ESCONDIDO RAPID BUS TRANSIT PRIORITY CONCEPT STUDY

Final Report

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Prepared for:

401 B Street, Suite 800
San Diego, CA 92101
(619) 699-1900

Prepared by:

701 B Street, Suite 1170
San Diego, CA 92101
(619) 234-4110

In Association with:

WILSON &COMPANY
ENGINEERS & ARCHITECTS
and Darnell & Associates
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E.0 EXECUTIVE SUMMARY

The Escondido Rapid Bus Transit Priority Concept Study addresses traffic and transit operations issues along the Route 350 alignment, an existing bus route serving the City of Escondido from the Escondido Transit Center to Westfield Shoppingtown North County. High ridership at peak times during the day and traffic conditions along the downtown corridor are the major causes of delay experienced by Route 350 riders.

The study defines the first “rapid bus” service for North San Diego County which will provide an example for both operators and patrons of what can be accomplished through enhanced transit amenities, service branding (“BreezeRapid”), operational enhancements, and transit priority measures. The study represents a cooperative effort between the City of Escondido, San Diego Association of Governments (SANDAG), and North County Transit District (NCTD) which brought together traffic engineers, transit service planners, regional planners, and public works staff in a Project Working Group to develop a solid consensus on a series of recommendations for the improvement of the Route 350 corridor.

The regional transportation plan, MOBILITY 2030, focuses on improvements to transit operations and performance such as the priority measures identified in this study. These measures are a way to make transit more competitive with the automobile for many of our trips and therefore open new markets to public transit. Route 350 was selected as the prototype for improvements through a screening process by NCTD, with the intent to apply these improvements to additional corridors in the future.

KEY FINDINGS

- This study identifies a number of key transit priority measures needed such as signal priority for late buses and queue jumper transit lanes at congested intersections.
- Overall, these measures result in an improvement of travel time for Route 350 riders of 16 percent.
- Impacts to traffic caused by these priority treatments are small and can be addressed when these treatments are implemented.
- An additional community benefit is the replacement of existing traffic signals in the downtown business corridor to provide better signal coordination for drivers.
- Improvements to Route 350 stops include an enhanced look and feel, benches, shelters, signage, schedule information, and real-time information on the next arriving bus (at key stops).
- Operational improvements to Route 350 are proposed, including the consolidation of bus stops along Escondido Boulevard.

CURRENT ISSUES

The study effort identified and confirmed a series of issues that either cause delay or operational problems for the current Route 350 service. These issues represent the combined input of City traffic engineers, transit operators, transit patrons, and community members, and include:
• Bunching of buses due to traffic congestion and delays (particularly on the Del Lago Boulevard approach to the southbound I-15 on-ramp).

• Heavy boardings near the schools along the southern end of Route 350 (especially at San Pasqual High School).

• Traffic congestion at several locations due to changes in the roadway cross-section, heavy traffic volumes, and signal delays.

• Dispersed boarding activity along South Escondido Boulevard requiring several stops along that stretch of the route.

• General lack of bus stop amenities at many stops (noted by transit patrons) such as schedule and status information, benches, or shelters, etc.

OBJECTIVES

The Project Working Group focused on providing a BreezeRapid service that would:

• Reduce transit travel times and increase schedule reliability by reducing the impact of traffic delays on buses with no significant impact to non-transit vehicle traffic.

• Provide an enhanced transit service experience and perception for riders through:
  o More reliable service connections with MTS Route 20, Escondido Transit Center routes, and the future I-15 Bus Rapid Transit and SPRINTER services.
  o Enhanced stop amenities where possible to provide shelter, benches, and lighting.
  o Special branding to distinguish the BreezeRapid from existing local Breeze bus services.
  o Improved information at stops in terms of signage, schedule information, and real-time information on bus arrivals.

• Reduce the impact to transit operations in terms of scheduling and costs by reducing the variability caused by delays.

PROPOSED IMPROVEMENTS

The study reviewed and suggested various improvements to resolve the current issues and achieve the objectives of the BreezeRapid service. These improvements can be classified in three categories:

• Transit Priority Measures - These include physical and signal based improvements to the roadway and the traffic signal system to aid in reducing overall transit travel times. Some examples include:
Transit Signal Priority (TSP) – A signal system based improvement where intersection signal timing/phasing is adjusted to allow buses running behind schedule to receive slight extension of a green light to avoid hitting a red light with the associated delay. In certain circumstances this also allows for shortening of red lights that a bus may be waiting at to reduce signal delay.

Physical Improvements – Queue jumper lanes are proposed at key intersections including Valley Parkway and Centre City Parkway to provide the bus with a dedicated lane and signal ahead of traffic at the intersection. Other roadway improvements include special signal phases or transit signal priority.

Special Transit Access/Other Improvement – These types of improvements include special access for buses at transit centers, and other improvements such as protected left turn lanes for both buses and other vehicles.

Transit Operations/Service Adjustments – These include adjustments to schedules once priority measures are in place or methods of operations that impact or enhance bus service.

Stop/Station Improvements – BreezeRapid stations will have a particular set of amenities such as benches, shelters, enhanced customer information, and special branding at stops and stations. Several preliminary design concepts were developed for and are presented as part of the study report. This category also includes adjustments to stop locations, stop consolidation, and methods for speeding boarding of buses.

The proposed transit priority measures are summarized in Figure E-1. Figures E-2 and E-3 display the proposed stop and station improvements for the north and south portions of the study area respectively.

BENEFITS AND POTENTIAL IMPACTS

The study analyzed the potential benefits and impacts associated with implementation of the proposed transit priority measures. In general, the study found:

- Due to the signal related delay experienced by buses along Route 350, the implementation of transit signal priority at signalized intersections along the corridor would visibly reduce the delay experienced by buses.

- Implementation of the proposed transit priority measures has the potential to reduce one-way transit travel times along Route 350 by 16%.

- The review of potential traffic impacts under average and worst-case conditions indicates that impacts to other vehicle traffic would be small, and can be managed or minimized with proper design and adjustments to the range of settings available with transit signal priority.

The development, design, and implementation of transit priority measures is an opportunity for City traffic engineers and transit operators to work together to find an ideal balance that provides benefits to transit service without significant impacts to other traffic. Unlike a typical development or construction project, the operation of transit priority measures is an iterative process that allows for refinement and adjustment to changing traffic patterns and conditions over time.
**Figure E-1**

**Summary of Proposed Transit Priority Improvements**

**Escondido Rapid Bus Transit Priority Concept Study**

- Segment deleted as Route 350 re-aligns Northbound to Beethoven Dr. when BRT Station Opens as Southern Terminus of Route.

- **Special Access to Future Del Lago BRT Station**

- **Protected Left-Turn Phases at Valley Pkwy. & 2nd.**

- **WB Queue Jump at Valley Pkwy./Centre City Pkwy.**

- **Separate NB & SB Queue Jumps at Las Palmas Ave./Peet Ln.**

- **Intersection Improvements and/or NB Left-Turn Queue Jump**

- **Symbol Key:**
  - Signal Coordination Update
  - Signal Priority
  - Queue Jumper (arrow indicates direction)
  - Special Access or Physical Improvement

**Escondido Rapid Bus Transit Priority Concept Study**
Figure E-2

Recommended Bus Stop Improvements
North Study Area

Existing Route 350 Bus Stop
Bus Stop Recommended for Consolidation
(Text notes added bus stop features or changes)
DMS = Digital Message Sign (Real Time Bus Info)
Escondido Rapid Bus
Transit Priority Concept Study

Figure E-3
Recommended Bus Stop Improvements
South Study Area

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**Stop 1**
Consolidate

**Stop 2**
Consolidate w/ opening of Del Lago BRT Station

**Stop 2A**
New stop w/opening Del Lago BRT Station

**Stop 3**
Consolidate

**Stop 4**
Two large shelters, DMS

**Stop 2B**
New stop would serve mall via Northbound Route 350

**Stop 5**
Shelter, DMS

**Stop 6**
Add trash can

**Stop 7**
Shelter

**Stop 28**
Add trash can

**Stop 29**
Shelter, DMS

**Stop 30**
Two large shelters, DMS

Deleted as Route 350 re-aligns Northbound to Beethoven Dr. when BRT Station opens as Southern terminus of route

Existing Route 350 Bus Stop
Bus Stop Recommended for Consolidation
(Text notes added bus stop features or changes)
DMS = Digital Message Sign (Real Time Bus Info)
PHASING AND PRELIMINARY COST ESTIMATES

Figure E-4 displays the proposed phasing of the Rapid Bus improvements into:

- **Initial Phase (Years 1-2)** – These improvements, such as signal priority, provide visible near-term benefits without significant implementation concerns.

- **Mid-Term Phase (Years 3-5)** – These improvements provide additional benefits, but require a more detailed review and engineering process, or they are related to the opening of the Del Lago Bus Rapid Transit Station and the start of the I-15 Bus Rapid Transit service.

- **Future Phase (Years 5+)** – These improvements can provide benefits, but may best be implemented in coordination with other transportation improvement projects such as roadway widenings that benefit all traffic.

Table E.1 provides a high level summary of the costs by category and phase. Some of the proposed Future Phase improvements may not be feasible outside of a larger roadway improvement effort. Most of the benefits to transit are gained in the Initial and Mid-Term Phases. Implementation of the Initial Phase and Mid-Term Phase only would lower the total estimated costs to $2.42M, including $1.90M for transit priority and operations measures and $522K for stop/station improvements.

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Note: *The 15% design cost factor is only applied to cost items requiring design, and is not a flat % applied to the total base cost.

** Station/Stops includes bus branding of $10,000 each for 10 buses during the initial deployment phase.
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<td><strong>More Physical Transit Priority Measures at:</strong></td>
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<td><strong>• Bear Valley Pkwy./Sunset Dr.</strong></td>
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<td><strong>Signal TSP Equipment &amp; Configuration</strong></td>
<td><strong>• NB Bear Valley Pkwy./Las Palmas Ave.</strong></td>
<td><strong>• SB Bear Valley Pkwy./Las Palmas Ave.</strong></td>
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<td><strong>Protected Left-Turn Phases Improvements</strong></td>
<td><strong>New Stops at Del Lago BRT Station and Westfield’s NB:</strong></td>
<td><strong>• Transit Lane along WB Valley Pkwy to Quince St.</strong></td>
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<td><strong>Special Access at Del Lago BRT Station:</strong></td>
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**Escondido Rapid Bus Transit Priority Concept Study**

Figure E-4
Summary of Proposed Project Phasing
SUMMARY OF FINDINGS

The Escondido Rapid Bus Transit Priority Concept Study has identified a series of viable improvements that would substantially enhance transit service in the corridor and provide an excellent model for wider deployment of Rapid Bus services throughout North County. The fact that these improvements were developed as a cooperative effort between the City of Escondido, SANDAG, and NCTD means that there is a common understanding of what these improvements would entail in terms of actual implementation and operation.

The opportunities for early public input provided through the study outreach efforts have allowed for the incorporation of issues and concepts developed by transit patrons and the community, and this input will provide a solid foundation for moving forward with the Initial Phase. The BreezeRapid concepts defined in this study represents an excellent opportunity to quickly move forward with design and implementation to provide clear near-term benefits to transit service in the Escondido area.

Next steps include additional traffic signal analysis in the Downtown Escondido area, engineering and design for the proposed treatments, and implementation.

COMMENTS/FINAL REPORT

A draft version of this final report was distributed to the Project Working Group, and comments from City of Escondido, NCTD, and SANDAG staff have been addressed in this final version of the report. In addition, draft findings and copies of the report were made available to the City of Escondido City Council, North County Transit District Planning Committee, and the SANDAG Transportation Committee. The response to the proposed project was very positive and each stakeholder group endorsed moving forward with the improvements included in this report. The predominate comment from the stakeholder groups was that methods should be looked at to accelerate the proposed implementation phasing to attempt and provide all of the proposed improvements as part of Phase 1. The report has retained the three phase breakdown as it was presented to the various stakeholder groups in that form, however this does not preclude attempts to accelerate Phases 2 & 3 as part of project design and implementation.
1.0 INTRODUCTION

The Escondido Rapid Bus Transit Priority Concept Study addresses traffic and transit operations issues along the existing Route 350 alignment. The study defines the first “rapid bus” service for North San Diego County which will provide an example for both operators and patrons of what can be accomplished through enhanced amenities, service branding, operational enhancements, and transit priority measures. Route 350 is operated by North County Transit District (NCTD) and provides service between the Escondido Transit Center in Downtown Escondido and the Westfield’s Shoppingtown North County Transit Center at Westfield’s Shoppingtown North County. In providing this connection between two key transit centers in the North County Inland region, Route 350 provides a critical service link to the other transit services in the area. This includes future connectivity with the Sprinter light rail currently under construction between the Oceanside and the Escondido Transit Centers and Bus Rapid Transit (BRT) service along I-15. There are more than 2,000 boardings on Route 350 on a typical day, making it one of the more heavily utilized routes in North County.

Figure 1-1 displays the Route 350 alignment and nearby activity centers. It should be noted that existing Route 350 was temporarily adjusted to run westbound along Grand Avenue as opposed to Valley Parkway (the previous alignment). This change was made as a temporary effort to avoid traffic delays, and this study makes recommendations that would allow for re-establishment of the previous preferred alignment.

1.1 DEFINITION OF RAPID BUS SERVICE

“Rapid bus” is an enhanced transit service which focuses on providing:

- Faster travel times
- Greater service/schedule reliability
- Improved station amenities
- More reliable service connections
- Distinctly identified or branded vehicles and stops

Rapid bus service achieves faster travel times and/or greater service reliability through the implementation of transit priority improvements and transit operations adjustments. The proposed improvements and operations adjustments are discussed in detail in this report.

While rapid bus service is enhanced over regular local and express services, it does not necessarily imply all of the higher-capacity improvements normally associated with Bus Rapid Transit (BRT). In this sense, rapid bus service is more scalable and applicable to a broader range of services current being provided and planned for North County.

1.2 COOPERATIVE STUDY EFFORT

The development of rapid bus concepts and services required close coordination and cooperation amongst the various stakeholder agencies. The Escondido Rapid Bus Transit Priority Concept Study has been a model of interagency cooperation where transit, traffic engineering, and planning professionals come together to cooperatively develop a rapid bus.
Note: Dashed line indicates recent re-routing of existing Route 350 service from Valley Pkwy. to Grand Ave. which was implemented to avoid certain traffic delays.
concept that fits into the overall community considering traffic and transit issues. The cooperative character of this study has been supported by:

- Creation and interaction with the Escondido Rapid Bus Transit Priority Concept Study Project Working Group (PWG) - The PWG includes traffic engineering, transit operations, and planning professionals from the following agencies:
  - City of Escondido
  - North County Transit District (NCTD)
  - San Diego Association of Governments (SANDAG)

- Continued public outreach and elected stakeholder involvement – As a part of this project a number of presentations were made to elected stakeholders such as the Escondido City Council, NCTD Planning Committee, and SANDAG Transportation Committee. In addition, public outreach efforts were made to inform the public of the intent of the study and rapid bus service, as well as solicit input from the public on concepts and ideas for service improvements. Some key outreach efforts included discussions with Escondido interest groups and school districts, as well as a public open house and public forums held at the transit centers and Farmer’s Market.

The details of the stakeholder involvement and cooperative efforts undertaken for this study are discussed in greater detail later in this report.

1.3 IDENTIFIED SERVICE PROBLEMS/ISSUES

A series of key traffic, community, and transit operations characteristics were identified through field review, public input, and discussions with members of the PWG that impact the attractiveness, existing travel time, and service reliability of Route 350. These issues were a primary focus of the study. The identified issues included:

- Bunching of buses due to traffic congestion and delays (particularly on the Del Lago Boulevard approach to the southbound I-15 on-ramp).
- Heavy boardings near the schools along the southern end of Route 350 (especially at San Pasqual High School).
- Traffic congestion at the following locations:
  - Northbound Bear Valley Parkway where the road cross-section drops from four to two lanes (predominately in the evening peak hours and during school hours).
  - Intersection of Bear Valley Parkway/Sunset Drive.
  - Northbound left-turn at the intersection of Escondido Boulevard/Valley Parkway (especially the lack of a protected northbound left-turn phase).
  - Intersections where the route crosses Centre City Parkway (specifically Grand Avenue and Valley Parkway).
- Dispersed boarding activity along South Escondido Boulevard requiring several stops along that stretch of the route.
- Lack of bus stop amenities such as schedule and status information, benches, or shelters, etc.
1.4 PROJECT VISION AND OBJECTIVES

The project vision and objectives were identified in early meetings with the PWG. These were refined and finalized by the PWG, and confirmed through presentations to elected stakeholder groups and the public.

1.4.1 Rapid Bus Vision

The ultimate vision for the Escondido Rapid Bus service is one where:

Specially branded vehicles, stops, and special transit priority treatments combine to provide both:

(1) Reliable and rapid service for patrons traveling to/from points between the Escondido Transit Center and Westfield’s Shoppingtown North County Transit Center, as well as connecting with the future Sprinter, I-15 BRT, and various south and north county bus routes; and

(2) Consistent and lower operations costs with the same headways serviced by fewer vehicles without significant impacts to traffic operations.

The near-term vision for the Escondido Rapid Bus is to:

Implement a distinctive package of transit priority treatments and stop improvements that provide visible gains in service reliability and limit the need to add additional vehicles during peak service and traffic congestion periods.

1.4.2 Objectives

The vision for the Escondido Rapid Bus project drove the definition of several objectives that serve as the basis for the suggestions and recommendations in this report. These objectives are:

- Deploy a transit priority system capable of tracking transit schedule adherence and communicating a request for transit priority to the traffic signal system.
- Implement a series of physical transit priority treatments that address significant areas of traffic delay or queue related congestion, and provide the best balance of time savings and capital costs.
- Identify traffic operations and roadway improvements that will enhance the general flow of traffic and alleviate congestion choke-points that impact both auto and transit travel times.
- Review and adjust transit operations to enhance reliability and decrease travel times while maintaining safety.
- Provide for the ability to manage transfers for customers transferring between major services.
- Enhance stop amenities at all Rapid Bus stops to include (at a minimum):
  - Shaded areas (either through a shelter structure or some other means) for waiting transit patrons,
  - Some sort of seating or leaning support for waiting transit patrons,
• Easily understood transit schedule and route information,
• Real-time arrival and status information (at major stops),
• Improved signage and branding to identify the service as unique.

• Utilize specially designated vehicles with possible enhancements such as:
  • Enhanced on-board passenger information (next stop, connection information, etc.)
  • Special branding and colors to identify the vehicle as Rapid Bus.
  • Enhanced or improved fare payment options (reducing boarding times).

1.5 COMPONENTS OF RAPID BUS SERVICE IMPROVEMENTS

In order to provide the desired rapid bus services, improvements must be made to the existing Route 350 service. Some examples of types of improvements include:

• **Transit Priority Measures** - These include physical and system based improvements to the roadway and the traffic signal system to aid in reducing overall transit travel times. Some examples include:
  • **Transit Only Lanes** – A physical improvement where special transit only lanes are implemented, sometimes shared with off-peak parking. This is generally a BRT type improvement and has more limited applicability to rapid bus service, but is mentioned here as it was considered.
  • **Queue Jump Lanes** – A physical improvement where a special bus lane is provided approaching an intersection, allowing the bus to bypass traffic delayed or staked-up at the intersection. The bus receives a special “go” indication prior to regular traffic to allow it to “jump” ahead of the normal traffic flow.
  • **Special Transit Access** – A physical improvement where buses are allowed specialized access separate from normal traffic, usually into or out of a transit center.
  • **Transit Signal Priority (TSP)** – A system based improvement where intersection signal timing/phasing is adjusted to allow buses running behind schedule to receive slight extension of a green light to avoid hitting a red light with the associated delay. In certain circumstances this also allows for shortening of red lights that a bus may be waiting at to reduce signal delay.

• **Transit Operations/Service Adjustments** – These include adjustments to schedules or methods of operations that impact or enhance bus service. This category can include adjustments to stop locations, methods for speeding boardings, as well as running of special services.

• **Stop/Station Improvements** – These include physical enhancements such as benches, shelters, enhance customer information, and special branding at stops and stations. Several preliminary design concepts were developed for and are presented as part of this study report.

The specific improvements, as well as their associated phasing, costs, and benefits are the primary focus of the remainder of this report.
1.6  **KEY POTENTIAL BENEFITS**

This report outlines a series of potential phased improvements to enhance the Route 350 service to provide rapid bus service. While the specific level of benefit gained will depend on the specific improvements implemented, the proposed improvements will have visible benefits to both operating agencies and transit riders. Table 1.1 summarizes the benefits likely to be derived from each category of proposed improvements. Specific levels of travel time savings or other beneficial impacts are discussed in greater detail in sections 4.0 and 5.0.

<table>
<thead>
<tr>
<th>Category of Improvement</th>
<th>Key Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Transit Priority Measures</strong></td>
<td></td>
</tr>
<tr>
<td>Physical Improvements</td>
<td>Even single physical improvements can offer substantial reductions in transit travel times during peak periods when traffic congestion and queuing is the heaviest. In general benefits include:</td>
</tr>
<tr>
<td></td>
<td>• Reduced transit travel times by reducing waiting in traffic queues,</td>
</tr>
<tr>
<td></td>
<td>• More reliable transit schedule adherence, and</td>
</tr>
<tr>
<td></td>
<td>• Improved public perception of transit as the bus receives a visible “advantage” over normal traffic.</td>
</tr>
<tr>
<td><strong>Signal Based Improvements</strong></td>
<td>Signal system transit priority relies on implementation across numerous signalized intersections to provide cumulative benefits, resulting in:</td>
</tr>
<tr>
<td></td>
<td>• Reduced transit travel times by reducing signal delays, and</td>
</tr>
<tr>
<td></td>
<td>• More reliable transit schedule adherence.</td>
</tr>
<tr>
<td></td>
<td>• Reduced transit operating costs in conjunction with appropriate transit service adjustments based on travel time savings.</td>
</tr>
<tr>
<td><strong>Transit Operations/Service Adjustments</strong></td>
<td>Relocating some stops and guaranteed transfers can provide:</td>
</tr>
<tr>
<td></td>
<td>• Reduced transit travel times,</td>
</tr>
<tr>
<td></td>
<td>• Reduced transit rider delay at transfers,</td>
</tr>
<tr>
<td></td>
<td>• Alleviation of some boarding/overcapacity problems.</td>
</tr>
<tr>
<td><strong>Stop/Station Improvements</strong></td>
<td>Enhancing stop/station amenities with shelters, information, benches, etc. provides:</td>
</tr>
<tr>
<td></td>
<td>• Less opportunity for transit rider confusion,</td>
</tr>
<tr>
<td></td>
<td>• Shorter perceived wait periods,</td>
</tr>
<tr>
<td></td>
<td>• Improved sense of rider security and comfort.</td>
</tr>
<tr>
<td></td>
<td>• Improved public perception of transit as an alternative mode.</td>
</tr>
</tbody>
</table>
1.7 REPORT STRUCTURE AND FORMAT

This report is intended to serve as a comprehensive summary of the findings and recommendations of the Escondido Rapid Bus Transit Priority Concept Study. It is structured into five major sections:

1. Introduction
2. Stakeholder Involvement & Participation – Summarizing the involvement of key agency stakeholders, as well as the public outreach/input process.
3. Existing Conditions – Establishing the existing conditions for Route 350 in terms of service, issues, and amenities, as well as traffic conditions along the route.
4. Proposed Rapid Bus Improvements – Detailing the proposed improvements by category in terms of methods of implementation, costs, impacts, etc.
5. Phasing and Implementation – Summarizing proposed improvements and their phasing, as well as cost estimates and highlights of potential impacts and benefits.

Various attachments are included with the report to provide technical background information on transit priority systems, worksheets for traffic analyses, etc.
2.0 STAKEHOLDER INVOLVEMENT & PUBLIC PARTICIPATION

The planning, development, and eventual implementation of rapid bus services requires close cooperation between numerous planning and engineering stakeholders. As the Escondido Rapid Bus represents the first effort of its type in North County, the need for public outreach and input was clear. Throughout the study effort a spirit of openness and cooperation was maintained with stakeholders, elected officials, and interested members of the public. This section summarizes the coordination activities, as well as the input gained from public outreach efforts.

2.1 STAKEHOLDER PROJECT WORKING GROUP

The primary coordinating and technical working group for the study effort was the Project Working Group (PWG) represented in Figure 2-1. This group met regularly throughout the project to provide technical input, review project documentation and findings, and discuss potential project issues. The PWG involved staff from the City of Escondido, San Diego Association of Governments (SANDAG), and North County Transit District (NCTD). The PWG established new standards for interagency cooperation by maintaining a balanced perspective on the needs of transit operations, traffic operations, and the community with an eye towards overall improvement of transit service in the study corridor.

Figure 2-1 - Escondido Rapid Bus Project Working Group Members
2.2 **ELECTED STAKEHOLDER INVOLVEMENT**

Throughout the development of the Escondido Rapid Bus project, information was provided to and input solicited from key elected stakeholder groups. These groups included:

- **Escondido City Council** – The project appeared before Escondido City Council on two occasions: (1) a presentation on the objectives of the study and key issues addressed; and (2) adoption of the Report and findings as a consent item. In addition, members of the Council were invited to attend the public open house in November 2005, and at least one member was in attendance.

- **NCTD Planning Committee** – Three presentations were made to the NCTD Planning Committee: (1) introduction of the study goals and objectives; (2) a presentation of initial findings and preliminary recommended improvements; and (3) a presentation of final study findings with recommendations made to the Board of Directors.

- **SANDAG Regional Planning Committee** – A single presentation was made to the SANDAG Regional Planning Committee as an introduction to the study.

- **SANDAG Transportation Committee** – Two presentations were made to the SANDAG Transportation Committee: (1) an introduction of the study objectives and process early in the development of the effort; and (2) a presentation of final findings and recommendations.

The general response from each of the elected stakeholder groups and meetings was overwhelming positive in terms of supporting the concepts and implementation recommendations for the Escondido Rapid Bus. In particular, during final presentations for the NCTD Planning Committee and the SANDAG Transportation Committee, elected stakeholders requested that the proposed project phasing be accelerated if possible.

2.3 **PUBLIC OUTREACH AND INVOLVEMENT**

The public outreach and involvement process for the study effort consisted of two elements. The first element consisted of getting information about the project out to stakeholders and the public. In addition to providing a briefing to the Escondido City Council, the PWG contacted a number of key groups and held informational booth events at major Route 350 transfer points and the Escondido Farmer’s Market. In addition to presentation boards designed to inform the public about the study’s scope, objectives, and timeline for completion, there were project handouts and materials on related SANDAG and NCTD projects. Project staff from SANDAG, NCTD, and the consultant team answered questions and took feedback from the public regarding the project.

Information Booth events were held at:

- Escondido Transit Center (Tuesday, September 6, 2005)
- Escondido Farmer’s Market (Tuesday, September 6, 2005)
- Westfield Shoppingtown North County (Tuesday, September 20, 2005)

A project information sheet was made available (see Appendix A) in both English and Spanish outlining the project objectives, efforts, and methods for providing public input. The project information sheet was made available at all public events for the project, on the SANDAG and NCTD public websites, and on Route 350 buses early in the project process.
Key groups contacted included:

- Escondido Chamber of Commerce
- Escondido Downtown Association
- San Pasqual High School
- Bear Valley Middle School
- Old Escondido Neighborhood Group

A PowerPoint presentation was made to the Old Escondido Neighborhood Group on Thursday, October 13, 2005.

The second element was an open house at which proposed Route 350 improvements and their benefits were presented for review and comment by the public. The open house was held on Monday, November 14, 2005, at the Escondido Public Library.

Attendees were asked to provide input on the project, as well as to express their preferences for three bus stop design themes, and two alternative bus branding themes (the designs are described and shown in Section 4.0). Of the three bus design themes: “Contemporary”, “Retro”, and “Cable Structure”, the expressed preference of attendees was for the “Cable Structure” design with the addition of a bench with back support. Of the two Breeze Rapid bus branding design themes: “Silver” and “Blue”, the blue was preferred.

Comments received relating directly to Route 350 included:

- Desire to see transit service extended on South Escondido Boulevard below Sunset Drive, and
- Concerns about afternoon bus passenger volumes and desire to see additional trippers added to accommodate increased demand.

Generalized comments about NCTD bus services were also received, and included:

- Higher seats for disabled riders,
- Relocating the handicapped facility in front of the railroad track at the Escondido Transit Center (ETC),
- Sensors on the faucets in ETC restrooms,
- Benches at all NCTD bus stops,
- The types of improvements being considered would be very valuable and enhance the transit rider’s perception and ease of use, and
• Covered bus stops for shade.

Overall the public outreach and input process was considered very successful, particularly given that the rapid bus concept for Route 350 is in the earlier phases of development. As follow-up stages of the project proceed, additional outreach efforts should be made to inform the public regarding the specific improvements selected for implementation and their intended construction phasing.
3.0 EXISTING CONDITIONS

This section describes existing conditions along Route 350 in terms of the general environment, transit service, traffic conditions, and stops/station conditions. As the implementation timeline for the improvements proposed as a part of this study are generally less than five years in the future, existing conditions were used as the baseline for comparing conditions and impacts unless noted otherwise.

3.1 OVERVIEW OF EXISTING ENVIRONMENT & CONDITIONS

The Escondido Rapid Bus service crosses three distinct urban environments:

- **Downtown Escondido (from the Escondido Transit Center to Vermont)** – This area includes the Downtown Escondido grid environment, as well as South Escondido Boulevard. Within the Downtown grid, signal timing balances the movements of all traffic approaches with some advantages given to the couplet formed by Grand Avenue and Valley Parkway. Along South Escondido Boulevard, traffic along that street receives the greater advantage over cross-streets. Both areas support a pedestrian friendly environment with store-fronts on the streets and on-street parking.

- **County Semi-rural (from Vermont to Bear Valley Parkway)** – This area is dominated by a winding two-lane rural road without traffic signals, fronted mostly by single family homes. Sidewalks are non-existent and the topography could be described as moderate hills.

- **Suburban Escondido (from Sunset to Del Lago/Via Rancho Parkway)** – This area, along Bear Valley Parkway, is dominated by a four to six lane arterial and the interchange with I-15. Several schools are present in this area creating significant pedestrian activity during school hours. Traffic congestion is predominately southbound in the AM commute period and northbound in the PM commute period, however localized congestion occurs around the interchange with I-15 and in the vicinity of the schools.

Each of these environments impacted the operations and traffic issues faced by the Escondido Rapid Bus service, as well as influenced the potential range of priority measures that were recommended.

A series of key traffic, community, and transit operations characteristics were identified through field review and discussions with members of the PWG that impact the existing travel time and reliability of Route 350. These issues are a primary focus of the study. The identified issues include:

- **Bunching of buses due to traffic congestion and delays** (particularly on the Del Lago approach to the southbound I-15 on-ramp).

- **Heavy boardings near the schools** along the southern end of Route 350 (especially at the San Pasqual High School).

- **Traffic congestion at the following locations**:
  - Northbound Bear Valley Parkway where the road cross-section drops from four to two lanes (predominately in the evening peak hours and during school hours).
  - Intersection of Bear Valley Parkway/Sunset.
3.2 EXISTING TRAFFIC OPERATIONS ANALYSIS

Existing traffic operations serve as the basis for assessing the potential benefits and impacts of potential transit priority treatments. Existing conditions were analyzed for key study intersections using Synchro traffic analysis software. Once priority treatments have been identified, they will be evaluated based on how they impact operations at study intersections.

3.2.1 Existing Traffic Conditions Analysis

Traffic counts were conducted in early September 2005. Counts occurred after schools had been back in session for about a week in order to capture worst-case traffic conditions.

Peak period intersection counts were conducted in the AM (7AM-9AM) and PM (4PM-6PM) peak periods. For study intersections in the vicinity of the High School and Middle School, counts were also conducted from 1PM-3PM to capture the period when classes typical let out.
Figure 3-1

Escondido Rapid Bus Transit Priority Concept Study

Key Transfers & Areas of Boarding Delay

- Dispersed boardings & frequent stops
- Key transfer points
- Heavy boardings during school periods
Figure 3-2
General Areas of Traffic Congestion & Signal Delay

Legend:

- Area of traffic delay (caused more by volume)
- Area of signal delay. (caused by delay at signals)

Escondido Rapid Bus Transit Priority Concept Study
Analysis Methodology

Street segments were evaluated based on their Average Daily Traffic (ADT) and the requirements of the Highway Capacity Manual (HCM). Intersection analysis was conducted using Synchro Traffic Analysis Software based on the intersection turning movement counts that were collected in September 2005 and the existing traffic signal timing plans under which the intersections currently operate. Counts sheets are included in Appendix A. Synchro worksheets are included in Appendix B. By mutual agreement of the PWG, not all intersections where signal priority could potentially be proposed were counted and analyzed in detail, as many of the intersections along Route 350 have similar characteristics and would have similar results should TSP be implemented. This occurred mostly with intersections with the majority of traffic on the main-street following Route 350, and modest to low volumes on the cross-street. In reviewing and determining the key study intersections, the PWG ensured that at least one similar or comparable intersection was studied in each case.

Analysis Results

The study roadway segments are presented in Figure 3-3 showing the roadway classifications and existing Average Daily Traffic (ADT) for the study roadway segments. Figure 3-3 also shows the intersection location key for the study area intersections. Only the two-lane street segments are shown to operate over-capacity based on the ADT under current conditions according to Table 3.1. The segment capacity is identified as that corresponding to LOS C according to the City of Escondido City of Escondido Design Standards (June 1999). The specific problem areas are better identified in the intersection analysis below.

Table 3.1 - Roadway Segment Analysis Based on City of Escondido Standards

<table>
<thead>
<tr>
<th>#</th>
<th>Street</th>
<th>Segment</th>
<th>Class</th>
<th>Capacity*</th>
<th>ADT</th>
<th>V/C</th>
<th>At Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Escondido Blvd</td>
<td>From 4th Ave to 5th Ave</td>
<td>4-Lane Collector</td>
<td>20,000</td>
<td>17,155</td>
<td>0.86</td>
<td>Under</td>
</tr>
<tr>
<td>2</td>
<td>Escondido Blvd</td>
<td>From 10th Ave to 11th Ave</td>
<td>2-Lane Collector</td>
<td>10,000</td>
<td>18,807</td>
<td>1.88</td>
<td>Over</td>
</tr>
<tr>
<td>3</td>
<td>Bear Valley Pkwy</td>
<td>South of Sunset Dr.</td>
<td>2-Lane Collector</td>
<td>10,000</td>
<td>20,994</td>
<td>2.10</td>
<td>Over</td>
</tr>
<tr>
<td>4</td>
<td>Via Rancho Pkwy</td>
<td>From San Pasqual Rd to Beethoven Dr</td>
<td>4-Lane Major</td>
<td>28,000</td>
<td>27,760</td>
<td>0.99</td>
<td>Under</td>
</tr>
</tbody>
</table>

* Capacity thresholds based on City of Escondido standards.

The AM, Midday, and PM peak hour traffic volumes at the study intersections are presented in Figures 3-4 & 3-5 along with the intersection levels of service during the three peak hour periods. Note that midday peak hours were evaluated only for intersections 12 through 15 due to their proximity and influence by nearby school traffic. The intersection geometrics are presented in Figures 3-6 & 3-7. The Synchro existing conditions analysis results are presented in Table 3.2 showing the stopped delay per vehicle and the associated level of service for each intersection. As shown in Table 3.2, all of the study intersections operate at acceptable levels of service with the exception of 9th Avenue / Escondido Boulevard and Beethoven Drive / Via Rancho Parkway, which operate at LOS E in the PM peak hour.
Escondido Rapid Bus
Transit Priority Concept Study

Figure 3-3
Intersection Key and Roadway Classification
Figure 3-4

Existing Turn Movement Volumes and Level of Service
Escondido Rapid Bus
Transit Concept Priority Study

**Figure 3-5**
Existing Turn Movement Volumes and Level of Service
<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Valley Parkway @ Quince Street</td>
<td>Valley Parkway @ Center City Parkway</td>
<td>Valley Parkway @ Escondido Boulevard</td>
</tr>
<tr>
<td>4</td>
<td>2nd Avenue @ Quince Street</td>
<td>2nd Avenue @ Center City Parkway</td>
<td>2nd Avenue @ Escondido Boulevard</td>
</tr>
<tr>
<td>5</td>
<td>5th Avenue @ Escondido Boulevard</td>
<td>9th Avenue @ Escondido Boulevard</td>
<td></td>
</tr>
</tbody>
</table>

**Legend**
- **Lane Configuration**
- **Traffic Signal**
- **Stop Sign**

**Figure 3-6**

*Escondido Rapid Bus Transit Concept Priority Study*

Existing Intersection Geometrics
13th Avenue @ Escondido Boulevard

Felicita Avenue @ Escondido Boulevard

Vermont Avenue @ Escondido Boulevard

Sunset Drive @ Bear Valley Parkway

Las Palmas Avenue @ Bear Valley Parkway

San Pasqual Road @ Bear Valley/Via Rancho Pkwy

Beethoven Drive @ Via Rancho Parkway

Via Rancho Parkway @ Del Lago

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**Escondido Rapid Bus**

**Transit Concept Priority Study**

**Figure 3-7**

Existing Intersection Geometrics
Table 3.2 - Peak Hour Intersection Analysis (Average Delay Per Vehicle)

<table>
<thead>
<tr>
<th>#</th>
<th>Intersection</th>
<th>AM</th>
<th>Midday</th>
<th>PM</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Delay</td>
<td>LOS</td>
<td>Delay</td>
</tr>
<tr>
<td>1</td>
<td>Valley Parkway / Quince Street</td>
<td>54.9</td>
<td>D</td>
<td>N/A</td>
</tr>
<tr>
<td>2</td>
<td>Valley Parkway / Center City Drive</td>
<td>26.4</td>
<td>C</td>
<td>N/A</td>
</tr>
<tr>
<td>3</td>
<td>Valley Parkway / Escondido Blvd</td>
<td>19.0</td>
<td>B</td>
<td>N/A</td>
</tr>
<tr>
<td>4</td>
<td>2nd Street / Quince Street</td>
<td>21.7</td>
<td>C</td>
<td>N/A</td>
</tr>
<tr>
<td>5</td>
<td>2nd Street / Center City Drive</td>
<td>17.7</td>
<td>B</td>
<td>N/A</td>
</tr>
<tr>
<td>6</td>
<td>2nd Street / Escondido Blvd</td>
<td>16.1</td>
<td>B</td>
<td>N/A</td>
</tr>
<tr>
<td>7</td>
<td>5th Avenue / Escondido Blvd</td>
<td>9.4</td>
<td>A</td>
<td>N/A</td>
</tr>
<tr>
<td>8</td>
<td>9th Avenue / Escondido Blvd</td>
<td>41.4</td>
<td>D</td>
<td>N/A</td>
</tr>
<tr>
<td>9</td>
<td>13th Avenue / Escondido Blvd</td>
<td>20.9</td>
<td>C</td>
<td>N/A</td>
</tr>
<tr>
<td>10</td>
<td>Felicita Avenue / Escondido Blvd</td>
<td>32.5</td>
<td>C</td>
<td>N/A</td>
</tr>
<tr>
<td>11</td>
<td>Vermont Avenue / Escondido Blvd</td>
<td>36.4</td>
<td>D</td>
<td>N/A</td>
</tr>
<tr>
<td>12</td>
<td>Sunset Drive / Bear Valley Parkway</td>
<td>29.2</td>
<td>C</td>
<td>13.5</td>
</tr>
<tr>
<td>13</td>
<td>Las Palmas Avenue / Bear Valley Parkway</td>
<td>28.0</td>
<td>C</td>
<td>22.4</td>
</tr>
<tr>
<td>14</td>
<td>San Pasqual Road / Via Rancho Parkway</td>
<td>19.1</td>
<td>B</td>
<td>15.1</td>
</tr>
<tr>
<td>15</td>
<td>Beethoven Drive / Via Rancho Parkway</td>
<td>49.9</td>
<td>D</td>
<td>31.0</td>
</tr>
<tr>
<td>16</td>
<td>Via Rancho Parkway / I-15 / Del Lago</td>
<td>21.8</td>
<td>C</td>
<td>N/A</td>
</tr>
</tbody>
</table>

3.2.2 Signal Operations and Coordination

In the Downtown Escondido area, signals are coordinated in a “grid” to facilitate movement along the primary one-way avenues in this area. This type of coordination exists along the length of the one-way couple comprised of 2nd Avenue in the eastbound direction and Valley Parkway in the westbound direction. Signal coordination in this area has been a focus of City of Escondido efforts in recent years due to the heavy levels of traffic and the availability of limited City resources to update signal timing/coordination.

The City of Escondido noted that they have not been able to update signal timing/coordination along Escondido Boulevard in recent years because of limited resources and competing priorities. Predominate traffic flow along this portion of Route 350 is in the north/south direction along Escondido Boulevard with major cross-street traffic occurring on Felicita Parkway.
Variations in existing cycle lengths and phasing along Escondido Boulevard indicate that a signal timing and coordination update effort could prove very beneficial.

3.3 **EXISTING TRANSIT OPERATIONS AND SCHEDULE**

Route 350 is a route which provides for a number of trip types including:

- Connection to other services at either Westfield’s Shoppingtown North County, the Del Lago Boulevard Park and Ride, or the Escondido Transit Center (and to a lesser extent for crossing services on Felicita Avenue (Routes 349 and 348) and the Park and Ride facility on Escondido Avenue).
- School service for both San Pasqual High School and Bear Valley Middle School
- Access to shopping and public services (Civic Center/City Hall, Escondido Library, Kit Carson Park)

Route 350 operates on the following basic schedule:

- Weekday service from 4:30AM – 10:30PM:
  - 15 minute peak headways
  - 30 minute off-peak headways
- Saturday service from 5:15AM-10:15PM at 30 minute headways.
- Sunday and holiday service from 7:15AM-9:30PM at 30 minute headways.

The following buses are required to operate the service:

- **Off-peak** = 3 buses
- **AM/PM peaks** = 4 buses
- **School Days** = 5 buses during peak periods in an attempt to accommodate student and regular rider boardings. In addition, a sixth bus was recently added as a tripper at 2:45PM on school days to directly pick-up passengers connecting from MTS Route 20 at Westfield’s Shoppingtown North County.

This means that during periods of greatest activity, six buses are required to operate the service and related connections. In NCTD terms, these extra buses are described as Route 450, but in effect they are serving the Route 350 riders and corridor.

The issues which have required NCTD to consider modification to the current operation include:

- Trips taking longer than the scheduled time resulting in reduced reliability and missed connections. MTS Route 20 interchanges with Route 350 at Westfield’s Shoppingtown North County and a large number of NCTD routes at the Escondido Transit Center.
- The introduction of an additional fifth bus (or “Tripper”) into the operation during peaks on school days to accommodate heavy boardings which, in optimum conditions, can be operated by four buses has increased operating costs for NCTD.
- The use of a sixth bus during the periods when schools let out to allow riders transferring from MTS Route 20 to be able to get a seat on a bus which are otherwise filled to capacity with students. Students will frequently cross the street from the schools and
ride for some distance away from their intended destination in order to ensure they have a seat.

Currently, a significant portion of patrons are transit dependent and an increase in scheduled trip time has a limited risk of lost patronage. However, the desire to improve travel time is part of an effort to attract discretionary riders.

Preliminary analysis and observation suggest that there are a number of issues which contribute significantly to the delay in the operation of this route. These issue areas were highlighted in Figures 3-1 and 3-2. Some of these issues are constant while others are variable and/or increasing. They include:

- The number of stops, particularly in the Escondido Boulevard corridor. There are sixteen non-terminus northbound stops (including nine in a 1.6 mile stretch of Escondido Boulevard northbound) and thirteen non-terminus stops southbound (including eight in a 1.4 mile stretch of Escondido Boulevard). There is no southbound stop for the Felicita Avenue Park and Ride facility. The average dwell time at bus stops is approximately 25 seconds. On any given trip a bus may stop at anywhere from one-third to two-thirds of stops.

- There are twenty (20) northbound and sixteen (16) southbound signalized intersections over a route of approximately 5.6 miles northbound (including the 1.2 mile loop from the terminus at Westfield’s Shoppingtown North County back to Beethoven Drive) and 4.5 miles southbound which is scheduled to take between sixteen (16) and twenty two (22) minutes depending on time of day and direction. There are eight signals northbound in a 1.6 mile segment of Escondido Boulevard and another three in the three-tenths of a mile of Valley Parkway. Southbound there are six signalized intersections along Escondido Boulevard. The average delay at signalized intersections is approximately 25 seconds. On any given trip a bus may be delayed anywhere from one-third to two-thirds of the signalized intersections.

- General congestion during peak periods which decreases travel speed and increases delay at intersections for all vehicles including buses. Locations which suffer under this condition include: northbound left turns from Escondido Boulevard to Valley Parkway, and turns in both directions at the Sunset Drive/Escondido Boulevard/Vermont Avenue five-leg intersection.

- Congestion is exacerbated at non-intersection locations where there is a reduction from two to one travel lanes for parking, traffic operations, and/or right of way reasons. For example, Bear Valley Parkway narrows to two travel lanes north of Las Palmas. South Escondido Boulevard narrows to two travel lanes between 5th and 13th Avenues.

- Delay due to issues such as double-parking, right turning vehicles and loading buses on buses were seemingly isolated and not occurring on a regular basis. The conflicts with stopped or right-turning vehicles is minimized if the bus is in the left lane, which it can be more often if there are less bus stops.

### 3.4 EXISTING STOPS/STATION AMENITIES

Most of the existing stops and stations along Route 350 are typical of local service stops in North County with some stops having benches and trash cans, others simply being marked by a bus stop sign, and a couple stops with shelters and more substantial amenities. The hub for
transit service in the area is the Escondido Transit Center which offers substantial amenities in terms of shelter, seating, restrooms, etc. This section describes and illustrates the location and existing conditions of Route 350 bus stops. The stops are described northbound from Westfield Shoppingtown North County (Westfield’s Shoppingtown North County) to the Escondido Transit Center, and southbound from the Escondido Transit Center back to Westfield Shoppingtown North County.

3.4.1 Northbound Stops

Stop 1. Westfield Shoppingtown North County
This stop is located on the northern periphery of the shopping center on Beethoven Drive. It provides a transfer connection with MTS Route 20. This stop currently has the following amenities:
- Shelters
- Benches
- Trash cans, and a
- Pay telephone

Stop 2. Del Lago Park and Ride (Nearside)
This stop is located across the street from the Del Lago Boulevard Park and Ride. This stop would be closed with the opening of the Del Lago BRT Station. This stop currently has the following amenities:
- Trash can

Stop 3. Bear Valley Parkway and San Pasqual Road (Farside)
This stop is located near the south end of San Pasqual High School. It has no amenities.
Stop 4. Bear Valley Parkway at San Pasqual High School (Nearside)

This stop is located directly adjacent to the pedestrian drop-off area and main entrance to San Pasqual High School. This stop has no amenities.

Stop 5. Bear Valley Parkway at Peet Lane (Nearside)

This stop is located across the street from Bear Valley Middle School. This stop currently has the following amenities:

- Bench
- Trash can
- Solar-powered lighting (with route map and schedule)

Stop 6. Sunset Drive near Royal Crest Drive (Farside)

This stop is located off the shoulder of the roadway. The stop currently has the following amenities:

- Bench
- Solar-powered lighting (with route map and schedule)
Stop 7. Sunset Drive near South Escondido Boulevard (Nearside)

This stop currently has the following amenities:

- Bench

Stop 8. South Escondido Boulevard near West Felicita Avenue (Nearside)

This stop currently has the following amenities:

- Bench

Stop 9. South Escondido Boulevard near West Felicita Avenue (Farside)

This stop currently has the following amenities:

- Bench
- Trash can
Stop 10. South Escondido Boulevard at West 15\textsuperscript{th} Avenue (Nearside)

This stop currently has no amenities.

Stop 11. South Escondido Boulevard at West 13\textsuperscript{th} Avenue (Farside)

This stop currently has no amenities.

Stop 12. South Escondido Boulevard at West 11\textsuperscript{th} Avenue (Nearside)

This stop currently has the following amenities:

- Trash can
Stop 13. South Escondido Boulevard near West 9th Avenue (Farside)
This stop currently has the following amenities:
   • Trash can

Stop 14. South Escondido Boulevard at West 6th Avenue (Farside)
This stop currently has the following amenities:
   • Bench
   • Trash can

Stop 15. South Escondido Boulevard at West 4th Avenue (Farside)
This stop currently has the following amenities:
   • Bench
Stop 16. South Escondido Boulevard at West 3rd Avenue (Farside)
This stop has no amenities.

Stop 17. Valley Parkway at South Orange St. (Nearside)
This stop features a conventional bus shelter and trash can.

Stop 18. Escondido Transit Center
Route 350 stops at Bay 4 of the Escondido Transit Center (ETC).
Amenities at the ETC include:

- Seating
- Restrooms
- Public telephones
- NCTD Customer Information Center
- Convenience Store

Numerous other routes serve the ETC, providing Route 350 patrons with a variety of transfer connections.
3.4.2 Southbound Stops

Stop 19. South Escondido Boulevard at West 2nd Avenue (Farside)
This stop currently has the following amenities:
- Bench
- Trash can

Stop 20. South Escondido Boulevard near West 4th Avenue (Farside)
This stop has no amenities.

Stop 21. South Escondido Boulevard at West 6th Avenue (Farside)
This stop has no amenities.
Stop 22. South Escondido Boulevard at West 9th Avenue (Farside)
This stop has no amenities.

Stop 23. South Escondido Boulevard at West 11th Avenue (Farside)
This stop has no amenities.

Stop 24. South Escondido Boulevard at West 13th Avenue (Farside)
This stop has no amenities.
Stop 25. South Escondido Boulevard near West 15th Avenue (Farside)

This stop currently has the following amenities:

- Bench

Stop 26. South Escondido Boulevard at West Felicita Avenue (Nearside)

This stop has the following amenities:

- Trash can

Stop 27. Sunset Drive near South Escondido Boulevard (Farside)

This stop currently has the following amenities:

- Bench
- Trash can
Stop 28. Sunset Drive near Royal Crest Drive (Nearside)
This stop currently has the following amenities:
  • Bench
  • Solar-powered lighting (with route map and schedule)

Stop 29. Bear Valley Parkway and Las Palmas Avenue (Farside)
This stop, located adjacent to Bear Valley Middle School, has no amenities.

Stop 30. Bear Valley Parkway and Mary Lane (Nearside)
This stop, located near San Pasqual High School, features a bench and bus sign.
Stop 31. Bear Valley Parkway and San Pasqual Road (Nearside)

This stop has no amenities. Following this stop, Route 350 returns to Westfield Shoppingtown North County (see Stop 1).
4.0 PROPOSED RAPID BUS IMPROVEMENTS

This section describes the various improvements that were considered as a part of the Escondido Rapid Bus Transit Priority Concept Study. Improvements are grouped into three categories:

- **Transit Priority Measures** - These include physical and system based improvements to the roadway and the traffic signal system to aid in reducing overall transit travel times. Some examples include:
  - **Physical Improvements** – Physical improvements such as roadway reconfigurations or queue jumps in possible combination with supporting system improvements (such as special phases or transit signal priority).
  - **Transit Signal Priority (TSP)** – A system based improvement where intersection signal timing/phasing is adjusted to allow buses running behind schedule to receive slight extension of a green light to avoid hitting a red light with the associated delay. In certain circumstances this also allows for shortening of red lights that a bus may be waiting at to reduce signal delay.
  - **Special Transit Access/Other Improvement** – These types of improvements include special access for buses to transit center, as well as improvements that reduce bus delay by resolving a broader issue for all vehicle traffic.

- **Transit Operations/Service Adjustments** – These include adjustments to schedules or methods of operations that impact or enhance bus service.

- **Stop/Station Improvements** – These include physical enhancements such as benches, shelters, enhance customer information, and special branding at stops and stations. Several preliminary design concepts were developed for and are presented as part of this study report. This category can include adjustments to stop locations, stop consolidation, and methods for speeding boardings.

The improvements reviewed for this study effort are discussed throughout the remainder of this section, along with the associated benefits and impacts. The following section (Section 5.0) discusses the proposed phasing and costs of the improvements detailed in this section.

4.1 TRANSIT PRIORITY MEASURE CONCEPTS AND PROCESS

Transit priority measures include a broad range of potential improvements to the physical roadway network and management systems that assist transit in terms of:

- Reducing delay due to signals or traffic congestion,
- Enhancing the perception of transit by allowing it to bypass delays experienced by other non-transit traffic.
- Enhancing transit schedule reliability and adherence by reducing the variable delay experienced by transit vehicles.

The various concepts involved in transit priority measures are discussed categorized by:

- Physical improvements,
• Transit signal priority, and
• Special access improvements.

4.1.1 Physical Improvements and Queue Jumpers Concepts and Process
Due to the character of the community and the traffic congestion along Route 350, special transit lanes for the Escondido Rapid Bus were largely limited to queue jumper applications. While exclusive transit lanes were considered on a larger scale early in the study, they are not warranted by the type of service provided by the Escondido Rapid Bus, the level of bus boardings, or traffic congestion along most of the route. Intersection and signal delay represent the majority of traffic related delay for the Route 350 alignment. For purposes of the Escondido Rapid Bus service, queue jumpers are excellent applications for key areas of congestion, as they allow the bus to avoid queues at signalized intersections. As part of the preliminary list of possible transit priority treatments, queue jumpers were considered at several locations.

A queue jumper is implemented by restriping or modifying the approach to a signalized intersection to allow for a special bus lane up to the intersection stop line. The length of the lane varies depending on the specific location, but the lane should be at least 150 feet long and 12 foot wide. Figure 4-1 provides a graphical representation of how a queue jumper works. In effect, it is a three step process:

• **Step One**: Vehicle traffic queues up at the intersection due to stop signal delay. The bus driver determines whether it is appropriate to use the queue jump lane depending on the status of the signal and level of queue.

• **Step Two**: The bus uses the queue jump lane (if appropriate) to move to the front of the vehicle queue and stops at the signal if red.

• **Step Three**: The bus receives a special indication (usually only visible to the bus in the queue jumper lane) to proceed. As a part of this special signal phase, the bus is given anywhere from a 3-5 second “jump” to proceed prior to the remaining traffic receiving a green light.

Options to queue jumpers include:

• Implementation of a special receiving lane on the far side of the intersection where there is a far side stop. This usually means that the bus does not receive a “jump” from the signal, but the lane allows the bus to bypass traffic queues at the intersection.

• Queue jump from the right turn lane can be implemented where very low right turn volumes are present in the dedicated right turn lane. This assumes sufficient curb-to-curb on the farside of the intersection to allow the bus to safely merge into traffic.

4.1.2 Transit Signal Priority Concepts and Process
Transit signal priority occurs at two basic levels:

• **Passive** – Where signals or a series of signals are timed through normal means to assist in the movement of buses along a route.

• **Active** – Where a system is implemented that allows the bus to request a special transit “priority” and the signal processes whether or not this can be granted given the status of the signal cycle and the configuration of the signal.
**STEP ONE: ARRIVAL**
Bus arrives on red, and uses queue jump lane to move to the stop line and avoid queues.

**STEP TWO: “THE JUMP”**
Bus receives a special indication, shown as a “T” indication in the figure, and the bus proceeds through the intersection approximately 3-5 seconds ahead of other traffic.

**STEP THREE:**
Bus clears the intersection while remaining traffic receives a green light and starts moving.

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Escondido Rapid Bus
Transit Priority Concept Study

Description of Basic Queue Jumper Operations

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Figure 4-1
Passive signal priority is most applicable where there are long distances between bus stops, and buses can move consistently with the flow of traffic. Due to the close spacing of stops along Route 350, the passive approach is not recommended.

**It is important to note that transit signal priority is not the same as emergency vehicle pre-emption which is sometimes granted for ambulance, police, and/or fire vehicles. Emergency pre-emption acts similar to a signalized at-grade railroad crossing where the emergency vehicle (similar to a train) receives a green light and all opposing directions receive a red light. Transit signal priority simply modifies the signal phase somewhat to reduce delay for transit vehicles, and it does not ensure that buses will always get a green light.**

However, active signal priority is very applicable to Route 350. Active transit signal priority is supported by three basic system components:

- **Intelligent Bus & Bus Tracking System** – The bus tracks its location relative to the schedule, allowing it to determine at any point along the route whether or not it is ahead, on, or behind schedule. Buses only request priority if they are determined to be greater than a agreed to period of time behind schedule, usually anywhere from 3-5 minutes. For purposes of the Escondido Bus Rapid Study, it was assumed that the Orbital TMS solution currently being deployed on the NCTD bus fleet will be used to provide the bus and schedule adherence tracking component. The Orbital TMS system was selected for deployment as the San Diego Regional Transit Management System which provides Global Positioning Satellite (GPS) based bus and schedule tracking.

- **Method of Communications** – The bus or bus tracking system needs a method to communicate with the traffic signal system to “request” signal priority. At this point in time, methods of communicating directly from the bus tracking system to the traffic signal system are not proven and should still be considered in the preliminary phases of development. However, several proven system exist from transmitting a signal between the bus and the traffic signal controller in the field. It is assumed that the Escondido Rapid Bus service will utilize an approach that communicates a “request” for signal priority directly from the bus to the traffic signal in the field.

- **Added Functionality to the Traffic Signal Controller** – The traffic signal must be enhanced with both hardware and software to support transit signal priority. While the specifics vary depending on the specific system implemented, the components include:
  - Priority request receiver allowing the traffic signal to receive communications requesting priority from the bus.
  - Phase selector or control card that allows for on-the-fly adjustments to the signal phase.
  - Special controller software or firmware that will recognize the request for priority and make the proper determination on whether or not to grant priority and in what manner to grant it.

Active transit signal priority involves a seven step process, as shown in Figure 4-2, for purposes of activation/implementation at individual intersections:
Transit Signal Priority Process Steps:
1. Bus schedules are updated and loaded into the Regional Transit Management System (RTMS).
2. Threshold for a “late” bus is set and schedules are uploaded to buses each morning.
3. Buses “know” their location using GPS positioning.
4. Buses “know” whether they are “late” based on their position and uploaded schedule.
5. If a bus determines that it is “late,” it requests signal priority.
6. Traffic signal determines (based on its settings) whether or not to grant the priority request. If granted, it modifies the signal timing/phasing appropriately (e.g. extends a green).
7. The signal control/monitoring system logs priority requests, actions taken, etc. and allows traffic signal staff to check for problems and manage priority settings.

Escondido Rapid Bus
Transit Priority Concept Study

Figure 4-2
Overview of Transit Signal Priority Process
1. **Bus Tracking/Regional Scheduling** – Bus schedules are updated and refined over time by transit operations planners and operational schedules are loaded into the bus tracking system.

2. **Vehicle (Bus) Tracking/Computer Aided Dispatch** – Known as the Regional Transit Management System in San Diego, this system allows a NCTD transit dispatch center to monitor bus operations and operational issues in the field. The level at which a bus is considered late can be adjusted at this system. Information is loaded from this system to buses every morning before they leave the bus maintenance yard.

3. **Global Position System (GPS)** – The same system utilized for navigation and tracking all over the world, GPS allows the bus to determine its location every few seconds.

4. **Vehicle (Bus) Tracking of Schedule and Priority Request** – The bus uses on-board computers to compare its actual location (from GPS data) with where it should be along the route at that point in the schedule. It then determines if it has exceeded the threshold of being “late,” and can then “request” transit signal priority.

5. **Communications with the Traffic Signal** – The bus communicates the “request” for priority to the traffic signal controller. The method of communication varies by system, but can involve infrared, optical, radio frequency, or even audible communications.

6. **Traffic Signal Decision** – The traffic signal controller receives the request and then determines whether or not it can be granted given, and if so how it should be granted.

7. **Signal Control Monitoring** – Traffic engineers can either monitor the transit signal priority activities (“requests and grants”) either at the traffic signal controller or remotely.

At the individual intersection, the actual modifications to the signal phase that occur can include:

- **Green extension** – Where a green indication is extended a few seconds (usually up to 10 seconds) to allow a bus a little more time to move through the intersection.

- **Early green** – Where a bus arrives on a red indication and the appropriate phase is advanced to allow the bus to receive a green light sooner than it otherwise would.

- **Special transit phases** – Where a special transit phase is inserted into the signal cycle to allow buses to make a special movement or maneuver. This approach is generally applied at access points for transit centers.
An example of a green extension and early green are displayed below.

Examples of Signal Phase Modifications for Transit Signal Priority

The factors that influence transit signal priority are numerous and include:

- **Vehicle location** – The bus requesting priority must be traveling on its assigned route.
- **Schedule adherence** – The bus must be behind schedule by a pre-configured amount of time (usually 3-5 minutes).
- **Time of day/day of week** – Sometimes specific times of day will be configured to either allow for greater or more restricted transit priority.
- **Duration since last priority request granted** – Signal controllers may be set to only grant a request if it has been a pre-configured time since the last request was granted. Sometimes this is stated as the number of cycles, and other times as a set time limit.
- **Phase of the signal** – The signal must be at an appropriate location to grant the priority request. For example, a request for an early green will not be granted if the signal is about to turn green in any event. In addition, very short cycle lengths and/or frequent pedestrian activations can limit the opportunities for granting transit signal priority.
- **Presence of emergency vehicles** – Emergency vehicles requesting “emergency pre-emption” always take priority over transit priority requests.

Each of the above factors can be influenced by specific conditions at individual intersections, as well as overall regional policy regarding transit signal priority. At particularly busy intersections, these factors can be used in combination to limit the potential for transit priority having a noticeable impact on vehicular traffic.

In order for transit signal priority to work properly, a number of baseline conditions need to be in place:

- **Appropriate equipment on the buses that will operate on the route** - Given the near-term implementation timeline for the Escondido Rapid Bus, it was assumed that a form of transit priority emitter would be installed on the bus and integrated with the on-board...
computers being deployed as a part of the RTMS (Regional Transit Management System).

- Signal equipment and communications and at the signalized intersections where transit signal priority is desired — Transit signal priority receivers would be installed at intersections (to receive requests from the buses), along with the appropriate signal equipment in the controller cabinet. Most of the intersections along Route 350 are already equipped with 3M Opticom emergency signal preemption equipment. This system could be modified to support transit signal priority as well, however no final decision has been made on the specific equipment to be deployed.

- Signal timing should be updated — In order to minimize the potential impacts of TSP on normal vehicular traffic, corridors where TSP will be implemented should have up to date signal timing and coordination.

4.1.3 Other Physical/Access Improvement Concepts

This category includes any physical improvements made to aid transit operations and avoid delay. An example is the addition of a signalized intersection for bus use only that allows for easier access. Another example would be the addition of a signal phase, traffic lane, or turn lane for use by all transit and vehicular traffic. While the improvement would not be particular to transit, the overall improved operations would benefit transit.

4.2 PROPOSED TRANSIT PRIORITY MEASURES

As discussed in Section 2, Existing Conditions, a number of areas of traffic congestion and signal delay were identified. Through a process of field review, technical analysis, and discussions with the PWG, a series of proposed transit priority measures were identified. The basic concept for implementing transit priority measures involves a four stage approach:

1. Preparation for Transit Signal Priority — In order for TSP to be most effective with minimal to no impact on normal vehicular traffic it is important that signal timing, coordination, and operations be reviewed at all signalized intersections involved in the TSP deployment effort. Preparation also includes the installation and configuration of the buses with the proper TSP equipment, and revision and refinement of the transit schedules.

2. Implementation of Transit Signal Priority — TSP can be a very cost-effective means of providing widespread transit priority without major impacts to traffic. Unlike physical transit priority measures, the benefits of TSP are cumulative across the many signalized intersections where it is deployed. The benefit to any one bus at a single intersection is relatively minor, but across an entire route the benefits are substantial.

3. Identification and Resolution of Key Operations Issues — A number of known traffic operations issues exist along Route 350, notably the delays in making the northbound left-turn from Escondido Boulevard to westbound Valley Parkway. Priority measures were identified to deal with these operational issues where possible.

4. Development of Location Specific Priority Improvements — Finally, a few locations exist where queue jump lanes or special physical treatments are appropriate, and these are identified.

Table 4.1 lists the proposed priority treatments by type and location. Figure 4-3 graphically displays a summary of the proposed transit priority measures along Route 350.
Table 4.1 - Proposed Transit Priority Treatments for Escondido Rapid Bus Service

<table>
<thead>
<tr>
<th>#</th>
<th>Location</th>
<th>Basic Priority Type</th>
<th>Special Description/Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Quince Street</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Valley Pkwy.</td>
<td>X</td>
<td>Signal priority for SB TH, heavy traffic cross volumes.</td>
</tr>
<tr>
<td>2</td>
<td>2nd Ave.</td>
<td>X</td>
<td>Signal priority for SB LT, heavy opposing traffic volumes.</td>
</tr>
<tr>
<td></td>
<td><strong>2nd Avenue</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Centre City Pkwy.</td>
<td>X</td>
<td>Signal priority for EB TH.</td>
</tr>
<tr>
<td>4</td>
<td>Orange St.</td>
<td>X</td>
<td>Signal priority for EB TH.</td>
</tr>
<tr>
<td></td>
<td><strong>Valley Pkwy.</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Orange St.</td>
<td>X</td>
<td>Signal priority for WB TH.</td>
</tr>
<tr>
<td>6</td>
<td>Centre City Pkwy.</td>
<td>X</td>
<td>Possible WB queue jump lane with restriping, as sufficient curb-to-curb width exists. The farside of the intersection would need to be widened to provide transition lane for bus.</td>
</tr>
<tr>
<td></td>
<td><strong>Escondido Blvd.</strong></td>
<td>Note - Signal coordination should be updated for S. Escondido Blvd. as baseline improvement.</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>2nd Ave.</td>
<td>X</td>
<td>Signal priority NB TH. SB protected LT phase would be put in place to match NB protected LT at Valley Pkwy.</td>
</tr>
<tr>
<td>8</td>
<td>Grand Ave.</td>
<td>X</td>
<td>Signal priority for NB TH.</td>
</tr>
<tr>
<td>9</td>
<td>Valley Pkwy.</td>
<td>X</td>
<td>Modification of signal phase to provide protected NB LT. May require adjustments to upstream intersections/phasing on Valley Pkwy.</td>
</tr>
<tr>
<td>10</td>
<td>5th Ave.</td>
<td>X</td>
<td>Signal priority NB &amp; SB TH</td>
</tr>
<tr>
<td>11</td>
<td>9th Ave.</td>
<td>X</td>
<td>Signal priority NB &amp; SB TH</td>
</tr>
<tr>
<td>12</td>
<td>13th Ave.</td>
<td>X</td>
<td>Signal priority NB &amp; SB TH</td>
</tr>
<tr>
<td>13</td>
<td>Felicita Ave.</td>
<td>X</td>
<td>Insufficient space of possible queue jump - Signal priority in NB &amp; SB TH directions only.</td>
</tr>
<tr>
<td>14</td>
<td>Sunset Dr.</td>
<td>X</td>
<td>Complexity of five-legged intersection and need to provide coordination with S. Escondido Blvd. limit signal priority opportunities.</td>
</tr>
</tbody>
</table>

Key:
- **TSP only** - Location considered for transit signal priority only (as opposed to physical treatments).
- **NB, SB, WB, EB** - Indicates direction of bus movement or approach of intersection.
- **LT, RT, TH** - Indicates left turn, right turn, or through movement.
Table 4.1 - Proposed Transit Priority Treatments for Escondido Rapid Bus Service

<table>
<thead>
<tr>
<th>#</th>
<th>Location</th>
<th>Basic Priority Type</th>
<th>Special Description/Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>None</td>
<td>TSP Only</td>
</tr>
<tr>
<td>15</td>
<td>Sunset Dr.</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>16</td>
<td>Las Palmas Ave./Peet Ln.</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Canyon Rd.</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Mary Ln.</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>San Pasqual Rd.</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Beethoven Dr.</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>I-15 BRT Direct Access Ramp (future)</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>Del Lago BRT Station (P &amp; R Lot)</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

Key:

TSP only - Location considered for transit signal priority only (as opposed to physical treatments).
NB, SB, WB, EB - Indicates direction of bus movement or approach of intersection.
LT, RT, TH - Indicates left turn, right turn, or through movement.
**Escondido Rapid Bus Transit Priority Concept Study**

**Figure 4-3**
Summary of Proposed Transit Priority Improvements

- **Protected Left-Turn Phases at Valley Pkwy. & 2nd.**
- **Separate NB & SB Queue Jumps at Las Palmas Ave./Peet Ln.**
- **Deleted segment as Route 350 re-aligns Northbound to Beethoven Dr. when BRT Station Opens as Southern Terminus of Route.**
- **Intersection Improvements and/or NB Left-Turn Queue Jump**
- **Special Access to Future Del Lago BRT Station**

**Symbol Key:**
- Signal Coordination Update
- Signal Priority
- Queue Jumper (arrow indicates direction)
- Special Access or Physical Improvement
4.2.1 Baseline Improvements

A number of baseline improvements are recommended in order to maximize the effectiveness of the transit priority measures and minimize any potential impacts to normal vehicular traffic. These improvements include:

- **Prepare Buses/Transit Vehicles** – Buses will need to be equipped with the appropriate signal priority equipment. While a maximum of six buses are required to operate Route 350 currently, it is suggested that 25 buses be installed with TSP equipment to provide some operational flexibility in the assignment of buses to routes and in bus maintenance. The TSP equipment will need to be tied into the on-board computer which has been deployed as part of the RTMS project in order to activate TSP only when the bus is “late.”

- **Conduct Bus Stop Survey** – To ensure high levels of accuracy for bus schedule adherence and TSP activation, it is important to conduct a detailed survey of the distances between bus stops on Route 350 considering the proposed improvements and changes noted in this report.

- **Analyze/Update Signal Operations & Coordination** – In order to ensure a solid baseline for the implementation of TSP, and to minimize the potential impacts on normal vehicular traffic it is important to:
  - Analyze signal operations and coordination in the Downtown Escondido grid network and along Escondido Boulevard south to Sunset Drive (see Figure 4-3). This analysis should be conducted in light of proposed improvements in this report, particularly any proposed changes in signal phasing such as the addition of a protected left-turn at Valley Parkway/Escondido Boulevard. The City of Escondido has noted that while signal coordination in the Downtown grid network is relatively up to date, resources have not allowed for recent review and coordination of South Escondido Boulevard.
  - Conduct before/after floating car studies to assess the impacts and effectiveness of any signal coordination changes. It may be desirable to conduct an additional “after” floating car study following implementation of TSP, at least to confirm minimal impacts to the major streets.
  - Update signal coordination as determined in the analysis effort. The coordination update should be implemented prior to the widespread application of TSP.

- **Procure/Install TSP Traffic Software/Equipment** – The appropriate TSP equipment for the traffic signals must be procured and installed, and the associated software must be configured. Modern TSP equipment allows for a wide range of configuration settings that determine when, how frequently, and under what conditions a priority request from a bus will be granted. In addition, any existing traffic signal equipment, such as traffic controllers, that is in poor shape or seriously obsolete will need to be replaced. Finally, software and communications should be in place to allow City of Escondido traffic engineers to monitor the status and records involving TSP requests and permissions.

- **Test TSP Operations & Configurations** – Testing for TSP implementation and configuration should occur at two levels:
o **Bench testing** – Lab or simulated tests of the TSP equipment and software to determine that the intended installation and configuration will not generate any unsafe conditions.

o **Field testing** – Scaled testing in the field to assess if the TSP is working as intended in real operations. Once initial field tests are complete, broader installation of TSP can commence.

All of these improvements or assessments should be in-place prior to the widespread implementation of TSP or other transit priority measures. The status of these improvements would not impact any of the station/stop improvements, presuming that any re-designs of stops or stations takes into account the impacts of any planned physical priority measures.

For physical priority measures, there are no specific baseline improvements required, and the typical engineering design/approval process for the City of Escondido should be followed.

### 4.2.2 Transit Signal Priority Improvements

The potential for applying TSP to all of the signalized intersections along Route 350 was considered as a part of this effort. In the end, TSP was proposed for most of the signalized intersections along Route 350 as shown in Table 4.1 and Figure 4-3. There were a couple of exceptions:

- **Valley Parkway/Centre City Parkway** – This location is subject more to traffic congestion and queuing than signal delay, so physical priority measures were identified instead of TSP.

- **South Escondido Boulevard/Sunset Drive/Vermont Avenue** - The complexity of this five-legged intersection, especially in terms of coordinating the cycle length with the intersections to the north, would significantly complicate TSP implementation at this location.

- **Bear Valley Parkway/Sunset Drive** – This location is subject to constrained geometry and heavy thru volumes on Bear Valley Parkway, so physical priority measures were identified instead of TSP.

- **Escondido Boulevard/Valley Parkway** – This location was identified for an adjustment to the signal phasing (addition of a northbound protected left-turn) which is a primary source of bus delay.

In any event, the potential impacts and benefits of TSP were analyzed for these exceptions in case it should be desired to implement TSP in the future at these locations.

### 4.2.3 Physical and Special Access Improvements

In addition to the baseline and TSP improvements considered for the Escondido Rapid Bus, a number of physical and special access transit priority measures have been developed. These include (see Table 4.1 and Figure 4-3):

- **Valley Parkway/Centre City Parkway** – Implementation of a westbound queue jump lane which will include:
  o Restriping of the westbound approach of Valley Parkway to provide for a queue jump lane at least back to the Orange Street intersection. Design of the queue
the jumper will need to consider proper access for traffic wishing to turn right from westbound Valley Parkway to northbound Centre City Parkway, as well as consider access issues for the driveway on the north side of the east leg of the intersection.

- Construction of a bus receiving and transition lane on the westbound farside of the intersection to allow the bus to merge should they miss the queue jump opportunity.
- Relocation of the northwest signal pole and installation of a new pole and mast arm with appropriate rewiring of the intersection.
- Deployment of a “T” priority indication that can only be seen from the queue jump lane with appropriate signage.

- **Valley Parkway/Escondido Boulevard** – Addition of a protected northbound left-turn phase implementation of which would include:
  - Replacement and realignment of the signal heads and a new mast-arm for the northeast signal pole.
  - Installation of near-right 1A signal pole.
  - Implementation of appropriate signage and striping modifications.

- **2nd Avenue/Escondido Boulevard** – Addition of a protected southbound left-turn phase implementation of which would include improvements similar to Valley Parkway/Escondido Boulevard with the following additions:
  - Replacement of the southwest signal pole to support a new signal mast arm would be required.
  - Rewiring and conduit replacement due to the age of the signal installation would be required.

  This improvement is only proposed should the protected left-turn be implemented at Valley Parkway/Escondido Boulevard.

- **Bear Valley Parkway/Sunset Drive** – Potential implementation of two options:
  - Construction of a dedicated eastbound right-turn lane for all vehicular traffic with the following changes to the intersection:
    - Construct a dedicated right-turn lane for use by all vehicular traffic including appropriate transitions, striping, and signage modifications.
    - Relocate the southwest signal pole to allow space for the right-turn lane, and make appropriate modifications to signal indications/heads.
    - Relocate power pole on the southwest corner of the intersection,
    - Construct retaining walls and grade as appropriate to provide a safe vertical and horizontal profile of the intersection.
    - In theory this improvement would allow for an overlapping right-turn with the northbound left.
  - Addition of a northbound left-turn bus lane with the following modifications:
- Widening of the intersection to allow for a bus only northbound left-turn lane with sufficient distance to act as a simple queue jump.
- Construction of a receiving lane on the westbound departing leg (Sunset Drive) to allow a left-turning bus proper transition into traffic flow.
- Relocation of signal poles on west side of intersection along with appropriate modifications to signal indications/heads.
- Relocate power pole on the southwest corner of the intersection,
- Construct retaining walls and grade as appropriate to provide a safe vertical and horizontal profile of the intersection.
- Deployment of a “T” priority indication that can only be seen from the queue jump lane with appropriate signage.

- **Bear Valley Parkway/Las Palmas Avenue/Peet Lane** – Potential implementation of two separate queue jump lanes:
  - A northbound queue jump from a dedicated right turn lane which would include the following modifications:
    - Widening of the northbound Bear Valley Parkway approach to allow for a dedicated right-turn lane to be used as a queue jump.
    - Construction of a transition lane on the farside northbound direction for buses using the northbound queue jump from the right-turn lane.
    - Modifications to the curb and sidewalk (including reconstructed pedestrian ramps to ADA standards) to allow for free movement of the bus from the nearside bus pad/stop to the queue jump and through the intersection. These modifications may require relocation of some underground utilities in this area, and it should be noted that some potentially environmentally sensitive areas may exist just to the east of the intersection.
    - Relocation of some/all signal poles on the east side of the intersection and make appropriate phasing, rewiring, and signage modifications.
    - Installation of a separate loop in the right turn lane to indicate bus location.
    - Deployment of a “T” priority indication that can only be seen from the queue jump lane with appropriate signage.
  - A southbound queue jump from a separate lane feeding into the farside bus stop pullout with the following modifications to the intersection:
    - Widening of the southbound Bear Valley Parkway approach to allow for a dedicated bus queue jump lane with modifications to the farside of the intersection to for free movement of the bus to the farside bus pad/stop from the queue jump lane.
- Modifications to the curb and sidewalk (including reconstructed pedestrian ramps to ADA standards) to allow the bus to enter the bus pad/stop from the queue jump lane.
- Relocation of signal pole of some/all signal poles on the west side of the intersection and make appropriate phasing, rewiring, and signage modifications.
- Deployment of a “T” priority indication that can only be seen from the queue jump lane with appropriate signage.

The City of Escondido has noted some concerns that the implementation of both the northbound and southbound queue jumps at this intersection would lengthen the pedestrian crossing to an unacceptable distance given the number of students crossing at this location. Generally, the northbound queue jump is preferred to the southbound in terms of potential benefit to transit service. Any designs for queue jumps in this area should be closely coordinated with the City of Escondido to ensure any pedestrian safety concerns are fully addressed.

- **Del Lago BRT Station Special Access** – At this location an option would be to provide a channelized southbound left-turn pocket starting several hundred feet prior to the existing Park-and-Ride entrance. This improvement would have to include appropriate signage, but would assist buses in avoiding the traffic that queues on Del Lago Boulevard from the I-15 southbound on-ramp which is metered. A second option involves coordination with Caltrans should they choose to construct a new signalized intersection just west of the Del Lago/I-15 overpass to allow the I-15 Managed Lanes Moveable Barrier Machines (MBM) to access a storage lot located between the existing Del Lago Park-and-Ride parking lot and Del Lago Boulevard. The Del Lago BRT Station, which is currently in final design, will be located in this area, and the addition of a new signalized intersection for the MBM would allow for the use of this intersection for the Escondido Rapid Bus. Should the new signalized intersection be constructed as part of the I-15 Managed Lanes project along with the Del Lago Direct Access Ramp (DAR), some additional improvements would be required to aid Rapid Bus access including:
  - Restriping and signage to provide advance notification of buses exiting/entering ahead (from both approaches).
  - Installation of advance overhead flashing warnings when buses or MBM are exiting or entering the special access point. The signal would only operate when a bus or MBM was entering or leaving the Del Lago BRT Station area.

The reasons for implementing specific physical transit priority measures, as well as the potential benefits and impacts are discussed in Section 4.3.

### 4.3 IMPACTS AND BENEFITS OF TRANSIT PRIORITY MEASURES

The intent of deploying transit priority measures is to improve transit service while generating minimal impacts to normal vehicular traffic. This section discusses the qualitative and quantitative impacts and benefits associated with the potential transit priority measures.

Unlike typical development impacts where a new housing complex can be anticipated to generate a well established number of vehicle trips during peak periods, transit priority
measures cannot be so easily analyzed. Most transit priority measures are only used by buses on an infrequent basis when they are behind schedule or experiencing traffic congestion or delay. There are several important points to keep in mind when considering the potential impacts and benefits of transit priority measures:

- Analyses of the potential impacts to vehicular traffic are conducted to reflect the worst-possible case, where all buses that can receive priority; request and are granted priority. In reality buses only request priority when they are behind schedule by a configured threshold, and they may not always be granted the priority request. For example, a bus behind schedule may not be granted a priority request if a previous bus was granted a request at that same location only a couple of cycles previous.

- There are numerous configuration settings that can be set for each individual location where a transit priority measure is implemented that can address specific operational concerns at that location.

- Queue jump lanes are only used by buses when there is a traffic queue present and they approach the intersection anticipating a yellow or red light.

Given these considerations, it is important to note that any analysis of potential impacts and benefits is preliminary, and guaranteed results can only be determined through actual testing and operations. During design and implementation of priority measures, a broad range of options exist to ensure traffic impacts are minimized.

While the specific quantitative impacts are difficult to assess, a qualitative assessment for transit priority measures is relatively straight-forward. The diagrams presented below provide an overview of the traffic impacts typically associated with standard transit priority measures.

1. **Transit Signal Priority Thru Movement** – Where the bus is traveling along the major street (with the greater volume of traffic) and moving with this traffic thru a signalized intersection with TSP activated. Under this situation, traffic delay for the major street thru movements tends to drop somewhat, while the side-street traffic delay increases. This is because the extra green time received by the bus to clear the intersection also helps a few more cars on the major street get through. It is not uncommon for the overall average delay at the intersection to improve slightly when TSP is active if the side-street volumes are significantly lower than the major street volumes.
2. **Transit Signal Priority Left-Turn** – Where the bus is making a left-turn from the major street to the side-street with TSP active. In this situation, the extra green time provided to the bus generates minor increases in delay for major and side-street traffic. In general, this will cause modest increases in average intersection delay for those signal cycles when the bus is granted priority.

3. **Queue Jump Lane** – Where the bus uses a special lane to bypass the traffic queue and reach the stop-line at the intersection. When the queue jumper is activated (in other words when a bus arrives on a yellow or red and uses the queue jump lane), major street and side-street traffic will experience a very small increase in delay. The bus only receives a couple seconds “jump” on regular vehicular traffic, so the potential impact to normal vehicular traffic of a queue jump activation is usually less than with traditional TSP.

Overall, as traffic impacts tend to be minimal and occur only across a single signal cycle, transit priority measures should not significantly impact normal traffic flow if properly designed and configured.

### 4.3.1 Assessment of Transit Signal Priority Impacts and Benefits

This subsection presents the methodology used to assess TSP-related transit benefits and the potential for traffic impacts to normal vehicular traffic.

**Transit Signal Priority Analysis Methodology**

The objective of the analysis is to determine the benefits attained by the bus transit system after the implementation of TSP treatment, and to define the impact of the priority treatment on intersection traffic operations at each intersection as a whole, and also the impact on the side street traffic operations. The following is a description of the methodology used to accomplish the objective.

- The transit benefits were determined based on the procedure presented in Figure 4-4 and as discussed with the PWG. This figure presents an example of the procedure based on a 100-second traffic signal cycle length. The analysis applies this procedure to the specific cycle length and timing splits for each of the intersections along the corridor. The analysis is based on a 15-minute bus headway (8 buses per hour), and assumes a standard 10-second green extension time and a 10-second red truncation (early green) time for transit signal priority.
**Escondido Rapid Bus**

**Transit Priority Concept Study**

Example of Transit Signal Priority Procedure

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**Figure 4-4**

**Escondido Rapid Bus Transit Priority Concept Study**

**Example of Transit Signal Priority Procedure**

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**Table: Transit Signal Priority Procedure**

<table>
<thead>
<tr>
<th>ARRIVAL TIME, sec</th>
<th>PROBABILITY %</th>
<th>GREEN EXTENSION, sec.</th>
<th>RED TRUNCATION, sec.</th>
<th>REDUCTION IN DELAY, Total sec.</th>
<th>SAVINGS IN TOTAL DELAY PER HOUR, sec.</th>
</tr>
</thead>
<tbody>
<tr>
<td>( T_0 ) ( 0 \leq T \leq 40 ) sec</td>
<td>40%</td>
<td>-</td>
<td>-</td>
<td>( \emptyset )</td>
<td>( \emptyset )</td>
</tr>
<tr>
<td>( T_1 ) ( 40 &lt; T &lt; 50 ) sec</td>
<td>10%</td>
<td>( T+10-5 ) ( = 5 ) sec.</td>
<td>-</td>
<td>100-T-10 ( = 45 ) sec.</td>
<td>( (0.10)(8)(45) = 36 )</td>
</tr>
<tr>
<td>Avg=45</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( T_2 ) ( 50 \leq T \leq 85 ) sec</td>
<td>35%</td>
<td>-</td>
<td>10 sec.</td>
<td>10 sec.</td>
<td>( (0.35)(8)(10) = 28 )</td>
</tr>
<tr>
<td>( T_3 ) ( 85 &lt; T &lt; 95 ) sec</td>
<td>10%</td>
<td>-</td>
<td>95-T = 5 sec.</td>
<td>5 sec.</td>
<td>( (0.1)(8)(5) = 4 )</td>
</tr>
<tr>
<td>Avg=90</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( T_4 ) ( 95 &lt; T &lt; 100 ) sec</td>
<td>5%</td>
<td>-</td>
<td></td>
<td>( \emptyset )</td>
<td>( \emptyset )</td>
</tr>
</tbody>
</table>

Average Delay Savings per Transit Vehicle = 68/8 = 8.5 sec./veh.

Note: Example is based on a 100-sec. cycle length, 10-sec. green extension, & 10-sec. red truncation (early green.)

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**Total Delay Savings/Hr.** 68 sec.
Intersection traffic operations were determined by calculating the delays and levels of service (LOS) resulting from the transit priority treatment and comparing them to the delays and levels of service of an optimized-coordinated scenario to identify any improvement or deterioration resulting from the priority treatment. Since signal coordination updates have been recommended for several of the study intersections, comparison of the traffic operations resulting from transit priority treatment with the existing conditions may not provide an accurate account of the impact of the priority treatment, and therefore the base for comparison was chosen to be an optimized and coordinated network using the existing traffic volumes and intersection geometrics.

Two levels of priority delays were considered in the comparison. One assumes average delay resulting from random arrival of buses and requiring green extension times ranging from 0 to 10 seconds (an average extension of 5 seconds), and the other assumes a maximum extension time of 10 seconds every time a bus calls for green extension, thus constituting a worst case scenario. Intersections were analyzed for the AM and PM peak hours. The midday (MD) peak hour was analyzed at the intersections of Sunset Drive / Bear Valley Parkway, Las Palmas Avenue / Bear Valley Parkway, San Pasqual Road / Via Rancho Parkway, and Beethoven Drive / Via Rancho Parkway due to the proximity of the Route 350 to San Pasqual High School and two other elementary schools in the vicinity of Bear Valley Parkway and Las Palmas Avenue.

Side-street traffic delays and levels of service were expressly evaluated to identify the magnitude of the impact of transit priority on these movements. Movements from the side streets are considered to be the most negatively impacted since any bus green time extension is taken from the green time available for the conflicting movements and side streets. As in the intersection operations analysis, the side street analysis also used an average delay based on a random bus arrival and a worst case scenario based on maximum green time extension. This analysis was also done for the AM, MD and PM peak hours.

The delay and level of service (LOS) analyses for these scenarios were conducted using the Synchro traffic analysis software based on the Highway Capacity Manual (HCM) methodology.

Transit Signal Priority Analysis Results

The optimized-coordinated scenario was used instead of the existing conditions as the base for comparing the traffic operations with and without transit priority treatment. This was done in order to ensure that any improvement shown with priority implementation can be attributed only to priority treatment and not to the optimization and coordination that the existing conditions could have benefited from regardless of transit priority. A side-by-side comparison of the intersection delay and level of service for the existing and optimized-coordinated conditions is provided in Table 4.2. According to this table, the intersection traffic operations under existing and optimized-coordinated conditions are fairly close, with only minor increases or decreases in delays.

It should be noted that two intersections suggested for potential TSP implementation and shown in Figure 4-3 were not analyzed in detail for their potential TSP benefits or impacts. These intersections were: Canyon Road/Bear Valley Parkway; and Mary Lane/Bear Valley Parkway.

As these intersections have relatively low traffic on the side-streets and heavy traffic on the major street (Bear Valley Parkway), it was determined that they would not be significantly
impacted by TSP and that review of the heavier volume intersections along this portion of the route would provide a better representation of how the corridor would operate. Implementation of TSP at these locations would receive a more detailed review when the wider route is reviewed in terms of signal operations and design for TSP implementation.

Table 4.2 - Delay & LOS Comparison: Existing vs. Optimized-Coordinated

<table>
<thead>
<tr>
<th>Intersection</th>
<th>Existing Conditions</th>
<th>Optimal-Coordinated</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AM</td>
<td>PM</td>
</tr>
<tr>
<td></td>
<td>Delay   LOS</td>
<td>Delay   LOS</td>
</tr>
<tr>
<td>Valley Parkway / Quince Street</td>
<td>54.9 D 46.9 D</td>
<td>54.9 D 49.4 D</td>
</tr>
<tr>
<td>Valley Parkway / Centre City Parkway *</td>
<td>26.4 C 25.9 C</td>
<td>26.4 C 25.9 C</td>
</tr>
<tr>
<td>Valley Parkway / Escondido Boulevard *</td>
<td>19.0 B 19.3 B</td>
<td>19.0 B 19.3 B</td>
</tr>
<tr>
<td>2nd Street / Quince Street</td>
<td>21.7 C 23.9 C</td>
<td>21.7 C 23.9 C</td>
</tr>
<tr>
<td>2nd Street / Centre City Parkway</td>
<td>17.7 B 24.8 C</td>
<td>17.7 B 24.9 C</td>
</tr>
<tr>
<td>2nd Street / Escondido Boulevard *</td>
<td>16.1 B 17.7 B</td>
<td>16.1 B 17.8 B</td>
</tr>
<tr>
<td>5th Avenue / Escondido Boulevard</td>
<td>9.4 A 13.5 B</td>
<td>9.1 A 12.8 B</td>
</tr>
<tr>
<td>9th Avenue / Escondido Boulevard</td>
<td>41.4 D 56.9 E</td>
<td>41.4 D 54.1 D</td>
</tr>
<tr>
<td>13th Avenue / Escondido Boulevard</td>
<td>20.9 C 27.5 C</td>
<td>17.0 B 21.7 C</td>
</tr>
<tr>
<td>Felicita Avenue / Escondido Boulevard</td>
<td>32.2 C 48.9 D</td>
<td>34.7 C 46.3 D</td>
</tr>
<tr>
<td>Vermont Avenue / Sunset Drive /</td>
<td>36.4 D 36.6 D</td>
<td>35.1 D 36.6 D</td>
</tr>
<tr>
<td>Escondido Boulevard *</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sunset Drive / Bear Valley Parkway *</td>
<td>29.2 C 12.7 B</td>
<td>29.2 C 12.7 B</td>
</tr>
<tr>
<td>Las Palmas Avenue / Peet Lane /</td>
<td>28.3 C 14.1 B</td>
<td>28.3 C 14.1 B</td>
</tr>
<tr>
<td>Bear Valley Parkway</td>
<td></td>
<td></td>
</tr>
<tr>
<td>San Pasqual Road / Via Rancho</td>
<td>16.5 B 8.5 A</td>
<td>16.5 B 13.0 B</td>
</tr>
<tr>
<td>Parkway</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beethoven Drive / Via Rancho</td>
<td>49.9 D 21.9 C</td>
<td>49.9 D 21.9 C</td>
</tr>
<tr>
<td>Parkway</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Via Rancho Parkway / I-15 / Del Lago **</td>
<td>21.8 C 32.2 C</td>
<td>21.8 C 32.2 C</td>
</tr>
</tbody>
</table>

Note: * This intersection was analyzed to determine the potential impacts and benefits of TSP, but was proposed for a physical transit priority measure instead. Results are included in this table should TSP be decided upon as an alternative to the physical measure suggested.

** This intersection would not be part of Route 350 once the Del Lago BRT Station opens.
Transit Benefits

The benefits to the bus transit system were calculated using the priority procedure described in Figure 4-4 and Appendix C and the existing traffic signal cycle lengths and timing splits presented in Table 4.3. In Table 4.3 timing splits are noted for both the street Route 350 runs on versus the side-street.

Table 4.3 - Existing Intersection Cycle Lengths and Timing Splits

<table>
<thead>
<tr>
<th>Intersection</th>
<th>Existing Cycle Length</th>
<th>Minor Street Timing Splits</th>
<th>Major Street Timing Splits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valley Parkway / Quince Street</td>
<td>85.0</td>
<td>56.5</td>
<td>28.5</td>
</tr>
<tr>
<td>Valley Parkway / Centre City Parkway *</td>
<td>85.0</td>
<td>53.6</td>
<td>31.4</td>
</tr>
<tr>
<td>Valley Parkway / Escondido Boulevard *</td>
<td>85.0</td>
<td>46.5</td>
<td>38.5</td>
</tr>
<tr>
<td>2nd Street / Quince Street</td>
<td>85.0</td>
<td>48.5</td>
<td>36.5</td>
</tr>
<tr>
<td>2nd Street / Centre City Parkway</td>
<td>85.0</td>
<td>48.5</td>
<td>36.5</td>
</tr>
<tr>
<td>2nd Street / Escondido Boulevard *</td>
<td>85.0</td>
<td>44.0</td>
<td>41.0</td>
</tr>
<tr>
<td>5th Avenue / Escondido Boulevard</td>
<td>70.0</td>
<td>35.0</td>
<td>35.0</td>
</tr>
<tr>
<td>9th Avenue / Escondido Boulevard</td>
<td>90.0</td>
<td>34.0</td>
<td>56.0</td>
</tr>
<tr>
<td>13th Avenue / Escondido Boulevard</td>
<td>70.0</td>
<td>28.5</td>
<td>41.5</td>
</tr>
<tr>
<td>Felicita Avenue / Escondido Boulevard</td>
<td>87.0</td>
<td>43.0</td>
<td>44.0</td>
</tr>
<tr>
<td>Vermont Avenue / Sunset Drive / Escondido Boulevard *</td>
<td>105.0</td>
<td>30.5</td>
<td>74.5</td>
</tr>
<tr>
<td>Sunset Drive / Bear Valley Parkway *</td>
<td>90.0</td>
<td>34.0</td>
<td>56.0</td>
</tr>
<tr>
<td>Las Palmas Avenue / Peet Lane / Bear Valley Parkway</td>
<td>110.0</td>
<td>43.5</td>
<td>66.5</td>
</tr>
<tr>
<td>San Pasqual Road / Via Rancho Parkway</td>
<td>110.0</td>
<td>32.0</td>
<td>78.0</td>
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<tr>
<td>Beethoven Drive / Via Rancho Parkway</td>
<td>110.0</td>
<td>64.2</td>
<td>45.8</td>
</tr>
<tr>
<td>Via Rancho Parkway / I-15 / Del Lago **</td>
<td>90.0</td>
<td>40.0</td>
<td>50.0</td>
</tr>
</tbody>
</table>

Note: * This intersection was analyzed to determine the potential impacts and benefits of TSP, but was proposed for a physical transit priority measure instead. Results are included in this table should TSP be decided upon as an alternative to the physical measure suggested. ** This intersection would not be part of Route 350 once the Del Lago BRT Station opens.

The results of the benefit analysis are presented in Table 4.4 for the AM, MD and PM peak hours. The table presents the benefits in terms of delay saved by the transit buses as a result of the priority treatment. Two delay values are shown for each peak hour and each intersection, the first value represents the delay savings, in seconds, for all buses going through the corresponding intersection during the peak hour (8 buses/hr), and the second value represents the average delay savings, in seconds, per bus at the corresponding intersection. The two values shown at the foot of the table for each peak hour represent the cumulative delay savings for buses going through all intersections listed in the table (16 intersections for the AM and PM peak hours, and 4 intersections for the MD peak hours).
Similarly, the first value represents the cumulative delay savings experienced by all 8 buses as they go thru all intersections, in minutes, and the second value represents the average delay savings, in minutes, for each bus going through all intersections.

Table 4.4 - Benefits Summary of Transit Priority Treatment (Peak Hours)

<table>
<thead>
<tr>
<th>Intersection</th>
<th>Delay Savings (AM)</th>
<th>Delay Savings (MD)</th>
<th>Delay Savings (PM)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total, sec./hr.</td>
<td>Avg., sec./bus</td>
<td>Total, sec./hr.</td>
</tr>
<tr>
<td>Valley Parkway / Quince Street</td>
<td>111.1</td>
<td>13.9</td>
<td>111.2</td>
</tr>
<tr>
<td>Valley Parkway / Centre City Parkway</td>
<td>105.6</td>
<td>13.2</td>
<td>105.6</td>
</tr>
<tr>
<td>Valley Parkway / Escondido Boulevard</td>
<td>92.2</td>
<td>11.5</td>
<td>92.2</td>
</tr>
<tr>
<td>2nd Street / Quince Street</td>
<td>96.0</td>
<td>12.0</td>
<td>96.0</td>
</tr>
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<td>2nd Street / Centre City Parkway</td>
<td>96.0</td>
<td>12.0</td>
<td>96.0</td>
</tr>
<tr>
<td>2nd Street / Escondido Boulevard</td>
<td>87.5</td>
<td>10.9</td>
<td>87.5</td>
</tr>
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<td>86.5</td>
<td>10.8</td>
<td>87.6</td>
</tr>
<tr>
<td>9th Avenue / Escondido Boulevard</td>
<td>64.9</td>
<td>8.1</td>
<td>64.9</td>
</tr>
<tr>
<td>13th Avenue / Escondido Boulevard</td>
<td>70.9</td>
<td>8.9</td>
<td>71.5</td>
</tr>
<tr>
<td>Felicita Avenue / Escondido Boulevard</td>
<td>83.7</td>
<td>10.5</td>
<td>95.7</td>
</tr>
<tr>
<td>Vermont Avenue / Sunset Drive / Escondido Boulevard</td>
<td>50.3</td>
<td>6.3</td>
<td>50.3</td>
</tr>
<tr>
<td>Sunset Drive / Bear Valley Parkway</td>
<td>64.9</td>
<td>8.1</td>
<td>73.0</td>
</tr>
<tr>
<td>Las Palmas Avenue / Peet Lane / Bear Valley Parkway</td>
<td>66.9</td>
<td>8.4</td>
<td>69.0</td>
</tr>
<tr>
<td>San Pasqual Road / Via Rancho Parkway</td>
<td>50.2</td>
<td>6.3</td>
<td>44.6</td>
</tr>
<tr>
<td>Beethoven Drive / Via Rancho Parkway</td>
<td>97.0</td>
<td>12.1</td>
<td>73.7</td>
</tr>
<tr>
<td>Via Rancho Parkway / I-15 / Del Lago</td>
<td>75.6</td>
<td>9.4</td>
<td>86.2</td>
</tr>
<tr>
<td>Total potential savings at all intersections analyzed, minutes:</td>
<td>21.7</td>
<td>2.7</td>
<td>4.3</td>
</tr>
<tr>
<td>Total potential savings at intersections suggested for TSP, minutes: ***</td>
<td>15.2</td>
<td>1.9</td>
<td>4.6</td>
</tr>
</tbody>
</table>

Note: * This intersection was analyzed to determine the potential impacts and benefits of TSP, but was proposed for a physical transit priority measure instead. Results are included in this table should TSP be decided upon as an alternative to the physical measure suggested.
** This intersection would not be part of Route 350 once the Del Lago BRT Station opens.
*** These numbers reflect the estimated transit delay reduction benefits of TSP should it be implemented as recommended in the study. Note that this means that some of the intersections analyzed would not be implemented with TSP, but with physical or other measures instead. Also, Midday (MD) results are shown only for those intersections near the schools along Bear Valley Parkway.
While the benefits shown are for the peak periods analyzed when the potential for impacts and benefits are both at their highest point, benefits would be incurred throughout the day for buses that request and are granted priority.

**Intersection Traffic Operations Benefits/Impacts**

**Average Green Extension:**

To calculate the benefits of transit priority on intersection operations under random bus arrival, an average green extension time of 5 seconds per priority call is used. This 5-second green extension time represents the average extension time needed since in reality it can be anywhere between 0 and 10 seconds. Intersection delay and level of service calculations were, therefore, run using modified signal timing that increased the green time available to the bus approach by 5 seconds while truncating the red time (side-street green) by 5 seconds and thus maintaining the same cycle length. The resulting intersection delay and level of service using the average green extension time is presented in Table 4.5. Synchro analysis worksheets are included in Appendix D.

<table>
<thead>
<tr>
<th>Intersection</th>
<th>AM Delay</th>
<th>AM LOS</th>
<th>MD Delay</th>
<th>MD LOS</th>
<th>PM Delay</th>
<th>PM LOS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valley Parkway / Quince Street</td>
<td>38.2</td>
<td>D</td>
<td></td>
<td></td>
<td>38.3</td>
<td>D</td>
</tr>
<tr>
<td>Valley Parkway / Centre City Parkway *</td>
<td>27.5</td>
<td>C</td>
<td></td>
<td></td>
<td>27.4</td>
<td>C</td>
</tr>
<tr>
<td>Valley Parkway / Escondido Boulevard *</td>
<td>18.7</td>
<td>B</td>
<td></td>
<td></td>
<td>18.6</td>
<td>B</td>
</tr>
<tr>
<td>2nd Street / Quince Street</td>
<td>21.9</td>
<td>C</td>
<td></td>
<td></td>
<td>24.3</td>
<td>C</td>
</tr>
<tr>
<td>2nd Street / Centre City Parkway</td>
<td>19.4</td>
<td>B</td>
<td></td>
<td></td>
<td>31.3</td>
<td>C</td>
</tr>
<tr>
<td>2nd Street / Escondido Boulevard *</td>
<td>16.7</td>
<td>B</td>
<td></td>
<td></td>
<td>18.1</td>
<td>B</td>
</tr>
<tr>
<td>5th Avenue / Escondido Boulevard</td>
<td>9.2</td>
<td>A</td>
<td></td>
<td></td>
<td>12.6</td>
<td>B</td>
</tr>
<tr>
<td>9th Avenue / Escondido Boulevard</td>
<td>36.1</td>
<td>D</td>
<td></td>
<td></td>
<td>57.2</td>
<td>E</td>
</tr>
<tr>
<td>13th Avenue / Escondido Boulevard</td>
<td>20.2</td>
<td>C</td>
<td></td>
<td></td>
<td>27.8</td>
<td>C</td>
</tr>
<tr>
<td>Felicita Avenue / Escondido Boulevard</td>
<td>33.2</td>
<td>C</td>
<td></td>
<td></td>
<td>53.7</td>
<td>D</td>
</tr>
<tr>
<td>Vermont Avenue / Sunset Drive / Escondido Boulevard *</td>
<td>35.4</td>
<td>D</td>
<td></td>
<td></td>
<td>38.0</td>
<td>D</td>
</tr>
<tr>
<td>Sunset Drive / Bear Valley Parkway *</td>
<td>21.4</td>
<td>C</td>
<td>12.3</td>
<td>B</td>
<td>12.5</td>
<td>B</td>
</tr>
<tr>
<td>Las Palmas Avenue / Peet Lane / Bear Valley Parkway</td>
<td>26.6</td>
<td>C</td>
<td>23.6</td>
<td>B</td>
<td>14.4</td>
<td>B</td>
</tr>
<tr>
<td>San Pasqual Road / Via Rancho Parkway</td>
<td>17.0</td>
<td>B</td>
<td>13.8</td>
<td>B</td>
<td>12.9</td>
<td>B</td>
</tr>
<tr>
<td>Beethoven Drive / Via Rancho Parkway</td>
<td>37.9</td>
<td>D</td>
<td>28.4</td>
<td>C</td>
<td>22.0</td>
<td>C</td>
</tr>
<tr>
<td>Via Rancho Parkway / I-15 / Del Lago **</td>
<td>23.3</td>
<td>C</td>
<td></td>
<td></td>
<td>32.6</td>
<td>C</td>
</tr>
</tbody>
</table>

Note:  * This intersection was analyzed to determine the potential impacts and benefits of TSP, but was proposed for a physical transit priority measure instead. Results are included in this table should TSP be decided upon as an alternative to the physical measure suggested.

** This intersection would not be part of Route 350 once the Del Lago BRT Station opens.

The results in Table 4.5 show that most intersections would operate without undue burden when average extension time is used, with three intersections suffering additional delays in the PM peak hour (italicized and shaded in the table), and some intersections performed better with
transit priority (bolded in the table). The main factor dictating whether an intersection benefits from transit signal priority is the intersection traffic patterns. An intersection with heavy traffic movement in the direction of the bus movement and light conflicting traffic would improve the intersection operations since more vehicles would go through the intersection taking advantage of the green extension, and thus reduce the overall delay per vehicle. However, when the conflicting traffic movements (side street traffic) is heavy or a heavy left turn movement exists, the green time extension would reduce the green time available to the conflicting movements, and thus cause increased overall delays at the intersection.

**Maximum Green Extension:**

Intersection delay and level of service resulting from using the maximum green extension time of 10 seconds were developed similar to the average green extension by increasing the green time available to the bus priority route by 10 seconds and truncating the conflicting movement (side-street) green by 10 seconds. The results of this analysis are presented in Table 4.6. Synchro analysis worksheets are included in Appendix D.

<table>
<thead>
<tr>
<th>Intersection</th>
<th>AM Delay</th>
<th>AM LOS</th>
<th>MD Delay</th>
<th>MD LOS</th>
<th>PM Delay</th>
<th>PM LOS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valley Parkway / Quince Street</td>
<td>34.2</td>
<td>C</td>
<td></td>
<td></td>
<td>33.0</td>
<td>C</td>
</tr>
<tr>
<td>Valley Parkway / Centre City Parkway *</td>
<td>27.6</td>
<td>C</td>
<td></td>
<td></td>
<td>26.9</td>
<td>C</td>
</tr>
<tr>
<td>Valley Parkway / Escondido Boulevard *</td>
<td>19.0</td>
<td>B</td>
<td></td>
<td></td>
<td>18.4</td>
<td>B</td>
</tr>
<tr>
<td>2nd Street / Quince Street</td>
<td>22.4</td>
<td>C</td>
<td></td>
<td></td>
<td>25.7</td>
<td>C</td>
</tr>
<tr>
<td>2nd Street / Centre City Parkway *</td>
<td>25.5</td>
<td>C</td>
<td></td>
<td></td>
<td>54.1</td>
<td>D</td>
</tr>
<tr>
<td>2nd Street / Escondido Boulevard</td>
<td>20.3</td>
<td>C</td>
<td></td>
<td></td>
<td>29.1</td>
<td>C</td>
</tr>
<tr>
<td>5th Avenue / Escondido Boulevard</td>
<td>9.2</td>
<td>A</td>
<td></td>
<td></td>
<td>12.6</td>
<td>B</td>
</tr>
<tr>
<td>9th Avenue / Escondido Boulevard</td>
<td>37.4</td>
<td>D</td>
<td></td>
<td></td>
<td>65.9</td>
<td>E</td>
</tr>
<tr>
<td>13th Avenue / Escondido Boulevard</td>
<td>19.4</td>
<td>B</td>
<td></td>
<td></td>
<td>27.1</td>
<td>C</td>
</tr>
<tr>
<td>Felicita Avenue / Escondido Boulevard</td>
<td>32.7</td>
<td>C</td>
<td></td>
<td></td>
<td>61.5</td>
<td>E</td>
</tr>
<tr>
<td>Vermont Avenue / Sunset Drive / Escondido Boulevard *</td>
<td>37.2</td>
<td>D</td>
<td></td>
<td></td>
<td>39.7</td>
<td>D</td>
</tr>
<tr>
<td>Sunset Drive / Bear Valley Parkway *</td>
<td>41.8</td>
<td>D</td>
<td>12.4</td>
<td>B</td>
<td>12.6</td>
<td>B</td>
</tr>
<tr>
<td>Las Palmas Avenue / Peet Lane / Bear Valley Parkway</td>
<td>24.1</td>
<td>C</td>
<td>22.8</td>
<td>C</td>
<td>14.4</td>
<td>B</td>
</tr>
<tr>
<td>San Pasqual Road / Via Rancho Parkway</td>
<td>19.0</td>
<td>B</td>
<td>13.0</td>
<td>B</td>
<td>12.6</td>
<td>B</td>
</tr>
<tr>
<td>Beethoven Drive / Via Rancho Parkway</td>
<td>32.5</td>
<td>C</td>
<td>26.2</td>
<td>C</td>
<td>20.5</td>
<td>C</td>
</tr>
<tr>
<td>Via Rancho Parkway / I-15 / Del Lago **</td>
<td>23.8</td>
<td>C</td>
<td></td>
<td></td>
<td>32.2</td>
<td>C</td>
</tr>
</tbody>
</table>

Note: * This intersection was analyzed to determine the potential impacts and benefits of TSP, but was proposed for a physical transit priority measure instead. Results are included in this table should TSP be decided upon as an alternative to the physical measure suggested.

** This intersection would not be part of Route 350 once the Del Lago BRT Station opens.
The intersections with increased delays as a result of the transit priority are italicized and shaded in Table 4.6, and those intersections that improve are bolded. Table 4.6 shows increased delays at 5 intersections during either the AM or PM peak hour, and 2 intersections to improve. Note that these results are a representation of the worst case scenario, which would be exceedingly rare to non-existent as the following conditions would have to exist:

- Each bus would have to be running “late” beyond a preconfigured amount (often set to five minutes or more behind schedule).
- Buses would have to be requesting priority from every intersection.
- Intersections would have to grant priority every time a bus arrived and requested priority within the allowable portion of the signal cycle where priority is activated. In most cases, TSP is limited by configurations at the intersections to only grant priority at prescribed intervals.

**Side-Street Traffic Operations Benefits/Losses**

The conflicting traffic to the bus movement, mainly side-street traffic, is the most impacted from the green extension and red truncation (early green) since this is time taken from the side-street green phase. To assess the impact of transit signal priority treatment on the side street traffic, the resulting delays from the average extension (5 seconds) and maximum extension (10 seconds) were determined for each approach of the side-streets. Figure 4-5 displays intersections where TSP implementation may generate some concerns for side-street traffic delay. If TSP is implemented at these locations, careful consideration should be given to balancing the TSP configuration between transit benefits and the potential for side-street delay increases. In most cases, signal engineers will be able through signal timing and TSP configuration settings to create a balanced situation.

In addition, pedestrian activations at intersections can sometimes limit the benefits of TSP where the cycle changes caused by TSP would conflict with the minimum pedestrian crossing time. Figure 4-5 displays intersections proposed for TSP where this may become a concern. Specific resolution of this issue will depend on the specific configuration of TSP and the signal timing adjustments made to the intersection. In general, some pedestrian times may be adjustable, and in cases where the time cannot be adjusted TSP can be configured to not activate when a pedestrian activation occurs.

**4.3.2 Assessment of Physical and Special Access Priority Impacts and Benefits**

In addition to the TSP improvements proposed as a part of the Escondido Rapid Bus effort, a number of physical improvements have been proposed, as discussed previously in Section 4.2. Unlike TSP improvements, it is more difficult to provide calculated quantitative impacts for most physical transit priority measures. Table 4.8 lists estimated qualitative and quantitative benefits and impacts for the physical and special access priority measures identified in the study. These results should be considered preliminary and can only be further refined if a detail simulation analysis of bus and traffic operations was to be conducted.
Potential Side-Street Impacts & Pedestrian Phase Conflicts for Further Review

Deleted segment as Route 350 re-aligns Northbound to Beethoven Dr. when BRT Station Opens as Southern Terminus of Route.

Pedestrian activation could limit TSP effectiveness.
Proposed location for TSP where side-street delay should be reviewed as analysis shows potential for >10 sec side-street delay increase during TSP impacted cycles.
Location where both conditions noted above should be reviewed.

Escondido Rapid Bus Transit Priority Concept Study

Figure 4-5
Potential Side-Street Impacts & Pedestrian Phase Conflicts for Further Review
Table 4.7 - Estimated Impacts and Benefits of Physical and Special Access Transit Priority Measures

<table>
<thead>
<tr>
<th>Location</th>
<th>Proposed Measure</th>
<th>Potential Impacts to Vehicular Traffic</th>
<th>Potential Benefits*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valley Parkway / Centre City Parkway</td>
<td>Eastbound queue jump lane on Valley Parkway.</td>
<td>• Minimal – Apx. 3 seconds additional intersection delay when queue jump activated.</td>
<td>• Buses could use queue jump to bypass queues during peak periods. Queue lengths: AM 95% = 280ft PM 95% = 300ft • Estimated average time savings per queue jump use during peak hours = 35 seconds. • Substantial enhancement of transit rider perceptions as bus moves to front of queue at busy intersection.</td>
</tr>
<tr>
<td>Valley Parkway / Escondido Boulevard</td>
<td>Northbound protected left-turn for all vehicular traffic.</td>
<td>• Minimal – Retiming of the intersection and coordination of the grid network should allow minimization of any impacts. • Delay for southbound traffic may increase slightly.</td>
<td>• Potential savings during peak periods up to apx. 2 minutes. • Implementation would resolve a major source of congestion delay experienced today. • Could allow restoration of original 350 routing on Valley Parkway.</td>
</tr>
<tr>
<td>2nd / Escondido Boulevard</td>
<td>Matching southbound protected left-turn for all vehicular traffic.</td>
<td>• Minimal – Retiming of the intersection and coordination of the grid network should allow minimization of any impacts. • Delay for northbound traffic may increase slightly.</td>
<td>• No benefit to buses, but a prerequisite noted by the City of Escondido for implementing a protected northbound left-turn at Valley Parkway / Escondido Boulevard.</td>
</tr>
<tr>
<td>Sunset Drive / Bear Valley Parkway – Option 1</td>
<td>Dedicated eastbound right-turn lane on Sunset Drive for all traffic.</td>
<td>• No significant impact - Synchro analysis for this option show very small improvements for overall intersection operations.</td>
<td>• Synchro analysis shows benefits to overall intersection operations to be very small.</td>
</tr>
<tr>
<td>Sunset Drive / Bear Valley Parkway – Option 2</td>
<td>Bus only northbound left-turn lane on Bear Valley Parkway.</td>
<td>• No significant impact – bus would proceed with northbound left-turn traffic. • Design effort may determine some restriction on southbound right-turn on red is needed.</td>
<td>• Buses could use queue jump to bypass queues during peak periods. Queue lengths: AM 95% = &gt; 300ft PM 95% = &gt; 250ft • Estimated average time savings per queue jump use during peak hours = apx. 2 min. • Substantial enhancement of transit rider perceptions as bus moves to front of queue at busy intersection.</td>
</tr>
<tr>
<td>Location</td>
<td>Proposed Measure</td>
<td>Potential Impacts to Vehicular Traffic</td>
<td>Potential Benefits*</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>----------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Las Palmas Avenue / Peet Lane / Bear Valley Parkway – Northbound Queue Jump</td>
<td>Northbound queue jump from new dedicated right-turn lane.</td>
<td>• No significant impact – bus would proceed with northbound thru traffic from right-turn lane.</td>
<td>• Buses could use queue jump to bypass queues during peak periods. Queue lengths: AM 95% = &gt; 300ft  PM 95% = &gt; 300ft</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Design effort may determine some restriction on westbound right-turn on red is needed.</td>
<td>• Estimated average time savings per queue jump use during peak hours = 46 seconds.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Properly designed receiving lane for the bus should ensure safe transitions into normal traffic flow.</td>
<td>• Note that northbound right-turn volumes may limit benefits during certain circumstances.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Substantial enhancement of transit rider perceptions as bus moves to front of queue at busy intersection.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Las Palmas Avenue / Peet Lane / Bear Valley Parkway – Southbound Queue Jump</td>
<td>Southbound queue jump lane</td>
<td>• Minimal – Apx. 3 seconds additional intersection delay when queue jump activated.</td>
<td>• Buses could use queue jump to bypass queues during peak periods. Queue lengths: AM 95% = &gt; 500ft  PM 95% = 300ft</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• About 2 of every 3 Route 350 buses might use the queue jump lane during peak periods.</td>
<td>• Estimated average time savings per queue jump use during peak hours = 35 seconds (limited due to potential length of queue jump lane).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Substantial enhancement of transit rider perceptions as bus moves to front of queue at busy intersection.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Del Lago BRT Transit Station Special Access</td>
<td>Two options: (1) Extended LT pocket at BRT station entrance. (2) Use of new signalized intersection to access BRT station for buses and barrier machines.</td>
<td>• Minimal – Intersection would cause delay to thru traffic on Del Lago Blvd., but only when buses or the barrier machines are entering/exiting the Del Lago BRT Station. 4-6 buses from Route 350 may use the intersection during peak hours. Extended LT would not have any significant traffic impact.</td>
<td>• Estimated potential savings in terms of bus access to the BRT Station of approximately 2 minutes for either option by avoiding queues at I-15 SB on-ramp at Via Rancho Pkwy.</td>
</tr>
</tbody>
</table>

Note: * Queue lengths from Synchro results – representing 95% queue length.
4.3.3 Summary of Transit Priority Measures Benefits and Impacts

Overall, the following basic conclusions can be drawn from the analysis of the potential benefits and impacts of TSP for Route 350:

- Due to the signal related delay experienced by buses along Route 350, the implementation of TSP at signalized intersections along the corridor would visibly reduce the delay experienced by buses. If implemented at all suggested intersections, TSP could reduce the avoidable signal delay for Route 350 buses by 50% to 70%.

- The implementation of TSP should have a positive impact on transit rider perceptions on the speed and reliability of the service.

- The review of potential traffic impacts under average and worst-case conditions indicates that any impacts would be small, and impacts can be managed or minimized within the configuration possibilities allowed by TSP.

In terms of physical priority measures, almost all of the identified measures offer substantial potential benefits without significant traffic impacts, with the exception of:

- Option 1 for Sunset Drive/Bear Valley Parkway - which would provide a dedicated eastbound right-turn lane for all vehicular traffic. While from a qualitative stand-point this improvement would seem to offer significant potential for improvement, Synchro analyses do not seem to point to substantial benefits. This could be due to the strong directionality of traffic flow during peak periods.

- 2nd Avenue/Escondido Boulevard – This improvement is paired with the protected northbound left-turn at Valley Parkway/Escondido Boulevard.

4.4 PROPOSED TRANSIT OPERATIONS IMPROVEMENTS

To make the most effective use of the proposed transit priority measures and to effectively establish the Escondido Rapid Bus service, certain transit operations adjustments or improvements need to be made. The transit operations improvements proposed for the Escondido Rapid Bus include:

- **Return of the Route 350 service to the original routing along Valley Parkway** – As noted in Existing Conditions, Route 350 has been temporarily re-routed to Grand Avenue in the westbound direction from Valley Parkway in an effort to avoid significant delays in turning left from northbound Escondido Boulevard to westbound Valley Parkway. If the proposed transit priority improvement of providing a protected northbound left-turn at Valley Parkway/Escondido Boulevard is implemented, Route 350 should be returned to Valley Parkway with appropriate schedule and stop adjustments.

- **Adjust transit schedules, blocks, and runs for Route 350** – Implementation of transit priority measures will impact the transit travel times along Route 350. Transit schedules need to be adjusted prior to the widespread implementation of the priority measures, as well as once data becomes available on actual operations. Priority measures are of little value if schedules are not adjusted because buses simply end up with longer dwell times at their layover points. Transit travel time information may be collected from the RTMS data (computers on-board the buses) or through field surveys.
• **Transfer connection protection for Route 350 and MTS Route 20** – One of the major issues identified by the public was missed transfers at the Westfield’s Shoppingtown North County transit stop between MTS Route 20 and NCTD Route 350. The RTMS can support transfer connection management which notifies transit dispatchers if an important connection is in jeopardy of being missed. Dispatchers can then ask the “receiving bus” to wait a couple of minutes for the “feeder bus” if appropriate. Transfers from Route 20 to Route 350 are an important component of Escondido Rapid Bus ridership. This improvement will assist in terms of limiting transfer wait times for passengers and improving the transit patron’s perception of the service being provided.

• **Train drivers for Route 350 on how to deal with the priority measures** - It is important that transit operators understand how priority measures work and what they can expect when behind the wheel of the Escondido Rapid Bus. Operators should receive training on what to expect with TSP operations, which require no specific actions on part of the bus driver. In addition, operators need to have an understanding of the proposed physical transit priority measures, particularly queue jump lanes and when and when not to use the lanes. Establishing a comfort level for the bus operators is essential to making the most effective use of transit priority measures.

## 4.5 PROPOSED STOP & STATION IMPROVEMENTS

### 4.5.1 Overview of Bus Stop Improvements

As noted in Section 1 – Objectives, the proposed bus stop improvements include enhancements and new amenities at most Route 350 bus stops. These amenities will provide for a more comfortable customer experience, which can lead to increased use of transit as a travel mode choice, as well as better service to existing transit customers. Recommended amenities include:

- **Bus shelters with benches and/or leaning support for waiting passengers** – Where space constraints exist, and preclude locating a shelter, a bus bench will be provided. At stops around San Pasqual High School, two shelters will be provided to accommodate higher passenger volumes.

- **Trash cans at all bus stops** – In order to provide a convenient means for depositing refuse, which can also lead to cleaner, more attractive stops and an improvement to the neighborhoods in which the stops are located.

- **Solar-powered LED lighting and Digital Messaging Signs (DMS)** – These amenities will provide increased visibility and a sense of security at the stops, especially at night and during inclement weather. Waiting patrons will also be easier for bus operators to see. At key stops along the route, DMS will provide patrons with real-time updates on when the next bus will arrive at the stop, and other information. Having these amenities operate on solar-power will eliminate the need to tie into local utilities, as well as save on the costs of operating and maintaining lighting and DMS equipment.

- **New Route 350 “Breeze Rapid” signage and schedules** – In order to promote the higher level of service that Rapid Bus provides, new signage and schedule information will be provided at all stops. This information will be especially helpful at those bus stops where DMS is not provided.
- **Improved bus stop pads** – Where needed, bus stop pads will be enlarged to meet anticipated passenger volumes. These improved pads will provide additional space for locating shelters, benches, trash cans and other amenities, as well as provide room for waiting bus patrons and still allow for good pedestrian movement.

- **Consolidation of bus stops** – In order to improve bus travel times and reduce the costs associated with the upgraded Rapid Bus service, consolidating some bus stops can be useful. This ensures that stops are located at a convenient distance from each other, yet far enough apart to minimize operational impacts. While consolidating stops can increase the dwell time at individual stops, the time is recovered by the increase in average bus speed due to more appropriately spaced stops. Route 350 currently has thirty-two stops. Six stops are recommended for immediate consolidation. One existing stop will be relocated to the Del Lago BRT Station to offer improved transfer to the new I-15 BRT service, one new stop to serve Westfield Shoppingtown North County (also timed with the inauguration of I-15 BRT service), and additional stop consolidated to account for rerouting of the 810 Express route and to improve Route 350 service.

Figures 4-6 and 4-7 show the locations of existing stops, those recommended for consolidation, and specific details associated with certain stops (such as space constraints), for the North and South portions of the study area, respectively.
Figure 4-6
Recommended Bus Stop Improvements
North Study Area

Escondido Rapid Bus
Transit Priority Concept Study

Existing Route 350 Bus Stop
Bus Stop Recommended for Consolidation
(Text notes added bus stop features or changes)
DMS = Digital Message Sign (Real Time Bus Info)
Recommended Bus Stop Improvements

South Study Area

- **Stop 1**
  - New stop

- **Stop 2**
  - Consolidate w/ opening of Del Lago BRT Station

- **Stop 2A**
  - New stop w/opening Del Lago BRT Station

- **Stop 3**
  - Consolidate

- **Stop 4**
  - Two large shelters, DMS

- **Stop 5**
  - Shelter, DMS

- **Stop 6**
  - Add trash can

- **Stop 7**
  - Shelter

- **Stop 28**
  - Add trash can

- **Stop 29**
  - Shelter, DMS

- **Stop 30**
  - Two large shelters, DMS

- **Stop 27**
  - Shelter

- **Stop 22**
  - New stop would serve mall via Northbound Route 350

- **Stop 23**
  - New stop

- **Stop 31**
  - Consolidate

- **Stop 28**
  - Add trash can

- **Stop 29**
  - Shelter, DMS

- **Stop 30**
  - Two large shelters, DMS

- **Stop 27**
  - Shelter

Deleted as Route 350 realigns Northbound to Beethoven Dr. when BRT Station opens as Southern terminus of route

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**Escondido Rapid Bus Transit Priority Concept Study**

**Figure 4-7**

Recommended Bus Stop Improvements

South Study Area
Escondido Rapid Bus
Transit Priority Concept Study

Figure 4-10
Smart Growth Concept Areas
Within Route 350 Study Area

Legend:
- Town Center
- Mixed Use Transit Corridor
- Potential Community Center

Potential Community Center
4.5.2 Potential Bus Stop Design Themes

Three representative design themes were developed for this study. They drew their inspiration from other notable Escondido buildings, including the City Hall, Escondido Transit Center, and design elements from the artwork and streetscape along South Escondido Boulevard. Each of these designs represents an opportunity to better tie transit stops to the built environments in which they are located.

The first theme is called “Retro”, and it was influenced by the design of the Escondido City Hall. It would feature clear or smoked panels behind the bench to better provide protection from wind and rain.

The second theme, “Contemporary” was inspired by, and designed to compliment the streetscape improvements that line South Escondido Boulevard. Like the Retro design, it would feature a windbreak of decorated metalwork.

The third theme, “Cable Structure” is drawn from some of the structures found at the Escondido Transit Center. It is simple and clean in its appearance. While there is no back to the shelter, its overhang offers protection from sun and rain.

Each stop, regardless of whether space is sufficient for a shelter, should have a bench and trash can. As well, each of the design themes will accommodate solar-powered LED lighting, which would be incorporated into the shelter’s roof. Key bus stops will also feature Digital Messaging Signs (DMS), to provide real-time bus arrival and status information.

The stops are intended to be scalable both in terms of amenities, as well as in the size of the shelters themselves. Any of the examples could be expanded to provide more extensive shelters at heavy boarding stops.

These design themes are representative, and for planning purpose only. Bus stop designs would be finalized and more detailed plans developed in the next phase of this project.
4.5.3 Route 350 Service Branding

New unique branding of the Route 350 is recommended. This branding would reflect the route's higher level of service, relative to other services, and would immediately differentiate an approaching Rapid Bus from a conventional bus, yet would retain familiar elements from other NCTD services.

“Breeze Rapid” is a proposed name for new NCTD Rapid Bus services, of which Route 350 would serve as the initial example.

Potential bus branding designs for the vehicles and for new bus stop signs were developed, as shown:

The upper picture shows a design concept calling for a metallic Silver bus, with reflective stripes in white, with blue and aqua elements. This design would be a very visible addition to NCTD transit vehicle liveries. The design concept in the lower picture shows a more traditional approach, in which the existing theme used on Breeze buses and the Coaster commuter rail services is updated, with reflective striping to suggest speed and movement, hallmarks of the speed and improved transfer connections offered by Rapid Bus service.
Bus signs would also be updated and would replace existing signs. Where Rapid Bus service was offered in addition to conventional services, such as on Valley Parkway at South Orange Avenue, the Rapid Bus sign would be added to the bus sign pole. A conceptual design for the new signage is displayed.

4.5.4 Bus Stop Consolidation

Consolidation of bus stops is a means by which spacing between bus stops is optimized. This consolidation concentrates passengers at the most-utilized stops. Consolidation provides several potential benefits, both operationally and to transit riders, including:

- Reducing travel trip time and increasing bus speeds (because stops are reduced, and the bus can move more quickly with traffic to the next stop, even taking into consideration potentially longer dwell times at stops)
- Shorter perceived wait periods (time spent moving is increased), which is a key factor in choosing transit as a travel option.
- Consolidating stops increases the cost-effectiveness of improvements, and concentrates resources and improved amenities at stops

Of course, consolidation has its impacts on some riders, particularly because the bus stop to which they are accustomed to traveling to or from has been relocated or is no longer there.

Bus stop consolidations are recommended after considering two factors:

- Daily ridership relative to other nearby stops was determined by referring to 2005 weekday boardings and alightings data.
- Improving the spacing of stops.

For the Route 350 Rapid Bus service, three pairs of bus stops are recommended for consolidation. The location of bus stops recommended for consolidation, and the reasons for these recommendations are described below.

Northbound and Southbound stops – Bear Valley Parkway at San Pasqual Road

These stops are recommended for consolidation. The daily ridership figures for these stops are low relative to nearby stops, and field observations indicate that many of the riders are coming from San Pasqual High School. Consolidation of these stops and improvement of the two stops nearer to the school will be beneficial.

Northbound and Southbound stops – South Escondido Boulevard at 4th Avenue and South Escondido Boulevard at 11th Avenue

Currently, bus stop spacing in the South Escondido Boulevard portion of the Route 350 corridor is inconsistent, and the distance between stops varies from one-three blocks. Following the recommended consolidation, spacing between stops will be three blocks, except between West 15th Avenue and West Felicita Avenue, which will remain two blocks. The ridership at these stops is also lower than that at adjoining stops.
In addition to the six stops described above, an additional two stops will be consolidated in the midterm phase of the project, when the Del Lago BRT Station opens and other bus services are re-routed.

Figures 4-8 and 4-9 display 2005 weekday boardings and alightings at all stops, as well as those stops recommended for consolidation.

4.5.5 Integration with SANDAG Smart Growth Concept Areas

In 2004, SANDAG adopted the Regional Comprehensive Plan (RCP); a long-range vision for the San Diego region. Central to the RCP is to concentrate development in smart growth areas served by transit. In 2005, SANDAG requested that each jurisdiction identify existing, planned, and potential smart growth areas to be compiled in a smart growth concept map. These areas will be eligible for planning and infrastructure grants from SANDAG.

Several smart growth concept areas identified by the City of Escondido are served by Route 350. These areas include:

- **ES-1** Downtown Specific Plan and Mercado Area Plan – Town Center
- **ES-4** South Escondido Boulevard – Mixed-Use Transit Corridor
- **ES-5** Felicita Ave. and Centre City Parkway – Community Center
- **ES-7** Westfield’s Shoppingtown North County (Bear Valley Parkway and I-15) – Community Center

The enhancements to Route 350 service proposed in this study are a key component of encouraging smart growth. The improvements to stops, such as shelters, benches, lighting, and real-time information can help promote use of transit, and serve as an additional catalyst for achieving Smart Growth goals.

Figure 4-10 identifies the draft smart growth concept areas served by the Route 350 Rapid Bus.
Figure 4-8
Escondido Rapid Bus Transit Priority Concept Study
2005 Weekday Boardings and Alightings North Study Area
Escondido Rapid Bus
Transit Priority Concept Study

Figure 4-9
2005 Weekday Boardings/Alightings
South Study Area

Delete segment as Route 350 re-aligns Northbound to Beethoven Dr. when BRT Station opens as Southern terminus of route.
4.6 STOP/SATIONS PROPOSED IMPROVEMENTS

This section describes the proposed improvements and amenities to be added to Route 350 bus stops. The stops are described northbound from Westfield Shoppingtown North County (Westfield’s Shoppingtown North County) to the Escondido Transit Center, and southbound from the Escondido Transit Center back to Westfield Shoppingtown North County. Cost details for each stop can be referenced in Appendix E.

Summary of Recommended Bus Stop Improvements

Table 4.9 provides a summary of existing amenities and recommended bus stop improvements.

<table>
<thead>
<tr>
<th>Stop #</th>
<th>Location</th>
<th>Bench</th>
<th>Trash Can</th>
<th>Shelter</th>
<th>Solar-Powered LED Lighting</th>
<th>Solar-Powered Digital Messaging Sign</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>New Bus Stop Amenities*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ground</td>
<td></td>
<td>Ground</td>
<td>Ground</td>
<td>Ground</td>
</tr>
<tr>
<td>Northbound</td>
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<td></td>
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<tr>
<td>1</td>
<td>Westfield Shoppingtown North County</td>
<td>Existing</td>
<td>Existing</td>
<td>Existing</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Del Lago Park and Ride</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2A</td>
<td>Del Lago BRT Station</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>2B</td>
<td>Westfield Shoppingtown North County</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>3</td>
<td>Bear Valley Pkwy. at San Pasqual Rd.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Bear Valley Pkwy. at San Pasqual High School</td>
<td>X (2)</td>
<td>X (2)</td>
<td>X (2)</td>
<td>X (2)</td>
<td>X</td>
</tr>
<tr>
<td>5</td>
<td>Bear Valley Parkway at Las Palmas Ave./Peet Ln.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>6</td>
<td>Sunset Dr. near Royal Crest Dr.</td>
<td>Existing</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Sunset Dr. at S. Escondido Blvd.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>8</td>
<td>S. Escondido Blvd. at W. Felicita Ave.</td>
<td>Existing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>S. Escondido Blvd. at W. Felicita Ave.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

Note: * (2) indicates that two of those particular items are proposed for that location.
## New Bus Stop Amenities*

<table>
<thead>
<tr>
<th>Stop #</th>
<th>Location</th>
<th>Bench</th>
<th>Trash Can</th>
<th>Shelter</th>
<th>Solar-Powered LED Lighting</th>
<th>Solar-Powered Digital Messaging Sign</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northbound (Continued)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>S. Escondido Blvd. at W. 15th Ave.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>S. Escondido Blvd. at W. 13th Ave. (Farside)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>S. Escondido Blvd. at W. 11th Ave.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Stop recommended for consolidation</td>
</tr>
<tr>
<td>13</td>
<td>S. Escondido Blvd. at W. 9th Ave.</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>S. Escondido Blvd. at W. 6th Ave.</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>S. Escondido Blvd. at W. 4th Ave.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Stop recommended for consolidation</td>
</tr>
<tr>
<td>16</td>
<td>S. Escondido Blvd. at W. 3rd Ave.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Valley Pkwy. at S. Orange St.</td>
<td>X</td>
<td>X (2)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Escondido Transit Center</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Southbound</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>S. Escondido Blvd. at W. 2nd Ave.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>S. Escondido Blvd. at W. 4th Ave.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Stop recommended for consolidation</td>
</tr>
<tr>
<td>21</td>
<td>S. Escondido Blvd. at W. 6th Ave.</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>S. Escondido Blvd. at W. 9th Ave.</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>23</td>
<td>S. Escondido Blvd. at W. 11th Ave.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Stop recommended for consolidation</td>
</tr>
<tr>
<td>24</td>
<td>S. Escondido Blvd. at W. 13th Ave.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>S. Escondido Blvd. at W. 15th Ave.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>S. Escondido Blvd. at W. Felicita Ave.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>27</td>
<td>Sunset Dr. near S. Escondido Blvd.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

Note: * (2) indicates that two of those particular items are proposed for that location.
### New Bus Stop Amenities*

<table>
<thead>
<tr>
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<th>Trash Can</th>
<th>Shelter</th>
<th>Solar-Powered LED Lighting</th>
<th>Solar-Powered Digital Messaging Sign</th>
</tr>
</thead>
<tbody>
<tr>
<td>Southbound (Continued)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>Sunset Dr. near Royal Crest Dr.</td>
<td>Existing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>Bear Valley Pkwy. at Las Palmas Ave./Peet Ln.</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>30</td>
<td>Bear Valley Pkwy. at Mary Ln.</td>
<td>X (2)</td>
<td>X (2)</td>
<td>X (2)</td>
<td>X (2)</td>
<td>X</td>
</tr>
<tr>
<td>31</td>
<td>Bear Valley Pkwy. at San Pasqual Rd,</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Stop recommended for consolidation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: * (2) indicates that two of those particular items are proposed for that location.

Details about improvements at each stop are provided in the next subsections.

#### 4.6.1 Northbound Stops

**Stop 1. Westfield Shoppingtown North County**

The amenities at this existing stop (shelters, benches, lighting, trash cans, and pay telephones) would be retained.

Recommended improvements at this stop include:

- DMS
- Sign

With the opening of the Del Lago BRT Station, this stop would continue to serve as the southbound stop for the mall.

**Stop 2. Del Lago Park and Ride (Nearsdie)**

This existing stop would be consolidated with the opening of the Del Lago BRT Station. Until that time, a new Route 350 Rapid Bus sign (Sign) would be installed at the stop.

**Stop 2A. Del Lago BRT Station**

With the opening of the Del Lago BRT Station, a new stop for Route 350 would be established there. In addition to planned station improvements, a solar-powered Digital Messaging Sign (DMS) would be installed, to provide real-time bus arrival and status information to waiting transit patrons.
Stop 2B. Westfield Shoppingtown North County

The current routing for Route 350 takes it through the mall, then around Beethoven Drive and Del Lago to Via Rancho Parkway (which becomes Bear Valley Parkway) as it makes its northbound run. When the Del Lago BRT Station opens, the bus will turn around at that station, and begin its northbound run back down Beethoven Drive and through the mall.

A new stop is proposed to serve the mall. This stop would feature the following amenities:

- Shelter
- Bench
- Trash Can
- Solar-powered LED lighting (Lighting)
- DMS
- Sign

While the ultimate location for the stop on the mall is subject to future negotiation between NCTD and the mall owner, should the stop be across from the current transit stop, there would need to be physical improvements in order to accommodate the bus and the stop. These improvements include:

- Construction of a new bus stop pad on which to install the shelter and other amenities.
- Construction of a concrete bus pad in the roadway, on which the buses could stop. Their weight necessitates this pad, in order to reduce wear and tear on the pavement as a result of bus movements.

Stop 3. Bear Valley Parkway at San Pasqual Road (Farside)

This existing stop is recommended for consolidation. It does not attract a significant number of riders, and those riders are often students from San Pasqual High School who walk to this stop (located adjacent to the high school). Consolidation of this stop would improve bus travel time and maximize the cost-effectiveness of improvements to the next stop to accommodate student riders.

Stop 4. Bear Valley Parkway at San Pasqual High School

This existing stop serves San Pasqual High School, and is located near the front entrance to the school. Students make up a significant percentage of daily Route 350 riders. Recommended improvements at this stop include:

- Two 17-foot shelters (unless otherwise stated, all proposed shelters are 13 feet wide)
- Two benches
- Two trash cans
- Lighting
- DMS
- Sign
• Installation of a approximately 300 square foot (s.f.) bus stop pad

Stop 5. Bear Valley Parkway at Las Palmas Avenue/Peet Lane (Nearside)
This existing stop serves Bear Valley Middle School, as well as L. R. Green Elementary School. Recommended improvements at this stop include:
• Shelter
• Bench
• Trash can
• Lighting
• DMS
• Sign

Stop 6. Sunset Drive near Royal Crest Drive (Farside)
Recommended improvements to this existing stop include:
• Trash can
• Sign

Stop 7. Sunset Drive at South Escondido Boulevard (Nearside)
Recommended improvements to this existing stop include:
• Shelter
• Bench
• Trash can
• Lighting
• Sign

This stop could be potentially relocated from Sunset Drive to South Escondido Boulevard to serve a proposed new residential development there.

Stop 8. South Escondido Boulevard at West Felicita Avenue (Nearside)
This existing stop would be consolidated with the opening of the Del Lago BRT Station and the re-routing of the 810 Express Bus service, which also uses this stop. Given the proximity of the Farside bus stop, eliminating this additional stop to serve this area would improve transit travel time without impacting service.

Until its consolidation, the recommended improvement at this stop would be the installation of a new Route 350 Rapid Bus sign.

Stop 9. South Escondido Boulevard at West Felicita Avenue (Farside)
This existing stop is located in two Smart Growth areas – ES-4, the South Escondido Boulevard Mixed-Use Transit Corridor, as well as the ES-5, the Felicita Avenue and Centre City Parkway Community Center. This stop also is located near a transfer point to NCTD Route 349, the Southeast Escondido Circulator.
Recommended improvements to this stop include:

- Shelter
- Bench
- Trash can
- Lighting
- DMS
- Sign
- Minor pad improvements to permit installation of shelter, etc.

**Stop 10. South Escondido Boulevard at West 15th Avenue (Nearside)**

Recommendations for improvements at this existing stop include:

- Shelter
- Bench
- Trash can
- Lighting
- Sign
- Minor pad improvements to permit installation of shelter, etc.

**Stop 11. South Escondido Boulevard at West 13th Avenue (Farside)**

Recommendations for improvements at this existing stop include:

- Shelter
- Bench
- Trash can
- Lighting
- Sign
- Minor pad improvements to permit installation of shelter, etc.

One consideration will be the need to accommodate the existing parking in front of the business at this stop.

**Stop 12. South Escondido Boulevard at West 11th Avenue (Nearside)**

This stop is recommended for consolidation.
Stop 13. South Escondido Boulevard at West 9th Avenue (Farside)
Recommendations for improvements at this existing stop include:
- Bench
- Trash can
- Sign
This existing stop is a space-constrained, which precludes recommending installation of a shelter here. The existing trash can should be replaced with a new one.

Stop 14. South Escondido Boulevard at West 6th Avenue (Farside)
Recommendations for improvements at this existing stop include:
- Bench
- Trash can
- Sign
This existing stop is a space-constrained, which precludes recommending installation of a shelter here, although the overhang of the building at this location provides some protection from the elements. The existing trash can should be replaced with a new one.

Stop 15. South Escondido Boulevard at West 4th Avenue (Farside)
This stop is recommended for consolidation.

Stop 16. South Escondido Boulevard at West 3rd Avenue (Farside)
Recommendations for improvement at this existing stop include:
- Shelter
- Bench
- Trash can
- Lighting
- Sign
- Minor pad improvements to permit installation of shelter, etc.

Stop 17. Valley Parkway at South Orange Street
This existing stop serves the Signature Theatre Pavilion and other downtown Escondido destinations. In addition to Route 350, this stop serves other NCTD routes. Recommendations for improvement here include:
- Sign
- Relocation of existing trash cans to improve pedestrian movement
Stop 18. Escondido Transit Center
This stop is a major center for transfer from Route 350 to other NCTD bus routes, and will become the terminus of the new Sprinter light rail line, which is under construction and scheduled for completion in December 2007. Recommendations for improvement at this stop include:

- DMS
- Sign

4.6.2 Southbound Stops

Stop 19. South Escondido Boulevard at West 2nd Avenue (Farside)
Recommendations for improvement at this existing stop include:

- Shelter
- Bench
- Trash can
- Lighting
- Sign

Stop 20. South Escondido Boulevard at West 4th Avenue (Farside)
This stop is recommended for consolidation.

Stop 21. South Escondido Boulevard at West 6th Avenue (Farside)
This existing stop is space-constrained, which precludes recommending installation of a shelter here. Recommendations for improvement at this stop include:

- Bench
- Trash can
- Sign

Stop 22. South Escondido Boulevard at West 9th Avenue (Farside)
This existing stop is space-constrained, which precludes recommending installation of a shelter here, although the overhang from the existing business at this location provides some protection from the elements. Ridership at this stop is significant, and given its location in the middle of the Old Escondido neighborhood shopping district, a digital messaging sign should be installed to provide real-time bus arrival and status information to transit patrons at this stop.

Recommendations for improvement at this stop include:

- Bench
- Trash can
- DMS
- Sign
Stop 23. South Escondido Boulevard at West 11th Avenue (Farside)
This stop is recommended for consolidation.

Stop 24. South Escondido Boulevard at West 13th Avenue (Farside)
Recommendations for improvements at this existing stop include:

- Shelter
- Bench
- Trash can
- Lighting
- Sign
- Minor pad improvements to permit installation of shelter, etc.

Stop 25. South Escondido Boulevard at West 15th Avenue (Farside)
Recommendations for improvements at this existing stop include:

- Shelter
- Bench
- Trash can
- Lighting
- Sign
- Minor pad improvements to permit installation of shelter, etc.

Stop 26. South Escondido Boulevard at West Felicita Avenue (Nearside)
Recommendations for improvements to this existing stop include:

- Shelter
- Bench
- Trash can
- Lighting
- DMS
- Sign
- Minor pad improvements to permit installation of shelter, etc.
Stop 27.  Sunset Drive at South Escondido Boulevard (Farside)
Recommendations for improvements at this existing stop include:
- Shelter
- Bench
- Trash can
- Lighting
- Sign
- Minor pad improvements to permit installation of shelter, etc.

Stop 28.  Sunset Drive near Royal Crest Drive (Nearsde)
Recommendations for improvements at this existing stop include:
- Trash can
- Sign

Stop 29.  Bear Valley Parkway at Las Palmas Avenue/Peet Lane (Farside)
This existing stop serves Bear Valley Middle School and R.L. Green Elementary School.
Recommendations for improvements at this stop include:
- Shelter
- Bench
- Trash can
- Lighting
- DMS
- Sign

Stop 30.  Bear Valley Parkway at Mary Lane (Nearsde)
This existing stop serves San Pasqual High School and Kit Carson Park.  Recommendations for improvements at this stop include:
- Two 17-foot shelters
- Two benches
- Two trash cans
- Lighting
- DMS
- Sign
- Installation of a approximately 300 square foot (s.f.) bus stop pad
Stop 31. Bear Valley Parkway at San Pasqual Road (Nearsidé)
This stop is recommended for consolidation.
5.0 PHASING AND IMPLEMENTATION

This section provides a summary of the proposed improvements, associated cost estimates, and proposed implementation phasing. In this sense, this section is a program overview of the proposed improvements for the Escondido Rapid Bus effort. Section 4.0 should be referenced for details on methods and specifics for the individual priority treatments, including analyses of the potential benefits and impacts associated with individual improvements.

5.1 OVERVIEW OF TYPES OF IMPROVEMENTS

For purposes of this section, improvements have been grouped into three basic categories:

- **Transit Priority Measures** - These include physical and system based improvements to the roadway and the traffic signal system to aid in reducing overall transit travel times. Some examples include:
  - Physical Improvement – Physical improvements such as roadway reconfigurations or queue jumps in possible combination with supporting system improvements (such as special phases or transit signal priority).
  - Transit Signal Priority (TSP) – A system based improvement where intersection signal timing/phasing is adjusted to allow buses running behind schedule to receive slight extension of a green light to avoid hitting a red light with the associated delay. In certain circumstances this also allows for shortening of red lights that a bus may be waiting at to reduce signal delay.
  - Special Transit Access/Other Improvement – These types of improvements include special access for buses to transit center, as well as improvements that reduce bus delay by resolving a broader issue for all vehicle traffic.

- **Transit Operations/Service Adjustments** – These include adjustments to schedules or methods of operations that impact or enhance bus service.

- **Stop/Station Improvements** – These include physical enhancements such as benches, shelters, enhance customer information, and special branding at stops and stations. Several preliminary design concepts were developed for and are presented as part of this study report. This category can include adjustments to stop locations, stop consolidation, and methods for speeding boardings.

In this section, improvements are displayed graphically and summarized by proposed phase of implementation.

5.2 PROPOSED IMPLEMENTATION PHASING

Overall, the focus of the Escondido Rapid Bus effort is to provide near-term visible improvements to the public. Therefore, phasing is proposed only through Year 5, and any longer-term plans are simply noted as “future.” Implementation phasing is broken down into three terms, each with a specific goal in mind.

- **Initial Phase (Years 1-2)** – During this phase the primary objective is to provide rapid visible improvements to service by implementing measures that can be undertaken quickly at lower relative cost.
• **Midterm Phase (Up to Year 5)** – This phase completes the basic rapid bus service picture by implementing improvements that are either more costly, time consuming, or both.

• **Future Phase (Year 5 +)** – This period includes improvements that were proposed as part of the study that have merit, but are probably best implemented as part of a larger roadway improvement effort. In addition, some of these improvements may have significant community or institutional issues that would require a longer implementation timeframe.

Each phase should represent a reasonable incremental improvement to service with the majority of transit priority improvements front-loaded into the phasing to promote near-term travel time benefits and potential operational cost savings.

### 5.3 SUMMARIES OF PROPOSED IMPROVEMENTS BY PHASE

The summaries of proposed improvements are represented by an overall summary table and a series of figures. Table 5.1 lists the proposed improvements by phase and category, as well as estimated costs by phase. Additional details on the specific improvements are listed in Section 4.0 of this report. The overall improvements are discussed below by phase with the appropriate figures.

• **Initial Phase (Years 1-2)** -
  - **Transit Priority Measures** – Focus is on baseline efforts needed to support transit priority, and transit signal priority measures along the route that offer cumulative benefits at relatively low costs. A critical improvement has been identified to create a protected northbound left-turn from S. Escondido Boulevard to Valley Parkway. Delays in making this left-turn have resulted in the temporary re-routing of Route 350 to Grand Avenue in an effort to improve service reliability. The PWG was unanimous in the concept that Valley Parkway is the preferred pattern for Route 350, and it is hoped that the initial phase improvements would allow a return to the original routing. The initial phase transit priority improvements are displayed in Figures 5-1 and 5-2 for the north and south study areas, respectively.

  - **Transit Operations** – Focus is on ensuring connections and modifying schedules to generate the best benefit from the transit priority measures.

  - **Stops/Stations** – Focus is on key transfer locations and broader less expensive improvements that can be made in the initial first two years, as well as some suggested stop consolidation, as shown in Figures 5-3 and 5-4.

• **Midterm Phase (Up to Year 5)** -
  - **Transit Priority Measures** – Focus is on implementing higher priority physical improvements, including the queue jump lane at Valley Pkwy./Centre City Pkwy. This phase also includes improvements associated with improved access to the Del Lago BRT Station. Figure 5-5 displays the proposed midterm transit priority measure improvements.
<table>
<thead>
<tr>
<th>Proposed Phase</th>
<th>Improvement Type</th>
<th>Description</th>
<th>Estimated Costs</th>
<th>Benefits</th>
<th>Potential Impacts</th>
</tr>
</thead>
</table>
| Initial Phase (First 2 Years) | Transit Priority Measures | • Non-site specific improvements include:  
  o Install signal priority equipment on 25 buses and integrate with on-board schedule tracking computer.  
  o Analyze and update signal coordination for the Downtown Escondido grid and S. Escondido Blvd. including before/after analyses.  
  o Procure signal priority software and supporting equipment.  
  • Implement transit signal priority (TSP) at the following intersections (along the directions of Route 350):  
    o Along Quince St. at:  
      - Valley Pkwy.  
      - 2nd Ave.  
    o Along 2nd Ave at:  
      - Centre City Pkwy.  
      - Orange St.  
    o Along Valley Pkwy at:  
      - Orange St.  
      - Centre City Pkwy.  
    o Along S. Escondido Blvd. at:  
      - Grand Ave.  
      - 5th Ave.  
      - 9th Ave.  
      - 13th Ave.  
      - Felicita Ave.  
    o Along Bear Valley Pkwy. at:  
      - Las Palmas Ave./Peet Ln.  
      - Canyon Rd.  
      - Mary Ln.  
      - San Pasqual Rd.  
      - Beethoven Dr.  
  • Implement the following changes to signal operations and intersections:  
    o Provide a northbound protected left-turn from S. Escondido Blvd. to Valley Pkwy. including changes to signal phasing, timing, as well as signage and signal heads.  
    o Provide a matching southbound protected left-turn from S. Escondido Blvd. to 2nd Ave. including changes to signal phasing, timing, as well as signage and signal heads.  

  Total = $930K (including: $30K design & $210K contingency) | • Reviewing and updating signal coordination in the Downtown grid network and S. Escondido Blvd. will improve regular traffic flow and ensure a sound basis for implementing TSP by limiting the potential for impacts to normal vehicular traffic.  
  • Cumulative benefits of TSP at the individual intersections will result in less signal delay for buses and increased schedule reliability.  
  • Provision of a protected northbound left-turn at S. Escondido Blvd/Valley Pkwy. should reduce delays in this movement for all vehicles and allow buses to return to routing along Valley Pkwy.  
  • Proposed Initial Phase improvements represent a potential 16% reduction in one-way travel time for Route 350.  
  • All TSP impacts should be manageable given the potential range of TSP settings within the traffic signal system.  
  • Cross-street delays will need to be monitored and TSP settings adjusted accordingly.  
  • TSP at intersections with Centre City Pkwy. and Felicita Ave. may need to be adjusted to restrict TSP during certain peak commute hours. |
| Transit Operations | • The following transit operations adjustments should be made in coordination with the transit priority improvements:  
  o Perform survey of stop distances and schedule refinement based on proposed improvements.  
  o Train Route 350 drivers on operating in a TSP environment.  
  o Return Route 350 to original routing along Valley Pkwy. (it has been temporarily re-routed to Grand Ave.)  
  o Implement guaranteed transfers (transfer protection) through the bus CAD/AVL system for the Route 20/350 exchange, as well as Route 350 transfers at the Escondido Transit Center.  
  o Following implementation of transit priority measures:  
    - Perform transit travel time survey or review data from the Regional Transit Management System (RTMS).  
    - Adjust Route 350 blocks/runs to reflect average transit travel time.  

  In general costs supported by bus operations budgets, project specific transit operations studies or costs are included in the transit priority measures costs. | • These actions are necessary to maximize the benefits of the transit priority measures.  
  • Guaranteed transfers help to ensure riders make a larger percentage of their key connections which has been a known issue between MTS Route 20 and Route 350.  
  • All of these actions should have positive impacts on Route 350 riders.  
  • Once TSP is in place and the schedule has been refined, it is hoped that some operational cost savings through increased efficiencies. |
<table>
<thead>
<tr>
<th>Proposed Phase</th>
<th>Improvement Type</th>
<th>Description</th>
<th>Estimated Costs</th>
<th>Benefits</th>
<th>Potential Impacts</th>
</tr>
</thead>
</table>
| Mid-Term (Up to 5 Years) | Transit Priority Measures | Implement the following changes to signal operations and intersections:  
- Construct a queue jump bus lane in the westbound direction at Valley Pkwy./Centre City Pkwy which includes:  
  - Widening of the far-side of westbound Valley Pkwy., at Centre City Pkwy. to accommodate a merge lane for the bus once "jumping" the intersection.  
  - Appropriate signal equipment and controller cabinet relocations/modifications, and install bus detection loop in queue jump lane.  
  - Modifications to striping to provide a bus queue jump lane back to the Signature driveway.  
  - Consideration of broken striping to provide the beginnings of the bus queue jump lane on the nearside of westbound Valley Pkwy/Signature Driveway (design must allow for non-transit vehicles to reach right-turn lane at Valley Pkwy./Centre City Pkwy.).  
  - Implement a queue jump bus lane in the northbound direction at Bear Valley Pkwy./Las Palmas Ave./Peet Ln. which includes:  
    - Appropriate signal equipment and controller cabinet relocations/modifications, and install bus detection loop in queue jump lane.  
    - Bus queue jump using the right turn lane.  
    - Modifications to sidewalk and access of near-side bus stop (stop not to be relocated) to allow free movement of the bus from the stop to the dedicated northbound right-turn lane.  
    - Curb, striping, and appropriate roadway modifications on farside of intersection.  
- Coordinate with proposed access changes to the Del Lago BRT Station just west of the I-15/Del Lago overpass. The major improvements, such as grading and construction of the intersections are assumed to occur as part of the I-15 Managed Lanes effort, but the following improvements are assumed as part of the Escondido Rapid Bus effort:  
  - Provision of advance warning for eastbound traffic approaching the intersection, including special signage to watch for exiting buses, as well as overhead flashing light structures.  
  - Modifications to the intersection signal phasing appropriate to support transit center access.  
  - Left-turn phase into the transit center should only be activated by buses or moveable barrier equipment.  
  - Restriping to allow buses a safe merge or transition distance when making a right-turn out of the transit center. Depending on the results of the final design, it may be necessary to provide a red light to through traffic on Del Lago to allow buses and moveable barrier equipment a safe exit. | Total = $970K (including: $100K design & $200K contingency) | Unlike TSP, implementation of the proposed queue jump lanes at Valley Pkwy./Centre City Pkwy. and Bear Valley Pkwy./Las Palmas Ave./Peet Ln. will allow buses to bypass portions of queued traffic during peak periods. | Implementation of the proposed queue jump lanes at Valley Pkwy./Centre City Pkwy. is estimated to have no substantial impact on traffic flow. In general queue jump lanes result in less cross-street delay than standard TSP. |
<table>
<thead>
<tr>
<th>Proposed Phase</th>
<th>Improvement Type</th>
<th>Description</th>
<th>Estimated Costs</th>
<th>Benefits</th>
<th>Potential Impacts</th>
</tr>
</thead>
</table>
| Long-Term (Beyond 5 Years) | Transit Priority Measures | **Implement the following changes to signal operations and intersections:**  
 o Implement a queue jump bus lane in the southbound direction at Bear Valley Pkwy./Las Palmas Ave./Peet Ln, which includes:  
 - Widening of the southbound approach of the intersection to provide for a bus queue jump lane.  
 - Modifications to the southbound far-side of the intersection to allow free movement of the bus from the queue jump lane to the far-side bus stop.  
 - Appropriate striping modifications, as well as relocation of the signal equipment and structures.  
 o Consider improvements to Bear Valley Pkwy./Sunset Dr. with two potential options:  
 - Option 1 – Construct a eastbound free right-turn lane for buses only for movements from Sunset Dr. to southbound Bear Valley Pkwy. This would require grading, retaining structures, some utility relocations, pedestrian control, and substantial modifications to the west leg of the intersection.  
 - Option 2 – Widen and re-align the intersection to the west slightly to allow for a bus only northbound left-turn lane. This would have to include appropriate grading, retaining structures, relocation of utilities, reconstruction of the intersection with associated improvements to the signal equipment, and widening of the westbound departing approach of Sunset Dr. to allow space for two left turn receiving lanes.  
 Implementation of either option should be considered in light of the future widening of Bear Valley Pkwy. from two to four lanes. The intent of this improvement would be to construct enhancements that would easily fit with the future widening of Bear Valley Pkwy.  
 o Implement TSP for Route 350 vehicles traveling through the I-15 Del Lago DAR intersection.  
 • Coordinate for potential extension of the Valley Pkwy./Centre City Pkwy. queue jump into a bus only lane westbound on Valley Pkwy. between Centre City Pkwy. and Quince Street. This improvement would be conducted as part of the planned widening of Valley Pkwy.  |
| | | Total = $2.39M  
 (including: $250K design & $490K contingency)  
 Costs for the transit lane on Valley Pkwy. are not included and would be part of a separate effort. | **A queue jump lane on southbound Bear Valley Pkwy./Las Palmas Ave./Peet Ln. would allow the bus to bypass portions of queued traffic during the AM commute.**  
 **Improvements proposed for this phase would either advance or integrate with planned future improvements along Bear Valley Pkwy. and Valley Pkwy. between Centre City Pkwy./Quince St.**  
 **Proposed improvements represent a potential one-way travel time savings of greater than 11% for Route 350.** | **The opening of the Del Lago BRT station will necessitate a new northbound stop at Westfield Shoppington North County.**  
 **All bus stop enhancements not completed as part of the Initial Phase would be completed in this phase.** | **Option 1 for Bear Valley Pkwy./Sunset Dr. would result in additional delay for thru traffic on Bear Valley Pkwy., and TSP/special phasing would need to review overall intersection operations closer to the period of intended implementation.** |
| Transit Operations | | **Re-assess Route 350 rapid bus service in light of ridership patterns and relationships with the I-15 BRT.**  
 **Adjust transit schedules to reflect benefits of improvements.** | NA | NA | NA |
Add northbound protected left-turn

Add southbound protected left-turn

Symbol Key:
- Signal Coordination Update
- Signal Priority
- Queue Jumper (arrow indicates direction)
- Special Access or Physical Improvement

Escondido Rapid Bus
Transit Priority Concept Study

Initial Phase Transit Priority
Proposed Improvements - North Study Area
Symbol Key:
- Signal Coordination Update
- Signal Priority
- Queue Jumper (arrow indicates direction)
- Special Access or Physical Improvement

Escondido Rapid Bus
Transit Priority Concept Study

Figure 5-2
Initial Phase Transit Priority
Proposed Improvements - South Study Area
Figure 5-3
Escondido Rapid Bus
Transit Priority Concept Study

Bus Stop Improvement Phasing
North Study Area

Stop 8
Mid-term

Stop 18
Initial

Stop 20
Initial

Stop 21
Initial

Stop 22
Initial

Stop 23
Initial

Stop 24
Initial

Stop 25
Initial

Stop 26
Initial

Existing Route 350 Bus Stop
Bus Stop Recommended for Consolidation
Improvements to be made in Initial Phase
Improvements to be made in Mid-term Phase
Figure 5-4

Escondido Rapid Bus
Transit Priority Concept Study

Bus Stop Improvement Phasing
South Study Area
Escondido Rapid Bus
Transit Priority Concept Study

Figure 5-5
Proposed Mid-Term Phase Transit Priority Improvements

Symbol Key:
- Signal Coordination Update
- Signal Priority
- Queue Jumper (arrow indicates direction)
- Special Access or Physical Improvement

WB Queue Jump at Valley Pkwy./Centre City Pkwy.

NB Queue Jump at Bear Valley Pkwy/Las Palmas Ave./Peet Ln.

Special Access &/or Intersection to Del Lago BRT Station

Deleted as Route 350 Re-aligns Northbound to Beethoven Dr. when BRT Station Opens as Southern Terminus of Route.
Transit Operations – Schedules may need to be modified once again to maximize benefits of the priority measures and to account for this route’s new southern terminus at the Del Lago BRT Station and integration with the I-15 BRT.

Stops/Stations – The focus in this phase is to make most consolidations of stops (with the exception of those taking place with the opening of the Del Lago BRT Station), and making improvements to bus stops, as well as branding of the vehicles.

Future Phase (Year 5+) -

Transit Priority Measures – Figure 5-6 displays proposed future phase transit priority measures. Concentration is on improvements that are of larger scale in terms of implementation timeframe and costs with an emphasis on integrating with planned future roadway improvements. The potential for a transit only lane on westbound Valley Pkwy. between Centre City Pkwy./Quince St. is noted in this report as a proposed future improvement. It is assumed this improvement would be part of a larger roadway widening project and no costs were estimated for this improvement.

Transit Operations – Prior to undertaking improvements for this phase it would be important to re-assess the relationship between Route 350 and the I-15 BRT considering ridership patterns, I-15 BRT service, and traffic levels at that time. If Route 350 becomes predominately a local service route with riders using the I-15 BRT to reach Downtown Escondido, then the implementation of the “future” priority measures only makes sense in cooperation with a larger roadway improvement effort.

Stops/Stations – Most stop/station improvements are anticipated to be completed by the midterm phase. Final consolidation of stops, timed to occur with the opening of the Del Lago BRT Station will be made during this phase, as well as the construction of a new northbound bus stop to serve riders at Westfield Shoppingtown North County.
Coordinate with Future Widening of Valley Pkwy. for Potential Transit Only Lane between Centre City Pkwy./Quince St.

Bear Valley Pkwy./Sunset Dr.
Two Options:
(1) Bus Only Eastbound RT Lane.
(2) Widen Intersection to Provide Bus Only Northbound LT Lane (coordinate with future widening of Bear Valley Pkwy.)

SB Queue Jump at Bear Valley Pkwy./Las Palmas Ave./Peet Ln.

TSP for Route 350 at BRT Direct Access Ramp

Deleted segment as Route 350 re-aligns Northbound to Beethoven Dr. when BRT Station Opens as Southern Terminus of Route.

Escondido Rapid Bus
Transit Priority Concept Study

Figure 5-6
Proposed Future Phase Transit Priority Improvements
5.4 SUMMARY OF ESTIMATED COSTS BY PHASE

Preliminary planning level cost estimates were prepared for all of the transit priority and stop improvements proposed for the Escondido Rapid Bus service. These costs include:

- Additional studies and analyses that should be performed as part of implementing the Escondido Rapid Bus service.
- Equipment for buses and signalized intersections to implement TSP.
- Software procurement and testing to support transit priority measure implementation.
- Physical improvement costs associated with intersections and stops/stations to make the proposed improvements.
- Design costs for appropriate physical transit priority measures and stop/station improvements (assumed as 15% of the estimated capital cost).
- An additional 10% cost for all physical transit priority measure improvements to account for traffic control, installation considerations, administrative costs, etc.
- Contingency of 30% on all cost items.

Costs did not include items that would be part of standard city engineering or transit operations efforts. For example, no staff costs have been estimated for the time associated with updating schedules once transit priority measures are implemented. In addition, no right-of-way costs were included in the estimates. In most cases right-of-way acquisition should not be required, but this should be confirmed for physical improvements once preliminary design efforts are completed.

5.4.1 Details of Estimated Costs

Cost estimates for transit priority measures were broken down into two categories:

- **Non-site specific or baseline costs (as shown in Table 5.2)** – In general, these costs reflect the costs for efforts that must be performed before any site specific improvements can be fully implemented. These costs include items such as: baseline studies, equipment procurements, software testing, signal timing update efforts, installation of TSP equipment on vehicles, etc.

- **Site-specific costs (as shown in Table 5.3)** – These are the site specific costs, including TSP and physical priority measures, of implementing the proposed improvements noted in Table 5.1. Table 5.3 makes specific reference to detail items which provide more detailed cost information in Appendix E.

Costs reflect basic unit cost estimation information for Year 2005. Each line item in the cost tables is assigned an implementation phase consistent with the phasing of improvements outlined in Table 5.1. Cost estimates for physical improvements have been reviewed by the PWG to ensure they are reasonable for planning purposes, however costs should be refined following preliminary design efforts.
### Table 5.2 - Preliminary Priority Treatment Cost Estimates (Non-Site Specific)
Non-Site Specific Costs for Planning Purposes Only

<table>
<thead>
<tr>
<th>Cost Category</th>
<th>Unit Cost</th>
<th>Qty</th>
<th>Total</th>
<th>Phase</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Vehicles/Transit</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Signal Priority Equipment</td>
<td>$2,500</td>
<td>25</td>
<td>$62,500</td>
<td>Initial</td>
<td>Assumes priority emitter or similar on bus with on-board computer and RTMS already present on bus.</td>
</tr>
<tr>
<td>Installation/Setup of Priority Equipment</td>
<td>$2,500</td>
<td>25</td>
<td>$62,500</td>
<td>Initial</td>
<td>Assumes physical installation and reconfiguration of on-board bus system.</td>
</tr>
<tr>
<td>Spare Priority Emitters</td>
<td>$2,500</td>
<td>3</td>
<td>$7,500</td>
<td>Initial</td>
<td>None</td>
</tr>
<tr>
<td>Bus Stop Distance/Survey</td>
<td>$35,000</td>
<td>1</td>
<td>$35,000</td>
<td>Initial</td>
<td>Specific measurement of distances between stops &amp; setting of priority trigger points.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Subtotal $167,500</td>
</tr>
<tr>
<td><strong>Signal Analysis/Coordination</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Additional Analysis of Signal Ops.</td>
<td>$50,000</td>
<td>1</td>
<td>$50,000</td>
<td>Initial</td>
<td>Review of green band and grid network operations.</td>
</tr>
<tr>
<td>Controller Firmware/Priority Software Testing</td>
<td>$100,000</td>
<td>1</td>
<td>$100,000</td>
<td>Initial</td>
<td>Testing of priority in conjunction with red light photo enforcement.</td>
</tr>
<tr>
<td>Signal Coordination</td>
<td>$2,500</td>
<td>23</td>
<td>$57,500</td>
<td>Initial</td>
<td>Recoordination for grid network and S. Escondido Blvd.</td>
</tr>
<tr>
<td>Before/After Floating Car Assessment &amp; Analysis</td>
<td>$25,000</td>
<td>1</td>
<td>$25,000</td>
<td>Initial</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Subtotal $232,500</td>
</tr>
<tr>
<td><strong>Priority Software/Signal Equipment</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Replacement Signal Controllers</td>
<td>$7,000</td>
<td>3</td>
<td>$21,000</td>
<td>Initial</td>
<td>Assumes 15% of signals to be outfitted with TSP will need new controllers.</td>
</tr>
<tr>
<td>Modems (wireless)</td>
<td>$500</td>
<td>0</td>
<td>0</td>
<td>Initial</td>
<td>Cost included with each intersection.</td>
</tr>
<tr>
<td>Laptops</td>
<td>$2,000</td>
<td>2</td>
<td>$4,000</td>
<td>Initial</td>
<td>For field configuration and adjustment of intersections.</td>
</tr>
<tr>
<td>Signal Priority Software License</td>
<td>$10,000</td>
<td>2</td>
<td>$20,000</td>
<td>Initial</td>
<td>One copy for each computer.</td>
</tr>
<tr>
<td>Priority Reporting Software</td>
<td>$10,000</td>
<td>1</td>
<td>$10,000</td>
<td>Initial</td>
<td>Reports priority results to City and allows settings to be changed remotely.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Subtotal $55,000</td>
</tr>
<tr>
<td><strong>Priority Equipment Install Setup Per Intersection (Unit Cost Only)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intersection 2-way or less (with receivers in place)</td>
<td>$5,500</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>Includes controller card and software with install to intersection (assumes appropriate priority receivers already in place e.g. Opticom).</td>
</tr>
<tr>
<td>Intersection 2-way or less (w/o receivers in place)</td>
<td>$10,500</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>Same, but assumes receivers must be installed/connected/set.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Subtotal $55,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Non-Site Specific Items Cost Estimate Summary</th>
<th>Total Base</th>
<th>Design**</th>
<th>Contingency</th>
<th>Phase Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Calculated Totals</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initial Phase</td>
<td>$455,000</td>
<td>$-</td>
<td>$136,500</td>
<td>$591,500</td>
</tr>
<tr>
<td>Midterm Phase</td>
<td>$-</td>
<td>$-</td>
<td>$-</td>
<td>$-</td>
</tr>
<tr>
<td>Future Phase</td>
<td>$-</td>
<td>$-</td>
<td>$-</td>
<td>$-</td>
</tr>
<tr>
<td><strong>Total Estimate w/Contingencies, etc.</strong></td>
<td>$591,500</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Rounded Totals</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initial Phase</td>
<td>$460,000</td>
<td>$-</td>
<td>$140,000</td>
<td>$600,000</td>
</tr>
<tr>
<td>Midterm Phase</td>
<td>$-</td>
<td>$-</td>
<td>$-</td>
<td>$-</td>
</tr>
<tr>
<td>Future Phase</td>
<td>$-</td>
<td>$-</td>
<td>$-</td>
<td>$-</td>
</tr>
<tr>
<td><strong>Total Estimate w/Contingencies, etc.</strong></td>
<td>$600,000</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Design = 15% does not apply to non-site specific costs. Contingency = 30%
Table 5.3 - Preliminary Priority Treatment Cost Estimates for Escondido Rapid Bus
Site Specific Costs for Planning Purposes Only

<table>
<thead>
<tr>
<th>#</th>
<th>Location</th>
<th>Basic Priority Type</th>
<th>Estimated Costs</th>
<th>Estimated Costs +10% Admin/Install</th>
<th>Phase Comment</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>None</td>
<td>TSP Only</td>
<td>Physical</td>
<td>Special</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Valley Pkwy.</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>2nd Ave.</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 2nd Avenue

<table>
<thead>
<tr>
<th>#</th>
<th>Location</th>
<th>Basic Priority Type</th>
<th>Estimated Costs</th>
<th>Estimated Costs +10% Admin/Install</th>
<th>Phase Comment</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Centre City Pkwy.</td>
<td>X</td>
<td>$5,500</td>
<td>$6,050</td>
<td>Initial</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Orange St.</td>
<td>X</td>
<td>$5,500</td>
<td>$6,050</td>
<td>Initial</td>
<td></td>
</tr>
</tbody>
</table>

### Valley Pkwy.

<table>
<thead>
<tr>
<th>#</th>
<th>Location</th>
<th>Basic Priority Type</th>
<th>Estimated Costs</th>
<th>Estimated Costs +10% Admin/Install</th>
<th>Phase Comment</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Orange St.</td>
<td>X</td>
<td>$5,500</td>
<td>$6,050</td>
<td>Initial</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Centre City Pkwy.</td>
<td>X</td>
<td>$55,575</td>
<td>$71,133</td>
<td>Midterm</td>
<td>See detail item A</td>
</tr>
</tbody>
</table>

**Escondido Blvd.**

Note - Signal coordination for Escondido Blvd. included in non-site specific costs.

<table>
<thead>
<tr>
<th>#</th>
<th>Location</th>
<th>Basic Priority Type</th>
<th>Estimated Costs</th>
<th>Estimated Costs +10% Admin/Install</th>
<th>Phase Comment</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>2nd Ave.</td>
<td>X</td>
<td>$5,500</td>
<td>$6,050</td>
<td>Initial</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Grand Ave.</td>
<td>X</td>
<td>$5,500</td>
<td>$6,050</td>
<td>Initial</td>
<td></td>
</tr>
</tbody>
</table>

### 2nd Ave.

<table>
<thead>
<tr>
<th>#</th>
<th>Location</th>
<th>Basic Priority Type</th>
<th>Estimated Costs</th>
<th>Estimated Costs +10% Admin/Install</th>
<th>Phase Comment</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Valley Pkwy.</td>
<td>X</td>
<td>$115,000</td>
<td>$126,500</td>
<td>Initial</td>
<td>See detail item B</td>
</tr>
</tbody>
</table>

### 10th Ave.

<table>
<thead>
<tr>
<th>#</th>
<th>Location</th>
<th>Basic Priority Type</th>
<th>Estimated Costs</th>
<th>Estimated Costs +10% Admin/Install</th>
<th>Phase Comment</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>10th Ave.</td>
<td>X</td>
<td>$5,500</td>
<td>$6,050</td>
<td>Initial</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>13th Ave.</td>
<td>X</td>
<td>$5,500</td>
<td>$6,050</td>
<td>Initial</td>
<td></td>
</tr>
</tbody>
</table>

### 13th Ave.

<table>
<thead>
<tr>
<th>#</th>
<th>Location</th>
<th>Basic Priority Type</th>
<th>Estimated Costs</th>
<th>Estimated Costs +10% Admin/Install</th>
<th>Phase Comment</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>Felicita Ave.</td>
<td>X</td>
<td>$5,500</td>
<td>$6,050</td>
<td>Initial</td>
<td></td>
</tr>
</tbody>
</table>

### Sunset Dr.

<table>
<thead>
<tr>
<th>#</th>
<th>Location</th>
<th>Basic Priority Type</th>
<th>Estimated Costs</th>
<th>Estimated Costs +10% Admin/Install</th>
<th>Phase Comment</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>Sunset Dr.</td>
<td>X</td>
<td>$5,500</td>
<td>$6,050</td>
<td>Initial</td>
<td></td>
</tr>
</tbody>
</table>

### Bear Valley Pkwy.

<table>
<thead>
<tr>
<th>#</th>
<th>Location</th>
<th>Basic Priority Type</th>
<th>Estimated Costs</th>
<th>Estimated Costs +10% Admin/Install</th>
<th>Phase Comment</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>Sunset Dr.</td>
<td>X</td>
<td>$632,000</td>
<td>$695,200</td>
<td>Future</td>
<td>See detail item C</td>
</tr>
<tr>
<td>16</td>
<td>Las Palmas Ave./Paet Ln.</td>
<td>X</td>
<td>$6,500</td>
<td>$6,050</td>
<td>Initial</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>at Las Palmas Ave. NB</td>
<td>X</td>
<td>$234,750</td>
<td>$258,225</td>
<td>Midterm</td>
<td>See detail item D</td>
</tr>
<tr>
<td>18</td>
<td>at Las Palmas Ave SB</td>
<td>X</td>
<td>$246,250</td>
<td>$270,875</td>
<td>Future</td>
<td>See detail item D</td>
</tr>
</tbody>
</table>

### Canyon Rd.

<table>
<thead>
<tr>
<th>#</th>
<th>Location</th>
<th>Basic Priority Type</th>
<th>Estimated Costs</th>
<th>Estimated Costs +10% Admin/Install</th>
<th>Phase Comment</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>19</td>
<td>Mary Ln.</td>
<td>X</td>
<td>$5,500</td>
<td>$6,050</td>
<td>Initial</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>San Pasqual Rd.</td>
<td>X</td>
<td>$5,500</td>
<td>$6,050</td>
<td>Initial</td>
<td></td>
</tr>
</tbody>
</table>

### Beethoven Dr.

<table>
<thead>
<tr>
<th>#</th>
<th>Location</th>
<th>Basic Priority Type</th>
<th>Estimated Costs</th>
<th>Estimated Costs +10% Admin/Install</th>
<th>Phase Comment</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>Del Lago Blvd.</td>
<td>X</td>
<td>$5,500</td>
<td>$6,050</td>
<td>Initial</td>
<td></td>
</tr>
</tbody>
</table>

### Del Lago Blvd.

<table>
<thead>
<tr>
<th>#</th>
<th>Location</th>
<th>Basic Priority Type</th>
<th>Estimated Costs</th>
<th>Estimated Costs +10% Admin/Install</th>
<th>Phase Comment</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>22</td>
<td>Direct Access Ramp (future)</td>
<td>X</td>
<td>$10,500</td>
<td>$11,550</td>
<td>Future</td>
<td>Costs of signal assumed part of DAR/BRT project</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>#</th>
<th>Location</th>
<th>Basic Priority Type</th>
<th>Estimated Costs</th>
<th>Estimated Costs +10% Admin/Install</th>
<th>Phase Comment</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>23</td>
<td>Del Lago BRT Station Site Access</td>
<td>X</td>
<td>$50,000</td>
<td>$55,000</td>
<td>Mid-Term</td>
<td>See detail item E</td>
</tr>
</tbody>
</table>

**Key:**

TSP only - Location considered for transit signal priority only (as opposed to physical treatments).

NB, SB, WB, EB - Indicates direction of bus movement or approach of intersection.

LT, RT, TH - Indicates left turn, right turn, or through movement.

### Calculated Totals

<table>
<thead>
<tr>
<th>Location</th>
<th>Initial Phase</th>
<th>Midterm Phase</th>
<th>Future Phase</th>
<th>Total Base</th>
<th>Design + Admin</th>
<th>Contingency</th>
<th>Phase Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$228,250</td>
<td>$34,238</td>
<td>$68,475</td>
<td>$330,963</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$668,575</td>
<td>$100,286</td>
<td>$200,573</td>
<td>$969,434</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$1,466,200</td>
<td>$246,930</td>
<td>$493,860</td>
<td>$2,386,990</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$3,687,386</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Location</th>
<th>Initial Phase</th>
<th>Midterm Phase</th>
<th>Future Phase</th>
<th>Total Base</th>
<th>Design + Admin</th>
<th>Contingency</th>
<th>Phase Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$230,000</td>
<td>$30,000</td>
<td>$70,000</td>
<td>$330,000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$670,000</td>
<td>$100,000</td>
<td>$200,000</td>
<td>$970,000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$1,650,000</td>
<td>$250,000</td>
<td>$490,000</td>
<td>$2,390,000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$3,690,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Rounded Totals**

<table>
<thead>
<tr>
<th>Location</th>
<th>Initial Phase</th>
<th>Midterm Phase</th>
<th>Future Phase</th>
<th>Total Base</th>
<th>Design + Admin</th>
<th>Contingency</th>
<th>Phase Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$230,000</td>
<td>$30,000</td>
<td>$70,000</td>
<td>$330,000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$670,000</td>
<td>$100,000</td>
<td>$200,000</td>
<td>$970,000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$1,650,000</td>
<td>$250,000</td>
<td>$490,000</td>
<td>$2,390,000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$3,690,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Total Estimate w/Contingencies, etc.**

<table>
<thead>
<tr>
<th>Location</th>
<th>Initial Phase</th>
<th>Midterm Phase</th>
<th>Future Phase</th>
<th>Total Base</th>
<th>Design + Admin</th>
<th>Contingency</th>
<th>Phase Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$3,687,386</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$3,690,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Cost estimates for bus stop improvements, broken out by stop location and phasing, along with appropriate comments about issues at specific stops, are displayed in Table 5.4. More detailed costs for each stop can be found in Appendix E.

Costs reflect basic unit cost estimation information for Year 2005. Each line item in the cost tables is assigned an implementation phase consistent with the phasing of improvements outlined in Table 5.1. Cost estimates for physical improvements have been reviewed by the PWG to ensure they are reasonable for planning purposes, however costs should be refined following preliminary design efforts.
Table 5.4 - Preliminary Bus Stop Improvement Cost Estimates for Escondido Rapid Bus
Site Specific Costs for Planning Purposes Only

<table>
<thead>
<tr>
<th>#</th>
<th>Location</th>
<th>Bus Stop Amenities*</th>
<th>Estimated</th>
<th>Phase</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Bench</td>
<td>Trash Can</td>
<td>Shelter</td>
<td>Solar-Powered LED Lighting</td>
</tr>
<tr>
<td>1</td>
<td>Westfield Shoppington North County</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Del Lago Park and Ride (Nearside)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2A</td>
<td>Del Lago BRT Station</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2B</td>
<td>Westfield Shoppington North County</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>3</td>
<td>Bear Valley Parkway at San Pasqual Road (Farside)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Bear Valley Parkway at San Pasqual High School</td>
<td>X (2)</td>
<td>X (2)</td>
<td>X (2)</td>
<td>X (2)</td>
</tr>
<tr>
<td>5</td>
<td>Bear Valley Parkway at Las Palmas Avenue/Pett Lane (Nearside)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>6</td>
<td>Sunset Drive near Royal Crest Drive (Farside)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>7</td>
<td>Sunset Drive at South Escondido Boulevard (Nearside)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>8</td>
<td>South Escondido Boulevard at West Felicita Avenue (Nearside)</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>South Escondido Boulevard at West Felicita Avenue (Farside)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>10</td>
<td>South Escondido Boulevard at West 15th Avenue (Nearside)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>South Escondido Boulevard at West 13th Avenue (Farside)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>South Escondido Boulevard at West 11th Avenue (Nearside)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>South Escondido Boulevard at West 9th Avenue (Farside)</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>South Escondido Boulevard at West 6th Avenue (Farside)</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>South Escondido Boulevard at West 4th Avenue (Farside)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>South Escondido Boulevard at West 3rd Avenue (Farside)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>17</td>
<td>Valley Parkway at South Orange Street (Nearside)</td>
<td>X</td>
<td>X (2)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Table 5.4 - Preliminary Bus Stop Improvement Cost Estimates for Escondido Rapid Bus Site Specific Costs for Planning Purposes Only**

<table>
<thead>
<tr>
<th>#</th>
<th>Location</th>
<th>Bench</th>
<th>Trash Can</th>
<th>Shelter</th>
<th>Solar-Powered LED Lighting</th>
<th>Digital Message Sign</th>
<th>Cost</th>
<th>Phase</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Escondido Transit Center</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$ 5,885</td>
<td>Initial</td>
<td>Existing facilities to be retained - Other amenities as noted</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Southbound</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>South Escondido Boulevard at West 2nd Avenue (Farside)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td>$ 14,465</td>
<td>Initial</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>South Escondido Boulevard at West 4th Avenue (Farside)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>NA</td>
<td>Initial</td>
<td>Stop recommended for consolidation</td>
</tr>
<tr>
<td>21</td>
<td>South Escondido Boulevard at West 6th Avenue (Farside)</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$ 1,540</td>
<td>Initial</td>
<td>Space constraints preclude shelter at this stop</td>
</tr>
<tr>
<td>22</td>
<td>South Escondido Boulevard at West 9th Avenue (Farside)</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>$ 5,390</td>
<td>Initial</td>
<td>Overhang of building at this stop precludes shelter at this stop</td>
</tr>
<tr>
<td>23</td>
<td>South Escondido Boulevard at West 11th Avenue (Farside)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>NA</td>
<td>Initial</td>
<td>Stop recommended for consolidation</td>
</tr>
<tr>
<td>24</td>
<td>South Escondido Boulevard at West 13th Avenue (Farside)</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$ 15,620</td>
<td>Initial</td>
<td>Approx. 30 s.f. new sidewalk required.</td>
</tr>
<tr>
<td>25</td>
<td>South Escondido Boulevard at West 15th Avenue (Farside)</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$ 15,620</td>
<td>Initial</td>
<td>Approx. 75 s.f. new sidewalk required.</td>
</tr>
<tr>
<td>26</td>
<td>South Escondido Boulevard at West Felicita Avenue (Nearside)</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$ 19,470</td>
<td>Initial</td>
<td>Approx. 75 s.f. new sidewalk required.</td>
</tr>
<tr>
<td>27</td>
<td>Sunset Drive near South Escondido Boulevard (Farside)</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$ 15,620</td>
<td>Initial</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>Sunset Drive near Royal Crest Drive (Nearside)</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$ 715</td>
<td>Initial</td>
<td>Provide trash can, new signage.</td>
</tr>
<tr>
<td>29</td>
<td>Bear Valley Parkway at Las Palmas Avenue/Pett Lane (Farside)</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$ 14,465</td>
<td>Initial</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>Bear Valley Parkway at Mary Lane (Nearside)</td>
<td>X (2)</td>
<td>X (2)</td>
<td>X (2)</td>
<td></td>
<td>X</td>
<td>$ 41,250</td>
<td>Initial</td>
<td>Two large shelters recommended to accommodate high passenger volumes w/approx. 300 s.f. concrete pad</td>
</tr>
<tr>
<td>31</td>
<td>Bear Valley Parkway at San Pasqual Road (Nearside)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>NA</td>
<td>Initial</td>
<td>Stop recommended for consolidation</td>
</tr>
</tbody>
</table>

**Note:** "(2)" indicates that two of that particular item are proposed for the stop.

### Site Specific Costs

<table>
<thead>
<tr>
<th></th>
<th>Calculated Costs</th>
<th>Rounded Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Base Design</strong></td>
<td>Total Base</td>
<td>Design</td>
</tr>
<tr>
<td>Initial Phase</td>
<td>$ 295,295</td>
<td>$ 44,294</td>
</tr>
<tr>
<td>Midterm Phase</td>
<td>$ 56,260</td>
<td>$ 8,439</td>
</tr>
<tr>
<td>Future Phase</td>
<td>$ -</td>
<td>$ -</td>
</tr>
<tr>
<td><strong>Subtotals</strong></td>
<td>$ 351,555</td>
<td>$ 52,733</td>
</tr>
<tr>
<td><strong>Total Estimate</strong></td>
<td>$ 509,755</td>
<td></td>
</tr>
</tbody>
</table>

Initial: $300,000, Design: $45,000, Contingency: $90,000, Phase Total: $435,000
Midterm: $60,000, Design: $9,000, Contingency: $18,000, Phase Total: $87,000
Future: $360,000, Design: $54,000, Contingency: $108,000, Phase Total: $522,000
5.4.2 Summary of Estimated Costs by Phase

Table 5.5 summarizes preliminary estimated costs by implementation phase. It should be noted that this assumes the phasing described earlier in this section is followed, however the breakdown of cost information should allow for the selection and consideration of various groupings and phasing of potential improvements.

<table>
<thead>
<tr>
<th>Phase</th>
<th>Improvements Types</th>
<th>Total Base</th>
<th>Design (15%)*</th>
<th>Contingency (30%)</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Phase</td>
<td>Transit Priority/</td>
<td>$690,000</td>
<td>$30,000</td>
<td>$210,000</td>
<td>$930,000</td>
</tr>
<tr>
<td></td>
<td>Transit Ops.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stations/Stops **</td>
<td>$300,000</td>
<td>$45,000</td>
<td>$90,000</td>
<td>$435,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mid-Term Phase</td>
<td>Transit Priority/</td>
<td>$670,000</td>
<td>$100,000</td>
<td>$200,000</td>
<td>$970,000</td>
</tr>
<tr>
<td></td>
<td>Transit Ops.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stations/Stops</td>
<td>$60,000</td>
<td>$9,000</td>
<td>$18,000</td>
<td>$87,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Future Phase</td>
<td>Transit Priority/</td>
<td>$1,650,000</td>
<td>$250,000</td>
<td>$490,000</td>
<td>$2,390,000</td>
</tr>
<tr>
<td></td>
<td>Transit Ops.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stations/Stops</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>** Station/Stops includes bus branding of $10,000 each for 10 buses during the initial deployment phase. All Station/Stop improvements are assumed to be completed in the Mid-Term Phase.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>* The 15% design cost factor is only applied to cost items requiring design, and is not a flat % applied to the total base cost.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

As shown in Table 5.5 the total preliminary estimated costs for the proposed Escondido Rapid Bus improvements are $4.81M. This includes $4.29M in potential transit priority and operations measures costs and $522K in stop and station improvement costs.

As discussed in earlier in this section, many of the future phase improvements may not be feasible outside of a larger roadway improvement effort. Implementation of the Initial Phase and Mid-Term Phase lowers the total estimated costs to $2.42M, including $1.90M for transit priority and operations measures and $522K for stop/station improvements.

5.4.3 Considerations for On-Going Operations Costs

While specific on-going operations costs were not estimated as part of the Escondido Rapid Bus study effort, it is important to recognize that the implementation of Rapid Bus service on the corridor will have some implications in terms of on-going operations costs and operating agency staff commitments. These on-going operations commitments should be incorporated into the annual operating budgets of the transit agency and city traffic engineering department in order that the Rapid Bus service can continue to provide higher levels of transit service with positive customer perceptions.
Some key on-going operations costs and potential staff commitments in full-time employee equivalents (FTE) include:

- **On-going signal/TSP monitoring and maintenance** – Will require staff experienced in signal operations and equipment with initial time commitments of 1/3 to 1/2 FTE dropping to 1/10 FTE once the TSP is fully configured and optimized.

- **Transit operations review/schedule adjustments** – A minimum of four schedule adjustments, in addition to those that may be part of the regular shake-down effort, will be required to adjust for the phased implementation of TSP, stop consolidation, and the Rapid Bus service. It is important that transit travel time reports from the RTMS be reviewed on a regular basis to determine if the effectiveness of the transit priority measures is being maintained. This could require 1/10 FTE once Rapid Bus service has been established and optimized.

- **Stop/station maintenance and up-keep** – The Escondido Rapid Bus project would represent a significant investment in enhanced stops and stations. In addition, trash pick-up and stop cleanliness were discussed as significant concerns during public input for this study. It is recommended that trash pick-up and cleaning for the Rapid Bus stops be twice as frequent as the regular local service until such time that the stops requiring extra effort can be identified.

- **Bus equipment checks/reviews** – Buses would receive regular service and maintenance checks consistent with the remainder of the local bus fleet, however the addition of the TSP equipment on the vehicles does require some addition monitoring.

All FTE estimates should be considered preliminary and are subject to the staffing structures and job assignments specific to individual agencies. For example, transit schedulers who deal with schedule adjustments on all Rapid Bus routes will be able to review travel time data and make appropriate adjustments more rapidly than someone who is not familiar with TSP, priority measures, and/or Rapid Bus service.

### 5.5 NEXT STEPS

The Escondido Rapid Bus Transit Priority Concept Study has laid the groundwork for the implementation of Rapid Bus service on NCTD Route 350. This report includes:

- Proposed improvements for transit priority measures, transit operations, stops, stations, and vehicles.

- Preliminary analyses of the potential benefits and impacts of the proposed improvements.

- Discussion of the potential implementation issues and concerns posed by PWG members, other project stakeholders, and the public.

- Suggested phasing for a logical staged implementation of Rapid Bus service.

- Planning level cost estimates by proposed improvement and by suggested phasing.

This information was developed in a cooperative effort between SANDAG, NCTD, and the City of Escondido with all three agencies being represented throughout the study effort. The proposed improvements represent a consensus amongst these three agencies as a starting point for Rapid Bus service implementation.
The general intent is to move forward with a relatively rapid implementation of the initial improvements in order to establish a working model for Rapid Bus service throughout North County. In order to proceed, the following next steps should be undertaken:

- **Confirm phasing of improvements and initiate project programming functions** – Given funding and project programming considerations, the phasing of Rapid Bus improvements should be reviewed and modified. Should funding prove more limited in the next year or two, the improvements indicated in this study could be re-organized. However, in order to effectively implement TSP, the baseline improvements discussed in this report would need to be implemented as part of the initial deployment phase.

- **Corridor signal system inventory and check** – The signal equipment at all intersections along Route 350 should be checked and inventoried, even those intersections not identified for TSP implementation. Checks should ensure the equipment is operating properly and make note of the controller make and mode, controller firmware, any special equipment (red light photo enforcement, etc.), existing timing plans, status of battery back-up systems, functioning of any communications, and specific makes and models of any emergency preemption equipment in place.

- **Initial signal timing and coordination update efforts** – Signal timing and coordination studies have been identified as a part of the Escondido Rapid Bus project in order to ensure the proposed priority treatments can work well with the existing grid and arterial network used by Route 350. These studies and any updates to signal timing and coordination must be completed prior to the implementation of TSP and the other priority treatments.

- **Confirm TSP approach and confirm status of on-board vehicle deployment** – The TSP approach proposed in this study should be considered in terms of the broader regional implementation plans for TSP. As proposed, TSP could be implemented within the 1-2 year initial timeframe, however if more complicated or untested approaches to TSP are used instead then the required timeline would likely extend at least into years 2-3. In addition, implementation of TSP assumes the functional operation of schedule adherence and integration of TSP equipment on-board the buses that would be assigned to Route 350. A review of the status of the RTMS deployment and some decisions regarding the make and models of buses that would be equipped with TSP should be made.

- **Initiate TSP design/signal engineering effort** – Once a signal system inventory is complete, signal coordination efforts are underway, and the TSP approach confirmed, the system design and signal engineering effort for the implementation of TSP at the proposed locations can be undertaken. This effort will identify specific settings and configurations for TSP at the intersections, and the effort can include design or even deployment of a system for monitoring TSP activity. This effort may also include testing of the specific TSP equipment in conjunction with the signal equipment that exists in the field to ensure safe operation.

- **Finalize bus and stop branding designs** – Several design concepts were presented to the public as a part of this study; and while preferred options were noted, no final decisions were made regarding the design of Rapid Bus vehicles or stops. These designs should be finalized as they will impact stop/station improvement site designs,
and there may be broader desires to develop a coordinated Rapid Bus theme for North County.

- **Initiate design for near-term physical priority measures** – This would include design for the proposed improvements to provide protected left-turn phases at Valley Parkway / Escondido Boulevard and 2nd Avenue / Escondido Boulevard.

- **Start and complete design process for stop improvements** – Any stops and station improvements identified for deployment in the Initial Phase should enter design once branding concepts have been confirmed. Design of these stops may take a little longer than is typical for traditional shelters, as new shelters may need to be designed in detail and fabricated.

- **Procurement of equipment** – Once the studies and preliminary design efforts are complete, the equipment procurement process should begin at least six months prior to scheduled installation. Procurement will need to include equipment for:
  
  - **Signals** – Including TSP equipment, software, replacements for obsolete equipment, etc.
  
  - **Bus equipment** – Including TSP equipment and anything required for integration with RTMS.
  
  - **Stops** – Including stop components for shelters, benches, trash cans, signage, lighting, etc.

  Procurement can be broken down into individual pieces or packaged in several different ways including design/build.

- **Initiate preliminary design for mid-term physical priority measures** – Several of the physical priority measures identified for the mid-term phase will require more lead time in terms of design due to complexity. If the desire is to implement these measures in Year 3, then design efforts will need to start in Year 2.

- **Schedule and perform before studies for evaluations of TSP impacts and transit travel time benefits** – As the Escondido Rapid Bus service will serve as a model for future deployments, it is important that conditions before the implementation of the service be documented. This includes appropriate floating car and transit travel time surveys.

Route 350 represents an excellent opportunity to deploy a viable Rapid Bus model in North County. The varied community environments, potential for Smart Growth coordination, existence of current transit travel time issues, and level of cooperation established between the stakeholder agencies represent a solid foundation for successful implementation.