I-805 BRT/47TH STREET TROLLEY STATION AREA PLANNING STUDY

Task 4: Initial Screening

Final Task Report

March 2013
Table of Contents

List of Figures ..................................................................................................................... ii
List of Tables ....................................................................................................................... ii
Introduction .......................................................................................................................... 1
   Study Purpose .................................................................................................................. 1
   Purpose of Task Report .................................................................................................. 1
Alternative Development Process ....................................................................................... 3
   Workshop and PDT Input ............................................................................................... 3
   Community Input ........................................................................................................... 4
Alternatives Overview ......................................................................................................... 4
   Design Options ................................................................................................................ 5
   Engineering Assumptions Applied to the Alternatives ................................................ 7
Initial Alternatives ................................................................................................................ 9
   Alternative 1A – Freeway Level, In-Line Station, Side Platforms ................................... 9
   1B – Freeway Level, In-Line Station, Center Platform ................................................... 10
   2A – Mid-Level, In-Line Station, Left Hand DAR ............................................................ 11
   2B – Mid-Level, Off-Line Station, Flyover, West Side Platform, Tunnel Crossing Under Tracks ... 12
   2C – Mid-Level, Off-Line Station, Flyover, East Side Platform, Tunnel Crossing Under Tracks ....... 13
   2D – Mid-Level, Off-Line Station, Flyover, West Side Platform, Open Crossing Under Tracks ..... 14
   2E – Mid-Level, Off-Line Station, Flyover, East Side Platform, Open Crossing Under Tracks ......... 15
   3A – Track Level, In-Line Station, Left Hand DAR .......................................................... 16
   3B – Track Level, Off-Line Station, Left Hand DAR, West Side Platform ......................... 17
   3C – Track Level, Off-Line Station, Left Hand DAR, East Side Platform ............................ 18
   3D – Track Level, In-Line Station, Right Hand DAR ....................................................... 19
   3E – Track Level, Off-Line Station, Right Hand DAR, West Side Platform ....................... 20
   3F – Track Level, Off-Line Station, Right Hand DAR, East Side Platform ......................... 21
   3G – Track Level, Off-Line Station, Flyover, West Side Platform ......................................... 22
   3H – Track Level, Off-Line Station, Flyover, East Side Platform ......................................... 23
Evaluation Criteria ............................................................................................................. 24
   Order of Magnitude Capital Cost .................................................................................... 24
   Effect on BRT and Trolley Operations ............................................................................ 24
   Proximity of Platforms and Ease of Access .................................................................... 24
   Economic Development Potential .................................................................................. 24
   Need for Design Exceptions ......................................................................................... 24
   Environmental Impacts .................................................................................................. 25
   Passenger Security and Related Operating Costs ........................................................... 25
Scoring Results and Recommendations ............................................................................. 28
Scoring Results .................................................................................................................... 28
   Alternatives Recommended for More Detailed Analysis ................................................ 28
Appendix – Conceptual Engineering Drawings of Each Alternative ................................. 31
List of Figures

Figure 1 – Study Area ............................................................................................................................ 2
Figure 2 – Grade Types .......................................................................................................................... 6
Figure 3 – Ramp Types .......................................................................................................................... 7
Figure 4 – Alternative 1A ...................................................................................................................... 9
Figure 5 – Alternative 1B ...................................................................................................................... 10
Figure 6 – Alternative 2A ..................................................................................................................... 11
Figure 7 – Alternative 2B ..................................................................................................................... 12
Figure 8 – Alternative 2C ..................................................................................................................... 13
Figure 9 – Alternative 2D ..................................................................................................................... 14
Figure 10 – Alternative 2E .................................................................................................................... 15
Figure 11 – Alternative 3A .................................................................................................................... 16
Figure 12 – Alternative 3B .................................................................................................................... 17
Figure 13 – Alternative 3C .................................................................................................................... 18
Figure 14 – Alternative 3D .................................................................................................................... 19
Figure 15 – Alternative 3E .................................................................................................................... 20
Figure 16 – Alternative 3F .................................................................................................................... 21
Figure 17 – Alternative 3G .................................................................................................................... 22
Figure 18 – Alternative 3H .................................................................................................................... 23

List of Tables

Table 1 – Alternatives Matrix .................................................................................................................. 4
Table 2 – Evaluation Categories ............................................................................................................. 26
Table 3 – Alternative Scores by Criterion ............................................................................................. 27
Table 4 – Alternative Scores ................................................................................................................ 29
Table 5 – Alternative Rankings .............................................................................................................. 30
Introduction

Study Purpose

The primary purpose of the I-805 BRT/47th Street Trolley Station Area Planning Study is to develop and evaluate design options to provide the nearby community with access to the new bus rapid transit (BRT) service on the future I-805 express lanes. The connection is intended to improve access to regional transit services, facilitate regional system connectivity between the Orange Line Trolley and I-805 BRT services, enhance community mobility, improve access to jobs outside of the community, and provide for greater mobility to access jobs within the community. The intent of the study is to facilitate implementation of the connection between the BRT, Orange Line Trolley, and local bus service by 2020 as desired by both SANDAG and the community. The primary project study area is shown in Figure 1.

Purpose of Task Report

The purpose of this report is to document how the initial alternatives were developed and to recommend the alternatives to be selected for detailed analysis. The first section describes the alternative development process including the input and discussions of the consultant team, the project development team (PDT), and the community. The following sections provide both a general overview of each of the different types of alternatives supplemented by detailed descriptions of each of the 15 alternatives. The evaluation criteria and the scoring system are discussed to provide an understanding of the various opportunities and constraints of each alternative and their scoring. Finally, each alternative is evaluated and ranked, leading to the selection of five alternatives plus one design variation to be carried forward into the detailed analysis. In addition, additional analysis of the feasibility of the west side alternatives will be conducted.
Alternative Development Process

The intent in developing the initial alternatives was to provide a comprehensive assortment of feasible options to make the connection between the BRT on the I-805 express lanes and the Orange Line Trolley station at 47th Street while meeting the study's goals. The consultant team met to conceptualize the different types of alternatives and organized them for presentation and discussion with the Project Development Team (PDT). The alternatives evolved over a period of several weeks into the 15 that were ultimately screened. The various steps in that process are documented in this section.

Workshop and PDT Input

The initial alternative workshop took place on July 11, 2012 at Caltrans. Those in attendance included staff from SANDAG, MTS, Caltrans, and the consultant team. The presentation began with an overview of the alternatives and the five general categories which included: in-line freeway level, mid-level, direct access ramp (DAR) left exit, DAR right exit, and flyovers. The group then discussed the five alternative concepts including key opportunities and constraints related to each alternative. Based on the discussion at the workshop, the alternatives were further refined and a more comprehensive set of alternatives along with initial evaluation criteria were developed.

A total of 15 alternatives were developed and presented at the July 26, 2012 PDT meeting along with the draft set of the evaluation screening criteria which included:

1) the ability to meet project goals and objectives
2) physical feasibility
3) effect on transit operations
4) order of magnitude capital cost
5) ability to support smart growth opportunities

At the July 26th PDT meeting, the group reviewed the 15 alternatives and took part in a brainstorming session to review and refine the evaluation criteria and scoring system that would be applied to each of the alternatives. The 15 alternatives and revised criteria were later presented to the Community Working Group (CWG) in September 2012. The revised initial evaluation screening criteria included:

1) order of magnitude cost estimates
2) effect on BRT & Trolley operations
3) proximity of platforms & ease of access
4) economic development potential
5) need for design exceptions
6) environmental and right of way impacts
7) passenger security & related operating costs

It was determined that all seven criteria would be scored on a scale of 1 – 5 with no weighting applied.

An additional workshop took place with members of the PDT on September 14, 2012 to discuss various assumptions and details related to the alternatives. The direction provided at this session enabled the consultant team to refine various aspects of the alternatives and the application of the scoring for the evaluation criteria.

During the PDT meeting on December 6, 2012, the final five alternatives plus one design variation were selected based on those with the highest scores and one other to provide a range of potential
alternatives. In addition, the PDT agreed to review key aspects affecting the feasibility of west side alternatives.

**Community Input**

SANDAG and the consultant team presented the 15 alternatives and initial evaluation screening criteria to the Community Working Group on September 24, 2012. The CWG provided feedback on the 15 alternatives presented and evaluation criteria. Many of the community members stated that their highest priorities were ease of access and security. Also, several individuals gave suggestions on where the BRT station should be located and whether or not the 47th Street Trolley Station should be relocated. This feedback was utilized in the next steps of the project when scoring each alternative and selecting which ones should move forward for more detailed analysis.

On December 1, 2012, a field trip followed by a working lunch was held for community representatives. The field trip included visits to several transit centers along SR-15 and I-15 to enable the group to see the various design treatment options. The community endorsed the alternatives proposed for detailed analysis and requested that the west side alternatives continue to receive consideration.

**Alternatives Overview**

Through the collaborative process described in the previous section, 15 alternatives were developed for initial screening. These alternatives represent a wide range of design options that could feasibly fulfill the project goals. Each alternative is a combination of elements for location (in-line or off-line), grade level (freeway, mid, or track level), and ramp type (left or right hand DAR or flyover) as summarized in Table 1 below.

**Table 1 – Alternatives Matrix**

<table>
<thead>
<tr>
<th>I-805/47th Street BRT Station Locations &amp; Alternatives</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 - Street/Track Level</td>
</tr>
<tr>
<td>(3a) Off-line - West BRT Station with Left Hand DAR</td>
</tr>
<tr>
<td>(3b) Off-line - West BRT Station with Left Hand DAR</td>
</tr>
<tr>
<td>(3e) Off-line - West BRT Station with Right Hand DAR</td>
</tr>
<tr>
<td>(3d) Off-line - West BRT Station with Right Hand DAR</td>
</tr>
<tr>
<td>(3g) Off-line - West BRT Station with Flyover</td>
</tr>
<tr>
<td>(3f) Off-line - West BRT Station with Flyover</td>
</tr>
<tr>
<td>2 - Mid-Level</td>
</tr>
<tr>
<td>(2b) Flyover - pass through a tunnel</td>
</tr>
<tr>
<td>(2d) Flyover - pass btw 805 shoulder and LRT bridge wall at mid-level</td>
</tr>
<tr>
<td>(2a) In-line - Mid-level Side Platform</td>
</tr>
<tr>
<td>(2e) Flyover - pass btw 805 shoulder and LRT bridge wall at mid-level</td>
</tr>
<tr>
<td>(1a) In-line - Freeway Level Side Platform</td>
</tr>
<tr>
<td>1 - Freeway Level</td>
</tr>
<tr>
<td>N/A</td>
</tr>
<tr>
<td>(1b) In-line - Freeway Level Center Platform</td>
</tr>
<tr>
<td>N/A</td>
</tr>
<tr>
<td><strong>Legend</strong></td>
</tr>
<tr>
<td><strong>Bus Lane Ramp</strong></td>
</tr>
<tr>
<td>Left Hand Ext DAR</td>
</tr>
<tr>
<td>Right Hand Ext DAR</td>
</tr>
<tr>
<td>Flyover above the general purpose lanes</td>
</tr>
<tr>
<td>Mid-level</td>
</tr>
<tr>
<td>At grade freeway level</td>
</tr>
</tbody>
</table>
**Design Options**

**In-Line Station**
The in-line station alternatives involve a side platform or center platform in the I-805 freeway median at the freeway level, mid-level, or track level. Some of the benefits of this design are lower capital costs, less time off-line for the BRT, and fewer environmental impacts. A few concerns about in-line stations include more design exceptions (e.g., minimizing lane and shoulder widths), less economic development potential than east side stations, and a higher level of effort to provide security.

**Off-Line Station**
The off-line station alternatives consist of a platform east or west of the I-805 at mid-level or track level.

**East Side Stations** Some of the advantages of the off-line east side stations are fewer Caltrans design exceptions, more efficient security (e.g., more line of sight and visibility of waiting passengers), and more economic development potential. Some issues related to east side stations include higher capital costs, more time off-line for the BRT, potential right of way impacts, and the potential for greater environmental impacts.

**West Side Stations** Similar to the east side stations, a beneficial element of the off-line west side stations is the need for fewer design exceptions such as substandard freeway lanes widths, shoulder widths, etc. A few of the drawbacks of west side stations include higher capital costs, more time off-line for the BRT, less economic development potential, and the potential for greater environmental impacts.

**Freeway Level**
In the freeway level alternatives (Figure 2), the BRT vehicles stay in-line at the same grade as the freeway with a passenger platform at the freeway level and a connection provided to a pedestrian walkway at the track level via stairs and elevators. These alternatives can have a side platform or center platform. The benefits of this design are lower capital costs, less time off-line for the BRT, no at-grade crossing of the Trolley tracks, and fewer environmental impacts. The disadvantages of the freeway level options are the large distance and grade differences between the BRT and Trolley platforms, more design exceptions, and a greater need for surveillance equipment and security personnel. Furthermore, this design would require the Greenwood Underpass (aka Trolley bridge) to be rebuilt because the freeway widening required would impact the existing embankment.

**Mid-Level**
For the mid-level alternatives (Figure 2), the BRT vehicles must climb to mid-level between the freeway and the Greenwood Underpass, with a passenger platform at the mid-level point, and a connection provided to the track level via pedestrian ramps. These alternatives can be in-line (in the median of the freeway) or off-line with a left hand DAR or flyover ramp to reach platforms on either side of I-805. Some of the advantages of this design are less time off-line for the BRT (compared to track level options explained below) and no need for at-grade crossing of the Trolley tracks. Drawbacks for the mid-level stations are the increased security effort due to greater grade differences and distance between platforms, limited lines of sight, and limited visibility of waiting passengers.

**Track Level**
The track level alternative (Figure 2) consists of a direct access ramp (DAR) or flyover ramp rising to the elevation of the Greenwood Underpass and connections between platforms by way of a pedestrian bridge adjacent to the Greenwood Underpass. These alternatives can be in-line or off-line with a station east or west of I-805. The benefits of this design for passengers are greater.
visibility of waiting passengers and sight lines from the rail station, and greater ease of access due to less distance and grade differences between the BRT and Trolley platforms. The disadvantages of the track level options are the longer time off-line for BRT, including the added time needed for at-grade crossing of the Trolley tracks.

**Figure 2 – Grade Types**

**Left Hand Direct Access Ramps (DAR)**

For the left hand DAR (Figure 3) station alternatives, BRT vehicles merge into the left side of the express lanes on I-805 and enter the ramp to access the BRT station at the mid-level or track level. At the track level, a left hand DAR would require a single crossing of the trolley tracks. Some of the advantages of this type of ramp are a smaller footprint, which would allow for the preservation of the Greenwood Underpass, and a decrease in delay for BRT operations with only a single crossing of the tracks. One perceived disadvantage of the left hand DAR is that it is not typically considered a standard ramp design.

**Right Hand Direct Access Ramps (DAR)**

In right hand DAR (Figure 3) station alternatives, BRT vehicles merge into the right side of express lanes on I-805 and enter the ramp to access the BRT station at the mid-level or track level. At the track level, a right hand DAR would require two crossings of the trolley tracks. One positive attribute of right hand DARs is that they are the accepted design standard for direct access ramps. However,
Drawbacks include a wider footprint, which would require widening the I-805 and replacing the Greenwood Underpass, and a greater potential for BRT operational delays with two track crossings.

**Flyovers**

The flyover design (Figure 3) involves a ramp that would route the BRT vehicles to the east or west side of I-805 to a station platform at the same elevation as the tracks or at the mid-level between the tracks and the freeway. Some of the benefits of this design are that there would be no change to the retaining walls of the express lane project, the Greenwood Underpass would not need to be replaced, and providing platforms at track level would reduce costs relative to platforms that require vertical circulation. Drawbacks for the flyover alternatives include an increase in the cost of construction and the potential of having to acquire right of way north or south of the tracks.

![Figure 3 – Ramp Types](image)

**Engineering Assumptions Applied to the Alternatives**

In studying the feasibility and impacts related to each of the proposed alternatives, the following assumptions were applied to all alternatives to preserve the future-existing freeway level of service and safety conditions.

- I-805 will maintain the same number of general purpose and HOV lanes in each direction, specifically five general purpose lanes, two HOV lanes, one HOV buffer, one auxiliary lane, and two shoulders (one on each side) between Imperial Avenue and Market Street.
- All of the lanes, shoulders, and buffer widths will be built to Caltrans standards, which include 12-foot lanes, 10-foot shoulders, and 4-foot buffers.
- Any alteration of the freeway alignment must support a design speed of 70 mph.
- The vertical clearances between bottom of a bridge and freeway grade must be at least 16.5 feet.
- The profile grade within the project limits is fairly flat. No BRT auxiliary lane is proposed next to the express lanes for acceleration or deceleration beyond the station area. However, an auxiliary lane within the station area could be proposed for buses to accelerate and merge back to the express lanes, or decelerate to stop at the platform.
There will be no impact on the proposed SR94/I-805 HOV connector because the improvements for this project will be located south of Hilltop Drive while the HOV connector touches down north of Hilltop Drive.
Initial Alternatives

The 15 alternatives developed for screening and scoring are described in this section. A summary of each alternative is provided along with a schematic drawing that represents the key design elements. Conceptual engineering drawings for each alternative are provided in the appendix.

Alternative 1A – Freeway Level, In-Line Station, Side Platforms

Alternative 1A (Figure 4) adds dedicated northbound and southbound BRT lanes within the existing median with side station platforms south of the Greenwood Underpass. Pedestrians would access the BRT station from the existing 47th Street Trolley Station east of I-805 via a pedestrian overcrossing and vertical connections (stairs and elevators). The pedestrian overcrossing would be placed at track level and adjacent to the Greenwood Underpass. Separate northbound and southbound bus stations would be positioned to the right of the bus lane within the median. The stations would be separated by concrete barriers from adjacent HOV lanes. This alternative would require widening the median.

Figure 4 – Alternative 1A

Issues and Considerations

One of the favorable elements of this alternative is its relatively low capital cost, assuming that the 47th Street Trolley Station would not be relocated. Since the design does not have many high cost elements like flyover ramps or tunnels, the project cost would be approximately $50 - $70 million. Also, this option has no at-grade crossings and allows for a minimal amount of time off-line for BRT vehicles so that they can serve the station with a minimal amount of added time. Another advantage is that the alternative poses few environmental impacts, since it would not create visual and noise
impacts nor would it require land acquisition. Also, the economic development potential of an in-line BRT station is better than that of a west side station due to its closer proximity to existing development.

One disadvantage of this design is its less convenient ease of access due to the greater distance and grade differences between the BRT and Trolley stations. Passengers would be required to use stairs or elevators to reach track level and then walk across the pedestrian overcrossing to reach the 47th Street Trolley Station. Another drawback of this alternative is a need for a higher level of effort to provide security due to the limited sight lines and visibility of waiting passengers. The most expensive elements of the capital cost of this alternative would be the realignment of the express lanes and general purpose lanes as well as the replacement of the Greenwood Underpass and the Imperial Avenue Overcrossing.

**1B – Freeway Level, In-Line Station, Center Platform**

Alternative 1B (Figure 5) is identical to Alternative 1A except for a few key elements. Alternative 1B adds dedicated northbound and southbound BRT lanes within the existing median with a center station platform south Greenwood Underpass. This alternative would include northbound buses crossing over the southbound bus lane on a bridge south of Greenwood Underpass. Likewise, southbound buses would cross over the northbound bus lane on a bridge north of Greenwood Underpass.

**Issues and Considerations**

Most of the same advantages and disadvantages from Alternative 1A apply to this alternative with a few exceptions. The capital cost of this design would be slightly higher, at approximately $70 - $80 million, due to the additional elements required to construct a center platform instead of side
platforms. As a result, the Oceanview Boulevard and Market Street Overcrossings would also be affected so that a total of four bridges would have to be replaced. Furthermore, grade-separated crossovers for the BRT would have to be constructed to allow for the center platform design. The construction and replacement of these elements would create additional environmental impacts.

2A – Mid-Level, In-Line Station, Left Hand DAR

Similar to Alternative 1A, Alternative 2A (Figure 6) adds dedicated northbound and southbound BRT lanes within the existing median with a left hand DAR and side station platforms at the Greenwood Underpass. However, this station would be located at mid-level between the freeway and track levels. The bus lanes would be built on retained earth with station platforms to minimize the widening of the freeway footprint. Pedestrians would access the BRT station from the existing 47th Street Trolley Station east of I-805 via a pedestrian overcrossing and vertical connections (stairs and elevators). The pedestrian overcrossing would be placed at track level and adjacent to Greenwood Underpass. Separate northbound and southbound bus stations would be positioned to the right of the bus lane.

Figure 6 – Alternative 2A

Issues and Considerations

Alternative 2A has many of the same positive and negative aspects as Alternative 1A including cost, effect on BRT operations, environmental impacts, and the replacement of two bridges (Greenwood Underpass and Imperial Avenue Overcrossing). However, there are a few differences between the two alternatives. This design provides slightly better ease of access because pedestrians must transition only one grade difference to reach the track level pedestrian crossing. Also, this alternative provides an improved waiting environment for passengers since they are farther away from the traffic at freeway level.
2B – Mid-Level, Off-Line Station, Flyover, West Side Platform, Tunnel Crossing Under Tracks

Alternative 2B (Figure 7) adds dedicated northbound and southbound BRT lanes within the existing median with flyover bridges across the southbound HOV and general purpose lanes. The side station platforms would be located outside the freeway facility, west of I-805. Pedestrians would access the stations from east of I-805 via a pedestrian overcrossing at track level and adjacent to the Greenwood Underpass. Separate northbound and southbound BRT stations would be positioned to the right of the bus lane at mid-level grade station. There would be two flyover structures, one south of the Greenwood Underpass and one north of the Greenwood Underpass. A tunnel, also at mid-level, running underneath the trolley tracks on the west side of I-805 would provide a grade-separated crossing of the tracks for buses. To assist passengers transferring between the two transit modes, the existing 47th Street Trolley Station may be relocated to the west side of I-805.

Figure 7 – Alternative 2B

Issues and Considerations

One of the advantages of this alternative is that there is no need for design exceptions because the bus lanes and station are not constrained in the freeway median. Also there is a relatively small effect on BRT operations because the BRT vehicles would not have to cross the Trolley tracks at grade, even though there would be slightly more time spent off-line for the BRT vehicles.

A disadvantage of this option is the high capital cost. Due to the many high-cost elements including the flyover ramps, tunnel, bridge replacements, and possible relocation of the Trolley platform the cost would be approximately $100 - $120 million. The Oceanview Boulevard, Imperial Avenue, and Market Street Overcrossings would be impacted in this design and would have to be replaced.
Furthermore, the ease of access associated with this alternative is low due to the distance and grade differences between the BRT and Trolley platforms. Since the BRT station would be located west of I-805 at mid-level, away from commercial activity, there would be limited potential for economic development. Another drawback of this alternative is the environmental impacts it would cause to Chollas Creek and the community. This design also requires a higher level of effort to provide security due to the grade difference and limited sight lines.

2C – Mid-Level, Off-Line Station, Flyover, East Side Platform, Tunnel Crossing Under Tracks

Alternative 2C (Figure 8) is a mirror image of the design for Alternative 2B. The only differences are that the flyover ramp would cross over the northbound HOV and general purpose lanes (instead of southbound lanes) and the tunnel at mid-level would run underneath the trolley tracks on the east side of I-805 (instead of the west side). Both the BRT station and Trolley Station would be located east of I-805.

![Figure 8 – Alternative 2C](image)

Issues and Considerations

Alternative 2C has many of the same benefits and drawbacks as Alternative 2B relating to capital cost, effect on BRT and trolley operations, design exceptions, environmental impacts, security, and the replacement of bridges. Nevertheless, there are a few important differences between the two designs due to the location of the BRT station east of I-805 rather than west of I-805. Although the BRT station is at a different grade than the Trolley Station, the ease of access for transferring passengers is improved due to the reduced distance between the two stations. Also the economic development potential of a BRT station on the east side of the freeway is higher due to its closer proximity to existing development.
2D – Mid-Level, Off-Line Station, Flyover, West Side Platform, Open Crossing Under Tracks

Similar to Alternative 2B, Alternative 2D (Figure 9) adds dedicated northbound and southbound BRT lanes within the existing median; flyover bridges across the southbound HOV and general purpose lanes; and side station platforms located outside the freeway facility, west of I-805. The major difference between this alternative and Alternative 2B, is instead of a mid-level tunnel under the tracks, the bus lanes would be placed between the Greenwood Underpass bridge abutment and the southbound general purpose lane’s edge of shoulder. Although the bus lanes would be adjacent to southbound general purpose lanes, they would be raised and barrier-protected. To assist passengers transferring between the two transit modes, the 47th Street Trolley Station may be relocated to the west side of I-805. Another possible option is to keep the Trolley Station east of I-805, or relocate the station closer to the freeway but east of the freeway.

Figure 9 – Alternative 2D

Issues and Considerations

Since Alternative 2D has similar design features as Alternative 2B, they also share many of the same advantages and disadvantages including capital cost, effect on BRT and trolley operations, ease of access, economic development potential, and design exceptions. The main difference between these two alternatives is that in addition to the three bridges requiring replacement for Alternative 2B (Oceanview Boulevard, Imperial Avenue, and Market Street Overcrossings), the Greenwood Underpass would also have to be replaced. Therefore, the construction of an open crossing under the trolley tracks would likely have more environmental impacts than a tunnel crossing.
2E – Mid-Level, Off-Line Station, Flyover, East Side Platform, Open Crossing Under Tracks

Alternative 2E (Figure 10) has a similar design to Alternative 2C including dedicated northbound and southbound BRT lanes within the existing median; flyover bridges across the northbound HOV and general purpose lanes; and side station platforms located outside the freeway facility, east of I-805. However, this alternative differs from Alternative 2C because instead of a mid-level tunnel, the bus lanes would negotiate between the Greenwood Underpass bridge abutment and the northbound general purpose lane’s edge of shoulder. Although the bus lanes would be adjacent to northbound general purpose lanes at this location, they would be raised and barrier protected. Passengers would transfer between the two transit modes on the east side of I-805 where the 47th Street Trolley Station is currently located.

**Figure 10 – Alternative 2E**

Issues and Considerations

Alternative 2E has many of the same positive and negative aspects as Alternative 2C including capital cost, effect on BRT and trolley operations, ease of access, economic development potential, and design exceptions. This alternative also shares some similarities to Alternative 2D since both alternatives have an open crossing under the trolley tracks. This alternative would likewise require the replacement of four bridges, including Oceanview Boulevard Overcrossing, Imperial Avenue Overcrossing, Market Street Overcrossing, and Greenwood Underpass. This type of design could also result in worse environmental impacts than Alternative 2C because an open crossing may expose the community to more noise and vibration than a tunnel crossing.
3A – Track Level, In-Line Station, Left Hand DAR

Alternative 3A (Figure 11) adds dedicated northbound and southbound BRT lanes within the existing median with a left hand DAR to reach track level. Separate northbound and southbound side platform bus stations would be located at the Greenwood Underpass and positioned to the right of the bus lanes. Pedestrians would access the station platforms from the 47th Street Trolley Station east of I-805 via a pedestrian overcrossing at track level and adjacent to the Greenwood Underpass. Although the vertical profile of the bus lanes would rise and fall between freeway level and track level, its horizontal alignment will remain in-line within the freeway median.

**Figure 11 – Alternative 3A**

**Issues and Considerations**

One of the favorable elements of this alternative is its relatively low capital cost. Since the design does not have many high-cost elements like flyover ramps or tunnels, the capital cost would be approximately $50 - $70 million. Also there is a relatively small effect on BRT operations because the BRT vehicles would not have to spend time off-line, even though they would have to cross the Trolley tracks which may create some delay. Although the BRT station would be relatively far from the Trolley Station, the ease of access for transferring passengers is improved since the passengers will not have to use stairs or elevators to move between grades. The economic development potential of an in-line BRT station is better than that of a west side station due to its closer proximity to existing development. Another advantage is that the alternative poses few environmental impacts since it would not create visual and noise impacts and would likely not require land acquisition.

One disadvantage of this design is the distance between the BRT and Trolley stations which limits the visibility of waiting passengers, even though this track level option is preferable to designs with grade differences. The most expensive elements of the capital cost of this alternative would be the
realignment of the express lanes and general purpose lanes as well as the replacement of the Greenwood Underpass and the Imperial Avenue Overcrossing.

### 3B – Track Level, Off-Line Station, Left Hand DAR, West Side Platform

Alternative 3B (Figure 12) includes a new bus station west of I-805 that would be located outside the freeway facility. There would also be dedicated northbound and southbound BRT lanes within the existing median with a left hand DAR. Instead of a pedestrian bridge in Alternative 3A, this alternative would utilize a track level, vehicular bridge with a sidewalk adjacent to Greenwood Underpass for buses and service vehicles to travel. To assist in transferring passengers between the two transit modes, the 47th Street Trolley Station may be relocated to the west side of I-805. A variation of this alternative is to keep the 47th Street Trolley Station east of I-805, or relocate the station closer to the freeway but east of the freeway.

**Figure 12 – Alternative 3B**

#### Issues and Considerations

This alternative has several benefits. Since there would be no grade difference between the BRT and Trolley Stations, waiting passengers would be more visible. One advantage of having the BRT station located off-line is that there is no need for design exceptions because the bus lanes and station are not constrained in the median. Also, if the 47th Street Station is not relocated to the west side of I-805, this concept would have capital costs of approximately $50 - $70 million.

A drawback of this option is the effect on BRT operations because the BRT would have to travel off-line and cross the trolley tracks which could cause delays. Due to the location of the BRT station far from the commercial activity on the east side of I-805, there would be limited potential for economic development. Another disadvantage of this alternative is the environmental impacts it would cause to Chollas Creek and the community. The most prominent construction efforts would be the
realignment of the express lanes and general purpose lanes as well as the replacement of the Greenwood Underpass and the Imperial Avenue Overcrossing.

3C – Track Level, Off-Line Station, Left Hand DAR, East Side Platform

Alternative 3C (Figure 13) includes a new bus station east of I-805 that would be located outside the freeway facility. There would also be dedicated northbound and southbound BRT lanes within the existing median with a left hand DAR. Similar to Alternative 3B, this alternative would utilize a track level, vehicular bridge that is adjacent to the Greenwood Underpass for buses to travel. Transfers between the two transit modes would take place on the east side of I-805 where the 47th Street Trolley Station is currently located.

**Issues and Considerations**

Alternative 3C has many of the same advantages and disadvantages as Alternative 3B relating to capital cost, effect on BRT and trolley operations, design exceptions, environmental impacts, and bridge replacement. However, this design has significantly better ease of access for transferring passengers due to the lack of grade difference and distance between the stations. Also, since the BRT station would be located on the east side of I-805, it would be in closer proximity to existing development and have better economic development potential. The location of the station also has high visibility of waiting passengers and a short distance between platforms.
3D – Track Level, In-Line Station, Right Hand DAR

Alternative 3D (Figure 14) adds dedicated northbound and southbound BRT lanes within the existing median with a right hand DAR. Separate northbound and southbound side platform bus stations would be located at the Greenwood Underpass and positioned to the left of the bus lanes at track level. All of the other concept features are the same as Alternative 3A, which is the same design except with a left hand DAR.

![Figure 14 – Alternative 3D](image)

Issues and Considerations

Most of the same positive and negative characteristics from Alternative 3A apply to this alternative with a few exceptions. The similarities include design features related to effect on BRT operations, ease of access, economic development potential, design exceptions, and security. One of the major differences between these two alternatives is capital cost. Since right hand DARs require a larger footprint, two additional bridges will have to be replaced resulting in a total of four bridge replacements (Greenwood Underpass and the Imperial Avenue, Oceanview Boulevard, and Market Street Overcrossings). Due to these construction requirements and other costly features, Alternative 3D would have a capital cost of approximately $80 - $90 million. Another negative consequence of the design’s large footprint is the adverse environmental impacts it would create including the disturbance of Chollas Creek and potential environmental justice issues related to the existing low-income housing next to the existing 47th Street Trolley Station.
3E – Track Level, Off-Line Station, Right Hand DAR, West Side Platform

Alternative 3E (Figure 15) includes a new bus station west of I-805 that would be located outside the freeway facility. There would also be dedicated northbound and southbound BRT lanes within the existing median with a right hand DAR. Similar to Alternative 3C, this alternative would utilize a track level, vehicular bridge adjacent to the Greenwood Underpass for buses to travel. To assist passengers transferring between the two transit modes, the 47th Street Trolley Station may be relocated to the west side of I-805. A variation of this alternative is to keep the 47th Street Trolley Station east of I-805, or relocate the station closer to the freeway but east of the freeway.

![Figure 15 – Alternative 3E](image)

**Issues and Considerations**

One of the benefits of Alternative 3E is the high visibility of waiting passengers due to the lack of grade differences. This would be further improved if the 47th Street Trolley Station is relocated west of I-805 closer to the BRT station. Assuming the Trolley Station is relocated, there would also be greater ease of access for transferring passengers due to the close proximity of the stations.

There are several issues with this design. The capital cost would be approximately $90 - $100 million due to high-cost features such as land acquisition and the replacement of four bridges (the Greenwood Underpass and the Imperial Avenue, Oceanview Boulevard, and Market Street Overcrossings). Furthermore, this alternative has an adverse effect on BRT operations because the BRT vehicles would have to cross the Trolley tracks and travel off-line which would result in delays for the BRT. Since the BRT station will be located west of I-805, there will be limited economic development potential. Due to the large footprint of this alternative, it is likely that there will be adverse environmental impacts to Chollas Creek and the surrounding community.
3F – Track Level, Off-Line Station, Right Hand DAR, East Side Platform

Alternative 3F (Figure 16) includes a new bus station east of I-805 that would be located outside the freeway facility. There would also be dedicated northbound and southbound BRT lanes within the existing median with a right hand DAR. Transfers between the two transit modes would take place on the east side of I-805 where the 47th Street Trolley Station is currently located. All of the other concept features are the same as Alternative 3E, which is the same design except with a west side BRT station.

Issues and Considerations

Since Alternative 3F has design features very similar to Alternative 3E, they also share many of the same advantages and disadvantages including capital cost, effect on BRT and trolley operations, environmental impacts, and bridge replacement. The main difference between these two alternatives is the distance between the BRT and the Trolley stations. For Alternative 3F, the two transit stations are located in close proximity which results in better ease of access and security. Since the station is located on the east side of I-805 near existing commercial activity, this concept also has higher economic development potential.
3G – Track Level, Off-Line Station, Flyover, West Side Platform

Alternative 3G (Figure 17) adds dedicated northbound and southbound BRT lanes within the existing median with flyover bridges across the southbound HOV and general purpose lanes. Separate northbound and southbound side station platforms would be positioned to the right of the bus lane at track level outside the freeway facility, west of I-805. There would be two flyover structures, one south and one north of the Greenwood Underpass. Pedestrians would access the stations from east of I-805 via a pedestrian overcrossing at track level and adjacent to the Greenwood Underpass. To assist transfers between the two transit modes, the 47th Street Trolley Station may be relocated to the west side of I-805. A variation of this alternative is to keep the 47th Street Trolley Station east of I-805 or relocate the station closer to but still east of the freeway.

Figure 17 – Alternative 3G

Issues and Considerations

This concept has a few positive aspects. Since there would be no grade difference between the BRT and Trolley stations, waiting passengers would be more visible, facilitating security. Another benefit of having both stations at track level is improved ease of access because passengers would not have to use stairs or elevators.

A drawback of this option is the capital cost which would be approximately $90 - $100 million due to high cost elements like flyover ramps, bridge replacement (Imperial Avenue, Oceanview Boulevard, and Market Street Overcrossings), and the possible relocation of the 47th Street Trolley Station. Another issue is that the BRT vehicles would have to cross the trolley tracks and travel off-line which would result in delays for BRT operations. Since the BRT station will be located west of I-805, there would be limited economic development potential. Also, there would be adverse environmental impacts due to the large footprint and its location on the west side closer to Chollas Creek.
3H – Track Level, Off-Line Station, Flyover, East Side Platform

Most of the design features of Alternative 3H (Figure 18) are the same as Alternative 3G with a few exceptions. Alternative 3H adds dedicated northbound and southbound BRT lanes within the existing median with flyover bridges across the northbound HOV and general purpose lanes. Separate northbound and southbound side station platforms would be located to the right of the bus lane at track level outside the freeway facility, east of I-805. Transfers between the two transit modes would take place on the east side of I-805 where the existing 47th Street Trolley Station is located.

**Figure 18 – Alternative 3H**

**Issues and Considerations**

Alternative 3H has many of the same advantages and disadvantages as Alternative 3G relating to the effect on BRT operations, environmental impacts, and bridge replacement. However, there are several differences based on the location of the BRT station on the east side for Alternative 3H. Because of the BRT station’s close proximity to the 47th Street Trolley Station and the commercial development east of I-805, this concept has better ease of access, security, and economic development potential. Furthermore, the capital cost of this design is slightly lower than Alternative 3G at $80 - $90 million because of lower right-of-way acquisition costs.
Evaluation Criteria

The following initial screening criteria were chosen because of their importance to the community and their relationship to the project’s feasibility. All of the criteria were weighted equally. The use of the 1-5 ranking system was applied to each criterion to ensure the scoring reflected the appropriate differences between the alternatives. Table 2 summarizes each criterion and shows how points were awarded for each criterion.

Order of Magnitude Capital Cost

The capital costs were estimated for each alternative based on how many high-cost elements were incorporated into the design. The alternatives given the lowest scores had the most expensive designs including features like flyover ramps, tunnels, bridge replacements, reconstruction of freeway interchanges, and relocation of the 47th Street Trolley Station. The alternatives given the highest scores were less expensive and thereby, more financially feasible. The 15 alternatives had capital costs ranging from $50 - $120 million.

Effect on BRT and Trolley Operations

The effect on BRT and Trolley operations was determined based on the number of design features which could cause delay to transit operations. For example, off-line stations cause delay for BRT vehicles because they have to travel farther out of the way to reach stations rather than having a shorter in-line travel path. Another cause of delay is an at-grade crossing of the Trolley tracks. The track level alternatives with one or two crossings would delay BRT operations since the BRT vehicles would have to wait for the Trolley to pass before crossing. The alternatives given the highest scores had no time off-line for BRT vehicles or at-grade crossings, while the lower scores were given to alternatives with one or both of these characteristics.

Proximity of Platforms and Ease of Access

The ease of access criterion measures the effort required by passengers transferring between the BRT and the Trolley. This is primarily based on the horizontal and vertical distances between the BRT and Trolley stations. The alternatives with the greatest horizontal distances are those with a BRT station west of I-805 and Trolley Station east of I-805, requiring passengers to walk a great distance between them. Furthermore, alternatives with the greatest vertical distances are those with a BRT station at freeway level and trolley station at track level, requiring passengers to travel between grades using stairs or elevators. The lowest scores were given to alternatives with large horizontal and vertical distances, while the higher-scoring alternatives had BRT stations at track level with minimal horizontal distances.

Economic Development Potential

This criterion addresses the development potential of the BRT station based on its location. Each alternative was given a score determined by the proximity of the station to potential development on-site and in the vicinity. Since most of the commercial activity is concentrated on the east side of I-805, designs with BRT stations closer to the east side were given higher scores than those located on the west side.

Need for Design Exceptions

Design exceptions are often necessary in alternatives with a constrained right of way resulting in deviations from Caltrans design standards for lane and shoulder widths. The alternatives with in-line BRT stations were given lower scores because substandard widths must often be used in order to stay within the right of way. Off-line station designs had higher scores because they could be provided without design exceptions in the freeway right of way.
The impact to MTS and SANDAG design criteria for transit stations, e.g., bus platform lengths and track alignment specifications, were also taken account.

**Environmental Impacts**

This evaluation criterion measures the potential adverse effects to the surrounding community and habitat including right of way, construction impacts, noise and vibration, visual impacts, environmental justice issues, and effects on hydrology and water quality in Chollas Creek. Off-line stations with large footprints were given the lowest scores because they would have a larger impact to private property between the BRT and Trolley platforms. The alternatives with in-line stations and alternatives with smaller footprints had fewer impacts on the surrounding environment, resulting in higher scores.

**Passenger Security and Related Operating Costs**

Passenger security was determined based on the visibility of waiting passengers and the existence of sufficient sight lines between the BRT platform and the Trolley station. For designs where these features were limited, there would have to be an increase in surveillance equipment and security personnel to ensure passenger safety. The alternatives with greater distance and grade differences between the BRT and Trolley platforms had fewer direct sight lines, resulting in a lower score. The higher scoring alternatives were located at track level closer to the east side.
Table 2 – Evaluation Categories

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Description / Considerations</th>
<th>Scoring</th>
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</table>
| Order of Magnitude Capital Cost with LRT Platform | High cost elements include flyovers, tunnels, Greenwood Underpass replacement, rebuilding interchanges, relocation of Trolley platform | 5  –  $50-70M  
4  –  $70-80M  
3  –  $80-90M  
2  –  $90-100M  
1  –  $100-120M |
| Effect on BRT and Trolley Operations          | Adverse effects on operations include time off-line for BRT and at-grade crossing of Trolley tracks. | 5  –  No time off-line for BRT, no At-grade crossing with LRT  
4  –  Time off-line for BRT or At-grade crossing with LRT  
2  –  Time off-line for BRT and At-grade crossing with LRT |
| Proximity of Platforms and Ease of Access     | Proximity and ease of access is determined by distance and grade differences between BRT and Trolley platforms | 5  –  Track Level East Side Station  
4  –  Track Level In-Line Station  
3  –  Mid-Level East Side Station, Track Level West Side Station  
2  –  Mid-Level In-Line Station, Mid-Level West Side Station  
1  –  Freeway Level In-Line Station |
| Economic Development Potential                | High potential is associated with greater proximity to existing development on site and in the vicinity | 5  –  East Side Station  
4  –  In-Line Station  
2  –  Track Level West Side Station  
1  –  Mid-Level West Side Station |
| Need for Design Exceptions                    | Necessary variations from design standards for freeway lane widths, shoulder widths            | 5  –  Off-Line Station  
4  –  In-Line Station |
| Environmental Impacts                         | Adverse impacts on Chollas Creek, noise & vibration, visual, environmental justice, Section 4(f), right of way | 5  –  In-Line Side Platforms, In-Line Left Hand DAR  
4  –  In-Line Right Hand DAR  
3  –  In-Line Center Platform  
2  –  Tunnel Crossing Under Tracks, Off-Line Left Hand DAR, Track Level Flyover  
1  –  Open Crossing Under Tracks, Off-Line Right Hand DAR |
| Passenger Security and Related Operating Costs | Security elements include grade differences, distance between platforms, sight lines, need for surveillance equipment and security personnel, visibility of waiting passengers | 5  –  Track Level East Side  
4  –  Track Level West Side  
3  –  Track Level In-Line  
2  –  Mid-Level In-Line, Tunnel Crossing Under Tracks  
1  –  Freeway Level In-Line, Open Crossing Under Tracks |
### Table 3 – Alternative Scores by Criterion

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Notes:
(1) – High cost elements include flyovers, tunnels, Greenwood Underpass replacement, rebuilding interchanges, relocation of Trolley platform
(2) – time off-line for BRT, need for at-grade crossing of Trolley tracks
(3) – Distance and grade differences between BRT and Trolley platforms
(4) – Proximity to existing development on site and in the vicinity
(5) – Need to vary from design standards for freeway lane widths, shoulder widths, et al
(6) – Noise & vibration, visual, Section 4(f), environmental justice
(7) – Grade differences, distance between platforms, sight lines, need for surveillance equipment and security personnel, visibility of waiting passengers
Scoring Results and Recommendations

Using the criteria and the approach outlined in the previous section, each alternative was scored. Table 3 gives the scores for each alternative and criterion, and Table 4 reports the ranking of the alternatives based on the summation of their scores.

Scoring Results

The alternatives with the highest scores had several similarities. All of the top seven alternatives had in-line or east side stations. In-line stations tended to score higher on magnitude of capital cost, effect on BRT operations, and environmental impacts. Alternatives with BRT stations east of I-805 had high scores for ease of access and economic development potential. Most of the highly ranked alternatives also had left hand DARs because of their smaller footprints and lower capital costs. Another trend in the rankings is the presence of several track level designs at the top of the rankings. These alternatives received more points for several criteria including effect on BRT and Trolley operations, ease of access, and passenger security.

Alternatives Recommended for More Detailed Analysis

Based on the rankings and the need to have a set of alternatives that represent a range of project design concepts, the following alternatives are recommended for detailed analysis:

- 3C – Track Level, Off-Line Station, Left Hand DAR, East Side Platform
- 3H – Track Level, Off-Line Station, Flyover, East Side Platform
- 3A – Track Level, In-Line Station, Left Hand DAR
- 2A – Mid-Level, In-Line Station, Left Hand DAR
- 1A – Freeway Level, In-Line Station, Side Platforms

The inclusion of Alternative 1A will enable analysis of alternatives at all three levels. In addition, Alternatives 2C and 2E (Mid-Level, Off-Line Station, Flyover, East Side Platform, Tunnel Crossing Under Tracks) are variations of Alternative 3H. Considering both mid and track level designs for this alternative will provide sufficient analysis to identify environmental and other trade-offs between the two. Within this set of alternatives there are designs at every grade (freeway level, mid-level, track level), stations in-line and off-line, and different ramp types (left hand DARs and flyover ramps).

In response to community interest expressed at the December 1, 2012 working session, additional analysis of the feasibility of the west side alternatives will also be conducted. This effort will include consideration of right of way availability and the impact of relocating the Trolley platform to the west side of the freeway.
### Table 4 – Alternative Scores

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**Note:**
- Trolley platform assumed to be on east side of freeway for all alternatives except those with 'W' in Alt No. where it is assumed to be on the west side of freeway.

- **Left Hand DAR**
- **Mid-Level In-Line**
- **Right Hand DAR**
- **Flyover**

29
## Table 5 – Alternative Rankings

<table>
<thead>
<tr>
<th>Alt No.</th>
<th>Description</th>
<th>Score</th>
<th>Ranking</th>
<th>Recommended for Detailed Analysis</th>
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<td>17</td>
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</tbody>
</table>

Trolley platform assumed to be on east side of freeway for all alternatives except those with ‘w’ in Alt No. where it is assumed to be on the west side of freeway.

- Left Hand DAR
- Right Hand DAR
- Flyover
- Mid-Level In-Line
- Freeway Level
Appendix – Conceptual Engineering Drawings of Each Alternative
PROPOSED FEATURES
1. BRT LINES IN MEDIAN.
2. 4TH-LEVEL BRT PLATFORMS, WITH STAIRS
   AND ELEVATORS.
3. PEDESTRIAN BRIDGE AT TRACK LEVEL SOUTH OF
   GREENWOOD HWY.
4. REALIGN I-805 EXPRESS LANES AND GENERAL-PURPOSE
   LANE.
5. REPLACE GREENWOOD HWY AND IMPERIAL AVE QD.

LEGEND
- EXISTING CALTRANS
- PROPOSED BRT STATION
- RIGHT-OF-WAY
- BRT ONLY LANE
- PROPOSED LRT STATION
- EXPRESS LANE
- PROPOSED BRT PLATFORM
- REPLACE BRIDGE/
   ROADWAY
- PROPOSED PEDESTRIAN
   BRIDGE
- PROPOSED VELOCITY
   BRIDGE

I-805/47TH STREET BRT/LRT
ALTERNATIVE 1a - IN-LINE STATION SIDE PLATFORMS
FREEWAY LEVEL (WITHOUT BRT AUX LANE)
PROPOSED FEATURES

1. BRT LANES IN MEDIAN
2. BRT GRADE-SEPARATED Crossovers
3. AT-GRADE CENTER PLATFORMS, WITH STAIRS AND ELEVATORS
4. PEDESTRIAN BRIDGE AT TRACK LEVEL SOUTH OF GREENWOOD UP
5. REALIGN I-805 EXPRESS LANES AND GENERAL-PURPOSE LANES
6. REPLACE GREENWOOD UP, IMPERIAL AVE OC, OCEANVIEW BLVD OC, AND MARKET ST OC

AT GREENWOOD UNDERPASS

LEGEND

**EXISTING**
- Existing Caltrans Right-Of-Way
- BRT Right-Of-Way
- BRT Only Lane
- Express Lane
- Replace Bridge/Roadway
- Proposed Pedestrian Bridge
- Proposed Vehicle Bridge

**PROPOSED**
- Proposed BRT Station
- Proposed BRT Platform
- Proposed LRT Station
- Proposed LRT Platform

SAN DIEGO
47TH STREET LRT STATION
CHOLLA-MEAD ELEMENTARY SCHOOL
PROPOSED FEATURES

1. BRT LINES IN MEDIAN.
2. MID-LEVEL SIDE PLATFORMS, WITH PEDESTRIAN BRIDGES.
3. PEDESTRIAN BRIDGE AND PLATFORM AT TRACE LEVEL SOUTH OF GREENWOOD UP.
4. REALIGN I-805 EXPRESS LAKES AND GENERAL-PURPOSE LAKES.
5. REPLACE GREENWOOD UP AND IMPERIAL AVE. FOR MARKET ST. OR IF PLATFORMS ARE NORTH OF LRT LINE.

LEGEND

EXISTING CALTRANS
RIGHT-OF-WAY
BRT ONLY LANE
EXPRESS LANE
REPLACE BRIDGE/ROADWAY
PROPOSED PEDESTRIAN BRIDGE
PROPOSED VEHICULAR BRIDGE

DRAFT

CH2M HILL
IBI GROUP
SANDAG

I-805/47TH STREET BRT/LRT
ALTERNATIVE 2a - IN-LINE STATION SIDE PLATFORMS
MID-LEVEL (WITHOUT BRT AUX LANE)

REV DATE 10-25-2012
PROPOSED FEATURES

1. BRT LINES IN MIDDLE
2. NEW LANE THROUGH TUNNEL WEST OF FREEWAY
3. REALIGN I-805 EXPRESS LANES AND GENERAL-PURPOSE LANES
4. REPLACE OCEANVIEW BLVD DC, IMPERIAL AVE DC, AND MARKET ST DC
5. BRT STATION (NUMBER OF BUS BAYS TO BE DETERMINED) WEST OF FREEWAY
6. PEDESTRIAN BRIDGE SOUTH OF GREENWOOD AV.

LEGEND
- EXISTING CALTRANS
- PROPOSED BRT STATION
- RIGHT-OF-WAY
- BRT ONLY LANE
- EXPRES LANE
- REPLACE BRIDGE
- PROPOSED BRT PLATFORM
- ROADWAY
- PROPOSED PEDESTRIAN BRIDGE
- PROPOSED BRT STATION

DRAFT
CH2M HILL
IBI GROUP
SANDAG

I-805/47TH STREET BRT/LRT
ALTERNATIVE 2b - FLYOVER WEST TUNNEL
MID-LEVEL (WITHOUT BRT AUX LANE)
PROPOSED FEATURES

1. BRT LINES IN MEDIAN,
2. NEW BYPASS THROUGH TUNNEL EAST OF FREEWAY,
3. REALIGN I-805 EXPRESS LINES AND GENERAL-PURPOSE LINES,
4. REPLACE OCEANVIEW BLVD QC, IMPERIAL AVE QC,
   AND HARBOR ST QC,
5. BRT STATION (NUMBER OF BUS DAYS TO BE DETERMINED) EAST OF FREEWAY,
6. PEDESTRIAN BRIDGE SOUTH OF GREENWOOD QC.
PROPOSED FEATURES

1. BRT LANES IN MEDIAN.
2. NEW LITTER.
3. REALIGN I-805 EXPRESS LANES AND GENERAL-PURPOSE LANES.
4. REPLACE GREENWOOD UP-OCEANVIEW BLVD OC, IMPERIAL AV OC, AND MAPLE ST OC.
5. DRY STATION (NUMBER OF BUS LANES TO BE DETERMINED) WEST OF FREEWAY.
6. PEDESTRIAN BRIDGE SOUTH OF GREENWOOD UP.

LEGEND

EXISTING CALTRANS
RIGHT-OF-WAY
BRT ONLY LANE
EXPRESS LANE
REPLACE BRIDGE/ROADWAY
PROPOSED BRIDGE
PROPOSED PEDESTRIAN BRIDGE
PROPOSED BRT PLATFORM
PROPOSED LRT PLATFORM

DRAFT
REV DATE 10-25-2012

I-805/47TH STREET BRT/LRT
ALTERNATIVE 2d - FLYOVER WEST SHOULDER MID-LEVEL (WITHOUT BRT AUX LANE)
PROPOSED FEATURES
1. BRT LAKES IN MEDIAN.
2. NEW FLORVES.
3. RELOCATION I-805 EXPRESS LANES AND GENERAL-USE LAKES.
4. REPLACE GREENWOOD UP, OCEANVIEW BLVD, IMPERIAL WAY, AND HARBOR ST UNDER.
5. 60 MTS (NUMBER OF BUS LANES TO BE DETERMINED) BEYOND FREeway.
6. PEDESTRIAN BRIDGE SOUTH OF GREENWOOD UP.

LEGEND
- EXISTING FEATURES
- PROPOSED BRT STATION
- RIGHT-OF-WAY
- BRT ONLY LANE
- EXPRESS LANE
- REPLACEMENT BRIDGE
- ROADWAY
- PROPOSED BRT PLATFORM
- PROPOSED LRT PLATFORM
- PROPOSED PEDESTRIAN BRIDGE
- PROPOSED VELOCYCLER BRIDGE

DRAFT
REV DATE 10-25-2012

I-805/47TH STREET BRT/LRT
ALTERNATIVE 2e - FLYOVER EAST SHOULDER
MID-LEVEL (WITHOUT BRT AUX LANE)
PROPOSED FEATURES

1. BRT Lanes in Median.
2. In-Line BRT Station with Cantilevered Platform South of Greenwood UP.
3. Pedestrian Bridge at Track Level South of Greenwood UP.
4. Realign I-805 Express Lanes and General-Purpose Lane.
5. Replace Greenwood UP and Imperial Ave GC.
PROPOSED FEATURES

1. BRT LANES IN MEDIAN.
2. BRT STATION WEST OF FREEWAY, RELOCATE 47TH ST LRT STATION TO WEST OF FREEWAY.
3. VEHICULAR BRIDGE 47TH STREET AT TRACK LEVEL SOUTH OF GREENWOOD UP.
4. REALIGN I-805 EXPRESS LANES AND GENERAL-PURPOSE LANES.
5. REPLACE GREENWOOD UP AND IMPERIAL AVE GC.

LEGEND

EXISTING CALTRANS
RIGHT-OF-WAY
BRT ONLY LANE
EXPRESS LANE
REPLACE BRIDGE/ROADWAY
PROPOSED PEDESTRIAN BRIDGE
PROPOSED VEHICULAR BRIDGE

DRAFT

I-805/47TH STREET BRT/LRT
ALTERNATIVE 3b - OFF-LINE LEFT DAR WEST
TRACK LEVEL (WITHOUT BRT AUX LANE)
**PROPOSED FEATURES**

1. BRT Lanes in Median.
2. BRT Station East of Freeway.
3. Vehicular Bridge with Sidewalk at Track Level South of Greenwood Ave.
4. Realignment I-805 Express Lanes and General-Purpose Lanes.
5. Replace Greenwood Rd and Imperial Ave Og.

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**LEGEND**

- **Existing Caltrans Right-Of-Way**
- **BRT Only Lane**
- **Express Lane**
- **Replace Bridge/Roadway**
- **Proposed Pedestrian Bridge**
- **Proposed Vehicular Bridge**

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**I-805/47TH STREET BRT/LRT**

**ALTERNATIVE 3c - OFF-LINE LEFT DAR EAST TRACK LEVEL (WITHOUT BRT AUX LANE)**

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**CH2MHILL**

**IBI GROUP**

**SANDAG**

**DRAFT**

**REV DATE 10-25-2012**
PROPOSED FEATURES

1. BRT LANES IN MEDIAN.
2. 3-LINE BRT STATION WITH CANTILEVERED PLATFORM SOUTH OF GREENWOOD AV.
3. PEDESTRIAN BRIDGE AT TRACK LEVEL SOUTH OF GREENWOOD AV.
4. REALIGN I-805 EXPRESS LANES AND GENERAL-PURPOSE LANE.
5. REPLACE GREENWOOD AV. OVERPASSE BLVD AV., IMPERIAL AV. GG, AND MARKET ST. GG.
PROPOSED FEATURES

1. BRT LANES IN MEDIAN.
2. BRT STATION BSTY OF FREEWAY, RELOCATE 4TH ST LRT STATION TO WEST OF FREEWAY.
3. VEHICULAR BRIDGE WITH SIDEWALK AT TRACK LEVEL SOUTH OF GREENWOOD UFP.
4. REALIGN I-805 EXPRESS LANES AND GENERAL-PURPOSE LANES.
5. REPLACE GREENWOOD UFP, OCEANAVER BLVD OFC, IMPERIAL AVE OGC, AND MARKET ST OGC.

AT GREENWOOD UNDERPASS
PROPOSED FEATURES

1. BRT LINES IN MEDIAN.
2. BRT STATION EAST OF FREEWAY.
3. VEHICULAR BRIDGE WITH SIDEWALK AT TRACK LEVEL SOUTH OF GREENWOOD AV.
4. REALIGN I-805 EXPRESS LAKES AND GENERAL-PURPOSE LAKES.
5. REPLACE GREENWOOD AV, OCEANVIEW BLVD OC, IMPERIAL AVE OC, AND MARKET ST OC.
PROPOSED FEATURES

1. BRT LINES IN MEDIANS.
2. NEW FLOWERS.
3. REALIGN I-805 EXPRESS LINES AND GENERAL-PURPOSE LINES.
4. REPLACE OCEANVIEW BLVD OC, IMPERIAL AVE OC, AND HARRET ST OC.
5. BRT STATION (NUMBER OF BUS LANES TO BE DETERMINED) WEST OF FREEWAY.
6. PEDESTRIAN BRIDGE SOUTH OF GREENWOOD UP.
PROPOSED FEATURES
1. BRT LANES IN MEDIAN.
2. NEW FLOWERS.
3. REALIGN I-805 EXPRESS LANES AND GENERAL-PURPOSE LANES.
4. REPLACE OCEANVIEW BLVD GC, IMPERIAL AVE GC, AND MARKET ST GC.
5. BRT STATION (NUMBER OF BUS BAYS TO BE DETERMINED) EAST OF FREEWAY.
6. PEDESTRIAN BRIDGE SOUTH OF GREENWOOD UP.