



**CITY OF GLENDALE, CALIFORNIA
REPORT TO THE TRANSPORTATION AND PARKING COMMISSION**

AGENDA ITEM

Report: Streetcar Feasibility Study Final Report

1. Motion to Note and File the Streetcar Feasibility Study Final Report and Provide Feedback.

COMMISSION/COMMITTEE ACTION

Item Type: Action Item

Approved for April 25, 2022 **calendar**

ADMINISTRATIVE ACTION

Submitted by:

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Prepared by:

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RECOMMENDATION

Staff respectfully recommends the Transportation and Parking Commission provide feedback and note and file the report.

BACKGROUND/ANALYSIS

For decades, the City of Glendale has discussed re-establishing a streetcar system in Downtown Glendale. Streetcar concepts were discussed or evaluated by the Greater Downtown Strategic Plan (1996), the Downtown Mobility Study (2007), and as part of workshops for the draft South Glendale Community Plan in July and August of 2016. On October 24, 2016 the streetcar concept was presented to the Transportation & Parking Commission (TPC). The Commission was supportive of conducting a new streetcar study.

On July 25, 2017 the City Council authorized staff to conduct the Glendale–Burbank Regional Streetcar Feasibility Study to study and evaluate alignment and design alternatives, various technologies, potential ridership, cost estimates, funding sources, and preliminary impacts. However, the completion of the Streetcar Feasibility Study was slowed due to Covid-19, in addition to the development of studies such as the NoHo-Pasadena Bus Rapid Transit, West Glendale Sustainable Transportation and Land Use Study, Space 134, and adoption of the Citywide Pedestrian Plan. In addition, the existing Beeline and Metro bus services were each analyzed (Beeline TRA and Metro NextGen) and recommendations for Beeline route modifications and new routes were implemented to better connect the Glendale Metrolink station to downtown Glendale and provide inter-community transit.

The advancement of these initiatives has been important to informing and shaping the Streetcar Feasibility Study to ensure that compatibility and operability between all modes and systems will create a cohesive multi-modal network. The final result is a highly comprehensive Streetcar Feasibility Study. There are two alternatives that were analyzed under this feasibility study, Alternative 1: Central/Brand Loop and Alternative 2: Central/Brand Two-Way. Alternative 2 was received by the City Council as a preferred alternative as it is the most direct streetcar route making it more intuitive for transit users. This alternative has built in ridership potential as it serves many existing transit users already accustomed to using Beeline and Metro bus services. Further ridership modeling will determine the number of new riders versus riders who were already riding Beeline or Metro bus services.

In addition, this alternative avoids conflicts with the Metro's proposed BRT service on Central Avenue and would solidify Brand Blvd as a multi-modal transportation corridor with pedestrian activity interacting with local bus and streetcar service. The next phase of the Streetcar project will focus on the mobility and economic benefits.

Ridership estimates for Alternative 2 range between 1,500 and 4,000 riders per day, depending on the development patterns and operating characteristics of the streetcar.

While conducting the feasibility study, project staff launched a streetcar website (www.glendalestreetcar.com) to obtain feedback from stakeholders and the public. Overall nearly 88% of respondents supported the streetcar feasibility study.

Analysis of Downtown Glendale Streetcar System and Alternatives

Alternative 1 - Central/Brand Loop: Beginning at the GTC, this alternative runs bidirectional (two tracks) along Central Avenue north to Lomita Avenue. North of Lomita

Avenue, the alternative creates a single-track loop by running northbound on Central Avenue, then heading eastbound on Stocker Street, and then running southbound on Brand

Boulevard until the route turns west on Lomita Avenue and continues south on Central Avenue.

Alternative 2 – Central/Brand Two-Way: Beginning at the GTC, this alternative runs bidirectional (two tracks) along Central Avenue north to Lomita Avenue, utilizes Lomita Avenue (or another nearby cross street) to transition to Brand Boulevard, then runs bidirectional on Brand Boulevard to Stocker Street.

Alternative 1: Central/Brand Loop: Alignment and Operational Characteristics

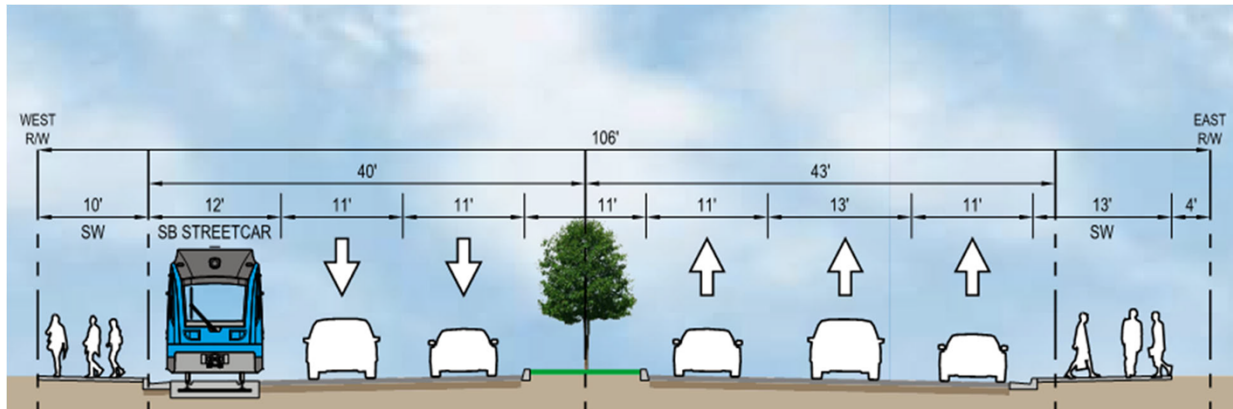
Along Central Avenue, between San Fernando Road and Colorado Street, the roadway has two lanes in the northbound and southbound direction, a center turn lane, and parallel parking along the curb. This segment of Central Avenue is a blend of residential and commercial properties fronting the sidewalks, creating a corridor of walkable destinations that would attract streetcar ridership. Streetcars would use the right lane in both the northbound and southbound direction, adjacent to parallel parking.

The Central/Brand Loop configuration would begin at Colorado Street. Northbound streetcars would use the right lane of Central Avenue north to Stocker Street, continuing east on Stocker Street, and then southbound in the right lane of Brand Blvd returning to Colorado Street.

Central Avenue, between Colorado Street and Stocker Street, has two through lanes northbound with right turn lanes and some parallel parking. An overhead pedestrian bridge is located north of Galleria Way; streetcars would traverse under this bridge without impact to the structure. Northbound Central Avenue has some commercial properties fronting the sidewalks; and several multi-family developments.

The loop would continue around Stocker Street and head southbound on Brand Blvd in the right lane. Brand Blvd has a mix of two and three through lanes southbound, right turn lanes, and a mix of angled parking, parallel parking, valet parking lanes, and loading zones. Brand Blvd has commercial and residential properties fronting both sides of the street with good pedestrian activity and connectivity.

Alternative 1 Cross-Section on Brand Boulevard, Colorado Street to Broadway, Looking North



Station Locations

Station locations are ideally spaced 3 to 5 blocks apart, located on or adjacent to sidewalks so streetcar customers can board the right side of the streetcar, similar to a bus. Each station contains a concrete platform at equal height with the floor of the streetcar vehicle to facilitate level boarding for ADA access. Each station is approximately 8 to 10 feet wide, and 80 to 95 feet long. Potential station locations for alternative 1 include –

- Glendale Transportation Center (terminus)
- Central/San Fernando (northbound and southbound)
- Central/Chevy Chase (northbound and southbound)
- Central/Maple (northbound and southbound)
- Central/Americana (northbound) and Brand/Americana (southbound), between Americana and Broadway on each street
- Central/California (northbound) and Brand/California (southbound)
- Central/Doran (northbound) and Brand/Doran (southbound)
- Central/Arden (northbound) and Brand/Arden (southbound)
- Stocker (Eastbound)

Alternative 2: Central/Brand Bi-Directional: Alignment and Operational Characteristics

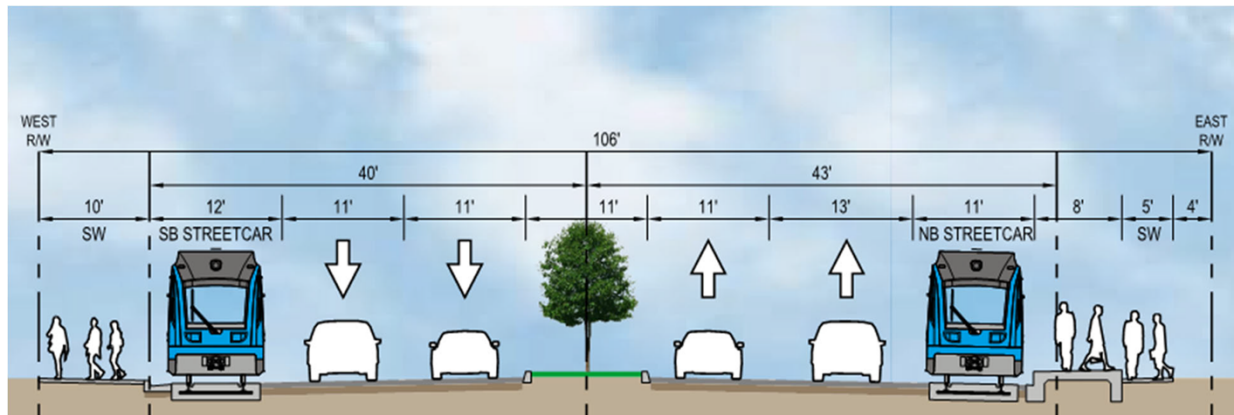
Alternative 2 would follow the same route on Central Avenue as Alternative 1 between the Glendale Transportation Center and Colorado Street with identical features and considerations along this section. Streetcars would use the right lane in both the northbound and southbound direction, adjacent to parallel parking.

The streetcar tracks would transition from Central Avenue to Brand Boulevard in the area between Maple Street and Colorado Street. If this alternative is selected, during future project study phases, the design for the streetcar will consider a variety of cross streets to connect from Central Avenue to Brand Boulevard, including Maple Street, Chestnut Street, Lomita Street, and Elk Avenue. The northbound and southbound tracks could also be split between two cross streets (e.g., northbound could use Maple Street to cross from Central Avenue to Brand Boulevard, and southbound could use Lomita Street to cross from Brand Boulevard to Central Avenue).

Once on Brand Boulevard, streetcars would use the right lane in both the northbound and southbound directions. This section of Brand Boulevard has a mix of two and three through lanes in each direction, left and right-turn lanes, and a mix of angled parking, parallel parking, valet parking lanes, and loading zones. The travel lanes and parking/loading/valet lanes will be configured to maintain two lanes of traffic adjacent to the streetcar. Along Brand Boulevard, signalized pedestrian crosswalks occur mid-block between signalized intersections. The route would be evaluated for the potential to add additional traffic signals to control cross traffic safely across the tracks in the next phase of design.

The streetcar tracks would cross SR-134 and continue north to a terminus just south of Stocker Street. Northbound streetcars would unload customers at a station platform, the operator would switch cab ends, and the streetcar would pick up customers from the platform to begin its southbound trip.

Alternative 2 Cross-Section on Brand Boulevard, Colorado Street to Broadway, Looking North



Potential station locations for Alternative 2 include:

- Glendale Transportation Center (terminus)
- Central/San Fernando (northbound and southbound)
- Central/Chevy Chase (northbound and southbound)
- Central/Maple (northbound and southbound)
- Brand/Americana (northbound and southbound), between Americana and Broadway
- Brand/California (northbound and southbound)
- Brand/Doran (northbound and southbound)
- Brand/Arden (northbound and southbound)
- Brand/Stocker (terminus)

Station Design

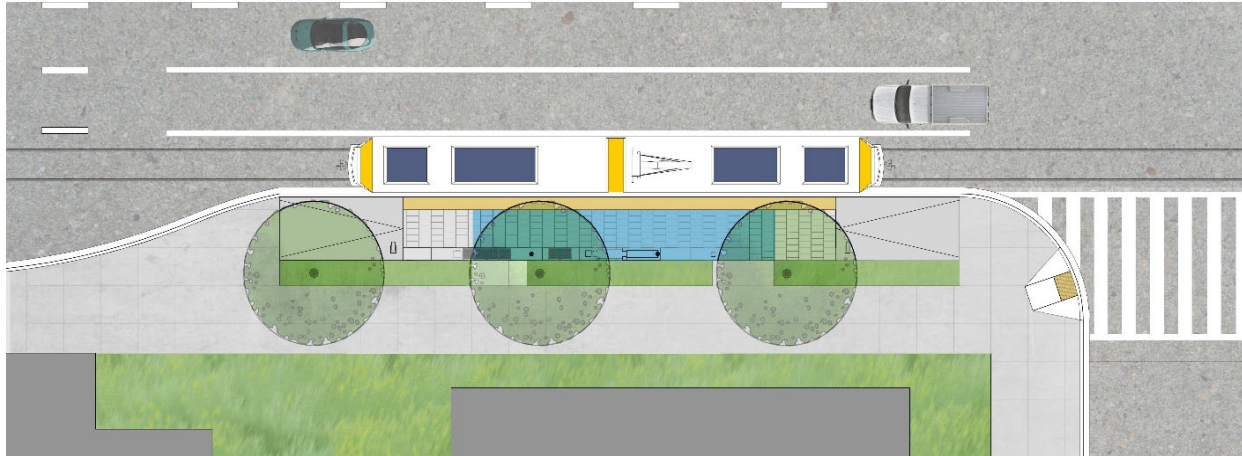
The Design Report of the Streetcar Feasibility Study provides the basic design, best lane configuration, station layout and the location and general layout of the operation and maintenance facility (OMF).

Bump-Out Station: A typical station layout for a curbside “bump out” station, where the roadway

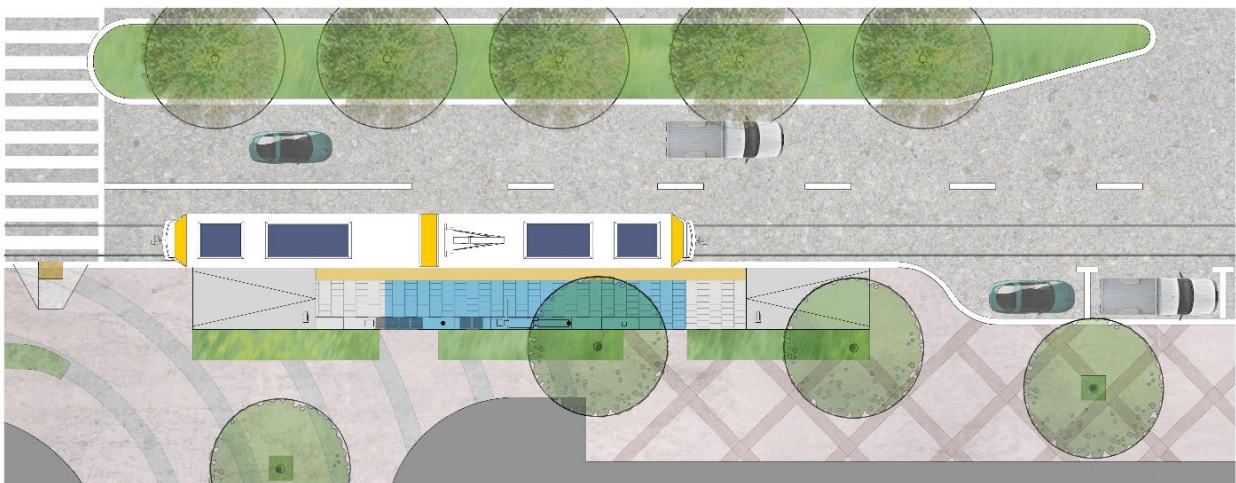
width is sufficient to place the boarding platform adjacent to the existing sidewalk. Bump-outs also shorten the crossing distance for pedestrians who are crossing the street. In areas where a bump-out is not feasible, station platforms will be integrated into the sidewalk.

Sidewalk Station: A typical station layout integrated into the sidewalk at locations where a Bump-Out station is not feasible.

Bump-Out Station – Typical Layout



Sidewalk Station – Typical Layout



Parking and Traffic Impacts

Potential impacts to traffic and parking along the proposed corridors were assessed for both alternatives. Based on the alignments of the alternatives, the movements (i.e., left turn, right turn, or through) that the streetcar would make at each intersection along the route were identified. In addition, intersections that would be located near stations were identified. Existing weekday AM and PM peak period traffic volumes were obtained for 16 key intersections.

In general, traffic operations would not be substantially affected at intersections at which the

streetcar makes a through movement, as it would cross the intersection at the same time as other vehicles traveling in the same direction. Opportunities to improve and potentially mitigate any mobility impacts can be addressed through signal timing modifications and the addition of transit-preferential treatments. Both strategies can provide improved mobility for through vehicles along the corridor.

In addition, the northbound and southbound directions along Central Avenue and Brand Avenue are the primary traffic movements. Signal timing strategies can include progression for these vehicular movements, minimizing stops along the corridor and between transit stops, and increasing overall green time for the roadway along which the streetcar operates.

Transit preferential treatments, including transit signal priority, may be easier to implement For Alternative 1, as the streetcar would operate in a one-way loop for the northern half of the alignment. With two-way operations, there could be situations when both northbound and southbound trains arrive at an intersection simultaneously; at these times, the signalization plans can only prioritize one movement at a time.

At intersections where the streetcar makes a turn, there is a greater potential for impact on traffic intersection operations due to the need for separation of time (signal timing) and space (turning geometry) between the streetcar and vehicles. Because of their larger turning radius, the streetcar vehicle may require additional space to complete a turning maneuver, which can impact adjacent travel lanes and create potential conflicts. Therefore, dedicated signal phases are provided to allow a transit vehicle to initiate and complete a turning maneuver without any conflicts. This exclusive time would require a transit vehicle to be in position at the front of a vehicle queue and to have all conflicting movements (vehicle and non-motorized) stopped. As a result of the exclusive time, traffic operations could be impacted.

The relative scale of the impacts can vary depending on existing intersection operations, available capacity, upstream and downstream configurations, and the signal timing and phasing. Based on these factors, there is the potential for impacts to traffic operations at the following intersections, and further analysis will be required in future phases of design:

- Central Avenue and Lomita Avenue (both Alternatives)
- Central Avenue and Stocker Street (Alternative 1 only)
- Brand Avenue and Stocker Street (Alternative 1 only)
- Brand Avenue and Lomita Avenue (both Alternatives)

In addition to potential traffic impacts due to turning movements, additional operational issues could occur at intersections adjacent to planned stations. An important consideration is whether each station will be nearside (before the intersection) or farside (after the intersection). These issues would be studied further in forthcoming refined design stages.

The focus of the parking analysis is to document on-street parking inventory within the study area along the proposed alignments and to identify potential impacts due to the guideway and station locations. Parking types within the study area include a range of parking management strategies such as unpaid time limited, paid time limited, loading zones, and valet spaces. There are a total of 350 total parking spaces along Central Avenue between Railroad Street and Stocker Street (166 on the west side of the street and 184 on the east side). All parking spaces along Central Avenue are parallel to the curb with a mixture of unpaid timed and paid/metered time spaces.

There are a total of 417 parking spaces along Brand Boulevard between Lomita Avenue and Stocker Street (194 on the west side of the street and 223 on the east side) with a mixture of angled and parallel parking spaces.

The guideway would not result in the loss of parking where the adjacent parking is parallel to the curb. Since all parking on Central Avenue is parallel, the guideway would not result in the loss of parking on Central Avenue under either alternative.

At locations where there is angled parking, the parking would need to be reconfigured as parallel parking to eliminate conflicts with the streetcar, resulting in a loss of parking in these areas. Table 1 shows the potential loss of parking spaces on Brand Boulevard resulting from each alternative, based on the conceptual designs conducted for this feasibility study. During future design efforts, it may be possible to optimize the design to reduce the loss of parking.

Because Alternative 1 travels in only the SB direction on Brand Boulevard, it has approximately half the parking impact as Alternative 2 along Brand Boulevard: the total number of parking spaces that would be eliminated under Alternative 1 is 60 spaces, all along the west side of Brand Boulevard. Alternative 2 would eliminate another 63 spaces on the east side of the street, for a total of 123 spaces.

Table 1: Parking Alternatives Analysis

Parking Spaces Eliminated					
Segment	Existing Parking Spaces		Alternative 1	Alternative 2	
	West Side	East Side	West Side	West Side	East Side
Stocker Street - Dryden Street	39	36	0	0	0
Dryden Street - Fairview Avenue	14	19	0	0	0
Fairview Avenue - Glenoaks Boulevard	11	9	0	0	0
Glenoaks Boulevard - Arden Avenue	0	0	0	0	0
Arden Avenue - Monterey Road	3	0	- 3	- 3	0
Monterey Road - Goode Avenue	0	0	0	0	0
Goode Avenue - Sanchez Drive	0	0	0	0	0
Sanchez Drive - Doran Street	4	0	- 4	- 4	0
Doran Street - Milford Street	7	0	- 7	- 7	0
Milford Street - Lexington Drive	19	11	- 8*	- 8*	0
Lexington Drive - California Avenue	33	33	- 15*	- 15*	- 14*
California Avenue - Wilson Avenue	31	26	- 8*	- 8*	- 12*
Wilson Avenue - Broadway	0	29	0	0	- 11*
Broadway - Harvard Street	4	15	0	0	- 10*
Harvard Street - Caruso Avenue	0	8	0	0	0
Caruso Avenue - Colorado Street	7	9	0	0	- 4*
Colorado Street - Elk Avenue	8	12	- 3*	- 3*	- 4*
Elk Avenue - Lomita Avenue	14	16	- 12*	- 12*	- 8*
Total	194	223	-60	-60	-63

Source: Kittelson & Associates, 2020

* - assumes conversion from angled parking to parallel parking

OPERATIONS AND MAINTENANCE FACILITY (OMF)

The OMF would handle inspection, servicing, maintenance, and repair activities to keep the streetcar vehicles in service. It is assumed the OMF would be designed to accommodate at least six streetcar vehicles for the opening of the system. Since the type of streetcar vehicle is unknown at this early study stage, the OMF concept assumes a maximum vehicle length of 82 feet and a maximum vehicle width of 8 feet-8 inches.

The OMF will include an enclosed building that contains maintenance bays and a single wash bay. It will also contain an office area for administration and operations staff and maintenance support areas with shop/storage space. The yard for the OMF will contain track to access the site and storage tracks. An employee/visitor parking lot will be part of the design.

OMF Concept Plan

Following figure shows an OMF concept at a potential site located next to the GTC, adjacent to the recently constructed Beeline OMF. The site is on an existing city-owned surface parking Lot and private property that may need to be acquired. This site is conceptual at this time, and more detailed design phases for the project will examine this and other potential sites in greater detail. The conceptual OMF layout at this potential site shows four indoor bays and two outside storage tracks along with associated offices and other operations uses. This site and other potential sites will be reviewed in more detail during subsequent project phases.

COMPARISON OF PRELIMINARY ALTERNATIVES

Based on conceptual engineering and operational analysis, both Alternative 1 and Alternative 2 are feasible and functional; however, the two alternatives each have advantages and disadvantages.

Table 2 summarizes the key characteristics of the route alternatives. The two alternatives have similar lengths, number of stations, end-to-end travel times, and capital costs.

Alternative 2 has slightly higher forecast ridership, as well as lower operating costs, because it serves a single, more established commercial corridor in downtown Glendale. However, Alternative 2 would also focus potential construction and parking impacts on that corridor, Brand Boulevard.

Alternative 1 would serve a larger geographic area, supporting recent and ongoing mixed-use development on Central Avenue, but the one-way loop is less intuitive for riders and causes indirect travel for some trips. The alignment on Central Avenue north of Broadway also would potentially conflict with Metro’s planned BRT and the existing bike lanes in that area.

Alternative 2 would reinforce Brand Boulevard as a multi-modal corridor in accord with local plans with the most direct and easy to understand route that serves the heart of downtown Glendale. It would concentrate potential economic development benefits on Brand Boulevard, but since Brand Boulevard is already a highly built environment, there may be fewer redevelopment opportunities.

Because Alternative 2 has higher forecast ridership, has the most intuitive route for riders, best serves the established commercial corridor along Brand Boulevard, and would not conflict with Metro’s planned BRT alignment, it is recommended that Alternative 2 be considered for further planning, engineering, and environmental evaluation. Alternative 2 has also been identified by the City Council as a likely preferred alignment.

Table 2: Alternatives Summary

Category	Alternative 1	Alternative 2
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	Central/Brand Loop	Central /Brand Two-Way
Route length	2.9 miles end-to-end (5.8 miles of track)	2.9 miles end-to-end (5.8 miles of track)
Number of stations/station pairs	9	9
Ridership	1,400 to 3,800 per weekday	1,500 to 4,000 per weekday
End-to-end travel time (AM/PM/Off-peak), minutes	44/50/38	44/51/35
Major shopping destinations, hotels, and cultural attractions along alignment	9	10
Residential units along alignment	579	281
Commercial uses along alignment (square feet)	6.2 million	8.15 million
Existing daily transit riders along route	3,537	3,921
Traffic impacts from operations	Potentially greater impacts due to additional turning movements	Potentially fewer impacts due to fewer turning movements
Parking impacts (on-street spaces removed)	90 to 94	153 to 157
Construction impacts	<ul style="list-style-type: none"> • Greater flexibility within each street • More streets impacted 	<ul style="list-style-type: none"> • Greater impact on each street • Fewer streets impacted
Capital Cost	<ul style="list-style-type: none"> • \$200 - 300 Million 	<ul style="list-style-type: none"> • \$250 -300 Million
Operating Cost	<ul style="list-style-type: none"> • \$7.4 Million /year 	<ul style="list-style-type: none"> • \$6.6 Million /year

Capital Cost

The methodology used to generate the capital cost estimates is consistent with Federal Transit Administration (FTA) guidelines. The basis of FTA guidance on cost estimating is its Standard Cost Categories (SCC), which enables all FTA-funded projects to develop budget baselines in a uniform manner and enables projects to develop budget baselines that summarize to the SCC.

The capital cost estimate includes guideway and track, stations, ancillary facilities such as the OMF, system, right-of-way, vehicles, design, and other professional services. The estimate also includes potential utility relocation, impacts to surface structures, temporary construction impacts, environmental consideration, various maintenance facilities locations, and right-of way requirements. The capital cost estimates of the recommended alternative in 2020 dollars (no escalation) by SCC is estimated \$495.391 Million.

Operating Costs

Operating costs were derived from National Transit Database annual operating costs for similar streetcar systems on a per-route mile basis including, Tucson Sun Link, Q—Line Detroit, Seattle Streetcar, Kansas City Streetcar, Portland Streetcar, and Cincinnati Bell Connector and estimate annual vehicle hours based on the operating schedule. This analysis utilizes a planning level revenue cost of \$250/hour. Although there is potential for the Glendale Streetcar to operate at a lower cost per hour, \$250/hour is appropriate for this early stage of project development. Based on the following schedule developed in this study:

Total Annual Revenue Hours	26,558
Cost Per Hour	250
Annual Operating Cost:	\$6.6 million

Grant Funding/Other Funding

The \$495 million construction cost and the \$6.6 million yearly operations cost may require grant funding. There are a number of grant opportunities that can potentially be used to fund the streetcar; however, in order for Glendale to take advantage of those opportunities, the City would need to become an Eligible Municipal Operator.

PROJECT SEQUENCES

Construction and operation of the project is not funded at this time. The Feasibility Study has explored methods of project financing, and offer a comparison of similar streetcar projects

around the U.S. A proposed project sequences is below:



FISCAL IMPACT

There is no fiscal impact associated with this report.

ALTERNATIVES

Alternative 1: Note and file and provide comments on the final Draft Streetcar Feasibility Study.

EXHIBITS

1. Final Draft Streetcar Feasibility Study