

Appendix H

Service and Operations Analysis



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TECHNICAL MEMORANDUM OPERATIONS AND MAINTENANCE (O&M) AND FLEET COSTS

The following memorandum provides a brief summary of the estimated operations and maintenance (O&M) costs and vehicle capital costs for Alternative A – Enhanced Bus and Alternative B – Bus Rapid Transit (BRT). It also estimates O&M and vehicle costs for an additional downtown Circulator transit route which was modeled by WFRC. Costing methodology is explained within this memorandum and in the attachments provided.

Vehicle Capital Costs

The number of additional vehicles needed for the alternatives and the circulator were derived based on service frequency, vehicle capacity, ridership during the peak, speed and distance, bus layover time, bus model/type, and an assumed vehicle spare ratio.

For both alternatives, data on round trip distance and round trip times were derived from the WFRC model outputs, service frequency was based on each alternative’s operating plan, peak hour capacity was determined by comparing modeled ridership on the highest ridership segment to bus capacity for a peak hour, and layover time was based on driver needs and potential traffic delay. The Alternative A vehicle type was assumed to be the same as the 35 M, the Van Hool Model A300L with a 2008 cost escalated to \$443,750 in 2014 using the CPI Index. The Alternative B vehicle type was assumed to be the New Flyer DE60LFA, a 60-foot articulated bus. The Regional Transportation Commission of Washoe County purchased these buses in 2010 for \$979,602 each. Escalating the cost of the vehicles using the May 2014 Consumer Price Index would result in the buses costing \$11,756,000. The number of vehicles was increased by 20 percent to allow for break down needs (spares). Attachment 2 shows the inputs used to project the number of new buses required for each alternative.

Table 1: Fleet Needs and Estimated Costs

	Alternative A- Enhanced Bus	Alternative B- Bus Rapid Transit (BRT)
Operating Fleet (no spares)	7 buses	9 buses
Fleet (with 20% Spares)	9 buses	11 buses
Capital Cost	\$3,994,000	\$11,756,000

Note: Assumes Alternative A vehicle is the Van Hool A300L and the Alternative B vehicle is the New Flyer DE60LFA.
Bus cost would vary based on amenities.

In addition, the WFRC modeled a Circulator route that traveled through downtown Salt Lake City to improve coverage. This route would require the purchase of two extra regular service Gillig buses estimated at \$389,000 each. The cost for these new Circulator buses would be **\$778,000**.

Operations and Maintenance Costs

Operations and maintenance costs for the two alternatives were estimated using a combination of modeled data, cost per revenue hour, and operations parameters for each alternative.

UTA National Transit Database (NTD) data was used to estimate the cost per revenue hour for the Enhanced Bus, the BRT, and the circulator. Tables 12 and 14 provided 2012 cost per revenue hour (\$128.91). Using the CPI to adjust to 2014 dollars, \$133.11 was used to estimate operating costs.

Enhanced Bus - Alternative A.

Service assumptions for Alternative A are included below.

Table 2: Enhanced Bus Service Assumptions

Span of Service	Peak Frequency/Peak Duration	Off Peak Frequency/Off Peak Duration
Weekdays 4:30 to 10:00	15 min/ 6 hours	15 min/ 12 hours
Saturdays 7:00 to 10:30	30 min/ 6 hours	30 min/ 9.5 hours
Sunday no service	NA	NA

Based on the service assumptions, and the peak vehicles required (4 per hour on weekdays and 2 per hour on Saturdays) the number of service hours was calculated. This was multiplied by the number of days operated at these levels (248 for weekday and 64 for Saturday) to get annual operating cost. Based on WFRC ridership estimates (annualized), the cost per ride was also estimated.

Alternative A annual O&M cost is estimated to be **\$2,725,000** in 2014 dollars.

Alternative A estimated O&M cost per ride: **\$4.53**

BRT - Alternative B

Service Assumptions for Alternative B are included below.

Table 3: BRT Service Assumptions

Span of Service	Peak Frequency/Peak Duration	Off Peak Frequency/Off Peak Duration
Weekdays 4:30 to 10:00	10 min/ 6 hours	15 min/ 12 hours
Saturdays 7:00 to 10:30	15 min/ 6 hours	15 min/ 9.5 hours
Sunday 7:00 to 10:30	30 min/ 6 hours	30 min/ 9.5 hours

Based on the service assumptions, and the peak vehicles required (6 per hour on weekdays, 4 per hour on Saturdays, 2 per hour on Sundays) the number of service hours was calculated. This number was multiplied by the number of days operated at these levels (248 for weekday, 64 for Saturdays, and 53 for Sundays) to get annual operating costs. Based on WFRC ridership estimates (annualized), the cost per ride was also estimated.

Alternative B annual O&M cost is estimated to be **\$4,450,000** in 2014 dollars.

Alternative B estimated O&M cost per ride: **\$4.30**

Circulator

A circulator service was also modeled with the alternatives to provide additional coverage within downtown Salt Lake City. An estimate of O&M Costing for this service was created to account for this additional service based on the service assumptions below.

Table 4: Circulator Route Service Assumptions

Span of Service	Peak Frequency/Peak Duration	Off Peak Frequency/Off Peak Duration
Weekdays 12 hours	30 min/ 6 hours	30 min/ 6 hours
Saturdays 10 hours	30 min/ 6 hours	30 min/ 4 hours
Sunday No Service	No service	No service

Based on the service assumptions, and the peak vehicles required (2 per hour on weekdays and 2 per hour on Saturdays) the number of service hours was calculated. This number was multiplied by the number of days operated at these levels (248 for weekday and 64 for Saturdays) to get annual operating costs.

Total annual O&M cost for the Circulator is estimated to be **\$987,000** in 2014 dollars.

Summary

The following table provides a brief summary of the operations and maintenance costs and capital fleet costs for the alternatives and the circulator route.

Table 5: Summary of Operating and Maintenance and Fleet Costs

	Alt. A Enhanced Bus	Alt. B Bus Rapid Transit (BRT)	Circulator Route
Annual Operating and Maintenance Costs	\$4,450,000	\$2,725,000	\$988,00
Fleet Capital Costs	\$3,994,000 (9 buses)	\$11,756,00 (11 buses)	\$987,000 (2 buses)
O&M Cost per Ride	\$4.30	\$4.53	Not calculated

Note: Assumes Alternative A vehicle is the Van Hool A300L, the Alternative B vehicle is the New Flyer DE60LFA, and the Circulator would use a standard Gillig vehicle.

Attachments

1. OPEX Estimate (cost per revenue hour is estimated to be \$133.11 in 2014 dollars based on the NTD Reports for UTA)
2. Bus Calculations
3. Operating and Maintenance Cost Estimates for Alternatives A and B
4. Operating and Maintenance Cost Estimates for Circulator