

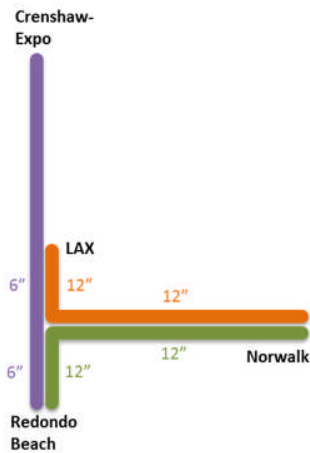
## CRENSHAW/LAX – GREEN LINE ALTERNATIVE SERVICE PLAN EVALUATION

The Crenshaw/LAX Line will be connected to the existing Green Line mid-line between Mariposa and Aviation Stations. The opening of this new rail network will provide three potential directions for trains to operate.

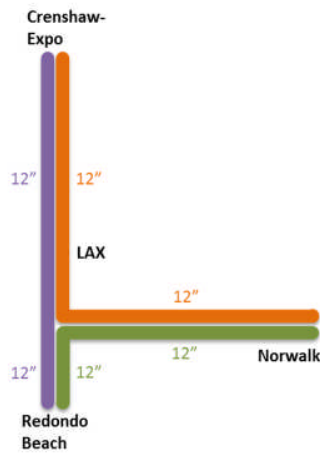
- Between Norwalk Station and Redondo Beach Station (existing Green Line)
- Between Expo/Crenshaw Station and Norwalk Station
- Between Expo/Crenshaw Station and Redondo Beach Station

Based on these train moves, 11 alternative service plans were developed, including:

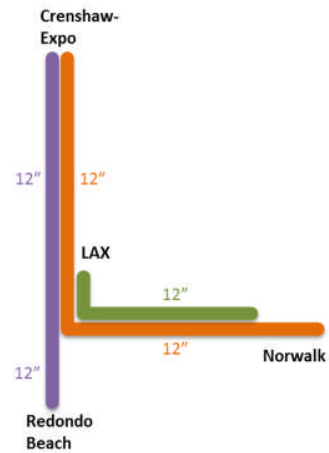
Alt B-1: Crenshaw/Redondo Green Line Branch



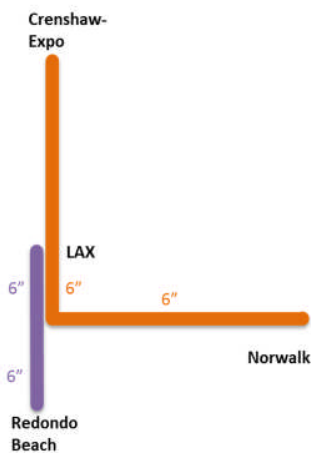
Alt B-2: Crenshaw/Green Line Branch



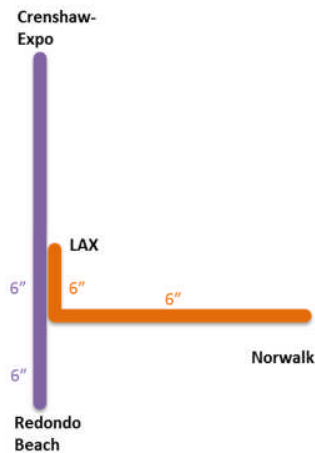
Alt B-3: Willowbrook/RP – Century/Aviation Shortline



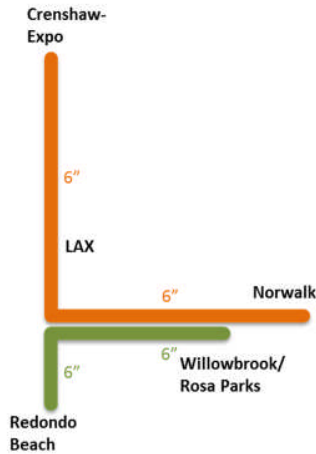
Alt C-1: Crenshaw/Norwalk Interline with Redondo Shuttle



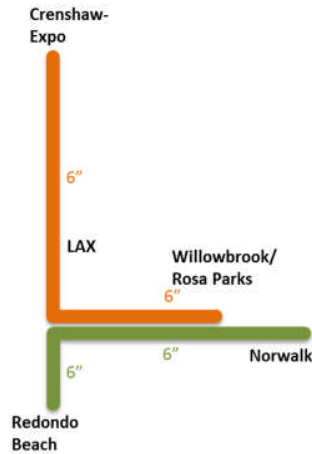
Alt C-2: Crenshaw/Redondo Interline, Norwalk Shortline



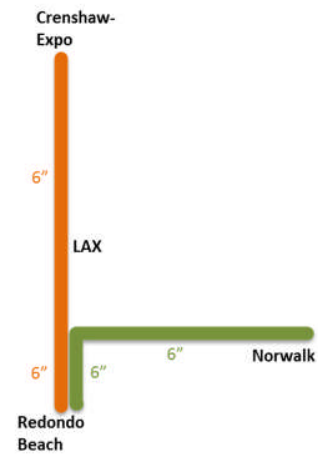
Alt C-3: Green Line shortline, Crenshaw to Norwalk



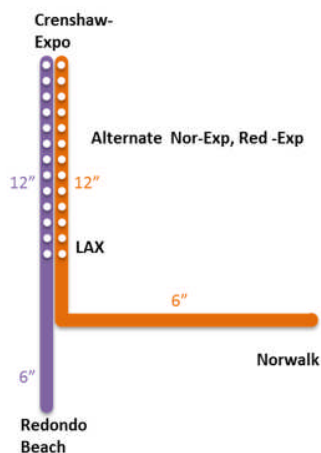
Alt C-4: Green Line, Crenshaw To Willowbrook/Rosa Parks



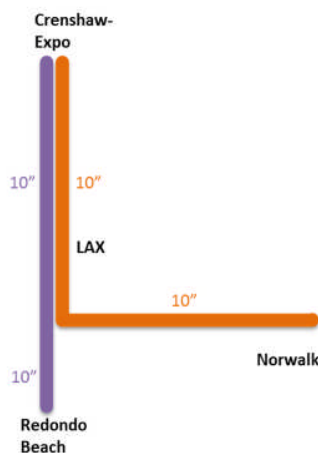
Alt C-5: Green Line, Crenshaw To Redondo Beach



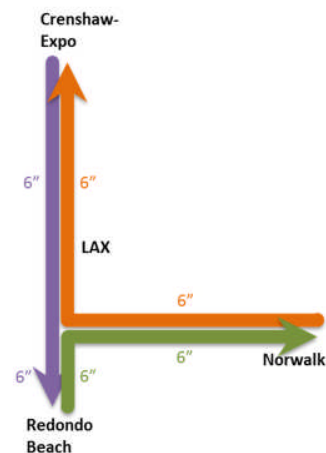
Alt D-1: Alternate Norwalk/ Crenshaw, Redondo/Crenshaw



Alt D-2: Alternate Norwalk/ Crenshaw, Redondo/Crenshaw



Alt D-3: One Way Operations



Each alternative service plan was evaluated using the following criteria:

- Connection to LAX

One primary goal of the Crenshaw/LAX Transit Project is to provide connectivity to LAX. Most bus connections, including the LAX Airport G Shuttle, will move from the current Aviation Station to the new Aviation/Century Station once Crenshaw/LAX opens. Therefore, the preferred service concept should ensure that a direct connection is provided between each of the three segments and the Aviation/Century and future 96th Street/AMC Station. Eight of the 11 alternatives achieve this criterion, including B-1, B-2, B-3, C-1, C-2, D-1, D-2, D-3.

- Current travel patterns – Figure 1-2 show the destinations of customers using the Green Line from each of the two segments (Norwalk – Aviation and Mariposa – Redondo Beach) based on TAP data. As shown in Figure 1, customers travelling along the Norwalk/I-105 Freeway segment are largely destined to central/south/southeast and downtown LA, along the Crenshaw Line corridor, and west along the Wilshire Corridor towards Santa Monica.

Figure 1  
Transit Destinations from Norwalk/I-105 Freeway Segment

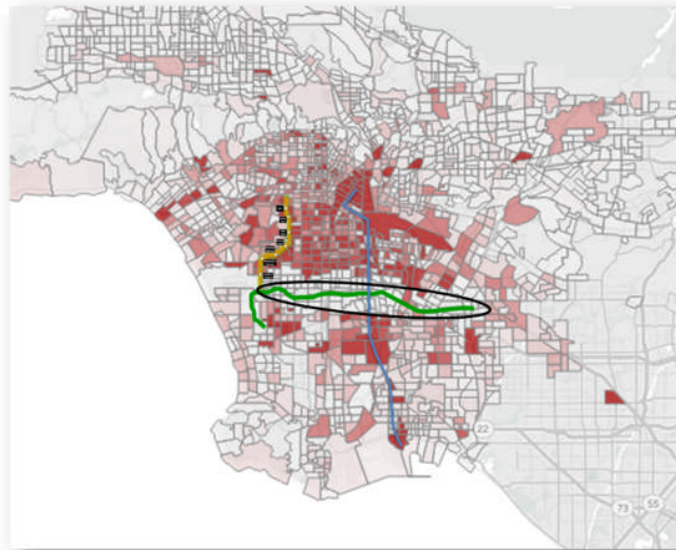
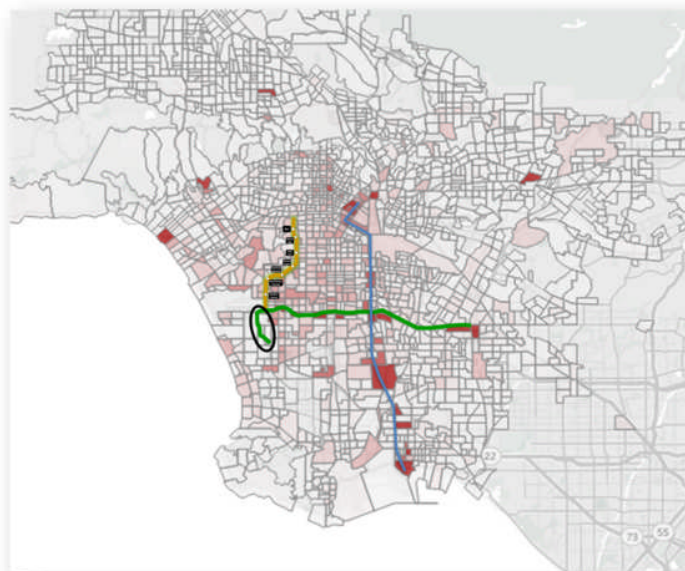


Figure 2  
Transit Destinations from Redondo Beach Segment



Customers boarding the Green Line along the Redondo Beach segment are largely travelling to destinations along the Blue Line. These are generally return trips for people working in the El Segundo business district.

Using Location Based Data from mobile devices, destinations of people travelling from a 1-mile buffer around the Norwalk/I-105 Freeway segment show similar results to the TAP data with more penetration south of the Green Line (Figure 3).

Figure 3  
All Travel Destinations from Norwalk/I-105 Freeway Segment

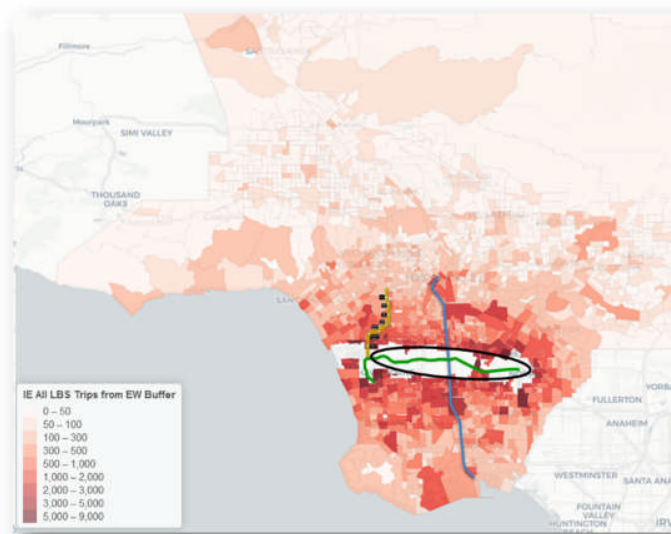
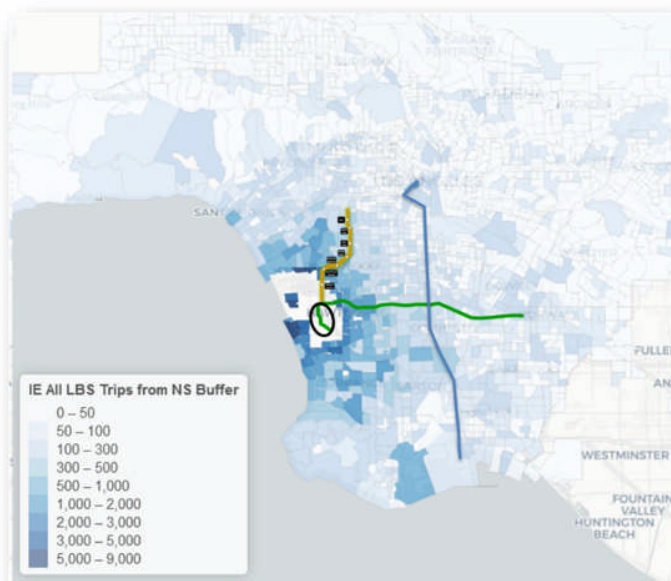


Figure 4  
All Travel Destinations from Redondo Beach Segment



Conversely, people starting their trips within a mile of the Redondo Beach segment are largely destined north and south along the I-405 corridor, and not east into the Crenshaw corridor nor the Green Line I-105 segment.

- Overall travel time for each of the six terminal-to-terminal moves

With the operating constraints from traction power and the wye junction, all scenarios have tradeoffs between providing one seat rides to and from all three terminals and frequency of service. If a transfer is required, the impact ranges between 3 and 7 minutes during the peak periods compared to a one seat ride. Transfers are required for some trips in all alternatives except for B-2. While B-2 provides a one seat ride to and from all three terminals, frequencies are reduced by 50% on each route from 6 to 12 minutes. Therefore, average wait time doubles from 3 to 6 minutes during the peak periods.

Based on the current Green Line travel demand, transfers between Norwalk and Expo/Crenshaw are likely to impact the most customers. Therefore, C-1 and C-3 provide the best overall travel time to the greatest number of customers with a 6 minute frequency and one seat ride between Norwalk and Expo/Crenshaw.

- Ridership demand for each of the three segments

It is important to consider current and future ridership along each of the three segments of the network to ensure that the appropriate capacity is provided to match demand. The Green Line currently carries about 33,000 average weekday boardings, with roughly 25,500 boardings on the I-105 Freeway segment between Norwalk and Aviation, and about 7,500 on the Redondo Beach – Aviation segment. The Crenshaw/LAX and Airport Metro Connector is expected to carry an additional 16,400 new boardings along the extension.

In addition, there is significant transfer activity currently occurring between the Green Line and major north/south bus corridors, such as Crenshaw BI, Hawthorne BI, and Vermont Av. Therefore, it is anticipated that many Green Line customers will migrate from these bus corridors to the Crenshaw/LAX Line, as experienced on the Expo Line from parallel bus services such as Wilshire BI, Olympic BI and Venice BI.

Future ridership will include the Green Line Extension to Torrance anticipated in 2028. This segment plus the current Redondo Beach demand is expected to generate about 16,300 boardings, matching the ridership projections of the Crenshaw/LAX segment. Therefore, the service plan should be revisited at least one year prior to the Torrance Extension opening to determine if travel patterns and other relevant factors show a need for a change in the service plan.

- Consistent Headways

To ensure that customers have an even level of service along the entire Crenshaw/LAX – Green Line network, and passenger loads are even from train to train, both directions of each segment should operate at a consistent frequency. Service is anticipated to begin in the Fall of 2019 with 6 minute peak hour frequencies on all segments with a maximum design frequency of 5 minutes. This frequency is also consistent with the Blue and Expo Lines, ensuring transfer loads are balanced between all three rail lines.

All alternatives provide consistent headways except for B1, B-2, and D-1.

- Network Simplicity

Simplifying the network makes the rail service more intuitive and easy to navigate. Fewer variations in routing and frequencies reduce confusion and requires less pre-planning by the customer before making the trip. This is especially beneficial for airport service as some customers will be first time riders and many from different parts of the world. Alternatives C-1, C-2, C-3, C-4, C-5, and D-2 are the easiest to navigate given their consistent routing and headways.