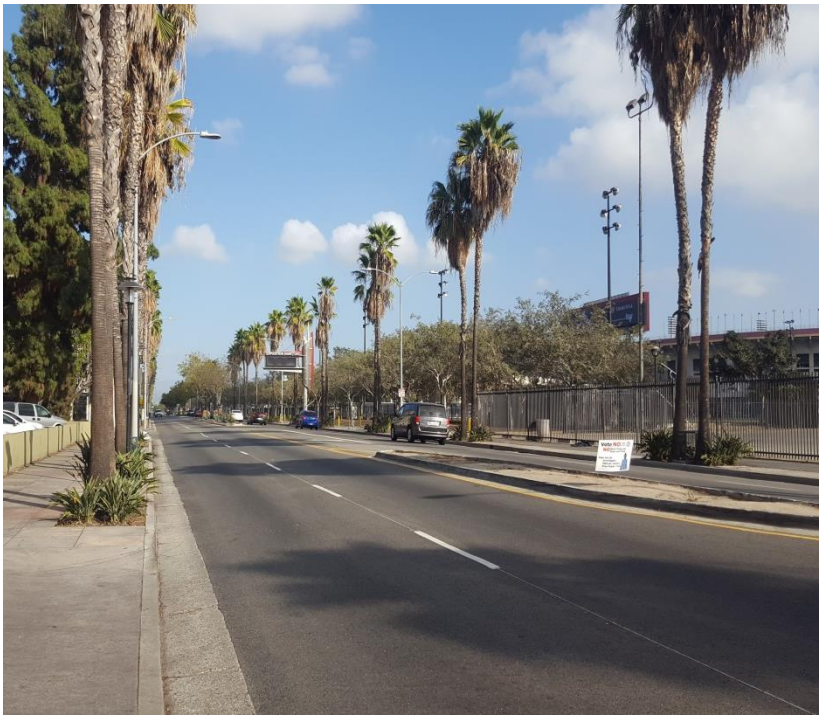
Chapter 3
BUS IMPROVEMENT CONCEPTS

The purpose of this chapter is to describe potential bus improvement strategies and potential impacts or implications associated with BRT implementation within the existing Vermont Avenue ROW.[4] The bus improvement strategies presented in this chapter are BRT concepts that encompass a package of BRT elements, or configuration types.



Segment D between Exposition and MLK Jr. Boulevard

In developing these concepts, several assumptions were made:

- All BRT concepts would include additional BRT attributes such as optional all-door boarding, enhanced traffic signal priority, enhanced BRT stations, and optimized operating plans.
- The converting of general purpose lanes to bus lanes is consistent with the City of Los Angeles Mobility Element 2035 adopted in January 2016 for the Vermont Corridor.
- No additional ROW would be acquired to accommodate the physical requirements associated with BRT implementation.

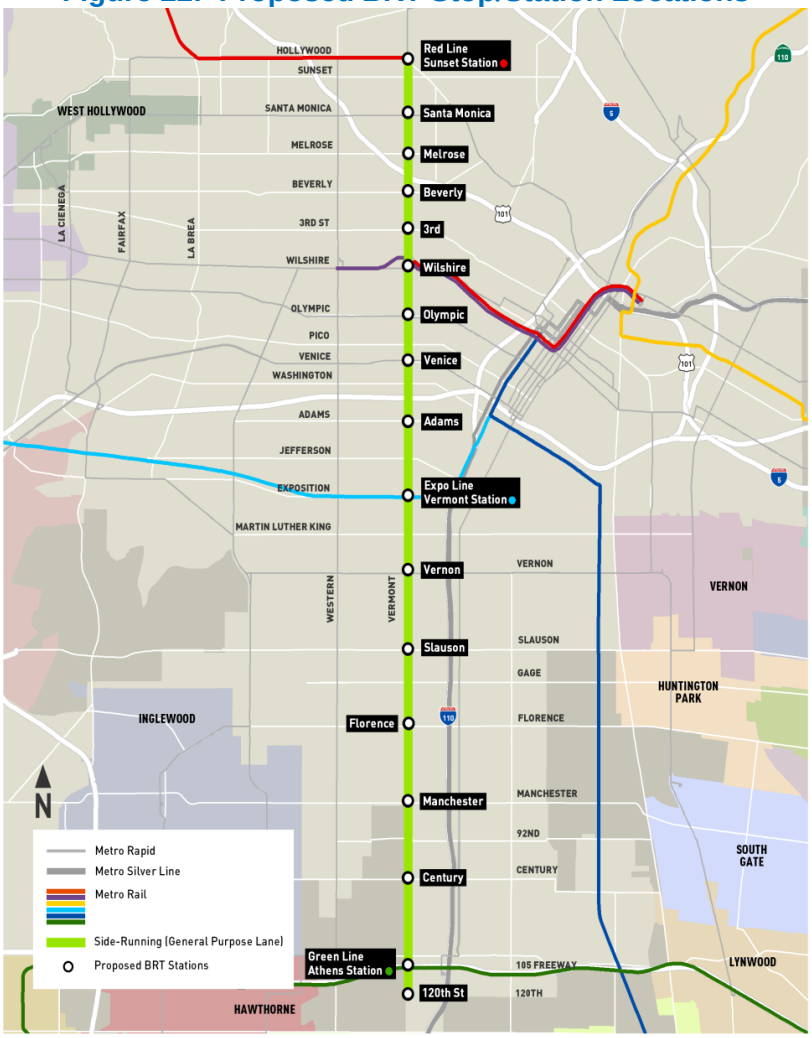
[4] It is assumed that no additional ROW would be acquired to accommodate the physical requirements of associated with each BRT concept.

- The BRT would operate from 5:00 AM to 10:00 PM weekdays with headways of every 5 minutes during peaks and every 10 minutes mid-day.
- Saturday service would operate from approximately 6:00 AM to 10:00 PM and from 6:00 AM to 8:00 PM on Sundays. Proposed headways on weekends are every 15 minutes.
- BRT lane widths vary from 12 to 14 feet. Twelve-foot lanes would be used under constrained conditions only.
- Existing streetscape, sidewalk widths, and landscaped medians would be maintained as much as possible throughout the corridor.

Definition of Concepts

This section provides a detailed description of four BRT concepts under consideration as part of the Vermont BRT Corridor Technical Study. Figure 22 illustrates the proposed alignment and stations along the Vermont Corridor.

Figure 22: Proposed BRT Stop/Station Locations



Source: Metro. 2016

The four (4) preliminary BRT concepts being considered include:

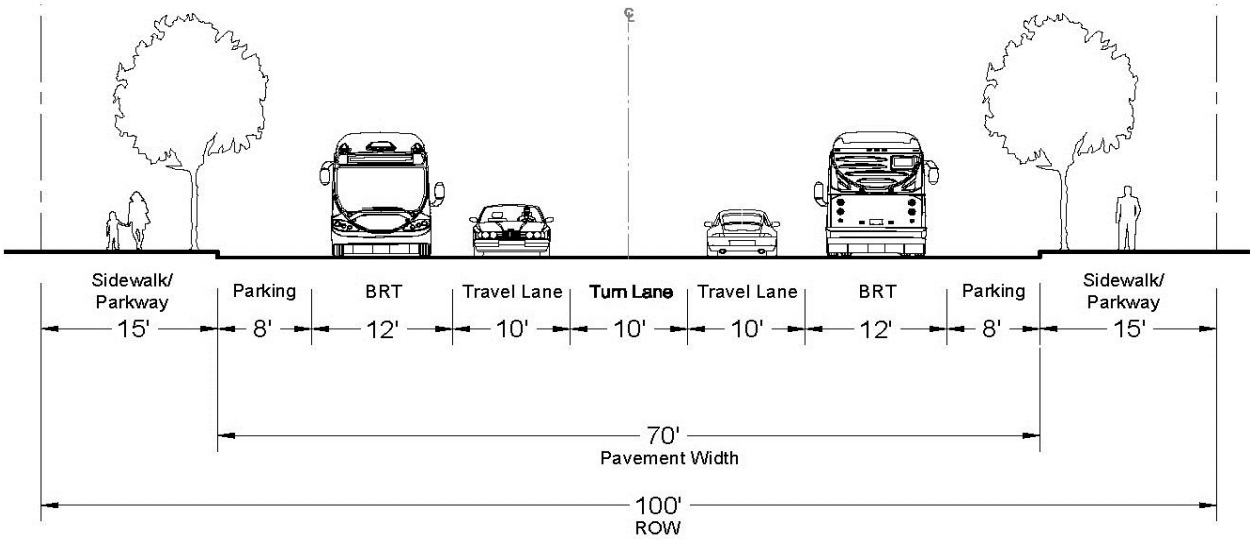
- **Concept 1**: End-to-End Side-Running BRT
- **Concept 2**: Combination Side and Center-Running BRT
- **Concept 3**: Curbside-Running BRT
- **Concept 4**: Peak Period Curbside-Running BRT

All four BRT concepts would have the same stop locations, as shown in Figure 22. In total there are 17 proposed stations, spaced approximately 0.7 mile apart. The stop locations were chosen to balance travel time with transit access. Consideration was also given to siting stop locations adjacent to major transfer connection points to other Metro bus and rail lines. Each BRT concept is described below in greater detail:

Concept 1: End-to-End Side-Running BRT

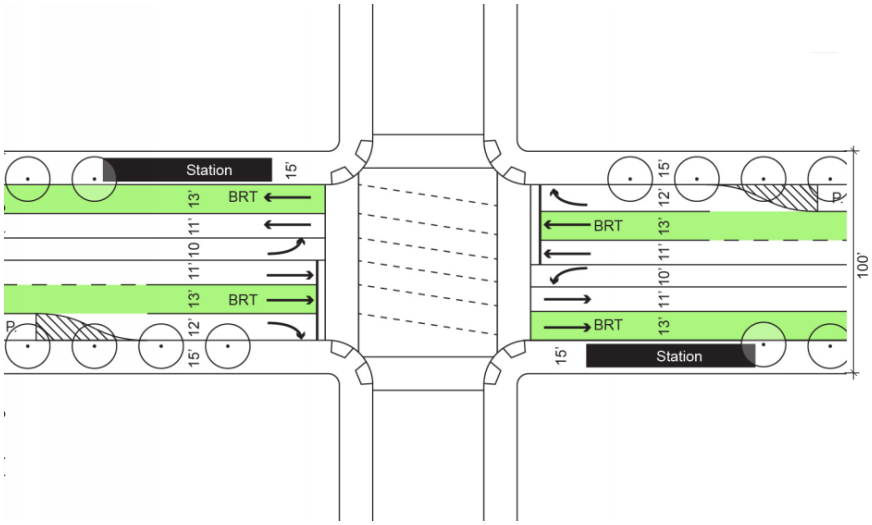
Concept 1: End-to-End Side-Running BRT features a dedicated bus lane along the entire 12.4 mile corridor within the existing ROW. Figure 23 depicts a typical cross-section of Vermont Avenue showing two 12-foot side-running dedicated BRT lanes along with the two remaining general purpose and parking lanes. Room for the bus lanes would be made available by converting the general purpose lane (one in each direction) adjacent to the curbside parking lanes to a transit only bus lane.

Figure 23: Typical Concept 1 Mid-Block Cross Section (Segment A between Hollywood and Wilshire Boulevards)



BRT stations with a number of passenger amenities including shelters, bus benches, trash cans, next bus information, and lighting, would be located on the sidewalks and far side of the intersections, as shown in Figure 24.

Figure 24: Station Plan for Side-Running BRT



Although the majority of on-street parking would be maintained, parking would be removed on the east side of Vermont Avenue in two of the more constrained segments: Segment B, between Wilshire and Jefferson Boulevards (approximately 160 spaces or 8 percent of the total on-street parking supply), and Segment E, between Martin Luther King Jr. Boulevard and Gage Avenue (approximately 203 spaces or 10 percent of the on-street parking supply) - a total loss of about 363 spaces on the east side of Vermont Avenue (18 percent of the total on-street parking supply).

Current all day parking utilization for Segments B and E is 39 percent and 58 percent, respectively, which reflects the relative amount of drivers that would experience parking impacts from implementation of Concept 1 along these segments.

Supplemental BRT attributes for Concept 1:

- Retains right-turn pockets at intersections to facilitate right-turn movements without interference with the BRT lanes
- Retains left-turn pockets at intersections
- All door boarding to reduce dwell times
- 12.4 miles of Transit Signal Priority Enhancements/Improvements
- Far-side stations with "bulb-outs" adjacent to sidewalks to reduce delays from buses having to pull back into traffic and provide additional space for BRT stations

Parking on the west side of Vermont Avenue would largely be preserved, except in the proximity of stations. Up to 83 additional spaces may be removed along the route at and/or near proposed stations to accommodate the station amenities. This represents over 4 percent of all on-street parking on the Vermont Corridor. Combined with the on-street parking spaces removed from the east side of Vermont Avenue in Segments B and E, over 22 percent of the parking spaces along Vermont Avenue would be removed under Concept 1.

The additional ROW gained from removing parking on the east side of Vermont Avenue along Segments B and E would accommodate street restriping to meet the minimum BRT design width (12-feet) and standard general purpose lane widths.

In Segments A through D, (between Hollywood and Adams Boulevards) curbside parking is currently restricted during peak periods and used as additional travel lanes. Because the BRT would operate in the lane adjacent to the curbside parking lane, current parking restrictions could be removed, thereby allowing all-day parking. This would increase peak parking supply by approximately 554 parking spaces along those four segments. Figure 25 shows the current street condition and how the BRT lanes would be implemented north and south of Gage Avenue.

Figure 25: Typical Before and After Renderings for Concept 1 with BRT Lanes

Concept 1 – Side-Running Dedicated BRT Lanes North of Gage Avenue

Concept 1 – Side-Running Dedicated BRT Lanes South of Gage Avenue

Concept 2: Combination Side and Center-Running BRT

Concept 2: Combination Side and Center-Running BRT features center-running dedicated BRT lanes south of Gage Avenue, where the ROW widens significantly, and side-running dedicated BRT north of Gage Avenue. South of Gage Avenue (Segments F through H), the corridor widens to three travel lanes in each direction and includes sufficient ROW to accommodate center-running BRT lanes. Because the ROW is generally narrower north of Gage Avenue, center-running BRT lanes would require considerable ROW acquisition. Therefore, side-running dedicated bus lanes are proposed north of Gage Avenue, from Segments A through E (Hollywood Boulevard to Gage Avenue for a total of 8.2 miles) similar to Concept 1.

Figure 26 depicts a typical center-running BRT configuration with two dedicated median BRT lanes and one traffic lane in each direction, while retaining on-street parking. An advantage of a center-running BRT lane is that it can achieve slightly faster bus travel times than a side-running lane from eliminating the friction associated with right-turning vehicles at intersections and into mid-block driveways. Center-running BRT lanes, which require more space than side-running BRT, would be accommodated by converting the two middle general travel lanes to dedicated bus only lanes. Existing left turns at intersections would be maintained.

Figure 26: Typical Concept 2 Mid-Block Cross Section (Segment A between Hollywood and Wilshire Boulevards)

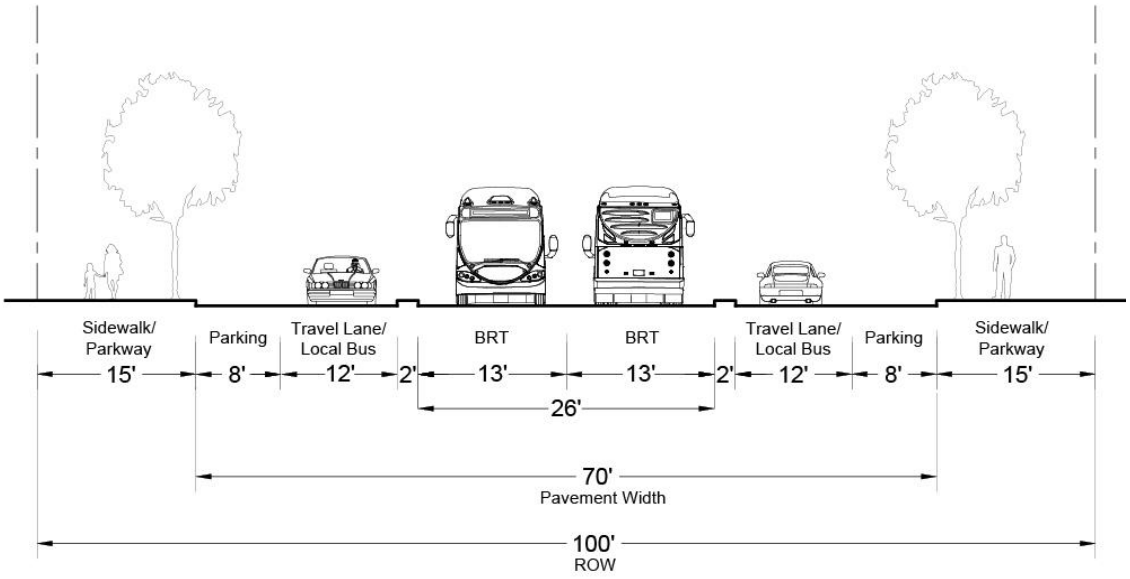


Figure 27 depicts a rendering of two center-running dedicated BRT lanes south of Gage Avenue. This configuration can be achieved by converting one travel lane in each direction to a bus only lane.

Figure 27: Typical Before and After Rendering for Concept 2 with BRT Lanes

Concept 2 – Center Running Dedicated BRT Lanes South of Gage Avenue

Figure 28 shows a typical configuration for a median BRT station, which would be located in the center of the ROW with platforms on either (far) side of the intersections. Median BRT platforms typically require more space than sidewalk BRT stations. A minimum width of 15-feet is desirable for median station platforms.

Figure 28: Station Plan for Center-Running BRT

Similar to Concept 1, Concept 2 would require some on-street parking removal, mainly on the east side of Vermont Avenue within Segment B (160 spaces) and Segment E (203 spaces). Up to 101 additional on-street spaces would be removed at or near proposed stations. Parking on the west side of the street in these two segments would be maintained (with the exception of a few spaces at and/or near proposed stations). Overall, Concept 2 would remove approximately 464 on-street parking spaces along the Vermont Corridor, or 23 percent of the total on-street parking supply.

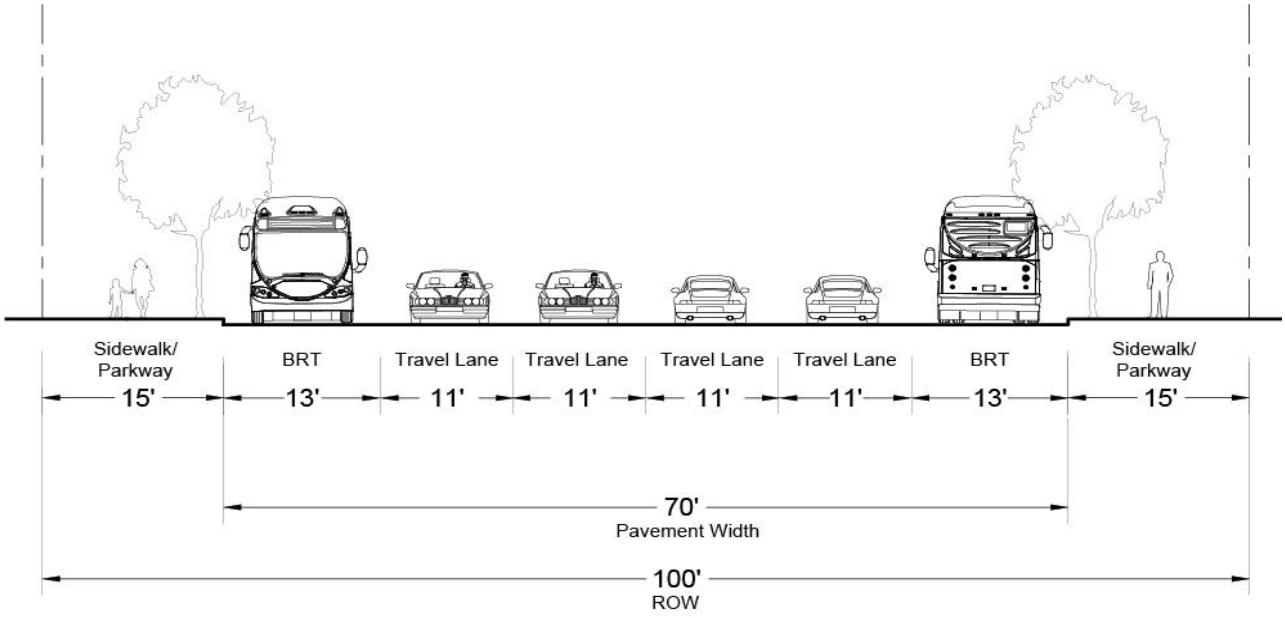
Supplemental BRT attributes for Concept 2:

- Retains right-turn pockets at intersections to facilitate right-turn movements without interference with the BRT lanes
- Retains left-turn pockets at intersections
- All door boarding to reduce dwell times
- 12.4 miles of Transit Signal Priority Enhancements/Improvements
- Far-side stations with "bulb-outs" adjacent to the sidewalks to reduce delays from buses having to pull back into traffic and provide additional space for BRT stations
- Median station platforms with similar passenger amenities at proposed stop locations (south of Gage Avenue)

Concept 3: Curbside-Running BRT

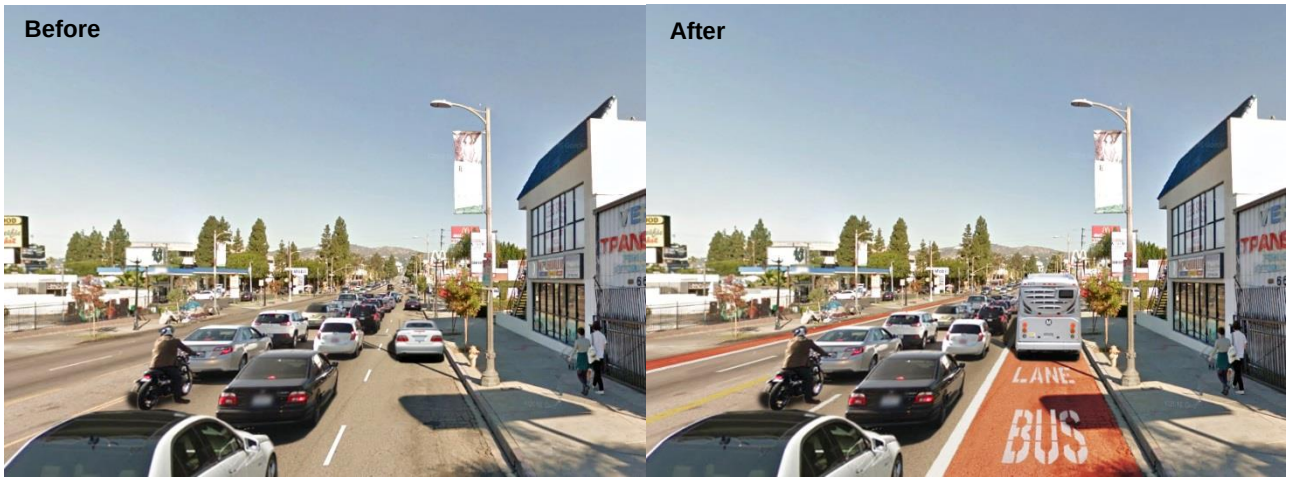
Concept 3: Curbside-Running BRT features dedicated BRT lanes next to the curb, which would require removal of existing on-street parking. Figure 29 illustrates a typical curbside BRT with dedicated bus only lanes. The dedicated lanes would replace existing parking lanes, while maintaining two general purpose travel lanes in each direction. This configuration would apply to segments north of Gage Avenue (Segments A through E) where adequate ROW exists. BRT stations would be located on sidewalks and at the far side of intersections, similar to Concept 1.

Figure 29: Typical Concept 3 Mid-Block Cross Section (Segment A between Hollywood & Wilshire Boulevards)



Concept 3 would require the removal of all on-street parking (a total of more than 1,000 spaces, or about 50 percent of all on-street parking on the Vermont Corridor) in Segments A through E (north of Gage Avenue). In Segment B between Wilshire and Jefferson Boulevards, and Segment E, between Martin Luther King Jr. Boulevard and Gage Avenue, however, the parking lane width is only 8 to 9 feet wide. Therefore, a curbside BRT lane would not fit within this space without acquiring additional ROW (even assuming a constrained minimum width of 12 feet and two travel lanes of minimum acceptable widths in each direction). Figure 30 shows the current street condition and how the BRT lanes would be implemented along the corridor.

Figure 30: Typical Before and After Renderings for Concept 3



Segment D (between Exposition Boulevard and Martin Luther King Jr. Boulevard) currently does not include on-street parking; therefore the BRT would operate in mixed flow within this segment (0.5 mile). South of Gage Avenue (Segments F, G and H), there is sufficient ROW to implement curbside BRT lanes while maintaining two general travel lanes in each direction. Parking impacts would be minimal and limited to those additional spaces needed at and/or near stations. Most of the existing on-street parking (between Gage Avenue and Manchester Boulevard) is located along frontage roads rather than in the immediate curb lanes.

Supplemental BRT attributes for Concept 3:

- Retains left-turn pockets at intersections
- All door boarding to reduce dwell times
- 12.4 miles of Transit Signal Priority enhancements/improvements
- Far-side stations with "bulb-outs" adjacent to the sidewalks to reduce delays from buses having to pull back into traffic and provide additional space for BRT stations

Due to these physical constraints, Concept 3 would include only 7.3 miles of dedicated bus lanes. The BRT would have to operate in mixed flow travel lanes for the remaining 5.1 miles. Additionally, buses would experience further delays at intersections waiting for vehicles in the right turn lanes to complete their turns.

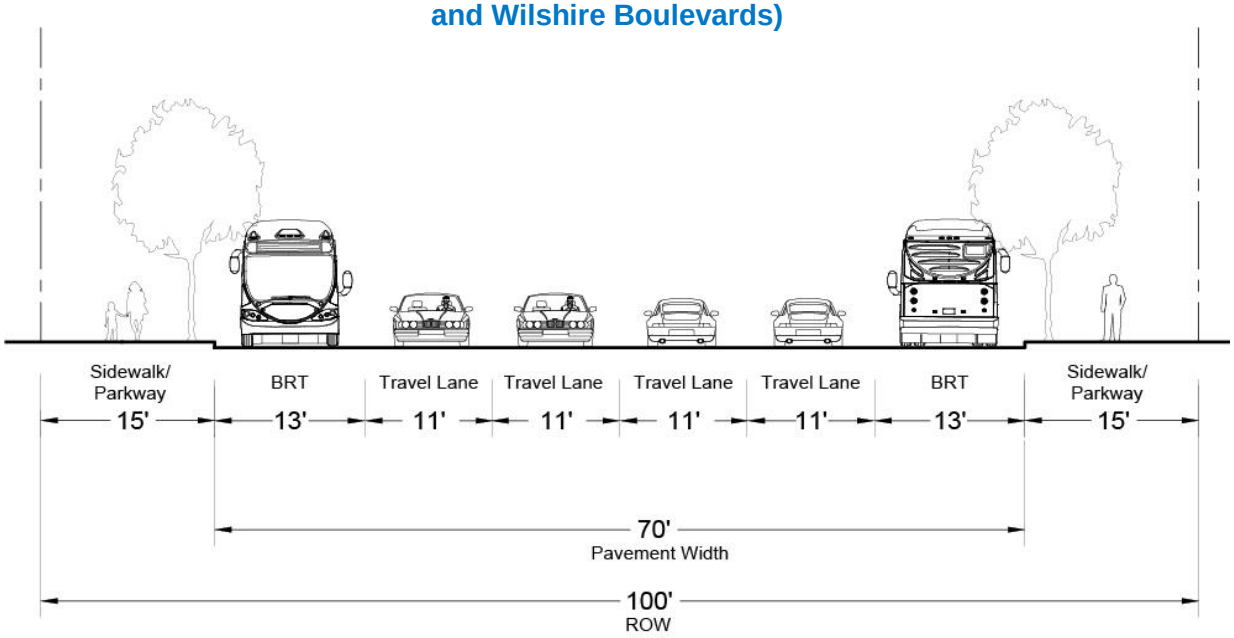
Concept 4: Peak Period Curbside-Running BRT

Concept 4: Peak Period Curbside-Running BRT features dedicated curbside bus lanes during peak periods only. Figure 31 illustrates a typical mid-block cross section north of Gage Avenue where ROW would be available (Segment A between Hollywood and Wilshire Boulevards). Bus lanes would be accommodated by converting the existing peak hour restricted parking lanes to bus only from 7:00 AM to 9:00 AM and 4:00 PM to 7:00 PM. The BRT would operate in a mixed-flow travel lane adjacent to the parking lane (as Metro Rapid Line 754 does today) during non-peak hours. BRT stations would be located on the sidewalk and on the far side of intersections, similar to Concept 1.

Supplemental BRT attributes for Concept 4:

- Retains left-turn pockets at intersections
- All door boarding to reduce dwell times
- 12.4 miles of Transit Signal Priority enhancements/improvements
- Far-side stations with "bulb-outs" adjacent to the sidewalks to reduce delays from buses having to pull back into traffic and provide additional space for BRT stations.

Figure 31: Typical Concept 4 Mid-Block Cross Section (Segment A between Hollywood and Wilshire Boulevards)



Hollywood Boulevard to Adams Boulevard (4.7 miles) is the only segment with current peak hour parking restrictions. Sufficient ROW is available on about half of Segment B to accommodate acceptable travel lane widths and 14-foot curbside bus-only lanes. Therefore, the BRT would operate in mixed-flow for approximately 9.7 miles, absent any additional peak hour parking restrictions on the remainder of the corridor.

Concept 4 would affect the peak hour parking supply, which is important to local businesses. Additionally, buses would experience additional delays at intersections waiting for vehicles in the right turn lanes to complete their turns. Figure 32 shows the current street condition and how the BRT lanes would be implemented along the curbside lanes during peak hours.

Figure 32: Typical Before and After Renderings for Concept 4