

Antelope Valley Line Study



Appendix 2 Task 4: Modeling and Evaluation of Initial Service Scenarios

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**Task 4: Modeling and Evaluation of
Initial Service Scenarios**

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Task 4 – Modeling of Service Scenarios		
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ACRONYMS AND ABBREVIATIONS

AVL	Antelope Valley Line
Metro	Los Angeles County Metropolitan Transportation Authority
MRP	Metrolink Rehabilitation Plan
PRE	Pacific Railway Enterprises
QA/QC	Quality Assurance/Quality Control
ROM	Rough-order-of-Magnitude
ROW	Right-of-way

1 INTRODUCTION

Task 4 of the Antelope Valley Line (AVL) study encompasses two major elements. First, a sketch planning analysis of alternative rail service scenarios for the AVL was undertaken using the Viriato¹ rail network planning tool, with initial network and train performance data provided by Metrolink. The initial scenarios were based on both local and express service patterns, operating at hourly or 30-minute headways. The analysis determined the infrastructure improvements that would be required to support the improved service levels for each scenario. This modeling looks at the feasibility of improved service without capacity improvements (Task 4.1 – the Baseline Scenario) and the service improvements that are possible with increased capacity on the line (Task 4.2), identifying the specific required capital projects.

The second element of Task 4 consists of the first stage of a two-stage evaluation process. The first stage evaluation uses five key evaluation categories and multiple sub-criteria (defined in Task 3) to evaluate the performance of the service scenarios identified through the modeling, and scores the scenarios based on specific adopted criteria.

This Technical Memorandum reviews the methodology and findings for both major elements, reviews Stakeholder and Metro input on the results, and identifies revised service scenarios for further modeling and Stage 2 evaluation.

¹ Viriato is an integrated timetable planning tool that allows users to optimize railway operational and capital planning, marketed by sma+. See https://www.sma-partner.com/images/Downloads/Viriato_E_160907.pdf

2 MODELING OF INITIAL SERVICE SCENARIOS

2.1 Data Sources and Methodology

Metrolink provided the initial Viriato files developed to test hourly and 30-minute headways on the AVL. WSP utilized these files to test multiple service scenarios on the existing infrastructure and identify required capital improvements necessary to support each scenario.

Viriato produces “stringline” (i.e., time-distance) diagrams as output of the modeling process, which show where trains pass in a given service scenario, indicating locations where double-tracking or other capacity improvements will be required. Figure 2-1 displays an example of one such stringline.

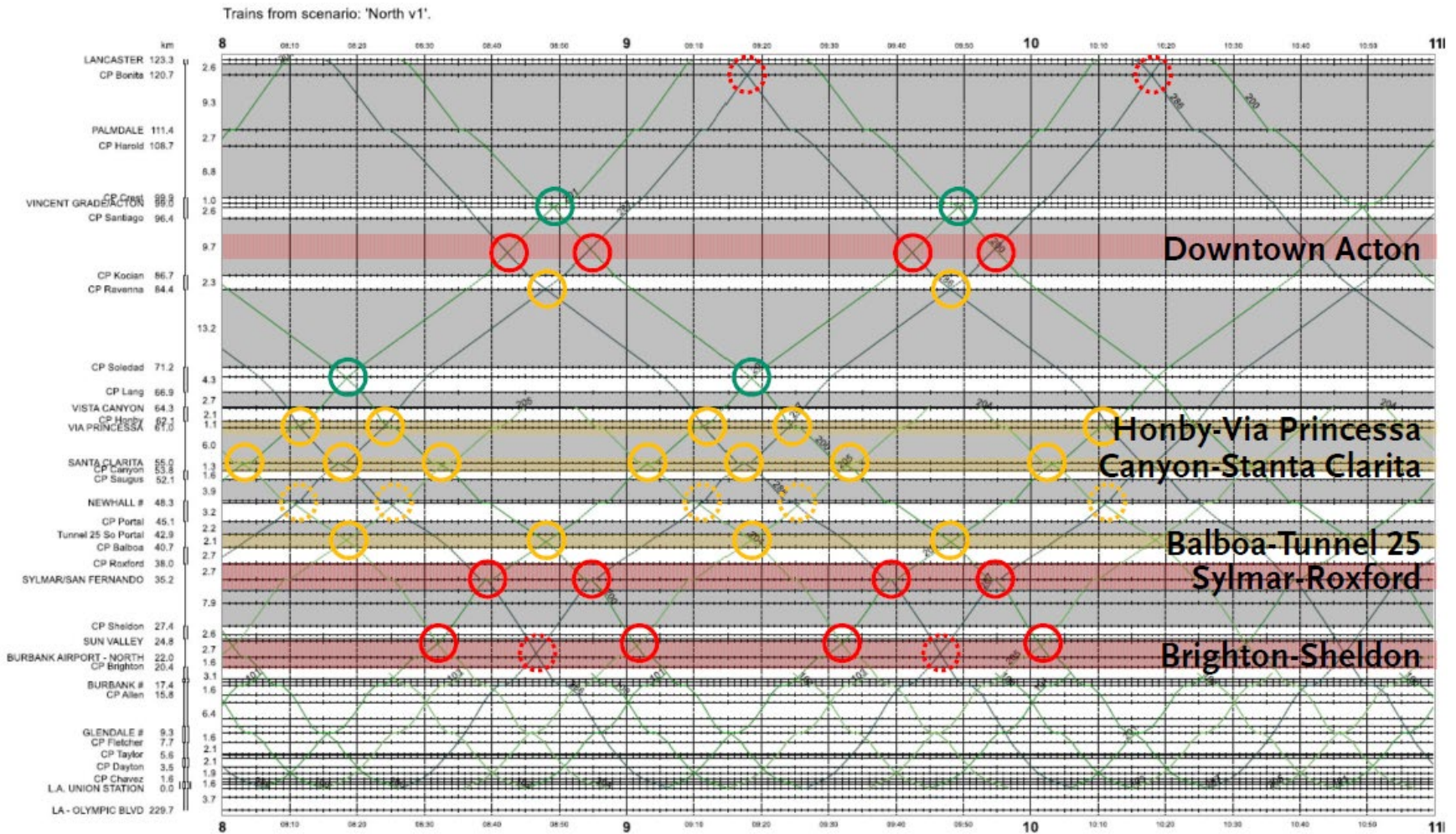
Looking at Figure 2-1, the horizontal axis displays time, and the vertical axis displays locations along the AVL. The horizontal white bands represent locations which are currently double-tracked, and the gray bands represent single-track territory. The lines crisscrossing the chart are modeled trains moving along the line. Locations where the trains cross represent areas where double-track will be required. These have been further highlighted for emphasis in Figure 2-1, with green circles representing train meets in current double-track areas, and yellow and red circles representing areas where capacity increases will be required to support the proposed service schedule being tested. These latter locations correspond to specific capital projects identified for the line, named on the right side of the chart.

In this manner, WSP modeled a progressive series of service improvement levels to identify capital requirements. To answer the RFP Scope’s first question regarding what level of service can be supported by the existing infrastructure, an hourly, bi-directional, all-day service was tested as the first scenario. That modeling effort determined that hourly, bi-directional clock-face service requires one new capital project, at a minimum, to be feasible. That project is a siding extension just south of Tunnel 25, and is one of the projects identified in the sample stringline in Figure 2-1.

WSP tested a total of five separate service scenarios during this initial modeling effort, which were as follows:

1. Scenario 1: Hourly bi-directional service only
2. Scenario 2: Semi-hourly bi-directional with intermediate turn-back
3. Scenario 3: Semi-hourly bi-directional with intermediate turn-back, full-length express service, and bunched outer-zone trains
4. Scenario 4: Semi-hourly bi-directional with intermediate turn-back, full-length express service, and spread-out outer-zone trains
5. Scenario 5: Same as (4), with intermediate turns at Sylmar instead of Vista Canyon

Figure 2-1: Sample Stringline Output from Viriato



Each of these scenarios were modeled, and stringlines were prepared which identified locations where double tracking would be needed for train meets or additional infrastructure (station improvements, train storage areas) would be needed to support each scenario. In the case of additional double tracking, the general locations and estimated lengths of the passing track segments were identified, based on a goal to provide reliable service under the scenario. The required extent of double tracking was estimated conservatively, in recognition of the uncertainties that exist at this high level of preliminary planning, as well as to account for potential future rolling stock choices that could result in equipment with different performance characteristics operating on the AVL.

2.2 Modeling Results

The modeling results from this effort indicated increasing levels of capital investment are required for the progressively increasing levels of service. The output from Viriato were used to develop draft AVL service timetables (“headway sheets”) and these were input into Task 5’s Infrastructure Improvements conceptual engineering and Task 6’s Conceptual Cost Estimates.

2.2.1 Identified Service Scenarios, Headway Sheets, and Operating Costs

Headway sheets (i.e., hypothetical timetables) for each of the five tested scenarios were developed directly from the Viriato stringlines in order to provide a familiar schedule format and display and are contained in the Attachment 1. Each succeeding scenario provides “slots” each hour for hourly full-line service, hourly short-turn service between Los Angeles Union Station and Via Princessa, and/or hourly full-line express service. For the short-turn and express service, only peak-period slots were filled with proposed scheduled trains, leaving mid-day slots available to accommodate additional service if desired, High-Speed Rail service, and/or UPRR freight service.

In addition to providing timetables for each scenario, the headway sheets were also utilized to calculate the net increase in train operating hours and trips, which have a direct bearing on the increased operating and maintenance costs. The trips in the headway sheets were also “blocked” (i.e., assigned to hypothetical train consists) to determine train consist requirements and train storage requirements at the Lancaster end of the line.

The operations and maintenance costs were estimated based on the net increase in annualized train service hours multiplied by Metrolink’s Train Operations Cost per Service Hour, calculated from SCRRA’s Comprehensive Annual Financial Report for FY 2017 (the latest available). Table 2-1 provides the estimated net increase in annual weekday operations and maintenance costs for each of the five modeled scenarios, over and above existing weekday service levels. As shown in Table 2-1, the increased service scenarios add between \$3.1 million and \$9.4 million in increased operations and maintenance costs, in proportion to the increase in service hours.

Table 2-1: Antelope Valley Line Estimated Net Increase in Annual Operating Costs of the Initial Five Scenarios

Scenario	Estimated Net Increase in Annual Weekday Operating and Maintenance Cost*
Scenario 1: Hourly bi-directional service only	\$3.1 M
Scenario 2: Semi-hourly bi-directional with intermediate turn-back	\$5.4 M
Scenario 3: Semi-hourly bi-directional with intermediate turn-back, full-length express service, and bunched outer-zone trains	\$9.3 M
Scenario 4: Semi-hourly bi-directional with intermediate turn-back, full-length express service, and spread-out outer-zone trains	\$9.3 M
Scenario 5: Same as (4), with intermediate turns at Sylmar instead of Vista Canyon	\$9.4 M

*Calculated based on Net Increase in Train Operating Hours over Existing Weekday Service Level multiplied by Metrolink FY 2017 Train Operations per Service Hour Cost

2.2.2 Identified Capital Improvements Required for Service Scenarios

In addition to the increased annual operating costs, the service scenarios require a successively larger number of capital projects to increase line capacity, thereby successively increasing capital costs. Following Task 5's Conceptual Engineering effort, as part of Task 6, Rough-Order-of-Magnitude capital costs were estimated for each of the capital projects identified in the modeling effort. Table 2-2 identifies the specific capital projects, their individual costs, and their combined costs by service scenario. For example, Scenario 1 requires just one capital project at an estimated cost of \$41.8 million. Scenario 2 requires four capital projects at a combined total estimated cost of \$175.2 million. Scenario 5 requires eight separate capital projects at a combined total estimated cost of \$425.8 million.

Table 2-2: Antelope Valley Line Total Estimated Capital Costs of the Initial Five Scenarios

Capital Projects and Costs				Scenario					ROM Cost Est. for Project ^{1,2}
MP	Project	Track-feet	Description	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	
Location				Hourly Only	30-60 No Express	3-Hourly Patterns	3-Hourly Patterns	3-Hourly Patterns	
-76.6	Lancaster Terminal -- 6 trainsets	3,440	New double track and second station platform face, plus two new 1,000' storage tracks		X			X	\$ 27,300,000
-76.6	Lancaster Terminal -- 8 trainsets	4,300	New double track and second station platform face, plus three new 1,000' storage tracks			X	X		\$ 30,100,000
68.5-72.0	Palmdale North	18,480	New double track and 2 platform tracks at station (integrated with HSR)				X	X	\$ 127,300,000
55.0-57.5	Acton Siding	13,200	New siding			X			\$ 40,200,000
50.0-52.5	Ravenna South	13,200	Extend existing siding (new double track)				X	X	\$ 56,300,000
37.5-38.6	Via Princessa-Honby	5,808	Extend existing siding (new double track)			X			\$ 26,400,000
33.4-35.0	Canyon-Sta. Clarita	8,448	Extend existing siding (new double track)		X	X	X	X	\$ 48,800,000
30.2-32.4	Hood-Saugus	11,616	Connect sidings and convert to double track			X			\$ 41,600,000
25.3-26.5	Balboa-Tunnel	6,336	Extend double track	X	X	X	X	X	\$ 41,800,000
21.9-23.6	Sylmar-Roxford	8,976	New double track			X			\$ 42,700,000
21.5-22.1	Sylmar Station	3,168	Second track at station (Costs included in Van Nuys - Sylmar)					X	\$ 22,900,000
19.5-21.9	Van Nuys Blvd-Sylmar	12,672	New double track						\$ 47,400,000
17.0-19.5	Sheldon-Van Nuys Blvd	13,200	New double track				X	X	\$ 67,000,000
12.7-15.6	Brighton-McGinley	15,312	Extend and connect double track sections		X	X	X	X	\$ 57,300,000
Total ROM Capital Cost				\$ 41,800,000	\$ 175,200,000	\$ 328,900,000	\$ 428,600,000	\$ 448,700,000	\$ 677,100,000

- Notes: 1. ROM Cost Estimate per RSE Antelope Valley CIP Project Cost Estimates, and PRE ROM Cost Estimates for Signal-Related work
2. All Costs include 35% Contingency on top of Base Construction Cost, and 60% Soft Cost rate added to Base Construction Costs AND Contingency.

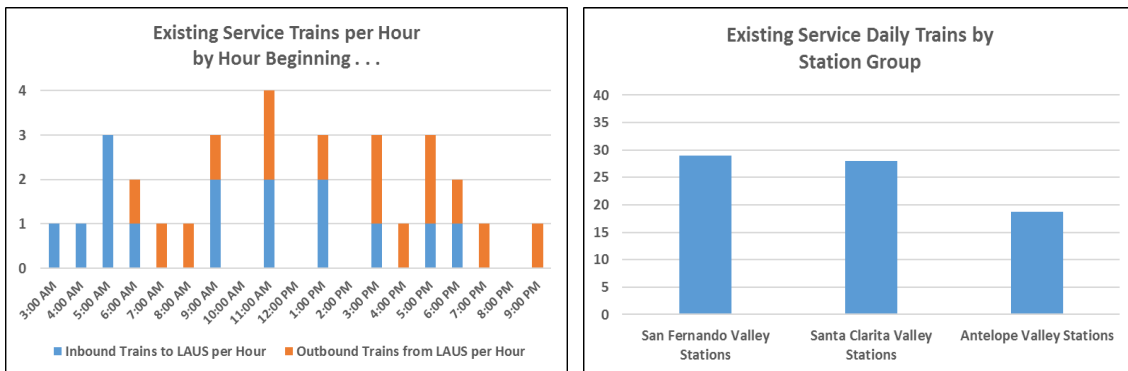
3 STAKEHOLDERS' PRESENTATION AND FEEDBACK

3.1 Stakeholders' Presentation

The initial five modeled service scenarios were presented to the AVL Project Stakeholders on December 12, 2018. The PowerPoint presentation made to the group is included in its entirety in Attachment 3. The following graphs were provided to illustrate each scenario, along with a summary explanation.

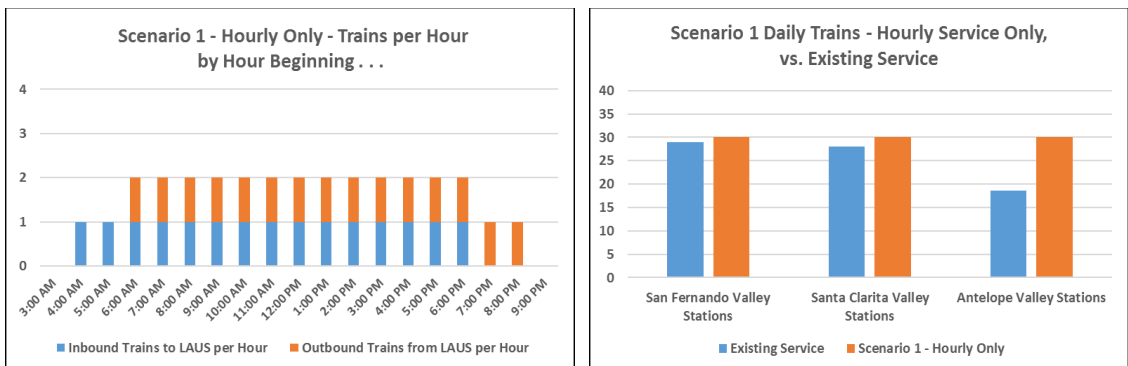
3.1.1 Existing Service

Existing service does not provide clock-face headways, and there are gaps during the day when no trains depart in either direction for an hour. The Antelope Valley stations receive a lower level of service than the San Fernando and Santa Clarita Valley Stations.



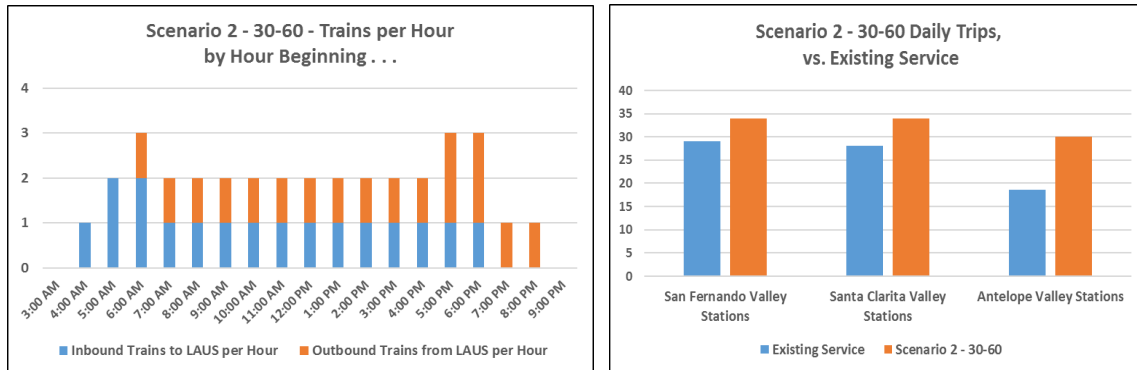
3.1.2 Scenario 1 – Hourly Bi-Directional Service Only

Scenario 1 provides an even hourly bi-directional headway all day, with even service levels to all stations. However, no peak period increased frequency or express service is provided. Compared to existing service, the Antelope Valley sees a significant service improvement. One capital project is required for this scenario at an estimated cost of \$41.8 million.



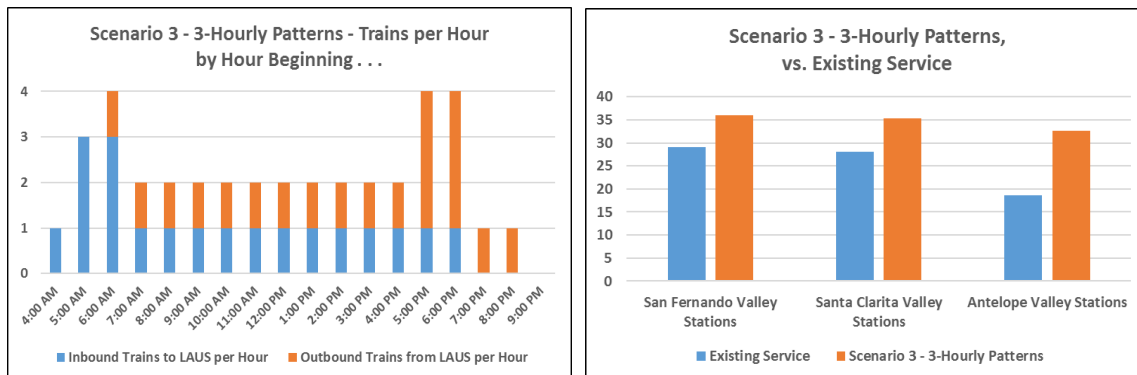
3.1.3 Scenario 2 – 30 minute/60 minute patterns

Scenario 2 starts with the hourly bi-directional all-day service and overlays partial-corridor trips from LAUS to Via Princessa hourly, to provide a total of 30 minute headways during peak periods on the inner portion and hourly on the outer portion of the line.² This scenario requires four capital projects at an estimated total cost of \$175.2 million.



3.1.4 Scenario 3 – Three hourly Patterns

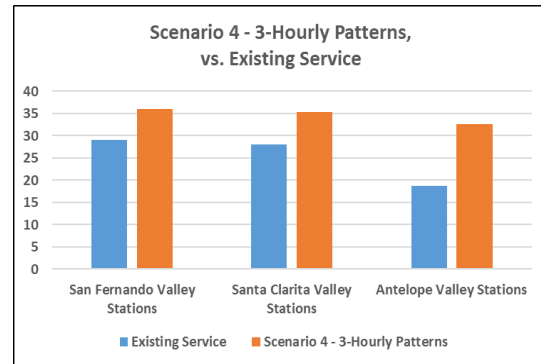
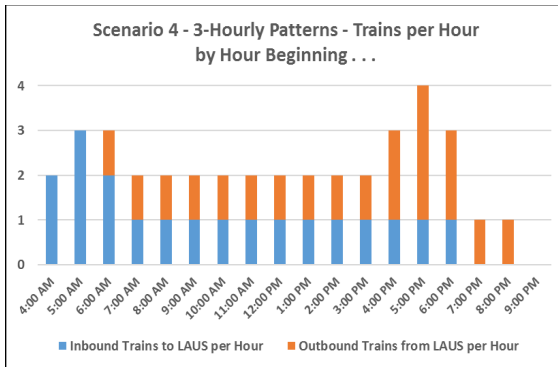
This scenario builds on Scenario 2 by adding hourly express service during the peak periods, for a total of three hourly patterns during the peak. This scenario requires eight capital projects at an estimated total capital cost of \$328.9 million.



3.1.5 Scenario 4 – Three Hourly Patterns (improved spacing between trains in Antelope Valley)

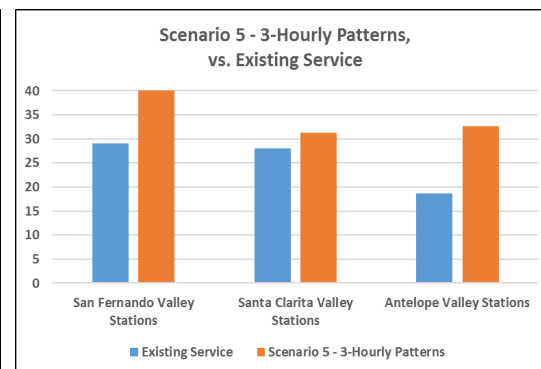
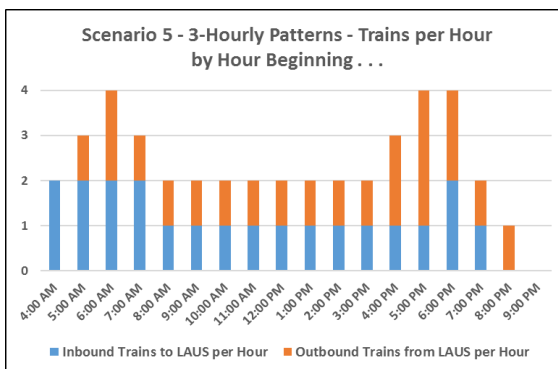
This scenario is similar to Scenario 3 but provides better spacing between express and local trains in the Antelope Valley. A total of seven capital projects are required at an estimated total cost of \$428.6 million.

² Inner portion of the line includes the San Fernando and Santa Clarita Valleys. The outer portion of the line includes Soledad Canyon and the Antelope Valley.



3.1.6 Scenario 5 – Three Hourly Patterns (short-turn trains terminate at Sylmar instead of Via Princessa)

This scenario is similar to Scenario 4 but turns the partial-corridor trips at Sylmar instead of Via Princessa, in order to reduce congestion and potential delays caused by the single-track Tunnel 25 segment. This scenario requires eight capital projects with an estimated total cost of \$448.7 million.



3.2 Stakeholders' Feedback

Valuable comments and input were received from the Stakeholders and Metro staff in response to the Stakeholder Presentation which helped shape revised service scenarios. This input included:

- The scenarios should be viewed as an incremental service improvement continuum, rather than any one scenario being an end-all objective.
- There was a strong desire to achieve some level of service improvement as soon as possible, with the knowledge that the more substantial service increases will take longer to implement.
- There was a strong desire to maintain the existing peak period frequency of service, albeit without clock-face headways initially. Given the substantial capital cost involved in operating the full-corridor local, short-turn local, and express service all on clock-face headways, and the lengthy time-period it would take to fund the projects in

Scenarios 3, 4, and 5, it was preferred to strive for earlier improvements to the existing service, with the higher-numbered scenarios serving as potential longer-term goals.

- There was a strong desire expressed for late-night service on weeknights and Saturdays, centering on departures at 10:30PM and 11:30 PM from LAUS.
- Clock-face hourly service would be a good goal for weekday mid-day periods, to the extent near-term capital funding for the Balboa siding extension project is sufficient to enable that service level.
- Hourly Saturday service, and bi-hourly Sunday service, on clock-face headways, would also be good near-term goals. Bi-hourly clock-face weekend service is feasible with the existing infrastructure, but hourly weekend service requires the Balboa siding extension near Tunnel 25 to be completed.

4 FIRST STAGE EVALUATION OF INITIAL SERVICE SCENARIOS

4.1 Evaluation Factors and Methodology

The evaluation and prioritization criteria for the Stage 1 evaluation were defined in Task 3. The Stage 1 evaluation uses five key evaluation categories and multiple sub-criteria to evaluate the performance of the initially-modeled service scenarios described in Section 2.1, and scores the scenarios based on the criteria (Table 4-7 shows the ranges of the sub-category's weight, score, weighted score and overall possible score). The Stage 2 evaluation is planned to be done as part of Task 7, and the sub-criteria will be refocused to evaluate each package of capital projects needed for a specific level of service improvement.

4.1.1 Evaluation Criteria Categories and Sub-Criteria

The Stage 1 evaluation is a high-level service level improvement evaluation that takes into consideration the overall proposed service level increments of each initially-modeled service scenario. Service options which do not meet basic service needs or require excessive infrastructure improvements to implement, will score lower against the sub-criteria of each of the five evaluation categories. The five evaluation categories and corresponding sub-categories in the Stage 1 evaluation were derived from an original list of eight categories, which were refined during a series of reviews and discussions with Metro staff. The evaluation categories have a proposed overall category weight, and sub-category weights assigned as part of each individual criterion. These subcategory weighted scores were added, and then multiplied by the overall category percentage to arrive at a numeric evaluation score for that category. The five key evaluation categories and corresponding overall weights are shown in Table 4-1.

Table 4-1: Stage 1 Evaluation Categories and Overall Weight

Category Number	Category	Overall Category Weight
1	Operations	35%
2	Regional Connectivity	25%
3	Costs and Financial Performance	20%
4	ROW Impacts	10%
5	Applied Technology	10%

Table 4-2 through Table 4-6 present the sub-categories in each of the five evaluation categories, and their corresponding metric/measure and evaluation methodology. Table 4-7 provides Evaluation Categories Maximum Possible Weights and Scores for each of the sub-criteria.

Table 4-2: Operations Sub-categories and Methodology

Category	Evaluation Criteria	Metric/Measure	Methodology
Operations	Capacity Improvement	Percent increase in trains	The percent increase in trains is calculated from number of existing trains per day, compared to the number of trains in each of the five scenarios
	Travel Time Improvement	Average percent reduction in overall train trip time (wait time plus on-board time)	The percent reduction in overall train trip time is calculated by dividing the total travel time savings of each of the five scenarios, by the existing service's total travel time. Travel time savings is estimated with the formula below: [Existing condition average trip time (in vehicle full length trips only) + Average wait time between vehicles] - [Scenario's average trip time in vehicle (full-length trips only) + average wait time between vehicles (all trips all stops)]
	Compatibility with Local Transit and Development Plans	Consistency with plans for future transit networks, route, and station area development plans	The compatibility with local transit and development plans is determined with the number of plans within the catchment area of each AVL stations, and with the number of new train stops per station of each new scenario. These two factors are used to create a measure to see how these projects will impact each scenario
	Flexibility for Future Growth in Long Term	Assessment of support for long-term service level increases	Flexibility to support future growth was evaluated on the scenario's ability to support long-term service increases with more infrastructure, transfers or coordination with future services like California High-Speed Rail, High Desert Corridor rail service, and East San Fernando Valley light rail, and its flexibility to develop service around the constraints of Tunnel 25
	Quality of the Passenger Experience	General assessment of the overall improvement in service frequency, multi-modal connectivity, amenities, on-time performance	Improvement to the quality of the passenger's experience was evaluated with the scenario's percent increase in service frequency, compared to the existing service. More frequent service increases connectivity and the sense of on-time service
	Compatibility with Clockface Schedule Patterns	Pass/fail assessment based on service plan slot schedule	Compatibility with service plan slot schedule patterns is evaluated based on the five service scenarios' number of train stops in intervals of 60, 30 or 15 minutes (+/- 2 minutes) between trains at AVL stations

Table 4-3: Regional Connectivity Sub-categories and Methodology

Category	Evaluation Criteria	Metric/Measure	Methodology
Regional Connectivity	Travel Markets Served	Percent increase in number of train trip stops at AVL stations (or station pairs)	The percent increase in the number of train trip stops at AVL stations is calculated from the five service scenarios' timetables, compared to the current number of trains stops identified in the existing timetable
	Multimodal Connectivity	Headway/Travel Pattern synchs or can be made to synch with local transit operators	Multimodal connectivity is measured with the number of existing bus lines providing service in intervals of 60, 30, 15 or 10 minutes to AVL Stations during peak periods. These existing bus lines from L.A. Metro, AVTA, and Santa Clarita Transit were multiplied by the number of additional train trips stops at AVL stations of each of the five service scenarios
	Regional Network Connectivity	Headway/trip pattern synchs with SCORE program connections in LAUS, Palmdale, Burbank Airport North	The ability of the scenarios' headways to provide better synchronization with the regional network was determined with the number of trains with intervals of 30 minutes or less (All five initial service scenarios start with a 60 minute base service)
	Rail Mode Share Potential	Projected percent increase in corridor mode share	The projected rail mode share is determined by calculating the percent increase in daily revenue hours from the existing weekday service. This is then used to calculate the increase in mode share by applying a ratio of every 1% increase in daily revenue hours yields a 0.5% increase in ridership ³

Table 4-4: Costs and Financial Performance Sub-categories and Methodology

Category	Evaluation Criteria	Metric/Measure	Methodology
Costs and Financial Performance	Total Capital Cost	Rough-order-of-Magnitude (ROM) capital cost	ROW capital costs are determined from high-level engineering drawings using high-level cost factors for number of miles of double-track, bridges, culverts, signal systems, and other similar elements, required for each project
	Relative Impact on Annual Operating Cost of AVL service	Percent increase in annual AVL operating cost	Percent increase in annual AVL operating cost is calculated based on percent increase in train miles compared to exciting operating costs.

³ Support for this approach is found in Transit Cooperative Research Program (TCRP) Report 95: *Traveler Response to Transportation System Changes, Chapter 9 – Transit Scheduling and Frequency*. Transportation Research Board, 2004.

Table 4-5: ROW Impacts Sub-categories and Methodology

Category	Evaluation Criteria	Metric/Measure	Methodology
ROW Impacts	Right-of-Way (ROW) takes	Extent of ROW acquisition required from UPRR or other ROW owners	ROW takes are calculated by measuring the total square feet of ROW acquisition required to implement the capital projects identified for each scenario. The capital projects' footprints were identified for a high-level engineering exercise
	Indirect Property (noise barriers, etc.)	Extent to which impacts to adjacent properties can be mitigated (i.e., with noise barriers, landscaping)	The extent of impacts to adjacent properties by the capital projects identified for each scenario, are determined with the capital projects' footprint adjacent to sensitive land uses (residential, schools, etc.)
	Sensitive Areas (historic, endangered species, etc.)	Extent to which proposed construction affects sensitive areas or communities	The extent of the impact to sensitive areas is determined with the number of drainage, bridges and earthwork projects required to implement the capital projects per scenario.

Table 4-6: Applied Technology Sub-categories and Methodology

Category	Evaluation Criteria	Metric/Measure	Methodology
Applied Technology	VMT Reduction	Number of vehicular miles travelled reduced (1000's)	The potential reduction of vehicular miles travelled is estimated by multiplying the expected ridership increase by the average commuter rail trip length in the corridor. Expected ridership increase is calculated with the increase of daily revenue hours with the ratio of every 1% increase in daily revenue hours yielding a 0.5% increase in ridership. The average commuter rail trip length in miles for the AVL was provided by SCRRA
	Clean Vehicle Technology (e.g., DMUs, Electrification)	Supports cleaner vehicle technology	The assessment of a scenario's capability to support the use of clean vehicle technology was measured by the service capacity to accommodate the maximum load capacity of a cleaner vehicle. Maximum load capacity is calculated with the percent increase of daily revenue hours from the existing weekday service and projected maximum loads
	Compatibility with Future High Speed Rail	Extent to which the service and infrastructure plan supports future development of HSR in the corridor	Support for the future development of HSR in the corridor was assessed with the scenario's ability to improve service frequency, infrastructure and express service
	Serves Disadvantaged Communities (DAC) and Low Income Households	Number of additional train stops serving stations near disadvantaged/low-income communities	The ability to serves DAC and Low Income Households/Communities was evaluated with the additional train stops per scenario, and number of disadvantaged/high poverty communities with a half-mile from these stations

Table 4-7: Stage 1 Evaluation Categories Possible Weights and Scores

No.	Category	Overall Category Weight	Evaluation Criteria	Metric/Measure	Type of Measure	Sub-Category Weight (Range)	Sub-Category Score (Range)	Sub-Category Weighted Score (Range)	Overall Category Score (Maximum score)
1	Operations	35%	Capacity Improvement	Percent increase in trains per hour or per day	Quantitative	1 -3	100 - 300	100 - 300	18
			Travel Time Improvement	Average percent reduction in overall train trip time (wait time plus on-board time)	Quantitative	1 -3	100 - 300	100 - 300	18
			Compatibility with Local Transit and Development Plans	Consistency with plans for future transit networks, route, and station area development plans	Qualitative	1 -3	100 - 300	100 - 300	18
			Flexibility for Future Growth in Long Term	Assessment of support for long-term service level increases	Qualitative	1 -3	100 - 300	100 - 300	18
			Quality of the Passenger Experience	General assessment of the overall improvement in service frequency, multi-modal connectivity, amenities, on-time performance	Qualitative	1 -3	100 - 300	100 - 300	18
			Compatibility with Clockface Schedule Patterns	Pass/fail assessment based on service plan slot schedule	Qualitative	1 -3	100 - 300	100 - 300	18
2	Regional Connectivity	25%	Travel Markets Served	Percent Increase in number of train trip stops at AVL stations (or station pairs)	Quantitative	1 -3	100 - 300	100 - 300	19
			Multimodal Connectivity	Headway/Travel Pattern synchs or can be made to synch with local transit operators	Qualitative	1 -3	100 - 300	100 - 300	19
			Regional Network Connectivity	Headway/trip pattern synchs with SCORE program connections in LAUS, Palmdale, Burbank Airport North	Qualitative	1 -3	100 - 300	100 - 300	19
			Rail Mode Share Potential	Projected Percent Increase in corridor mode share	Qualitative	1 -3	100 - 300	100 - 300	19
3	Costs and Financial Performance	20%	Total Capital Cost	ROM Capital cost using high-level cost factors for # of miles of double-track, bridges, etc.	Quantitative	1 -3	100 - 300	100 - 300	30
			Relative Impact on Annual Operating Cost of AVL service	Percent increase in annual AVL operating cost based on % increase in train miles	Qualitative in First Stage	1 -3	100 - 300	100 - 300	30
4	ROW Impacts	10%	Right-of-Way Takes	Extent of ROW acquisition required from UPRR or other ROW owners	Qualitative	1 -3	100 - 300	100 - 300	10
			Indirect Property (noise barriers, etc.)	Extent to which impacts to adjacent properties can be mitigated (i.e., with noise barriers, landscaping)	Qualitative	1 -3	100 - 300	100 - 300	10
			Sensitive Areas (historic, endangered species, etc.)	Extent to which proposed construction affects sensitive areas or communities (including natural, cultural, and community resources)	Qualitative	1 -3	100 - 300	100 - 300	10
5	Applied Technology	10%	VMT Reduction	Number of vehicular miles travelled reduced (1000's)	Quantitative	1 -3	100 - 300	100 - 300	8
			Clean Vehicle Technology (e.g., DMUs, Electrification)	Supports cleaner vehicle technology	Qualitative	1 -3	100 - 300	100 - 300	8
			Compatibility with Future High Speed Rail	Extent to which the service and infrastructure plan supports future development of HSR in the corridor	Qualitative	1 -3	100 - 300	100 - 300	8
			Serves DAC s and Low Income Households/ Communities	Number of additional train stops serving stations near disadvantaged/low-income communities	Quantitative	1 -3	100 - 300	100 - 300	8
Potential Final Score									300

4.2 Evaluation Results

The criteria for the Stage 1 Evaluation are intended to provide an evaluation of the overall performance and benefits of the service levels provided by each of the scenarios, as well as their costs and impacts. The five service scenarios presented in Section 2.1 were evaluated utilizing the metric and methodology for the five evaluation categories and corresponding sub-categories. For each sub-category, a score between 100 and 300 was assigned to each service scenario based on a predetermined score breakdown. This score between 100 and 300 was then weighted with the sub-category weight of 1, 2 or 3, and finally these subcategory weighted scores were added, and then multiplied by the overall category percentage to arrive at a numeric evaluation score for that category. The overall evaluation results are presented in this section, and Attachment 4 presents more detail tables of the evaluation.

4.2.1 Overall Evaluation Results of the Five Scenarios

The Stage 1 Evaluation is heavily focused on service level improvement, which is reflected by the 35% overall weight assigned to the Operations category. The evaluation resulted in service scenarios 3, 4 and 5 having a better performance for the Operations category with their semi-hourly bi-directional, full-length express and intermediate turn-back operations services. Service Scenario 1 with its hourly bi-directional service ranked the lowest for the Operations category. Service Scenario 5 scored the highest in all Operations sub-categories, except on compatibility with clock-face schedule patterns.

For the Regional Connectivity category, and its overall 25% overall weight, service Scenario 5 performed the best by offering a significant increase in the number of train trip stops, which help enhance synchronization to local and regional transit services, and allow for an increase in the regional rail's corridor mode share. Service Scenarios 3 and 4 performed better than Scenarios 1 and 2 for the category.

The other important factor of this evaluation is the feasibility to implement the service scenario without requiring excessive infrastructure improvements. The Costs and Financial Performance category, with a 20% overall weight, was designed to gauge the impact of the capital and operating costs to implement these scenarios. Service Scenario 1 requiring only one capital project, and the least additional operations cost, performed the best in this category. As service Scenarios 3, 4 and 5 required more capital projects to provide greater levels of service, and greater operations cost associated with this service, they scored lowest in this category.

The sub-categories in the Right-of-Way Impacts category (with a 10% overall weight), evaluate the effects on adjacent property, and communities, to implement each service scenario. Service Scenarios 3, 4 and 5 scored the lowest in this category because they required capital projects that involve the acquisition of property, construction sites, and mitigation measures to be implemented. Service Scenario 1 scored the highest because it required only one capital project, which is not located near sensitive land uses.

The ability of a scenario to have a positive impact through the use of technology was evaluated with the Applied Technology category, which was assigned a 10% overall weight. Scenario 5 scored the highest for this category, with Scenarios 2, 3, and 4 scoring slightly lower, and Scenario 1 scoring the lowest. Scenario 5 provides more favorable service to disadvantaged communities, reduces vehicular miles travelled, and supports future development of HSR service and use of cleaner vehicles. Despite all five service scenarios providing some

opportunity to support the future development of HSR service, none of them address the requirement of electrifying the corridor, which is crucial for HSR service. A major impediment to this on the AVL line is the limited clearance height of Tunnel 25, which is insufficient to allow installation of electric catenary lines.

The Stage 1 evaluation results show Scenario 5 with an overall score 238 out of a possible score of 300. Scenario 3 has the second highest overall score with 225, followed by Scenario 4 with an overall score of 219. The lowest overall scores from this evaluation are for Scenario 1 with a score of 184, and Scenario 2 with a score of 204. This evaluation shows that Scenario 5 has the highest ability to meet the criteria which measure the performance and benefits of enhanced service for the AVL. Table 4-8 summarizes the final overall score of the Stage 1 evaluation, and Table 4-9 presents the sub-category scores, overall score and final score out of 300 for each of the five scenarios. More detailed tables of the evaluation of each of the sub-categories are presented in Attachment 4.

Table 4-8: Stage 1 Evaluation Overall Score

Stage 1 Evaluation	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Overall Score (Out of 300)	184	204	225	219	238

Table 4-9: Summary of Sub-category's Scores, Overall Scores and Final Service Scenarios Scores

No.	Category	Evaluation Criteria	Sub-Category Score	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Possible Overall Category Score	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
1	Operations	Capacity Improvement	100 - 300	100	100	250	250	300	18	6	6	15	15	18
		Travel Time Improvement	100 - 300	200	250	300	300	300	18	12	15	18	18	18
		Compatibility with Local Transit and Development Plans	100 - 300	100	200	300	300	300	18	6	12	18	18	18
		Flexibility for Future Growth in Long Term	100 - 300	200	200	300	300	300	18	12	12	18	18	18
		Quality of the Passenger Experience	100 - 300	100	100	200	200	300	18	6	6	12	12	18
		Compatibility with Clockface Schedule Patterns	100 - 300	150	300	250	200	150	18	9	18	15	12	9
2	Regional Connectivity	Travel Markets Served	100 - 300	100	200	250	250	300	19	6	13	16	16	19
		Multimodal Connectivity	100 - 300	100	150	250	250	300	19	6	9	16	16	19
		Regional Network Connectivity	100 - 300	100	200	300	300	300	19	6	13	19	19	19
		Rail Mode Share Potential	100 - 300	150	200	300	250	300	19	9	13	19	16	19
3	Costs and Financial Performance	Total Capital Cost	100 - 300	300	200	100	100	100	30	30	20	10	10	10
		Relative Impact on Annual Operating Cost of AVL service	100 - 300	300	250	100	100	100	30	30	25	10	10	10
4	ROW Impacts	Right-of-Way Takes	100 - 300	300	200	200	100	100	10	10	7	7	3	3
		Indirect Property (noise barriers, etc.)	100 - 300	300	300	100	300	300	10	10	10	3	10	10
		Sensitive Areas (historic, endangered species, etc.)	100 - 300	300	200	200	100	100	10	10	7	7	3	3
5	Applied Technology	VMT Reduction	100 - 300	100	150	300	300	300	8	3	4	8	8	8
		Clean Vehicle Technology (e.g., DMUs, Electrification)	100 - 300	300	300	300	300	300	8	8	8	8	8	8
		Compatibility with Future High Speed Rail	100 - 300	100	200	200	200	300	8	3	5	5	5	8
		Serves DAC s and Low Income Households/ Communities	100 - 300	150	200	250	250	300	8	4	5	6	6	8
Final Score (Out of 300)										184	204	225	219	238

4.2.2 Sensitivity Analysis Findings

The Stage 1 evaluation shows that Scenario 5 has the highest capability to increase service for the AVL. However, implementing this scenario requires an excessive amount of infrastructure improvement and increased annual operating cost which make the scenario less feasible to implement. The results made it apparent that the evaluation criteria were heavily weighted toward the benefits of service improvements, vs. the costs.

Accordingly, after the Stage 1 evaluation was completed, a sensitivity analysis was performed on the overall category weights to see what combination of weights result in service scenarios that required excessive infrastructure improvements being less feasible (to have a lower overall score), when compared to service scenarios that don't require excessive infrastructure improvements. By increasing the overall weight of the Costs and Financial Performance category from 20% to 40%, and reducing the overall weight for the Operations and Regional Connectivity categories from 35% to 25% and from 25% to 20% respectively, service Scenarios 1 and 2, which require the least infrastructure improvements, resulted in the highest evaluation overall scores. Table 4-10 shows the Stage 1 evaluation categories and sensitivity analysis overall weights, and Table 4-11 displays how the overall scores of the five service scenarios compare with the different weights.

Table 4-10: Stage 1 Evaluation Categories and Sensitivity Analysis Overall Weights

Category Number	Category	Overall Category Weight	Sensitivity Analysis Overall Category Weight
1	Operations	35%	25%
2	Regional Connectivity	25%	20%
3	Costs and Financial Performance	20%	40%
4	ROW Impacts	10%	10%
5	Applied Technology	10%	10%

Table 4-11: Stage 1 Evaluation Categories and Sensitivity Analysis Overall Scores

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Stage 1 Evaluation Overall Score	184	204	225	219	238
Sensitivity Analysis Overall Score	224	220	205	200	215

4.2.3 Evaluation Conclusions

Based on the evaluation findings and sensitivity analysis, it has become clear that improvements to service on the AVL (and the capital projects needed to support those improvements) should be viewed as an incremental service improvement continuum as funding permits, rather than any one scenario being an end-all objective. This was also one of the key messages coming out of the discussion of the service scenarios with Stakeholders on December 12, 2018, and will help shape study recommendations going forward.

5 REVISED SERVICE SCENARIOS

5.1 Revised Scenario Service Levels and Patterns

After consideration of Stakeholder input and consultation with Metro staff, the study team identified six revised scenarios (hereinafter referred to as “Revised Scenarios” for clarity) for further modeling and evaluation during the Stage 2 evaluation process, as displayed in Table 5-1. These scenarios include near-term scenarios that offer service increases without any capital projects (Revised Scenario 1) or with just one capital project (Revised Scenario 2). All scenarios offer late night service Monday through Saturday, and strive for hourly clock-face mid-day service beginning with Revised Scenario 2. Revised Scenarios 3 through 6 offer longer term service level objectives to strive for as capital and operating funding to support them becomes available.

Table 5-1: Revised AVL Service Scenarios based on Stakeholder and Metro Feedback

Scenario	Peak Service	Late Night Assumption	Off-Peak Assumption	Weekend Assumption	Capital Impact over Baseline
Revised Scenario 1: Late Evening Trip	Existing Peak service	1 late night trip LAUS - LAN	Current schedule	Current Schedule plus 1 Late Night Trip Saturday	None
Revised Scenario 2: Two Additional Off-Peak Round Trips	Existing Peak service	1 late night trip LAUS - LAN	Inbound: Two additional mid-day trips; Outbound: Two additional mid-day trips or one mid-day and one additional late night trip	Hourly Saturday, bi-hourly Sunday, with one late evening trip on Saturday	Requires Balboa Siding Extension totaling \$41.8 million
Revised Scenario 3: Improved Peak Service and Semi-Hourly Off-Peak Service	Existing Peak service with modest improvements	2 late night trips LAUS - LAN	30-minute mid-day on inner portion of the line LAUS to Vista Canyon, hourly out to Lancaster	Hourly Saturday, bi-hourly Sunday, with two late evening trips on Saturday	Requires Balboa Siding Extension and three additional capital projects totaling \$175.2 million
Revised Scenario 4: Three Patterns: Semi-hourly plus express service	Three hourly patterns - full-corridor local, short-turn local, and Express, all on clockface headways	2 late night trips LAUS - LAN	30-minute mid-day on inner portion of the line LAUS to Vista Canyon, hourly out to Lancaster	Hourly Saturday, bi-hourly Sunday, with two late evening trips on Saturday	Requires eight capital projects totaling \$328.9 million
Revised Scenario 5: Three Patterns: Semi-Hourly Plus Express Service with Hub at Santa Clarita	Three hourly patterns - full-corridor local, short-turn local, and Express, all on clockface headways	2 late night trips LAUS - LAN	30-minute mid-day on inner portion of the line LAUS to Vista Canyon, hourly out to Lancaster	Hourly Saturday, bi-hourly Sunday, with two late evening trips on Saturday	Requires seven capital projects totaling \$428.6 million
Revised Scenario 6: Semi-Hourly Plus Express Service with Hub at Sylmar	Three hourly patterns - full-corridor local, short-turn local, and Express, all on clockface headways	2 late night trips LAUS - LAN	30-minute mid-day on inner portion of the line LAUS to Vista Canyon, hourly out to Lancaster	Hourly Saturday, bi-hourly Sunday, with two late evening trips on Saturday	Requires eight capital projects totaling \$448.7 million

Headway Sheets were developed for the six revised scenarios and are included in Attachment 5. The Revised Scenarios are intended to be “layered”, with successively increasing service levels with each higher-numbered scenario. Examination of the headway sheets shows a significant improvement in service levels in Revised Scenarios 2 through 6, particularly in the mid-day period.

The estimated net increase in annual operating cost that results from the Revised Scenarios is displayed in Table 5-2. The annualized operating cost increases for the higher-numbered Revised Scenarios are much larger than for the originally modeled scenarios due to significantly larger service increases, including filling in the mid-day schedules with short-turn trips between LAUS and Via Princessa or Sylmar. Those operating costs should be considered as the upper bounds in costs, with the likelihood that mid-day service would be gradually increased as demand grows over time.

It should be noted that the evaluation of the service scenarios (reviewed in Section 4 of this report) is based on the initially-modeled service scenarios, not the Revised Scenarios that resulted from the Stakeholder and Metro input. The evaluation of the Revised Scenarios will be addressed in Task 7, Evaluation of Alternatives.

Table 5-2: AVL Estimated Net Increase in Annual Operating Costs of the Revised Scenarios, Including Weekday and Weekend Service Improvements

Service Option	Weekday Base Increase	Weekday Night Increase	Saturday Base Increase	Saturday Night Increase	Sunday Base Increase	Sunday Night Increase	TOTAL
Revised Scenario 1: Late Evening Trip	\$ -	\$ 2,306,327	\$ -	\$ 432,899	\$ -	\$ -	\$ 2,739,226
Revised Scenario 2: Two Additional Off-Peak Round Trips	\$ 5,792,027	\$ 2,306,327	\$ 2,907,370	\$ 432,899	\$ 345,744	\$ -	\$ 11,784,367
Revised Scenario 3: Improved Peak Service and Semi-Hourly Off-Peak Service	\$21,066,205	\$ 4,492,097	\$ 2,907,370	\$ 865,798	\$ 345,744	\$ -	\$ 29,677,214
Revised Scenario 4: Three Patterns: Semi-hourly plus express service	\$28,829,094	\$ 4,329,606	\$ 2,907,370	\$ 865,798	\$ 345,744	\$ -	\$ 37,277,611
Revised Scenario 5: Three Patterns: Semi-Hourly Plus Express Service with Hub at Santa Clarita	\$29,615,342	\$ 4,329,606	\$ 2,907,370	\$ 865,798	\$ 345,744	\$ -	\$ 38,063,859
Revised Scenario 6: Semi-Hourly Plus Express Service with Hub at Sylmar	\$22,093,569	\$ 4,329,606	\$ 2,907,370	\$ 865,798	\$ 345,744	\$ -	\$ 30,542,087

*Please refer to Scenario Descriptions for Assumptions

5.2 Operations and Maintenance Cost Estimating Methodology

Increasing the number of Metrolink trains operating on the AVL will increase costs for operations and maintenance. These costs will be partially offset by fare revenues generated from increased ridership. Estimates of annual operations and maintenance (O&M) costs for Metrolink service on the AVL were prepared for six rail service scenarios. These estimates consider the expected incremental cost associated with increasing train service, over and above the cost of delivering the existing AVL service. The incremental costs are primarily associated with train crews and train operations, fuel, and rolling stock maintenance.

Two different methods were used, to generate a range of estimated incremental costs for each service scenario. Using a range of costs reflects the underlying uncertainty of estimating costs in the early phase of planning, uncertainties about how operations and maintenance will be contracted by Metrolink in the future, and uncertainties about how operational characteristics will change in the future as service grows.

The two methods were:

- (1) Estimates of costs for diesel fuel, train crews and equipment maintenance based on operations data, using unit cost factors derived by Metrolink, similar to a method used in a recent Metrolink study of the San Bernardino Line
- (2) Estimate of incremental cost based on incremental change in the level of revenue service hours, using high-level unit costs per service hour derived from cost line items presented in Metrolink's budgets and comprehensive annual financial reports (CAFRs), deemed to represent costs that vary based on the level of service provided

The second method generated incremental costs that were higher than the first method for all scenarios. With the high-level factoring approach used in the second method, it can be difficult to separate elements of fixed costs from purely variable costs, which may be one reason the estimates using this method resulted in relatively higher costs.

The first method produces estimates closer to what Metrolink would expect in terms of the incremental cost of adding trains to an existing line. Metrolink, however, is in the process of changing the way it contracts for its operations, moving towards a single contract covering all operations and maintenance activities. This will affect how Metrolink estimates operations cost in the future, and could move the incremental cost per hour closer to the high-end range figure.

The main volume of the AVL Study final report includes only the low end of the range of O&M cost estimates, so as not to imply a commitment to funding operations larger than what may be needed or supportable. Presenting only a single value, and acknowledging that funding has not yet been identified, simplifies the presentation of initial study results. More detailed analysis of operations and O&M costs will be needed to support investment and funding decisions, and updated O&M cost estimates will be prepared based on those analyses.

For purposes of this high-level study of the AVL, the two methods generate a reasonable low-to-high range of incremental costs that can be used for evaluating the cost-effectiveness and financial feasibility of increasing service according to any of the six scenarios that were analyzed.

5.2.1 Methodology: Low End of Cost Range

The low end of the cost range was developed by applying unit cost factors to service quantities derived from the service plans for each scenario. The cost categories and cost drivers included:

- Diesel fuel, based on train-miles

- Other transportation costs, based on the number of train crews utilized, with different cost factors for crews that operate on a regular shift versus those that operate on a split shift (with mid-day layover period)
- Rolling stock maintenance, based on the number of revenue train sets in operation on the line

Unit costs were provided by Metrolink based on historical experience. The unit costs for each cost driver are shown in Table 5-3. Train-miles are taken directly from the scenario timetables. The number of required train crews also was derived from the timetables, making reasonable assumptions about crew assignments, layovers and overtime. A contingency of 20 percent was applied to the total incremental O&M cost to reflect elements of variable cost not included in the estimates generated by the four primary cost drivers.

Table 5-3: Unit Costs for Operations and Maintenance, Method #1

Cost Driver	Unit Cost
Fuel	\$6.75 per train-mile
Train crew – straight shift	\$1,752 per crew per day
Train crew – split shift	\$2,134 per crew per day
Equipment maintenance	\$2,000 per revenue trainset per day

Source: SCRRRA

5.2.2 Methodology: High End of Cost Range

To develop the high-end of the cost estimate range, WSP obtained a line-item budget for “Operations & Services” and “Administration & Services” from the Southern California Regional Rail Authority Fiscal Year 2018-19 Adopted Budget. That line item budget is provided in Exhibit 3.6, page 41 of the Adopted Budget.

WSP then recreated that line item budget, for FY18-19, in Table 5-2 below. As shown in Table 2, the total of Operations and Administration Services for FY18-19 is \$193.2 million. When that number is divided into the estimated 84,838 Estimated Service Hours (based on the FY18 Comprehensive Annual Financial Report, page 65), the resulting unit cost figure is \$2,278 per revenue service hour.

Next, the team used the concept of “fixed” vs. “variable” costs to identify only those cost categories that mostly vary with the amount of service provided. Under this approach, costs which are fixed or not directly related to the quantity of train service are assumed to not vary with service levels and were therefore excluded from the calculation of incremental costs. After excluding the mostly fixed costs, and also excluding all Administration costs (which are assumed to be fixed regardless of relatively minor changes in overall service levels), the resulting unit cost figure was \$1,232 per revenue service hour, as shown in the second column of Table 5-4. This unit cost was applied to each of the service scenarios developed for the AVL study to arrive at an estimated incremental increase in operating and maintenance cost for each scenario, over existing service levels.

Table 5-4: Calculation of Operations and Maintenance Cost per Service Hour for “High-End” Cost Range, Method #2

Antelope Valley Study
 Estimated Cost Allocation per Service Hour
 Metrolink FY 2018-19 Operating Budget

Cost Category (000's)	FY 18-19 Budget	Include in Refined Op Cost/Service Hour? (Y/N)	Refined Op Cost	Comment
Operations & Services				
Train Operations	\$46,872	Y	\$46,872	
Equipment Maintenance	\$38,133	Y	\$38,133	
Contingency (Train Ops)				
Fuel	\$18,744	Y	\$18,744	
Non-Scheduled Rolling Stock Repairs	\$260	Y	\$260	
Operating Facilities Maintenance	\$1,684			Fixed cost
Other Operating Train Services	\$482	Y	\$482	
Rolling Stock Lease	\$336			Fixed cost
Security - Sheriff	\$5,889	Y	\$0	
Security - Guards	\$2,450	Y	\$0	
Supplemental Additional Security	\$690	Y	\$0	
Public Safety Program	\$389			Fixed cost
Passenger Relations	\$1,732			Fixed cost
Holiday Trains - - - - - N/A				
TVM Maintenance/Revenue Collection	\$9,055			Fixed cost
Marketing	\$5,380			Fixed cost
Media & External Communications	\$458			Fixed cost
Utilities/Leases	\$3,473			Fixed cost
				Assumes this is reimbursement to other Operators for transferring pax as a reduction on revenue
Transfers to Other Operators	\$6,496			Assumes this is reimbursement to other Operators for transferring pax as a reduction on revenue
Amtrak Transfers	\$2,400			Fixed cost
Station Maintenance	\$1,806			Fixed cost
Rail Agreements	\$5,400			Fixed cost
Subtotal Operations & Services	\$152,129		\$104,491	
Administration & Services				
Ops Salaries & Fringe Benefits	\$13,782			All admin cost assumed to be fixed costs
Ops Non-Labor Expenses	\$7,635			
Indirect Administrative Expenses	\$17,096			
Ops Professional Services	\$2,579			
Subtotal Admin & Services	\$41,092		\$0	
Contingency (Non-Train Ops)				
Total Train Operating Expenses	\$193,221		\$104,491	
Total Estimated Service Hours for FY19	84,838		84,838	
Total Estimated Train Operating Cost per Service Hour	\$ 2,278		\$ 1,232	

Source: SCRR FY2018-19 Operating Budget

5.3 Incremental Operations and Maintenance Cost Estimates

5.3.1 Level of Service Inputs

The six service scenarios propose a series of incremental increases in weekday train service on the AVL. In order to derive estimates of annual O&M costs, assumptions were made about the level of service on weekends and holidays in all scenarios. In addition, the scenarios assume introduction of late evening service on different days of the week – either only on Friday and Saturday nights, or on Monday through Saturday nights. Service levels, therefore, were developed for Mondays-through-Thursdays, Fridays, Saturdays and Sundays/holidays.

Table 5-5 presents the number of daily round trip trains on each day of the week, for the existing service and the six scenarios. In Scenarios 1 and 2, existing weekend service is assumed to be retained (with the addition of a late-night train on Saturdays). Scenarios 3 through 6 assume weekend service is increased to hourly service on Saturdays and bi-hourly service on Sundays and holidays.

In Scenarios 1 and 2, a late evening round trip is added on Friday and Saturday nights. In Scenario 3, late night service is extended to all days of the week except Sundays and holidays. Scenarios 4, 5 and 6 add a second late evening train on Fridays and Saturdays, and the opportunity also exists to add this second train in Scenario 3. The assumed number of late evening trains, by day of the week, is shown in Table 5-6 for each scenario. Table 5-7 presents the number of days in a typical 365-day year falling into each day-of-week category.

Table 5-5: Round Trips per Day, by Scenario

Days	Existing	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6
Mon-Thu	15	15	17	29	35	35	35
Fri	15	16	18	29–30 ¹	36	36	36
Sat	6	7	7	14–15 ¹	15	15	15
Sun & Hol	6	6	6	7	7	7	7

¹ Higher number reflects addition of a second late night train departing LAUS on Fridays and Saturdays after 11pm.
Source: WSP

Table 5-6: Late Evening Round Trips, by Scenario

Days	Existing	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6
Mon-Thu	--	--	--	1	1	1	1
Fri	--	1	1	1–2	2	2	2
Sat	--	1	1	1–2	2	2	2
Sun & Hol	--	--	--	--	--	--	--

Source: WSP

Table 5-7: Operating Days per Year

Days	Existing
Mon-Thu	203
Fri	52
Sat	52
Sun & Hol	58
Total	365

Source: WSP

The total quantity of annual service on the AVL is presented in Table 5-8 for each scenario. The total number of revenue round trips and total quantity of revenue service hours are compared with the existing AVL level of service.

Table 5-8: Annual Round Trips and Revenue Hours

Days	Existing	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6
Round Trips	4,485	4,589	5,099	8,529 ²	10,163	10,163	10,163
Revenue Hours	16,781	17,221	20,038	28,823 ²	32,948	33,330	29,671

² Annual round trips and revenue hours for Scenario 3 based on one late night LAUS departure on Mondays through Saturdays. Source: WSP

5.3.2 Results

Applying the unit cost factors to the service quantities for each scenario, using each of the two costing methods discussed in Section 5, yields the range of incremental annual O&M costs shown in Table 5-9. Scenario 1, adding a late evening train on Fridays and Saturdays, is projected to increase O&M costs by \$400,00 to \$500,000 per year. Adding two additional daily off-peak round trips would increase annual costs by \$3.3 to \$4.0 million, compared with existing service. Scenario 3 dramatically increases the number of off-peak trains and marginally increases peak service, resulting in a relatively large increase in annual costs, between \$10.8 and \$14.8 million. Scenarios 4, 5 and 6 increase peak and reverse-peak service and would result in increased O&M costs in the range of \$10 to \$20 million per year.

Table 5-9: Incremental Annual Operations and Maintenance Costs Compared to Existing AVL Service (Millions of 2018 dollars)

Days	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6
Low Range	\$0.41	\$3.30	\$10.79	\$14.37	\$14.37	\$10.29
High Range	\$0.54	\$4.01	\$14.83	\$19.91	\$20.38	\$15.88

Note: Based on annual revenue hours. Assumes all scheduled Metrolink train slots are filled with revenue trains. Highlighted cells contain incremental O&M cost estimates used in the final report main volume. Source: WSP

The above comparison assumes that all of the scheduled AVL train slots identified in the service plan for each scenario are utilized by Metrolink trains. While that is feasible, and may be warranted by demand, it is not necessary for all slots to be filled, and a somewhat lower level of service might prove to be warranted based on demand and financial constraints. This also would provide slots that could be utilized for rail freight trains during off-peak periods in the future.

To illustrate the potential in Scenarios 3 through 6 for more modest O&M cost increases, with a more gradual increase in service, an alternative set of estimates was developed, making arbitrary assumptions about a reduced level of off-peak service. Scenarios 1 and 2 only propose modest increases in service over existing levels, so there would be no equivalent opportunity for reduced service in these scenarios. Table 5-10 presents a level of train service with two to three fewer weekday round trips, compared with the full service levels presented in Table 5-5. Table 5-11 shows the resulting reduction in annual round trips, annual revenue service hours, and incremental annual O&M costs, respectively.

Table 5-10: Round Trips per Day, at Reduced Service Levels for Scenarios 3-6

Days	Existing	Scenario 3	Scenario 4	Scenario 5	Scenario 6
Mon-Thu	15	26	33	33	33
Fri	15	26	34	34	34
Sat	6	12	13	13	13
Sun & Hol	6	7	7	7	7

Note: Assumes reduced level of service with 2-3 daily round trip slots not filled with trains.
Source: WSP

Table 5-11: Incremental Annual Operations and Maintenance Costs at Reduced Service Levels for Scenarios 3-6 Compared to Existing AVL Service (Millions of 2018 dollars)

Days	Scenario 3	Scenario 4	Scenario 5	Scenario 6
Incremental Round Trips	3,175	5,064	5,064	5,064
Incremental Revenue Hours	9,109	14,236	14,591	10,806
Incremental Annual O&M Cost				
Low Range	\$6.23	\$10.98	\$10.98	\$7.02
High Range	\$11.22	\$17.53	\$17.97	\$13.31

Note: Assumes reduced level of service with 2-3 daily round trip slots not filled with trains.
Compares with existing service with 4,485 annual round trips and 16,781 annual revenue service hours.
Highlighted cells contain incremental O&M cost estimates used in the final report main volume.
Source: WSP

6 NEXT STEPS

The following actions define the steps to be taken for the Antelope Valley Line Study subsequent to the definition of the six revised service scenarios.

6.1 Refinement of Service Scenarios

- The study team will present the Revised Scenarios to the AVL Study stakeholders on February 11, 2019 for their review and feedback, which will help shape final study recommendations.
- Reaching out to the public for feedback through a survey – As part of the December 12 meeting, it was decided to conduct an on-board survey of current riders to help determine preferences among specific near-term and longer-term service improvements contained in the Revised Scenarios. This will also help inform final study recommendations.
- Incorporate feedback from stakeholder and the public into the final report. – With completion of the February 11 Stakeholder meeting and the on-board survey, the study team will incorporate the additional input into the draft final report.

6.2 Second Stage Evaluation

The second stage evaluation will address specific project improvements at a more detailed level, to determine the most reasonable capital improvement projects to attain the desired service level improvements identified by Metro and the stakeholders. This second stage evaluation will be completed as part of Task 7.

6.3 Final Report

The final report will incorporate all work conducted for this study to produce a set of near-term and longer term recommendations. The technically-detailed Final Report and Appendices will be accompanied by an Executive Summary.

7 ATTACHMENTS

1. Initially-Modeled Scenario Headway Sheets
2. Operations and Maintenance Cost Summaries
3. PowerPoint Presentation to Stakeholders, December 12, 2018
4. Evaluation Matrices for Service Scenario Evaluation
5. Revised Scenario Headway Sheets

APPENDIX 2 – ATTACHMENT 1

Initially-Modeled Scenario Headway Sheets

ANTELOPE VALLEY LINE

EXISTING SERVICE

Inbound: Lancaster to L.A.

Metrolink Train No.	MONDAY THROUGH FRIDAY														
	200	202	204	282	206	208	210	212	214	216	218	220	222	224	226
Lancaster	3:44 AM	4:46 AM	5:16 AM		5:58 AM	6:48 AM		9:01 AM		11:35 AM		1:45 PM			6:17 PM
Palmdale	3:54 AM	4:56 AM	5:26 AM	5:58 AM	6:08 AM	6:58 AM		9:11 AM		11:45 AM		1:55 PM			6:26 PM
Vincent Grade/Acton	4:06 AM	5:08 AM	5:38 AM		6:21 AM	7:10 AM		9:23 AM		11:57 AM		2:07 PM			6:39 PM
Via Princessa	4:42 AM	5:44 AM	6:15 AM		6:56 AM	7:48 AM	9:05 AM	9:59 AM	11:26 AM	12:34 PM	1:51 PM	2:43 PM	3:25 PM		7:25 PM
Santa Clarita	4:48 AM	5:50 AM	6:21 AM	6:48 AM	7:02 AM	7:55 AM	9:11 AM	10:05 AM	11:32 AM	12:40 PM	1:57 PM	2:49 PM	3:32 PM	5:11 PM	7:31 PM
Newhall	4:56 AM	5:58 AM	6:29 AM		7:10 AM	8:02 AM	9:19 AM	10:13 AM	11:40 AM	12:48 PM	2:05 PM	3:03 PM	3:40 PM	5:19 PM	7:46 PM
Sylmar/San Fernando	5:11 AM	6:13 AM	6:45 AM	7:11 AM	7:28 AM	8:20 AM	9:35 AM	10:32 AM	11:56 AM	1:06 PM	2:20 PM	3:17 PM	3:56 PM	5:35 PM	8:00 PM
Sun Valley	5:18 AM	6:20 AM	6:56 AM		7:36 AM	8:27 AM	9:43 AM	10:40 AM	12:04 PM	1:14 PM	2:29 PM	3:25 PM	4:06 PM	5:43 PM	8:13 PM
Burbank Airport - North (AV Line)	5:22 AM	6:24 AM	7:00 AM		7:40 AM	8:31 AM	9:47 AM	10:44 AM	12:08 PM	1:18 PM	2:33 PM	3:29 PM	4:10 PM	5:47 PM	8:17 PM
Burbank - Downtown	5:28 AM	6:30 AM	7:05 AM	7:22 AM	7:45 AM	8:37 AM	9:52 AM	10:49 AM	12:13 PM	1:23 PM	2:39 PM	3:35 PM	4:21 PM	5:52 PM	8:22 PM
Glendale	5:34 AM	6:36 AM	7:12 AM		7:51 AM	8:43 AM	9:59 AM	10:56 AM	12:20 PM	1:30 PM	2:45 PM	3:41 PM	4:28 PM	5:59 PM	8:29 PM
L.A. Union Station	5:53 AM	6:55 AM	7:25 AM	7:40 AM	8:06 AM	8:57 AM	10:13 AM	11:08 AM	12:34 PM	1:43 PM	3:01 PM	3:55 PM	4:41 PM	6:14 PM	8:42 PM
Trip Time Revenue Hours	2:09:00	2:09:00	2:09:00	1:42:00	2:08:00	2:09:00	1:08:00	2:07:00	1:08:00	2:08:00	1:10:00	2:10:00	1:16:00	1:03:00	2:25:00

Outbound: L.A. to Lancaster

Metrolink Train No.	MONDAY THROUGH FRIDAY														
	201	203	205	207	209	211	213	215	217	219	285	221	223	225	227
L.A. Union Station	6:19 AM	7:29 AM	8:29 AM	9:42 AM	11:06 AM	11:58 AM	1:55 PM	3:28 PM	3:50 PM	4:44 PM	5:34 PM	5:58 PM	6:38 PM	7:36 PM	9:25 PM
Glendale	6:31 AM	7:41 AM	8:41 AM	9:54 AM	11:18 AM	12:10 PM	2:07 PM	3:40 PM	4:02 PM	4:56 PM		6:10 PM	6:50 PM	7:48 PM	9:37 PM
Burbank - Downtown	6:38 AM	7:49 AM	8:48 AM	10:01 AM	11:25 AM	12:18 PM	2:14 PM	3:48 PM	4:09 PM	5:04 PM	5:51 PM	6:18 PM	6:57 PM	7:55 PM	9:44 PM
Burbank Airport - North (AV Line)	6:44 AM	7:55 AM	8:54 AM	10:07 AM	11:31 AM	12:24 PM	2:20 PM	3:54 PM	4:16 PM	5:10 PM		6:23 PM	7:03 PM	8:01 PM	9:50 PM
Sun Valley	6:49 AM	7:59 AM	8:59 AM	10:12 AM	11:36 AM	12:29 PM	2:25 PM	3:58 PM	4:21 PM	5:14 PM		6:28 PM	7:08 PM	8:06 PM	9:54 PM
Sylmar/San Fernando	7:01 AM	8:08 AM	9:08 AM	10:21 AM	11:45 AM	12:38 PM	2:36 PM	4:10 PM	4:30 PM	5:24 PM	6:05 PM	6:37 PM	7:17 PM	8:15 PM	10:03 PM
Newhall	7:19 AM	8:26 AM	9:24 AM	10:40 AM	12:03 PM	12:54 PM	2:51 PM	4:25 PM	4:45 PM	5:42 PM		6:52 PM	7:32 PM	8:30 PM	10:18 PM
Santa Clarita	7:26 AM	8:33 AM	9:32 AM	10:48 AM	12:11 PM	1:02 PM	3:00 PM	4:32 PM	4:52 PM	5:49 PM	6:25 PM	7:00 PM	7:43 PM	8:38 PM	10:26 PM
Via Princessa	7:33 AM	8:42 AM	9:40 AM	10:55 AM	12:18 PM	1:12 PM	3:06 PM	4:39 PM		5:56 PM		7:07 PM	7:50 PM	8:45 PM	10:33 PM
Vincent Grade/Acton	8:12 AM		10:24 AM		12:59 PM			5:17 PM		6:35 PM		7:49 PM	8:28 PM	9:23 PM	11:11 PM
Palmdale	8:22 AM		10:35 AM		1:10 PM			5:28 PM		6:50 PM	7:21 PM	8:00 PM	8:39 PM	9:34 PM	11:22 PM
Lancaster	8:35 AM		10:46 AM		1:20 PM			5:41 PM		6:58 PM		8:12 PM	8:54 PM	9:49 PM	11:37 PM
Trip Time Revenue Hours	2:16:00	1:13:00	2:17:00	1:13:00	2:14:00	1:14:00	1:11:00	2:13:00	1:02:00	2:14:00	1:47:00	2:14:00	2:16:00	2:13:00	2:12:00

ANTELOPE VALLEY LINE

SCENARIO 1 - Hourly Only, No Express

V1

Inbound: Lancaster to L.A.

Metrolink Train No.	MONDAY THROUGH FRIDAY														
	200	202	204	206	208	210	212	214	216	218	220	222	224	226	228
Lancaster	4:27 AM	5:27 AM	6:27 AM	7:27 AM	8:27 AM	9:27 AM	10:27 AM	11:27 AM	12:27 PM	1:27 PM	2:27 PM	3:27 PM	4:27 PM	5:27 PM	6:27 PM
Palmdale	4:36 AM	5:36 AM	6:36 AM	7:36 AM	8:36 AM	9:36 AM	10:36 AM	11:36 AM	12:36 PM	1:36 PM	2:36 PM	3:36 PM	4:36 PM	5:36 PM	6:36 PM
Vincent Grade/Acton	4:48 AM	5:48 AM	6:48 AM	7:48 AM	8:48 AM	9:48 AM	10:48 AM	11:48 AM	12:48 PM	1:48 PM	2:48 PM	3:48 PM	4:48 PM	5:48 PM	6:48 PM
Via Princessa/Vista Canyon	5:26 AM	6:26 AM	7:26 AM	8:26 AM	9:26 AM	10:26 AM	11:26 AM	12:26 PM	1:26 PM	2:26 PM	3:26 PM	4:26 PM	5:26 PM	6:26 PM	7:26 PM
Santa Clarita	5:32 AM	6:32 AM	7:32 AM	8:32 AM	9:32 AM	10:32 AM	11:32 AM	12:32 PM	1:32 PM	2:32 PM	3:32 PM	4:32 PM	5:32 PM	6:32 PM	7:32 PM
Newhall	5:40 AM	6:40 AM	7:40 AM	8:40 AM	9:40 AM	10:40 AM	11:40 AM	12:40 PM	1:40 PM	2:40 PM	3:40 PM	4:40 PM	5:40 PM	6:40 PM	7:40 PM
Sylmar/San Fernando	5:55 AM	6:55 AM	7:55 AM	8:55 AM	9:55 AM	10:55 AM	11:55 AM	12:55 PM	1:55 PM	2:55 PM	3:55 PM	4:55 PM	5:55 PM	6:55 PM	7:55 PM
Sun Valley	6:02 AM	7:02 AM	8:02 AM	9:02 AM	10:02 AM	11:02 AM	12:02 PM	1:02 PM	2:02 PM	3:02 PM	4:02 PM	5:02 PM	6:02 PM	7:02 PM	8:02 PM
Burbank Airport - North (AV Line)	6:05 AM	7:05 AM	8:05 AM	9:05 AM	10:05 AM	11:05 AM	12:05 PM	1:05 PM	2:05 PM	3:05 PM	4:05 PM	5:05 PM	6:05 PM	7:05 PM	8:05 PM
Burbank - Downtown	6:09 AM	7:09 AM	8:09 AM	9:09 AM	10:09 AM	11:09 AM	12:09 PM	1:09 PM	2:09 PM	3:09 PM	4:09 PM	5:09 PM	6:09 PM	7:09 PM	8:09 PM
Glendale	6:16 AM	7:16 AM	8:16 AM	9:16 AM	10:16 AM	11:16 AM	12:16 PM	1:16 PM	2:16 PM	3:16 PM	4:16 PM	5:16 PM	6:16 PM	7:16 PM	8:16 PM
L.A. Union Station	6:26 AM	7:26 AM	8:26 AM	9:26 AM	10:26 AM	11:26 AM	12:26 PM	1:26 PM	2:26 PM	3:26 PM	4:26 PM	5:26 PM	6:26 PM	7:26 PM	8:26 PM
Trip Time Revenue Hours	1:59:00	1:59:00	1:59:00	1:59:00	1:59:00	1:59:00	1:59:00	1:59:00	1:59:00	1:59:00	1:59:00	1:59:00	1:59:00	1:59:00	1:59:00

Outbound: L.A. to Lancaster

Metrolink Train No.	MONDAY THROUGH FRIDAY														
	201	203	205	207	209	211	213	215	217	219	221	223	225	227	229
L.A. Union Station	6:06 AM	7:06 AM	8:06 AM	9:06 AM	10:06 AM	11:06 AM	12:06 PM	1:06 PM	2:06 PM	3:06 PM	4:06 PM	5:06 PM	6:06 PM	7:06 PM	8:06 PM
Glendale	6:17 AM	7:17 AM	8:17 AM	9:17 AM	10:17 AM	11:17 AM	12:17 PM	1:17 PM	2:17 PM	3:17 PM	4:17 PM	5:17 PM	6:17 PM	7:17 PM	8:17 PM
Burbank - Downtown	6:24 AM	7:24 AM	8:24 AM	9:24 AM	10:24 AM	11:24 AM	12:24 PM	1:24 PM	2:24 PM	3:24 PM	4:24 PM	5:24 PM	6:24 PM	7:24 PM	8:24 PM
Burbank Airport - North (AV Line)	6:29 AM	7:29 AM	8:29 AM	9:29 AM	10:29 AM	11:29 AM	12:29 PM	1:29 PM	2:29 PM	3:29 PM	4:29 PM	5:29 PM	6:29 PM	7:29 PM	8:29 PM
Sun Valley	6:33 AM	7:33 AM	8:33 AM	9:33 AM	10:33 AM	11:33 AM	12:33 PM	1:33 PM	2:33 PM	3:33 PM	4:33 PM	5:33 PM	6:33 PM	7:33 PM	8:33 PM
Sylmar/San Fernando	6:40 AM	7:40 AM	8:40 AM	9:40 AM	10:40 AM	11:40 AM	12:40 PM	1:40 PM	2:40 PM	3:40 PM	4:40 PM	5:40 PM	6:40 PM	7:40 PM	8:40 PM
Newhall	6:57 AM	7:57 AM	8:57 AM	9:57 AM	10:57 AM	11:57 AM	12:57 PM	1:57 PM	2:57 PM	3:57 PM	4:57 PM	5:57 PM	6:57 PM	7:57 PM	8:57 PM
Santa Clarita	7:04 AM	8:04 AM	9:04 AM	10:04 AM	11:04 AM	12:04 PM	1:04 PM	2:04 PM	3:04 PM	4:04 PM	5:04 PM	6:04 PM	7:04 PM	8:04 PM	9:04 PM
Via Princessa/Vista Canyon	7:13 AM	8:13 AM	9:13 AM	10:13 AM	11:13 AM	12:13 PM	1:13 PM	2:13 PM	3:13 PM	4:13 PM	5:13 PM	6:13 PM	7:13 PM	8:13 PM	9:13 PM
Vincent Grade/Acton	7:51 AM	8:51 AM	9:51 AM	10:51 AM	11:51 AM	12:51 PM	1:51 PM	2:51 PM	3:51 PM	4:51 PM	5:51 PM	6:51 PM	7:51 PM	8:51 PM	9:51 PM
Palmdale	8:02 AM	9:02 AM	10:02 AM	11:02 AM	12:02 PM	1:02 PM	2:02 PM	3:02 PM	4:02 PM	5:02 PM	6:02 PM	7:02 PM	8:02 PM	9:02 PM	10:02 PM
Lancaster	8:10 AM	9:10 AM	10:10 AM	11:10 AM	12:10 PM	1:10 PM	2:10 PM	3:10 PM	4:10 PM	5:10 PM	6:10 PM	7:10 PM	8:10 PM	9:10 PM	10:10 PM
Trip Time Revenue Hours	2:04:00	2:04:00	2:04:00	2:04:00	2:04:00	2:04:00	2:04:00	2:04:00	2:04:00	2:04:00	2:04:00	2:04:00	2:04:00	2:04:00	2:04:00

ANTELOPE VALLEY LINE

SCENARIO 2 - 30-60, No Express

V1 30-60

Inbound: Lancaster to L.A.

Metrolink Train No.	MONDAY THROUGH FRIDAY																
	200	202	204	206	208	210	212	214	216	218	220	222	224	226	228	230	232
Lancaster	4:27 AM		5:27 AM		6:27 AM	7:27 AM	8:27 AM	9:27 AM	10:27 AM	11:27 AM	12:27 PM	1:27 PM	2:27 PM	3:27 PM	4:27 PM	5:27 PM	6:27 PM
Palmdale	4:36 AM		5:36 AM		6:36 AM	7:36 AM	8:36 AM	9:36 AM	10:36 AM	11:36 AM	12:36 PM	1:36 PM	2:36 PM	3:36 PM	4:36 PM	5:36 PM	6:36 PM
Vincent Grade/Acton	4:48 AM		5:48 AM		6:48 AM	7:48 AM	8:48 AM	9:48 AM	10:48 AM	11:48 AM	12:48 PM	1:48 PM	2:48 PM	3:48 PM	4:48 PM	5:48 PM	6:48 PM
Via Princessa/Vista Canyon	5:26 AM	5:53 AM	6:26 AM	6:53 AM	7:26 AM	8:26 AM	9:26 AM	10:26 AM	11:26 AM	12:26 PM	1:26 PM	2:26 PM	3:26 PM	4:26 PM	5:26 PM	6:26 PM	7:26 PM
Santa Clarita	5:32 AM	6:04 AM	6:32 AM	7:04 AM	7:32 AM	8:32 AM	9:32 AM	10:32 AM	11:32 AM	12:32 PM	1:32 PM	2:32 PM	3:32 PM	4:32 PM	5:32 PM	6:32 PM	7:32 PM
Newhall	5:40 AM	6:11 AM	6:40 AM	7:11 AM	7:40 AM	8:40 AM	9:40 AM	10:40 AM	11:40 AM	12:40 PM	1:40 PM	2:40 PM	3:40 PM	4:40 PM	5:40 PM	6:40 PM	7:40 PM
Sylmar/San Fernando	5:55 AM	6:26 AM	6:55 AM	7:26 AM	7:55 AM	8:55 AM	9:55 AM	10:55 AM	11:55 AM	12:55 PM	1:55 PM	2:55 PM	3:55 PM	4:55 PM	5:55 PM	6:55 PM	7:55 PM
Sun Valley	6:02 AM	6:32 AM	7:02 AM	7:32 AM	8:02 AM	9:02 AM	10:02 AM	11:02 AM	12:02 PM	1:02 PM	2:02 PM	3:02 PM	4:02 PM	5:02 PM	6:02 PM	7:02 PM	8:02 PM
Burbank Airport - North (AV Line)	6:05 AM	6:35 AM	7:05 AM	7:35 AM	8:05 AM	9:05 AM	10:05 AM	11:05 AM	12:05 PM	1:05 PM	2:05 PM	3:05 PM	4:05 PM	5:05 PM	6:05 PM	7:05 PM	8:05 PM
Burbank - Downtown	6:09 AM	6:40 AM	7:09 AM	7:40 AM	8:09 AM	9:09 AM	10:09 AM	11:09 AM	12:09 PM	1:09 PM	2:09 PM	3:09 PM	4:09 PM	5:09 PM	6:09 PM	7:09 PM	8:09 PM
Glendale	6:16 AM	6:46 AM	7:16 AM	7:46 AM	8:16 AM	9:16 AM	10:16 AM	11:16 AM	12:16 PM	1:16 PM	2:16 PM	3:16 PM	4:16 PM	5:16 PM	6:16 PM	7:16 PM	8:16 PM
L.A. Union Station	6:26 AM	6:57 AM	7:26 AM	7:57 AM	8:26 AM	9:26 AM	10:26 AM	11:26 AM	12:26 PM	1:26 PM	2:26 PM	3:26 PM	4:26 PM	5:26 PM	6:26 PM	7:26 PM	8:26 PM
Trip Time Revenue Hours	1:59:00	1:04:00	1:59:00	1:04:00	1:59:00	1:59:00	1:59:00	1:59:00	1:59:00	1:59:00	1:59:00	1:59:00	1:59:00	1:59:00	1:59:00	1:59:00	1:59:00

Outbound: L.A. to Lancaster

Metrolink Train No.	MONDAY THROUGH FRIDAY																
	201	203	205	207	209	211	213	215	217	219	221	223	225	227	229	231	233
L.A. Union Station	6:06 AM	7:06 AM	8:06 AM	9:06 AM	10:06 AM	11:06 AM	12:06 PM	1:06 PM	2:06 PM	3:06 PM	4:06 PM	5:06 PM	5:36 PM	6:06 PM	6:36 PM	7:06 PM	8:06 PM
Glendale	6:17 AM	7:17 AM	8:17 AM	9:17 AM	10:17 AM	11:17 AM	12:17 PM	1:17 PM	2:17 PM	3:17 PM	4:17 PM	5:17 PM	5:46 PM	6:17 PM	6:46 PM	7:17 PM	8:17 PM
Burbank - Downtown	6:24 AM	7:24 AM	8:24 AM	9:24 AM	10:24 AM	11:24 AM	12:24 PM	1:24 PM	2:24 PM	3:24 PM	4:24 PM	5:24 PM	5:54 PM	6:24 PM	6:54 PM	7:24 PM	8:24 PM
Burbank Airport - North (AV Line)	6:29 AM	7:29 AM	8:29 AM	9:29 AM	10:29 AM	11:29 AM	12:29 PM	1:29 PM	2:29 PM	3:29 PM	4:29 PM	5:29 PM	6:00 PM	6:29 PM	7:00 PM	7:29 PM	8:29 PM
Sun Valley	6:33 AM	7:33 AM	8:33 AM	9:33 AM	10:33 AM	11:33 AM	12:33 PM	1:33 PM	2:33 PM	3:33 PM	4:33 PM	5:33 PM	6:03 PM	6:33 PM	7:03 PM	7:33 PM	8:33 PM
Sylmar/San Fernando	6:40 AM	7:40 AM	8:40 AM	9:40 AM	10:40 AM	11:40 AM	12:40 PM	1:40 PM	2:40 PM	3:40 PM	4:40 PM	5:40 PM	6:10 PM	6:40 PM	7:10 PM	7:40 PM	8:40 PM
Newhall	6:57 AM	7:57 AM	8:57 AM	9:57 AM	10:57 AM	11:57 AM	12:57 PM	1:57 PM	2:57 PM	3:57 PM	4:57 PM	5:57 PM	6:27 PM	6:57 PM	7:27 PM	7:57 PM	8:57 PM
Santa Clarita	7:04 AM	8:04 AM	9:04 AM	10:04 AM	11:04 AM	12:04 PM	1:04 PM	2:04 PM	3:04 PM	4:04 PM	5:04 PM	6:04 PM	6:34 PM	7:04 PM	7:34 PM	8:04 PM	9:04 PM
Via Princessa/Vista Canyon	7:13 AM	8:13 AM	9:13 AM	10:13 AM	11:13 AM	12:13 PM	1:13 PM	2:13 PM	3:13 PM	4:13 PM	5:13 PM	6:13 PM	6:42 PM	7:13 PM	7:42 PM	8:13 PM	9:13 PM
Vincent Grade/Acton	7:51 AM	8:51 AM	9:51 AM	10:51 AM	11:51 AM	12:51 PM	1:51 PM	2:51 PM	3:51 PM	4:51 PM	5:51 PM	6:51 PM		7:51 PM		8:51 PM	9:51 PM
Palmdale	8:02 AM	9:02 AM	10:02 AM	11:02 AM	12:02 PM	1:02 PM	2:02 PM	3:02 PM	4:02 PM	5:02 PM	6:02 PM	7:02 PM		8:02 PM		9:02 PM	10:02 PM
Lancaster	8:10 AM	9:10 AM	10:10 AM	11:10 AM	12:10 PM	1:10 PM	2:10 PM	3:10 PM	4:10 PM	5:10 PM	6:10 PM	7:10 PM		8:10 PM		9:10 PM	10:10 PM
Trip Time Revenue Hours	2:04:00	2:04:00	2:04:00	2:04:00	2:04:00	2:04:00	2:04:00	2:04:00	2:04:00	2:04:00	2:04:00	2:04:00	1:06:00	2:04:00	1:06:00	2:04:00	2:04:00

= Short Turn trains. Require arrangements for non-revenue moves and turn-around

ANTELOPE VALLEY LINE

SCENARIO 3 - 30-60, with Express

V1 SCORE 2023

Inbound: Lancaster to L.A.

	MONDAY THROUGH FRIDAY																		
Metrolink Train No.	200	202	282	204	206	284	208	210	212	214	216	218	220	222	224	226	228	230	232
Lancaster	4:27 AM		5:15 AM	5:27 AM		6:15 AM	6:27 AM	7:27 AM	8:27 AM	9:27 AM	10:27 AM	11:27 AM	12:27 PM	1:27 PM	2:27 PM	3:27 PM	4:27 PM	5:27 PM	6:27 PM
Palmdale	4:36 AM		5:25 AM	5:36 AM		6:25 AM	6:36 AM	7:36 AM	8:36 AM	9:36 AM	10:36 AM	11:36 AM	12:36 PM	1:36 PM	2:36 PM	3:36 PM	4:36 PM	5:36 PM	6:36 PM
Vincent Grade/Acton	4:48 AM			5:48 AM			6:48 AM	7:48 AM	8:48 AM	9:48 AM	10:48 AM	11:48 AM	12:48 PM	1:48 PM	2:48 PM	3:48 PM	4:48 PM	5:48 PM	6:48 PM
Via Princessa/Vista Canyon	5:26 AM	5:53 AM		6:26 AM	6:53 AM		7:26 AM	8:26 AM	9:26 AM	10:26 AM	11:26 AM	12:26 PM	1:26 PM	2:26 PM	3:26 PM	4:26 PM	5:26 PM	6:26 PM	7:26 PM
Santa Clarita	5:32 AM	6:04 AM	6:17 AM	6:32 AM	7:04 AM	7:17 AM	7:32 AM	8:32 AM	9:32 AM	10:32 AM	11:32 AM	12:32 PM	1:32 PM	2:32 PM	3:32 PM	4:32 PM	5:32 PM	6:32 PM	7:32 PM
Newhall	5:40 AM	6:11 AM		6:40 AM	7:11 AM		7:40 AM	8:40 AM	9:40 AM	10:40 AM	11:40 AM	12:40 PM	1:40 PM	2:40 PM	3:40 PM	4:40 PM	5:40 PM	6:40 PM	7:40 PM
Sylmar/San Fernando	5:55 AM	6:26 AM	6:39 AM	6:55 AM	7:26 AM	7:39 AM	7:55 AM	8:55 AM	9:55 AM	10:55 AM	11:55 AM	12:55 PM	1:55 PM	2:55 PM	3:55 PM	4:55 PM	5:55 PM	6:55 PM	7:55 PM
Sun Valley	6:02 AM	6:32 AM		7:02 AM	7:32 AM		8:02 AM	9:02 AM	10:02 AM	11:02 AM	12:02 PM	1:02 PM	2:02 PM	3:02 PM	4:02 PM	5:02 PM	6:02 PM	7:02 PM	8:02 PM
Burbank Airport - North (AV Line)	6:05 AM	6:35 AM		7:05 AM	7:35 AM		8:05 AM	9:05 AM	10:05 AM	11:05 AM	12:05 PM	1:05 PM	2:05 PM	3:05 PM	4:05 PM	5:05 PM	6:05 PM	7:05 PM	8:05 PM
Burbank - Downtown	6:09 AM	6:40 AM	6:51 AM	7:09 AM	7:40 AM	7:51 AM	8:09 AM	9:09 AM	10:09 AM	11:09 AM	12:09 PM	1:09 PM	2:09 PM	3:09 PM	4:09 PM	5:09 PM	6:09 PM	7:09 PM	8:09 PM
Glendale	6:16 AM	6:46 AM		7:16 AM	7:46 AM		8:16 AM	9:16 AM	10:16 AM	11:16 AM	12:16 PM	1:16 PM	2:16 PM	3:16 PM	4:16 PM	5:16 PM	6:16 PM	7:16 PM	8:16 PM
L.A. Union Station	6:26 AM	6:57 AM	7:06 AM	7:26 AM	7:57 AM	8:06 AM	8:26 AM	9:26 AM	10:26 AM	11:26 AM	12:26 PM	1:26 PM	2:26 PM	3:26 PM	4:26 PM	5:26 PM	6:26 PM	7:26 PM	8:26 PM
Trip Time Revenue Hours	1:59:00	1:04:00	1:51:00	1:59:00	1:04:00	1:51:00	1:59:00	1:59:00	1:59:00	1:59:00	1:59:00	1:59:00	1:59:00	1:59:00	1:59:00	1:59:00	1:59:00	1:59:00	1:59:00

Outbound: L.A. to Lancaster

	MONDAY THROUGH FRIDAY																		
Metrolink Train No.	201	203	205	207	209	211	213	215	217	219	221	223	285	225	227	287	229	231	233
L.A. Union Station	6:06 AM	7:06 AM	8:06 AM	9:06 AM	10:06 AM	11:06 AM	12:06 PM	1:06 PM	2:06 PM	3:06 PM	4:06 PM	5:06 PM	5:27 PM	5:36 PM	6:06 PM	6:27 PM	6:36 PM	7:06 PM	8:06 PM
Glendale	6:17 AM	7:17 AM	8:17 AM	9:17 AM	10:17 AM	11:17 AM	12:17 PM	1:17 PM	2:17 PM	3:17 PM	4:17 PM	5:17 PM		5:46 PM	6:17 PM		6:46 PM	7:17 PM	8:17 PM
Burbank - Downtown	6:24 AM	7:24 AM	8:24 AM	9:24 AM	10:24 AM	11:24 AM	12:24 PM	1:24 PM	2:24 PM	3:24 PM	4:24 PM	5:24 PM	5:42 PM	5:54 PM	6:24 PM	6:42 PM	6:54 PM	7:24 PM	8:24 PM
Burbank Airport - North (AV Line)	6:29 AM	7:29 AM	8:29 AM	9:29 AM	10:29 AM	11:29 AM	12:29 PM	1:29 PM	2:29 PM	3:29 PM	4:29 PM	5:29 PM		6:00 PM	6:29 PM		7:00 PM	7:29 PM	8:29 PM
Sun Valley	6:33 AM	7:33 AM	8:33 AM	9:33 AM	10:33 AM	11:33 AM	12:33 PM	1:33 PM	2:33 PM	3:33 PM	4:33 PM	5:33 PM		6:03 PM	6:33 PM		7:03 PM	7:33 PM	8:33 PM
Sylmar/San Fernando	6:40 AM	7:40 AM	8:40 AM	9:40 AM	10:40 AM	11:40 AM	12:40 PM	1:40 PM	2:40 PM	3:40 PM	4:40 PM	5:40 PM	5:56 PM	6:10 PM	6:40 PM	6:56 PM	7:10 PM	7:40 PM	8:40 PM
Newhall	6:57 AM	7:57 AM	8:57 AM	9:57 AM	10:57 AM	11:57 AM	12:57 PM	1:57 PM	2:57 PM	3:57 PM	4:57 PM	5:57 PM		6:27 PM	6:57 PM		7:27 PM	7:57 PM	8:57 PM
Santa Clarita	7:04 AM	8:04 AM	9:04 AM	10:04 AM	11:04 AM	12:04 PM	1:04 PM	2:04 PM	3:04 PM	4:04 PM	5:04 PM	6:04 PM	6:19 PM	6:34 PM	7:04 PM	7:19 PM	7:34 PM	8:04 PM	9:04 PM
Via Princessa/Vista Canyon	7:13 AM	8:13 AM	9:13 AM	10:13 AM	11:13 AM	12:13 PM	1:13 PM	2:13 PM	3:13 PM	4:13 PM	5:13 PM	6:13 PM		6:42 PM	7:13 PM		7:42 PM	8:13 PM	9:13 PM
Vincent Grade/Acton	7:51 AM	8:51 AM	9:51 AM	10:51 AM	11:51 AM	12:51 PM	1:51 PM	2:51 PM	3:51 PM	4:51 PM	5:51 PM	6:51 PM			7:51 PM			8:51 PM	9:51 PM
Palmdale	8:02 AM	9:02 AM	10:02 AM	11:02 AM	12:02 PM	1:02 PM	2:02 PM	3:02 PM	4:02 PM	5:02 PM	6:02 PM	7:02 PM	7:12 PM			8:02 PM	8:12 PM	9:02 PM	10:02 PM
Lancaster	8:10 AM	9:10 AM	10:10 AM	11:10 AM	12:10 PM	1:10 PM	2:10 PM	3:10 PM	4:10 PM	5:10 PM	6:10 PM	7:10 PM	7:20 PM		8:10 PM	8:20 PM		9:10 PM	10:10 PM
Trip Time Revenue Hours	2:04:00	2:04:00	2:04:00	2:04:00	2:04:00	2:04:00	2:04:00	2:04:00	2:04:00	2:04:00	2:04:00	2:04:00	2:04:00	1:53:00	1:06:00	2:04:00	1:53:00	1:06:00	2:04:00

= Short Turn trains. Require arrangements for non-revenue moves and turn-around
 = Express Trains

ANTELOPE VALLEY LINE

SCENARIO 4 - Hourly Express, Local, & Inner Zone Local

V3 3-Hourly

Inbound: Lancaster to L.A.

	MONDAY THROUGH FRIDAY																		
Metrolink Train No.	200	202	282	204	284	206	208	210	212	214	216	218	220	222	224	226	228	230	232
Lancaster	4:27 AM		4:57 AM	5:27 AM	5:57 AM		6:27 AM	7:27 AM	8:27 AM	9:27 AM	10:27 AM	11:27 AM	12:27 PM	1:27 PM	2:27 PM	3:27 PM	4:27 PM	5:27 PM	6:27 PM
Palmdale	4:36 AM		5:06 AM	5:36 AM	6:06 AM		6:36 AM	7:36 AM	8:36 AM	9:36 AM	10:36 AM	11:36 AM	12:36 PM	1:36 PM	2:36 PM	3:36 PM	4:36 PM	5:36 PM	6:36 PM
Vincent Grade/Acton	4:48 AM			5:48 AM			6:48 AM	7:48 AM	8:48 AM	9:48 AM	10:48 AM	11:48 AM	12:48 PM	1:48 PM	2:48 PM	3:48 PM	4:48 PM	5:48 PM	6:48 PM
Via Princessa/Vista Canyon	5:26 AM	5:58 AM		6:26 AM		6:58 AM	7:26 AM	8:26 AM	9:26 AM	10:26 AM	11:26 AM	12:26 PM	1:26 PM	2:26 PM	3:26 PM	4:26 PM	5:26 PM	6:26 PM	7:26 PM
Santa Clarita	5:32 AM	6:06 AM	6:00 AM	6:32 AM	7:00 AM	7:06 AM	7:32 AM	8:32 AM	9:32 AM	10:32 AM	11:32 AM	12:32 PM	1:32 PM	2:32 PM	3:32 PM	4:32 PM	5:32 PM	6:32 PM	7:32 PM
Newhall	5:40 AM	6:14 AM		6:40 AM		7:14 AM	7:40 AM	8:40 AM	9:40 AM	10:40 AM	11:40 AM	12:40 PM	1:40 PM	2:40 PM	3:40 PM	4:40 PM	5:40 PM	6:40 PM	7:40 PM
Sylmar/San Fernando	5:55 AM	6:29 AM	6:21 AM	6:55 AM	7:21 AM	7:29 AM	7:55 AM	8:55 AM	9:55 AM	10:55 AM	11:55 AM	12:55 PM	1:55 PM	2:55 PM	3:55 PM	4:55 PM	5:55 PM	6:55 PM	7:55 PM
Sun Valley	6:02 AM	6:36 AM		7:02 AM		7:36 AM	8:02 AM	9:02 AM	10:02 AM	11:02 AM	12:02 PM	1:02 PM	2:02 PM	3:02 PM	4:02 PM	5:02 PM	6:02 PM	7:02 PM	8:02 PM
Burbank Airport - North (AV Line)	6:05 AM	6:38 AM		7:05 AM		7:38 AM	8:05 AM	9:05 AM	10:05 AM	11:05 AM	12:05 PM	1:05 PM	2:05 PM	3:05 PM	4:05 PM	5:05 PM	6:05 PM	7:05 PM	8:05 PM
Burbank - Downtown	6:09 AM	6:43 AM	6:33 AM	7:09 AM	7:33 AM	7:43 AM	8:09 AM	9:09 AM	10:09 AM	11:09 AM	12:09 PM	1:09 PM	2:09 PM	3:09 PM	4:09 PM	5:09 PM	6:09 PM	7:09 PM	8:09 PM
Glendale	6:16 AM	6:49 AM		7:16 AM		7:49 AM	8:16 AM	9:16 AM	10:16 AM	11:16 AM	12:16 PM	1:16 PM	2:16 PM	3:16 PM	4:16 PM	5:16 PM	6:16 PM	7:16 PM	8:16 PM
L.A. Union Station	6:26 AM	7:00 AM	6:47 AM	7:26 AM	7:47 AM	8:00 AM	8:26 AM	9:26 AM	10:26 AM	11:26 AM	12:26 PM	1:26 PM	2:26 PM	3:26 PM	4:26 PM	5:26 PM	6:26 PM	7:26 PM	8:26 PM
Trip Time Revenue Hours	1:59:00	1:02:00	1:50:00	1:59:00	1:50:00	1:02:00	1:59:00	1:59:00	1:59:00	1:59:00	1:59:00	1:59:00	1:59:00	1:59:00	1:59:00	1:59:00	1:59:00	1:59:00	1:59:00

Outbound: L.A. to Lancaster

	MONDAY THROUGH FRIDAY																		
Metrolink Train No.	201	203	205	207	209	211	213	215	217	219	221	285	223	225	287	227	229	231	233
L.A. Union Station	6:06 AM	7:06 AM	8:06 AM	9:06 AM	10:06 AM	11:06 AM	12:06 PM	1:06 PM	2:06 PM	3:06 PM	4:06 PM	4:47 PM	5:06 PM	5:32 PM	5:47 PM	6:06 PM	6:32 PM	7:06 PM	8:06 PM
Glendale	6:17 AM	7:17 AM	8:17 AM	9:17 AM	10:17 AM	11:17 AM	12:17 PM	1:17 PM	2:17 PM	3:17 PM	4:17 PM		5:17 PM	5:43 PM		6:17 PM	6:43 PM	7:17 PM	8:17 PM
Burbank - Downtown	6:24 AM	7:24 AM	8:24 AM	9:24 AM	10:24 AM	11:24 AM	12:24 PM	1:24 PM	2:24 PM	3:24 PM	4:24 PM	5:02 PM	5:24 PM	5:51 PM	6:02 PM	6:24 PM	6:51 PM	7:24 PM	8:24 PM
Burbank Airport - North (AV Line)	6:29 AM	7:29 AM	8:29 AM	9:29 AM	10:29 AM	11:29 AM	12:29 PM	1:29 PM	2:29 PM	3:29 PM	4:29 PM		5:29 PM	5:56 PM		6:29 PM	6:56 PM	7:29 PM	8:29 PM
Sun Valley	6:33 AM	7:33 AM	8:33 AM	9:33 AM	10:33 AM	11:33 AM	12:33 PM	1:33 PM	2:33 PM	3:33 PM	4:33 PM		5:33 PM	5:58 PM		6:33 PM	6:58 PM	7:33 PM	8:33 PM
Sylmar/San Fernando	6:40 AM	7:40 AM	8:40 AM	9:40 AM	10:40 AM	11:40 AM	12:40 PM	1:40 PM	2:40 PM	3:40 PM	4:40 PM	5:16 PM	5:40 PM	6:07 PM	6:16 PM	6:40 PM	7:07 PM	7:40 PM	8:40 PM
Newhall	6:57 AM	7:57 AM	8:57 AM	9:57 AM	10:57 AM	11:57 AM	12:57 PM	1:57 PM	2:57 PM	3:57 PM	4:57 PM		5:57 PM	6:22 PM		6:57 PM	7:22 PM	7:57 PM	8:57 PM
Santa Clarita	7:04 AM	8:04 AM	9:04 AM	10:04 AM	11:04 AM	12:04 PM	1:04 PM	2:04 PM	3:04 PM	4:04 PM	5:04 PM	5:37 PM	6:04 PM	6:29 PM	6:37 PM	7:04 PM	7:29 PM	8:04 PM	9:04 PM
Via Princessa/Vista Canyon	7:13 AM	8:13 AM	9:13 AM	10:13 AM	11:13 AM	12:13 PM	1:13 PM	2:13 PM	3:13 PM	4:13 PM	5:13 PM		6:13 PM	6:39 PM		7:13 PM	7:39 PM	8:13 PM	9:13 PM
Vincent Grade/Acton	7:51 AM	8:51 AM	9:51 AM	10:51 AM	11:51 AM	12:51 PM	1:51 PM	2:51 PM	3:51 PM	4:51 PM	5:51 PM		6:51 PM			7:51 PM		8:51 PM	9:51 PM
Palmdale	8:02 AM	9:02 AM	10:02 AM	11:02 AM	12:02 PM	1:02 PM	2:02 PM	3:02 PM	4:02 PM	5:02 PM	6:02 PM	6:32 PM	7:02 PM		7:32 PM	8:02 PM		9:02 PM	10:02 PM
Lancaster	8:10 AM	9:10 AM	10:10 AM	11:10 AM	12:10 PM	1:10 PM	2:10 PM	3:10 PM	4:10 PM	5:10 PM	6:10 PM	6:45 PM	7:10 PM		7:45 PM	8:10 PM		9:10 PM	10:10 PM
Trip Time Revenue Hours	2:04:00	2:04:00	2:04:00	2:04:00	2:04:00	2:04:00	2:04:00	2:04:00	2:04:00	2:04:00	2:04:00		2:04:00	1:07:00	1:58:00	2:04:00	1:07:00	2:04:00	2:04:00

= Short Turn trains. Require arrangements for non-revenue moves and turn-around
 = Express Trains

ANTELOPE VALLEY LINE

SCENARIO 5 - Hourly Express, Local, & Inner Zone Local

- Short Turns in Sylmar instead of Via Princessa/Vista Canyon

V4 3-Hourly Patterns

Inbound: Lancaster to L.A.

MONDAY THROUGH FRIDAY

Metrolink Train No.	200	202	282	204	284	206	208	210	212	214	216	218	220	222	224	226	228	230	232
Lancaster	4:27 AM		4:57 AM	5:27 AM	5:57 AM		6:27 AM	7:27 AM	8:27 AM	9:27 AM	10:27 AM	11:27 AM	12:27 PM	1:27 PM	2:27 PM	3:27 PM	4:27 PM	5:27 PM	6:27 PM
Palmdale	4:36 AM		5:06 AM	5:36 AM	6:06 AM		6:36 AM	7:36 AM	8:36 AM	9:36 AM	10:36 AM	11:36 AM	12:36 PM	1:36 PM	2:36 PM	3:36 PM	4:36 PM	5:36 PM	6:36 PM
Vincent Grade/Acton	4:48 AM			5:48 AM			6:48 AM	7:48 AM	8:48 AM	9:48 AM	10:48 AM	11:48 AM	12:48 PM	1:48 PM	2:48 PM	3:48 PM	4:48 PM	5:48 PM	6:48 PM
Via Princessa/Vista Canyon	5:26 AM			6:26 AM			7:26 AM	8:26 AM	9:26 AM	10:26 AM	11:26 AM	12:26 PM	1:26 PM	2:26 PM	3:26 PM	4:26 PM	5:26 PM	6:26 PM	7:26 PM
Santa Clarita	5:32 AM		6:00 AM	6:32 AM	7:00 AM		7:32 AM	8:32 AM	9:32 AM	10:32 AM	11:32 AM	12:32 PM	1:32 PM	2:32 PM	3:32 PM	4:32 PM	5:32 PM	6:32 PM	7:32 PM
Newhall	5:40 AM			6:40 AM			7:40 AM	8:40 AM	9:40 AM	10:40 AM	11:40 AM	12:40 PM	1:40 PM	2:40 PM	3:40 PM	4:40 PM	5:40 PM	6:40 PM	7:40 PM
Sylmar/San Fernando	5:55 AM	6:31 AM	6:21 AM	6:55 AM	7:21 AM	7:31 AM	7:55 AM	8:55 AM	9:55 AM	10:55 AM	11:55 AM	12:55 PM	1:55 PM	2:55 PM	3:55 PM	4:55 PM	5:55 PM	6:55 PM	7:55 PM
Sun Valley	6:02 AM	6:37 AM		7:02 AM		7:37 AM	8:02 AM	9:02 AM	10:02 AM	11:02 AM	12:02 PM	1:02 PM	2:02 PM	3:02 PM	4:02 PM	5:02 PM	6:02 PM	7:02 PM	8:02 PM
Burbank Airport - North (AV Line)	6:05 AM	6:40 AM		7:05 AM		7:40 AM	8:05 AM	9:05 AM	10:05 AM	11:05 AM	12:05 PM	1:05 PM	2:05 PM	3:05 PM	4:05 PM	5:05 PM	6:05 PM	7:05 PM	8:05 PM
Burbank - Downtown	6:09 AM	6:45 AM	6:33 AM	7:09 AM	7:33 AM	7:45 AM	8:09 AM	9:09 AM	10:09 AM	11:09 AM	12:09 PM	1:09 PM	2:09 PM	3:09 PM	4:09 PM	5:09 PM	6:09 PM	7:09 PM	8:09 PM
Glendale	6:16 AM	6:52 AM		7:16 AM		7:52 AM	8:16 AM	9:16 AM	10:16 AM	11:16 AM	12:16 PM	1:16 PM	2:16 PM	3:16 PM	4:16 PM	5:16 PM	6:16 PM	7:16 PM	8:16 PM
L.A. Union Station	6:26 AM	7:02 AM	6:47 AM	7:26 AM	7:47 AM	8:02 AM	8:26 AM	9:26 AM	10:26 AM	11:26 AM	12:26 PM	1:26 PM	2:26 PM	3:26 PM	4:26 PM	5:26 PM	6:26 PM	7:26 PM	8:26 PM
Trip Time Revenue Hours	1:59:00	0:31:00	1:50:00	1:59:00	1:50:00	0:31:00	1:59:00	1:59:00	1:59:00	1:59:00	1:59:00	1:59:00	1:59:00	1:59:00	1:59:00	1:59:00	1:59:00	1:59:00	1:59:00

Outbound: L.A. to Lancaster

MONDAY THROUGH FRIDAY

Metrolink Train No.	201	203	205	207	209	211	213	215	217	219	221	285	223	225	287	227	229	231	233
L.A. Union Station	6:06 AM	7:06 AM	8:06 AM	9:06 AM	10:06 AM	11:06 AM	12:06 PM	1:06 PM	2:06 PM	3:06 PM	4:06 PM	4:47 PM	5:06 PM	5:32 PM	5:47 PM	6:06 PM	6:32 PM	7:06 PM	8:06 PM
Glendale	6:17 AM	7:17 AM	8:17 AM	9:17 AM	10:17 AM	11:17 AM	12:17 PM	1:17 PM	2:17 PM	3:17 PM	4:17 PM		5:17 PM	5:43 PM		6:17 PM	6:43 PM	7:17 PM	8:17 PM
Burbank - Downtown	6:24 AM	7:24 AM	8:24 AM	9:24 AM	10:24 AM	11:24 AM	12:24 PM	1:24 PM	2:24 PM	3:24 PM	4:24 PM	5:02 PM	5:24 PM	5:51 PM	6:02 PM	6:24 PM	6:51 PM	7:24 PM	8:24 PM
Burbank Airport - North (AV Line)	6:29 AM	7:29 AM	8:29 AM	9:29 AM	10:29 AM	11:29 AM	12:29 PM	1:29 PM	2:29 PM	3:29 PM	4:29 PM		5:29 PM	5:56 PM		6:29 PM	6:56 PM	7:29 PM	8:29 PM
Sun Valley	6:33 AM	7:33 AM	8:33 AM	9:33 AM	10:33 AM	11:33 AM	12:33 PM	1:33 PM	2:33 PM	3:33 PM	4:33 PM		5:33 PM	5:58 PM		6:33 PM	6:58 PM	7:33 PM	8:33 PM
Sylmar/San Fernando	6:40 AM	7:40 AM	8:40 AM	9:40 AM	10:40 AM	11:40 AM	12:40 PM	1:40 PM	2:40 PM	3:40 PM	4:40 PM	5:16 PM	5:40 PM	6:07 PM	6:16 PM	6:40 PM	7:07 PM	7:40 PM	8:40 PM
Newhall	6:57 AM	7:57 AM	8:57 AM	9:57 AM	10:57 AM	11:57 AM	12:57 PM	1:57 PM	2:57 PM	3:57 PM	4:57 PM		5:57 PM			6:57 PM		7:57 PM	8:57 PM
Santa Clarita	7:04 AM	8:04 AM	9:04 AM	10:04 AM	11:04 AM	12:04 PM	1:04 PM	2:04 PM	3:04 PM	4:04 PM	5:04 PM	5:37 PM	6:04 PM		6:37 PM	7:04 PM		8:04 PM	9:04 PM
Via Princessa/Vista Canyon	7:13 AM	8:13 AM	9:13 AM	10:13 AM	11:13 AM	12:13 PM	1:13 PM	2:13 PM	3:13 PM	4:13 PM	5:13 PM		6:13 PM			7:13 PM		8:13 PM	9:13 PM
Vincent Grade/Acton	7:51 AM	8:51 AM	9:51 AM	10:51 AM	11:51 AM	12:51 PM	1:51 PM	2:51 PM	3:51 PM	4:51 PM	5:51 PM		6:51 PM			7:51 PM		8:51 PM	9:51 PM
Palmdale	8:02 AM	9:02 AM	10:02 AM	11:02 AM	12:02 PM	1:02 PM	2:02 PM	3:02 PM	4:02 PM	5:02 PM	6:02 PM	6:32 PM	7:02 PM		7:32 PM	8:02 PM		9:02 PM	10:02 PM
Lancaster	8:10 AM	9:10 AM	10:10 AM	11:10 AM	12:10 PM	1:10 PM	2:10 PM	3:10 PM	4:10 PM	5:10 PM	6:10 PM	6:45 PM	7:10 PM		7:45 PM	8:10 PM		9:10 PM	10:10 PM
Trip Time Revenue Hours	2:04:00	2:04:00	2:04:00	2:04:00	2:04:00	2:04:00	2:04:00	2:04:00	2:04:00	2:04:00	2:04:00	1:58:00	2:04:00	0:35:00	1:58:00	2:04:00	0:35:00	2:04:00	2:04:00

= Short Turn trains. Require arrangements for non-revenue moves and turn-around
 = Express Trains

APPENDIX 2 – ATTACHMENT 2

Operations and Maintenance Cost Summaries

ANTELOPE VALLEY LINE STUDY

Contract No. PS-2415-3024-03

DRAFT Operations and Maintenance Cost Increase Estimates For Revised Service Scenarios

Prepared for:



Los Angeles County
Metropolitan Transportation Authority

Prepared by:



444 South Flower Street
Suite 800
Los Angeles, California 90071

February 6, 2019

Operations and Maintenance Cost Estimates for Revised Service Scenarios		
	Date	Initials
Originator	02-05-19	Tom L.
Checker	02-05-19	Salvador M.
Back Checker	02-06-19	Tom L.
Format Checker	02-05-19	Foster N.
Approved by	02-06-19	Tom L.

AVL Scenarios Revised
2/5/2019

Scenario	Peak Service	Late Night Assumption	Off-Peak Assumption	Weekend Assumption	Capital Impact over Baseline
Revised Scenario 1: Late Evening Trip	Existing Peak service	1 late night trip LAUS - LAN	Current schedule	Current Schedule plus 1 Late Night Trip Saturday	None
Revised Scenario 2: Two Additional Off- Peak Round Trips	Existing Peak service	1 late night trip LAUS - LAN	Inbound: Two additional mid-day trips; Outbound: Two additional mid-day trips or one mid-day and one additional late night trip	Hourly Saturday, bi- hourly Sunday, with one late evening trip on Saturday	Requires Balboa Siding Extension totaling \$41.8 million
Revised Scenario 3: Improved Peak Service and Semi- Hourly Off-Peak Service	Existing Peak service with modest improvements	2 late night trips LAUS - LAN	30-minute mid-day on inner portion of the line LAUS to Vista Canyon, hourly out to Lancaster	Hourly Saturday, bi- hourly Sunday, with two late evening trips on Saturday	Requires Balboa Siding Extension and three additional capital projects totaling \$175.2 million
Revised Scenario 4: Three Patterns: Semi- hourly plus express service	Three hourly patterns - full-corridor local, short turn local, and Express, all on clockface headways	2 late night trips LAUS - LAN	30-minute mid-day on inner portion of the line LAUS to Vista Canyon, hourly out to Lancaster	Hourly Saturday, bi- hourly Sunday, with two late evening trips on Saturday	Requires eight capital projects totaling \$328.9 million
Revised Scenario 5: Three Patterns: Semi- Hourly Plus Express Service with Hub at Santa Clarita	Three hourly patterns - full-corridor local, short turn local, and Express, all on clockface headways	2 late night trips LAUS - LAN	30-minute mid-day on inner portion of the line LAUS to Vista Canyon, hourly out to Lancaster	Hourly Saturday, bi- hourly Sunday, with two late evening trips on Saturday	Requires seven capital projects totaling \$428.6 million
Revised Scenario 6: Semi-Hourly Plus Express Service with Hub at Sylmar	Three hourly patterns - full-corridor local, short turn local, and Express, all on clockface headways	2 late night trips LAUS - LAN	30-minute mid-day on inner portion of the line LAUS to Vista Canyon, hourly out to Lancaster	Hourly Saturday, bi- hourly Sunday, with two late evening trips on Saturday	Requires eight capital projects totaling \$448.7 million

Updated 2-5-19

Summary Annualized Operating Cost Increase of Combined Scenarios*

Service Option	Weekday Base Increase	Weekday Night Increase	Saturday Base Increase	Saturday Night Increase	Sunday Base Increase	Sunday Night Increase	TOTAL
Scenario 1	\$ -	\$ 2,306,327	\$ -	\$ 432,899	\$ -	\$ -	\$ 2,739,226
Scenario 2	\$ 5,792,027	\$ 2,306,327	\$ 2,907,370	\$ 432,899	\$ 345,744	\$ -	\$ 11,784,367
Scenario 3	\$ 21,066,205	\$ 4,492,097	\$ 2,907,370	\$ 865,798	\$ 345,744	\$ -	\$ 29,677,214
Scenario 4	\$ 28,829,094	\$ 4,329,606	\$ 2,907,370	\$ 865,798	\$ 345,744	\$ -	\$ 37,277,611
Scenario 5	\$ 29,615,342	\$ 4,329,606	\$ 2,907,370	\$ 865,798	\$ 345,744	\$ -	\$ 38,063,859
Scenario 6	\$ 22,093,569	\$ 4,329,606	\$ 2,907,370	\$ 865,798	\$ 345,744	\$ -	\$ 30,542,087

*Please refer to Scenario Descriptions for Assumptions

Antelope Valley Line Study Operating Cost Calculator

Revised Weekday Scenarios 1 - 6

2/5/2019

Scenario 1: Weekdays - 1 Late Night Trip LAUS - LAN, Existing Peak and Mid-Day						
Day Type	# of Days	Existing Service Hours	Revised Base Service Hours	Net Change in Service Hours per Day Type	Operating Cost per Service Hour	Total Annual Cost Impact
Weekdays	255	54.83	54.83	0	\$ 2,055.55	\$ -
Plus 1st Late Trip	255			4.40	\$ 2,055.55	\$ 2,306,327
TOTAL COST						\$ 2,306,327

Scenario 2: Two Additional Off-Peak Round Trips						
Day Type	# of Days	Existing Service Hours	Revised Base Service Hours	Net Change in Service Hours per Day Type	Operating Cost per Service Hour	Total Annual Cost Impact
Weekday	255	54.83	65.88	11.05	\$ 2,055.55	\$ 5,792,027
Plus 1st Late Trip	255			4.40	\$ 2,055.55	\$ 2,306,327
TOTAL COST						\$ 8,098,355

Scenario 3: Improved Peak Service and Semi-Hourly Off-Peak Service						
Day Type	# of Days	Existing Service Hours	Revised Base Service Hours	Net Change in Service Hours per Day Type	Operating Cost per Service Hour	Total Annual Cost Impact
Weekday	255	54.83	95.02	40.19	\$ 2,055.55	\$ 21,066,205
Plus 1st Late Trip	255			4.40	\$ 2,055.55	\$ 2,306,327
Plus 2nd Late Trip	255			4.17	\$ 2,055.55	\$ 2,185,769
TOTAL COST						\$ 25,558,302

Scenario 4: Three Patterns: Semi-hourly plus express service						
Day Type	# of Days	Existing Service Hours	Revised Base Service Hours	Net Change in Service Hours per Day Type	Operating Cost per Service Hour	Total Annual Cost Impact
Weekday	255	54.83	109.83	55.00	\$ 2,055.55	\$ 28,829,094
Plus 1st Late Trip	255			4.13	\$ 2,055.55	\$ 2,164,803
Plus 2nd Late Trip	255			4.13	\$ 2,055.55	\$ 2,164,803
TOTAL COST						\$ 33,158,699

Scenario 5: Three Patterns: Semi-Hourly Plus Express Service with Hub at Santa Clarita						
Day Type	# of Days	Existing Service Hours	Revised Base Service Hours	Net Change in Service Hours per Day Type	Operating Cost per Service Hour	Total Annual Cost Impact
Weekday	255	54.83	111.33	56.5	\$ 2,055.55	\$ 29,615,342
Plus 1st Late Trip	255			4.13	\$ 2,055.55	\$ 2,164,803
Plus 2nd Late Trip	255			4.13	\$ 2,055.55	\$ 2,164,803
TOTAL COST						\$ 33,944,947

Scenario 6: Semi-Hourly Plus Express Service with Hub at Sylmar						
Day Type	# of Days	Existing Service Hours	Revised Base Service Hours	Net Change in Service Hours per Day Type	Operating Cost per Service Hour	Total Annual Cost Impact
Weekday	255	54.83	96.98	42.15	\$ 2,055.55	\$ 22,093,569
Plus 1st Late Trip	255			4.13	\$ 2,055.55	\$ 2,164,803
Plus 2nd Late Trip	255			4.13	\$ 2,055.55	\$ 2,164,803
TOTAL COST						\$ 26,423,175

Annualized Cost Calculator

Saturday Service Levels for Scenarios

Scenario 1: Leave Saturday as is currently, Add one late night trip Saturday						
Day Type	# of Days	Existing Service Hours	Revised Base Period Service Hours	Net Change in Service Hours per Day Type	Operating Cost per Service Hour	Total Annual Cost Impact
Saturday	52	25.45	25.45	0.00	\$ 2,055.55	\$ -
Plus 1st Late Trip	52			4.05	\$ 2,055.55	\$ 432,899
TOTAL COST						\$ 432,899

Scenario 2: Hourly Saturday Service and 1 Late night trip						
Day Type	# of Days	Existing Service Hours	Revised Base Period Service Hours	Net Change in Service Hours per Day Type	Operating Cost per Service Hour	Total Annual Cost Impact
Saturday	52	25.45	52.65	27.20	\$ 2,055.55	\$ 2,907,370
Plus 1st Late Trip	52			4.05	\$ 2,055.55	\$ 432,899
TOTAL COST						\$ 3,340,269

Scenarios 3 - 6: Hourly Saturday Service and 2 Late Night Trips						
Day Type	# of Days	Existing Service Hours	Revised Base Period Service Hours	Net Change in Service Hours per Day Type	Operating Cost per Service Hour	Total Annual Cost Impact
Saturday	52	25.45	52.65	27.20	\$ 2,055.55	\$ 2,907,370
Plus 1st Late Trip	52			4.05	\$ 2,055.55	\$ 432,899
Plus 2nd Late Trip	52			4.05	\$ 2,055.55	\$ 432,899
TOTAL COST						\$ 3,773,168

Annualized Cost Calculator

Sunday Service Levels for Scenarios

Scenario 1: Leave Sunday as is						
Day Type	# of Days	Existing Service Hours	Revised Base Period Service Hours	Net Change in Service Hours per Day Type	Operating Cost per Service Hour	Total Annual Cost Impact
Sunday	58	25.45	25.45	0.00	\$ 2,055.55	\$ -
Plus 1st Late Trip	58	0	0	0.00	\$ 2,055.55	\$ -
TOTAL COST						\$ -

Scenarios 2 - 6: Bi-Hourly Clockface headways on Sundays						
Day Type	# of Days	Existing Service Hours	Revised Base Period Service Hours	Net Change in Service Hours per Day Type	Operating Cost per Service Hour	Total Annual Cost Impact
Sunday	58	25.45	28.35	2.9	\$ 2,055.55	\$ 345,744
Plus 1st Late Trip	58	0	0	0	\$ 2,055.55	\$ -
TOTAL COST						\$ 345,744

Metrolink Operating Expenses and Train Service Hours
 From Metrolink Comprehensive Annual Financial Report FY17

Item	Value	Source
Total Train Operations Costs	\$ 175,618,000	From Page 9
Service Hours	85,436	From Page 10 and 71
Train Operations Cost/Service Hour, FY17	<u>\$ 2,055.55</u>	

APPENDIX 2 – ATTACHMENT 3

PowerPoint Presentation to Stakeholders, December 12, 2018

Antelope Valley Line Study

Preliminary Findings

Stakeholder Meeting
December 12, 2018

Agenda

A. Introduction

B. Technical Presentation and Discussion

1. Overview
2. Ridership Market Benefits
3. Service Scenario Components
4. Service Scenario Development and Analysis
5. Evaluation Methodology

C. Breakout Sessions

1. Exercise 1 – Prioritize Markets by Geographic Area and Trip Purpose
2. Exercise 2 – Identify Preferences for Types of Service Improvement, Given Finite Funding

D. Report out from breakout sessions

E. Discussion

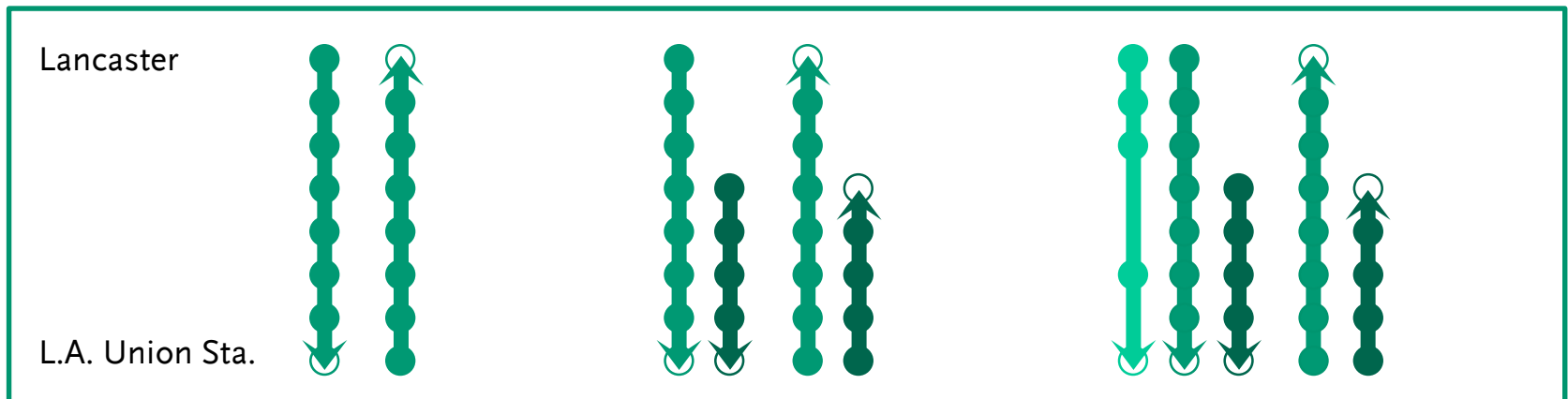
F. Other Items / Next Steps



A. Overview

Study Scope of Work Goals and Objectives:

1. Study clock-face scheduling based on 1-hour or 30-minute frequencies, including the following service options:

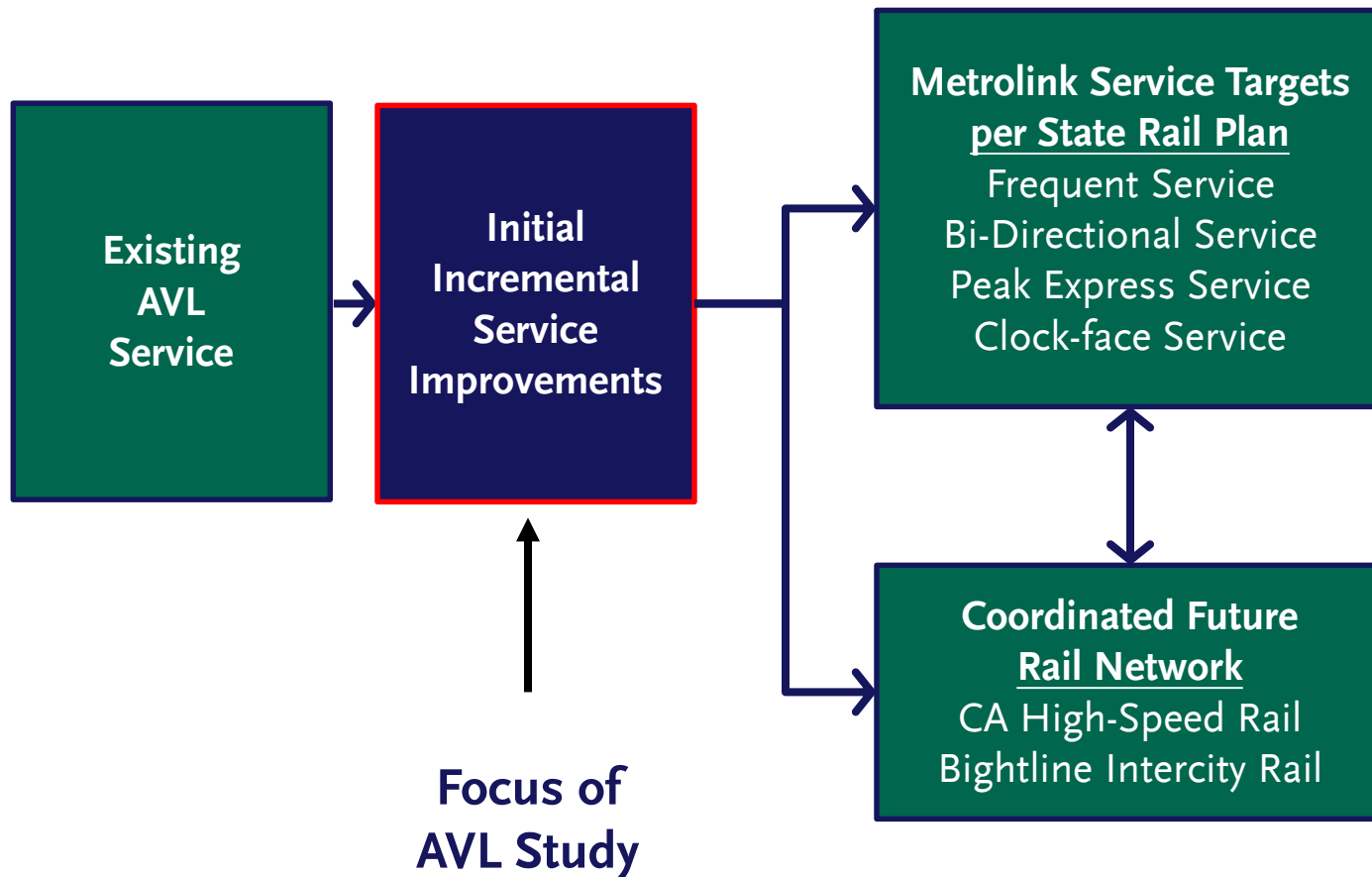


2. Prioritize infrastructure projects in order to deliver capacity for 1-hour and 30-minute service to the AVL corridor on the regional rail system.



A. Overview

Summary of Service Improvement Trajectory



A. Overview

1. Project Status

- a) Existing AVL Service:
Existing Conditions and Market Analysis completed
- b) Incremental Service Improvement Scenarios:
Multiple scenarios with clock-face schedules developed and compared to existing service
- c) Interim Improvements for Service Scenarios:
Capital projects needed for each scenario identified, capital and operating costs estimated, service scenario evaluation underway
- d) Coordination with Parallel Efforts: CA HSR; Virgin Trains USA; UPRR; L.A.-Glendale-Burbank Corridor Study

2. Seeking feedback and guidance from stakeholders

- a) Prioritization of travel markets (geographic and trip purpose)
- b) Preferences for service improvement types

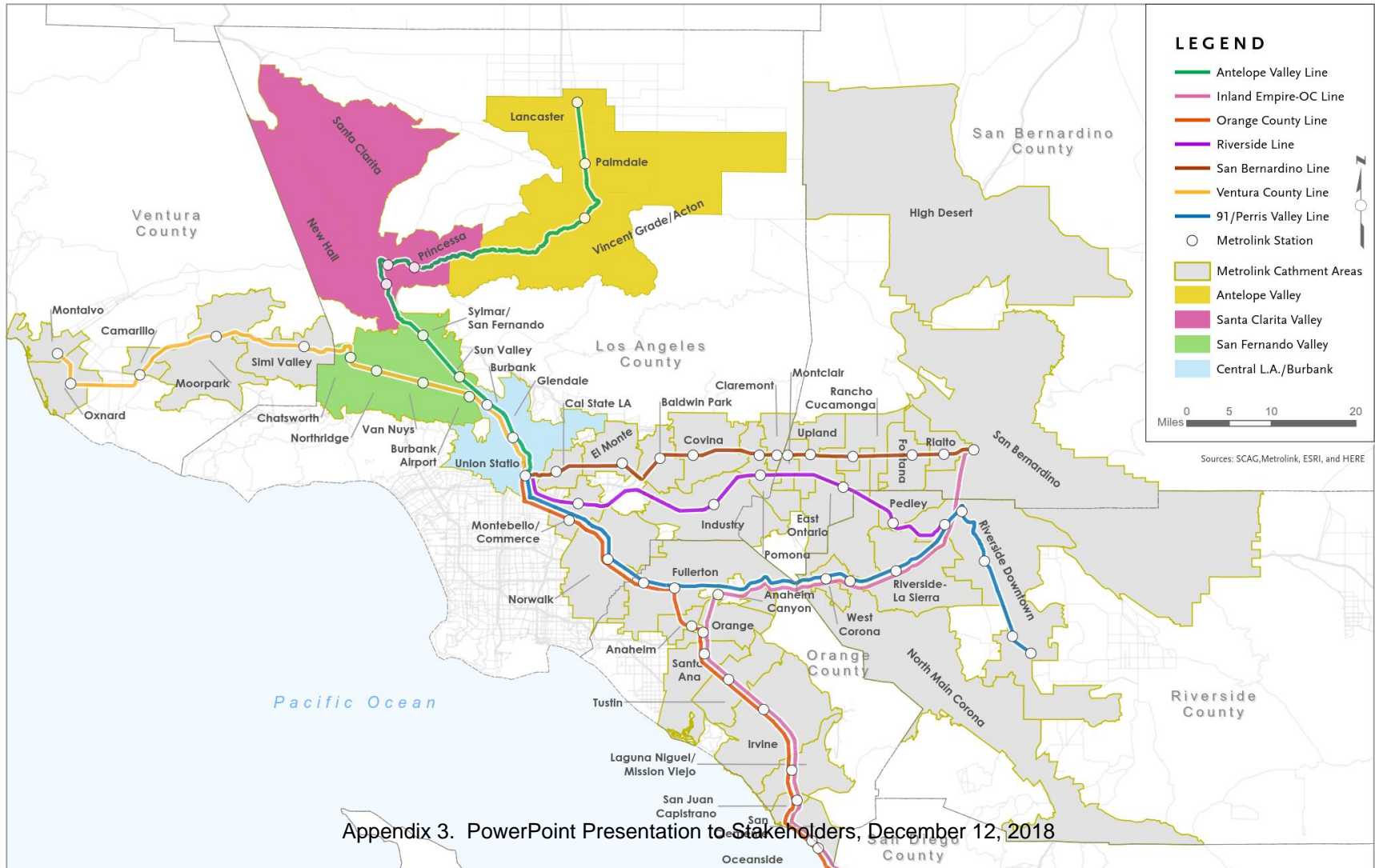


B. Ridership Market Comparison



B. Ridership Markets

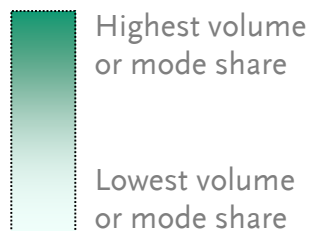
Aggregated Station Catchment Areas for Metrolink Trips



B. Ridership Markets – Catchment Zone Pairs

Total Daily Trips

<u>Origin Zone</u>	<u>Destination Zone</u>	<u>Dir</u>	<u>All-Mode Total Trips</u>	<u>Rail Trips</u>	<u>Rail Share</u>
Santa Clarita Valley	San Fernando Valley	Int	147,300	390	0.3%
San Fernando Valley	Central L.A. / Burbank	Pk	146,041	579	0.4%
Santa Clarita Valley	Central L.A. / Burbank	Pk	58,060	1,715	3.0%
Central L.A. / Burbank	San Fernando Valley E.	Rev	53,500	40	0.1%
San Fernando Valley	Santa Clarita Valley	Rev	51,900	140	0.3%
Antelope Valley	San Fernando Valley	Int	35,100	1,410	4.0%
Central L.A. / Burbank	Santa Clarita Valley	Rev	26,900	140	0.5%
Antelope Valley	Central L.A. / Burbank	Pk	23,396	2,750	11.8%
Antelope Valley	Santa Clarita Valley	Int	22,300	570	2.6%
San Fernando Valley	Antelope Valley	Rev	7,300	30	0.4%
Santa Clarita Valley	Antelope Valley	Rev	6,700	70	1.0%
Central L.A. / Burbank	Antelope Valley	Rev	2,000	10	0.5%



Directionality:

Pk=Peak direction travel to or through Central L.A.

Int=Peak direction travel to intermediate points within AVL Corridor

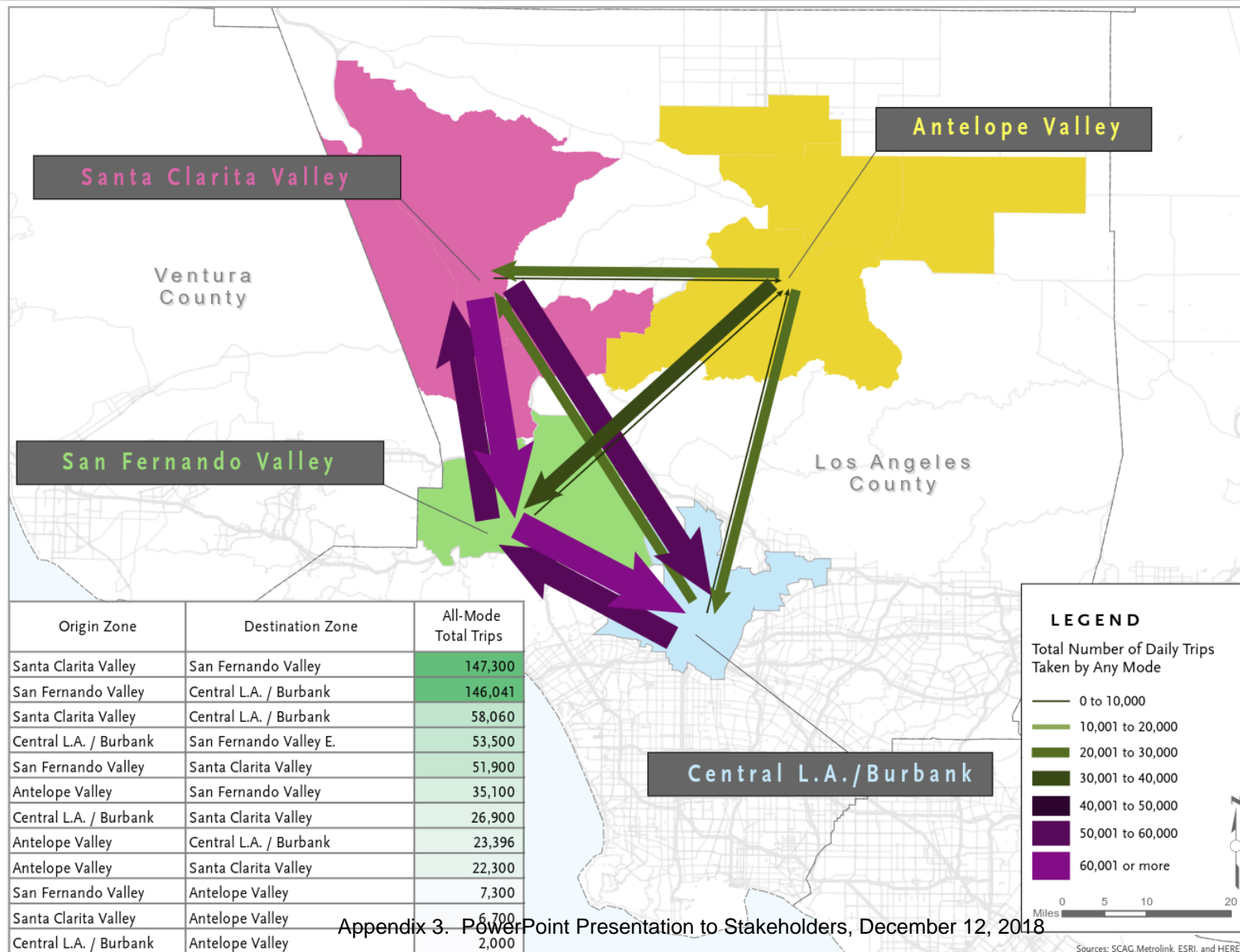
Rev=Reverse-peak direction travel

Source: SCAG daily trip data for 2012, from regional travel demand model



Metro

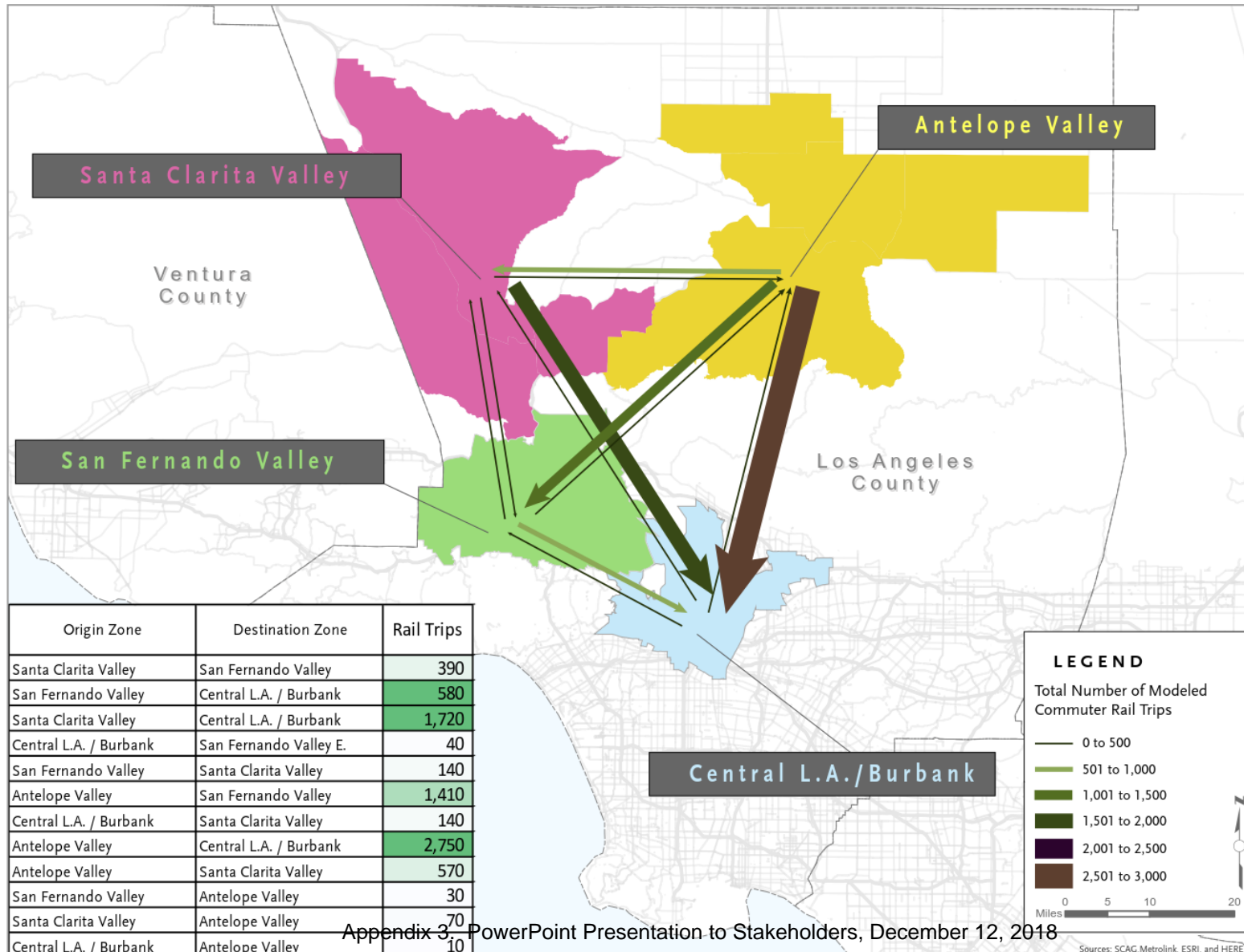
B. Daily Trips Between Catchment Zones – All Modes*



Appendix 3. PowerPoint Presentation to Stakeholders, December 12, 2018

Source: SCAG daily trip data for 2012, from regional travel demand model

B. Daily Metrolink AVL Trips Between Catchment Zones

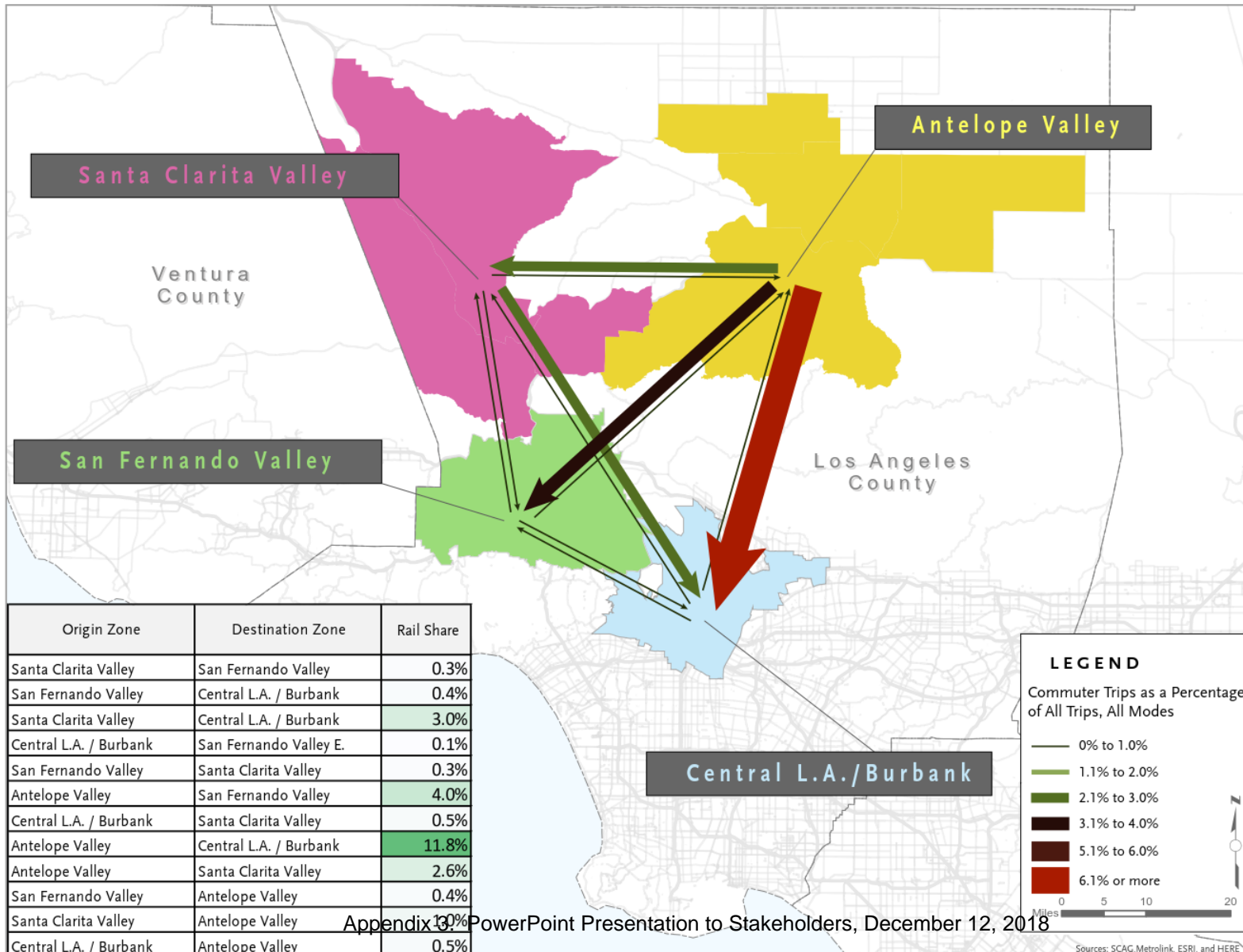


Appendix 3, PowerPoint Presentation to Stakeholders, December 12, 2018

Sources: SCAG, Metrolink, ESRI, and HERE

Source: SCAG daily trip data for 2012, from regional travel demand model

B. Commuter Rail Shares of Total Daily Trips



Source: SCAG daily trip data for 2012, from regional travel demand model

C. Service Scenario Components

1. What is a service scenario?

- a) Essentially a train timetable
- b) Service patterns driven by travel market demand
- c) Reflects physical and operational constraints

2. Components

- a) Service types and stopping patterns
 - i. Service frequency – peak, reverse-peak and off-peak
 - ii. Local, express and limited patterns
 - iii. Regularity of service intervals
- b) Rail infrastructure configuration (track, signal, structures, ROW)
- c) Stations, including multi-modal connectivity
- d) Rolling stock fleet and storage/maintenance facilities



Regularized Clockface Schedules

1. Benefits

- a) Convenient for riders
- b) Supports regional and state-wide coordinated rail network
- c) Promotes multi-modal connectivity
- d) Makes efficient use of rail infrastructure capacity

2. Issues and Impacts

- a) Extensive single track constrains flexibility with respect to future train schedules and trip time improvements
- b) Changes the nature of rail freight operations

C. Service Components Considered

Peak Express Service

1. Benefits

- a) Shorter trip time to downtown L.A. and points beyond downtown
- b) Passenger benefit increases with trip length

2. Issues and Impacts

- a) Some intermediate stations and markets not served
- b) Intra-line and multi-modal connectivity is more challenging
- c) Expensive to develop on largely single-track line with bi-directional operations

C. Service Components Considered

Rolling Stock Options

1. Options

- a) Continuation of diesel locomotive train-sets
- b) Diesel Multiple Unit (DMU)
- c) Electric Multiple Unit (EMU) – including future HSR-compatible

2. Issues

- a) Passenger capacity
- b) Operational performance (acceleration and braking, with steep grades)
- c) Operating and maintenance costs
- d) Platform heights and ADA accessibility

D. Service Scenario Development



D. Service Scenario Development

1. Service Planning Principles

- a) **Verify physical and operational feasibility**
- b) **Provide for safe and reliable service**
- c) **Make efficient use of infrastructure capacity**
- d) **Build towards consistency with State Rail Plan**
- e) **Distribute benefits equitably among markets within the AVL corridor**
- f) **Seek solutions that are mutually beneficial in locations where other operators will use or adjoin the AVL**
- g) **Preserve flexibility to account for future uncertainty**



D. Service Scenario Development

Scenarios Considered:

1. Hourly bi-directional service only
2. Semi-hourly bi-directional with intermediate turn-back
- *3. Semi-hourly bi-directional with intermediate turn-back, full-length express service, and bunched outer-zone trains
- *4. Semi-hourly bi-directional with intermediate turn-back, full-length express service, and spread-out outer-zone trains
- *5. Same as (4), with intermediate turns at Sylmar instead of Vista Canyon

*These scenarios are consistent with levels and types of rail service included in the State Rail Plan



Existing Service

Existing Service:

Weekdays: Total of 30 Trips

Full-Corridor Trips: 18

Partial Corridor Trips: 10

Express Trips: 2 (1 SB Peak, 1 NB Peak)

Headways: Variable, 26 minutes to 2 ½ hours between trains

Estimated Capital and Operating Cost:

Est. Capital Cost: \$0

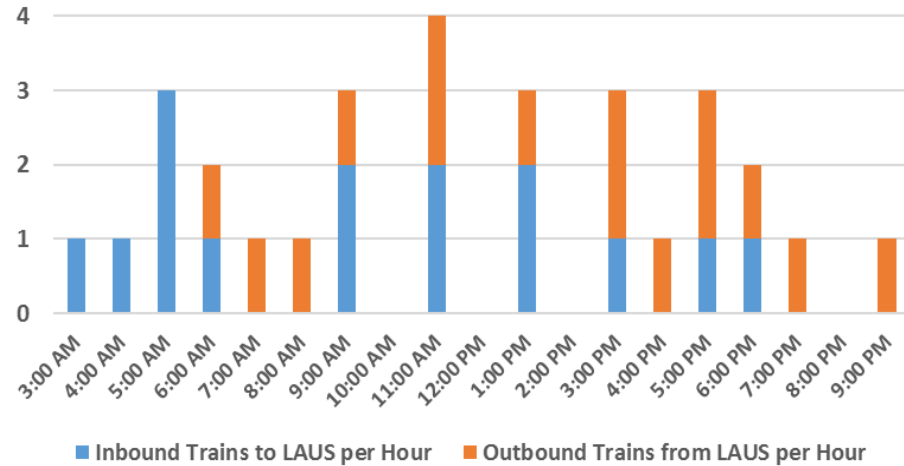
Est. Operating Cost Increase over current service: \$0

Capital Projects Required:

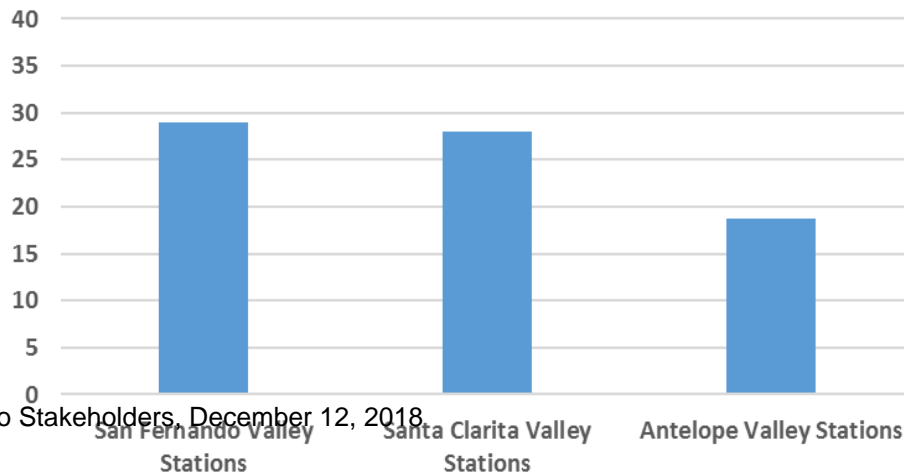
No. of Capital Projects Required: 0



Existing Service Trains per Hour by Hour Beginning . . .



Existing Service Daily Trains by Station Group



Scenario 1 – Hourly Service Only

Scenario 1 – Hourly Service Only:

Weekdays: Total of 30 Trips

Full-Corridor Trips: 30

Partial Corridor Trips: 0

Express Trips: 0

Headways: 60 minutes between trains all day

Estimated Capital and Operating Cost:

Est. Capital Cost: \$41.8 M*

Est. Annual Operating Cost Increase over current service: \$3.1 M**

Capital Projects Required:

No. of Capital Projects Required: 1

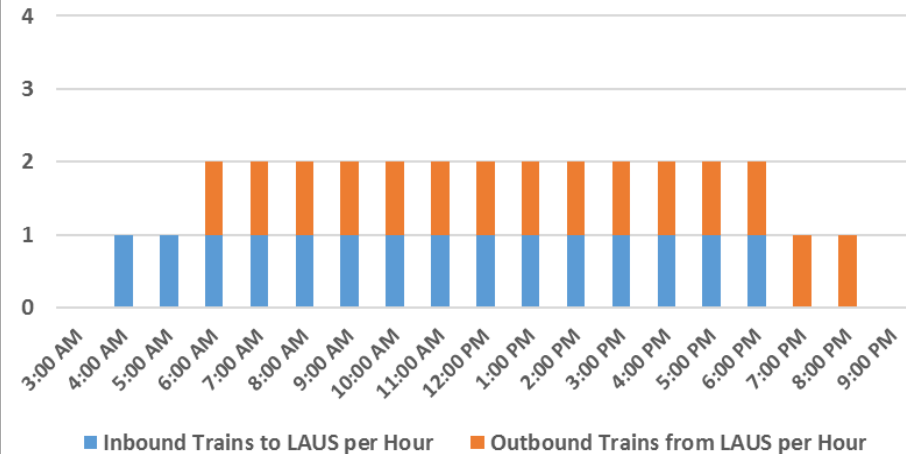


*Expressed in millions of 2018 dollars

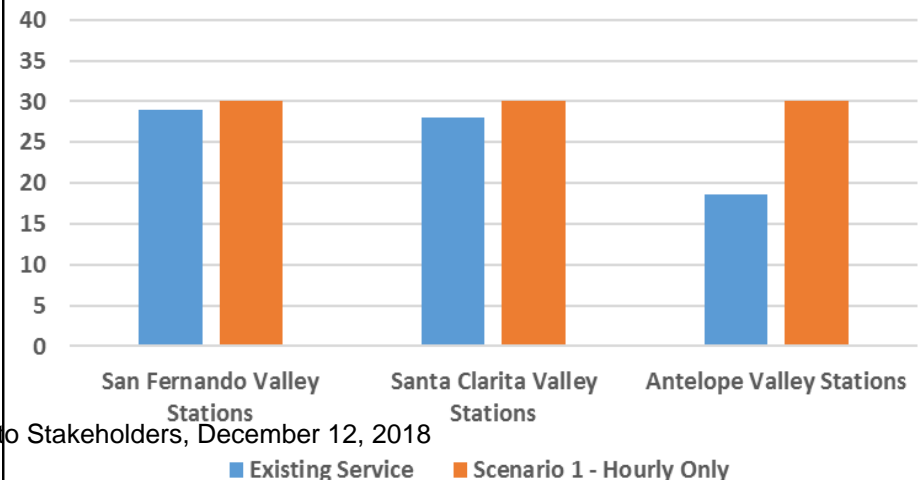
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Scenario 1 - Hourly Only - Trains per Hour by Hour Beginning . . .

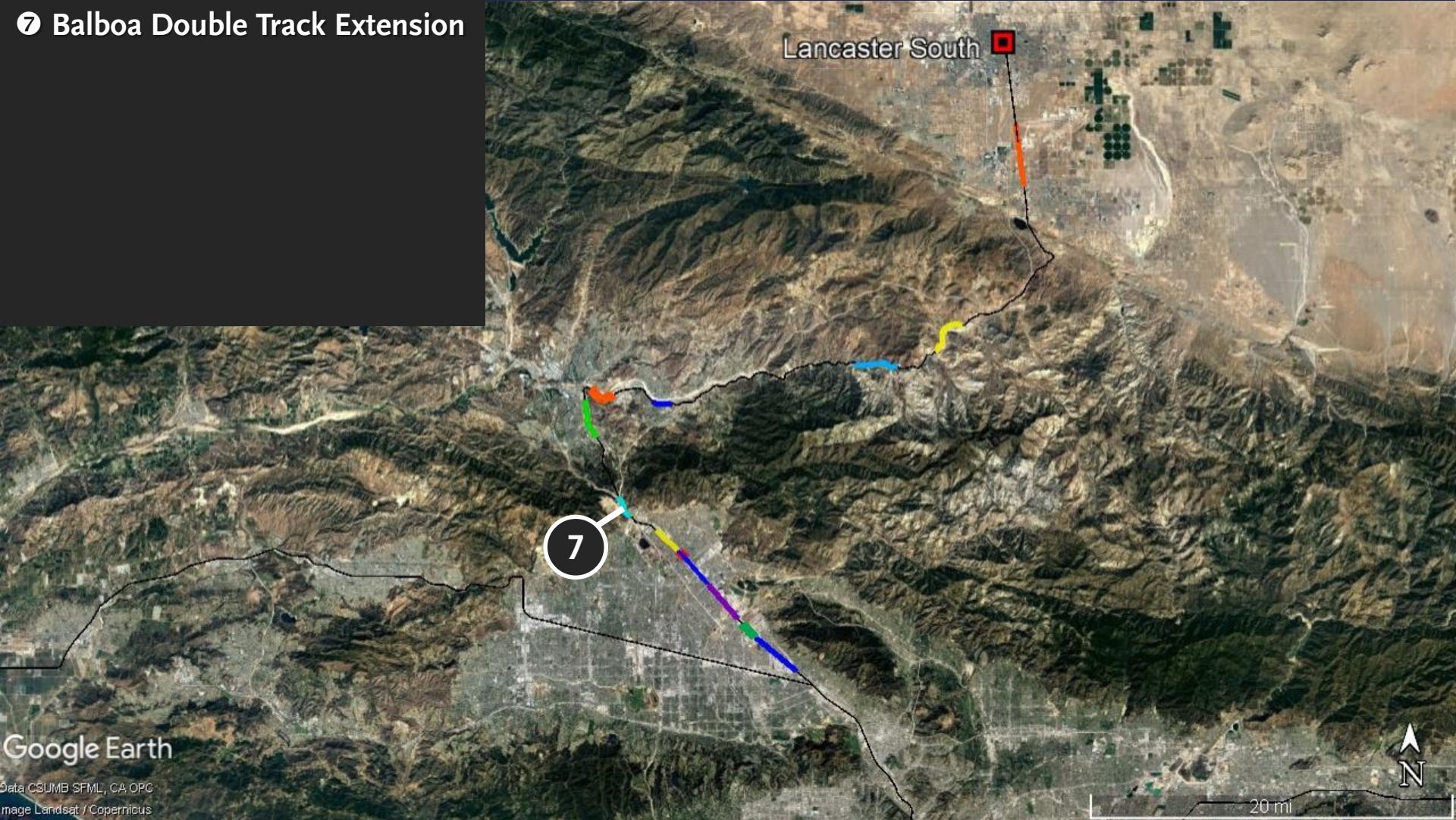


Scenario 1 Daily Trains - Hourly Service Only, vs. Existing Service



Scenario 1 Capacity Infrastructure Projects

7 Balboa Double Track Extension



Scenario 2 – 30-60

Scenario 2 - 30-60:

Weekdays: Total of 34 Trips

Full-Corridor Trips: 30

Partial Corridor Trips (Via Princessa): 4

Express Trips: 0

Headways: 30 minutes in peak period, peak direction, hourly rest of day

Estimated Capital and Operating Cost:

Est. Capital Cost above Scen. 1: \$141.8 M*

Est. Annual Operating Cost Increase over Scenario 1 service: \$2.3 M**

Capital Projects Required:

No. of Capital Projects Required: 4

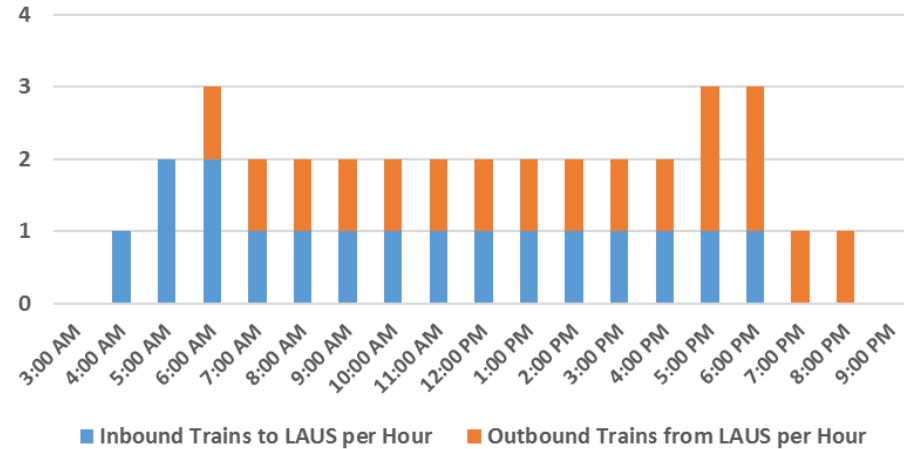


*Expressed in millions of 2018 dollars

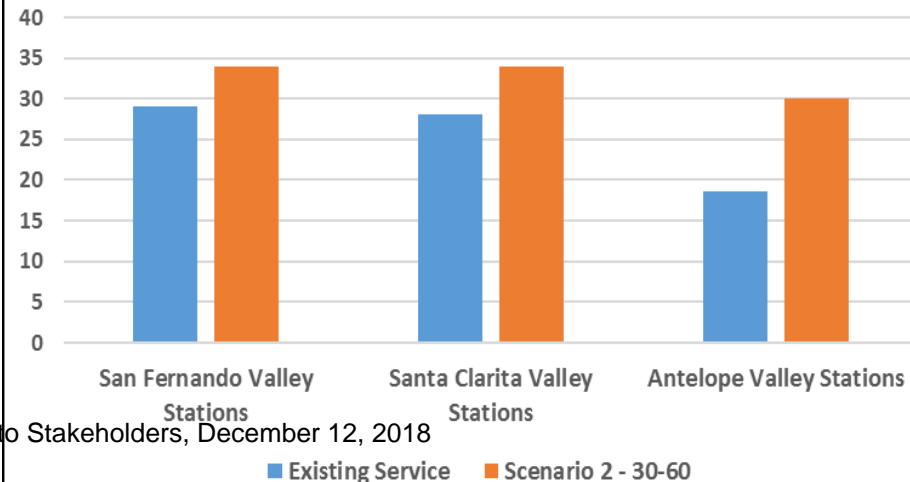
**Expressed in millions of 2017 dollars.

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Scenario 2 - 30-60 - Trains per Hour by Hour Beginning . . .

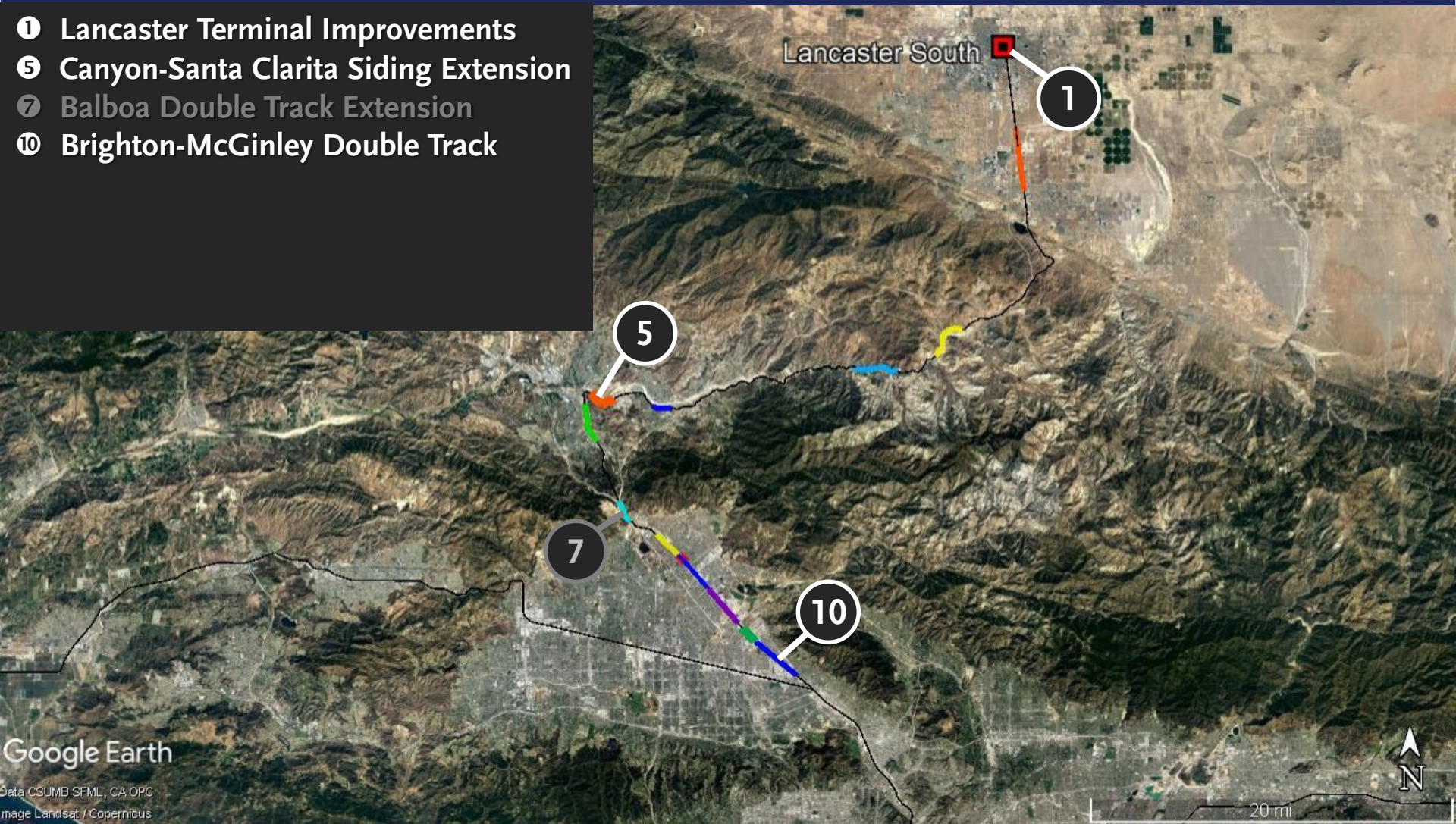


Scenario 2 - 30-60 Daily Trips, vs. Existing Service



Scenario 2 Capacity Infrastructure Projects

- ① Lancaster Terminal Improvements
- ⑤ Canyon-Santa Clarita Siding Extension
- ⑦ Balboa Double Track Extension
- ⑩ Brighton-McGinley Double Track



Scenario 3 – 3-Hourly Patterns

Scenario 3 – 3-Hourly Patterns:

Weekdays: Total of 38 Trips

Full-Corridor Trips: 30

Partial Corridor Trips (Via Princessa): 4

Express Trips: 4

Headways: 30 minutes + express trains in peak, peak direction, hourly rest of day

Estimated Capital and Operating Cost:

Est. Capital Cost over Scen. 2: \$158.7 M*

Est. Annual Operating Cost Increase over Scenario 2 service: \$3.9 M**

Capital Projects Required:

No. of Capital Projects Required: 8

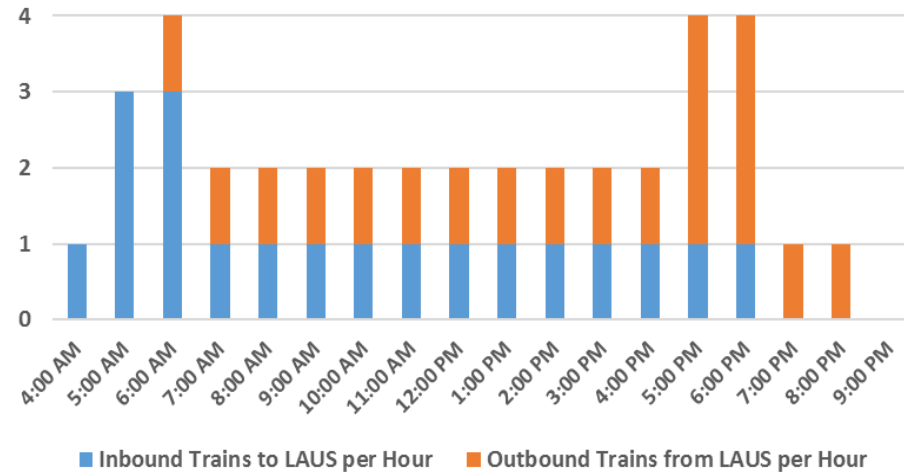


*Expressed in millions of 2018 dollars

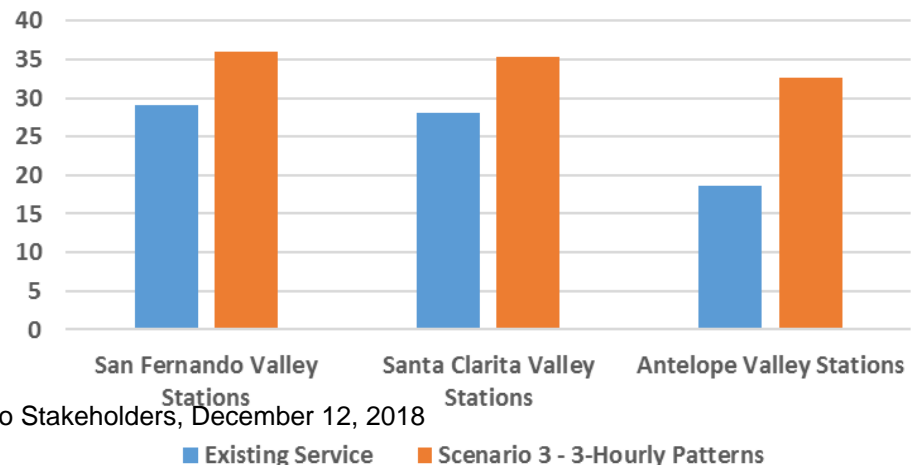
**Expressed in millions of 2017 dollars.

Appendix 3. PowerPoint Presentation to Stakeholders, December 12, 2018

Scenario 3 - 3-Hourly Patterns - Trains per Hour by Hour Beginning . . .

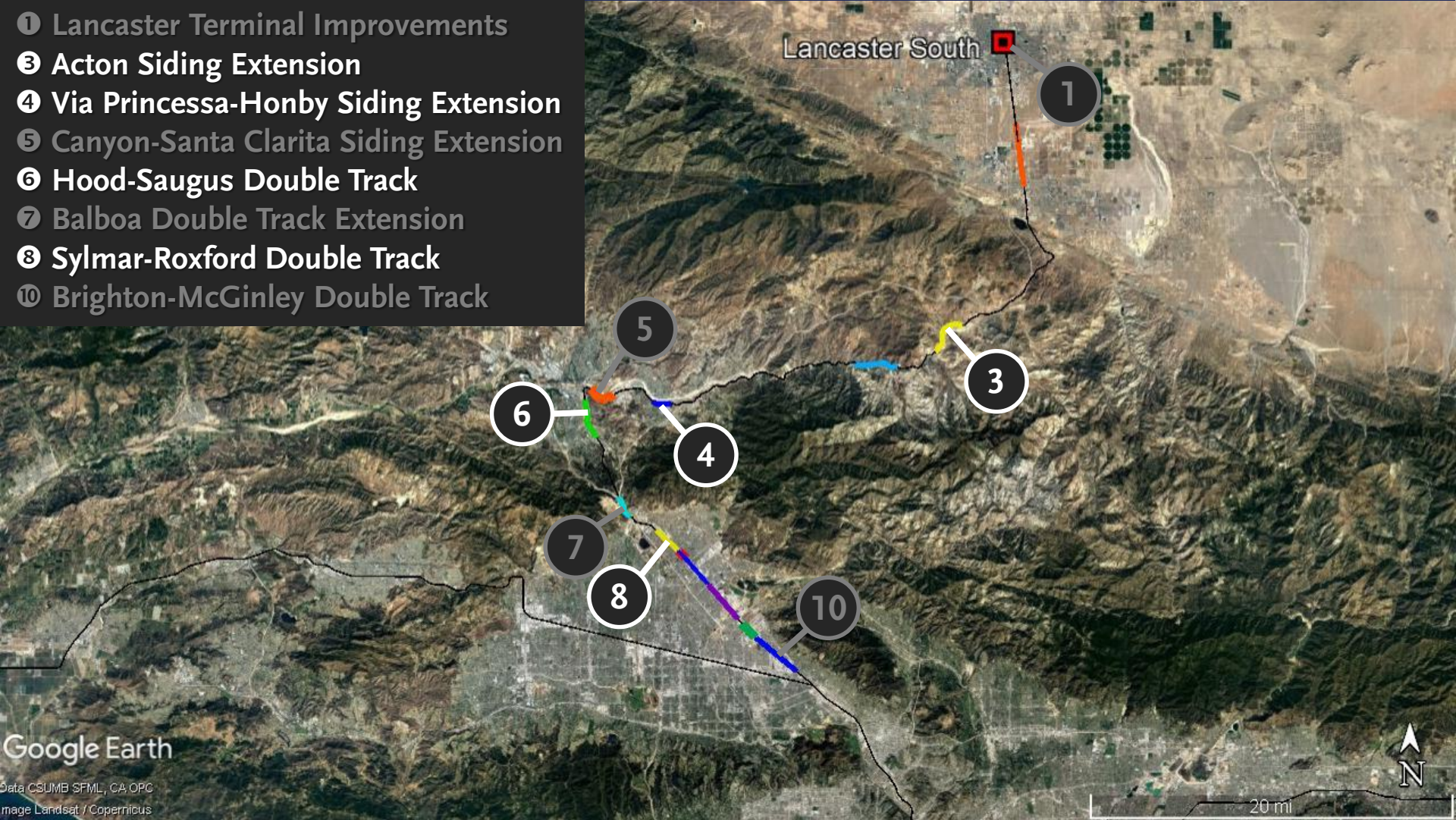


Scenario 3 - 3-Hourly Patterns, vs. Existing Service



Scenario 3 Capacity Infrastructure Projects

- ① Lancaster Terminal Improvements
- ③ Acton Siding Extension
- ④ Via Princessa-Honby Siding Extension
- ⑤ Canyon-Santa Clarita Siding Extension
- ⑥ Hood-Saugus Double Track
- ⑦ Balboa Double Track Extension
- ⑧ Sylmar-Roxford Double Track
- ⑩ Brighton-McGinley Double Track



Google Earth

Data CSUMB SFML, CA OPC
Image Landsat / Copernicus



Scenario 4 – 3-Hourly Patterns

Scenario 4 – 3-Hourly Patterns:

Weekdays: Total of 38 Trips

Full-Corridor Trips: 30

Partial Corridor Trips (Via Princessa): 4

Express Trips: 4 (Improved intervals bet. Express and Local trains)

Headways: 30 minutes + express trains in peak, peak direction, hourly rest of day

Estimated Capital and Operating Cost:

Est. Capital Cost over Scen. 2: \$236.6 M*

Est. Annual Operating Cost Increase over Scenario 2 service: \$2.9 M**

Capital Projects Required:

No. of Capital Projects Required: 7

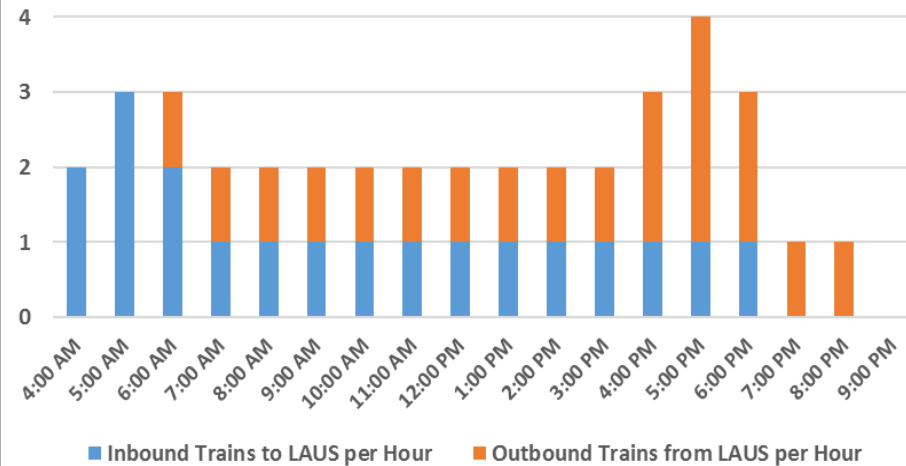


*Expressed in millions of 2018 dollars

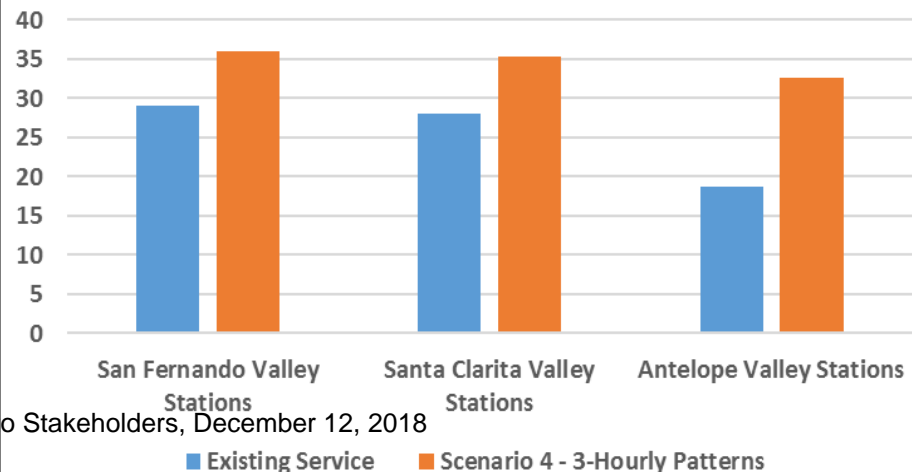
**Expressed in millions of 2017 dollars.

Appendix 3. PowerPoint Presentation to Stakeholders, December 12, 2018

Scenario 4 - 3-Hourly Patterns - Trains per Hour by Hour Beginning . . .

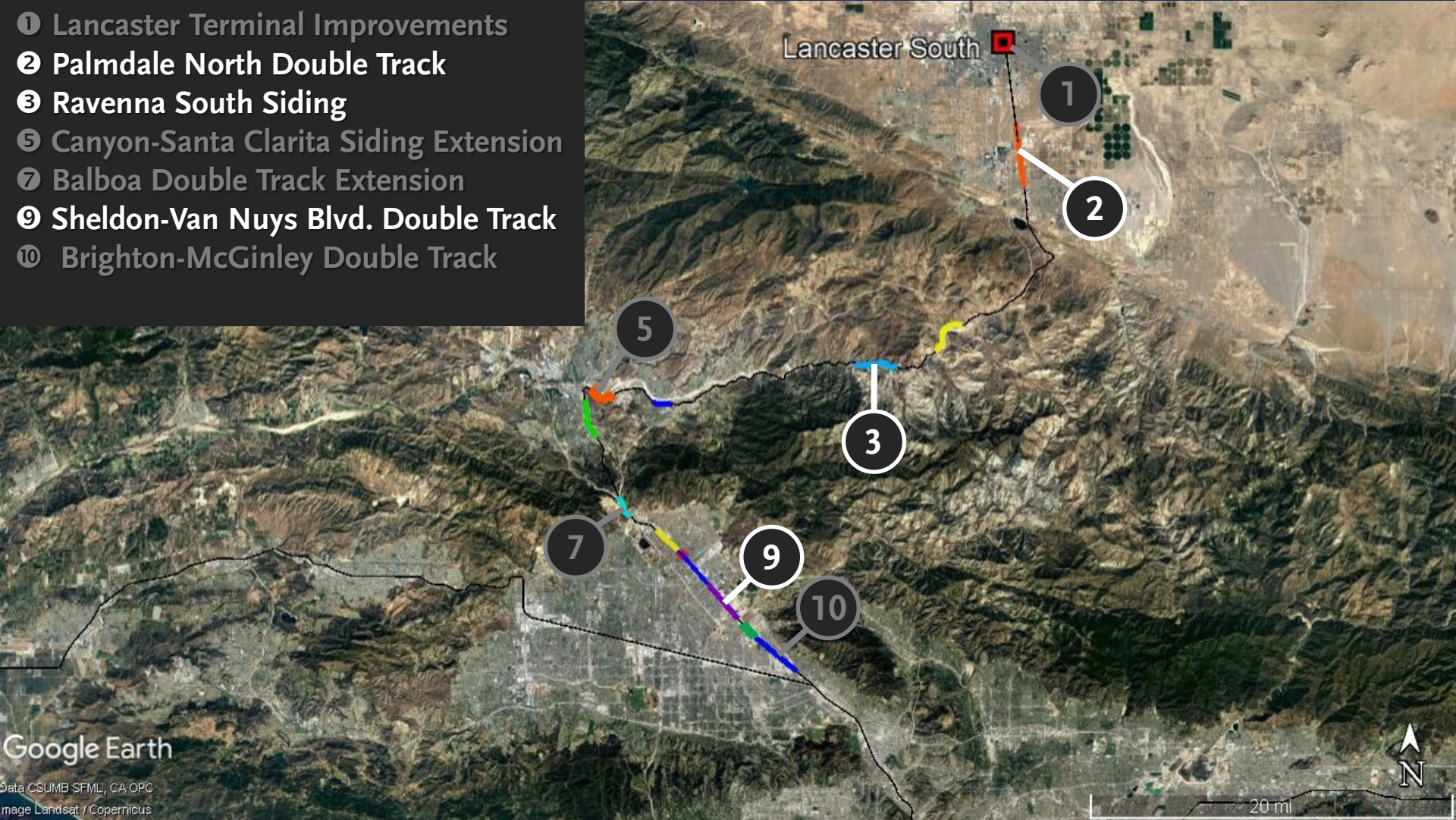


Scenario 4 - 3-Hourly Patterns, vs. Existing Service



Scenario 4 Capacity Infrastructure Projects

- ① Lancaster Terminal Improvements
- ② Palmdale North Double Track
- ③ Ravenna South Siding
- ⑤ Canyon-Santa Clarita Siding Extension
- ⑦ Balboa Double Track Extension
- ⑨ Sheldon-Van Nuys Blvd. Double Track
- ⑩ Brighton-McGinley Double Track



Scenario 5 – 3-Hourly Patterns

Scenario 5 – 3-Hourly Patterns:

Weekdays: Total of 42 Trips

Full-Corridor Trips: 30

Partial Corridor Trips (Sylmar): 8

Express Trips: 4 (Improved intervals bet. Express and Local trains)

Headways: 30 minutes + express trains in peak, peak direction, hourly rest of day

Estimated Capital and Operating Cost:

Est. Capital Cost over Scen 2: \$236.6 M*

Est. Annual Operating Cost Increase over Scenario 2 service: \$4.0 M**

Capital Projects Required:

No. of Capital Projects Required: 8

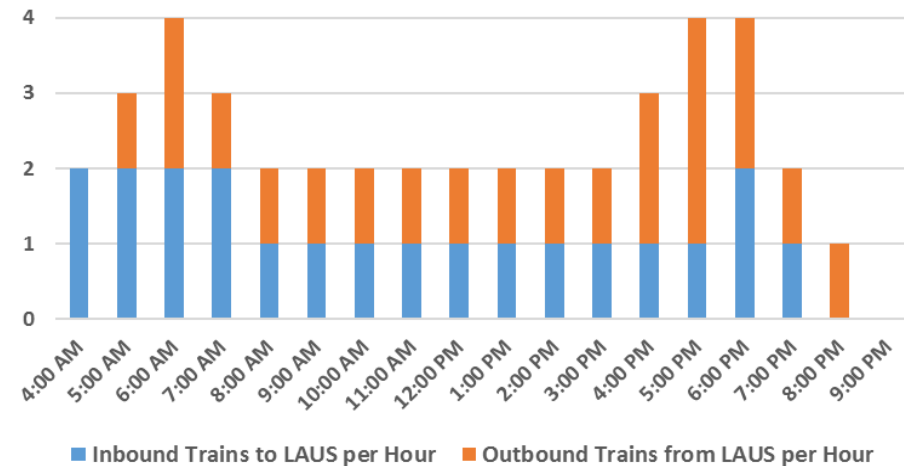


*Expressed in millions of 2018 dollars

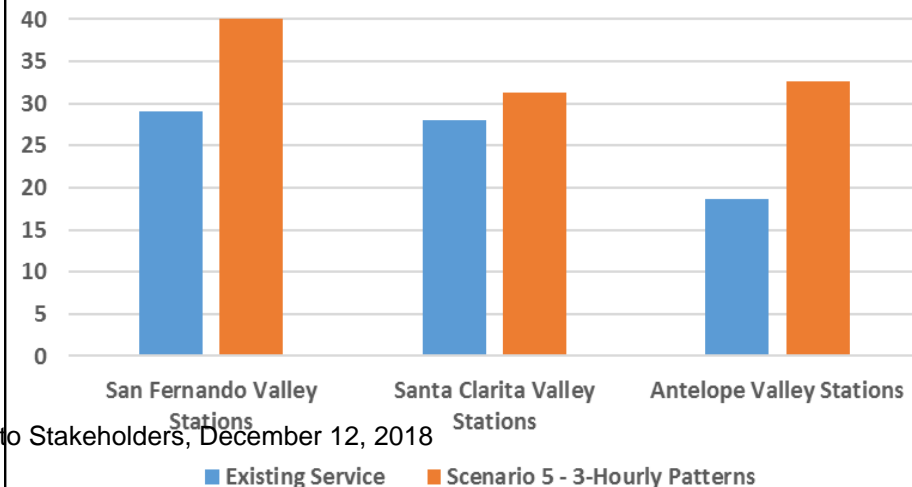
**Expressed in millions of 2017 dollars.

Appendix 3. PowerPoint Presentation to Stakeholders, December 12, 2018

Scenario 5 - 3-Hourly Patterns - Trains per Hour by Hour Beginning . . .

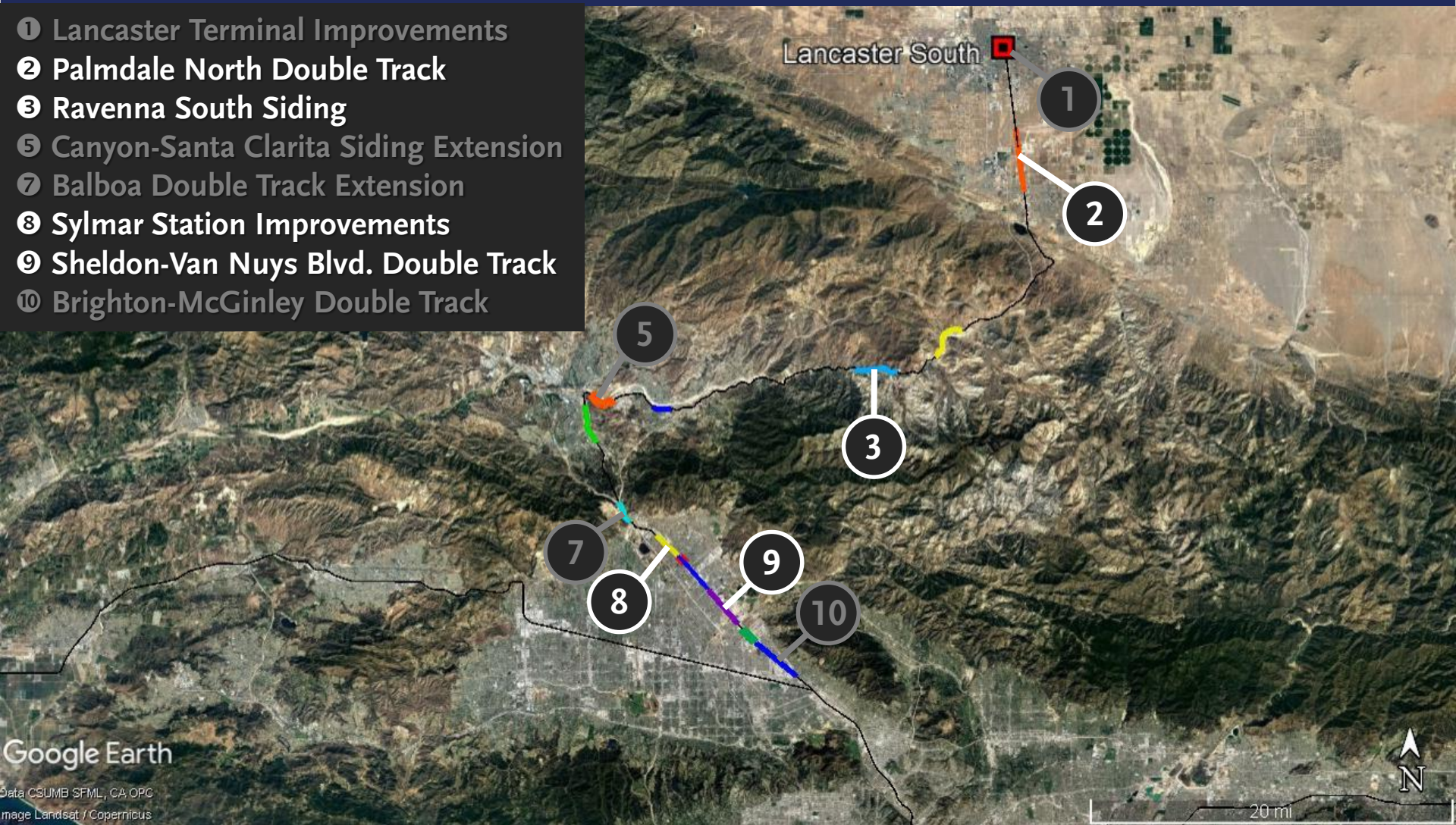


Scenario 5 - 3-Hourly Patterns, vs. Existing Service



Scenario 5 Capacity Infrastructure Projects

- ① Lancaster Terminal Improvements
- ② Palmdale North Double Track
- ③ Ravenna South Siding
- ⑤ Canyon-Santa Clarita Siding Extension
- ⑦ Balboa Double Track Extension
- ⑧ Sylmar Station Improvements
- ⑨ Sheldon-Van Nuys Blvd. Double Track
- ⑩ Brighton-McGinley Double Track



C. Capital and Operating Cost

Scenario	Characteristics	Capital Cost (\$M 2018)	Incremental Operating Cost Above Existing (\$M 2017)
1. Hourly	Hourly Local Service, LA Union Station to Lancaster	\$42	\$3.1
2. 30-60	Hourly Svc, LA Union Station-Lancaster 30-Min Svc, LA Union Station-Vista Cyn	\$184	\$5.4
3. Three Patterns	Bunched Exp & Lcl in Antelope Valley Vista Canyon Intermediate Turn-back	\$342	\$9.3
4. Three Patterns	Evenly Spaced Trains in Antelope Valley Vista Canyon Intermediate Turn-back	\$420	\$8.3
5. Three Patterns	Evenly Spaced Trains in Antelope Valley Sylmar Intermediate Turn-back	\$420	\$9.4

D. Service Scenario Analysis – Tradeoffs

Maximizing value for limited initial investment

1. Which travel markets should benefit first?

- a) Maximize ridership vs. distribute benefits equitably

2. Should express service include intermediate stops?

- a) Faster trip time (fewer stops) vs. better connectivity and service to intermediate markets (more stops)

3. Which stations should be developed as major hubs?

- a) E.g., Palmdale, Santa Clarita, Sylmar, Hollywood Burbank Airport

4. Near-term benefit vs. future flexibility

- a) Limit near-term investments to projects that support multiple future scenarios; avoid scenario-specific projects



D. Service Scenario Analysis – Future-Proofing

1. Looking Beyond the Immediate Incremental Investment Timeframe

- a) The Antelope Valley Line doesn't exist in a vacuum
- b) Near-term investment decisions should be made with an awareness of future network visions and associated risks and opportunities

2. Rationale for “Future-Proofing”

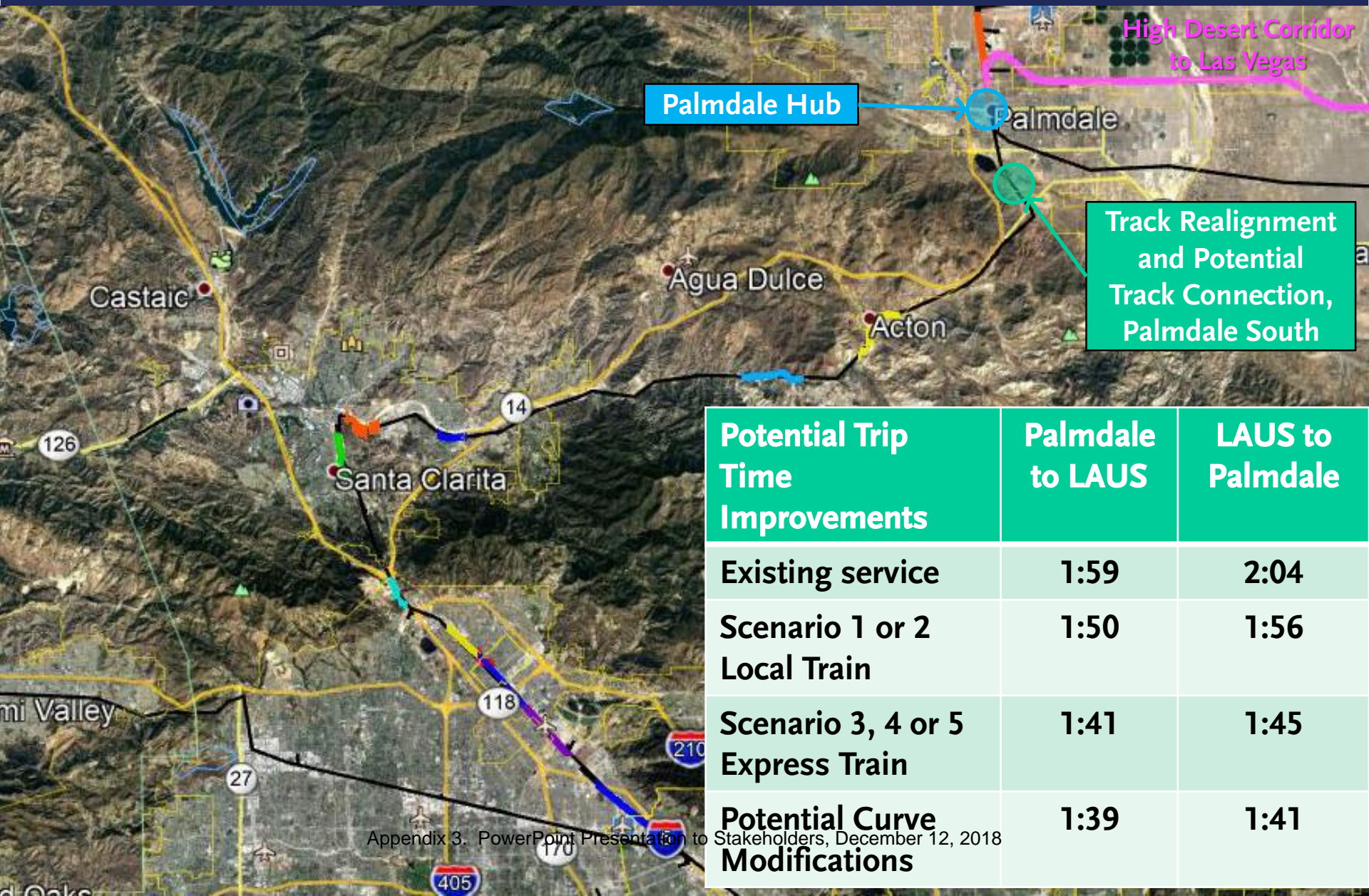
- a) Verifies robustness of interim infrastructure projects
- b) Demonstrates long-term utility of interim investments
- c) Identifies opportunities for transportation network benefits and cost-effective investment at a scale beyond the AVL
- d) Protects future flexibility for AVL service
- e) Identifies future choices and tradeoffs



D. Service Scenario Analysis – Future-Proofing

- 1. AVL as a component of integrated regional rail**
 - a) Connection opportunities with Link-US
- 2. Burbank-LAUS service mix and train volumes**
 - a) LOSSAN Corridor, Ventura County Line, local transit service along AVL
- 3. Future rolling stock mix**
 - a) Construct longer sidings to accommodate a range of rolling stock
- 4. Future freight service**
- 5. East San Fernando Valley transit line**
- 6. CA HSR and Intercity Rail Service to Las Vegas**

HSR on the AVL – Palmdale-to-Burbank



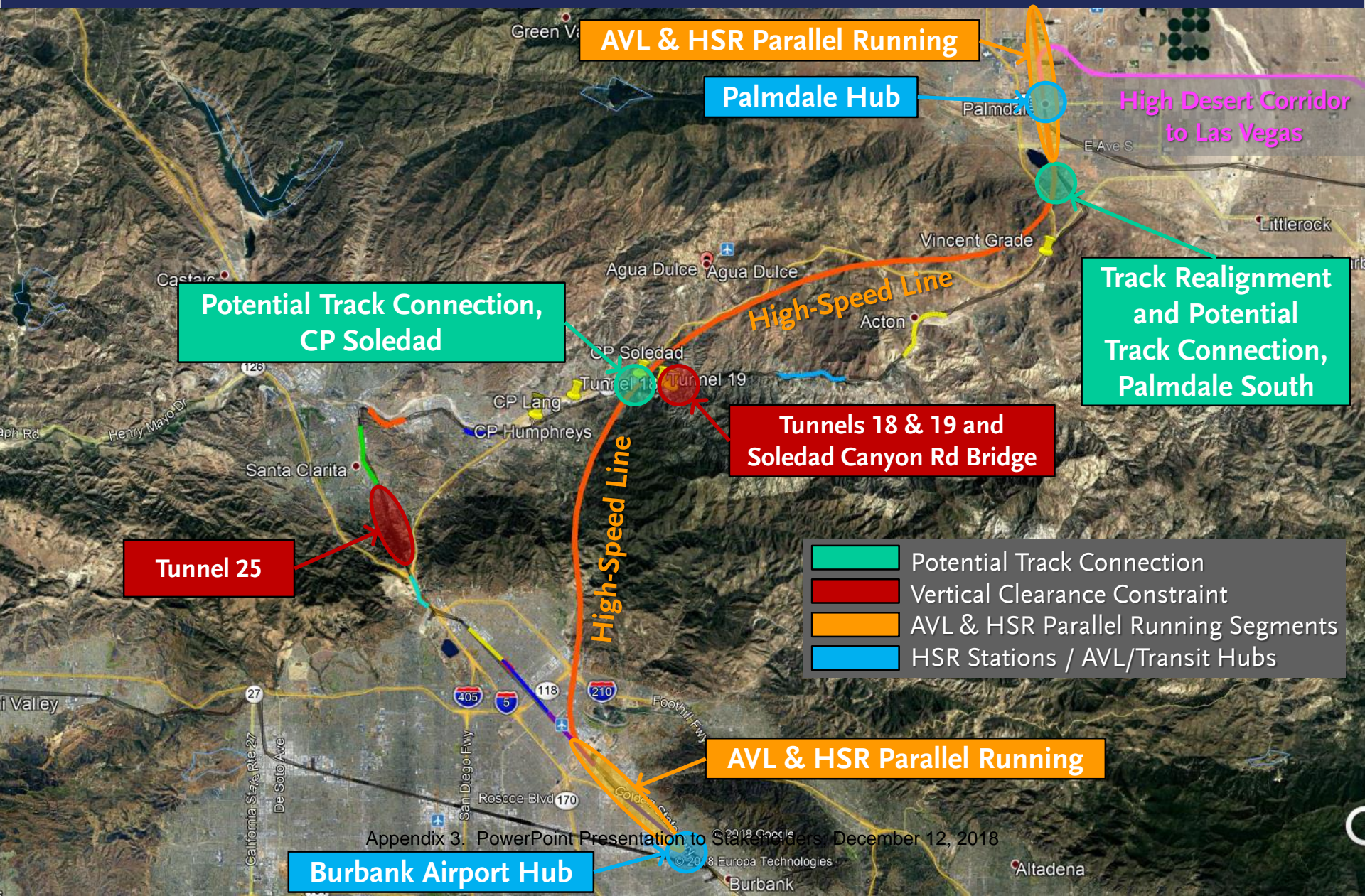
Palmdale Hub

High Desert Corridor to Las Vegas

Track Realignment and Potential Track Connection, Palmdale South

Potential Trip Time Improvements	Palmdale to LAUS	LAUS to Palmdale
Existing service	1:59	2:04
Scenario 1 or 2 Local Train	1:50	1:56
Scenario 3, 4 or 5 Express Train	1:41	1:45
Potential Curve Modifications	1:39	1:41

HSR and AVL – Palmdale-to-Burbank



E. Evaluation Methodology

1. Overall Evaluation Categories

a) Operations (35%)

- Metrics: Increase in trains per day, travel time improvement; compatibility with local transit networks; supports long-term service level increases

b) Regional Connectivity (25%)

- Metrics: Increase in train stops per station; synchs with connections in LAUS, Palmdale, Burbank Airport North; estimated increase in mode share

c) Costs and Financial Performance (20%)

- Metrics: Estimated capital cost increase; percent increase in annual operating cost

d) ROW Impacts (10%)

- Metrics: Extent of ROW acquisitions reqd.; mitigatable property impacts; impacts on sensitive areas or communities

e) Applied Technology (10%)

- Metrics: VMT reductions; support for cleaner vehicle technology; support for HSR



E. Evaluation Methodology (continued)

2. Methodology

a) Evaluation Criteria under each category

- Criteria share the total weight applied to each category area

b) Metric/Measure

- Values for each metric under each scenario calculated or estimated, assigned a score of 100 to 300 points

c) Weighting Process

- All criteria within each category area assigned a weight of “1” for purposes of the Stage 1 Service Evaluation

Breakout Sessions



Prioritization Exercise Objectives

1. Identify the market factors and service characteristics that distinguish the service scenarios
2. Evaluate the five service scenarios – in two ways
 - a) Prioritize the potential markets to be served by the AVL and evaluate the scenarios in terms of the extent to which they benefit high-priority markets
 - b) Prioritize the service characteristics of the scenarios in terms of their benefit to high-priority markets and evaluate the performance of the scenarios
3. Inform the development of capital investment priorities

Discussion Results



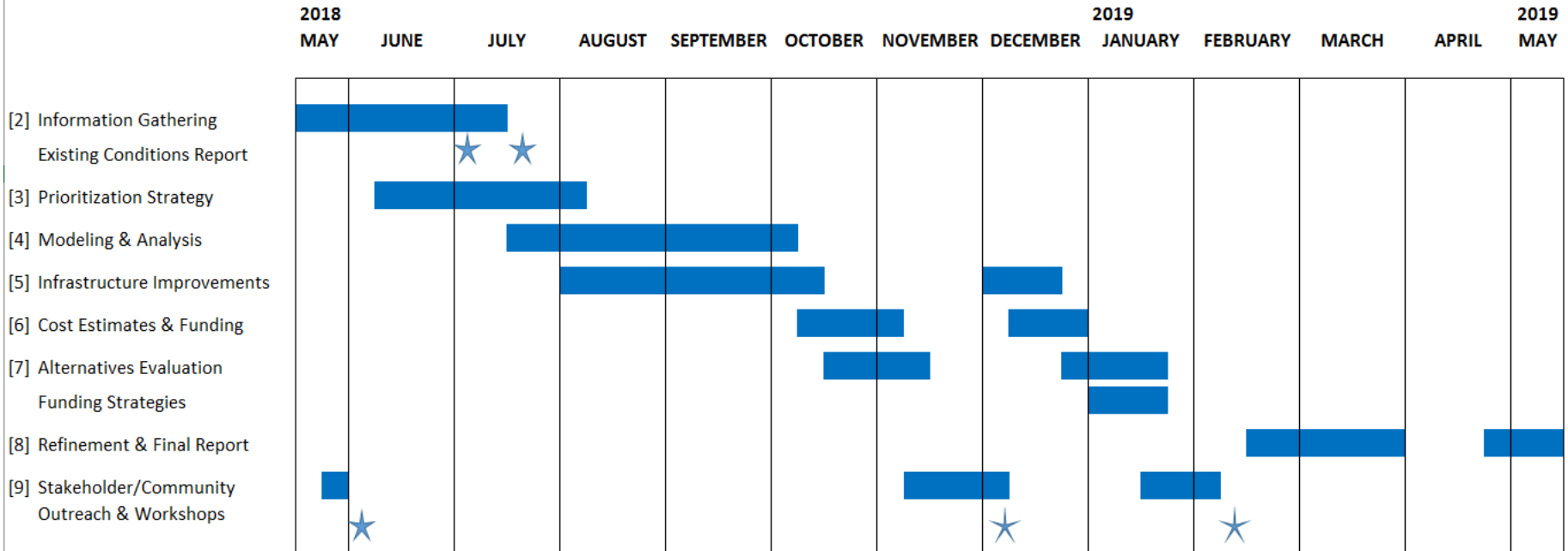
Breakout Session Summary and Notes

Breakout groups report on their prioritization discussions

1. - Record group input
2. -
3. -
4. -
5. -
6. -

Study Schedule

ANTELOPE VALLEY LINE STUDY PROJECT SCHEDULE



Next Steps

1. Meeting summary
2. Incorporate feedback from stakeholders
3. Continue evaluation process
4. Refine the capital projects
5. Identify Total costs and funding opportunities
6. Return to stakeholders with draft findings
7. Finalize the report

Thank You



APPENDIX 2 – ATTACHMENT 4

Evaluation Matrices for Service Scenario Evaluation

Stage 1 Evaluation Categories

Category Number	Category	Overall Category Weight	Evaluation Criteria	Metric/Measure
1	Operations	35%	Capacity Improvement	Percent increase in trains per hour or per day
			Travel Time Improvement	Average percent reduction in overall train trip time (wait time plus on-board time)
			Compatibility with Local Transit and Development Plans	Consistency with plans for future transit networks, route, and station area development plans
			Flexibility for Future Growth in Long Term	Assessment of support for long-term service level increases
			Quality of the Passenger Experience	General assessment of the overall improvement in service frequency, multi-modal connectivity, amenities, on-time performance
			Compatibility with Clockface Schedule Patterns	Pass/fail assessment based on service plan slot schedule
2	Regional Connectivity	25%	Travel Markets Served	Percent Increase in number of train trip stops at AVL stations (or station pairs)
			Multimodal Connectivity	Headway/Travel Pattern synchs or can be made to synch with local transit operators
			Regional Network Connectivity	Headway/trip pattern synchs with SCORE program connections in LAUS, Palmdale, Burbank Airport North
			Rail Mode Share Potential	Projected Percent Increase in corridor mode share
3	Costs and Financial Performance	20%	Total Capital Cost	ROM Capital cost using high-level cost factors for # of miles of double-track, bridges, etc.
			Relative Impact on Annual Operating Cost of AVL service	Percent increase in annual AVL operating cost based on % increase in train miles
4	ROW Impacts	10%	Right-of-Way Takes	Extent of ROW acquisition required from UPRR or other ROW owners
			Indirect Property (noise barriers, etc.)	Extent to which impacts to adjacent properties can be mitigated (i.e., with noise barriers, landscaping)
			Sensitive Areas (historic, endangered species, etc.)	Extent to which proposed construction affects sensitive areas or communities (including natural, cultural, and community resources)
5	Applied Technology	10%	VMT Reduction	Number of vehicular miles travelled reduced (1000's)
			Clean Vehicle Technology (e.g., DMUs, Electrification)	Supports cleaner vehicle technology
			Compatibility with Future High Speed Rail	Extent to which the service and infrastructure plan supports future development of HSR in the corridor
			Serves DAC s and Low Income Households/ Communities	Number of additional train stops serving stations near disadvantaged/low-income communities

Capacity Improvement (Operations Category)

Category Number	Category	Overall Category Weight	Evaluation Criteria	Metric/Measure
1	Operations	35%	Capacity Improvement	Percent increase in trains per day

Score Breakdown

Percent increase in trains per day	Sub-Category Score (100 - 300)
14% or less	100
15% to 19%	150
20% to 24%	200
25% to 29%	250
30% or more	300

Evaluation Table

	Existing Weekday	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Trains per day	30	30	34	38	38	42
Difference		0	4	8	8	12
Percent Increase		0%	13%	27%	27%	40%
Score based on breakdown		100	100	250	250	300

Sub-Criteria's Score Summary

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Metric/Measure	0%	13%	27%	27%	40%
Score (100-300)	100	100	250	250	300

Travel Time Improvement (Operations Category)

Category Number	Category	Overall Category Weight	Evaluation Criteria	Metric/Measure
1	Operations	35%	Travel Time Improvement	Average percent reduction in overall train trip time to existing service wait time plus on-board time

Score Breakdown

Average percent reduction in overall train trip time	Sub-Category Score (100 - 300)
Less than/or 9%	100
10% - 11%	150
12% - 13%	200
14% - 15%	250
16% or more	300

Supplemental Evaluation

Service Scenario	Existing Condition Average trip time in vehicle full length trips only	Average wait time between vehicles	Scenario's Average trip time in vehicle (full-length trips only)	Scenario's Average wait time between Vehicles (all trips all stops)	Total travel time savings	Existing Condition's total travel time	Average percent reduction in overall train trip time
	a	b	c	d	e = (a+b)-(c+d)	f = a+b	g = e/f
1	2:10:27	1:13:19	1:59:00	1:00:00	0:24:46	3:23:46	12%
2	2:10:27	1:13:19	1:59:00	0:54:12	0:30:34	3:23:46	15%
3	2:10:27	1:13:19	1:59:00	0:51:48	0:32:58	3:23:46	16%
4	2:10:27	1:13:19	1:59:00	0:51:25	0:33:21	3:23:46	16%
5	2:10:27	1:13:19	1:59:00	0:51:20	0:33:26	3:23:46	16%

Travel Time Improvement (Con't) (Operations Category)

Evaluation Table

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Travel Time Improvement	0:24:46	0:30:34	0:32:58	0:33:21	0:33:26
Average percent reduction in overall train trip time to existing service wait time plus on-board time.	12%	15%	16%	16%	16%
Score based on breakdown	200	250	300	300	300

Sub-Category's Score Summary

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Metric/Measure	12%	15%	16%	16%	16%
Score (100-300)	200	250	300	300	300

Compatibility with Local Transit and Development Plans (Operations Category)

Category Number	Category	Overall Category Weight	Evaluation Criteria	Metric/Measure
1	Operations	35%	Compatibility with Local Transit and Development Plans	Consistency with plans for future transit networks, route, and station area development plans

Score Breakdown

Consistency with plans	Sub-Category Score (100 - 300)
High	300
Medium	200
Low	100

Supplemental Evaluation

Supplemental research was completed to determine quantitative and qualitative factors for transit and development plans for each AVL station: new housing units, additional commercial space, new transit corridor projects, TOD Plans, etc. As well, calculations to determine the number of new trains stops per AVL station per service scenario. See 4.1.1 Evaluation Criteria Categories and Sub-Criteria for a more detailed methodology.

Evaluation Table

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Compatibility with Local Transit and Development Plans	Low	Medium	High	High	High
Score based on breakdown	100	200	300	300	300

Sub-Category's Score Summary

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Metric/Measure	Low	Medium	High	High	High
Score (100-300)	100	200	300	300	300

Flexibility For Growth (Operations Category)

Category Number	Category	Overall Category Weight	Evaluation Criteria	Metric/Measure
1	Operations	35%	Flexibility for Future Growth in Long Term	Assessment of support for long-term service level increases

Score Breakdown

Assessment of support for long-term service level	Sub-Category Score (100 - 300)
High	300
Medium	200
Low	100

Evaluation Table

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Infrastructure Improvements	Low	Medium	High	High	High
Ability to synchronize with future service; HSR, HDC,	Low	Low	High	High	High
Flexibility to schedule service around the constraints of Tunnel 25	High	High	Medium	Low	High
Metric/Measure	Medium	Medium	High	High	High
Score based on breakdown	200	200	300	300	300

Flexibility For Growth (Con't) (Operations Category)**Supplemental Evaluation**

Infrastructure Improvements				
Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Low	Medium	High	High	High
1 New project - not so flexible	4 New project - Somewhat flexible	8 New project - Really flexible	7 New project - Really flexible	8 New project - Really flexible
Ability to synchronize with future service; HSR, HDC,				
Low	Low	High	High	High
<ul style="list-style-type: none"> No express service Less capacity for other services Less connections at Palmdale 	<ul style="list-style-type: none"> No express service Less capacity for other services Less connections at Palmdale 	<ul style="list-style-type: none"> Express service More capacity for other services More connections at Palmdale & Sylmar 	<ul style="list-style-type: none"> Express service More capacity for other services More connections at Palmdale & Sylmar 	<ul style="list-style-type: none"> Express service More capacity for other services More connections at Palmdale & Sylmar
Flexibility to schedule service around the constraints of Tunnel 25				
High	High	Medium	Low	High
Schedule has flexibility around Tunnel 25	Schedule has flexibility around Tunnel 25	The spacing between trains approaching Tunnel 25 is not flexible	The tight spacing between trains around Tunnel 25 are a cause of reliability concern, and prohibit flexibility.	Schedule has flexibility around Tunnel 25

Sub-Category's Score Summary

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Metric/Measure	Medium	Medium	High	High	High
Score (100-300)	200	200	300	300	300

Quality of the Passenger Experience (Operations Category)

Category Number	Category	Overall Category Weight	Evaluation Criteria	Metric/Measure
1	Operations	35%	Quality of the Passenger Experience	General assessment of the overall improvement in service frequency, multi-modal connectivity, amenities, on-time performance

Score Breakdown

Overall Improvements	Sub-Category Score (100 - 300)
High	300
Medium	200
Low	100

Evaluation Table

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Improvement in Service Frequency	Low	Low	Medium	Medium	High
Running time - Express Service Available	Low	Low	High	High	High
Metric/Measure	Low	Low	Medium	Medium	High
Score based on breakdown	100	100	200	200	300

Quality of the Passenger Experience (Con't) (Operations Category)

Supplemental Evaluation

Service Scenario	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Improvement in Service Frequency	0%	13%	27%	27%	40%
	Low	Low	Medium	Medium	High
Running time - Express Service Available	No	No	Yes	Yes	Yes
	Low	Low	High	High	High

Sub-Category's Score Summary

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Metric/Measure	Low	Low	Medium	Medium	High
Score (100-300)	100	100	200	200	300

Compatibility with Clockface Schedule Patterns (Operations Category)

Category Number	Category	Overall Category Weight	Evaluation Criteria	Metric/Measure
1	Operations	35%	Compatibility with Clockface Schedule Patterns	Assessment based on service plan slot schedule

Score Breakdown

Number of trains stops in clock-face intervals	Sub-Category Score (100 - 300)
149 or less	100
150 or 159	150
160 to 169	200
170 to 179	250
180 or more	300

Evaluation Table

Minutes	Existing Weekday	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
60	12	168	150	152	146	147
30	8	0	32	19	14	11
15	4	0	0	6	1	1
Number of trains stops in clock-face intervals	24	168	182	177	161	159
Score based on breakdown	N/A	150	300	250	200	150

Sub-Category's Score Summary

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Metric/Measure	168	182	177	161	159
Score (100-300)	150	300	250	200	150

Travel Markets Served (Regional Connectivity Category)

Category Number	Category	Overall Category Weight	Evaluation Criteria	Metric/Measure
2	Regional Connectivity	25%	Travel Markets Served	Percent Increase in number of train trip stops at AVL stations (or station pairs)

Score Breakdown

Percent Increase	Sub-Category Score (100 - 300)
19% or less	100
20% to 24%	150
25% to 29%	200
30% to 34%	250
35% or more	300

Evaluation Table

	Existing Weekday	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
# Train Stops	314	360	396	420	420	432
Difference		46	82	106	106	118
% Increase		15%	26%	34%	34%	38%
Score based on breakdown		100	200	250	250	300

Sub-Category's Score Summary

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Metric/Measure	15%	26%	34%	34%	38%
Score (100-300)	100	200	250	250	300

Multimodal Connectivity (Regional Connectivity Category)

Category Number	Category	Overall Category Weight	Evaluation Criteria	Metric/Measure
2	Regional Connectivity	25%	Multimodal Connectivity	Headway/Travel Pattern synchs or can be made to synch with local transit operators.

Score Breakdown

Metric/Measure	Sub-Category Score (100 - 300)
100 or less	100
110 to 119	150
120 to 129	200
130 to 139	250
140 or more	300

Evaluation Table

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Number of additional train trips served by lines with a headways pattern that synch with local transit operators service.	94	108	136	136	146
Score based on breakdown	100	150	250	250	300

Multimodal Connectivity (Con't) (Regional Connectivity Category)**Supplemental Evaluation**

Station	Bus Line Frequency - Peak Period Only				SUM
	60 Mins	30 Mins	15 Mins	10 Mins	
Sun Valley	2	1	2	0	5
Sylmar/San Fernando	1	1	2	1	5
Newhall	0	6	0	0	6
Santa Clarita	0	0	0	0	0
Via Princessa	0	1	0	0	1
Vincent Grande/Acton	0	0	0	0	0
Palmdale	2	1	0	0	3
Lancaster	2	1	0	0	3
Number of new stops per station					
	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Lancaster	6	6	8	8	8
Palmdale	5	5	7	7	7
Vincent Grande/Acton	6	6	6	6	6
Via Princessa	2	4	4	4	2
Santa Clarita	0	2	4	4	2
Newhall	1	3	3	3	1
Sylmar/San Fernando	0	2	4	4	6
Sun Valley	1	3	3	3	5

Sub-Category's Score Summary

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Metric/Measure	94	108	136	136	146
Score (100-300)	100	150	250	250	300

Regional Network Connectivity (Regional Connectivity Category)

Category Number	Category	Overall Category Weight	Evaluation Criteria	Metric/Measure
2	Regional Connectivity	25%	Regional Network Connectivity	Headway/trip pattern synchs with SCORE program connections in LAUS, Palmdale, Burbank Airport North

Score Breakdown

Number of trains with intervals of less than 30 minutes	Sub-Category Score (100 - 300)
0 to 14	100
15 to 29	200
30 or more	300

Evaluation Table

	Existing Weekday	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
90+	29	0	0	0	0	0
60 - 90	48	0	0	0	0	0
30 - 60	55	168	162	166	160	170
15 - 30	10	0	24	18	34	31
0 - 15	3	0	0	14	4	3
Total number of trains with intervals of less than 30 minutes		0	24	32	38	34
Score based on breakdown		100	200	300	300	300

Sub-Category's Score Summary

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Metric/Measure	0	24	32	38	34
Score (100-300)	100	200	300	300	300

Rail Mode Share Potential (Regional Connectivity Category)

Category Number	Category	Overall Category Weight	Evaluation Criteria	Metric/Measure
2	Regional Connectivity	25%	Rail Mode Share Potential	Projected Percent Increase in ridership on the AVL.

Score Breakdown

Ridership Increase	Sub-Category Score (100 - 300)
0% to 3%	100
4% to 7%	150
8% to 11%	200
12% to 15%	250
16% or more	300

Evaluation Table

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Daily Revenue Hours	60:45:00	65:05:00	72:33:00	70:41:00	72:45:00
Daily Rev. Hr increase from existing weekday service.	5:55:00	10:15:00	17:43:00	15:51:00	17:55:00
Percent Increase of daily revenue hours from existing weekday service.	11%	19%	32%	29%	33%
Expected Ridership based on projected percent increase daily revenue hours.	6,156	6,387	6,785	6,685	6,795
Ridership increase using %50 ratio service to ridership.	315	546	944	844	954
Projected Percent Increase in ridership on the AVL.	5%	9%	16%	14%	16%
Score based on breakdown	150	200	300	250	300

Sub-Category's Score Summary

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Metric/Measure	5%	9%	16%	14%	16%
Score (100-300)	150	200	300	250	300

Total Capital Cost (Costs and Financial Performance Category)

Category Number	Category	Overall Category Weight	Evaluation Criteria	Metric/Measure
3	Costs and Financial Performance	20%	Total Capital Cost	ROM Capital cost using high-level cost factors for # of miles of double-track, bridges, etc.

Score Breakdown

Total ROW Capital Cost (In millions)	Sub-Category Score (100 - 300)
\$300 or more	100
\$100 to \$200	200
\$100 or less	300

Evaluation Table

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Total ROM Capital Cost	\$41,800,000	\$175,200,000	\$328,900,000	\$428,600,000	\$448,700,000
Total ROW Capital Cost (In millions)	\$42	\$175	\$329	\$429	\$449
Score based on breakdown	300	200	100	100	100

Sub-Category's Score Summary

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Metric/Measure	\$41,800,000	\$175,200,000	\$328,900,000	\$428,600,000	\$448,700,000
Score (100-300)	300	200	100	100	100

Costs and Financial Performance (Costs and Financial Performance Category)

Category Number	Category	Overall Category Weight	Evaluation Criteria	Metric/Measure
3	Costs and Financial Performance	20%	Relative Impact on Annual Operating Cost of AVL service	Increase in annual AVL operating cost based on % increase in train miles

Score Breakdown

Increase in operation cost (In Millions)	Sub-Category Score (100 - 300)
\$8.0 or more	100
\$7.0 to \$7.9	150
\$6.0 to \$6.9	200
\$5.0 to \$5.9	250
\$4.9 or less	300

Evaluation Table

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Increase in annual AVL operating cost based on % increase in train miles	\$3,103,000	\$5,373,000	\$9,288,000	\$8,308,000	\$9,393,000
(In millions)	\$3.1	\$5.4	\$9.3	\$8.3	\$9.4
Score based on breakdown	300	250	100	100	100

Sub-Category's Score Summary

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Metric/Measure	\$3,103,000	\$5,373,000	\$9,288,000	\$8,308,000	\$9,393,000
Score (100-300)	300	250	100	100	100

Right-of-Way (ROW) Impacts (Right-of-Way Takes Category)

Category Number	Category	Overall Category Weight	Evaluation Criteria	Metric/Measure
4	ROW Impacts	10%	Right-of-Way Takes	Extent of ROW acquisition required from UPRR or other ROW owners

Score Breakdown

Total SF of ROW Takes	Sub-Category Score (100 - 300)
0 SF	300
1 SF to 100,000 SF	200
100,001 SF or more	100

Evaluation Table

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Total SF of ROW Takes	0	76300	76300	139660	139660
Score based on breakdown	300	200	200	100	100

Supplemental Evaluation

Project	Property Purpose	Parcel No.	Length	Width	Total SF
Lancaster South	Train Storage Area	1	1,154	55	63,470
Lancaster South	Access Track/Turnout	2	135	30	4,050
Lancaster South	Access Lead	3	130	30	3,900
Project Total					71,420
Palmdale North	Second Track	1	1,584	40	63,360
Project Total					63,360
Santa Clarita Station	Second Platform	1	122	40	4,880
Project Total					4,880

ROW Impacts (Con't) (Right-of-Way Takes Category)**Supplemental Evaluation**

Capital Projects				Scenario					
MP Location	Project	Track-feet	Description	Right-of-Way Takes in Sq Ft	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Total SF of ROW Takes →				0	76,300	76,300	139,660	139,660	
-76.6	Lancaster Terminal -- 6 trainsets	3,440	Station and yard improvements (scope?)	71,420		X			X
-76.6	Lancaster Terminal -- 8 trainsets	4,300	New double track and second station platform face, plus three new 1,000' storage tracks	71,420			X	X	
68.5-72.0	Palmdale North	18,480	New double track and 2 platform tracks at station (integrated with HSR)	63,360				X	X
33.4-35.0	Canyon-Sta. Clarita	8,448	Extend existing siding (new double track)	4,880		X	X	X	X

Sub-Category's Score Summary

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Metric/Measure	0	76,300	76,300	139,660	139,660
Score (100-300)	300	200	200	100	100

Indirect Property Impacts (ROW Impacts Category)

Category Number	Category	Overall Category Weight	Evaluation Criteria	Metric/Measure
4	ROW Impacts	10%	Indirect Property (noise barriers, etc.)	Extent to which impacts to adjacent properties can be mitigated (i.e., with noise barriers, landscaping)

Score Breakdown

Metric/Measure	Sub-Category Score (100 - 300)
No Impacts	300
Impacts to adjacent properties	100

Evaluation Table

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Approximate linear feet of affected property	0	0	2,550	0	0
Impacts to adjacent properties	No	No	Yes	No	No
Score based on breakdown	300	300	100	300	300

Supplemental Evaluation

The approximate linear feet of affected property were determined for all the capital projects required for each scenario. It was determined that only segments of the Hood-Saugus (connect sidings and convert to double track) and Sylmar-Roxford (second track at station) capital projects require a sound wall or other mitigation. Only Service scenario 3 requires these two projects.

Sub-Category's Score Summary

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Metric/Measure	No	No	Yes	No	No
Score (100-300)	300	300	100	300	300

Sensitive Areas (ROW Impacts Category)

Category Number	Category	Overall Category Weight	Evaluation Criteria	Metric/Measure
4	ROW Impacts	10%	Sensitive Areas (historic, endangered species, etc.)	Extent to which proposed construction affects sensitive areas or communities (including natural, cultural, and community resources)

Score Breakdown

Metric/Measure	Sub-Category Score (100 - 300)
High	300
Medium	200
Low	100

Evaluation Table

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Drainage	Low	Medium	Medium	High	High
Bridges	Low	Low	High	High	High
Earthwork	Low	Medium	Medium	High	High
Metric/Measure	Low	Medium	Medium	High	High
Score based on breakdown	300	200	200	100	100

Sensitive Areas (Con't) (ROW Impacts Category)

Supplemental Evaluation

Number of Projects		Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
	Drainage	0	12	20	32	32
	Low	Medium	Medium	High	High	
Bridges	0	0	4	4	4	
	Low	Low	High	High	High	
Earthwork	2	4	4	11	11	
	Low	Medium	Medium	High	High	

Sub-Category's Score Summary

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Metric/Measure	Low	Medium	Medium	High	High
Score (100-300)	300	200	200	100	100

VMT Reduction (Applied Technology Category)

Category Number	Category	Overall Category Weight	Evaluation Criteria	Metric/Measure
5	Applied Technology	10%	VMT Reduction	Number of vehicular miles travelled reduced (1000's)

Score Breakdown

	Sub-Category Score (100 - 300)
Less than 30,000	100
30,000 to 40,000	150
40,000 to 50,000	200
50,000 to 60,000	250
More than 60,000	300

Evaluation Table

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Daily Revenue Hours	60:45:00	65:05:00	72:33:00	70:41:00	72:45:00
Daily Rev. Hr increase from existing weekday service	5:55:00	10:15:00	17:43:00	15:51:00	17:55:00
Percent Increase of daily revenue hours from existing weekday service	10.8%	18.7%	32.3%	28.9%	32.7%
Ridership increase using %50 ratio service to ridership	315	546	944	844	954
Expected Ridership based on projected percent increase daily revenue hours	6,156	6,387	6,785	6,685	6,795
Weekday miles reduced	22,563	39,089	67,563	60,444	68,325
Score based on breakdown	100	150	300	300	300

VMT Reduction (Con't) (Applied Technology Category)

Supplemental Evaluation

	Existing Weekday
Daily Revenue Hours	54:50:00
AVL Ridership	5,841
Average trip length in miles	36

Sub-Category's Score Summary

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Metric/Measure	22,563	39,089	67,563	60,444	68,325
Score (100-300)	100	150	300	300	300

Clean Vehicle Technology (Applied Technology Category)

Category Number	Category	Overall Category Weight	Evaluation Criteria	Metric/Measure
5	Applied Technology	10%	Clean Vehicle Technology (e.g., DMUs, Electrification)	Supports cleaner vehicle technology

Score Breakdown

Supports cleaner vehicle technology	Sub-Category Score (100 - 300)
Yes	300
No	100

Evaluation Table

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Number of trains that exceeds the capacity crush load of 450 passengers	1	1	1	1	1
Number of trains with # of passengers greater than 75% of the 450 passengers capacity of DMUs.	1	1	1	1	1
Metric/Measure	Yes	Yes	Yes	Yes	Yes
Score based on breakdown	300	300	300	300	300

Sub-Category's Score Summary

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Metric/Measure	Yes	Yes	Yes	Yes	Yes
Score (100-300)	300	300	300	300	300

Compatibility with Future High Speed Rail (Applied Technology Category)

Category Number	Category	Overall Category Weight	Evaluation Criteria	Metric/Measure
5	Applied Technology	10%	Compatibility with Future High Speed Rail	Extent to which the service and infrastructure plan supports future development of HSR in the corridor

Score Breakdown

Metric/Measure	Sub-Category Score (100 - 300)
High	300
Medium	200
Low	100

Evaluation Table

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Service Frequency	Low	Medium	Medium	Medium	High
Infrastructure Improvements	Low	Low	Low	Low	Low
Potential for express service	Low	Low	High	High	High
Metric/Measure	Low	Medium	Medium	Medium	High
Score based on breakdown	100	200	200	200	300

Compatibility with Future High Speed Rail (Con't) (Applied Technology Category)

Supplemental Evaluation

Service Frequency				
Low	Medium	Medium	Medium	High
Lower connectivity potential and frequent clockface compatibility	Good connectivity at Palmdale with more additional train stops and clockface frequency	Good connectivity at Palmdale with more additional train stops and clockface frequency	Good connectivity at Palmdale with more additional train stops and clockface frequency	Good connectivity at Palmdale with more additional train stops and 1/2 service at peak hours.
Infrastructure Improvements				
Low	Low	Low	Low	Low
Current infrastructure improvements do not electrify the ROW necessary to run HSR service	Current infrastructure improvements do not electrify the ROW necessary to run HSR service	Current infrastructure improvements do not electrify the ROW necessary to run HSR service	Current infrastructure improvements do not electrify the ROW necessary to run HSR service	Current infrastructure improvements do not electrify the ROW necessary to run HSR service
Potential for express service				
Low	Low	High	High	High
No slots to run express service	No slots to run express service	Express service slots can be accommodated	Express service slots can be accommodated	Express service slots can be accommodated

Sub-Category's Score Summary

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Metric/Measure	Low	Medium	Medium	Medium	High
Score (100-300)	100	200	200	200	300

Serves DAC s and Low Income Households/ Communities (Applied Technology Category)

Category Number	Category	Overall Category Weight	Evaluation Criteria	Metric/Measure
5	Applied Technology	10%	Serves DAC s and Low Income Households/ Communities	Number of additional train stops serving stations near disadvantaged/low-income communities

Score Breakdown

# of New Stations multiplied by the # of Communities	Sub-Category Score (100 - 300)
29 or less	100
30 to 59	150
60 to 89	200
90 to 119	250
120 or more	300

Evaluation Table

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
# New Stops	13	19	25	25	27
# of New Stations multiplied by the # of Communities	59	89	119	119	141
Score based on breakdown	150	200	250	250	300

Serves DAC s and Low Income Households/ Communities (Con't) (Applied Technology Category)

Supplemental Evaluation

Station	# of Disadvantage Communities	Communities with 75%+ of Population in Poverty	Total Communities
Sunvalley	6	1	7
Sylmar/San Fernando	3	3	6
Newhall	0	2	2
Santa Clarita	0	0	0
Via Princessa	0	0	0
Vincent Grande/Acton	0	0	0
Palmdale	1	3	4
Lancaster	0	5	5

Number of new stops per station					
	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Lancaster	6	6	8	8	8
Palmdale	5	5	7	7	7
Vincent Grande/Acton	6	6	6	6	6
Via Princessa	2	4	4	4	2
Santa Clarita	0	2	4	4	2
Newhall	1	3	3	3	1
Sylmar/San Fernando	0	2	4	4	6
Sun Valley	1	3	3	3	5

Sub-Category's Score Summary

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Metric/Measure	59	89	119	119	141
Score (100-300)	150	200	250	250	300

APPENDIX 2 – ATTACHMENT 5

Revised Scenario Headway Sheets

**February 11, 2019 Stakeholders Meeting
Draft Service Scenarios 1 - 6**

Prepared for:



Los Angeles County
Metropolitan Transportation Authority

Prepared by:



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METROLINK ANTELOPE VALLEY LINE For Discussion Purposes Only

SCENARIO 1: Late Evening Train - Existing Peak and Mid-Day Service plus 1 Late Night Trip

INBOUND: LANCASTER - L.A. UNION STATION

Train number	MONDAY THROUGH FRIDAY															29:21:00	
	200	202	204	282	206	208	210	212	214	216	218	220	222	224	226		1230
LANCASTER	3:44	4:46	5:16		5:58	6:48		9:01		11:35		13:45			18:17		
PALMDALE	3:54	4:56	5:26	6:01	6:08	6:58		9:11		11:45		13:55			18:26	19:35	
VINCENT GRADE/ACTON	4:06	5:08	5:38		6:21	7:10		9:23		11:57		14:07			18:39	19:47	
VISTA CANYON																	
VIA PRINCESSA	4:42	5:44	6:15		6:56	7:48	9:05	9:59	11:26	12:34	13:51	14:43	15:25		19:25	20:52	
SANTA CLARITA	4:48	5:50	6:21	6:49	7:02	7:55	9:11	10:05	11:32	12:40	13:57	14:49	15:32	17:11	19:31	20:58	
NEWHALL #	4:56	5:58	6:29		7:10	8:02	9:19	10:13	11:40	12:48	14:05	15:03	15:40	17:19	19:46	21:05	
SYLMAR/SAN FERNANDO	5:10	6:12	6:44	7:13	7:27	8:19	9:34	10:31	11:55	13:04	14:19	15:16	15:54	17:33	19:59	21:19	
SYLMAR/SAN FERNANDO	5:11	6:13	6:45	7:14	7:28	8:20	9:35	10:32	11:56	13:06	14:20	15:17	15:56	17:35	20:00	21:20	
SUN VALLEY	5:18	6:20	6:56		7:36	8:27	9:43	10:40	12:04	13:14	14:29	15:25	16:05	17:43	20:13	21:28	
BURBANK AIRPORT - NORTH	5:22	6:24	7:00		7:40	8:31	9:47	10:44	12:08	13:18	14:33	15:29	16:10	17:47	20:17	21:32	
BURBANK #	5:28	6:30	7:05	7:25	7:45	8:37	9:52	10:49	12:13	13:23	14:38	15:35	16:21	17:52	20:22	21:37	
GLENDALE #	5:34	6:36	7:12		7:51	8:43	9:59	10:56	12:20	13:30	14:45	15:41	16:28	17:59	20:29	21:43	
L.A. UNION STATION	5:53	6:55	7:25	7:44	8:06	8:57	10:13	11:08	12:34	13:43	15:01	15:55	16:41	18:14	20:42	21:54	
	2:09:00	2:09:00	2:09:00	1:43:00	2:08:00	2:09:00	1:08:00	2:07:00	1:08:00	2:08:00	1:10:00	2:10:00	1:16:00	1:03:00	2:25:00	2:19:00	

OUTBOUND: L.A. UNION STATION - LANCASTER

Train number	MONDAY THROUGH FRIDAY															29:57:00	
	201	203	205	207	209	211	213	215	217	219	285	221	223	225	227		1235
L.A. UNION STATION	6:19	7:29	8:29	9:42	11:06	11:58	13:55	15:28	15:50	16:44	17:32	17:58	18:38	19:36	21:25	22:30	
GLENDALE #	6:31	7:41	8:41	9:54	11:18	12:10	14:07	15:40	16:02	16:56		18:10	18:50	19:48	21:37	22:41	
BURBANK #	6:38	7:49	8:48	10:01	11:25	12:18	14:14	15:48	16:09	17:04	17:48	18:18	18:57	19:55	21:44	22:48	
BURBANK AIRPORT - NORTH	6:44	7:55	8:54	10:07	11:31	12:24	14:20	15:54	16:16	17:10		18:23	19:03	20:01	21:50	22:53	
SUN VALLEY	6:49	7:59	8:59	10:12	11:36	12:29	14:25	15:58	16:21	17:14		18:28	19:08	20:06	21:54	22:58	
SYLMAR/SAN FERNANDO	6:59	8:07	9:07	10:20	11:44	12:37	14:35	16:08	16:29	17:23	18:04	18:36	19:16	20:14	22:02	23:06	
SYLMAR/SAN FERNANDO	7:01	8:08	9:08	10:21	11:45	12:38	14:36	16:10	16:30	17:24	18:05	18:37	19:17	20:15	22:03	23:07	
NEWHALL #	7:19	8:26	9:24	10:40	12:03	12:54	14:51	16:25	16:45	17:42		18:53	19:32	20:30	22:18	23:22	
SANTA CLARITA	7:26	8:33	9:32	10:48	12:11	13:02	15:00	16:32	16:52	17:49	18:25	19:00	19:43	20:38	22:26	23:29	
VIA PRINCESSA	7:33	8:42	9:40	10:56	12:18	13:12	15:06	16:39		17:56		19:07	19:50	20:45	22:33	23:36	
VISTA CANYON																	
VINCENT GRADE/ACTON	8:12		10:24		12:59			17:17		18:35		19:49	20:28	21:23	23:11	0:16	
PALMDALE	8:22		10:35		13:10			17:28		18:49	19:21	20:00	20:39	21:34	23:22	0:27	
LANCASTER	8:35		10:46		13:20			17:41		18:58		20:12	20:54	21:49	23:37	0:35	
	2:16:00	1:13:00	2:17:00	1:14:00	2:14:00	1:14:00	1:11:00	2:13:00	1:02:00	2:14:00	1:49:00	2:14:00	2:16:00	2:13:00	2:12:00	2:05:00	

= Express Trains
 = Late Night Train Service

Total Service Hours 59:18:00

2

METROLINK ANTELOPE VALLEY LINE For Discussion Purposes Only

SCENARIO 2: Two Additional Off-Peak Round Trips - Existing Peak Service

INBOUND: LANCASTER - L.A. UNION STATION

Train number	MONDAY THROUGH FRIDAY																		
	200	200	204	282	206	206	4210	2212	3214	2216	3218	2220	3222	2224	2226	4228	206	1230	
LANCASTER	3:44	4:46	5:16		5:58	6:48	7:46	9:04		11:04		13:04		15:04	16:04	17:11	18:17		
PALMDALE	3:54	4:56	5:26	6:01	6:08	6:58	7:55	9:14		11:14		13:14		15:14	16:14	17:20	18:26	19:35	
VINCENT GRADE/ACTON	4:06	5:08	5:38		6:21	7:10	8:07	9:26		11:26		13:26		15:26	16:26	17:32	18:39	19:47	
VISTA CANYON																			
VIA PRINCESSA	4:42	5:44	6:15		6:56	7:48	8:46	10:04	11:04	12:04	13:04	14:04	15:04	16:04	17:04	18:11	19:25	20:52	
SANTA CLARITA	4:48	5:50	6:21	6:49	7:02	7:55	8:51	10:10	11:10	12:10	13:10	14:10	15:10	16:10	17:10	18:18	19:31	20:58	
NEWHALL #	4:56	5:58	6:29		7:10	8:02	8:59	10:18	11:18	12:18	13:18	14:18	15:18	16:18	17:18	18:26	19:46	21:05	
SYLMAR/SAN FERNANDO	5:10	6:12	6:44	7:13	7:27	8:19	9:18	10:32	11:32	12:32	13:32	14:32	15:32	16:32	17:32	18:43	19:59	21:19	
SYLMAR/SAN FERNANDO	5:11	6:13	6:45	7:14	7:28	8:20	9:19	10:33	11:33	12:33	13:33	14:33	15:33	16:33	17:33	18:44	20:00	21:20	
SUN VALLEY	5:18	6:20	6:56		7:36	8:27	9:27	10:40	11:40	12:40	13:40	14:40	15:40	16:40	17:40	18:52	20:13	21:28	
BURBANK AIRPORT - NORTH	5:22	6:24	7:00		7:40	8:31	9:30	10:44	11:44	12:44	13:44	14:44	15:44	16:44	17:44	18:55	20:17	21:32	
BURBANK #	5:28	6:30	7:05	7:25	7:45	8:37	9:35	10:49	11:49	12:49	13:49	14:49	15:49	16:49	17:49	19:00	20:22	21:37	
GLENDALE #	5:34	6:36	7:12		7:51	8:43	9:42	10:55	11:56	12:55	13:56	14:55	15:56	16:55	17:55	19:07	20:29	21:43	
L.A. UNION STATION	5:53	6:55	7:25	7:44	8:06	8:57	9:53	11:06	12:06	13:06	14:06	15:06	16:06	17:06	18:06	19:18	20:42	21:54	
	2:09:00	2:09:00	2:09:00	1:43:00	2:08:00	2:09:00	2:07:00	2:02:00	1:02:00	2:02:00	1:02:00	2:02:00	1:02:00	2:02:00	2:02:00	2:07:00	2:25:00	2:19:00	34:41:00

OUTBOUND: L.A. UNION STATION - LANCASTER

Train number	MONDAY THROUGH FRIDAY																		
	201	4203	4205	3207	2209	3211	2213	3215	2217	2219	5219	219	285	221	223	225	227	1235	
L.A. UNION STATION	6:19	7:35	8:35	9:44	10:44	11:44	12:44	13:44	14:44	15:44	16:10	16:44	17:32	17:58	18:38	19:36	21:25	22:30	
GLENDALE #	6:31	7:46	8:46	9:56	10:56	11:56	12:56	13:56	14:56	15:56	16:22	16:56		18:10	18:50	19:48	21:37	22:41	
BURBANK #	6:38	7:53	8:53	10:03	11:03	12:03	13:03	14:03	15:03	16:03	16:30	17:04	17:48	18:18	18:57	19:55	21:44	22:48	
BURBANK AIRPORT - NORTH	6:44	7:58	8:58	10:08	11:08	12:08	13:08	14:08	15:08	16:08	16:36	17:10		18:23	19:03	20:01	21:50	22:53	
SUN VALLEY	6:49	8:03	9:03	10:12	11:12	12:12	13:12	14:12	15:12	16:12	16:40	17:14		18:28	19:08	20:06	21:54	22:58	
SYLMAR/SAN FERNANDO	6:59	8:11	9:11	10:21	11:21	12:21	13:21	14:21	15:21	16:21	16:49	17:23	18:04	18:36	19:16	20:14	22:02	23:06	
SYLMAR/SAN FERNANDO	7:01	8:12	9:12	10:22	11:22	12:22	13:22	14:22	15:22	16:22	16:50	17:24	18:05	18:37	19:17	20:15	22:03	23:07	
NEWHALL #	7:19	8:27	9:27	10:37	11:37	12:37	13:37	14:37	15:37	16:37	17:08	17:42		18:53	19:32	20:30	22:18	23:22	
SANTA CLARITA	7:26	8:34	9:34	10:44	11:44	12:44	13:44	14:44	15:44	16:44	17:15	17:49	18:25	19:00	19:43	20:38	22:26	23:29	
VIA PRINCESSA	7:33	8:41	9:41	10:51	11:51	12:51	13:51	14:51	15:51	16:51	17:22	17:56		19:07	19:50	20:45	22:33	23:36	
VISTA CANYON																			
VINCENT GRADE/ACTON	8:12	9:25	10:25		12:31		14:31		16:31		17:31	18:01	18:35		19:49	20:28	21:23	23:11	
PALMDALE	8:22	9:36	10:36		12:42		14:42		16:42		17:42	18:15	18:49	19:21	20:00	20:39	21:34	23:22	
LANCASTER	8:35	9:44	10:44		12:50		14:50		16:50		17:50	18:24	18:58		20:12	20:54	21:49	23:37	
	2:16:00	2:09:00	2:09:00	1:07:00	2:06:00	1:07:00	2:06:00	1:07:00	2:06:00	2:06:00	2:14:00	2:14:00	1:49:00	2:14:00	2:16:00	2:13:00	2:12:00	2:05:00	35:36:00

 = Short Turn trains. Require arrangements for turn-around at Via Princessa/Vista Canyon
 = Express Trains
 = Late Night Train Service

Total Service Hours 70:17:00

3

METROLINK ANTELOPE VALLEY LINE Hypothetical Weekday Timetable

SCENARIO 3: Improved Peak Service and Semi-Hourly Off-Peak Service

INBOUND: LANCASTER - L.A. UNION STATION

Train number	MONDAY THROUGH FRIDAY																														
	200	2204	2282	2206	2284	2206	3206	2208	3208	2210	3210	2212	3212	2214	3214	2216	3216	2218	3218	2220	3220	2222	3222	2224	3224	2226	4228	206	1230	4228	
Remarks	AM PEAK																														
LANCASTER	3:44	4:28	4:56	5:13	5:41	6:04		7:04		8:04		9:04		10:04		11:04		12:04		13:04		14:04		15:04		16:04	17:11			21:00	
PALMDALE	3:54	4:37	5:05	5:22	5:50	6:14		7:14		8:14		9:14		10:14		11:14		12:14		13:14		14:14		15:14		16:14	17:20	18:21	19:35	21:09	
VINCENT GRADE/ACTON	4:06	4:49		5:34		6:26		7:26		8:26		9:26		10:26		11:26		12:26		13:26		14:26		15:26		16:26	17:32	18:34	19:47	21:21	
VISTA CANYON																															
VIA PRINCESSA	4:42	5:26		6:11		7:04	7:34	8:04	8:34	9:04	9:34	10:04	10:34	11:04	11:34	12:04	12:34	13:04	13:34	14:04	14:34	15:04	15:34	16:04	16:34	17:04	18:11	19:23	20:52	21:59	
SANTA CLARITA	4:48	5:32	5:58	6:17	6:43	7:10	7:40	8:10	8:40	9:10	9:40	10:10	10:40	11:10	11:40	12:10	12:40	13:10	13:40	14:10	14:40	15:10	15:40	16:10	16:40	17:10	18:18	19:31	20:58	22:05	
NEWHALL #	4:56	5:39		6:24		7:18	7:48	8:18	8:48	9:18	9:48	10:18	10:48	11:18	11:48	12:18	12:48	13:18	13:48	14:18	14:48	15:18	15:48	16:18	16:48	17:18	18:26	19:46	21:05	22:13	
SYLMAR/SAN FERNANDO	5:10	5:52	6:17	6:37	7:02	7:32	8:02	8:32	9:02	9:32	10:02	10:32	11:02	11:32	12:02	12:32	13:02	13:32	14:02	14:32	15:02	15:32	16:02	16:32	17:02	17:32	18:43	19:59	21:19	22:30	
SYLMAR/SAN FERNANDO	5:11	5:53	6:18	6:38	7:03	7:33	8:03	8:33	9:03	9:33	10:03	10:33	11:03	11:33	12:03	12:33	13:03	13:33	14:03	14:33	15:03	15:33	16:03	16:33	17:03	17:33	18:44	20:00	21:20	22:31	
SUN VALLEY	5:18	6:00		6:45		7:40	8:10	8:40	9:10	9:40	10:10	10:40	11:10	11:40	12:10	12:40	13:10	13:40	14:10	14:40	15:10	15:40	16:10	16:40	17:10	17:40	18:52	20:13	21:28	22:39	
BURBANK AIRPORT - NORTH	5:22	6:03		6:48		7:44	8:14	8:44	9:14	9:44	10:14	10:44	11:14	11:44	12:14	12:44	13:14	13:44	14:14	14:44	15:14	15:44	16:14	16:44	17:14	17:44	18:55	20:17	21:32	22:42	
BURBANK #	5:28	6:07	6:30	6:52	7:15	7:49	8:19	8:49	9:19	9:49	10:19	10:49	11:19	11:49	12:19	12:49	13:19	13:49	14:19	14:49	15:19	15:49	16:19	16:49	17:19	17:49	19:00	20:22	21:37	22:47	
GLENDALE #	5:34	6:13		6:58		7:55	8:26	8:55	9:26	9:55	10:26	10:55	11:26	11:55	12:26	12:55	13:26	13:55	14:26	14:55	15:26	15:55	16:26	16:55	17:26	17:55	19:07	20:29	21:43	22:54	
L.A. UNION STATION	5:53	6:23	6:45	7:08	7:30	8:06	8:36	9:06	9:36	10:06	10:36	11:06	11:36	12:06	12:36	13:06	13:36	14:06	14:36	15:06	15:36	16:06	16:36	17:06	17:36	18:06	19:18	20:42	21:54	23:05	
	2:09:00	1:55:00	1:49:00	1:55:00	1:49:00	2:02:00	1:02:00	2:02:00	1:02:00	2:02:00	1:02:00	2:02:00	1:02:00	2:02:00	1:02:00	2:02:00	1:02:00	2:02:00	1:02:00	2:02:00	1:02:00	2:02:00	1:02:00	2:02:00	1:02:00	2:02:00	2:07:00	2:21:00	2:19:00	2:05:00	51:11:00

OUTBOUND: L.A. UNION STATION - LANCASTER

Train number	MONDAY THROUGH FRIDAY																															
	3201	2201	3203	2203	3205	2205	3207	2207	3209	2209	3211	2211	3213	2213	3215	2215	3217	2217	3219	2219	5219	2221	2263	285	221	223	225	227	1235	1237		
Remarks	PM PEAK																															
L.A. UNION STATION	6:14	6:44	7:14	7:44	8:14	8:44	9:14	9:44	10:14	10:44	11:14	11:44	12:14	12:44	13:14	13:44	14:14	14:44	15:14	15:44	16:15	16:44	17:15	17:32	17:58	18:38	19:36	21:25	22:30	23:30		
GLENDALE #	6:26	6:56	7:26	7:56	8:26	8:56	9:26	9:56	10:26	10:56	11:26	11:56	12:26	12:56	13:26	13:56	14:26	14:56	15:26	15:56	16:26	16:56	17:26		18:10	18:50	19:48	21:37	22:41	23:41		
BURBANK #	6:33	7:03	7:33	8:03	8:33	9:03	9:33	10:03	10:33	11:03	11:33	12:03	12:33	13:03	13:33	14:03	14:33	15:03	15:33	16:03	16:33	17:03	17:33	17:48	18:18	18:57	19:55	21:44	22:48	23:48		
BURBANK AIRPORT - NORTH	6:38	7:08	7:38	8:08	8:38	9:08	9:38	10:08	10:38	11:08	11:38	12:08	12:38	13:08	13:38	14:08	14:38	15:08	15:38	16:08	16:39	17:08	17:38		18:23	19:03	20:01	21:50	22:53	23:53		
SUN VALLEY	6:42	7:12	7:42	8:12	8:42	9:12	9:42	10:12	10:42	11:12	11:42	12:12	12:42	13:12	13:42	14:12	14:42	15:12	15:42	16:12	16:43	17:12	17:43		18:28	19:08	20:06	21:54	22:58	23:58		
SYLMAR/SAN FERNANDO	6:51	7:21	7:51	8:21	8:51	9:21	9:51	10:21	10:51	11:21	11:51	12:21	12:51	13:21	13:51	14:21	14:51	15:21	15:51	16:21	16:51	17:21	17:51	18:04	18:36	19:16	20:14	22:02	23:06	0:06		
SYLMAR/SAN FERNANDO	6:52	7:22	7:52	8:22	8:52	9:22	9:52	10:22	10:52	11:22	11:52	12:22	12:52	13:22	13:52	14:22	14:52	15:22	15:52	16:22	16:52	17:22	17:52	18:05	18:37	19:17	20:15	22:03	23:07	0:07		
NEWHALL #	7:07	7:37	8:07	8:37	9:07	9:37	10:07	10:37	11:07	11:37	12:07	12:37	13:07	13:37	14:07	14:37	15:07	15:37	16:07	16:37	17:08	17:37	18:07		18:53	19:32	20:30	22:18	23:22	0:22		
SANTA CLARITA	7:14	7:44	8:14	8:44	9:14	9:44	10:14	10:44	11:14	11:44	12:14	12:44	13:14	13:44	14:14	14:44	15:14	15:44	16:14	16:44	17:15	17:44	18:16	18:25	19:00	19:43	20:38	22:26	23:29	0:29		
VIA PRINCESSA	7:21	7:51	8:21	8:51	9:21	9:51	10:21	10:51	11:21	11:51	12:21	12:51	13:21	13:51	14:21	14:51	15:21	15:51	16:21	16:51	17:22	17:51	18:23		19:07	19:50	20:45	22:33	23:36	0:36		
VISTA CANYON																																
VINCENT GRADE/ACTON		8:31		9:31		10:31		11:31		12:31		13:31		14:31		15:31		16:31		17:31	18:02	18:31	19:03		19:49	20:28	21:23	23:11	0:16	1:16		
PALMDALE		8:42		9:42		10:42		11:42		12:42		13:42		14:42		15:42		16:42		17:42	18:13	18:42	19:14	19:21	20:00	20:39	21:34	23:22	0:27	1:27		
LANCASTER		8:50		9:50		10:50		11:50		12:50		13:50		14:50		15:50		16:50		17:50	18:21	18:50	19:22		20:12	20:54	21:49	23:37	0:35	1:35		
	1:07:00	2:06:00	1:07:00	2:06:00	1:07:00	2:06:00	1:07:00	2:06:00	1:07:00	2:06:00	1:07:00	2:06:00	1:07:00	2:06:00	1:07:00	2:06:00	1:07:00	2:06:00	1:07:00	2:06:00	1:07:00	2:06:00	1:07:00	2:06:00	1:49:00	2:14:00	2:16:00	2:13:00	2:12:00	2:05:00	2:05:00	52:24:00

= Short Turn trains. Require arrangements for turn-around at Via Princessa/Vista Canyon
 = Express Trains
 = Late Night Train Service

Total Service Hours 103:35:00

METROLINK ANTELOPE VALLEY LINE
For Discussion Purposes Only

SCENARIO 4: Three Patterns: Semi-Hourly Plus Express Service

INBOUND: LANCASTER - L.A. UNION STATION

	MONDAY THROUGH FRIDAY																																					
Train number	200	250	204	252	284	208	254	286	212	256	288	216	258	220	260	224	262	228	264	232	266	236	268	240	270	244	272	248	274	252	276	256	278	260	264	266		
Remarks	AM PEAK																																					
LANCASTER	3:25		4:25		5:15	5:25		6:15	6:25		7:15	7:25		8:25		9:25		10:25		11:25		12:25		13:25		14:25		15:25		16:25		17:25		18:25	19:25	20:25		
PALMDALE	3:35		4:35		5:25	5:35		6:25	6:35		7:25	7:35		8:35		9:35		10:35		11:35		12:35		13:35		14:35		15:35		16:35		17:35		18:35	19:35	20:35		
VINCENT GRADE/ACTON	3:47		4:47			5:47			6:47			7:47			8:47			9:47			10:47			12:47			14:47			16:47			17:47			18:47	19:47	20:47
VISTA CANYON	4:23	4:54	5:23	5:54		6:23	6:54		7:23	7:54		8:23	8:54	9:23	9:54	10:23	10:54	11:23	11:54	12:23	12:54	13:23	13:54	14:23	14:54	15:23	15:54	16:23	16:54	17:23	17:54	18:23	18:54	19:23	20:23	21:23		
VIA PRINCESSA																																						
SANTA CLARITA	4:31	5:02	5:31	6:02	6:17	6:31	7:02	7:17	7:31	8:02	8:17	8:31	9:02	9:31	10:02	10:31	11:02	11:31	12:02	12:31	13:02	13:31	14:02	14:31	15:02	15:31	16:02	16:31	17:02	17:31	18:02	18:31	19:02	19:31	20:31	21:31		
NEWHALL #	4:39	5:09	5:39	6:09		6:39	7:09		7:39	8:09		8:39	9:09	9:39	10:09	10:39	11:09	11:39	12:09	12:39	13:09	13:39	14:09	14:39	15:09	15:39	16:09	16:39	17:09	17:39	18:09	18:39	19:09	19:39	20:39	21:39		
SYLMAR/SAN FERNANDO	4:53	5:23	5:53	6:23	6:38	6:53	7:23	7:38	7:53	8:23	8:38	8:53	9:23	9:53	10:23	10:53	11:23	11:53	12:23	12:53	13:23	13:53	14:23	14:53	15:23	15:53	16:23	16:53	17:23	17:53	18:23	18:53	19:23	19:53	20:53	21:53		
SYLMAR/SAN FERNANDO	4:54	5:24	5:54	6:24	6:39	6:54	7:24	7:39	7:54	8:24	8:39	8:54	9:24	9:54	10:24	10:54	11:24	11:54	12:24	12:54	13:24	13:54	14:24	14:54	15:24	15:54	16:24	16:54	17:24	17:54	18:24	18:54	19:24	19:54	20:54	21:54		
SUN VALLEY	5:02		6:02			7:02			8:02			9:02		10:02		11:02		12:02		13:02		14:02		15:02		16:02		17:02		18:02		19:02		20:02	21:02	22:02		
BURBANK AIRPORT - NORTH	5:05	5:33	6:05	6:33		7:05	7:33		8:05	8:33		9:05	9:33	10:05	10:33	11:05	11:33	12:05	12:33	13:05	13:33	14:05	14:33	15:05	15:33	16:05	16:33	17:05	17:33	18:05	18:33	19:05	19:33	20:05	21:05	22:05		
BURBANK #	5:10	5:38	6:10	6:38	6:51	7:10	7:38	7:51	8:10	8:38	8:51	9:10	9:38	10:10	10:38	11:10	11:38	12:10	12:38	13:10	13:38	14:10	14:38	15:10	15:38	16:10	16:38	17:10	17:38	18:10	18:38	19:10	19:38	20:10	21:10	22:10		
GLENDALE #	5:17	5:45	6:17	6:45		7:17	7:45		8:17	8:45		9:17	9:45	10:17	10:45	11:17	11:45	12:17	12:45	13:17	13:45	14:17	14:45	15:17	15:45	16:17	16:45	17:17	17:45	18:17	18:45	19:17	19:45	20:17	21:17	22:17		
L.A. UNION STATION	5:27	5:56	6:27	6:56	7:06	7:27	7:56	8:06	8:27	8:56	9:06	9:27	9:56	10:27	10:56	11:27	11:56	12:27	12:56	13:27	13:56	14:27	14:56	15:27	15:56	16:27	16:56	17:27	17:56	18:27	18:56	19:27	19:56	20:27	21:27	22:27		
	2:02:00	1:02:00	2:02:00	1:02:00	1:51:00	2:02:00	1:02:00	1:51:00	2:02:00	1:02:00	1:51:00	2:02:00	1:02:00	2:02:00	1:02:00	2:02:00	1:02:00	2:02:00	1:02:00	2:02:00	1:02:00	2:02:00	1:02:00	2:02:00	1:02:00	2:02:00	1:02:00	2:02:00	1:02:00	2:02:00	1:02:00	2:02:00	1:02:00	2:02:00	2:02:00	2:02:00	57:39:00	

OUTBOUND: L.A. UNION STATION - LANCASTER

	MONDAY THROUGH FRIDAY																																			
Train number	201	251	203	253	205	255	207	257	209	259	211	261	213	263	215	265	217	267	219	269	221	271	223	301	273	225	275	227	277	229	279	231	233	235		
Remarks	PM PEAK																																			
L.A. UNION STATION	6:04	6:36	7:04	7:36	8:04	8:36	9:04	9:36	10:04	10:36	11:04	11:36	12:04	12:36	13:04	13:36	14:04	14:36	15:04	15:26	15:36	16:04	16:26	16:36	17:04	17:26	17:36	18:04	18:36	19:04	19:36	20:04	20:36	21:04	22:04	23:04
GLENDALE #	6:16	6:47	7:16	7:47	8:16	8:47	9:16	9:47	10:16	10:47	11:16	11:47	12:16	12:47	13:16	13:47	14:16	14:47	15:16		15:47	16:16		16:47	17:16		17:47	18:16	18:47	19:16	19:47	20:16	20:47	21:16	22:16	23:16
BURBANK #	6:23	6:54	7:23	7:54	8:23	8:54	9:23	9:54	10:23	10:54	11:23	11:54	12:23	12:54	13:23	13:54	14:23	14:54	15:23	15:41	15:54	16:23	16:41	16:54	17:23	17:41	17:54	18:23	18:54	19:23	19:54	20:23	20:54	21:23	22:23	23:23
BURBANK AIRPORT - NORTH	6:28	6:59	7:28	7:59	8:28	8:59	9:28	9:59	10:28	10:59	11:28	11:59	12:28	12:59	13:28	13:59	14:28	14:59	15:28		15:59	16:28		16:59	17:28		17:59	18:28	18:59	19:28	19:59	20:28	20:59	21:28	22:28	23:28
SUN VALLEY	6:32		7:32		8:32		9:32		10:32		11:32		12:32		13:32		14:32		15:32		16:32		17:32		18:32		19:32		20:32		21:32		22:32	23:32		
SYLMAR/SAN FERNANDO	6:41	7:09	7:41	8:09	8:41	9:09	9:41	10:09	10:41	11:09	11:41	12:09	12:41	13:09	13:41	14:09	14:41	15:09	15:41	15:54	16:09	16:41	16:54	17:09	17:41	17:54	18:09	18:41	19:09	19:41	20:09	20:41	21:09	21:41	22:41	23:41
SYLMAR/SAN FERNANDO	6:42	7:10	7:42	8:10	8:42	9:10	9:42	10:10	10:42	11:10	11:42	12:10	12:42	13:10	13:42	14:10	14:42	15:10	15:42	15:55	16:10	16:42	16:55	17:10	17:42	17:55	18:10	18:42	19:10	19:42	20:10	20:42	21:10	21:42	22:42	23:42
NEWHALL #	6:57	7:25	7:57	8:25	8:57	9:25	9:57	10:25	10:57	11:25	11:57	12:25	12:57	13:25	13:57	14:25	14:57	15:25	15:57		16:25	16:57		17:25	17:57		18:25	18:57	19:25	19:57	20:25	20:57	21:25	21:57	22:57	23:57
SANTA CLARITA	7:04	7:33	8:04	8:33	9:04	9:33	10:04	10:33	11:04	11:33	12:04	12:33	13:04	13:33	14:04	14:33	15:04	15:33	16:04	16:18	16:33	17:04	17:18	17:33	18:04	18:18	18:33	19:04	19:33	20:04	20:33	21:04	21:33	22:04	23:04	0:04
VIA PRINCESSA																																				
VISTA CANYON	7:14	7:44	8:14	8:44	9:14	9:44	10:14	10:44	11:14	11:44	12:14	12:44	13:14	13:44	14:14	14:44	15:14	15:44	16:14		16:44	17:14		17:44	18:14		18:44	19:14	19:44	20:14	20:44	21:14	21:44	22:14	23:14	0:14
VINCENT GRADE/ACTON	7:51		8:51		9:51		10:51		11:51		12:51		13:51		14:51		15:51		16:51		17:51		18:51		19:51		20:51		21:51		22:51		23:51	0:51		
PALMDALE	8:02		9:02		10:02		11:02		12:02		13:02		14:02		15:02		16:02		17:02	17:12	18:02	18:12		19:02	19:12		20:02		21:02		22:02		23:02	0:02	1:02	
LANCASTER	8:10		9:10		10:10		11:10		12:10		13:10		14:10		15:10		16:10		17:10	17:19	18:10	18:19		19:10	19:19		20:10		21:10		22:10		23:10	0:10	1:10	
	2:06:00	1:08:00	2:06:00	1:08:00	2:06:00	1:08:00	2:06:00	1:08:00	2:06:00	1:08:00	2:06:00	1:08:00	2:06:00	1:08:00	2:06:00	1:08:00	2:06:00	1:08:00	2:06:00	1:08:00	2:06:00	1:08:00	2:06:00	1:08:00	2:06:00	1:08:00	2:06:00	1:08:00	2:06:00	1:08:00	2:06:00	1:08:00	2:06:00	1:08:00	2:06:00	60:27:00

- Short Turn trains. Require arrangements for turn-around at Vista Canyon
- Express Trains
- Late Night Train Service

Total Service Hours 118:06:00

6

METROLINK ANTELOPE VALLEY LINE For Discussion Purposes Only

SCENARIO 6: Three Patterns: Semi-Hourly Plus Express Service with Hub at Sylmar/San Fernando

INBOUND: LANCASTER - L.A. UNION STATION

Train number	MONDAY THROUGH FRIDAY																																							
	200	250	204	284	252	208	286	254	212	288	256	216	258	220	260	224	262	228	264	232	266	236	268	240	270	244	272	248	274	252	276	256	278	260	DH	DH	264	266		
Remarks	AM PEAK																																							
LANCASTER	3:25		4:25	4:55		5:25	5:55		6:25	6:55		7:25		8:25		9:25		10:25		11:25		12:25		13:25		14:25		15:25		16:25		17:25		18:25		19:25	20:25			
PALMDALE	3:35		4:35	5:05		5:35	6:05		6:35	7:05		7:35		8:35		9:35		10:35		11:35		12:35		13:35		14:35		15:35		16:35		17:35		18:35		19:35	20:35			
VINCENT GRADE/ACTON	3:47		4:47	5:17		5:47	6:17		6:47	7:17		7:47		8:47		9:47		10:47		11:47		12:47		13:47		14:47		15:47		16:47		17:47		18:47		19:47	20:47			
VISTA CANYON	4:23		5:23	5:52		6:23	6:52		7:23	7:52		8:23		9:23		10:23		11:23		12:23		13:23		14:23		15:23		16:23		17:23		18:23		19:23		20:23	21:23			
VIA PRINCESSA																																								
SANTA CLARITA	4:31		5:31	6:00		6:31	7:00		7:31	8:00		8:31		9:31		10:31		11:31		12:31		13:31		14:31		15:31		16:31		17:31		18:31		19:31		20:31	21:31			
NEWHALL #	4:39		5:39	6:08		6:39	7:08		7:39	8:08		8:39		9:39		10:39		11:39		12:39		13:39		14:39		15:39		16:39		17:39		18:39		19:39		20:39	21:39			
SYLMAR/SAN FERNANDO	4:53		5:53	6:22		6:53	7:22		7:53	8:22		8:53		9:53		10:53		11:53		12:53		13:53		14:53		15:53		16:53		17:53		18:53		19:53		20:53	21:53			
SYLMAR/SAN FERNANDO	4:54	5:27	5:54	6:23	6:27	6:54	7:23	7:27	7:54	8:23	8:27	8:54	9:27	9:54	10:27	10:54	11:27	11:54	12:27	12:54	13:27	13:54	14:27	14:54	15:27	15:54	16:27	16:54	17:27	17:54	18:27	18:54	19:27	19:54	20:27	21:27	20:54	21:54		
SUN VALLEY	5:02	5:34	6:02		6:34	7:02		7:34	8:02		8:34	9:02	9:34	10:02	10:34	11:02	11:34	12:02	12:34	13:02	13:34	14:02	14:34	15:02	15:34	16:02	16:34	17:02	17:34	18:02	18:34	19:02	19:34	20:02	20:34	21:34	21:02	22:02		
BURBANK AIRPORT - NORTH	5:05	5:38	6:05		6:38	7:05		7:38	8:05		8:38	9:05	9:38	10:05	10:38	11:05	11:38	12:05	12:38	13:05	13:38	14:05	14:38	15:05	15:38	16:05	16:38	17:05	17:38	18:05	18:38	19:05	19:38	20:05	20:38	21:38	21:05	22:05		
BURBANK #	5:10	5:43	6:10		6:43	7:10		7:43	8:10		8:43	9:10	9:43	10:10	10:43	11:10	11:43	12:10	12:43	13:10	13:43	14:10	14:43	15:10	15:43	16:10	16:43	17:10	17:43	18:10	18:43	19:10	19:43	20:10	20:43	21:43	21:10	22:10		
GLENDALE #	5:17	5:50	6:17		6:50	7:17		7:50	8:17		8:50	9:17	9:50	10:17	10:50	11:17	11:50	12:17	12:50	13:17	13:50	14:17	14:50	15:17	15:50	16:17	16:50	17:17	17:50	18:17	18:50	19:17	19:50	20:17	20:50	21:50	21:17	22:17		
L.A. UNION STATION	5:27	6:00	6:27	6:47	7:00	7:27	7:47	8:00	8:27	8:47	9:00	9:27	10:00	10:27	11:00	11:27	12:00	12:27	13:00	13:27	14:00	14:27	15:00	15:27	16:00	16:27	17:00	17:27	18:00	18:27	19:00	19:27	20:00	20:27	21:00	22:00	21:27	22:27		
	2:02:00	0:33:00	2:02:00	1:52:00	0:33:00	2:02:00	1:52:00	0:33:00	2:02:00	1:52:00	0:33:00	2:02:00	1:52:00	0:33:00	2:02:00	1:52:00	0:33:00	2:02:00	1:52:00	0:33:00	2:02:00	1:52:00	0:33:00	2:02:00	1:52:00	0:33:00	2:02:00	1:52:00	0:33:00	2:02:00	1:52:00	0:33:00	2:02:00	1:52:00	0:33:00	2:02:00	1:52:00	0:33:00	2:02:00	51:33:00

OUTBOUND: L.A. UNION STATION - LANCASTER

Train number	MONDAY THROUGH FRIDAY																																							
	DH	DH	201	255	203	257	205	259	207	261	209	263	211	265	213	267	215	269	217	271	219	273	299	221	275	301	223	277	303	225	279	227	281	229	283	231	233	235		
Remarks	PM PEAK																																							
L.A. UNION STATION	4:30	5:30	6:04	6:30	7:04	7:30	8:04	8:30	9:04	9:30	10:04	10:30	11:04	11:30	12:04	12:30	13:04	13:30	14:04	14:30	15:04	15:30	15:46	16:04	16:30	16:46	17:04	17:30	17:46	18:04	18:30	19:04	19:30	20:04	20:30	21:04	22:04	23:04		
GLENDALE #	4:41	5:41	6:16	6:41	7:16	7:41	8:16	8:41	9:16	9:41	10:16	10:41	11:16	11:41	12:16	12:41	13:16	13:41	14:16	14:41	15:16	15:41		16:16	16:41		17:16	17:41		18:16	18:41	19:16	19:41	20:16	20:41	21:16	22:16	23:16		
BURBANK #	4:48	5:48	6:23	6:48	7:23	7:48	8:23	8:48	9:23	9:48	10:23	10:48	11:23	11:48	12:23	12:48	13:23	13:48	14:23	14:48	15:23	15:48		16:23	16:48		17:23	17:48		18:23	18:48	19:23	19:48	20:23	20:48	21:23	22:23	23:23		
BURBANK AIRPORT - NORTH	4:54	5:54	6:28	6:54	7:28	7:54	8:28	8:54	9:28	9:54	10:28	10:54	11:28	11:54	12:28	12:54	13:28	13:54	14:28	14:54	15:28	15:54		16:28	16:54		17:28	17:54		18:28	18:54	19:28	19:54	20:28	20:54	21:28	22:28	23:28		
SUN VALLEY	4:58	5:58	6:32	6:58	7:32	7:58	8:32	8:58	9:32	9:58	10:32	10:58	11:32	11:58	12:32	12:58	13:32	13:58	14:32	14:58	15:32	15:58		16:32	16:58		17:32	17:58		18:32	18:58	19:32	19:58	20:32	20:58	21:32	22:32	23:32		
SYLMAR/SAN FERNANDO	5:06	6:06	6:41	7:06	7:41	8:06	8:41	9:06	9:41	10:06	10:41	11:06	11:41	12:06	12:41	13:06	13:41	14:06	14:41	15:06	15:41	16:06	16:10	16:41	17:06	17:10	17:41	18:06	18:10	18:41	19:06	19:41	20:06	20:41	21:06	21:41	22:41	23:41		
SYLMAR/SAN FERNANDO			6:42		7:42		8:42		9:42		10:42		11:42		12:42		13:42		14:42		15:42		16:11	16:42		17:11	17:42		18:11	18:42		19:42		20:42		21:42		22:42	23:42	
NEWHALL #			6:57		7:57		8:57		9:57		10:57		11:57		12:57		13:57		14:57		15:57		16:27	16:57		17:27	17:57		18:27	18:57		19:57		20:57		21:57		22:57	23:57	
SANTA CLARITA			7:04		8:04		9:04		10:04		11:04		12:04		13:04		14:04		15:04		16:04		16:34	17:04		17:34	18:04		18:34	19:04		20:04		21:04		22:04		23:04	0:04	
VIA PRINCESSA																																								
VISTA CANYON			7:14		8:14		9:14		10:14		11:14		12:14		13:14		14:14		15:14		16:14		16:43	17:14		17:43	18:14		18:43	19:14		20:14		21:14		22:14		23:14	0:14	
VINCENT GRADE/ACTON			7:51		8:51		9:51		10:51		11:51		12:51		13:51		14:51		15:51		16:51		17:21	17:51		18:21	18:51		19:21	19:51		20:51		21:51		22:51		23:51	0:51	
PALMDALE			8:02		9:02		10:02		11:02		12:02		13:02		14:02		15:02		16:02		17:02		17:32	18:02		18:32	19:02		19:32	20:02		21:02		22:02		23:02		0:02	1:02	
LANCASTER			8:10		9:10		10:10		11:10		12:10		13:10		14:10		15:10		16:10		17:10		17:40	18:10		18:40	19:10		19:40	20:10		21:10		22:10		23:10		0:10	1:10	
	0:36:00	0:36:00	2:06:00	0:36:00	2:06:00	0:36:00	2:06:00	0:36:00	2:06:00	0:36:00	2:06:00	0:36:00	2:06:00	0:36:00	2:06:00	0:36:00	2:06:00	0:36:00	2:06:00	0:36:00	2:06:00	0:36:00	1:54:00	2:06:00	0:36:00	1:54:00	2:06:00	0:36:00	1:54:00	2:06:00	0:36:00	1:54:00	2:06:00	0:36:00	1:54:00	2:06:00	0:36:00	1:54:00	2:06:00	53:42:00

- = Short Turn trains. Require arrangements for turn-around at Vista Canyon
- = Express Trains
- = Late Night Train Service
- = Out of Service Deadhead Trips

Total Service Hours 105:15:00