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SERVICE DESIGN GUIDELINE OVERVIEW

The Service Design Guideline (SDG) have been developed as a supplement to the Transportation Sustainability Policy (TSP) process to evaluate, design, implement and monitor VTA transit services. The guidelines provide linkage between local support of transit service, construction and operational feasibility, overall operational efficiency and ridership. They outline the conditions and provide a roadmap of the actions necessary to effectively operate all modes of transit service available in Santa Clara County from Community Bus to Heavy Rail (e.g., Caltrain and future BART) systems. Summaries of the transit modes considered in the Service Design Guidelines are provided in the following sections.

COMMUNITY BUS

DEFINITION

Community Bus provides low cost, circulator transit service in lower-density communities to meet the needs of the community it serves. Community Bus typically connects local residential communities to local downtown districts or provides connections within downtown business districts offering connections from major transit centers to employment centers, commercial areas and residential districts.

APPLICATION OF MODE

Community buses are deployed along short fixed routes, designed for people to easily enter and exit the system. Typically VTA operates 28 foot buses with a vehicle capacity of 25 passengers plus two additional spaces reserved for wheelchair passengers. Bus stops, vehicles, and marketing materials are specially branded to reflect the unique nature of the service.

Provisions can be made for local agencies and private organizations to develop a financial partnership to fund community bus service. Community Bus typically provides a high degree of access and multiple stops across short distances – approximately every 500 feet - within a focused area.
COMMUNITY BUS

**Los Gatos Community Shuttles**

*Funding Source:*
VTA

*Service Area:*
Between Winchester Transit Station and Downtown Los Gatos

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COMMUNITY BUS

**Downtown DASH (San Jose)**

*Funding Source:*
Downtown San Jose Business Association

*Service Area:*
Downtown San Jose

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COMMUNITY BUS

**Gilroy Shuttle**

*Funding Source:*
VTA

*Service Area:*
Between Gilroy Transit Center and St. Louise Hospital
LOCAL BUS

DEFINITION

Local Buses provide low cost feeder service within a specified area that links communities to major activity centers (e.g., airports). Secondary and primary grid routes provide medium to long distance services that create connections between neighborhoods, activity centers, employment areas and/or major transit hubs. Feeder routes provide shorter distance local trips within neighborhoods or city centers.

APPLICATION OF MODE

Buses operate on arterial streets in mixed flow traffic lanes typically following the grid pattern of a city street. They experience the same congestion and travel-time delays as other traffic. However, when coupled with enhancements such as signal priorities, buses are able to improve their travel time performance and remain more competitive than the car.

Feeder routes offer a high degree of access for shorter distance local trips within a neighborhood or city, while secondary and primary grid routes have greater stop spacing to allow for medium to long-distance trips. In general, buses can be rerouted to meet the changing needs of the community it serves.

Local bus stop spacing ranges from 500 to 750 feet. The buses are typically standard 40 foot buses; however, in instances where there is high ridership demand, VTA may choose to use 60 foot articulated buses.

LOCAL BUS

Feeder Route

Examples:
• Route 10
• Route 44

Service Characteristics:
• Short routes providing local stop service
• Low to high service frequency
• Access to transit generators not directly accessible from other major lines
LOCAL BUS

Secondary Grid

Examples:
• Route 35
• Route 72

Service Characteristics:
• Medium length lines general operating on less traveled arterial streets
• Serve areas with medium density land uses
• Fills gaps in the grid route network
• Typically distributes trips along entire length of the line with many trip origin and destination points

Primary Grid

Examples:
• Route 22
• Route 68

Service Characteristics:
• Evenly spaced lines providing medium to long regional and sub-regional service
• Direct service with minimum route deviations, operating along major corridors with high-density land uses
• Relatively high-frequency service
• May use higher capacity articulated buses when ridership permits
EXPRESS BUS

DEFINITION

Express Bus service is typically a fast transit service that traverses long distances, providing connections between outlying suburban areas, and urban employment centers and schools. To maintain high travel speeds and level-of-service, Express Buses make a few stops in suburban communities to pick-up and drop-off passengers, then travel non-stop on freeways, highways, and/or expressways to its final destination. VTA employs three types of Express Bus service in the county including:

- **Limited stop** service typically overlays existing Local Bus routes and caters to the time-sensitive commuter by improving travel times through a reduction of stops.
- **Express service** covers longer distance trips than Limited-stop service by offering fewer pick-up stops before traveling non-stop to its final destination
- **Regional Express service** typically provides trips between counties, often through physically constrained or congested corridors where limited alternative transit routes exist.

APPLICATION OF MODE

Limited Stop service can operate throughout the day and on both weekdays and weekends. Buses are typically employed on local arterial streets. Bus signal priority and other transit priority enhancements can make Express Buses more competitive with the automobile.

Limited stop buses are typically the standard 40 foot bus but can be upgraded to 60 foot articulated bus when ridership demand warrants.

Express and Regional Express service typically is geared towards commuters and operates only on weekdays during commute times. Service can operate on a combination of roadways (e.g. mixed-flow traffic arterial streets, expressways, highways); however, buses typically perform best when operating on highway, freeways, or expressway HOV lanes, which allow the bus to bypass traffic queues in the mixed-flow travel lanes. Buses are typically larger 45 foot buses that have amenities that are attractive to longer distance commuters such as high-back seats, arm rests, reading lights, overhead storage space and foldout tables.
EXPRESS BUS

Limited Stop Service

Examples:
• Route 304
• Route 321

Service Characteristics:
• Long lines operating on major corridors providing direct service with few stops
• May be designated to service specific commute travel patterns and serve more than one employment center
• Provides service that operates at higher speeds and has fewer stops than local bus but more stops than express lines
• Serves major transfer points

EXPRESS BUS

Express Service

Examples:
• Route 101
• Route 180

Service Characteristics:
• Operating on major corridors
• Long routes providing direct service with few stops
• Serves park-and-ride lots
• Uses commuter lanes and other special treatments whenever possible
• Serves highly-traveled trip patterns with common origins and destinations
EXPRESS BUS
Regional Express Service

Examples:
- Dumbarton Express
- Highway 17 Express

Service Characteristics:
- Provides all-day service in both directions
- Long distance trips (usually over 20 miles)
- Serve primary regional transfer and activity points
- Routes are closely integrated with rail service to provide convenient transfers
- Serves inter-county trips

BUS RAPID TRANSIT (BRT)

DEFINITION

BRT service typically has higher operating speeds compared to Local Bus service. It operates on a headway-based schedule with minimum headways ranging from five to 15 minutes. BRT offers many of the same features of rail transit but rely on traditional bus vehicles. VTA has two categories for BRT:

- **BRT 1** is a premium level service, with higher operating speeds, greater reliability, and fewer stops than Local Bus service. Stations generally have standard amenities such as shelters, benches, and may include real-time passenger information.

- **BRT 2** provides high-quality high-speed environmentally-friendly public transit service in specialized dedicated running ways. Similar to Light Rail or Heavy Rail, infrastructure includes high-capacity stations with enhanced amenities. BRT 2 requires higher capital investments than BRT 1 due to specialized or dedicated running ways, and enhanced infrastructure such as high-capacity stations. In addition, BRT 2 has additional features to improve service including passing lanes at bus stations to provide vehicles the flexibility to bypass stations and unique branding of vehicles to distinguish BRT 2 service from other bus transit modes. The permanent operating facilities for BRT 2 promote diverse, high-density land uses, particularly around station areas.

APPLICATION OF MODE

BRT is implemented on longer corridors dotted with higher density activity centers or development nodes that provide connections between downtowns, employment centers and outlying residential and commercial centers. The service can be designed to serve a specific commute pattern or operate in both directions.
In general, BRT systems make fewer stops than local buses to increase its travel speeds and remain more competitive with single-occupancy vehicles. Stop spacing can range from 2,500 to 7,500 feet. To further improve travel speeds, many BRT systems are combined with intelligent transportation systems (ITS) including signal timing and priority systems, queue jump lanes and/or off-board fare collection. In addition, stations are equipped with amenities such as enhanced shelters and real-time information to improve information available to transit riders. BRT services, and stations are often brand differentiated from other transit modes.

BRT lines generally use standard or articulated coaches. Buses have the flexibility to operate as a BRT 1 or BRT 2 system or as some hybrid service with a combination of running way types along segments of the corridor, based on demand and infrastructure available. Routes operating on fixed guideways have the potential to attract greater density development around station areas.

BRT has the flexibility to be upgraded and expanded to meet increasing demand along a corridor, and can, in some situations, serve as a precursor to implementation of light rail transit (LRT).

### BUS RAPID TRANSIT

**BRT 1**

*Examples:*
- Route 522

*Service Characteristics:*
- System operates on existing ROW
- Unique station areas to improve rider comfort
- Minimum headways of 15 minutes

**BRT 2 (Currently not available in Santa Clara County)**

*Examples:*
- Eugene Oregon

*Service Characteristics:*
- Physically separated from general traffic, requiring new ROW
- Enhanced station areas to improve rider comfort and to provide the appearance of rail service
LIGHT RAIL TRANSIT (LRT)

DEFINITION

LRT provides high-quality, high-speed, and environmentally-friendly public transit service in established trunk corridors that link major trip generators, regional centers, and county cores. Successful LRT service generates high levels of ridership, is time-competitive with the automobile, accommodates higher capacity needs than Bus Rapid Transit, and costs less than Heavy Rail Transit.

LRT is a premium, accessible and convenient service capable of attracting and promoting development and investment around stations and along corridors.

APPLICATION OF MODE

LRT is designed to have limited access points with a few key stops along the corridor. On average the stop spacing for LRT should be between 2,500 and 7,500 feet. Routes can share a street with mixed-flow traffic or operate on semi- or fully separated right-of-way, such as freeway medians or shoulders, railway right-of-ways, pedestrian malls, tunnels or elevated structures.

Train length and service frequency can be adjusted to respond to changing demand and special operating speeds. Transit signal priority is employed for LRT at-grade crossings to minimize delay and waiting time at intersections. In many cases, when Light Rail is built, there is a community response to intensify land use development along the corridor.

LIGHT RAIL TRANSIT

Examples:
• Route 901 from Alum Rock to Santa Teresa
• Route 902 from Downtown Mountain View to Winchester

Service Characteristics:
• Preferred high density mixed development around station areas
• Stations are well integrated with the community including pedestrian oriented and transit-friendly developments
• Optimal minimum headways of 5 to 10 minutes during peak periods and 15 minutes during off peak periods
STATION AREAS

DEFINITION

Light and Heavy Rail transit stations provide permanent connections to the local community and encourage development and densification around station areas.

APPLICATION OF MODE

Rail stations in the county include Light Rail, Commuter Rail (Caltrain, ACE and Amtrak), and Heavy Rail (future BART) stations.

Stations create a link between the transit system and community. Well placed and well designed stations with good multi-modal connectivity, direct and convenient access to adjacent communities, and transit-supportive land uses have the potential to generate high volumes of transit trips. Suburban rail stations are often simple designs with Park & Ride and Kiss & Ride facilities, whereas urban rail stations often do not have parking, but link directly into large multimodal, downtown transit terminals. All stations

<table>
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<tr>
<td>Light Rail - VTA Light Rail</td>
<td></td>
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<tr>
<td>Station Characteristics:</td>
<td></td>
</tr>
<tr>
<td>• Stations are located every .75 to 1 mile</td>
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<tr>
<td>• Wide ROW to accommodate bi-directional tracks</td>
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<tr>
<td>Heavy Rail - BART</td>
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<tr>
<td>Station Characteristics:</td>
<td></td>
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<tr>
<td>• Stations are typically one to several miles apart</td>
<td></td>
</tr>
<tr>
<td>• Long platforms</td>
<td></td>
</tr>
<tr>
<td>Multimodal</td>
<td></td>
</tr>
<tr>
<td>Station Characteristics:</td>
<td></td>
</tr>
<tr>
<td>• Easy connections between travel modes</td>
<td></td>
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<tr>
<td>• Long platforms to accommodate all modes</td>
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shall be located in close proximity to (if not directly serving) major trip generators such as civic and employment centers, mixed-use districts and high-density residential areas, colleges, universities and shopping centers.

Figure 1 summarizes the operating characteristics of each of the transit modes standards presented in the Service Design Guidelines.

Figure 2 compares the distance a person can travel by each mode over a ten-minute period. In addition, it shows the stop spacing of each of the modes over a ten-minute period. As the figure shows, a direct relationship between the stop spacing, the travel distance; fewer stops means greater travel distance, while more frequent stops equates to reduced stop spacing.
### Typical Operating Characteristics

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<td>20</td>
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<td>Limited Stop 20</td>
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#### 2007 SDG Standards

- **Load Factor**: 1.0 = a target of no standees.
- **Crush Capacity**: Typically 125-150% of the seating + standing capacity

### Vehicle Capacity: Seated + Standing

- **40' Standard**
  - **Community Bus**: 50-60 passengers
  - **Local Bus Feeder**: 50-60 passengers
  - **Local Bus Secondary Grid**: 50-60 passengers
  - **Local Bus Primary Grid**: 50-60 passengers
  - **Express Bus**: 100-1,000 passengers

- **60' Articulated**
  - **Community Bus**: 80-90 passengers
  - **Local Bus Feeder**: 80-90 passengers
  - **Local Bus Secondary Grid**: 80-90 passengers
  - **Local Bus Primary Grid**: 80-90 passengers
  - **Express Bus**: 80-90 passengers

### Passenger Volume

- **Average Peak Load**: 50-1,500 passengers/hour
- **Average Operating Speed**: 15-25 mph
- **Average Headways**: 10-20 minutes

### Other Measures

- **Boardings Per Route Mile**: 55
- **Boardings Per Station**: 150
- **Boardings Per Route Mile**: 600

### Figure 1

- **Boardings Per Station**: 350
- **Boardings Per Route Mile**: 1,250
- **Boardings Per Car**: 100 (single car) to 500 (multiple car)
- **Acceptable Load Factor**: 1.00-1.25

---

*1) Load factor connotes standing + seated load divided by seating capacity (thus 1.0 = a target of no standees).
2) Crush Capacity - Typically 125-150% of the seating + standing capacity
3) 40' Standard Bus - up to 80 passengers
4) 60' Articulated Bus - up to 120 passengers

VTA TRANSIT SUSTAINABILITY POLICY 2007*
Distance by Mode Over 10-Minute Travel Time

- Walk
- Bicycle
- Community Bus
- Local Bus
- Express / Limited-Stop Bus
- Bus Rapid Transit / Light Rail Transit
- Heavy / Rapid Rail
- Commuter Rail

Typical stop spacing and line capacity details for each mode are provided in the figure.