



# Transit Design Guidelines

Final Report

March 15, 2013



## DISCLAIMER

The purpose of these guidelines is to develop suggested design criteria that should be considered when designing and placing transit facilities. This information is not to be used as a set of standard details on which to base a final design, but rather as recommended criteria and general guidance for the placement and safe design of transit facilities. It cannot be overemphasized that these guidelines must be used in conjunction with sound evaluation of the facts and planning/engineering judgment. These guidelines are intended to be used for actions on new or revised stop locations, and do not intend to apply to existing stop locations.

Local jurisdictions, in endorsing these guidelines, indicate their general acceptance of the information provided. Their acceptance of these guidelines does not modify or supersede their current standards and/or policies otherwise adopted by the jurisdiction. It is also important to note that the preferred dimensions should be planned for, and minimum dimensions are applicable only in specific constrained circumstances.

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## 1. INTRODUCTION

This document summarizes the recommended guidelines for the design of transit system components including bus stops, bus facilities and amenities, and the sbX system.

### 1.1 Purpose and Organization of Transit Design Guidelines

The purpose of this manual is to provide design criteria guidelines that should be considered when designing and placing safe and secure transit facilities. These guidelines are developed by Omnitrans, working with the local jurisdictions they serve for the goal of providing safe, comfortable and convenient high quality facilities at bus stop locations, while considering the operational needs of Omnitrans, the requirements of the Americans with Disabilities Act (ADA), other federal and state accessibility mandates, and public safety and security.

These guidelines are intended for use by city planners, designers, traffic engineers, developers, and other public officials. The general public may also find these guidelines useful in understanding the current practices for the placement of transit facilities. By no means is this information intended to be used as standard details on which to base a final design, but rather as recommended criteria and general guidance for the placement and safe design of transit facilities. It cannot be overemphasized that these guidelines must be used in conjunction with full evaluation of the facts and local conditions, and the application of sound planning/engineering judgment. Each particular site must be thoroughly examined and each particular project must be evaluated from the aspect of safety, operational requirements, and cost-effectiveness. Design solutions may need to be adjusted accordingly to satisfy site specific constraints and applicable local ordinances.

These guidelines are intended to be used for actions on new or revised stop locations and for sbX system implementation, and do not apply to existing stop locations.

### 1.2 Goals

The goals of the guidelines are to:

- Promote consistency in local bus stop and transit facility placement and design throughout Omnitrans' service area;
- Provide guidance for cities, property owners, real estate developers, and other partners to incorporate bus stops and other facilities within new development that meet Omnitrans' operational needs;
- Help communities meet their mobility and sustainability goals by providing safe, comfortable, and convenient transit facilities that encourage public transportation use;
- Incorporate intelligent transportation systems (ITS) seamlessly into the Omnitrans system;
- Provide comfortable and convenient high quality transit facilities; and
- Provide a template for sbX system development in identified sbX corridors and station locations.

### 1.3 Document Overview

Omnitrans provides a range of services, each with its own identity, to serve the San Bernardino Valley. These services require different transit infrastructure improvements based on the type of service. This document provides the design guidelines for the full range of Omnitrans services and corresponding transit facilities. This effort to include all of Omnitrans services in a

single document that builds upon Omnitrans 2006 Bus Stop Design Guidelines and includes a standardized design of the sbX system that is currently under construction along Route 2 in San Bernardino and Loma Linda.

Local fixed route bus service accounts for the largest portion of Omnitrans services. In addition to the local fixed route service, Omnitrans operates the Access and Omni-link services and is introducing a new mode of transit service in its service area, Bus Rapid Transit (BRT), a premium transit service. The San Bernardino express (sbX) is a BRT system with its own unique identity and branding as well as unique system components, specialized vehicles, roadway design and station components.

Omnitrans vehicle designs vary for both for local bus service and sbX Service. Local bus stops and transit centers are designed around a typical 40' local bus. These vehicles are 40' long, with a 3'6" bike rack attached to the front of the vehicle. Efficient operation of Omnitrans local bus service is dependent upon the vehicles properly interfacing with bus stops, roadway designs, other vehicles on the roadway, pedestrian and bicycle networks and transit centers, which are discussed in their respective sections of the guidelines. The other major design vehicle is the sbX specialized 60' articulated bus. These 5-door vehicles will operate in sbX corridors, and have their own design requirements to properly interface with sbX stations and roadway components.

One of the major components of Omnitrans services are the bus stops. A range of bus stops exist including minimum, standard and high activity stops. Omnitrans is also introducing sbX stations to its service area with the development of the sbX green Line currently under construction. There are three major types of bus stops: farside stops, where the vehicle crosses into the intersection to pull up to the stop; nearside where stops are located before crossing the intersection and mid-block locations located away from intersections. Curb clearance requirements

and bus stop and transition lengths are detailed here. These local bus requirements are also presented in Section 1.4, summary of requirements.

The planning and policy framework for the location of local bus stops, requests for changes to bus stop locations, community planning and development coordination, and a discussion of mitigating construction impacts on transit services are described in Section 4. The planning and policy framework has changed very little since the 2006 bus stop design guidelines, with changes consisting primarily in the addition of a checklist to review development plans to ensure location of bus stops are conducive to providing transit access. It is also important to note that the preferred dimensions should be planned for, and minimum dimensions are only applicable in specific circumstances.

Omnitrans' minimum stops are for rural or low activity stops, and standard bus stops should be planned for all new stops. As shown in Figure 1-1, Minimum bus stops must include space for ADA landing pads located at the front door (5' x 8') and rear door (10' x 8') of vehicles, along with a minimum 4' clear pedestrian sidewalk. Curb ramps are integral to bus stop locations, and signage with route and schedule must be provided, outside of the clear zone for landing pads and to avoid conflict with bus mirrors.



*Figure 1-1: Minimum Bus Stop*

Amenities for local bus stops such as shelters, benches, trash receptacles, additional lighting, bicycle parking, newspaper and vendor boxes and landscaping should be considered based on a number of factors, including:

- Average daily boardings;
- Proximity to major trip generators;
- Passenger transfer activity;
- Planned neighborhood improvements;
- Transit corridor marketing efforts;
- Equity among communities in the County;
- Proximity of other nearby sheltered areas; and
- Customer and community requests.

The range of amenities provided distinguish standard bus stops, as shown in Figure 1-2, which contain a landing pad, a bus pole with signage and route information, a bus shelter and bus bench and a trash receptacle; from the high ridership bus stops, as

shown in Figure 1-3 which may contain additional amenities such as bike racks, water fountains, vendor boxes, and additional seating and distinct shelters. High ridership stops also qualify for additional amenities as shown in Figure 1-3.



*Figure 1-2: Standard Bus Stop*



*Figure 1-3: High Ridership Bus Stop*



sbX stations, as shown in Figure 1-4, are passengers first impression of the sbX service and are designed to be similar to light-rail stations, and provide quicker on and off boarding of passengers. Station features such as level boarding, off board ticket purchasing through ticket-vending machines are based on a kit-of-parts that help create the sbX brand.

OmniTrans vehicles also require specific roadway design considerations for pulling in and out of bus stops, as well as locating bus stops near intersections. Considerations of roadway design are presented must take into account tradeoffs between

traffic volumes, safety, and pedestrian and bicycle environments. Bus pads for reinforced roadway surfaces have proven to be helpful to prevent roadway deterioration due to the weight of transit vehicles. Bus turnouts are presented as a potential option for accommodating local bus service, however as bus turnouts increase the difficulty of buses re-entering traffic they should only be considered in special circumstances. Bus bulbouts and enhancements to the pedestrian environment are critical to providing a safe and secure path of travel to bus stops, and bus turning radii are presented.

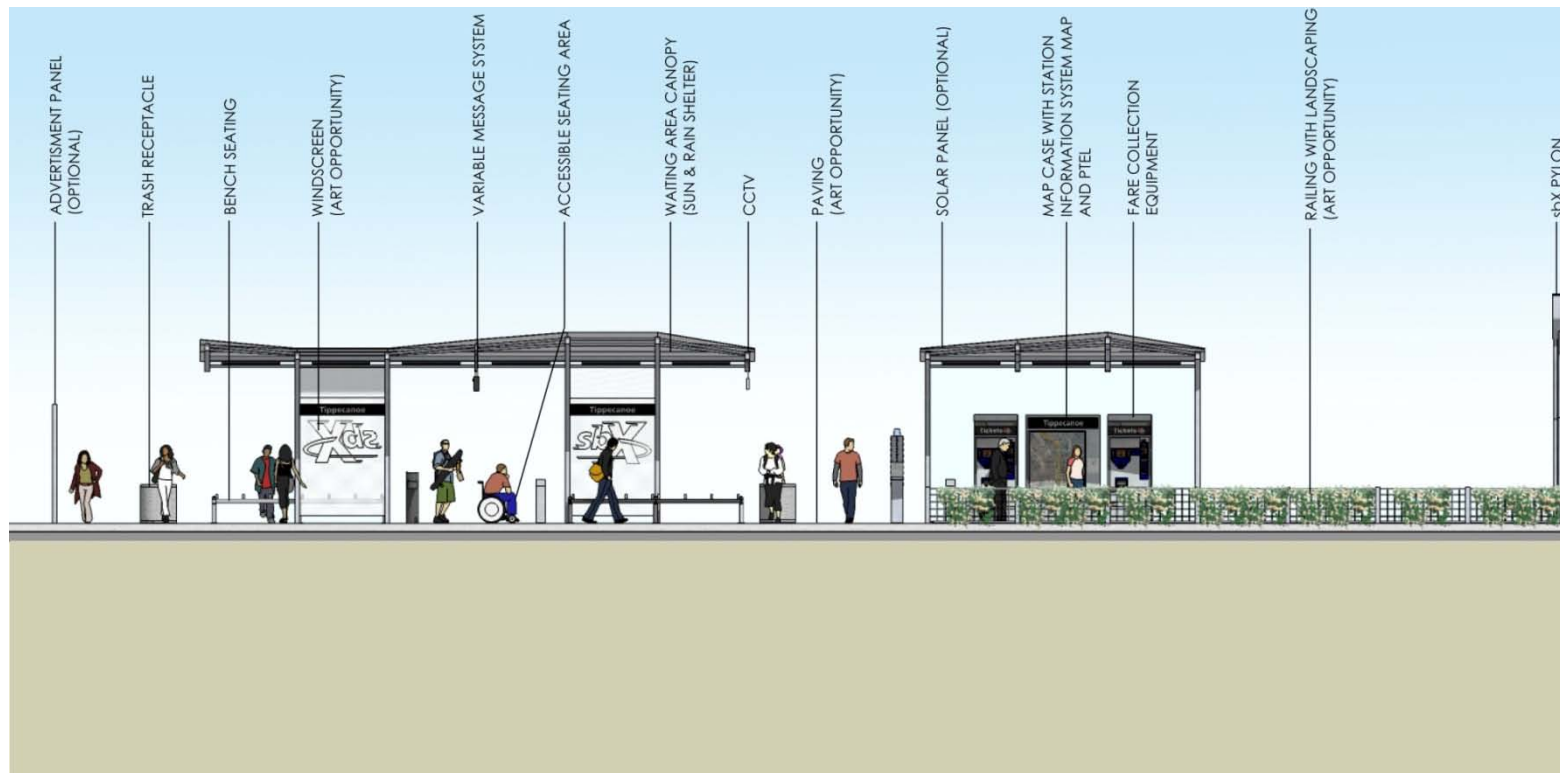


Figure 1-4: sbX Station

As a premium transit service, sbX corridors are designed for faster and more reliable service. Specific roadway elements associated with sbX service can help meet these goals, including the introduction of exclusive lanes, where only sbX vehicles would operate. Exclusive lanes, can occur either in the center of the street along the median or at the curb, and can be fully separated lanes, or converted bus lanes. Exclusive bus lane widths for the sbX service range from 12' in the minimum condition to 14' in the optimum condition. Queue jumper, which allow sbX vehicles to bypass traffic waiting at signalized intersections also help meet the goals of the sbX service. Multiple configurations are described, and both exclusive lanes and queue jumper lanes require special signage and roadway markings to distinguish sbX lanes from travel lanes.

Transit Signal Priority (TSP) is also a useful tool that allows for premium transit service to be introduced into sbX corridors. TSP enables transit vehicles that are behind schedule to communicate with traffic signals, and request priority treatment based on a variety of conditions. If appropriate conditions are met, then the signal either stays green for a brief period, allowing the sbX vehicles to pass through the intersection, or shortens the red cycle reducing the dwell time at intersections.

Safety and security are one of the most critical areas of Omnitrans system and is addressed at all levels, from training of drivers and staff, to the physical design of Omnitrans facilities including adherence to Crime Prevention through Environmental Design (CPTED); a major design guideline that guides physical security planning, station related systems, public areas, facility design, and security systems.

As part of the sbX service, Omnitrans is introducing new fare collection equipment at sbX stations that helps to reduce the dwell time of the sbX vehicles at stations. Before boarding, users purchase tickets at a ticket vending machine (TVM) on the station

platform or use a standalone validator (SAV) for activating prepaid tickets and passes.

Parking lots, generally in the form of park-and-rides are a new element of Omnitrans service area and facility designs. Travel demand forecasting and the availability of developable land drive the number of parking spaces that are able to be provided, however basic guidelines for development and the range of amenities that these facilities may provide are described in the guidelines.

Typical landscaping considerations for sbX corridors and station areas, as well as a sample landscaping palette that was used for the development of the sbX Green Line are presented in the guidelines. Basic goals, the plant selection process, and additional guidelines are provided.

Transit centers are critical to Omnitrans services, as they provide reliable and timely as well as safe and secure points of transfers for Omnitrans users. A range of transit and transfer centers exist in Omnitrans service area, the location and accessibility are key elements in the development of the centers. Site development factors are described, and include physical constraints, passenger circulation at the site, and economic and development potential resulting from higher levels of activity at the site. Site amenities are key in provide a safe and secure center, and suggested amenities are described in detail.

A major contributing factor to the success of the sbX and Omnitrans system is Transit Oriented Development (TOD). This set of guidelines introduces the definition and characteristics of TODs. TOD development is a critical element in sbX services, by providing higher activity uses near sbX stations and transit centers, which in turn generates higher ridership on Omnitrans system. Examples of successful TODs are described in detail, including regional and local legislation that supports the integration of transit and land use planning.

## 1.4 Summary of Requirements

The following is a summary of requirements for Omnitrans local bus service, and sbX requirements. Minimum requirements should only be used in constrained cases where the standard or typical requirements are determined to be infeasible.

- Curb Clearance for Bus Stopping zones – Bus stopping zones should be located a minimum of 43' from the intersection for low speed and low volume streets, with 60' for high speed and high volume streets, not including the length of the vehicles. The curb clearance for transitioning into mixed traffic is also 43' and 60' based on street speed and volume, with the exception of near side stops, which can transition back into mixed flow using the intersection. If space is needed to accommodate additional vehicles, then the space for a second vehicle plus 10' of space per additional vehicle is needed. 60' of space from the intersection is the minimum for bus stops located after turns.
- Boarding Areas – A standard boarding area of 43' x 10' is required for local bus stops. Minimum boarding areas must include space for front door (5' x 8') and rear door (10' x 8') ADA landing pads, and a minimum 4' clear pedestrian sidewalk. Additional space may be required to high ridership stops and/or to accommodate 60' vehicles on high volume routes.
- Curb Ramps – All intersections with crosswalks within walking distance of bus stops should provide curb ramps.
- Bus Turnouts – Turnouts for buses make it difficult for buses to re-enter traffic and should only be located when a prescribed set of conditions are met. Turnouts have a standard width of 12' and minimum of 10'. When the outside travel lane is wide, a partial turnout may be used; however, the outside travel lane width plus turnout must be at least 24'6" to allow traffic to pass the bus. Length of the bus turnouts vary based on location and number of vehicles to be accommodated.
- Bus Pads – Bus pads should be 12' wide and 40' long. Bus pads should be 3000 PSI, P.C.C. pavement, 9" deep without rebar or 8" deep with #3 rebar at 18" on center.
- Dedicated Bus Lanes – Width of dedicated bus lanes are 12' - 14' for side and center running dedicated lanes. 12' lanes will require a 1' buffer zone to prevent mirror-to-mirror strikes.
- Clear Space Along Curb Line – A minimum of 33' and a standard of 43' of clear space is required along curb area on the street side prior to bus stop pole (relative to traffic flow). The clear space should be level with a paved or concrete utility strip filled in to sidewalk at a minimum of 30' long. The clear space is to be minimum of 4' back from curb line.
- ADA Landing Pad – the dimensions of the ADA landing pad are 5 feet parallel to street and 8 feet deep. This can be in front of and part of shelter pad (if shelter installed) or freestanding. It should be immediately adjacent to bus stop sign pole (prior to pole in the direction of traffic). Wheelchair accessible pathway should be included, if not existing, including access ramps as necessary. The landing pad should be tied into sidewalk, if existing.
- Bus Stop Information – Bus stops must accommodate bus stop pole, flags and schedule information holders at the front of the bus stop to identify the stopping location of the bus. All bus stop signs and poles should be located no closer than 18" to 24" to the curb line, and not impede the 4' clear pedestrian zone or the ADA landing pads.
- Trash – Trash and recycling containers should be placed outside of the clear space along curb line and outside the ADA landing pad. Trash Cans should be placed after pole (as per traffic flow), behind pad or sidewalk, or at the end of the clear space.

- **Bus Bench** – Bus bench must be located on a pad. If located on the ADA landing pad, a minimum of 8 feet is required from curb; and if outside the ADA landing pad, a minimum of 4 feet is required from the curb. Bus bench must not block pedestrian and ADA access to or from the bus stop or sidewalk.
- **Bus Shelter Pad** – The bus shelter pad is 5 x 13 feet with a 6 inch concrete base (may be re-enforced with wire grid) and a sub base of blue stone. The bus shelter pad should be located a minimum of 8 feet behind the curb, adjacent to the bus stop pole to accommodate ADA landing pad. The bus shelter pad should be placed outside of ADA pad, adjacent to the sidewalk, with a minimum of 4 feet back from curb line and must be within the clear curb space. An additional 4 to 6 feet wide pad extension is recommended to accommodate any newspaper boxes, trash cans, etc.
- **Bus shelter** – The bus shelter should be designed to be waterproof, avoid exposing passengers to splashing water from passing vehicles and runoff, and protect passengers from the elements including wind and the sun. The shelters should not be placed in front of regularly used building exits or commercial signs, displays or building windows. bus shelter should be located on the bus shelter pad at a minimum vertical clearance of 7.5' with a minimum roof dimension of 6' x 9 and a preferred dimension of 10' x 20'. The shelter overhang should be a minimum of 2' back from the curb line. The bus shelter supports should be located outside of the landing area. When the sidewalk is at the rear of the shelter a 4' sidewalk width is the minimum and 5' is preferred. Shelter supports and the bus bench must be located outside of the ADA landing pad. A 12" minimum clear zone at the rear of the structure is required when the sidewalk is in front of the shelter. A minimum space of 30" x 48" of clear floor space for people in wheelchairs is required within the shelter. Shelters should not be placed such that they block sight distance at intersections or driveways. This can normally be accomplished by placing the shelter more than 25' from the beginning or end of curb return of an intersection or driveway;
- **Vendor Boxes** – Vendor boxes must be located outside of clear curb space, and outside of ADA landing pad area. Vendor boxes must not impede pedestrian and ADA traffic flow to and from bus stop, landing pad and shelter. Vendor boxes should be located beside shelter, behind the front line of shelter and sidewalk, or with trashcans at end outside of the clear curb space. Free publication vendor boxes are discouraged.
- **Electric** – Electric connections must include a 1-inch conduit to junction box at rear corner of shelter pad (circuit breaker). Electrical connections should be to building power (if possible) or nearest signal control box or electric power junction box. Electricity (120 volts/20 amp circuits) and communications to support ticket vending machines, real-time passenger information, and lighting of stop, security cameras and emergency call boxes should be provided. Additionally, for cleaning purposes and landscape maintenance, provide outlet for maintenance equipment. The shelter shall be grounded by installation of a grounding rod or similar acceptable method, and outlets shall utilize Ground Fault Interrupter protection.
- **Landscaping** – Trees for shade and lightning arrestors should not be placed within clear curb zone, and 3 to 4 feet of back of curb line. Trees may be placed immediately outside of clear curb area, or back of sidewalk. Bus nub may be installed to accommodate tree line and still give proper ADA landing pad and clear curb space.

- Traffic Protection – Crash barrier should be installed in advance of stop/shelter for passenger protection, if applicable, for major road (speed limit 45 or higher) without sidewalks, or street parking, or other natural barriers to protect bus riders. Especially if there is narrow curb space, and passengers have to stand within 6 feet or curb line.
- Transfer or High Volume Stops – Transfer or high volume stops are where routes cross, usually at a cross street intersection. Location of these stops should be as close to the intersection as possible, near a marked crosswalk to encourage proper street crossing, and within line of sight of each other. These stops usually require a shelter. Route information needs to be provided for all routes, so area for sign holder, kiosk or other information delivery systems needs to be provided. Besides all of the above, extra space for passenger waiting, along shelter or clear curb space, should be included in design. A standard of 8-10 square feet per peak load passenger should be used. Special care should be taken with placement of trashcans and vendor boxes to keep pedestrian pathways and waiting area clear.
- Key Stops or Express Stops – Key stops or express stops are stops that have been identified as major stops on routes, usually several blocks apart. In addition to all of the above, the shelter at these stops should be designed to cover a 10' x 20' area, with seating and overhanging roof for standing under roof covering inside and outside the shelter. Visibility of the bus approach route is required and trees must not block view of bus approach path. These stops should also include lighting, public information display systems, route maps, transit information, stop request and security call mechanisms, radiant heaters, ticket vending machines, and advertisements. Solar technology should be used where feasible.
- Lighting – Lighting internal to shelter should be 3 foot candles 3' above the concrete shelter pad and illuminate approximately 40 square feet; external to shelter, should follow local standards with a suggested 2-5 foot candles. Solar units must be capable of providing 5 days of full brightness and provide a minimum of 4 foot candles at the sidewalk from an elevation of 10' with a 6 square feet area of illumination at the sidewalk.