EXPRESS BUS SERVICE DESIGN GUIDELINES
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1. VISION STATEMENT

Express Bus service is typically fast and traverses long distances. Its primary role is to connect commuters from outlying suburban areas to urban employment centers/areas and schools. To maintain high travel speeds and level-of-service, Express Buses only make a few stops to pick-up and drop-off passengers, then travels non-stop to its final urban destination(s). They operate on a combination of mixed traffic arterial lanes, expressways, highways, and freeways; however, Express Bus services typically performs best when operating on highway, freeway, or expressway HOV priority lanes, which allows the bus to bypass traffic queues in the mixed-flow lanes.

Over long distances, the cumulative timesavings can be substantial and make express service time competitive with personal automobile trips. Larger and more comfortable vehicles are often used for express services due to the longer trip durations required. VTA is evaluating future applications of Express Bus service including allowing Express Buses on future High Occupancy Toll (HOT) lanes, a hybrid system where Express Bus operates on freeway, highway, and expressway environments with in-roadway bus stops that provide connections to local bus lines, and a hybrid express and BRT line.

2. MODAL OVERVIEW

Express services are intended to be more time-competitive with the automobile and meet the needs of daily commuters traveling long distances. Express Buses typically serve trip patterns that have common origins and destinations, which are connected by highways, freeways, or expressways, typically with HOV facilities for maximum time-savings benefits. Express Bus services usually make stops at dedicated areas such as Park & Ride facilities, regional transit centers, and major transit rail and bus stations, then proceed non-stop to urban employment and commercial centers located in medium-high intensity core areas. Typically, suburban bus stops are located close to major arterials, major freeway on- and off-ramps, and HOV facilities to reduce access times, optimize speeds, and keep the express service time competitive with the automobile.

Express Buses primarily operate in peak commute periods and usually only on weekdays, although some regional express services may offer all-day, mid-day, evening, and weekend services, if markets for these services exist. For shorter routes, express...
services employ conventional 40-foot buses (the same as those on local bus service), while for longer distance trips 45-foot commuter coaches are often employed, with more comfort and amenities attractive to longer distance commuters such as high-back seats, arm rests, reading lights, overhead storage space and foldout tables. Figure 1 provides an example of an Express Bus traveling in the HOV lane.

VTA’s Express Bus services may consist of the following:

- **Limited Stop Service** – Frequently deployed over existing local bus routes that operate on corridors of great length, or where there is a need to offer faster service to complement the local service. Limited Stop routes typically operate with mixed-flow traffic. They are highly flexible to reroute to meet changing travel demand. Limited Stop routes serve major transit centers and on-street bus stops, and typically operate during peak periods only.

- **Express Service** – Tailored to meet the daily needs of commuters traveling long distances. Express Bus service often operates on dedicated transitways or highways, freeways, or expressways, especially if it has an HOV lane (Figure 2 shows a typical freeway HOV lane segment). Vehicles may be larger than conventional buses used on Limited Stop routes, and often offer greater ride comfort with high-back seats, arm rests, foot rests, overhead storage, tables, and reading lights. Express Bus services typically cover longer distances than Limited Stop services and have fewer pick-up stops before traveling non-stop to the final destination. Express Buses are intended to be time competitive with automobiles and often originate at Park and Ride lots (in local communities and along highways, freeways, or expressways) and/or rail or bus stations (usually with Park and Ride lots). In some instances, they may also share stops with Local Bus services or connect to other regional operators.

Some Express Bus routes schedule all pickup points before the bus enters the freeway or highway portion of the route—which is what VTA employs—while other routes serve multiple points along the highway, freeway, or expressway—as is the case in Houston, with its reversible flow HOV lanes.

- **Regional Express Service** – Typically provide trips between counties, often through physically constrained or congested corridors where limited routing alternatives exist. They are often designed for longer, multi-purpose trips, and may supplement Local Bus or Rail networks. They connect with key transfer and activity points and usually provide all-day service in both directions to accommodate commuters. Regional Express lines typically cover routes in excess of 20 miles in length.

The design of Express Bus services shall follow the descriptions outlined in the Service Management Plan (SMP) and in Table 1. Any proposed route changes (e.g. deviations, extensions) shall be subject to technical evaluation using formulas in the SMP and other similar industry accepted formulas.
## Table 1 VTA Express Services

<table>
<thead>
<tr>
<th>Express Type</th>
<th>Characteristics</th>
</tr>
</thead>
</table>
| **Limited Stop**                                                                                                                                           | - Long routes operating through major corridors, providing direct service with few stops.  
  - Generally operate on arterials and expressways, such as the San Thomas and the Lawrence Expressways.  
  - May operate with Transit Signal Priority (TSP) and other special corridor treatments.  
  - May be designed to serve specific commute travel patterns and multiple employment centers.  
  - Serves major transfer points.  
  - Typically only operates during the weekday peak period and in the peak direction.  
  - Generally travels in the north-south direction from South San Jose to business parks in north Santa Clara. These are only offered during the weekday peak. |
| **Peak Express**                                                                                                                                           | - Long commute-oriented lines, usually over 20 miles.  
  - Serves a maximum of three Park & Ride lots.  
  - More than 50% of the line shall be on freeways and/or expressways.  
  - Typically use commuter or bypass lanes and other special treatments, where possible, to reduce travel time.  
  - Serves highly traveled trip patterns that have common origins and destinations.  
  - Typically only operates during the weekday peak period and in the peak direction.  
  - Essentially cross-county routes and inter-county routes (e.g. between Alameda and Santa Clara counties) that operate along regional highways, such as SR 237 and SR85, and interstates, such as Interstates 680, 880, and 280. Figure 2 shows an example of an HOV lane where Express Buses travels in.  
  - Typically stop at most half a dozen places on the way to the final destination.  
  - Stops are all at transit centers or other regional transit stations, such as BART and Caltrain. |
### Table 1: VTA Express Services (continued)

<table>
<thead>
<tr>
<th>Express Type</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full-Day Express</td>
<td>• Similar to peak Express Bus routes except service is provided all-day in both directions.</td>
</tr>
<tr>
<td></td>
<td>• Serves multipurpose trips.</td>
</tr>
<tr>
<td></td>
<td>• Provides all-day service in both directions.</td>
</tr>
<tr>
<td></td>
<td>• Long lines, usually over 20 miles in length.</td>
</tr>
<tr>
<td></td>
<td>• Operates on freeways and expressways.</td>
</tr>
<tr>
<td></td>
<td>• Serves primary regional transfer and activity points that are closely integrated with rail services.</td>
</tr>
<tr>
<td></td>
<td>• Serves inter-county trips.</td>
</tr>
<tr>
<td></td>
<td>• Operates throughout the day in both directions and during the weekends.</td>
</tr>
<tr>
<td>Regional Express</td>
<td>• Provides inter-county long-distance service, which are designed for longer multipurpose trips.</td>
</tr>
<tr>
<td></td>
<td>• Supplements the Local Bus and Rail networks.</td>
</tr>
<tr>
<td></td>
<td>• VTA contributes funds to two regional express services: (i) Highway 17 Express (Hwy 17) between Santa Cruz and San Jose via Highway 17; and (ii) Dumbarton Bridge Express (DBX) between Union City and Los Altos/Palo Alto via the Dumbarton Bridge.</td>
</tr>
<tr>
<td></td>
<td>Hwy 17 operates every day throughout the day, while the Dumbarton Express operates only during weekdays. Figure 3 is an example of the Highway 17 regional Express Bus.</td>
</tr>
</tbody>
</table>

**Figure 2** HOV Lane Segment on Freeway, Typically Used by Express Bus Routes
3. PLANNING AND IMPLEMENTATION PROCESS

The design, implementation, and operation of all Express Bus service shall result from a comprehensive planning process. Prior to implementation all potential new lines or service changes will be subject to an initial planning study to determine the feasibility and structure, and identify the local commitments and funding necessary. The following Service Design Guidelines are part of this process for planning, designing, implementing and monitoring new service. Specific steps to evaluate existing and proposed service are as follows:

EXISTING SERVICE EVALUATION
Step 1 – Assess existing service versus established service standards
Step 2 – Devise and implement an Improvement Plan, if necessary

IMPLEMENTATION OF NEW SERVICE
Step 1 – Conduct market research and estimate ridership and revenue potential
Step 2 – Identify and design route alignments
Step 3 – Establish bus stop locations
Step 4 – Design stops and facilities
Step 5 – Develop an operating plan and implementation schedule
Step 6 – Monitor service performance (see Existing Service Evaluation)

4. EXPRESS BUS POLICIES

4.1 EXPRESS BUS PERFORMANCE STANDARDS

Consistent with the 2003 Service Management Plan, VTA Express Bus lines shall be evaluated according to the following standards, as shown in Table 2:

- Limited Stop – Boardings per Revenue Hour
- Express – 60% of Average Peak Load Factor for Weekday Service
- Regional Express – 60% of Average Peak Load Factor for Weekday Service

The boardings per revenue hour measures the number of boardings during a given revenue hour of vehicle service. It has served as VTA’s long-established evaluation criteria to assess
productivity of transit services. This indicator shows how well service is utilized given the amount of service provided. It also indicates whether the transit capacity offered is appropriate, and how well operating resources are deployed to provide service.

The average peak load factor is a measure of resource utilization. It compares the supply of seats available on a bus versus the average peak number of on-board passengers aboard at any given time during the peak period. For all-day service, the average peak load factor is based on the average peak load factor over the entire day.

Performance Standards Policy Note
The goal of Express Bus is to achieve a 20 to 25% farebox recovery ratio consistent with VTA’s Board adopted objective for all routes in the system.

Planning Notes
Future planning efforts will include an examination of the potential to operate express lines under new conditions and configurations. These may include express lines:

- As part of a High Occupancy Toll (HOT) Lane system.
- As hybrid lines that operate in freeway and highway environments with in-roadway stops connecting with local bus lines.
- As hybrid express/BRT lines.

These planning efforts will also include the review and study of existing lines for conversion to other modes such as from limited stops lines to BRT lines, and peak express lines to all-day express lines.

4.2 MARKET RESEARCH AND RIDERSHIP/REVENUE FORECASTS
Prior to the implementation of new service VTA shall undertake market research to comprehend market needs and ridership potential. The steps shall be to identify:

- Major trip generators and origin and destination patterns within the community.

<table>
<thead>
<tr>
<th>Table 2 Minimum Performance Standards for VTA Express Bus Service^</th>
<th>Type of Express Route</th>
<th>Weekday</th>
<th>Saturday</th>
<th>Sunday</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boardings per Revenue Hour^</td>
<td>Limited Stop (#300, #304, #305, etc.)</td>
<td>15</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>Minimum Peak Load Factors^</td>
<td>Peak Express (#101, #102, etc.)</td>
<td>60%</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>Full-Day Express (#180)</td>
<td>60%</td>
<td>50%</td>
<td>50%</td>
</tr>
<tr>
<td></td>
<td>Regional Express (#Hwy 17, Dumbarton Express)</td>
<td>60%</td>
<td>50%</td>
<td>50%</td>
</tr>
</tbody>
</table>

Table notes:
A These are examples of the performance standards as presented in VTA’s annual Route Productivity evaluation. The performance standards will be updated to reflect annual average ridership performance.
B Based on existing VTA performance.
C Based on standards established in the 2005 Service Management Plan (SMP).
• Type of infrastructure improvements needed.

• Optimal routing and service design characteristics (i.e. acceptable travel times, type of vehicles, service span, and days of operation).

• Potential location along the route that generates maximum ridership and revenues.

Even though a market may exist for a given route, the performance may not be sufficient to satisfy VTA standards as given in Table 2. Thus, VTA shall conduct ridership and revenue analyses on potential new routes and service segments to assure they meet existing standards. In addition, the analyses will help to identify potential locations along the route that generate maximum ridership and revenues. Considerations in these analyses are as follows:

• Ridership estimates shall be developed through a comprehensive planning process using VTA’s Countywide Transportation Model, Transit Service Planning Tool (TSP) and other Direct Demand Models. Local jurisdictions shall have access to these tools through the Improvement Plan (IP) Process.

• Revenue projections shall assume that fares will be consistent with VTA’s fare policy.

• Lines maybe incrementally implemented and expanded as demand increases.

**4.3 EXISTING SERVICE CRITERIA AND POLICIES**

An existing line not meeting the noted standards shall be subject to an IP to build ridership, increase fare revenues, and/or reduce operating costs and inefficiencies. Any modifications to a service must be designed to produce results that achieve the standards.

**Existing Service Policy Notes**

• A Limited Stop route not meeting minimum performance standards outlined in Table 2 shall be subject to an IP, which may include the following actions:

  » Restructuring or extending the route to improve ridership by better serving key trip generator areas and reduce operating costs by re-routing around unproductive segments, as long as total travel time is not increased significantly.

  » Reducing service hours or revenue miles, particularly in the off-peak.

  » Relocating bus stops to maximize potential riders based on existing land use and development.

  » Temporarily stopping service on particularly unproductive segments or unproductive stations.

• Peak, Full Day, or Regional Express Bus route not meeting minimum performance standards outlined in Table 2 shall be subject to an IP, which may include the following actions:

  » Restructuring or extending the route to improve ridership by better serving key trip generator areas and reduce operating costs by re-routing around unproductive segments, as long as total travel time is not increased significantly.

  » Changing to smaller vehicles to reduce unused capacity and thereby improve peak load factors and operating cost performance.

  » Reducing the number of daily runs operated and thereby the total supply of available seats every day.

• Any modifications to service must produce results complying with the average boardings per revenue hour or peak hour factor threshold.
• In instances where an IP is unacceptable or not practical, and limited stop services cannot be shown to meet the boardings per revenue hour standard, Limited Stop service shall be considered for local bus service levels or terminated depending on existing demand profile.

• In instances where an IP is unacceptable and Peak, Full Day, or Regional Express Bus services cannot be shown to meet the average peak load standard, lines shall be considered for Local Bus or Limited Stop service levels or terminated depending on existing ridership profile.

4.4 NEW SERVICE CRITERIA AND POLICIES
All new service shall be provided provisionally, subjected to at a minimum an annual review. New service shall be given two years to reach the performance standards in Table 2, with intermediate performance expectations as shown in Table 3. Lines that do not meet the performance expectations and that do not have an approved IP shall be discontinued, with resources reallocated to services that meet or exceed the standard.

5. EXPRESS BUS ROUTE DESIGN
Express Bus routes shall be longer distance routes that connect suburban areas, including regional transit centers with Rail and Local Bus connections and Park and Ride lots with urban areas, including employment cores and activity centers. These routes shall serve high volume origin and destination pairs. Express Bus routes shall have a limited number of pickup points in suburban areas and continue non-stop to urban destinations on high-speed thoroughfares such as expressways and highways to remain time-competitive with automobiles.

Once off high-speed thoroughfares, Express Bus routes shall operate on major arterials leading into the city and urban areas. Where available, Express Bus routes shall maximize the utilization of HOV or dedicated express lanes. Figure 4 shows a typical route design for Express Bus.

In general, Limited Stop services provide faster service than Local Bus services, with fewer stops. Standard and Regional Express Bus services traveling on freeways, highways, or expressways or HOV lanes operate more quickly and stop less frequently than Limited Stop arterial services. Refer to section 9 for a discussion of Express Bus vehicle characteristics.

<table>
<thead>
<tr>
<th>Time from Implementation (Months)</th>
<th>% Compliance with New Service Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>60</td>
</tr>
<tr>
<td>12</td>
<td>75</td>
</tr>
<tr>
<td>24</td>
<td>100</td>
</tr>
</tbody>
</table>
6. EXPRESS BUS STOP LOCATIONS

The functionality, safety, and visual appearance of stops are critical to attracting and maintaining transit riders in any location. Accordingly, local jurisdictions that proactively work to improve the public perception of transit and access to transit stops and stations shall receive priority considerations for service improvement when competing opportunities or proposals exist (see Transit Sustainability Plan Improvement Plan (IP) for more details on IP process).

Express Bus stop location guidelines are as follows:

- Existing bus stop facilities for Local Bus services as well as those at transit centers and major transit stations shall be utilized to the extent possible, such that conditions described below are met to attract and assure a sustainable ridership level and to achieve competitive operating speeds versus automobiles.

- Suburban stop locations shall be selected to maximize suburban or outlying ridership potential and provide direct and safe access between stops and surrounding land uses.

- Suburban stop locations shall be located at regional Park and Ride facilities, regional transit centers, and major rail and bus transit stations.

- Suburban and urban stop locations shall be adjacent to or in close proximity to major arterials, major freeway, highway, and expressway on- and off-ramps, and HOV facilities to assure direct and quick access.

- Urban stops shall be located at regional transit centers and at major rail and bus transit stations.

- Urban stops shall be located within urban employment and commercial centers possessing medium-high intensity of development to assure sustained and high demand from suburban residential areas.

- Specific stop location shall be governed by safety and physical constraints.

- Bus stops shall be provided in locations with sufficient right-of-way for related facilities and amenities, including passenger shelters, benches, lighting, poles, informational signage, bike racks, and trash receptacles.

- Bus stops shall be provided in locations with sufficient red-curb space for buses to move into and away from the curb.

7. EXPRESS BUS STOP FACILITIES DESIGN

Bus stops are the link between riders and the community, and the transit service offered. Express Bus stops may consist of flagpoles and benches at an intersection, or may be more elaborate with shelters and passenger information, for instance at a major transit center or Park and Ride lot. Express Bus services often share bus stops with local bus services. VTA Express Bus stops shall have the following features:

- Bus stop amenities shall be determined based on ridership levels, available rights-of-way, adjacent land uses, and local agency or private contributions.

- The minimum facilities shall include:

  - A bus stop pole with a line number sign.
  - ADA accessible dimensions (new and modified stops).
  - Concrete pad per VTA criteria (new and modified stops).

- Designs based on the CDT Manual (Appendix A), which includes stopping pad, red curb area, sidewalk, and amenity descriptions.
• ADA compliant designs.
• Additional protection if the stop is located on the freeway shoulder or median to shield waiting passengers from fast-moving vehicles, potential flying debris, and high winds.
• Stations shall have sufficient facilities to meet Park and Ride users at inbound suburban station where there is/are: (i) available open space for parking lots; (ii) appropriate access roads; and (iii) demand for auto trips.
• Stations shall have sufficient facilities to meet Park and Ride users at inbound suburban station where there is/are: (i) available curbspace and sidewalk width for pickup and dropoff zones; (ii) appropriate access roads; and (iii) demand for auto trips.
• Appropriate facilities and links to other nearby intermodal transit/transfer stations (e.g. local bus, rail), including information signs, covered walkways and shelters.
• Bicycle parking is required at all stations per VTA’s adopted Bicycle Plan. Bike rack and locker design, placement and number of racks shall comply with the Bicycle Technical Guidelines.
• Direct pedestrian and bicycle links to the surrounding community and nearby transit friendly developments.
• Adequate support facilities, such as layover bays, turnaround areas, red-curb space, space for stops, and inter-modal transfer facilities at locations where transit lines meet and transfers occur to: (i) allow for safe and easy pedestrian flow; (ii) provide for adequate signage and visual cues; (iii) accommodate waiting transfer passengers; (iv) permit seamless and quick transfers; and (v) accommodate multiple transit modes simultaneously at a single facility.
• Appropriate operator break and bus layover facilities at route origin and destination. Break points shall also have necessary right of way to accommodate buses.

8. OPERATING DESIGN AND MANAGEMENT

An operating plan details how a particular transit service shall operate. It includes specifics on the type of route, frequency, service span, and stop spacing. Table 4 shows the proposed Express Bus operating plan requirements for VTA:
<table>
<thead>
<tr>
<th>Aspect</th>
<th>Limited Stop Routes</th>
<th>Express Routes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Route Type/Structure</td>
<td>A service making a limited number of stops compared to Local Bus services on longer routes. Operates primarily on major arterials and freeways, highways, and expressways. Service is only in the peak direction.</td>
<td>A faster service with fewer stops than Limited Stop service on longer distance routes. Operates primarily on highways, freeways, and expressway HOV lanes. Service may be in the peak direction only or bi-directional, depending on the level of demand.</td>
</tr>
<tr>
<td>Span of Service</td>
<td>Peak only</td>
<td>Primarily peak only, but depends on demand. All-day service is employed for Full Day Express Bus services.</td>
</tr>
<tr>
<td>Operating Period</td>
<td>Weekdays only</td>
<td>Primarily weekdays, however, depending on demand, weekends are possible as well.</td>
</tr>
<tr>
<td>Minimum Headways</td>
<td>Developed through planning studies and based on demand intensity at suburban stations.</td>
<td></td>
</tr>
<tr>
<td>Minimum Average Operating Speed</td>
<td>~25 to 50 mph</td>
<td></td>
</tr>
<tr>
<td>Bus Stop Spacing</td>
<td>Spacing based on the need to maximize ridership potential and should be located in close proximity to Park and Ride lots, regional transit centers, regional bus and rail transit stations, and close to highways, freeways, and expressways.</td>
<td></td>
</tr>
<tr>
<td>Operating Coordination with Other Transit Providers</td>
<td>Coordinated with those of other operators to the extent possible, especially for Peak Express Bus services, which only operate during a limited peak window and only in the peak direction.</td>
<td></td>
</tr>
<tr>
<td>Fares</td>
<td>Consistent with VTA fare policies.</td>
<td></td>
</tr>
<tr>
<td>Bus Stop Maintenance</td>
<td>Performed pursuant to the policies outlined in the CDT Manual and the Ad-Shelter Program.</td>
<td></td>
</tr>
</tbody>
</table>
9. VEHICLE CHARACTERISTICS
Standard 40-foot coaches (similar to buses used for local service) and 45-foot commuter coach style buses (similar to Greyhound) may be deployed for express services. While seating capacity is nearly the same for either standard or commuter coaches, commuter coaches shall be deployed on relatively long routes so that every passenger has a comfortable seat for long trips. Table 5 shows VTA’s recommend vehicle characteristics. Figures 5 and 6 show examples of the standard 40-foot bus and the 45-foot commuter coach bus, respectively.

10. SPECIALIZED BRANDING/MARKETING
VTA Express Buses shall employ the traditional VTA branding and coloring.

<table>
<thead>
<tr>
<th>Table 5 Recommended VTA Express Vehicle Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Vehicle Characteristics</strong></td>
</tr>
<tr>
<td>Seating Capacity</td>
</tr>
<tr>
<td>Seating + Standing Capacity</td>
</tr>
<tr>
<td>Minimum # of Doors</td>
</tr>
<tr>
<td>Style</td>
</tr>
<tr>
<td>Branding</td>
</tr>
<tr>
<td>Bicycle Racks</td>
</tr>
<tr>
<td>Application</td>
</tr>
</tbody>
</table>

Figure 5  Standard 40-foot Bus for VTA Express Services (Regional Express Route #180)

Figure 6  Typical 45-foot Commuter Coach for Express Services