

Operating and Maintenance Costs



Conceptual Operations and Maintenance (O&M) Costs were calculated using RTD's methodology. Their methodology relies on the average hourly cost for operating a transit service (driver salaries, fuel, etc.), multiplied by the total number of hours a bus operates to meet the service span (hours of service over the course of the day), multiplied by the number of buses necessary to meet the service frequency (frequency of buses per hour, i.e. 7.5 minute frequency = 1 bus every 7.5 minutes) requirement set forth in the alternate scenarios. This number is then annualized for service over the course of a year. That number is added to the average annual maintenance cost for transit vehicles multiplied by the total number of vehicles necessary to operate the service span and frequency in the alternate operations scenarios. The following tables contain the O&M costs for the operations scenarios tested for this project.



SH 7 BRT
CONCEPTUAL FLEET SIZE CALCULATIONS AND O&M COSTS - 7.5/15 minute headways draft 1/11/17

		Operating scen	ario								
		1-0	1-1	1-2	1-3	1-4	2	3	4	4+1	5 (same as 1)
Mixed Traffic											
	Fleet	30	31	31	31	31	30	31	20	49	
	Costs	\$12,145,500	\$12,379,500	\$12,379,500	\$12,379,500	\$12,379,500	\$12,145,500	\$12,379,500	\$8,019,000	\$20,164,500	
Dedicated Lane											
	Fleet	25	25	25	25	25	23	26	14	39	25
	Costs	\$11,209,500	\$11,209,500	\$11,209,500	\$11,209,500	\$11,209,500	\$10,224,000	\$11,443,500	\$6,331,500	\$17,541,000	\$11,209,500
Managed Lane											
	Fleet	26	26	26	26	26	26	27	14	40	
	Costs	\$11,443,500	\$11,443,500	\$11,443,500	\$11,443,500	\$11,443,500	\$10,692,000	\$11,677,500	\$6,331,500	\$17,775,000	
Standard Bus											
	Fleet	34	34	34	34	34	34	35	21	55	
	Costs	\$13,599,000	\$13,599,000	\$13,599,000	\$13,599,000	\$13,599,000	\$13,599,000	\$13,833,000	\$8,253,000	\$21,852,000	

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draft 1/11.	/17								
OPERATIN	IG SCENARIO 1-0 2040 A		nin peak headway		15 min off peak hea	durave		1	
distance time	27.7 miles 76 minutes 1.266667 hours		plus 20 min. layo	I	distance 27.7 miles time 54 minutes 0.9 hours	128	rt plus layover buses		
avg speed	21.86842 mph	23 re	ounded	10% addl capacity	avg speed 30.77778 mph	9	rounded incl 20% spares and	10% addl capacity	
						Operating Hours			
RUNS AND	CAPACITY (assumes 18-	nour weekday)				30 min			
		s/hr/ Buses/		Max psgr Max psg			53 365	Plus 20% dh Cost/hr	Ann cost
Peaks	Hours Headways dire	ection hour T	otal hours 138	cap/veh cap/day	rev hrs 138	Weekdays Saturdays 63960 8424			
Off-Peaks	12 30	2 9	108		108				
Total	18		246	75 1845	0 246	63960 8424	8586 80970	97164 \$125	\$12,145,500
OPERATIN	IG SCENARIO 1-0 2040 E		nin peak headway		15 min off peak hea	-twave		1	
distance time	27.7 miles 59 minutes			I	distance 27.7 miles time 52 minutes		rt plus layover		
	0.983333 hours	18.4 b		Ver	0.866667 hours	8.266667	buses		
avg speed	28.16949 mph		ounded not 20% spares and	10% addl capacity	avg speed 31.96154 mph		rounded incl 20% spares and	10% addl capacity	
						Operating Hours			
RUNS AND	CAPACITY (assumes 18-I	nour weekday)				18 hrs 30 min	18 hrs 30 min		
		s/hr/ Buses/		Max psgr Max psg	Daily Vehicle	all day 260 52		Plus 20% dh Cost/hr	Ann cost
	Hours Headways dire	ection hour T	otal hours	cap/veh cap/day	rev hrs	Weekdays Saturdays	Sundays	200 011 0050 18	Ariii Cosc
Peaks Off-Peaks		4 19 9	114 108		114 108	57720 8424	8586		
Total	18		222	75 1665	0 222	57720 8424	8586 74730	89676 \$125	\$11,209,500
	IG SCENARIO 1-0 2040 A		nin peak headway		15 min off peak hea	dways		1	
distance time	27.7 miles 64 minutes	148 rt	plus 20 min. layo	ver	distance 27.7 miles time 52 minutes	124	rt plus layover		
	1.066667 hours 25.96875 mph	19.73333 b			0.866667 hours avg speed 31.96154 mph		buses rounded		
ung spece	ESTAGO S HIGH			10% addi capacity	ang speed officers inpir		incl 20% spares and	10% addl capacity	
						Operating Hours 18 hrs	18 hrs		
RUNS AND	CAPACITY (assumes 18-	nour weekday)				30 min	30 min	100	
	Run	s/hr/ Buses/		Max psgr Max psg	Daily Vehicle	all day 260 52	all day 53 365	Plus 20% dh Cost/hr	Ann cost
Peaks	Hours Headways dire	ection hour T	otal hours 120	cap/veh cap/day	rev hrs	Weekdays Saturdays 59280 8424			
Off-Peaks		2 9	108		108	0120	0.00		
Total	18		228	75 1710	0 228	59280 8424	8586 76290	91548 \$125	\$11,443,500
OPERATIN	IG SCENARIO 1-0 2040 S		nin peak headway	5	15 min off peak hea	dways		1	
					distance 27.7 miles				
distance time	27.7 miles 85 minutes	190 rt	plus 20 min, lavo	ver		142	rt plus lavover		
time	85 minutes 1,416667 hours	25.33333 b	plus 20 min. layo uses	ver	time 61 minutes 1,016667 hours	9,466667			
time	85 minutes	25.33333 b 26 re	uses ounded	ver 10% addl capacity	time 61 minutes	9,466667		10% addl capacity	
time	85 minutes 1,416667 hours	25.33333 b 26 re	uses ounded		time 61 minutes 1,016667 hours	9,466667 10 13 Operating Hours	buses rounded Incl 20% spares and	10% addl capacity	
time avg speed	85 minutes 1,416667 hours	25.33333 b 26 ro 34 fr	uses ounded		time 61 minutes 1,016667 hours avg speed 27,2459 mph	9,466667 10 13 Operating Hours 18 hrs 30 min	buses rounded Incl 20% spares and 18 hrs 30 min		
time avg speed	85 minutes 1,416667 hours 19,55294 mph CAPACITY (assumes 18-I	25.33333 b 26 rc 34 fr nour weekday)	uses ounded	10% addl capacity	time 61 minutes 1.016667 hours avg speed 27.2459 mph	9,46667 10 13 Operating Hours 18 hrs 30 min all day	buses rounded incl 20% spares and 18 hrs 30 min all day	Plus	Ann cost
time avg speed RUNS AND	85 minutes 1,416667 hours 19.55294 mph CAPACITY (assumes 18-1 Run Hours Headways dire	25,33333 b 26 rc 34 in nour weekday) s/hr/ Buses/ cction hour T	uses sunded incl 20% spares and otal hours		time 61 minutes 1,016667 hours avg speed 27,2459 mph Daily Vehicle r vehicle	9,46667 10 13 Operating Hours 18 hrs 30 min all day 260 52 Weekdays Saturdays	buses rounded Incl 20% spares and 18 hrs 30 min all day 53 365 Sundays		Ann cost
time avg speed RUNS AND	85 minutes 1,416667 hours 19.55294 mph CAPACITY (assumes 18-I Hours Headway dim 6 15	25,33333 b 26 rd 34 fr nour weekday) s/hr/ Buses/	uses ounded ccl 20% spares and	10% addl capacity Max psgr Max psg	time 61 minutes 1.016667 hours avg speed 27.2459 mph Dally Vehicle	9,466667 10 13 Operating Hours 18 hrs 30 min all day 260 52	buses rounded Incl 20% spares and 18 hrs 30 min all day 53 365 Sundays	Plus	Ann cost

Total

276

75 20700

276

71760 9360 9540 90660 108792 \$125 \$13,599,000

SH 7 BRT CONCEPTUAL FLEET SIZE CALCULATIONS AND OBM COSTS draft 1/11/17 OPERATING SCENARIO 1-1 2040 MIXED TRAFFIC
7.5 min peak headways 15 min off peak headways distance 27.7 miles distance 27.7 miles 174 rt plus 20 min. lav 54 minutes 0.9 hours 128 rt plus lavover 1.283333 hours 23.2 buses
24 rounded
31 incl 20% spares and 10% addit capacity 8.533333 buses 9 rounded avg speed 30.77778 mph 12 Incl 20% spares and 10% addl capacity Operating Hours 18 hrs 18 hrs 18 hrs 18 hrs
30 min 30 min
all day all day
260 52 53
Weekdays Saturdays Sundays
65520 8424 8586 RUNS AND CAPACITY (assumes 18-hour weekday) Max psgr Max psgr cap/veh cap/day 365 20% dh Cost/hr Ann cost | Runs/hr/ Buses/ | Hours | Headways direction hour | Total hours | Peaks | 6 | 15 | 4 | 24 | 144 | | Off-Peaks | 12 | 30 | 2 | 9 | 108 | rev hrs 144 108 18 252 75 18900 252 65520 8424 8586 82530 99036 \$125 \$12,379,500 OPERATING SCENARIO 1-1 2040 DEDICATED LANES
7.5 min peak headways 15 min off peak headways distance 27.7 miles time 52 minutes 0.866667 hours distance 27.7 miles time 59 minutes 0.983333 hours 138 rt plus 20 min. laye 124 rt plus layove 8.266667 buses 9 rounded 18.4 buses 19 rounded avg speed 28,16949 mph avg speed 31,96154 mph 25 Incl 20% spares and 10% addl capacity 12 Incl 20% spares and 10% addl capacity Operating Hours 18 hrs 18 hrs 30 min 30 min RUNS AND CAPACITY (assumes 18-hour weekday) Runs/hr/ Buses/ all day all day 260 52 53 Weekdays Saturdays Sundays Daily Max psgr Max psgr cap/veh cap/day 365 20% dh Cost/hr Ann cost rev hrs 57720 8424 Total 18 222 75 16650 222 57720 8424 8586 74730 89676 \$125 \$11,209,500 OPERATING SCENARIO 1-1 2040 MANAGED LANES
7.5 min peak her 15 min off peak headways 27.7 miles 52 minutes time 65 mmus-150 rt plus 20 min. layo 124 rt plus layover 65 minutes time 0.866667 hours 20 buses 8.266667 buses 20 rounded avg speed 25.56923 mph avg speed 31.96154 mph 9 rounded 12 Incl 20% spares and 10% addl capacity 26 Incl 20% spares and 10% addi capacity Operating Hours 18 hrs 18 hrs 30 min 30 min all day all day 0 52 53 RUNS AND CAPACITY (assumes 18-hour weekday) Daily 260 52 53 Weekdays Saturdays Sundays 59280 8424 8586 Max psgr Max psgr cap/veh cap/day 365 20% dh Cost/hr Ann cost 108 18 75 17100 59280 8424 8586 76290 91548 \$125 \$11,443,500 Total 228 228 OPERATING SCENARIO 1-1 2040 STANDARD BUS
7.5 min peak headways 15 min off peak headways distance 27.7 miles 192 rt plus 20 min. layor 25.6 buses 26 rounded 144 rt plus layover 9.6 buses 10 rounded 62 minutes 1,033333 hours time 86 minutes 1,433333 hours avg speed 19.32558 mph avg speed 26.80645 mph 34 incl 20% spares and 10% addl capacity 13 incl 20% spares and 10% addl capacity Operating Hours Operating Hours

18 hrs 18 hrs
30 min 30 min
all day all day

260 52 53

Weekdays Saturdays Sundays
71760 9360 9540 RUNS AND CAPACITY (assumes 18-hour weekday) Plus 365 20% dh Cost/hr Ann cost Max psgr Max psgr cap/veh cap/day Vehicle rev hrs 156 120

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CONCEPTUAL FLEET SIZE CALCULATIONS AN draft 1/11/17	D OBM COSTS				
OPERATING SCENARIO 1-2 2040 MIXED TRA		_			
distance 27.7 miles	7.5 min peak headwa	1	15 min off peak head distance 27.7 miles	,	
time 77 minutes 1,283333 hours	174 rt plus 20 min. lay 23.2 buses	over	time 54 minutes 0.9 hours	128 rt plus layover 8.533333 buses	
avg speed 21.58442 mph	24 rounded 31 Incl 20% spares an	d 10% addi capacity	avg speed 30.77778 mph	9 rounded 12 Incl 20% spares and 10% addl capacity	
	31 III.Cl 2016 Spares an	u los addi capacity		Operating Hours	
RUNS AND CAPACITY (assumes 18-hour week	day)			18 hrs 18 hrs 30 min 30 min	
Runs/hr/ Bu	ses/	Max psgr Max psgr	Daily Vehicle	all day all day Plus 260 52 53 365 20% dh Cost/hr Ann co	st
Hours Headways direction ho Peaks 6 15 4		cap/veh cap/day	rev hrs	Weekdays Saturdays Sundays 65520 8424 8586	
Off-Peaks 12 30 2	9 108		108	03320 0424 0300	
Total 18	252	75 18900	252	65520 8424 8586 82530 99036 \$125 \$12,5	270 500
TOTAL TO	252	75 18900	252	00020 0424 0000 02000 97030 5120 512,	379,500
OPERATING SCENARIO 1-2 2040 DEDICATE	D LANES 7.5 min peak headwa	-	15 min off peak head		
distance 27.7 miles		Ί	distance 27.7 miles		
time 59 minutes 0.983333 hours	138 rt plus 20 min. lay 18.4 buses	over	time 52 minutes 0.866667 hours	124 rt plus layover 8.266667 buses	
avg speed 28.16949 mph	19 rounded 25 Incl 20% spares an	d 10% addi capacity	avg speed 31.96154 mph	9 rounded 12 incl 20% spares and 10% addit capacity	
	25 lifet 2016 spares an	u los addicapacity		Operating Hours	
RUNS AND CAPACITY (assumes 18-hour week	day)			18 hrs 18 hrs 30 min 30 min	
Runs/hr/ Bu	ses/	Max psgr Max psgr	Dally Vehicle	all day all day Plus 260 52 53 365 20% dh Cost/hr Ann co	st
Hours Headways direction ho		cap/veh cap/day	rev hrs	Weekdays Saturdays Sundays 57720 8424 8586	
Off-Peaks 12 30 2	9 108		108	37720 0424 0300	
Total 18	222	75 16650	222	57720 8424 8586 74730 89676 \$125 \$11,7	209,500
Total 18 OPERATING SCENARIO 1-2 2040 MANAGED	LANES	_			209,500
OPERATING SCENARIO 1-2 2040 MANAGED distance 27.7 miles	LANES 7.5 min peak headwa	ys 	15 min off peak head distance 27.7 miles	dways	209,500
OPERATING SCENARIO 1-2 2040 MANAGED	LANES	ys 	15 min off peak head distance 27.7 miles time 52 minutes 0.866667 hours		209,500
OPERATING SCENARIO 1-2 2040 MANAGED distance 27.7 miles: time 65 minutes	LANES 7.5 min peak headwa	ys 	15 min off peak head distance 27.7 miles time 52 minutes	dways 124 rt plus layover	209,500
OPERATING SCENARIO 1-2 2040 MANAGED distance 27.7 miles time 65 minutes 1.08333 hours	7.5 min peak headwa 150 rt plus 20 min. lay 20 buses 20 rounded	ys 	15 min off peak head distance 27.7 miles time 52 minutes 0.866667 hours	dways 124 rt plus layover 8.266667 bures 9 rounded 12 incl 20% spares and 10% addit capacity Operating Hours	209,500
OPERATING SCENARIO 1-2 2040 MANAGED distance 27.7 miles time 65 minutes 1.08333 hours	7.5 min peak headwa 150 rt plus 20 min. lay 20 buses 20 rounded 26 incl 20% spares an	ys 	15 min off peak head distance 27.7 miles time 52 minutes 0.866667 hours	dways 124 rt plus layover 8.266667 buses 9 rounded 12 incl 20% spares and 10% addicapacity	209,500
OPERATING SCENARIO 1-2 2040 MANAGED distance 27.7 miles time 65 minutes 1.083333 hours avg speed 25.56923 mph RUNS AND CAPACITY (assumes 18-hour week	7.5 min peak headwa 150 rt plus 20 min. tay 20 buses 20 rounded 26 incl 20% spares an	ys 	15 min off peak head distance 27.7 miles time 52 minutes 0.86667 hours avg speed 21.96154 mph	dways 124 rt plus layover 8.26667 burss 9 rounded 12 incl 20% spares and 10% addit capacity Operating Hours 18 hrs 30 min 30 min all day all day Plus	
OPERATING SCENARIO 1-2 2040 MANAGED distance 27.7 miles time 6.83333 hours avg speed 25.56923 mph RUNS AND CAPACITY (assumes 18-hour week Runs/hr/ 8u Hours Headways direction hours	Total hours Total hours 7.5 min peak headwa 150 rt plus 20 min. lay 20 buses 20 rounded 26 incl 20% spares an ddy) see/	ys 	15 min off peak head distance 27.7 miles time 52 minutes 0.86667 hours avg speed 31.96154 mph	### 124 rt plus layover 8.266667 bures 9 rounded 12 incl 20% spares and 10% addit capacity Operating Hours 18 hrs 18 hrs 30 min 30 min 30 min all day all day 18	
OPERATING SCENARIO 1-2 2040 MANAGED distance 27.7 miles time 65 minutes 1.083333 hours avg speed 25,56923 mph RUNS AND CAPACITY (assumes 18-hour weel	Total hours Total hours 7.5 min peak headwa 150 rt plus 20 min. lay 20 buses 20 rounded 26 incl 20% spares an ddy) see/	ys Over d 10% addl capacity Max psgr Max psgr Max psgr Max psgr	distance 27.7 miles time 52 minutes 0.86667 hours avg speed 31.96154 mph	### 124 rt plus layover 8.266667 buses 9 rounded 12 incl 20% spares and 10% addit capacity Operating Hours 18 hrs 18 hrs 30 min 30 min 30 min all day all day all day 260 52 53 365 20% dib Cost/hr Annico	
OPERATING SCENARIO 1-2 2040 MANAGED	Total hours 20 120 120 120 120 120 120 120 120 120 1	ys Over d 10% addl capacity Max psgr Max psgr Max psgr Max psgr	15 min off peak hear distance 27.7 miles time 52 minutes 0.866697 hours avg.speed 31.96154 mph Dally Vehicle rev hrs 120 108	### 124 rt plus layover 8.266667 bures 9 rounded 12 incl 20% spares and 10% addit capacity Operating Hours 18 hrs 18 hrs 30 min 30 min 30 min all day all day 18	sst
OPERATING SCENARIO 1-2 2040 MANAGED	20 total hours of 128 o	ys over d 10% addicapacity Max psgr Max psgr cap/veh cap/day	15 min off peak head distance 27.7 miles time 52 minutes 0.86667 hours avg speed 21.96154 mph Daily Vehicle rev hrs 120 108	### 124 rt plus layover 8.266667 bures 9 rounded 12 incl 20% spares and 10% addit capacity Operating Hours 18 hrs 18 hrs 30 min 30 min all day all day Plus 260 52 53 365 20% dh Cost/hr Ann.co Weekday Saturdays Sundays 59280 8424 8586 76290 91548 \$125 \$11,4	sst
OPERATING SCENARIO 1-2 2040 MANAGED	LANES 7.5 min peak headwa 150 rt plus 20 min. lay 20 buses 20 rounded 26 incl 20% spares an .dday) 5565/ ur Total hours 20 120 9 108	ys over d 10% addicapacity Max psgr Max psgr cap/veh cap/day	15 min off peak head distance 27.7 miles time 52 minutes 0.86667 hours avg speed 31.96154 mph Daily Vehicle rev hrs 120 106 226	### 124 rt plus layover 8.266667 bures 9 rounded 12 incl 20% spares and 10% addit capacity Operating Hours 18 hrs 18 hrs 30 min 30 min all day all day Plus 260 52 53 365 20% dh Cost/hr Ann.co Weekday Saturdays Sundays 59280 8424 8586 76290 91548 \$125 \$11,4	sst
OPERATING SCENARIO 1-2 2040 MANAGED	Total hours 20 120 20 50 120 2	ys over a 10% addicapacity Max psgr Max psgr cap/veh cap/day 75 17100	15 min off peak head distance 27.7 miles time 52 minutes 0.86667 hours avg speed 31.96154 mph Daily Vehicle rev hrs 120 108 226 15 min off peak head distance 27.7 miles time 62 minutes 15 min off peak head distance 27.7 miles time 62 minutes 15 min off peak head distance 27.7 miles time 62 minutes 15 min off peak head distance 27.7 miles 15 min off peak head distance 27 min off peak head distance 27 min off peak head distance 27 min off peak	### 124 rt plus layover 8.266667 burss 9 rounded 12 incl 20% spares and 10% addi capacity Operating Hours 18 hrs 30 min 30 min 30 min 30 min 41 day all day Plus 260 52 53 365 20% dh Cost/hr Ann co Weekdays Saturdays Sundays 59280 8424 8586 76290 91548 \$125 \$11,4 ##################################	sst
OPERATING SCENARIO 1-2 2040 MANAGED	LANES 7.5 min peak headwa 150 rt plus 20 min. iay 20 buses 20 rounded 26 incl 20% spares an ddy) sess/ ur Total hours 20 120 9 108 228 DBUS 7.5 min peak headwa 192 rt plus 20 min. lay 25.6 buses 26 rounded	ys Over Over	15 min off peak hear distance 27.7 miles time 55 minutes 0.86667 hours avg.speed 31.96154 mph Delity Vehicle rev.hrs 120 108 228	### 124 rt plus layover 8.266667 burss 9 rounded 12 incl 20% spares and 10% addit capacity Operating Hours 18 hrs 30 min 30 min all day all day Plus 260 52 53 365 20% dh Cost/hr Ann co Weekdays Saturdays Sundays 59280 8424 8586 76290 91548 \$125 \$11,4 ##################################	sst
OPERATING SCENARIO 1-2 2040 MANAGED	20 total hours 20 total hours 20 tours 20 rounded 26 incl 20% spares an 20 total hours 20 120 20 120 20 120 20 120 20 120 21 20 28 228 25 5.5 min peak headwa 192 rt plus 20 min. lay 25.6 buses	ys Over Over	15 min off peak hear distance 27.7 miles time 55 minutes 0.86667 hours avg speed 31.96154 mph Dally Vehicle rev hrs 120 108 226 15 min off peak hear distance 27.7 miles time 62 minutes 1.03333 hours 1.033333 hours 1.033333 hours 1.033333 hours 1.05 minutes 1.033333 hours 1.05 minutes 1.05	### 124 rt plus layover 8.266667 bures 9 rounded 12 incl 20% spares and 10% addit capacity Operating Hours 18 hrs 18 hrs 30 min 30 min all day all day 18 lday 18 ld	sst
OPERATING SCENARIO 1-2 2040 MANAGED	20 buss 20 rounded 25 incl 20% spares an 20 rounded 26 incl 20% spares an 20 rounded 27 incl 20% spares an 28 rounded 28 rounded 29 108 228 28 buss 28 buss 25 buss 28 rounded 34 incl 20% spares an	ys Over Over	15 min off peak hear distance 27.7 miles time 55 minutes 0.86667 hours avg speed 31.96154 mph Dally Vehicle rev hrs 120 108 226 15 min off peak hear distance 27.7 miles time 62 minutes 1.03333 hours 1.033333 hours 1.033333 hours 1.033333 hours 1.05 minutes 1.033333 hours 1.05 minutes 1.05	### 124 rt plus layover 8.266667 buses 9 rounded 12 incl 20% spares and 10% addit capacity Operating Hours 18 hrs 18 hrs 30 min 30 min 10 min 10 min 260 55 53 365 20% dh Cost/hr Annico Weekdays Saturdays Sundays 59280 8424 8586 76290 91548 \$125 \$11,4 ##################################	sst
OPERATING SCENARIO 1-2 2040 MANAGED	20 total hours 20 total hours 20 tounded 26 incl 20% spares an 20 tounded 26 incl 20% spares an 20 120 20 120 20 120 20 120 21 20 228 228 280 29 total hours 20 120 31 incl 20% spares an 20 120 31 incl 20% spares an 20 120 31 incl 20% spares an 20 incl 20% spares an	ys over down addicapacity Max psgr Max psgr cap/veh cap/day 75 17100	15 min off peak head distance 27.7 miles time 52 minutes 0.86667 hours avg speed 31.96154 mph Daily Vehicle rev hrs 120 108 226 15 min off peak head distance 27.7 miles time 62 minutes 1.03333 hours avg speed 26.80445 mph	### 124 rt plus layover 8.266667 bures 9 rounded 12 incl 20% spares and 10% addit capacity Operating Hours 18 hrs 18 hrs 30 min 30 min all day all day all day Plus 19260 52 53 365 20% dh Cost/hr Annico Weekdays Stardays Sundays 59280 8424 8586 59280 8424 8586 76290 91548 \$125 \$11,4 ##################################	st 443,500
OPERATING SCENARIO 1-2 2040 MANAGED	Total hours 20 buses 20 rounded 25 incl 20% spares an day) 20 buses 20 rounded 25 incl 20% spares an day) 20 20 20 20 20 20 20 20 20 20 20 20 20 2	ys Over Over	15 min off peak head distance 27.7 miles time 52 minutes 0.86667 hours avg speed 31.96154 mph Daily Vehicle rev hrs 120 108 226 15 min off peak head distance 27.7 miles time 6.2 minutes 1.03333 hours avg speed 26.80645 mph	### 124 rt plus layover 8.266667 burss 9 rounded 12 incl 20% spares and 10% addit capacity Operating Hours 18 hrs 18 hrs 30 min 30 min all day all day Plus 260 52 53 365 20% dh Cost/hr Ann co Weekdays Saturdays Sundays 59280 8424 8586 76290 91548 \$125 \$11,4 ##################################	st 443,500
OPERATING SCENARIO 1-2 2040 MANAGED	Total hours 20 buses 20 rounded 25 incl 20% spares an day) 20 buses 20 rounded 25 incl 20% spares an day) 20 20 20 20 20 20 20 20 20 20 20 20 20 2	ys Over Owe add capacity Max psgr Max psgr Max psgr cap/veh cap/day 75 17100 7	15 min off peak head distance 27.7 miles time 52 minutes 0.86667 hours avg speed 21.96154 mph Daily Vehicle rev hrs 120 108 228 25 27.7 miles time 62 minutes 1.03333 hours avg speed 26.80645 mph	### 124 rt plus layover 8.266667 bures 9 rounded 12 incl 20% spares and 10% addit capacity Operating Hours 18 hrs 18 hrs 30 min 30 min all day all day all day Plus 19260 52 53 365 20% dh Cost/hr Annico Weekdays Stardays Sundays 59280 8424 8586 59280 8424 8586 76290 91548 \$125 \$11,4 ##################################	st 443,500

71760 9360 9540 90660 108792 \$125 \$13,599,000

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SH 7 BRT CONCEPTUAL FLEET SIZE CALCULATIONS AND draft 1/11/17	OBM COSTS			
OPERATING SCENARIO 1-3 2040 MIXED TRAF				1
distance 27.7 miles	7.5 min peak headways	15 min off peak head distance 27.7 miles	dways	
time 77 minutes	174 rt plus 20 min. layover	time 54 minutes	128 rt plus layover	
1.283333 hours avg speed 21.58442 mph	23.2 buses 24 rounded	0.9 hours avg speed 30.77778 mph	8.533333 buses 9 rounded	
avg speed 21.50m2 inpir	31 Incl 20% spares and 10% addicapacity	avg speed 30.77776 IIIpii	12 Incl. 20% spares and	10% addi capacity
			Operating Hours 18 hrs 18 hrs	
RUNS AND CAPACITY (assumes 18-hour weekd	lay)		30 min 30 min	
Runs/hr/ Bus	es/ Max psgr Max psgr	Daily Vehicle		Plus 20% dh Cost/hr Ann cost
Hours Headways direction hou		rev hrs	Weekdays Saturdays Sundays	20% dil Coso ili Alli Cosc
Peaks 6 15 4 Off-Peaks 12 30 2		144 108	65520 8424 8586	
Off-Peaks 12 30 2	9 108	108		
Total 18	252 75 18900	252	65520 8424 8586 82530	99036 \$125 \$12,379,500
OPERATING SCENARIO 1-3 2040 DEDICATED	LANES			
distance 27.7 miles	7.5 min peak headways	15 min off peak head distance 27.7 miles	dways	
time 59 minutes	138 rt plus 20 min. layover	time 52 minutes	124 rt plus layover	
0.983333 hours	18.4 buses	0.866667 hours	8.266667 buses	
avg speed 28.16949 mph	19 rounded 25 Incl 20% spares and 10% addl capacity	avg speed 31.96154 mph	9 rounded 12 Incl 20% spares and	10% add capacity
	25 micr 20x spares and love addit capacity			Too dour capacity
1			Operating Hours 18 hrs 18 hrs	
RUNS AND CAPACITY (assumes 18-hour weekd	lay)		30 min 30 min	
		Daily	all day all day	Plus
Runs/hr/ Bus Hours Headways direction hou		Vehicle rev hrs	260 52 53 365 Weekdays Saturdays Sundays	20% dh Cost/hr Ann cost
Peaks 6 15 4		114	57720 8424 8586	
Off-Peaks 12 30 2	9 108	108		
Total 18	222 75 16650	222	57720 8424 8586 74730	89676 \$125 \$11,209,500
OPERATING SCENARIO 1-3 2040 MANAGED L	ANES 7.5 min peak headways	15 min off peak head	huans	1
distance 27.7 miles		distance 27.7 miles		
time 65 minutes	150 rt plus 20 min. layover	time 52 minutes	124 rt plus layover	
1.083333 hours avg speed 25.56923 mph	20 buses 20 rounded	0.866667 hours avg speed 31.96154 mph	8.266667 buses 9 rounded	
	26 Incl 20% spares and 10% addl capacity		12 Incl 20% spares and	10% addl capacity
			Operating Hours 18 hrs 18 hrs	
RUNS AND CAPACITY (assumes 18-hour weekd	lay)		30 min 30 min	
		Daily		Plus
Runs/hr/ Bus- Hours Headways direction hou		Vehicle rev hrs	260 52 53 365 Weekdays Saturdays Sundays	20% dh Cost/hr Ann cost
Peaks 6 15 4	20 120	120	59280 8424 8586	
Off-Peaks 12 30 2	9 108	108		
Total 18	228 75 17100	228	59280 8424 8586 76290	91548 \$125 \$11,443,500
OPERATING SCENARIO 1-3 2040 STANDARD				
distance 27.7 miles	7.5 min peak headways	15 min off peak head distance 27.7 miles	dways	
time 86 minutes	192 rt plus 20 min. layover	time 62 minutes	144 rt plus layover	
1.433333 hours	25.6 buses	1,033333 hours	9.6 buses	
avg speed 19.32558 mph	26 rounded 34 incl 20% spares and 10% addl capacity	avg speed 26.80645 mph	10 rounded 13 incl 20% spares and	10% addl canacity
	34 III.C. 20% spares and Tue add capacity		13 Inc. 20% spares and	ioe auti capacity
I			Operating Hours	
RUNS AND CAPACITY (assumes 18-hour weekd	lav)		18 hrs 18 hrs 30 min 30 min	
and the man in passentes for four weeks	727	Daily	all day all day	Plus
Runs/hr/ Bus-	es/ Max psgr Max psgr	Vehicle		20% dh Cost/hr Ann cost
Hours Headways direction hou				
Peaks 6 15 4	r Total hours cap/veh cap/day	rev hrs	Weekdays Saturdays Sundays 71760 9360 9540	
Peaks 6 15 4 Off-Peaks 12 30 2				

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CONCEPT draft 1/1	UAL FLEET 1/17	T SIZE CA	LCULATI	ONS AND	OG.M	COSTS											
distance time		7 miles 7 minute: 3 hours		ED TRA	7.5 174 23.2 24	min peak headwa rt plus 20 min. lay buses rounded incl 20% spares an	over	capacity	distance time	min off peak hea 27.7 miles 54 minutes 0.9 hours 1 30.77778 mph	,	8.533333 9	rt plus layo buses rounded Incl 20% sp		10% addl c	apacity	
RUNS AND		Headwa	Runs/	hr/ Bus	es/	Total hours 144 108		r Max psgr cap/day		Daily Vehicle rev hrs 144 108		18 hrs 30 min all day 52	all day 53 Sundays		Plus 20% dh	Cost/hr	Ann cost
Total	18	3				252	7	5 18900)	252	65520	8424	8586	82530	99036	\$125	\$12,379,50
distance time		7 miles 9 minutes 3 hours		DICATED	7.5 138 18.4 19	s min peak headwa rt plus 20 min. lay buses rounded inct 20% spares an	over	capacity	distance time	min off peak hea 27.7 miles 52 minutes 0.866667 hours 1 31.96154 mph		8.266667	rt plus layo buses rounded incl 20% sp		10% addl c	apacity	
RUNS AND	6	Headwa	Runs/ tys direct	hr/ Bus	es/	Total hours 114 108		r Max psgr cap/day		Daily Vehicle rev hrs 114 108		18 hrs 30 min all day 52 Saturdays	all day 53 Sundays		Plus 20% dh	Cost/hr	Ann cost
Total	18	3				222	7	5 16650)	222	57720	8424	8586	74730	89676	\$125	\$11,209,50
distance time		7 miles 5 minute: 3 hours		NAGED I	7.5 150 20 20	min peak headwa rt plus 20 min. lay buses rounded incl 20% spares an	over	capacity	distance time	min off peak head 27.7 miles 52 minutes 0.866667 hours 1 31.96154 mph		8.266667 9	rt plus layo buses rounded incl 20% sp		10% addl c	apacity	
RUNS AND	6	Headwa	Runs/	hr/ Bus	es/	Total hours 120 108		r Max psgr cap/day		Daily Vehicle rev.hrs 120 108		18 hrs 30 min all day 52	30 min all day 53 Sundays		Plus 20% dh	Cost/hr	Ann cost
Total	18	3				228	7	5 17100		228	59280	8424	8586	76290	91548	\$125	\$11,443,50
distance time		7 miles 5 minute: 3 hours		ANDARD	7.5 192 25.6 26	min peak headwa rt plus 20 min. lay buses rounded incl 20% spares an	over	capacity	distance time	min off peak head 27.7 miles 62 minutes 1.033333 hours 1 26.80645 mph		9.6	rt plus layo buses rounded incl 20% sp		10% addl c	apacity	
RUNS AND Peaks Off-Peaks	Hours	Headwa	Runs/ ays direct	hr/ Bus	es/	Total hours 156 120		r Max psgr cap/day		Daily Vehicle rev.hrs 156 120	260 Weekdays	18 hrs 30 min all day 52	30 min all day 53 Sundays		Plus 20% dh	Cost/hr	Ann cost

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CONCEPT draft 1/1		SIZE CALC	ULATIONS	AND OGM	COSTS											
distance time	27.7		MIXED T	7.5 172 22.93333 23	min peak headw rt plus 20 min. la buses rounded incl 20% spares a	nyover	city	distance time	min off peak hea 27.7 miles 53 minutes 0.883333 hours 1 31.35849 mph		8.4	rt plus layo buses rounded incl 20% sp		0% addl ca	pacity	
RUNS AND	Hours 6		Runs/hr/ direction	Buses/ hour 4 23		Max psgr Ma cap/veh cap			Dally Vehicle rev hrs 138 108		18 hrs 30 min all day 52	all day 53 Sundays		Plus 20% dh	Cost/hr	Ann cost
Total	18	3			246	75	18450		246	63960	8424	8586	80970	97164	\$125	\$12,145,50
distance time	27.7	RIO 2 2040 7 miles 7 minutes 5 hours 9 mph	DEDICAT	7.5 134 17.86667 18	min peak headw rt plus 20 min. la buses rounded incl 20% spares a	iyover	city	distance time	min off peak hear 27.7 miles 50 minutes 0.833333 hours 33.24 mph		8 8 10	rt plus layo buses rounded incl 20% sp		so Ibbe %0	pacity	
RUNS AND Peaks Off-Peaks	Hours 6	Y (assumes Headways 5 15 2 30	Runs/hr/ direction	Buses/ hour 18		Max psgr Ma cap/veh cap			Dally Vehicle rev hrs 108 96	1	18 hrs 30 min all day 52	all day 53 Sundays		Plus 20% dh	Cost/hr	Ann cost
Total	18	3			204	75	15300		204	53040	7488	7632	68160	81792	\$125	\$10,224,00
distance time	27.7	7 miles 3 minutes 5 hours 5 mph	MANAGE	7.5 146 19,46667 20	min peak headw rt plus 20 min. la buses rounded incl 20% spares a	iyover	city	distance time	min off peak hear 27.7 miles 50 minutes 0.833333 hours 33.24 mph		8	rt plus layo buses rounded incl 20% sp		0% addl ca	pacity	
RUNS AND	Hours 6	Y (assumes Headways 5 15 2 30	Runs/hr/ direction	Buses/ hour 4 20		Max psgr Ma cap/veh cap			Daily Vehicle rev hrs 120 96	3	18 hrs 30 min all day 52	53 Sundays		Plus 20% dh	Cost/hr	Ann cost
Total	18	3			216	75	16200		216	56160	7488	7632	71280	85536	\$125	\$10,692,00
distance time	27.7		STANDA	7.5 190 25.33333 26	min peak headw rt plus 20 min. la buses rounded incl 20% spares a	iyover	city	distance time	min off peak head 27.7 miles 61 minutes 1.016667 hours 27.2459 mph		9,466667	rt plus layo buses rounded incl 20% sp		so lbbe %0	apacity	
RUNS AND	Hours 6		Runs/hr/ direction	Buses/ hour 4 26		Max psgr Ma cap/veh cap			Daily Vehicle rev.hrs 156 120		18 hrs 30 min all day 52 Saturdays	30 min all day 53 Sundays		Plus 20% dh	Cost/hr	Ann cost

276 75 20700 276 71760 9360 9540 90660 108792 \$125 \$13,599,000

SH 7 BRT CONCEPTUAL FLEET SIZE CALCULATIONS AND OBM COSTS

PERATING SCENARIO 3 2040 MIXED TRAI		45	1
istance 27.7 miles	7.5 min peak headways	15 min off peak head distance 27.7 miles	dways
ne 80 minutes	180 rt plus 20 min. layover	time 54 minutes	
1.333333 hours	24 buses	0.9 hours	8.533333 buses
g speed 20.775 mph	24 rounded 31 incl 20% spares and 10% addi capacity	avg speed 30.77778 mph	9 rounded 12 Incl 20% spares and 10% addicapacity
	31 Inc. 2016 spares and Tole addit capacity		12 Inc. 206 spares and Tole audit capacity
			Operating Hours
NE AND CADACITY (see 10 house)	i de 3		18 hrs 18 hrs
INS AND CAPACITY (assumes 18-hour wee	kdayj	Dally	30 min 30 min all day all day Plus
Runs/hr/ 8	uses/ Max psgr Max psg		260 52 53 365 20% dh Cost/hr Ann cost
Hours Headways direction h	our Total hours cap/veh cap/day	rev hrs	Weekdays Saturdays Sundays
aks 6 15 4 f-Peaks 12 30 2	24 144 9 108	144	65520 8424 8586
-reaks 12 30 2	7 100	100	
tal 18	252 75 1890	00 252	65520 8424 8586 82530 99036 \$125 \$12,379,
ERATING SCENARIO 3 2040 DEDICATED	LANES		
and the same	7.5 min peak headways	15 min off peak head	dways
tance 27.7 miles	***	distance 27.7 miles	NAME OF TAXABLE PARTY.
ne 62 minutes 1,033333 hours	144 rt plus 20 min. layover 19.2 buses	time 52 minutes 0,866667 hours	124 rt plus layover 8.266667 buses
z speed 26.80645 mph	20 rounded	avg speed 31.96154 mph	9 rounded
	26 Incl 20% spares and 10% addit capacity	18.11	12 Incl 20% spares and 10% addl capacity
			Operating Hours
			18 hrs 18 hrs
NS AND CAPACITY (assumes 18-hour wee	kday)		30 mln 30 mln
		Daily	all day all day Plus 260 52 53 365 20% dh Cost/hr Ann cost
Runs/hr/ 8 Hours Headways direction h			260 52 53 365 20% dh Cost/hr Ann cost Weekdays Saturdays Sundays
aks 6 15 4	20 120	120	59280 8424 8586
f-Peaks 12 30 2	9 108	108	
tal 18	228 75 1710	00 228	59280 8424 8586 76290 91548 \$125 \$11,443,
ERATING SCENARIO 3 2040 MANAGED L	ANES		
	7.5 min peak headways	15 min off peak head	dways
tance 27.7 miles ne 68 minutes	157 Auto Waste Inches	distance 27.7 miles time 52 minutes	424 A (Iva)
1.133333 hours	156 rt plus 20 min. layover 20.8 buses	0.866667 hours	124 rt plus layover 8.266667 buses
g speed 24.44118 mph	21 rounded	avg speed 31.96154 mph	9 rounded
	27 Incl 20% spares and 10% addicapacity		12 Incl 20% spares and 10% addl capacity
			Operating Hours
			18 hrs 18 hrs
NS AND CAPACITY (assumes 18-hour wee	kday)		30 min 30 min
Runs/hr/ B	uses/ Max psgr Max psg	Daily Vehicle	all day all day Plus 260 52 53 365 20% dh Cost/hr Ann cost
Hours Headways direction h			Weekdays Saturdays Sundays
aks 6 15 4	21 126	126	60840 8424 8586
Peaks 12 30 2	9 108	108	
tal 18	234 75 1755	50 234	60840 8424 8586 77850 93420 \$125 \$11,677,
ERATING SCENARIO 3 2040 STANDARD	7.5 min peak headways	15 min off peak hea	durar
tance 27.7 miles		distance 27.7 miles	
ne 89 minutes	198 rt plus 20 min. layover	time 62 minutes	
1.483333 hours	26.4 buses	1,033333 hours	9.6 buses
speed 18.67416 mph	27 rounded 35 incl 20% spares and 10% addl capacity	avg speed 26.80645 mph	10 rounded 13 incl 20% spares and 10% addl capacity
	So mice zone spares and tone audit capacity		
			Operating Hours
NS AND CAPACITY (assumes 18-hour wee	hdowl		18 hrs 18 hrs
TO MIND CAPACITY (assumes 16-flour wee	nuay)	Daily	30 min 30 min all day all day Plus
Runs/hr/ B		r Vehicle	260 52 53 365 20% dh Cost/hr Ann cost
Hours Headways direction h	our Total hours cap/veh cap/day	rev hrs	Weekdays Saturdays Sundays
	27 162	162	73320 9360 9540
Peaks 12 30 2	10 120	120	
tal 18	282 75 2115	50 282	73320 9360 9540 92220 110664 \$125 \$13,833,4

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CONCEPTUAL FLEET SIZE CALCULATIONS AND OBM COSTS draft 1/11/17		
OPERATING SCENARIO 4 2040 MIXED TRAFFIC distance 7.5 min peak headways clime 27.7 miles 0.016667 hours 14.13333 buses avg speed 38.65116 mph 15 rounded 10c or 10c 20% spares and 10% addl	15 min off peak headways distance 27.7 miles 80 rt plus layover 0.5 hours 5.33333 buses avg speed 55.4 mph 6 rounded 81 incl 20% spares and 10% addicapacity 8 incl 20% spares and 10% addicapacity 10 inclination	
RUNS AND CAPACITY (assumes 18-hour weekday) Runs/hr/ Buses/ Max psg	Operating Hours 18 hrs 18 hrs 30 min 30 min Daily all day Plus Degr Max pegr Vehicle 260 52 53 365 20% dh Cost/hr we'n cap/day rev hrs Weekdays Saturdays Sundays 90 42120 5616 5724	Ann cost
Total 18 162 7	75 12150 162 42120 5616 5724 53460 64152 S12	5 \$8,019,000
OPERATING SCENARIO 4 2040 DEDICATED LANES State 27.7 miles Time 27 minutes 74 rt plus 20 min. layover 0.45 hours 9.866667 burse 3 representation 10 rounded 13 incl. 20% spares and 10% additional 10 received 10 rounded 10 received 10 received	15 min off peak headways	
	Operating Hours 18 hrs 18 hrs 30 min 30 m/n 30 m/n Dally all day all day Plus oser Max psgr Vehicle 260 52 53 365 20% dh Cost/hr weh cap/day rev hrs Weekdays Saturdays Sundays 60 31200 4680 4770 60	Ann cost
Total 18 120 7	75 9000 120 31200 4680 4770 40650 48780 512	5 \$6,097,500
OPERATING SCENARIO 4 2040 MANAGED LANES 7.5 min peak headways 1.5 min pe	15 min off peak headways distance 27.7 miles time 24 minutes 68 rt plus layover 0.4 hours 4.533333 buses 3 rounded 5 rounded 5 rounded 7 incl 20% spares and 10% addi capacity 7 incl 20% spares and 10% additional capacity 7 incl 20% spares and	
	Operating Hours 18 hrs 18 hrs 30 min 30 min Daily all day Plus osgr Max psgr Vehicle 260 52 53 365 20% dh Cost/hr reh cap/day rev hrs Weekdays Saturdays Sundays 66 32760 4680 4770	Ann cost
Total 18 126 7	75 9450 126 32760 4680 4770 42210 50652 \$12	5 \$6,331,500
### OPERATING SCENARIO 4 2040 STANDARD BUS ###################################	15 min off peak headways	
	Operating Hours 18 hrs 18 hrs 30 min 30 min Daily all day Plus osgr Max psgr Vehicle 260 52 53 365 20% dh Cost/hr reh cap/day rev hrs Weekdays Saturdays Sundays 96 43680 5616 5724 72	Ann cost
Total 18 168 7	75 12600 168 43680 5616 5724 55020 66024 \$12	5 \$8,253,000