306,250,000
High Cost			3.8	6.6	1.2					
Medium Cost			1.9	5.6	4.1					
Low Cost			0.0	4.6	7.0					
Concept 5 - Valley & Colima / Golden Springs	30.7	28.4				23	26	\$ 383,000,000	\$ 325,550,000	\$ 478,750,000
High Cost			10.7	14.1	3.7					
Medium Cost			5.3	11.7	11.4					
Low Cost			0.0	9.4	19.1					
Concept 10 - Rosemead	12.4	12.4				10	11	\$ 259,000,000	\$ 220,150,000	\$ 323,750,000
High Cost			9.7	0.5	2.2					
Medium Cost			4.9	1.0	6.6					
Low Cost			0.0	1.6	10.9					
Concept 11 - Peck & Beverly	15.7	13.1				17	13	\$ 233,000,000	\$ 198,050,000	\$ 291,250,000
High Cost			4.2	7.1	1.8					
Medium Cost			2.1	5.2	5.8					
Low Cost			0.0	3.3	9.8					
Concept 12 - Azusa	10.4	10.4				15	9	\$ 220,000,000	\$ 187,000,000	\$ 275,000,000
High Cost			4.9	4.4	1.1					
Medium Cost			2.5	4.4	3.6					
Low Cost			0.0	4.4	6.0					
Concept 13 - Citrus / Grand	16.4	14.4				15	14	\$ 217,000,000	\$ 184,450,000	\$ 271,250,000
High Cost			4.9	2.0	7.5					
Medium Cost			2.4	3.4	8.6					
Low Cost			0.0	4.7	9.7					

Table 2 – Program Cost Summary

Element	Quantity	Capital Cost
Transit Priority Enhancements ¹	Up to 180	\$35 MM
BRT Line Improvements (Lanes & Stations) ²	Up to 30 Miles	\$410 MM
Transit Hub Improvements	Allowance for up to 4	\$90 MM
Bus Operations Center Improvements	Allowance	\$25 MM
Electric Buses	Up to 30	\$40 MM
Phase 1 Program Cost		\$600 MM

Notes:

1: For Priority Bus Network

2: Based on C-1 / C-5 (without vehicles)

ATTACHMENT 1

CONCEPT CONFIGURATION BY SEGMENT

		Total Length (mi)	Bus Lanes (mi)	No of Signals	R/W	C/C	Median	Inside Lanes	Outside Lanes	Bike	Parking	Width	Shoulder	SW	R/W	Stations	Unsignalized Intersections	Center Running	Curb Running	Side Running	Mixed Flow	Remarks						
Concept 1 - Valley Boulevard																												
Valley Blvd	Eastern to Fremont	1.9	1.5	10.0	90	70	10	2	2	0	2	70		2	90	2		Roadway too narrow	N/F (bike lane)	Convert outside lane (parking remains)		Congestion I-710 to Fremont may require mixed flow						
Valley Blvd	Fremont Ave to Santa Anita Ave	9.1	9.1	38	100	76 - 80	12	2	2	0	2	76		12	100	6.5	39	Convert inside travel lane; retain parking midblock	Remove parking; revise lane widths*	Convert outside lane (parking remains)		* - Off peak parking option						
Valley Blvd	Santa Anita Ave to Ramona Ave	0.6	0.6	4.0	80	64	12	2	2	0	0	64	0	2	80	1.5		Roadway too narrow	Convert outside travel lane	N/A								
Valley Blvd	Ramona to I-605	2.1	2.1	5.5	100	80	12	2	2	0	2	80	0	10	100	1	10	Convert inside travel lane; retain parking midblock	Remove parking; revise lane widths*	Convert outside lane (parking remains)		* - Off peak parking option; center running incompatible w/ industrial land use						
Valley Blvd	I-605 to Lemon Ave	12.4	12.4	27.5	100	80 - 84	12	2	3	0	1	80	0	2	96	6		Reduction from 3 to 1 travel lanes not advisable	Remove parking; revise lane widths*	N/A		* - Off peak parking option						
Lemon-Currier-Brea Canyon-Valley	Valley/Lemon to Valley/Brea Canyon	1.8	0.0	7												1						X Bus lane doesn't save significant travel time						
Grand	Valley Blvd to Temple Ave	1.3	0.0	4.0	100	90	14	2	2	2		90		2	100	1						X Bus lane doesn't save significant travel time						
Temple Ave	Grand Ave to Campus Dr	1.9	0.0	4	100	86	18	2	2	0	0	84	2	0	100	3						X Bus lane doesn't save significant travel time						
Campus Dr	Temple Ave to Kellog Dr	0.3	0.0	1.0	100	60	0	2	2	2	0	60	2	0	100	1						X Bus lane doesn't save significant travel time						
Kellog Dr	Campus Dr to Valley Blvd	0.35	0.0	1.5	100	70	14	2	2	2	0	70	2	2	100	0						X Bus lane doesn't save significant travel time						
Valley Blvd-Holt Ave	Kellog Dr to Main St	3.5	3.5	11.5	100	76	16	2	2	0	2	80	0	10	100	3	17	Convert inside travel lane; retain parking midblock	Remove parking; revise lane widths*	Convert outside lane (parking remains)		* - Off peak parking option						
Main St	Holt Ave to Transit Center	0.1	0.0	0	70	46	0		2	0	2	46	0	2	70	1						X Bus lane doesn't save significant travel time						
		35.4	29.2	114	83%																							
Concept 2 - SR-60																												
Frontage Roads	Altantic to Vail	2.0	2.0	10.0	Frontage roads with varying configuration												2	Frontage road configuration precludes center running	Convert outside travel lane	Convert outside travel lane		Combination of curb & side running (block specific)						
SR-60	Vail to San Gabriel Blvd	2.2	0.0	5													0					X Mixed-flow with possible ramp improvements						
San Gabriel Blvd - Durfee Ave	SR-60 to Rosemead	1.1	0.0	2.0	120	84	14	2	2	2	0	84	2	0	100	0.5						X Relatively low volume; does not warrant bus lane						
Durfee Ave	Rosemead to Peck	1.8	0.0	2	80	64	10	11	11	5	0	64	0	8	80	1						X Two lane; low volume; does not warrant bus lane						
Peck Rd	Durfee Ave to Workman Mill Rd	1.0	0.0	3.0	Varies 72+	Varies 56+	6	2	2	0	0	56	2	0	72	1						X Two lane; low volume; does not warrant bus lane						
Workman Mill Rd - Crossroads Pkwy	Peck Rd to SR-60	1.65	0.0	6.5	84	64	12	2	2	0	0	64	0	2	84	0.5						X Congestion level doesn't warrant bus lane						
SR-60	Crossroads Pkwy to 7th Ave	1.7	0.0	0.0													0	N/A (freeway)	N/A (freeway)	N/A (freeway)		X Mixed-flow with possible ramp improvements						
Gale Ave	7th Ave to Hacienda Blvd	1.5	1.5	5.5	80	60-64	10	2	2	0	0	64	0	8	80	1.5		N/F	Convert outside travel lane	N/A								
Hacienda Blvd	Gale Ave to Haliburton Rd	1.0	1.0	4.0	100	84	16	2	4	0	0	84	0	8	100	1		Too narrow for 4-lanes plus center busway	Convert outside travel lane	N/A								
Haliburton Rd	Hacienda Blvd to Colima Rd	1.5	1.5	3	100	84	16	2	2	2	0	84	0	8	100	1	9	Convert median and inside travel lane	N/F (bike lane)	Convert outside travel lane (bike lane remains)								
Colima Rd	Haliburton Rd to Fullerton Rd	2.3	2.3	9.0	100	84	14	2	2	2	0	84	0	8	100	2	5	Convert median and inside travel lane	N/F (bike lane)	Convert outside travel lane (bike lane remains)								
Colima Rd	Fullerton Rd to Fairway Dr	2.1	2.1	10	100	84	10	4	2	0	0	84	0	8	100	1		Reduction to 1 travel lane not advisable	Convert outside travel lane	N/A								
Fairway Dr	Colima Rd to SR-60	0.7	0.0	3.0	100	84	16	2	2	2	2	84	0	8	100	0.5						X Too short to justify lane						
SR-60/SR-57	Fairway Dr to Temple Ave/Mission Rd	5.6	0.0	1													0	N/A (freeway)	N/A (freeway)	N/A (freeway)		X Mixed-flow with possible ramp improvements						
Mission Rd	Temple Ave/Diamond Bar Blvd to Dudley St	2.0	0.0	8.0	80	60	10	2	2	0	0	60	2		80	2						X Congestion level doesn't warrant bus lane						
Mission Rd	Dudley St to Main St	1.2	1.2	5	100	68	10	2	2	0	2	68	0	16	100	1		Roadway too narrow	Roadway too narrow	Convert outside travel lane (parking remains)								
Main St	Mission Blvd to Transit Center	0.3	0.0	5.0	70	46	0		2	0	2	46	0	12	70	1						X Too short to justify lane						
		29.6	11.6	82	39%																	16	14					

ATTACHMENT 1 CONCEPT CONFIGURATION BY SEGMENT

		Total Length (mi)	Bus Lanes (mi)	No of Signals	R/W	C/C	Median	Inside Lanes	Outside Lanes	Bike	Parking	Width	Shoulder	SW	R/W	Stations	Unsignalized Intersections	Center Running	Curb Running	Side Running	Mixed Flow	Remarks			
Concept 5 - Valley & Colima/Golden Springs																									
Frontage Roads	Altantic to Vail	2.0	2.0	10.0				Frontage roads with varying configuration										2		Frontage road configuration precludes center running	Convert outside travel lane	Convert outside travel lane			Combination of curb & side running (block specific)
Potrero Grande Dr - Rush St	Vail to Walnut Grove Ave	2.7	2.7	5	100	84	16	2	2	0	2	84	0	2	100	2	15	Convert inside travel lane; retain parking midblock	N/A	Convert outside travel lane (parking remains)			Traffic levels do not justify center running		
Walnut Grove Ave	Rush St to Garvey Ave	0.8	0.8	3	80	64	0	2	2	2	0	64	2	2	80	1		Roadway too narrow	N/F (bike lane)	Convert outside travel lane (bike lane remains)					
Garvey Ave	Walnut Grove Ave to Valley Blvd	3.6	3.6	17	100	76	12	2	2	0	2	76	0	2	100	2.5	20	Convert inside travel lane; retain parking midblock	Remove parking; revise lane widths*	Convert outside travel lane (parking remains)			* - Off peak parking option		
Valley Blvd	Garvey to I-605	1	1	1.5	100	80	12	2	2	0	2	80	0	2	100	0.5	7	Convert inside travel lane; retain parking midblock	Remove parking; revise lane widths*	Convert outside travel lane (parking remains)			* - Off peak parking option		
Valley Blvd	I-605 to Azusa Ave	5.7	5.7	17.5	100	80 - 84	12	2	3	0	1	80	0	2	96	4		Reduction from 3 to 1 travel lanes not advisable	Remove parking; revise lane widths*	N/A			* - Off peak parking option		
Azusa Ave	Valley Blvd to Colima Rd	1.6	1.6	8	100-125	84 - 100	12	4	2	0	0	84 - 100	0	2	100-125	0.5		Bridges preclude median busway	Convert outside travel lane						
Colima Rd	Azusa Ave to Fullerton Rd	1.5	1.5	6	100	84	14	2	2	2	0	84	0	2	100	1	2	Convert inside travel lane	N/F (bike lane)	Convert outside travel lane (bike lane remains)					
Colima Rd	Fullerton Rd to Fairway Dr	2.1	2.1	10	100	84	10	4	2	0	0	84	0	2	100	2		Reduction to 1 travel lane not advisable	Convert outside travel lane	N/A					
Colima Rd - Golden Springs Dr	Fairway Dr to Diamond Bar Limit	0.6	0.6	1.5	100	84	16	2	2	2	2	84	0	2	100	0.5		Segment too short to justify center running bus lanes	N/A	Convert outside lane (parking remains)					
Golden Springs Dr	Diamond Bar Limit to Brea Canyon Rd	1.2	1.2	4.5	100	84	14	2	2	2	0	84	0	2	100	0.5	2	Convert inside travel lane	N/A	Convert outside travel lane (bike lane remains)					
Golden Springs Dr	Brea Canyon Rd to Grand Ave	1.5	1.5	5	90	80	14	2	2	2	0	80	0	2	90	1	0	Convert inside travel lane		Convert outside travel lane (bike lane remains)					
Golden Springs Dr	Grand Ave to Diamond Bar Blvd	1.2	1.2	4	80	64	10	2	2	2	0	64	0	2	80	1		Roadway too narrow		Convert outside travel lane (bike lane remains)					
Diamond Bar Blvd	Golden Springs Dr to Mission Rd	1.9	1.9	8	100	84	14	2	2	2	0	84	0	2	100	1	1	Convert inside travel lane		Convert outside travel lane (bike lane remains)					
Mission Rd	Temple Ave/Diamond Bar Blvd to Dudley St	2.0	0.0	8	80	60	10	2	2	0	0	60	2	10	80	1.5					X	Congestion level doesn't warrant bus lane			
Mission Rd	Dudley St to Main St	1.2	1.2	5	100	68	10	2	2	0	2	68	0	16	100	1		Roadway too narrow	Roadway too narrow	Convert outside lane (parking remains)					
Main St	Mission Blvd to Transit Center	0.3	0.0	0.0	70	46	0	2	0	2	2	46	0	12	70	1					X	Too short to justify lane			
		30.7	28.4	114	93%											23	47								

Concept 10 - Rosemead

Colorado Blvd	Sierra Madre Villa Ave to Rosemead Blvd	0.5	0.5	2	100	76	12	2	2	0	2	76	0	2	100	1		Segment too short support to justify reconstruction	Remove parking; revise lane widths*	Convert outside lane (parking remains)			* - Off peak parking option
Rosemead Blvd	Colorado Blvd to Huntington Dr	1.1	1.1	3	108	90	18	2	2	0	2	90	0	9	108	0.5	16	Remove landscaped median and parking at intersections	Remove parking; revise lane widths*	Convert outside lane (parking remains)			* - Off peak parking option
Rosemead Blvd	Huntington Dr to Duarte Rd	0.5	0.5	2	100	84	16	2	2	0	2	84	2	5	100	0.5	2	Remove landscaped median and parking at intersections	Remove parking; revise lane widths*	Convert outside lane (parking remains)			* - Off peak parking option
Rosemead Blvd	Duarte Rd to UPRR (No of Grand Ave)	2.2	2.2	7.5	100	80	8	2	2	2	2	80	2	5	100	1		Roadway too narrow	N/F (bike lanes)	Convert outside lanes (parking and bike remains)			
Rosemead Blvd	UPRR (No of Grand Ave) to I-10	1.3	1.3	5	100	80	16	2	2	0	2	80	0	10	100	1	12	Remove parking and reduce to 1 travel lane	Remove parking; revise lane widths*	Convert outside lane (parking remains)			* - Off peak parking option
Rosemead Blvd	I-10 to Garvey Ave	0.8	0.8	2.5	110	90	6	4	2	0	1	90	2	0	110	0.5	0	Convert median and inside lane	Convert curb lane	N/A			"Parking" dimension is painted or raised shoulder
Rosemead Blvd	Garvey Ave to Rush St	0.8	0.8	1	128	104	16	4	2	0	2	104	0	12	128	1	4	Convert median and inside lane	Revise shoulder and restrips	N/A			
Rosemead Blvd	Rush St to Gallatin Rd	2.7	2.7	4	128	68	16	2	2	0	0	68	2	0	90	1.5	2	Convert median and inside lane	Convert curb lane or outside through lane (at interchange)	Convert curb lane or outside through lane (at interchange)			
Rosemead Blvd	Gallatin Rd to Washington Blvd	2.6	2.6	9	125+	105+	16	2	2	0	2	104	0	10	124	3	14	Convert median and inside lane	Remove parking; revise lane widths*	Convert outside lane (parking remains)			* - Off peak parking option
		12.4	12.4	36	100%											10	50						

ATTACHMENT 1 CONCEPT CONFIGURATION BY SEGMENT

		Total Length (mi)	Bus Lanes (mi)	No of Signals	R/W	C/C	Median	Inside Lanes	Outside Lanes	Bike	Parking	Width	Shoulder	SW	R/W	Stations	Unsignalized Intersections	Center Running	Curb Running	Side Running	Mixed Flow	Remarks	
Concept 11 - Peck & Beverly																							
Myrtle Ave	Duarte Rd to Live Oak Ave	1.5	1.5	4	100	76	12	2	2	0	2	76	2	2	100	1.5	17	Convert inside travel lane; retain parking midblock	Remove parking; revise lane widths*	Convert outside lane (parking remains)		* - Off peak parking option	
Peck Rd	Live Oak Ave to Ramona Blvd	2.7	2.7	11	100	80	12	2	2	0	2	80	0	2	100	2	19	Convert inside travel lane; retain parking midblock	Remove parking; revise lane widths*	Convert outside lane (parking remains)		* - Off peak parking option	
Ramona Blvd	Peck Rd to Valley Blvd	0.6	0.6		70	56	10	2	2	0	0	56	0	2	70	0.5		Roadway too narrow	Convert curb lane	N/F			
Valley Blvd	Ramona Blvd to Santa Anita Ave	0.6	0.6		80	64	12	2	2	0	0	64	0	2	80	1		Roadway too narrow	Convert outside travel lane	N/F			
Santa Anita Ave	Valley Blvd to Rush St	1.7	1.7		100	80	12	2	2	0	2	80	0	2	100	3		Roadway too narrow	Convert outside lane (parking remains)	Convert outside lane (parking remains)		* - Off peak parking option	
Rush St	Santa Anita Ave to Durfee (Peck)	0.9	0.9		80	64	0	2	2	0	2	64	0	2	80	0.5		Roadway too narrow	N/F	Convert outside lane (parking remains)		* - Off peak parking option	
Durfee Ave - Peck Rd	Rush St/Peck Rd to Durfee Rd/Peck Rd	0.9	0.9	4	100	80	12	2	2	0	2	80		2	100	0.5		Roadway too narrow	N/F (bike lanes)	Convert outside travel lane (bike lane remains)			
Peck Rd	Durfee Ave to Workman Mill	1.0	0.0	3	80	64	12	2	2	0	0	64	0	2	80	1.5		N/F (2 lane bridge @ I-605)	N/F	N/F	X		
Workman Mill Rd	Peck Rd to Beverly Blvd	2.1	2.1	7	100	84	14	2	2	0	2	84	0	2	100	2		(Reconstruction not justified)	Remove parking and restripe parking and shoulder area	Remove parking and restripe parking and shoulder area	X	Congestion level doesn't warrant bus lane	
Beverly Blvd - Greenleaf Ave	Workman Mill Rd/Beverly Blvd to Greenleaf Ave/Philadelphia St	2.1	2.1		56	56	0	2	2	0	0	56	0	0	56	1		Roadway too narrow	Restripe curb lane (TOD parking option)	N/F	X		
Greenleaf Ave - Whittier Blvd - Washington Blvd	Greenleaf Ave/Philadelphia St to Washington Blvd/Lambert Rd	1.6	0.0		Varies											3.5				X			
		15.7	13.1	29	83%												17	36					
Concept 12 - Azusa																							
Azusa Ave	9th St to 1st St	1.1	1.1	3.5	76	56	0	1	2		2	56		2	76	2.5		N/F (one-way couplet)	N/A	Convert outside lane (parking remains)			
San Gabriel Ave	9th St to 1st St			5.5	100	68	0	2	2	0	2	68	0	2	100	2.5		N/F (one-way couplet)	N/A	Convert outside lane (parking remains)			
Azusa Ave	1st St to I-10	3.4	3.4	16.5	100	86	16	2	2	0	2	84	2	2	100	3.5	10	Convert inside travel lane; retain parking midblock	Remove parking; revise lane widths*	Convert outside lane (parking remains)		* - Off peak parking option	
Azusa Ave	I-10 to Francisquito Ave	1.5	1.5	6.5	100	80	14	2	2	0	2	80	0	2	100	1.5	14	Convert inside travel lane; retain parking midblock	Remove parking; revise lane widths*	Convert outside lane (parking remains)		* - Off peak parking option	
Azusa Ave	Francisquito Ave to Colima Rd	4.4	4.4	19	110+	88	14	2	4	0	0	88	0	2	108	5		NF - High volumes and multiple turn bays	Convert outside travel lane	N/A			
		10.4	10.4	51	100%												15	24					
Concept 13 - Citrus / Grand																							
Citrus Ave	Foothill Blvd - Arrow Hwy	2.0	2.0	9	80	60	0	2	2	0	0	60	0	2	80	2.5		Roadway too narrow	Convert outside travel lane	N/A			
Citrus Ave	Arrow Hwy - Workman Ave	2.2	2.2	10	100	78	14	2	2	0	2	78	0	2	100	2.5	13	Convert inside travel lane; retain parking midblock	Remove parking; revise lane widths*	Convert outside lane (parking remains)		* - Off peak parking option	
Workman Ave	Citrus Ave - Barranca Ave	0.5	0.0	1	80	50	0	2	0.5	0	1	50	2	2	80	1		Roadway too narrow	Potential to convert EB curb lane to bus only	N/A	X	Mixed Flow (1 lane WB)	
Barranca Ave	Workman Ave - Cameron Ave	1.0	1.0	5	80	64	0	2	2	0	2	64	0	2	80	1		Roadway too narrow	Roadway too narrow	Convert outside lane (parking remains)			
Cameron Ave	Barranca Ave - Grand Ave	0.9	0.9	1	80	64	0	2	2	2	0	64	2	2	80	0.5		Roadway too narrow	N/F (bike lane)	Convert outside travel lane (bike lane remains)			
Grand Ave	Cameron Ave - Temple Ave	1.7	1.7	4	90	80	16	2	2	2	0	80	1	1	90	1		Few intersections - does not justify reconstruction	N/F (striped shoulder lane)	Convert outside travel lane (shoulder remains)			
Grand Ave	Temple Ave - Valley Blvd	1.3	1.3	4	100	90	14	2	2	2	0	90	0	2	100	0.5		Few intersections - does not justify reconstruction	N/F (striped shoulder lane)	Convert outside travel lane (shoulder remains)			
Valley Blvd	Grand Ave - Brea Canyon Rd	0.6	0	2	100	84	12	4	2	0	0	84	8	8	100	0					X	Segment too short to justify bus lanes	
Brea Canyon Rd	Valley Blvd - Golden Springs Dr	2.7	2.7	7	100	84	14	2	2	0	0	84		2	100	1		Convert inside travel lane; retain parking midblock	Convert outside travel lane	N/A			
Brea Canyon Rd	Golden Springs Dr - Pathfinder Rd	1.1	1.1	3	80	64	10	2	2	2		64	0	2	80	1		Roadway too narrow	N/F (bike lane)	Convert outside travel lane (bike lane remains)			
Pathfinder Rd	Brea Canyon Rd - Diamond Bar Blvd	0.9	0.0	5	100	84	15	2	2	0	2	80	0	0	80	1					X	Segment too short to justify bus lanes	
Diamond Bar Blvd	Pathfinder Rd - SR-57	1.5	1.5	8	100	84	12	2	2	2	0	84	0	2	100	1		Few intersections - does not justify reconstruction	N/F (bike lane)	Convert outside travel lane (bike lane remains)			
SR-57	Diamond Bar Blvd - Lambert Rd	3.6	0.0	1.5												0				X	Mixed Flow on Freeway (HOV lane)		
Lambert Rd - State College Blvd	SR-57 - Brea Mall Ctr	0.9	0	4.5												2					Mixed Flow in Orange Co		
				65												15	13						
		Subtotal to SR-57	16.4	14.4	88%																		
		Route Total	20.9	14.4	46.00																		

ATTACHMENT 2 COST BUILDUP

Items	Units	Unit Cost	Qty	Item Cost
Side Running / Restriping				\$ 1,510,000
Remove striping	LF	\$ 1.50	21120	\$ 31,680
New lane striping	LF	\$ 5.00	31680	\$ 158,400
Miscellaneous pavement markings	LS	\$ 50,000	1	\$ 50,000
Full width red paint (12' wide)	SF	\$ 10	126720	\$ 1,267,200
				\$ -

Curb Running / Outside Lane Conversion				\$ 2,840,000
Mill existing asphalt 2" (20' width each side)	SF	\$ 2.50	211200	\$ 528,000
Haul off millings	TON	\$ 35	2345	\$ 82,075
Overlay new asphalt 2"	TON	\$ 300	2345	\$ 703,500
New lane striping	LF	\$ 5.00	42240	\$ 211,200
Miscellaneous pavement markings	LS	\$ 50,000	1	\$ 50,000
Full width red paint (12' wide)	SF	\$ 10	126720	\$ 1,267,200
				\$ -

Center Running / Reconstruct Roadway				\$ 5,980,000
Demo existing road pavement, curb to curb (80' width)	SF	\$ 5.25	422400	\$ 2,217,600
Asphalt pavement and base, curb to curb (4" asphalt)	TON	\$ 300	9378	\$ 2,813,400
Miscellaneous pavement markings	LS	\$ 50,000	1	\$ 50,000
Full width red paint (12' wide)	SF	\$ 10	63360	\$ 633,600
New lane striping	LF	\$ 5.00	52800	\$ 264,000
				\$ -

Side Running Platforms (two 10x100)				\$ 1,040,000
Demo existing road pavement for platform	SF	\$ 5.25	2240	\$ 11,760
Demo existing road pavement for bus pad	SF	\$ 5.25	2800	\$ 14,700
Demo existing sidewalk around platform	SF	\$ 8.00	2800	\$ 22,400
Demo existing curb and gutter for platform	LF	\$ 12.00	140	\$ 1,680
Asphalt pavement + base around station + pad demo (4")	TON	\$ 300.00	18	\$ 5,400
Reconstruct sidewalk and tie in platform, incl. bump outs	SF	\$ 14.00	1560	\$ 21,840
Reconstruct curb and gutter	LF	\$ 40.00	150	\$ 6,000
Replace cross walk markings	SF	\$ 5.00	3200	\$ 16,000
				\$ -
Concrete platform	SF	\$ 70.00	2000	\$ 140,000
Concrete pad for bus parking	SF	\$ 55.00	2400	\$ 132,000
Detectable warning surfaces at edge	SF	\$ 50.00	400	\$ 20,000
Bus shelter w/ seating	EA	\$ 35,000	8	\$ 280,000
Railing (SS)	LF	\$ 400	200	\$ 80,000
Station Marker	EA	\$ 35,000	2	\$ 70,000
Trash Receptacle	EA	\$ 5,500	4	\$ 22,000
Advertising Kiosk	EA	\$ 10,000	2	\$ 20,000
Station Signage	LS	\$ 10,000	2	\$ 20,000
Bike rack	EA	\$ 1,800	2	\$ 3,600
Electric power supply & platform lighting	EA	\$ 75,000	2	\$ 150,000

Curb Running Platforms (two 10x100)				\$ 1,050,000
Demo existing road pavement for platform	SF	\$ 5.25	1400	\$ 7,350
Demo existing road pavement for bus pad	SF	\$ 5.25	2800	\$ 14,700
Demo existing sidewalk for platform	SF	\$ 8.00	2400	\$ 19,200
Demo existing curb and gutter for platform	LF	\$ 12.00	140	\$ 1,680
Asphalt pavement + base around station + pad demo (4")	TON	\$ 300.00	18	\$ 5,400
Reconstruct sidewalk and tie in platform	SF	\$ 14.00	2800	\$ 39,200
Reconstruct curb and gutter	LF	\$ 40.00	140	\$ 5,600
Replace cross walk markings	SF	\$ 5.00	3200	\$ 16,000
				\$ -

ATTACHMENT 2 COST BUILDUP

Items	Units	Unit Cost	Qty	Item Cost
Concrete platform	SF	\$ 70.00	2000	\$ 140,000
Concrete pad for bus parking	SF	\$ 55.00	2400	\$ 132,000
Detectable warning surfaces at edge	SF	\$ 50.00	400	\$ 20,000
Bus shelter w/ seating	EA	\$ 35,000	8	\$ 280,000
Railing (SS)	LF	\$ 400	200	\$ 80,000
Station Marker	EA	\$ 35,000	2	\$ 70,000
Trash Receptacle	EA	\$ 5,500	4	\$ 22,000
Advertising Kiosk	EA	\$ 10,000	2	\$ 20,000
Station Signage	LS	\$ 10,000	2	\$ 20,000
Bike rack	EA	\$ 1,800	2	\$ 3,600
Electric power supply & platform lighting	EA	\$ 75,000	2	\$ 150,000

Center Platforms (two 10x100)				\$ 990,000
Demo existing road pavement for platform	SF	\$ 5.25	2400	\$ 12,600
Demo existing road pavement for bus pad	SF	\$ 5.25	2800	\$ 14,700
Asphalt pavement and base around station, pad demo (4")	TON	\$ 300	18	\$ 5,400
Replace cross walk markings	SF	\$ 5.00	3200	\$ 16,000
Concrete platform	SF	\$ 70	2000	\$ 140,000
Concrete pad for bus parking	SF	\$ 55	2400	\$ 132,000
Detectable warning surfaces at edge	SF	\$ 50	400	\$ 20,000
Bus shelter w/ seating	EA	\$ 35,000	8	\$ 280,000
Railing (SS)	LF	\$ 400	200	\$ 80,000
Station Marker	EA	\$ 35,000	2	\$ 70,000
Trash Receptacle	EA	\$ 5,500	4	\$ 22,000
Advertising Kiosk	EA	\$ 10,000	2	\$ 20,000
Station Signage	LS	\$ 10,000	2	\$ 20,000
Bike rack	EA	\$ 1,800	2	\$ 3,600
Electric power supply & platform lighting	EA	\$ 75,000	2	\$ 150,000

SCC 50 - Systems				
Full new signalized intersection	EA	\$ 350,000	1	\$ 350,000
Modify existing signal for transit priority	EA	\$ 75,000	1	\$ 75,000
Communications/Passenger Information Systems (Nextbus display, PA, cabinet, conduits, pullboxes, etc)	LS	\$ 150,000	2	\$ 300,000
Fiber connection	LS	\$ 25,000	2	\$ 50,000

SCC 40.08				
SWPPP, Street sweeping, SD vac	LF	\$ 6	5280	\$ 31,680
Traffic Control, Staging, Pedestrian Control	LF	\$ 40	5280	\$ 211,200
Mobilization / Demobilization			%	8%
Contractor Gen Conditions, insurance			%	12%

Miscellaneous				
Buses	EA	\$ 1,000,000	1	\$ 1,000,000
Transit Center Improvements	LS	\$ 10,000,000	4	\$ 40,000,000
Bus Operations Facility	LS	\$ 10,000,000	1	\$ 10,000,000
Bus Contingency			%	10%
Allocated Contingency			%	20%
Unallocated Contingency			%	15%
Professional Services			%	37%

ATTACHMENT 3 VEHICLE CALCULATIONS

Assumptions	Concept 1	Concept 2	Concept 5	Concept 10	Concept 11	Concept 12	Concept 13
Route Length (miles)	35.4	29.6	30.7	12.4	15.7	10.4	16.4
Headway (minutes)	10	10	10	10	10	10	10
Average Speed (mph)	17.5	17.5	17.5	17.5	17.5	17.5	17.5
Two-way distance (miles)	70.8	59.2	61.4	24.9	31.3	20.8	32.7
Buses per hour	6	6	6	6	6	6	6
Headway (hours)	0.167	0.167	0.167	0.167	0.167	0.167	0.167
Number of Buses in Service	24.3	20.3	21.1	8.5	10.7	7.1	11.2
Total Buses Needed	29.1	24.4	25.3	10.2	12.9	8.6	13.5
Buses Rounded	30	25	26	11	13	9	14