

To Barrow Emerson, SamTrans
Melissa Reggiardo, SamTrans

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From Corey Wong, Arup
Steve Crosley, Fehr + Peers

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Subject ECR BRT Phasing Plan – O&M Costs

1 Introduction

This memo presents the estimated operating and maintenance (O&M) costs for the various service concepts proposed in previous memos. This memo builds on findings for each service concept from the August 31, 2014 *Operating Plan Memo – Draft v1* and the September 13, 2014 *ECR Capital Cost Memo*.

2 O&M Cost Elements

O&M costs can be divided into two elements:

- **Service O&M Costs** – Service costs relate solely to provision of transit service (i.e., the operation and maintenance of the buses themselves for revenue service). Service costs include driver salaries and fringe benefits, bus maintenance fees, as well as fueling costs, etc. Service O&M costs were estimated in the August 31, 2014 *Operating Plan Memo – Draft v1*.
- **Fixed Infrastructure O&M Costs** – These costs relate to the upkeep and maintenance of fixed infrastructure including bus lanes, transit signal priority, and bus stations.

2.1 Service O&M Costs

From the August 31, 2014 *Operating Plan Memo – Draft v1*, service O&M costs were as follows in Table 1. The cost estimates found that service options that operated overlay ECR service, had more frequent service, and operated along the entire corridor generally had higher annual operating costs.

Table 1: Annual Service O&M Costs by Service Concept

Service Concept	Service O&M Costs
Concept 1 - 2020 Base Case	\$18,510,000
Concept 2 - 2020 Full Rapid	\$29,459,000
Concept 3 - 2020 Truncated (Daly City-Redwood City)	\$27,634,000
Concept 4 - 2020 Truncated (San Bruno-Redwood City)	\$25,027,000
Concept 5 - 2020 Hybrid A (76 Stops - 12 Min)	\$21,638,000

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Service Concept	Service O&M Costs
Concept 6 - 2020 Hybrid B (50 Stops - 12 Min)	\$20,074,000
Concept 7 - 2020 Peak Rapid	\$24,767,000
Concept 8 - 2020 Hybrid A (76 Stops - 10 Min)	\$24,506,000
Concept 9 - 2020 Hybrid B (50 Stops - 7.5 Min)	\$27,895,000
Concept 10 - 2040 Bus Rapid Transit (BRT)	\$27,113,000

Source: *Operating Plan Memo – Draft v1, August 31, 2014.*

2.2 Fixed Infrastructure O&M Costs

Besides costs to operate the vehicles in revenue service, there will also be O&M costs related to upkeep and maintenance of fixed infrastructure purposely implemented for the Rapid, Hybrid, or BRT concepts including:

- Stations
- Real-time passenger information systems
- Transit signal priority (TSP)
- Ticket vending machines (TVM)
- Mixed flow lane enhancements
- Dedicated bus lane segments
- Queue jump lanes

O&M costs for these elements are estimated by multiplying overall capital costs by an assumed percentage rate for annual O&M costs. Table 2 presents these assumed percentages for particular infrastructure elements – these assumptions are based on industry practice as well as Arup experience in similar projects. Please refer to the descriptions of these fixed infrastructure elements for each service concept in the September 13, *ECR BRT Phasing Plan – Capital Costs Memo*.

Table 2: Assumed Percent of Capital Costs Attributed to Annual O&M Costs

Fixed Infrastructure Element	Assumed % of Capital Costs Attributed to Annual O&M Costs
Enhanced stop, stop with minor enhancements, or BRT station	5%
Real-time passenger information	5%
TVM	5%
Pavement improvements to existing lanes (for mixed flow operation)	3%
Bus lanes (center- or side-running)	3%
TSP in vehicles	5%
TSP at intersections	5%
Queue jump lanes	3%

Note: O&M for vehicles is already covered in the service O&M costs.

Based on these assumptions, O&M costs for fixed infrastructure by service concept is shown below (note that these costs include contingency, overhead and profit, and other soft costs as estimated in

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the September 13, 2014 *ECR Capital Cost Memo*). For 2020 service concepts, the Hybrid only concepts generally have higher costs than the Rapid/ECR concepts since additional stops outside of the 74 high demand stops must be maintained. The 2040 Full BRT concept (Concept 10) generates the largest fixed infrastructure O&M costs due to the need to maintain dedicated bus lanes as well as maintain mixed flow lanes that the BRT would operate in.

Table 3: Annual Fixed Infrastructure O&M Costs by Service Concept

Service Concept	Fixed Infrastructure O&M Costs
Concept 1 - 2020 Base Case	\$-
Concept 2 - 2020 Full Rapid	\$707,000
Concept 3 - 2020 Truncated (DC-RC)	\$616,000
Concept 4 - 2020 Truncated (SB-RC)	\$459,000
Concept 5 - 2020 Hybrid A (76 Stops - 12 Min)	\$806,000
Concept 6 - 2020 Hybrid B (50 Stops - 12 Min)	\$742,000
Concept 7 - 2020 Peak Rapid	\$707,000
Concept 8 - 2020 Hybrid A (76 Stops - 10 Min)	\$809,000
Concept 9 - 2020 Hybrid B (50 Stops - 7.5 Min)	\$749,000
Concept 10 - 2040 BRT	\$5,686,000

2.3 Combined Annual O&M Costs

Table 4 and **Error! Reference source not found.** depicts the combined annual O&M costs by concept, inclusive of both service and fixed infrastructure O&M costs. Major findings are as follows:

- For all 2020 service concepts, service O&M costs comprise at least 96% of the total annual O&M costs. Thus service costs predominate over fixed infrastructure O&M costs. Service O&M costs account for 83% of total O&M costs for the 2040 BRT concept, which is not surprising given the amount of fixed infrastructure included under this concept.
- For 2020 service concepts, Concept 2 (2020 Full Rapid) generates the highest annual O&M costs at \$30.24 million, while Concept 9 (2020 Hybrid B (50 Stops – 7.5 Min)) follows closely at \$28.6 million annually. Both concepts propose extensive service throughout the corridor. The concept generating the lowest annual O&M costs is Concept 6 (2020 Hybrid B (50 Stops – 12 Min)) at about \$20.5 million per year.
- The 2040 BRT concept generates the highest annual O&M cost overall at \$2.8 million because it proposes extensive service in the corridor and requires the most fixed infrastructure.

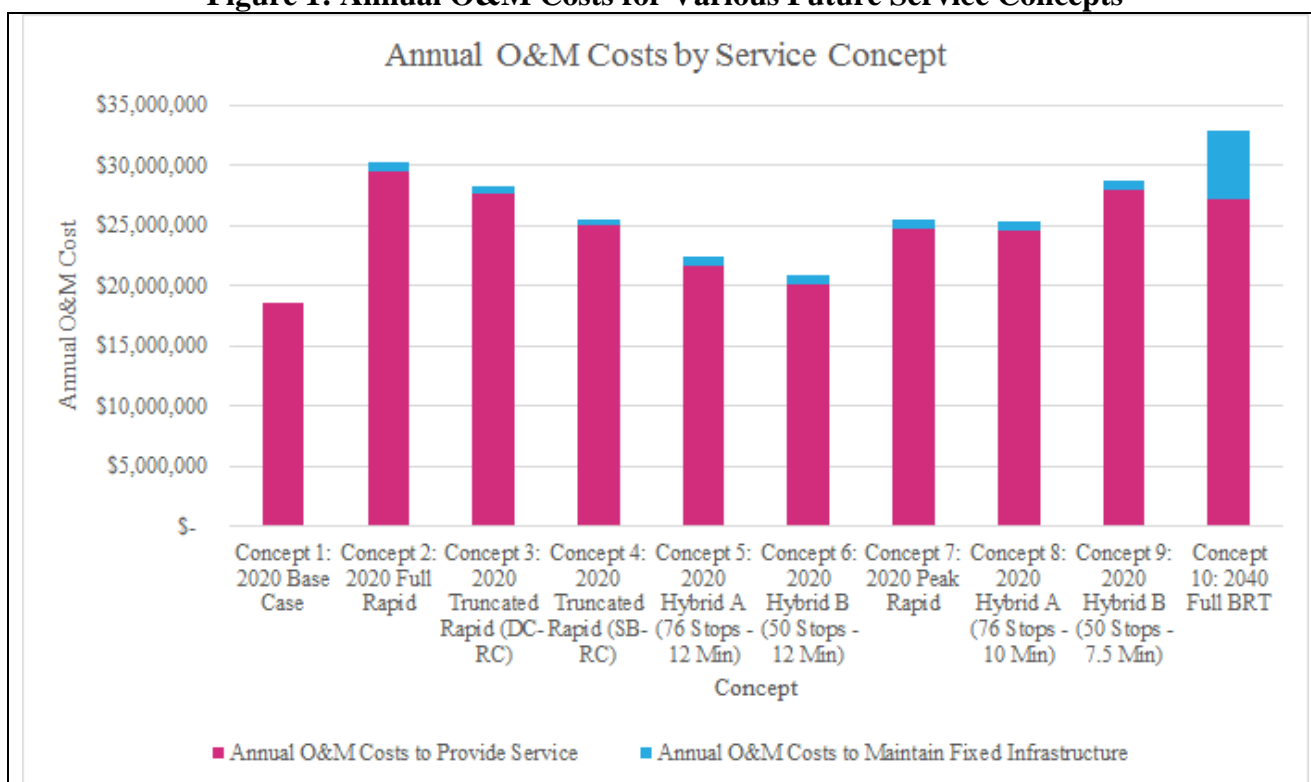
Table 4: Annual Combined O&M Costs by Service Concept

Service Concept	Annual O&M Costs to Provide Service	Annual O&M Costs to Maintain Fixed Infrastructure	Total Annual O&M Costs	% of Service O&M Costs to Total
Concept 1 - 2020 Base Case	\$18,510,000	\$-	\$18,510,000	100%
Concept 2 - 2020 Full Rapid	\$29,459,000	\$707,000	\$30,166,000	98%
Concept 3 - 2020 Truncated (DC-RC)	\$27,634,000	\$616,000	\$28,250,000	98%
Concept 4 - 2020 Truncated (SB-RC)	\$25,027,000	\$459,000	\$25,486,000	98%

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Service Concept	Annual O&M Costs to Provide Service	Annual O&M Costs to Maintain Fixed Infrastructure	Total Annual O&M Costs	% of Service O&M Costs to Total
Concept 5 - 2020 Hybrid A (76 Stops - 12 Min)	\$21,638,000	\$806,000	\$22,444,000	96%
Concept 6 - 2020 Hybrid B (50 Stops - 12 Min)	\$20,074,000	\$742,000	\$20,816,000	96%
Concept 7 - 2020 Peak Rapid	\$24,767,000	\$707,000	\$25,474,000	97%
Concept 8 - 2020 Hybrid A (76 Stops - 10 Min)	\$24,506,000	\$809,000	\$25,315,000	97%
Concept 9 - 2020 Hybrid B (50 Stops - 7.5 Min)	\$27,895,000	\$749,000	\$28,644,000	97%
Concept 10 - 2040 BRT	\$27,113,000	\$5,686,000	\$32,799,000	83%

Figure 1: Annual O&M Costs for Various Future Service Concepts



2.4 Difference in Annual O&M Costs vs. 2020 Base Case

Table 5 and **Error! Reference source not found.** depict the increase in annual 2020 O&M costs over the 2020 Base Case (ECR only, generating \$18.5 million in annual O&M costs), and in the case of Concept 10, the assumed increase in costs over the presumed 2040 Base Case. Among 2020 Rapid concepts (i.e., Concepts 2, 3, 4, and 7), Concept 2 (2020 Full Rapid) has the largest increase in annual O&M costs relative to the 2020 Base Case at nearly \$11.7 million or 39% more the 2020 Base Case. Concepts 4 (2020 Truncated Rapid (SB-RC)) and 7 (2020 Peak Rapid) have the smallest difference in annual O&M costs at \$7.0 million or 27% more than the 2020 Base Case.

Among 2020 Hybrid concepts, Concept 6 (2020 Hybrid B (50 Stops – 12 Min)) has the lowest increase in annual O&M costs over the 2020 Base Case (\$2.3 million or a 11% increase), while Concept 9 (2020 Hybrid B (50 Stops – 7.5 Min)) has the largest annual increase at \$10.1 million or a

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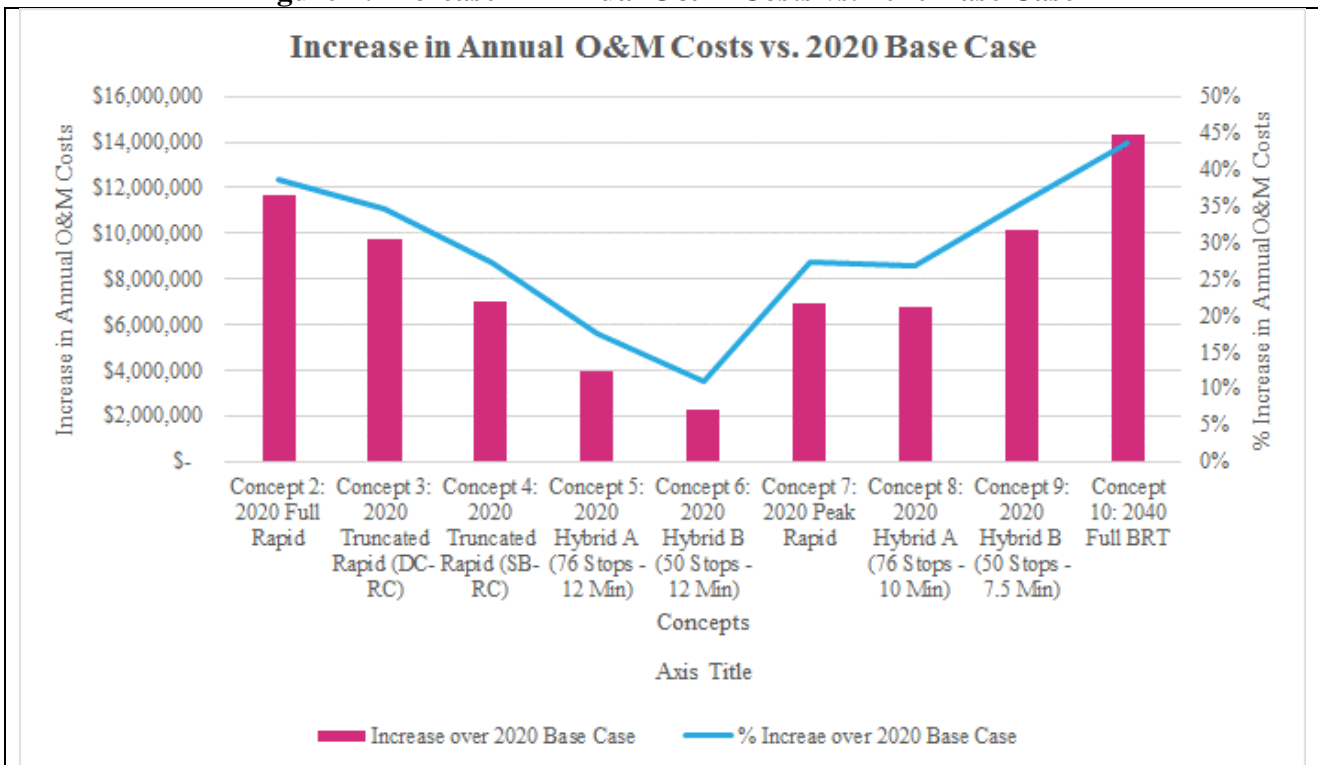
35% increase. Concept 10 (2040 Full BRT) is expected to generate annual costs of \$14.3 million over the 2040 Base Case or a 44% increase.

Table 5: Increase in Annual Combined O&M Costs vs. 2020 Base Case

#	Concept	Increase over 2020 Base Case	% Increase over 2020 Base Case
1	Concept 1: 2020 Base Case	\$-	0%
2	Concept 2: 2020 Full Rapid	\$11,656,000	39%
3	Concept 3: 2020 Truncated Rapid (DC-RC)	\$9,740,000	34%
4	Concept 4: 2020 Truncated Rapid (SB-RC)	\$6,976,000	27%
5	Concept 5: 2020 Hybrid A (76 Stops - 12 Min)	\$3,934,000	18%
6	Concept 6: 2020 Hybrid B (50 Stops - 12 Min)	\$2,306,000	11%
7	Concept 7: 2020 Peak Rapid	\$6,964,000	27%
8	Concept 8: 2020 Hybrid A (76 Stops - 10 Min)	\$6,805,000	27%
9	Concept 9: 2020 Hybrid B (50 Stops - 7.5 Min)	\$10,134,000	35%
10	Concept 10: 2040 Full BRT	\$14,289,000	44%

Note: It is assumed that the 2040 Base Case for comparison to Concept 10 – 2040 BRT has the same operating plan and resource requirements as the 2020 Base Case (Concept 1).

Figure 2: Increase in Annual O&M Costs vs. 2020 Base Case



Note: It is assumed that the 2040 Base Case for comparison to Concept 10 – 2040 BRT has the same operating plan and resource requirements as the 2020 Base Case (Concept 1).

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3 Appendix A – Service Concept Fixed Infrastructure O&M Cost Summaries

This appendix contains fixed infrastructure O&M cost summaries for the proposed service concepts (note final O&M cost is rounded up to the nearest thousand). Capital costs presented in this appendix are the same as those in the September 13, 2014 *ECR Capital Cost Memo*. No fixed infrastructure O&M costs are assumed for Concept 1 – 2020 Base Case. Note that:

- Annual O&M costs are based on the total project cost including overhead, profit, contingency, and soft costs; and
- No O&M costs are attributed to the new vehicles, as such costs are already included in the \$210/hour cost used to calculate the service O&M costs.

Description	Quantity	Unit	Unit Cost	Total Capital Cost	Infra OPEX % Assumption
Rapid Service Option: Concept 2: 2020 Full Rapid					
Enhanced Stations (Both Directions)	74	ea	\$ 62,660	\$ 4,637,000	5%
Real-Time Passenger Information	74	ea	\$ 10,200	\$ 755,000	5%
New 60 ft. Diesel Low Floor Transit Bus (equipped with CAD/AVL)	-	ea	\$ 543,000	\$ -	-
New 60 ft. Diesel-Hybrid Low Floor Transit Bus (equipped with CAD/AVL)	17	ea	\$ 770,000	\$ 13,090,000	-
Transit Signal Priority (TSP) on Rapid Service Buses	17	ea	\$ 5,000	\$ 85,000	5%
Transit Signal Priority (TSP) at Intersection	120	ea	\$ 9,710	\$ 1,166,000	5%
Total Direct Cost				\$ 19,733,000	\$ 332,150
Maintenance of Traffic (MOT)			4%	\$ 789,320	\$ 13,286
Indirects			15%	\$ 2,959,950	\$ 49,823
Total Construction Cost (Direct + Indirect)				\$ 23,482,270	\$ 395,259
Overhead & Profit			10%	\$ 2,348,227	\$ 39,526
Total Construction Price (TCC + OH&P)				\$ 25,830,497	\$ 434,784
Contingency			25%	\$ 6,457,624.25	\$ 108,696.09
Total Construction Price				\$ 32,288,121	\$ 543,480
Soft Costs			30%	\$ 9,686,436.38	\$ 163,044.13
Total Project Price				\$ 41,974,558	\$ 706,525
	\$ 1,635,800	\$/Mile		\$ 41,975,000	\$ 707,000
Length of Rapid Service Option: Concept 2: 2020 Full Rapid: 25.66 Miles					

Description	Quantity	Unit	Unit Cost	Total Capital Cost	Infra OPEX % Assumption
Rapid Service Option: Concept 3: 2020 Truncated Rapid (DC-RC)					
Enhanced Stations (Both Directions)	64	ea	\$ 62,660	\$ 4,010,000	5%
Real-Time Passenger Information	64	ea	\$ 10,200	\$ 653,000	5%
New 60 ft. Diesel Low Floor Transit Bus (equipped with CAD/AVL)	-	ea	\$ 543,000	\$ -	-
New 60 ft. Diesel-Hybrid Low Floor Transit Bus (equipped with CAD/AVL)	14	ea	\$ 770,000	\$ 10,780,000	-
Transit Signal Priority (TSP) on Rapid Service Buses	14	ea	\$ 5,000	\$ 70,000	5%
Transit Signal Priority (TSP) at Intersection	102	ea	\$ 10,370	\$ 1,058,000	5%
Total Direct Cost				\$ 16,571,000	\$ 289,550
Maintenance of Traffic (MOT)			4%	\$ 662,840	\$ 11,582
Indirects			15%	\$ 2,485,650	\$ 43,433
Total Construction Cost (Direct + Indirect)				\$ 19,719,490	\$ 344,565
Overhead & Profit			10%	\$ 1,971,949	\$ 34,456
Total Construction Price (TCC + OH&P)				\$ 21,691,439	\$ 379,021
Contingency			25%	\$ 5,422,859.75	\$ 94,755.24
Total Construction Price				\$ 27,114,299	\$ 473,776
Soft Costs			30%	\$ 8,134,289.63	\$ 142,132.86
Total Project Price				\$ 35,248,588	\$ 615,909
	\$ 1,693,800	\$/Mile		\$ 35,249,000	\$ 616,000
Length of Rapid Service Option: Concept 3: 2020 Truncated Rapid (DC-RC): 20.81 Miles					

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Description	Quantity	Unit	Unit Cost	Total Capital Cost	Infra OPEX % Assumption
Rapid Service Option: Concept 4: 2020 Truncated Rapid (SB-RC)					
Enhanced Stations (Both Directions)	46	ea	\$ 62,660	\$ 2,882,000	5%
Real-Time Passenger Information	46	ea	\$ 10,200	\$ 469,000	5%
New 60 ft. Diesel Low Floor Transit Bus (equipped with CAD/AVL)	-	ea	\$ 543,000	\$ -	-
New 60 ft. Diesel-Hybrid Low Floor Transit Bus (equipped with CAD/AVL)	10	ea	\$ 770,000	\$ 7,700,000	-
Transit Signal Priority (TSP) on Rapid Service Buses	10	ea	\$ 5,000	\$ 50,000	5%
Transit Signal Priority (TSP) at Intersection	77	ea	\$ 11,790	\$ 908,000	5%
Total Direct Cost				\$ 12,009,000	\$ 215,450
Maintenance of Traffic (MOT)			4%	\$ 480,360	\$ 8,618
Indirects			15%	\$ 1,801,350	\$ 32,318
Total Construction Cost (Direct + Indirect)				\$ 14,290,710	\$ 256,386
Overhead & Profit			10%	\$ 1,429,071	\$ 25,639
Total Construction Price (TCC + OH&P)				\$ 15,719,781	\$ 282,024
Contingency			25%	\$ 3,929,945.25	\$ 70,506.01
Total Construction Price				\$ 19,649,726	\$ 352,530
Soft Costs			30%	\$ 5,894,917.88	\$ 105,759.02
Total Project Price				\$ 25,544,644	\$ 458,289
	\$ 1,719,000	\$/Mile		\$ 25,545,000	\$ 459,000
Length of Rapid Service Option: Concept 4: 2020 Truncated Rapid (SB-RC): 14.86 Miles					

Description	Quantity	Unit	Unit Cost	Total Capital Cost	Infra OPEX % Assumption
Hybrid Service Option: Concept 5: 2020 Hybrid A (76 Stops - 12 Min)					
Enhanced Stops (Both Directions)	74	ea	\$ 62,660	\$ 4,637,000	5%
Stops with Minor Improvements (Both Directions)	78	ea	\$ 11,420	\$ 891,000	5%
Real-Time Passenger Information	74	ea	\$ 10,200	\$ 755,000	5%
New 60 ft. Diesel Low Floor Transit Bus (equipped with CAD/AVL)	-	ea	\$ 543,000	\$ -	-
New 60 ft. Diesel-Hybrid Low Floor Transit Bus (equipped with CAD/AVL)	3	ea	\$ 770,000	\$ 2,310,000	-
Transit Signal Priority (TSP) on Rapid Service Buses	25	ea	\$ 5,000	\$ 125,000	5%
Transit Signal Priority (TSP) at Intersection	120	ea	\$ 9,710	\$ 1,166,000	5%
Total Direct Cost				\$ 9,884,000	\$ 378,700
Maintenance of Traffic (MOT)			4%	\$ 395,360	\$ 15,148
Indirects			15%	\$ 1,482,600	\$ 56,805
Total Construction Cost (Direct + Indirect)				\$ 11,761,960	\$ 450,653
Overhead & Profit			10%	\$ 1,176,196	\$ 45,065
Total Construction Price (TCC + OH&P)				\$ 12,938,156	\$ 495,718
Contingency			25%	\$ 3,234,539	\$ 123,930
Total Construction Price				\$ 16,172,695	\$ 619,648
Soft Costs			30%	\$ 4,851,808.50	\$ 185,894.36
Total Project Price				\$ 21,024,504	\$ 805,542
	\$ 819,400	\$/Mile		\$ 21,025,000	\$ 806,000
Length of Hybrid Service Option: Concept 5: 2020 Hybrid A (76 Stops - 12 Min): 25.66 Miles					

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Description	Quantity	Unit	Unit Cost	Total Capital Cost	Infra OPEX % Assumption
Hybrid Service Option: Concept 6: 2020 Hybrid B (50 Stops - 12 Min)					
Enhanced Stops (Both Directions)	74	ea	\$ 62,660	\$ 4,637,000	5%
Stops with Minor Improvements (Both Directions)	26	ea	\$ 11,420	\$ 297,000	5%
Real-Time Passenger Information	74	ea	\$ 10,200	\$ 755,000	5%
New 60 ft. Diesel Low Floor Transit Bus (equipped with CAD/AVL)	-	ea	\$ 543,000	\$ -	-
New 60 ft. Diesel-Hybrid Low Floor Transit Bus (equipped with CAD/AVL)	1	ea	\$ 770,000	\$ 770,000	-
Transit Signal Priority (TSP) on Rapid Service Buses	23	ea	\$ 5,000	\$ 115,000	5%
Transit Signal Priority (TSP) at Intersection	120	ea	\$ 9,710	\$ 1,166,000	5%
Total Direct Cost				\$ 7,740,000	\$ 348,500
Maintenance of Traffic (MOT)			4%	\$ 309,600	\$ 13,940
Indirects			15%	\$ 1,161,000	\$ 52,275
Total Construction Cost (Direct + Indirect)				\$ 9,210,600	\$ 414,715
Overhead & Profit			10%	\$ 921,060	\$ 41,472
Total Construction Price (TCC + OH&P)				\$ 10,131,660	\$ 456,187
Contingency			25%	\$ 2,532,915	\$ 114,047
Total Construction Price				\$ 12,664,575	\$ 570,233
Soft Costs			30%	\$ 3,799,372.50	\$ 171,069.94
Total Project Price				\$ 16,463,948	\$ 741,303
	\$ 641,600	\$/Mile		\$ 16,464,000	\$ 742,000
Length of Hybrid Service Option: Concept 6: 2020 Hybrid B (50 Stops - 12 Min): 25.66 Miles					

Description	Quantity	Unit	Unit Cost	Total Capital Cost	Infra OPEX % Assumption
Rapid Service Option: Concept 7: 2020 Peak Rapid					
Enhanced Stations (Both Directions)	74	ea	\$ 62,660	\$ 4,637,000	5%
Real-Time Passenger Information	74	ea	\$ 10,200	\$ 755,000	5%
New 60 ft. Diesel Low Floor Transit Bus (equipped with CAD/AVL)	-	ea	\$ 543,000	\$ -	-
New 60 ft. Diesel-Hybrid Low Floor Transit Bus (equipped with CAD/AVL)	17	ea	\$ 770,000	\$ 13,090,000	-
Transit Signal Priority (TSP) on Rapid Service Buses	17	ea	\$ 5,000	\$ 85,000	5%
Transit Signal Priority (TSP) at Intersection	120	ea	\$ 9,710	\$ 1,166,000	5%
Total Direct Cost				\$ 19,733,000	\$ 332,150
Maintenance of Traffic (MOT)			4%	\$ 789,320	\$ 13,286
Indirects			15%	\$ 2,959,950	\$ 49,823
Total Construction Cost (Direct + Indirect)				\$ 23,482,270	\$ 395,259
Overhead & Profit			10%	\$ 2,348,227	\$ 39,526
Total Construction Price (TCC + OH&P)				\$ 25,830,497	\$ 434,784
Contingency			25%	\$ 6,457,624.25	\$ 108,696.09
Total Construction Price				\$ 32,288,121	\$ 543,480
Soft Costs			30%	\$ 9,686,436.38	\$ 163,044.13
Total Project Price				\$ 41,974,558	\$ 706,525
	\$ 1,635,800	\$/Mile		\$ 41,975,000	\$ 707,000
Length of Rapid Service Option: Concept 7: 2020 Peak Rapid: 25.66 Miles					

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Description	Quantity	Unit	Unit Cost	Total Capital Cost	Infra OPEX % Assumption
Hybrid Service Option: Concept 8: 2020 Hybrid A (76 Stops - 10 Min)					
Enhanced Stops (Both Directions)	74	ea	\$ 62,660	\$ 4,637,000	5%
Stops with Minor Improvements (Both Directions)	78	ea	\$ 11,420	\$ 891,000	5%
Real-Time Passenger Information	74	ea	\$ 10,200	\$ 755,000	5%
New 60 ft. Diesel Low Floor Transit Bus (equipped with CAD/AVL)	-	ea	\$ 543,000	\$ -	-
New 60 ft. Diesel-Hybrid Low Floor Transit Bus (equipped with CAD/AVL)	8	ea	\$ 770,000	\$ 6,160,000	-
Transit Signal Priority (TSP) on Rapid Service Buses	30	ea	\$ 5,000	\$ 150,000	5%
Transit Signal Priority (TSP) at Intersection	120	ea	\$ 9,710	\$ 1,166,000	5%
Total Direct Cost				\$ 13,759,000	\$ 379,950
Maintenance of Traffic (MOT)			4%	\$ 550,360	\$ 15,198
Indirects			15%	\$ 2,063,850	\$ 56,993
Total Construction Cost (Direct + Indirect)				\$ 16,373,210	\$ 452,141
Overhead & Profit			10%	\$ 1,637,321	\$ 45,214
Total Construction Price (TCC + OH&P)				\$ 18,010,531	\$ 497,355
Contingency			25%	\$ 4,502,633	\$ 124,339
Total Construction Price				\$ 22,513,164	\$ 621,693
Soft Costs			30%	\$ 6,753,949.13	\$ 186,507.96
Total Project Price				\$ 29,267,113	\$ 808,201
	\$ 1,140,600	\$/Mile		\$ 29,268,000	\$ 809,000
Length of Hybrid Service Option: Concept 8: 2020 Hybrid A (76 Stops - 10 Min): 25.66 Miles					

Description	Quantity	Unit	Unit Cost	Total Capital Cost	Infra OPEX % Assumption
Hybrid Service Option: Concept 9: 2020 Hybrid B (50 Stops - 7.5 Min)					
Enhanced Stops (Both Directions)	74	ea	\$ 62,660	\$ 4,637,000	5%
Stops with Minor Improvements (Both Directions)	26	ea	\$ 11,420	\$ 297,000	5%
Real-Time Passenger Information	74	ea	\$ 10,200	\$ 755,000	5%
New 60 ft. Diesel Low Floor Transit Bus (equipped with CAD/AVL)	-	ea	\$ 543,000	\$ -	-
New 60 ft. Diesel-Hybrid Low Floor Transit Bus (equipped with CAD/AVL)	15	ea	\$ 770,000	\$ 11,550,000	-
Transit Signal Priority (TSP) on Rapid Service Buses	37	ea	\$ 5,000	\$ 185,000	5%
Transit Signal Priority (TSP) at Intersection	120	ea	\$ 9,710	\$ 1,166,000	5%
Total Direct Cost				\$ 18,590,000	\$ 352,000
Maintenance of Traffic (MOT)			4%	\$ 743,600	\$ 14,080
Indirects			15%	\$ 2,788,500	\$ 52,800
Total Construction Cost (Direct + Indirect)				\$ 22,122,100	\$ 418,880
Overhead & Profit			10%	\$ 2,212,210	\$ 41,888
Total Construction Price (TCC + OH&P)				\$ 24,334,310	\$ 460,768
Contingency			25%	\$ 6,083,578	\$ 115,192
Total Construction Price				\$ 30,417,888	\$ 575,960
Soft Costs			30%	\$ 9,125,366.25	\$ 172,788.00
Total Project Price				\$ 39,543,254	\$ 748,748
	\$ 1,541,100	\$/Mile		\$ 39,544,000	\$ 749,000
Length of Hybrid Service Option: Concept 9: 2020 Hybrid B (50 Stops - 7.5 Min): 25.66 Miles					

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Description	Quantity	Unit	Unit Cost	Total Capital Cost	Infra OPEX % Assumption
BRT Service Option: Concept 10: 2040 Full BRT					
Enhanced BRT Stations (Both Directions)	74	ea	\$ 210,340	\$ 15,565,000	5%
Real-Time Passenger Information	74	ea	\$ 10,200	\$ 755,000	5%
Ticket Vending Machines (TVM)	74	ea	\$ 96,910	\$ 7,171,000	5%
New 60 ft. Diesel Low Floor Transit Bus (equipped with CAD/AVL)	-	ea	\$ 548,000	\$ -	-
New 60 ft. Diesel-Hybrid Low Floor Transit Bus (equipped with CAD/AVL)	14	ea	\$ 770,000	\$ 10,780,000	-
Mixed Flow Operations (Outside Bus Lane)	14.8	Miles	\$ 77,000	\$ 1,137,000	3%
Bus Lanes (Center-Running)	10.9	Miles	\$ 4,231,000	\$ 46,118,000	3%
Bus Lanes (Side Running)	-	Miles	\$ 3,864,000	\$ -	3%
Transit Signal Priority (TSP) on BRT Buses	14	ea	\$ 5,000	\$ 70,000	5%
Transit Signal Priority (TSP) at Intersection	120	ea	\$ 9,710	\$ 1,166,000	5%
Queue Jump Lane (both direction)	6	ea	\$ 63,000	\$ 378,000	5%
Total Direct Cost				\$ 83,140,000	\$ 2,672,900
Maintenance of Traffic (MOT)			4%	\$ 3,325,600	\$ 106,916
Indirects			15%	\$ 12,471,000	\$ 400,935
Total Construction Cost (Direct + Indirect)				\$ 98,936,600	\$ 3,180,751
Overhead & Profit			10%	\$ 9,893,660	\$ 318,075
Total Construction Price (TCC + OH&P)				\$ 108,830,260	\$ 3,498,826
Contingency			25%	\$ 27,207,565.00	\$ 874,706.53
Total Construction Price				\$ 136,037,825	\$ 4,373,533
Soft Costs			30%	\$ 40,811,347.50	\$1,312,059.79
Total Project Price				\$ 176,849,173	\$ 5,685,592
	\$ 6,892,000	\$/Mile		\$ 176,850,000	\$ 5,686,000
Length of BRT Service Option: Concept 10: 2040 Full BRT: 25.66 Miles					