samTrans

Bus Stop Design Guidelines

April 2024

Introduction

The SamTrans Bus Stop Design Guidelines seek to improve the experience for all riders, while streamlining and standardizing the bus stop design process.

The SamTrans Bus Stop Design Guidelines provide decision-oriented guidance on preferred bus stop configurations across the SamTrans system, for both new and existing bus stops. These guidelines represent SamTrans' policy and expectations for amenities and features at SamTrans bus stops. These guidelines apply any time changes are made to the bus stop.

Typical scenarios that present opportunities to bring bus stops into compliance with this document include:

- A **new development** adjacent to a bus stop
- A **streetscape project** that requires modification to a bus stop
- **Local jurisdiction plans** that would modify the bus stop or roadway/ sidewalk adjacent to the bus stop
- Any **proposed changes to bus stops**, including stop relocation or new stops

Local city staff, staff at other agencies, and developers should use these guidelines to understand the process of improving a SamTrans bus stop. SamTrans riders and other members of the public are also encouraged to read through the document to better understand the policies and procedures related to SamTrans stops. Depending on the scope of a particular project, users of this guide may need to reference just one, a handful, or all sections of the guidelines.

SamTrans recognizes the effort and resources required for bringing every SamTrans stop into compliance, and this document should not be interpreted as binding guidance with which all stops must immediately comply. Instead, this document presents a vision for incremental change across the system as new developments, other jurisdictions' plans, and street improvement projects allow for the upgrade or addition of bus stops.

SamTrans' Vision for Bus Stops

SamTrans is committed to providing a **comfortable, convenient, and dignified** experience for riders at bus stops. SamTrans has set the following goals for every rider's experience when waiting for the bus:

Convenient

Provide a stop environment that is convenient to use, featuring appropriate curb access and a sidewalk free from obstructions.

Informative

Provide service information to riders at bus stops, including schedules and the ability to access real-time arrival data.

Comfortable

Provide shelter and a place to sit at all-day stops.

Improving a SamTrans Bus Stop

SamTrans approval and local permits are required for all stop modifications. Coordinate with SamTrans early and often for assistance in the planning process.

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Requesting Changes to Bus Stops

No matter the change or addition, always consult SamTrans throughout the bus stop improvement process by emailing bus.stops@samtrans.com. Development projects should reach out to SamTrans at least twice before construction: 1) ahead of submitting the planning application and 2) ahead of permit requests.

Step 1

Email Us!

Email bus.stops@samtrans.com with the following information:

- Existing stop location and ID number *if applicable*
- Proposed new stop location, including GPS coordinates (preferred) or cross streets and photos *if applicable*
- Description of the proposed improvement and rationale for the change
- Contact information
- Any letters of support or other evidence of general community approval *optional*

Step 2

SamTrans Review

SamTrans will review the request for compliance with these guidelines. SamTrans will also conduct any additional community outreach needed.

Step 3

SamTrans Feedback

SamTrans will respond in writing to the request within 90 days with approval, a request for additional information, or suggested modifications to the request.

Who Owns and Maintains the...

Bus stop signs, poles, and pole seats

SamTrans

Bus benches and shelters

Green shelters: SamTrans
Brown shelters: SamTrans
Brown composite wood benches: SamTrans
Green benches: SamTrans
Other shelters and benches: Ownership varies. Typically local jurisdiction or neighboring business

Trash receptacle

Green or concrete trash receptacles: SamTrans
Other receptacles: Ownership varies. Typically local jurisdiction or neighboring business

Sidewalks and crosswalks

Right-of-way owner. Typically local agencies, San Mateo County, or Caltrans

Roads and bikeways

Right-of-way owner. Typically local agencies, San Mateo County, or Caltrans

Traffic signals and signs

Right-of-way owner. Typically local agencies, San Mateo County, or Caltrans

Street trees

Right-of-way owner. Typically cities, County of San Mateo, or Caltrans

Bus stop advertisements

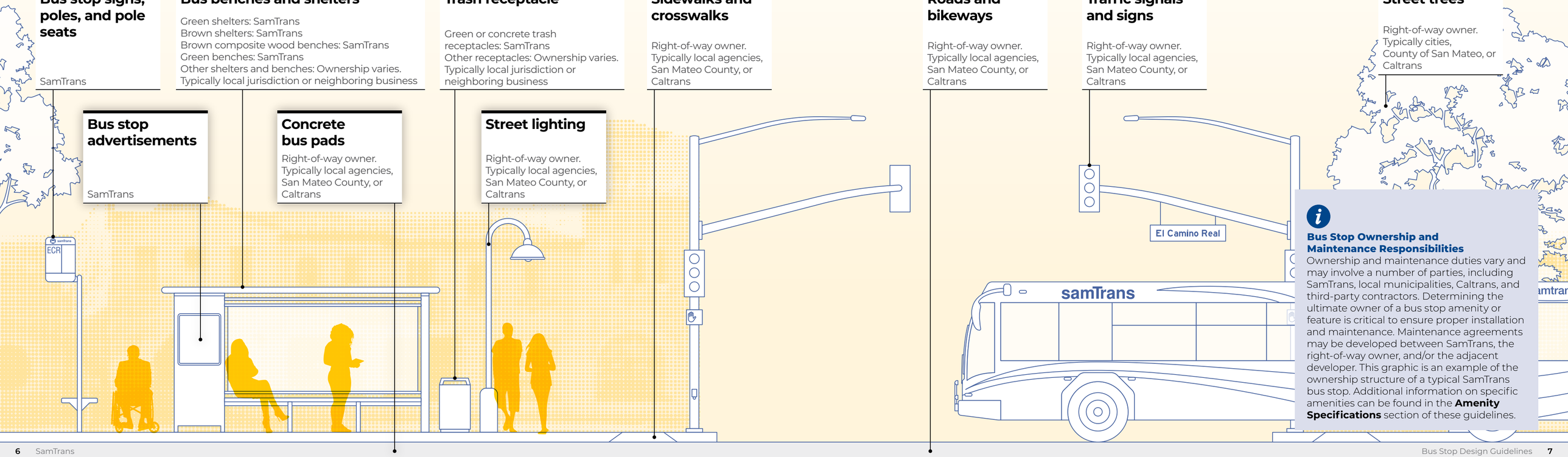
SamTrans

Concrete bus pads

Right-of-way owner. Typically local agencies, San Mateo County, or Caltrans

Street lighting

Right-of-way owner. Typically local agencies, San Mateo County, or Caltrans



Bus Stop Ownership and Maintenance Responsibilities

Ownership and maintenance duties vary and may involve a number of parties, including SamTrans, local municipalities, Caltrans, and third-party contractors. Determining the ultimate owner of a bus stop amenity or feature is critical to ensure proper installation and maintenance. Maintenance agreements may be developed between SamTrans, the right-of-way owner, and/or the adjacent developer. This graphic is an example of the ownership structure of a typical SamTrans bus stop. Additional information on specific amenities can be found in the **Amenity Specifications** section of these guidelines.

Step 1

Identify Bus Stop Category

Bus Stop Categories

To provide guidance on amenities and operational considerations, SamTrans has sorted bus stops into three categories:

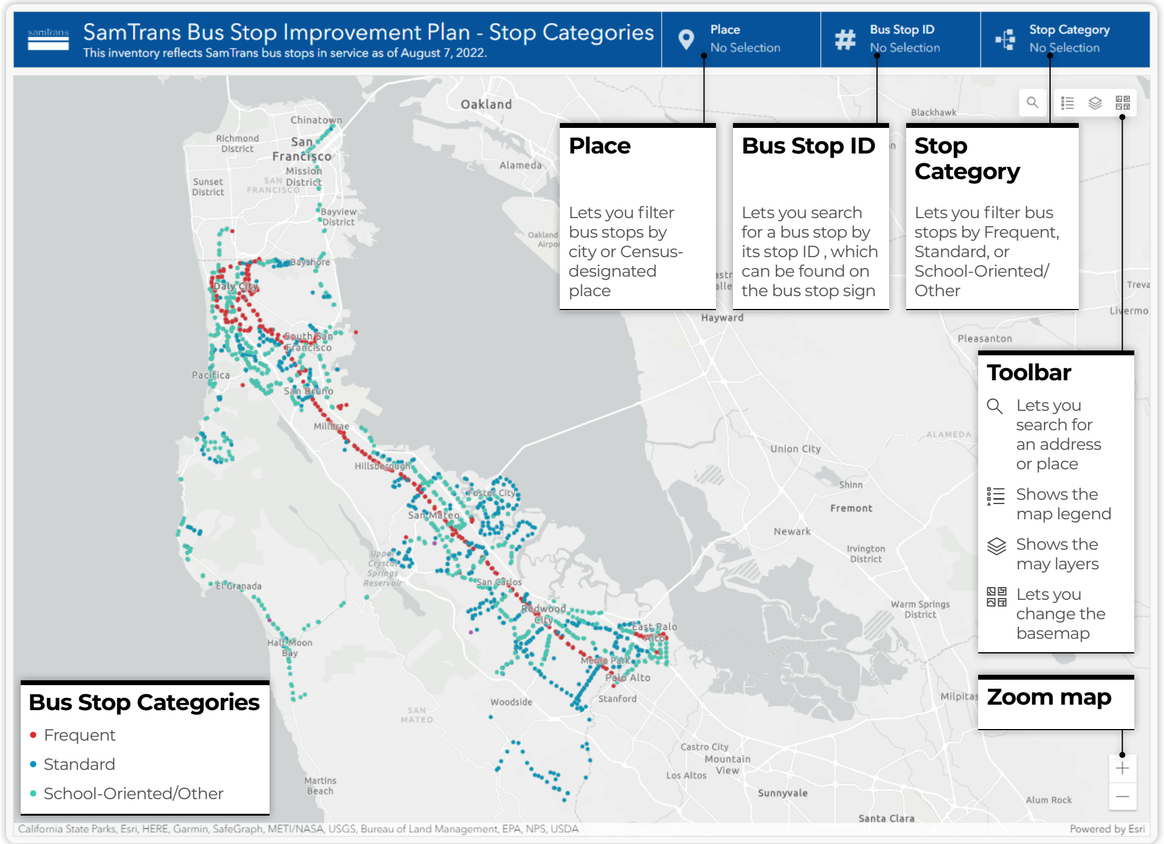
- Frequent
- Standard
- School-oriented/other

Stop categories are defined by how often a bus stop is served by one or more SamTrans routes throughout the day.

Bus Stop Categories

Category	Definition	Typical SamTrans Service	Estimated Percentage of Stops
Frequent	Stops served by a bus at least four times an hour, for at least 12 hours per weekday	ECR, 120, 130, and 296 plus bus stops that serve multiple local routes	20%
Standard	Stops served by a bus 1-3 times per hour, for at least 12 hours per weekday	Most three-digit routes (100s, 200s)	45%
School-Oriented/ Other	Stops only served by school-oriented routes. A bus may come as infrequently as once per day	School-oriented routes (two-digit routes), rush hour-only routes (FCX), Shuttle service	35%

Visit our online dashboard to view each bus stop's category. The screenshot on the facing page shows how to use the dashboard. If you have a question about which category applies to an existing or proposed stop, please contact SamTrans at bus.stops@samtrans.com.



Step 2

Identify Appropriate Bus Stop Amenities

Transit Amenities

A bus stop's category determines the appropriate bus stop amenities. To determine the bus stop category, refer to the **Identify Bus Stop Category** section of these guidelines. The table below outlines the minimum amenity recommendations for each category. To be able to provide bus stop amenities, the newly constructed or altered bus stop must have at least eight feet of sidewalk width.

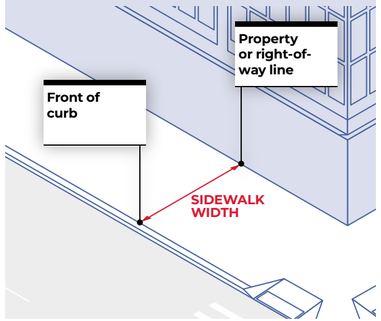
For stops where the available sidewalk width is less than eight feet, upgrades may be necessary to ensure pedestrian and passenger accessibility prior to amenity improvements. Stop relocation may be necessary for new or altered stops. Contact SamTrans at bus.stops@samtrans.com to determine the best path forward.

Transit Amenities by Category

Category	Minimum Recommended Amenities
Frequent (Includes Transit Centers)	· Bus bulb or bus boarding island to widen the sidewalk (refer to the **Bus Stop Position** section of these guidelines) · Standard sign and pole · Shelter with lighting · Real-time information provided via digital signage · Service map and schedule
Standard	· Standard sign and pole · Shelter or shade structure and bench/Simme-Seat with lighting · Service map and schedule · Real-time information provided via digital signage
School-Oriented/ Other	· Standard sign and pole · Real-time information provided via QR codes that direct riders to a stop-specific webpage

*Note: Additional information on specific amenities can be found in the **Amenity Specifications** section of these guidelines.*

Measuring Sidewalk Width
To determine available sidewalk width, measure the distance between front-of-curb and property or right-of-way line.



Trash Cans
SamTrans is moving away from providing and maintaining trash cans at stops, and instead provides trash cans on all buses. Local jurisdictions may still choose to add and maintain their own trash cans adjacent to bus stops as they see fit.

Accessibility Requirements

SamTrans strives to provide meaningful access to its transportation services, including its fixed-route service. All of SamTrans' buses are accessible, and many persons with disabilities are able to use SamTrans bus service. SamTrans provides paratransit for persons with disabilities who cannot independently use SamTrans bus service through RediWheels on the bayside of the county and RediCoast on the coastside.

Access to bus stops are outside the jurisdiction of SamTrans. Refer to the **Ownership and Maintenance** graphic on page 6 for more details.

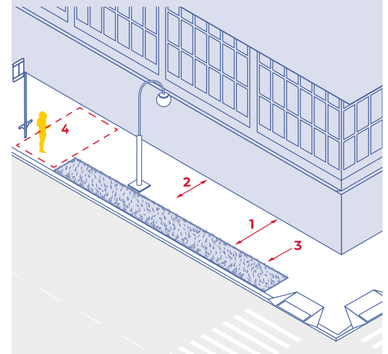
Any amenities provided must respect the legally required dimensions, regardless of bus stop category. The table below outlines the California Building Code requirements for minimum clear width, clear width at right-of-way restrictions, cross slope, and passenger landing pad dimensions at new or altered bus stops. Local applicable standards should be followed for areas outside of SamTrans jurisdiction. When in doubt, contact SamTrans at bus.stops@samtrans.com to determine the best path forward.

California Building Code Specifications[1]

Item	Specification
Minimum clear width	48"
Minimum clear width at right-of-way restrictions	36"
Maximum cross slope	1:48
Minimum bus boarding/alighting area (passenger landing pad)	96" deep x 60" wide

Notes:
1. California Building Code 2022 Triennial Edition, Chapter 11B

Understanding Minimum Widths and Maximum Slopes



1. Minimum Clear Width
2. Minimum clear width at right-of-way restrictions
3. Minimum cross slope
4. Minimum bus boarding/ alighting area

Regulatory Standards

While the design guidance presented in these guidelines aligns with federal and state standards as published, this is not a regulatory document. To ensure bus stop designs meet applicable standards, consult the regulatory standards including but not limited to those in the table below.

Regulatory Standards Governing Bus Stops

Standard	Notes
2006 Americans with Disabilities Act (ADA) Accessibility Guidelines	Section 810 (Transportation Facilities) contains bus stop requirements.
Federal Transit Administration (FTA) Circular C 4710.1	This document provides FTA's guidance concerning the ADA.
California Building Code	Chapters 11B-403 and 11B-810 contain requirements for walking surfaces and transportation facilities, respectively.
Local applicable design standards	Consult local design standards in addition to federal and state guidance.

Bus Stop Layouts

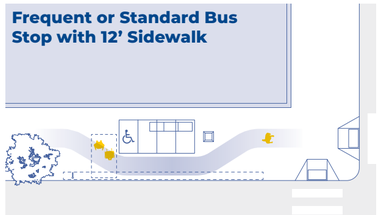
Cities and developers may choose to procure and install their own bus stop infrastructure separately from SamTrans. This is permitted; however, all non-standard amenities would need to be maintained by the local jurisdiction or property owner. Please coordinate with SamTrans throughout the process to ensure installation meets accessibility and operational requirements.

The bus stop layouts shown at right and detailed on the following pages:

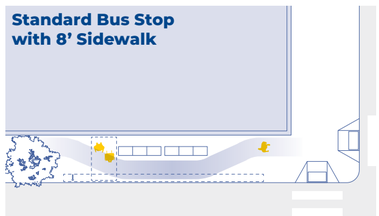
- Provide the recommended configurations of bus stop amenities
- Specify minimum dimensions for rider usability

Each bus stop location is unique. Not all locations may fit neatly into one of these examples, particularly when above-ground utilities are present. Contact SamTrans at bus.stops@samtrans.com for support in determining the optimal bus stop layout at your location.

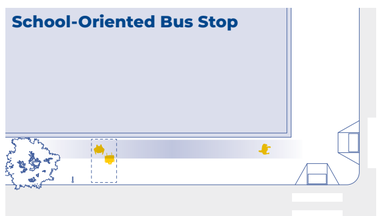
Frequent or Standard Bus Stop with 12' Sidewalk



Standard Bus Stop with 8' Sidewalk

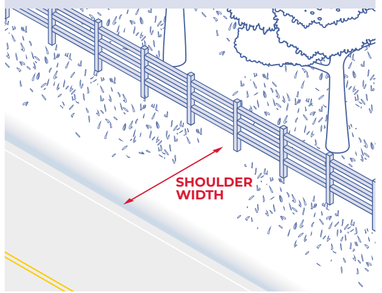


School-Oriented Bus Stop

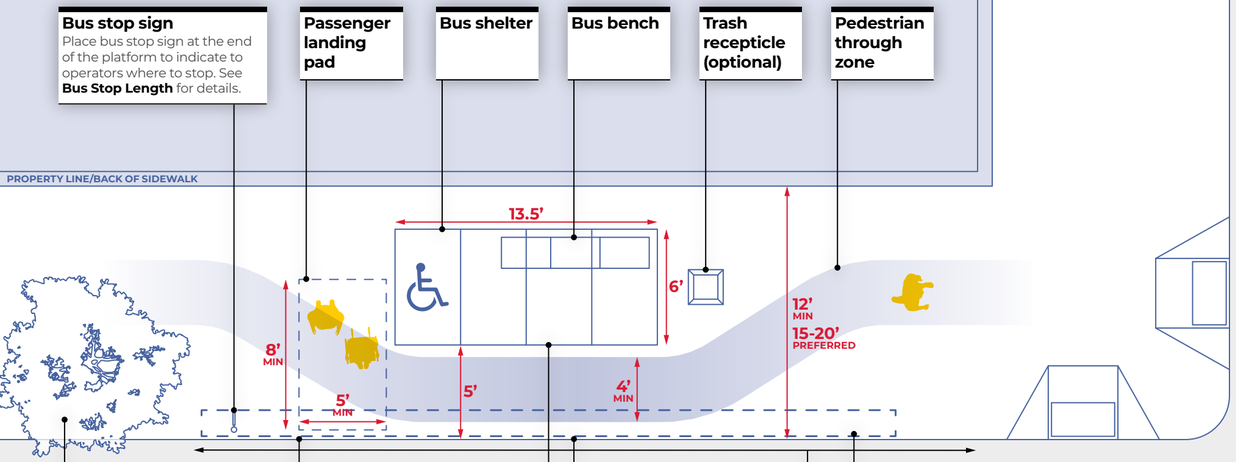


Bus Stops on Rural Roads

Some SamTrans bus stops are located on roads without sidewalks and/or without curb and gutter. For improvements at these stop locations, additional work will likely need to be done to prepare the location for additional amenities. At a minimum, a concrete slab installation and utility coordination will need to be completed, which will have cost implications to the project. Please reach out to SamTrans at bus.stops@samtrans.com for more information. Include the width from the edge of the roadway to the adjacent property line (right-of-way limits) in your email.



Frequent or Standard Bus Stop with 12’ or Wider Sidewalk



Bus stop sign
Place bus stop sign at the end of the platform to indicate to operators where to stop. See **Bus Stop Length** for details.

Passenger landing pad

Bus shelter

Bus bench

Trash recepticle (optional)

Pedestrian through zone

Tree well
Place tree wells outside of the bus stop zone or locate them as far to the rear of the sidewalk as possible to minimize impact to bus operations.

Passenger landing pad
Passenger landing pad footprint can overlap with shelter footprint as long as there are no obstructions within the 8’ x 5’ area

Red curb
See **Bus Stop Length** section for details.

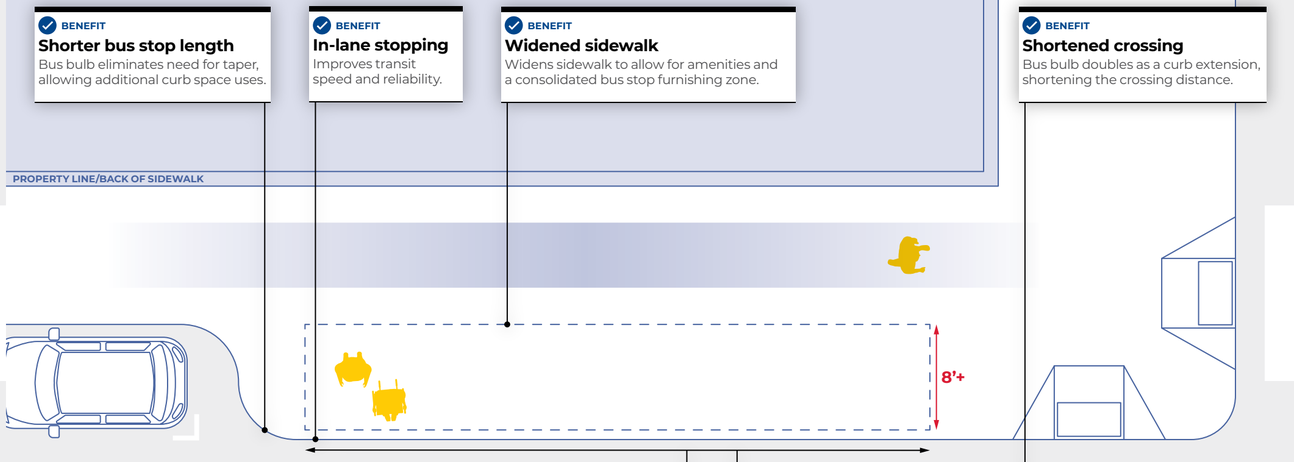
Clear Zone
Keep the curb in the bus stop zone free of landscaping and furnishing to allow for easy access to front and rear doors.

Bus shelter placement
If there is a building setback, place the shelter near the back of sidewalk. If there is no building setback (building frontage abuts property-line), provide 4’ minimum between the shelter and building frontage. The slim shelter may be required.

Amenities placement
When above-ground utilities, street furniture, landscaping, or other constraints are present in the bus stop area, first prioritize an 8’ by 5’ passenger landing pad and 4’ pedestrian through zone. Then position bus stop amenities around those areas.

Bus Bulb or Boarding Island Application

Follow process in **In-Lane Stopping Flow Charts** to determine whether your stop is eligible for a bus bulb or bus boarding island.



BENEFIT
Shorter bus stop length
Bus bulb eliminates need for taper, allowing additional curb space uses.

BENEFIT
In-lane stopping
Improves transit speed and reliability.

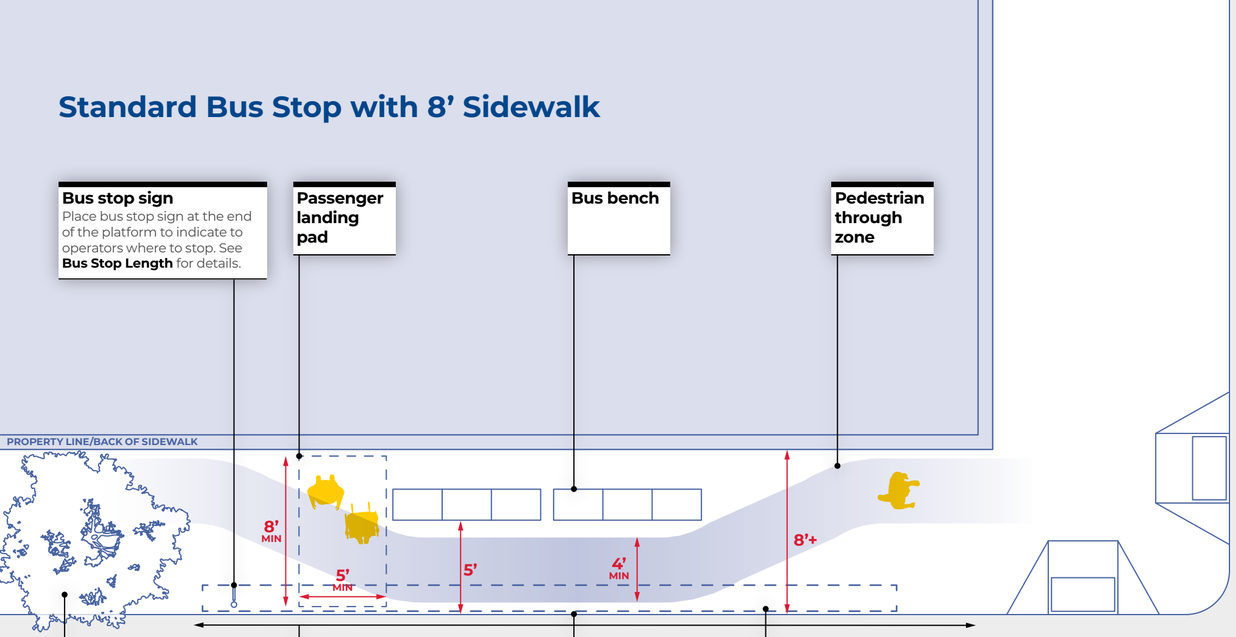
BENEFIT
Widened sidewalk
Widens sidewalk to allow for amenities and a consolidated bus stop furnishing zone.

BENEFIT
Shortened crossing
Bus bulb doubles as a curb extension, shortening the crossing distance.

Bus bulb or bus boarding island
Bus bulbs and boarding islands shadow the parking lane and/or repurpose extra right-of-way to provide all the benefits called out above. If a bike facility is present, install a boarding island instead of the bus bulb shown.

Amenities placement
Place amenities in alignment with the **Frequent or Standard Bus Stop with 12’ or Wider Sidewalk** layout.

Standard Bus Stop with 8’ Sidewalk



Bus stop sign
Place bus stop sign at the end of the platform to indicate to operators where to stop. See **Bus Stop Length** for details.

Passenger landing pad

Bus bench

Pedestrian through zone

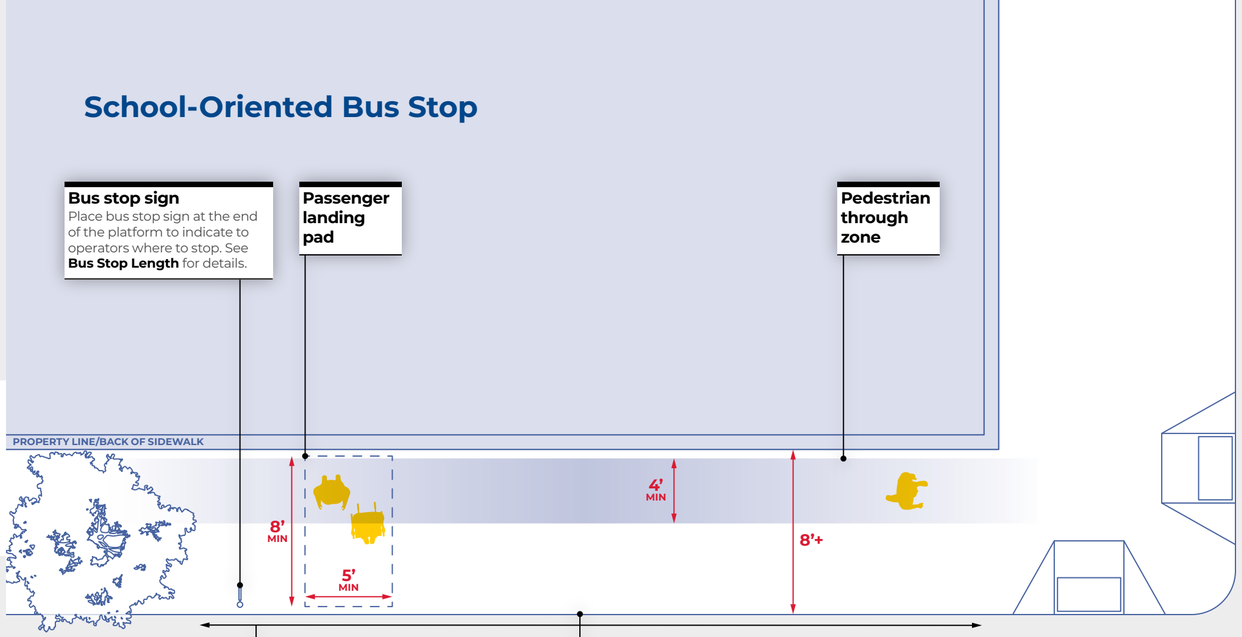
Tree well
Place tree wells outside of the bus stop zone or locate as far to the rear of the sidewalk as possible to minimize impact to bus operations.

Amenities placement
Constraints such as above-ground utilities, existing street furniture, and landscaping may be present at your stop location. Prioritize providing an 8’x5’ passenger landing pad and 4’ clear width throughout the bus stop zone first, and then position bus stop amenities around those areas.

Red curb
See **Bus Stop Length** section for details.

Clear Zone
Keep the curb in the bus stop zone free of landscaping and furnishing to allow for easy access to front and rear doors.

School-Oriented Bus Stop



Bus stop sign
Place bus stop sign at the end of the platform to indicate to operators where to stop. See **Bus Stop Length** for details.

Passenger landing pad

Pedestrian through zone

Bus stop demarcation
Many of SamTrans’ school-oriented bus stops are located in residential areas with a high demand for parking. Given that school-oriented bus stops are only serviced a handful of times per day, these stops may be marked as a time-restricted passenger loading zone (white curb) as opposed to a no-parking zone (red curb). Signage should clearly indicate passenger loading only during the hours the bus stop is operating, allowing for midday or overnight parking if desired.

Red/white curb
See **Bus Stop Length** section for details.

Amenity Specifications

This section provides design specifications, manufacturer information, and maintenance responsibilities for each SamTrans rider amenity. See **Attachment A** for specifications.

SamTrans is working with vendors to expand our current set of standard amenities to include real-time information, shade structures, lighting options, and slimmer shelters. Please reach out to SamTrans for a status update if you are interested in these amenities.

Shelter Models

Advertising Shelter

Manufacturer
Tolar Manufacturing Company

Maintenance Responsibilities:
SamTrans

Specification Reference
Attachment A-1

SamTrans Shelter

Manufacturer
Columbia Equipment Company

Maintenance Responsibilities
SamTrans

Specification Reference
Attachment A-2

Simme-Seat

Simme-Seat

Manufacturer
Simme LLC

Maintenance Responsibilities
SamTrans

Specification Reference
Attachment A-3

Bench Models

Composite Wood Bench

Manufacturer
Jaqua of California

Maintenance Responsibilities
SamTrans

Specification Reference
Attachment A-4

Green Perforated Bench

Manufacturer
Tolar Manufacturing Company

Maintenance Responsibilities
SamTrans

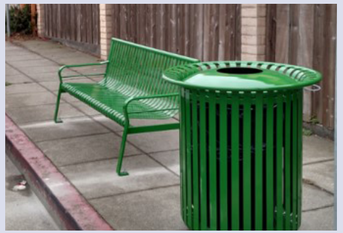
Specification Reference
Attachment A-5

Green Bench

Manufacturer
Tolar Manufacturing Company

Maintenance Responsibilities
SamTrans

Specification Reference
Attachment A-6



Step 3

Establish Appropriate Bus Stop Location & Position

Bus Stop Spacing

Appropriate bus stop spacing balances convenient access for passengers and efficient bus operations for reliable service. Bus stops should be close enough that passengers can walk to them easily, but far enough apart that buses can travel efficiently.

SamTrans establishes its bus stop locations using spacing guidance in the SamTrans Service Policy Framework and in consultation with cities and other partners. If you would like to add a new stop or discuss adjusting an existing stop location, contact SamTrans at bus.stops@samtrans.com using the process outlined in the **Requesting Changes to Bus Stops** section.

Bus Stop Location

As shown in the graphic on the facing page, there are three potential locations for a bus stop:

- The far-side of an intersection
- The near-side of an intersection
- Mid-block

SamTrans bus stops should be located on the far-side of the intersection. Far-side stops minimize bus conflicts with autos and pedestrians while reducing delays.

Only consider near-side and mid-block stops under the special circumstances shown on this page, which are at the discretion of SamTrans. These stop location guidelines align with the SamTrans Service Policy Framework

If there is an existing near-side stop and you are considering amenity improvements to that stop, first explore if it can be relocated to the far-side.

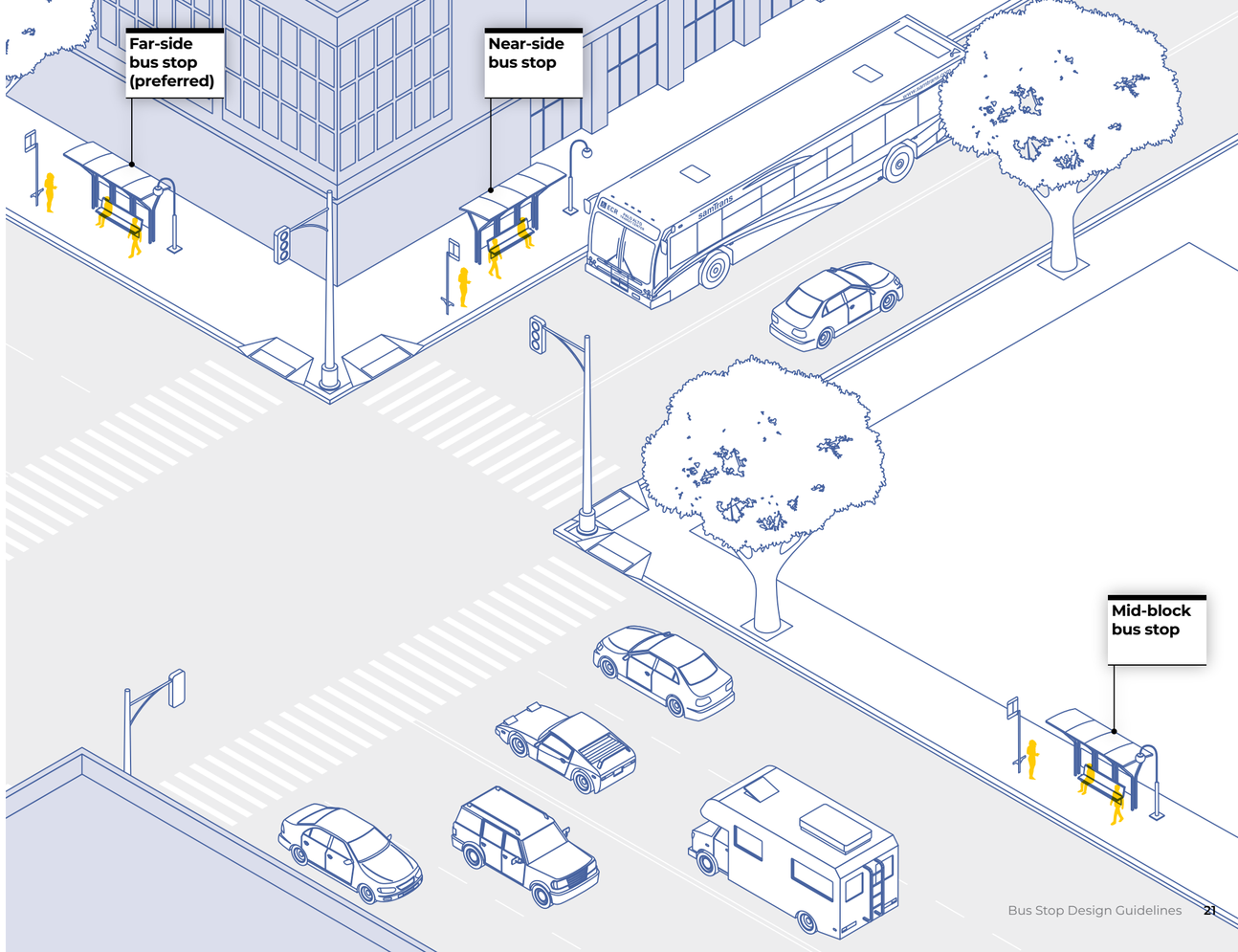
Special Circumstances for Near-Side Bus Stops

- Locations where a far-side stop would be unsafe or impractical, and the stop cannot be moved to a different intersection
- Locations with a high volume of transfers, where there is a need to minimize street crossings for transferring passengers
- Stops that serve multiple routes that go in different directions after the downstream intersection

Special Circumstances for Mid-Block Bus Stops

- Locations where the alignment of the route requires the bus to make a left turn, and it is not feasible to locate the bus stop on the far-side of the intersection (i.e., the bus cannot physically get to the curb due to turning radii)
- Locations with a high-ridership generator mid-block, such as a hospital or school

Contact SamTrans at bus.stops@samtrans.com to determine if these circumstances apply.



Bus Stop Visibility and Stopping Distance

Bus stops should be placed in locations with clear sight lines both for the transit operator and other road users. Avoid placing bus stops on the crest of a hill, in or immediately after a curve to the right, or in any location where visibility may be reduced due to obstructions. This is particularly important for in-lane stops (see the **Bus Stop Position** section). Any proposed stop location should be approved by SamTrans.

Bus Stop Visibility and Stopping Distance

Design Speed (MPH)	Stopping Sight Distance (Feet)
20	125
25	150
30	200
35	250
40	300
45	360
50	430
55	500

Source: Caltrans Highway Design Manual, Chapter 400. Reference local standards if available.

Bus Stop Position

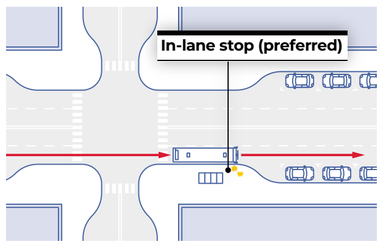
As shown in the graphics below, there are three potential positions for a bus stop:

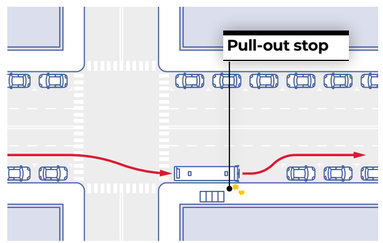
- In-lane, where the bus stops directly in the travel lane
- Pull-out, where the bus pulls into a parking lane
- Cut-out, where the bus pulls into a recessed area

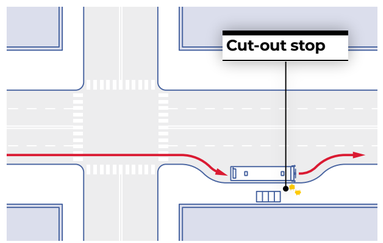
SamTrans prefers in-lane stops for the majority of bus stops and strongly recommends them for Frequent bus stops.

Pull-out stops can be upgraded to in-lane stops using bus bulbs or bus boarding islands at stops that meet a variety of roadway conditions. **Use the flow-charts on the following pages** to determine if a bus boarding island or bus bulb is appropriate at the stop location in question.

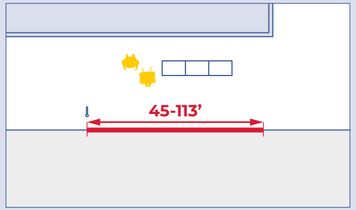
Avoid cut-out stops, with the exception of bus layovers. Cut-out stops often result in a narrowing of the pedestrian environment and make it challenging for bus operators to merge back into traffic.







In-Lane Bus Stop Flow Chart: Far-Side

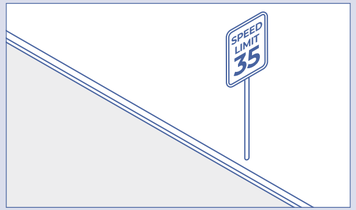


Curb Length

Does your bus stop location have the minimum curb length required for a bus stop? Refer to the **Bus Stop Length** section for more details.

YES

NO



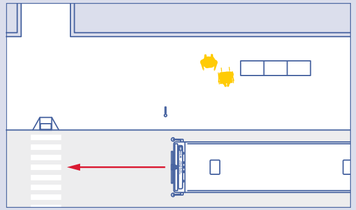
Posted Speed

Is the posted and observed roadway speed 35MPH or less?

YES

NO

In-lane stops are not recommended on high-speed roadways. Implement speed management strategies or implement a pull-out stop.



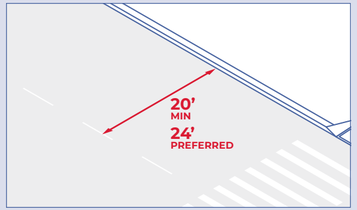
Sight Distance

Is there an uncontrolled crosswalk within the stopping sight distance downstream from the bus stop? Refer to the **Bus Stop Visibility and Stopping Distance** section for stopping distances.

YES

In-lane stops block sight lines for cars queueing behind the bus. Cars may choose to go around a bus stopped at the bus stop and be unaware of conflict points downstream. Determine if relocation of bus stop and/or crosswalk is feasible. If not, leave the existing bus stop as a pull-out.

NO



Roadway Width

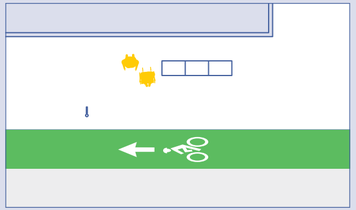
Is there at least 24' (preferred) or 20' (minimum) from the existing curb line to the outer edge of the travel lane (inclusive of the parking lane, bikeway, and curbside travel lane)?

NO

Benefit/cost may be less for bus bulb/boarding island in these instances, as often the bus is already stopping in-lane under this condition.

Leave curb line as is unless there are strong pedestrian safety benefits to installation.

YES



Bike Facility

Is there an existing or planned bike facility on the corridor/through the stop zone?

YES

NO

Recommendation

Implement a bus boarding island. Refer to the **Bus/Bicycle Interface** section for design options.

Subject to design and engineering feasibility

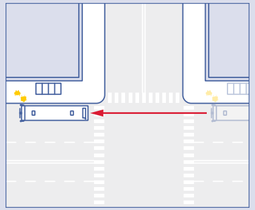
Implement a bus bulb

Subject to design and engineering feasibility

Leave existing curb/bus stop as is.

Relocate the stop to another far-side location.

In-Lane Bus Stop Flow Chart: Near-Side

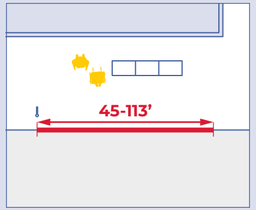


Far-Side Relocation

SamTrans prefers far-side stops. Can the stop be moved to the far-side? Check the curb length and sidewalk width at the far-side. Refer to **Bus Stop Location** and **Bus Stop Length** for more details.

NO

YES

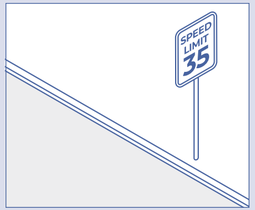


Curb Length

Does your bus stop location have the minimum curb length required for a bus stop? Refer to the **Bus Stop Length** section of the Guide for more details.

YES

NO



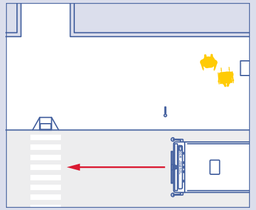
Posted Speed

Is the posted and observed roadway speed 35MPH or less?

NO

In-lane stops are not recommended on high-speed roadways. Implement speed management strategies or implement a pull-out stop.

YES



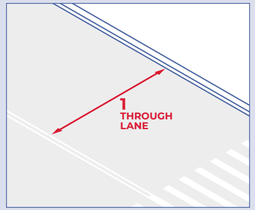
Sight Distance

Is there the adequate stopping sight distance for downstream crosswalks? Is the intersection approach controlled, either by a signal or an all-way stop?

NO

In-lane stops block sight lines for cars queueing behind the bus, and therefore are not recommended at uncontrolled intersection approaches or upstream from crosswalks. Cars may choose to go around a bus stopped at the bus stop and lack the appropriate stopping sight distance.

YES



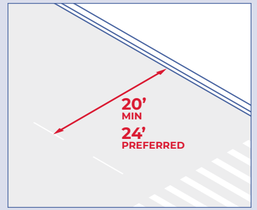
Number of Lanes

Is there only one through lane in the direction of travel?

NO

Near-side in-lane stops are not recommended on multi-lane roads without significant design treatments such as routing right turns behind the bus boarding island and/or right turn prohibitions to mitigate drivers from making right turns in front of the bus.

YES



Roadway Width

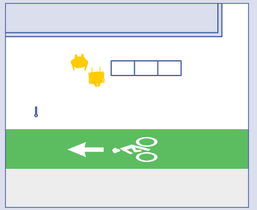
Is there at least 24' (preferred) or 20' (minimum) from the existing curb line to the outer edge of the travel lane (inclusive of the parking lane, bikeway, and curbside travel lane)?

NO

Benefit/cost may be less for bus bulb/boarding island in these instances, as often the bus is already stopping in-lane under this condition.

Leave curb line as is unless there are strong pedestrian safety benefits to installation.

YES



Bike Facility

Is there an existing or planned bike facility on the corridor/through the stop zone?

NO

Implement bus bulb. Consider installing transit signal priority.

Subject to design and engineering feasibility

YES

Recommendation

Implement a bus boarding island. Consider installing transit signal priority and a bike signal or leading pedestrian interval with sign R9-5 "Bikes Use Ped Signal" to give bikes a head start at the intersection.

Subject to design and engineering feasibility

Leave existing curb/bus stop as is. Consider installing transit signal priority.

Relocate the stop to a far-side location.

Bus Stop Length

SamTrans requires a minimum stop length of 45 to 113 feet, depending on the type of buses serving the stop, location and position of the stop, and roadway speed. The elements that comprise the total bus stop length include platform length, pull-in/out taper, entering/exiting bike lane taper, and clearance from the crosswalk. The tables on page 29 outline the minimum bus stop lengths that are required for a given stop and roadway configuration.

Platform Length

The platform length is determined by the number and type of buses serving the stop. If a stop will be serviced by multiple routes, reach out to SamTrans directly at bus.stops@samtrans.com for the appropriate platform length.

Pull-In/Pull-Out Taper

The pull-in/pull-out taper allows the bus to smoothly maneuver into and out of a pull-out stop. Providing the appropriate taper length also allows the bus to be flush with the curb and appropriately serve passengers with mobility impairments who may need to use the wheelchair ramp. The taper length varies by roadway speed and bus stop location and only applies to pull-out and cut-out stops.

Entering/Exiting Bike Lane Taper

This taper applies to stops with bus boarding islands that have a bike bypass zone behind the platform. Tapers are needed to help bicyclists easily maneuver into and out of the bypass zone.

Clearance from Crosswalk

This applies to all stops located at the intersection. Appropriate clearance should be provided to support a comfortable walking environment.

Minimum Bus Stop Length: Pull-Out and Cut-Out Stops

	Far-Side Stop		Near-Side Stop		Mid-Block and Cut-Out Stop	
	<35 MPH	**>35 MPH**	**<35 MPH**	**>35 MPH**	**<35 MPH**	**>35 MPH**
Platform: 40’ Bus	40’	40’	40’	40’	40’	40’
Pull-In Taper	—	—	15’	25’	15’	25’
Pull-Out Taper	15’	25’	—	—	15’	25’
Clearance from Crosswalk	10’	10’	10’	10’	—	—
Stop Length: 40’ Bus	**65’**	**75’**	**65’**	**75’**	**70’**	**90’**
Additional Platform Length: 60’ Bus[1,2]	20’	20’	20’	20’	20’	20’
Stop Length: 60’ Bus	**85’**	**95’**	**85’**	**95’**	**90’**	**110’**

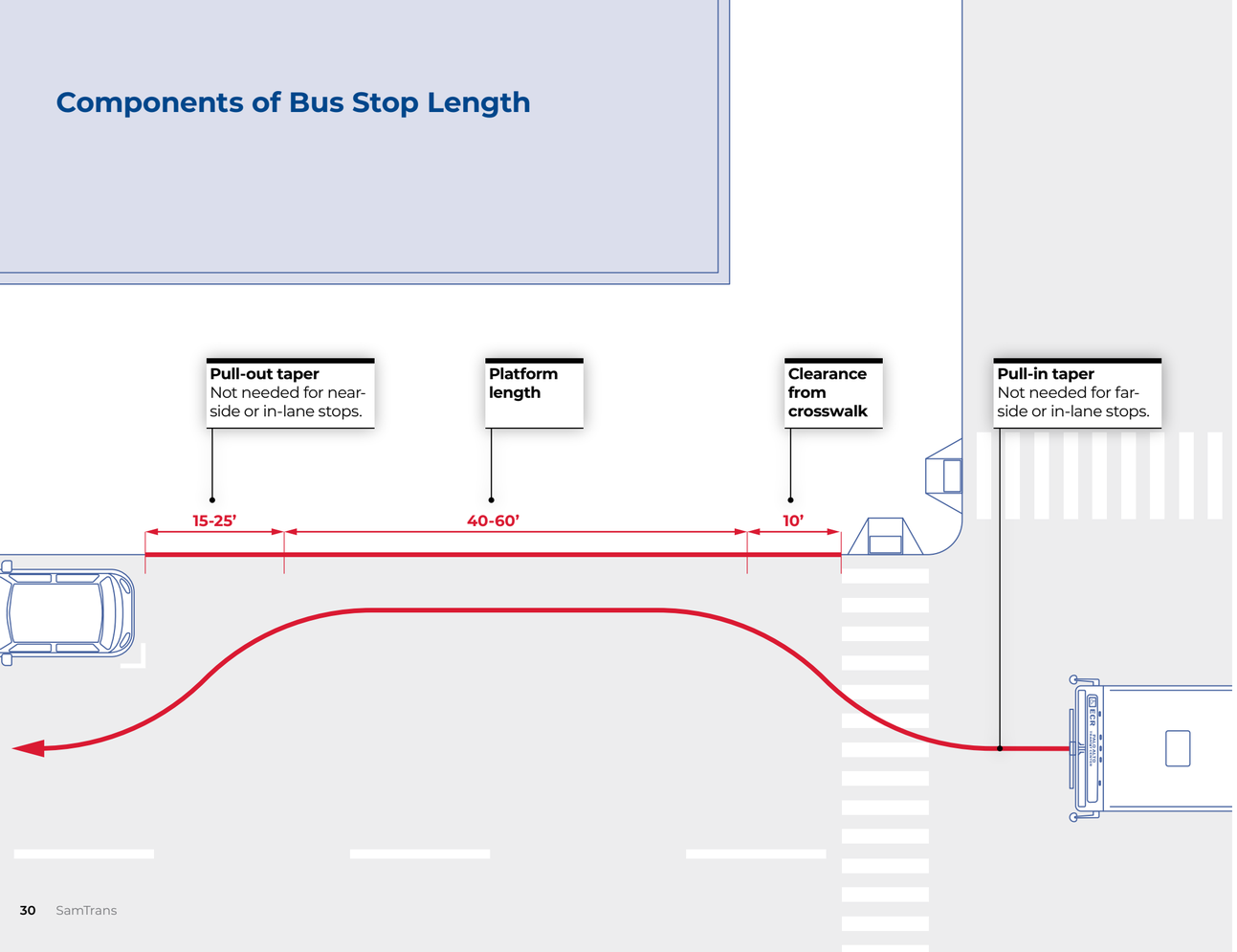
Notes:
1. SamTrans prefers planning for 60’ buses to allow for more flexibility in bus selection.
2. If multiple buses are anticipated to serve the stop at the same time, platform length should be (bus #1 length)+(20’ spacing)+(bus #2 length).

Minimum Bus Stop Length: In-Lane Stops (All Speeds)

	Far-Side Stop	Near-Side Stop	Mid-Block Stop
Platform: 40’ Bus	45’	45’	45’
Clearance from Crosswalk	10’	10’	—
Bus Bulb Stop Length: 40’ bus	**55’**	**55’**	**45’**
Additional Platform Length: 60’ Bus[1,2]	20’	20’	20’
Bus Bulb Stop Length: 60’ bus	**75’**	**75’**	**65’**
Entering Bike Lane Taper[3]	—	18-24’	18-24’
Exiting Bike Lane Taper[3]	18-24’	—	18-24’
Bus Boarding Island Stop Length: 40’ bus	**73-79’**	**73-79’**	**81’-93’**
Bus Boarding Island Stop Length: 60’ bus	**93-99’**	**93-99’**	**101-113’**

Notes:
1. SamTrans prefers planning for 60’ buses to allow for more flexibility in bus selection.
2. If multiple buses are anticipated to serve the stop at the same time, platform length should be (bus #1 length)+(20’ spacing)+(bus #2 length).
3. Standard bike lane adjacent to parking is 24’; separated, parking-protected bikeway is 18’.

Components of Bus Stop Length



Demarcating Bus Stops

All SamTrans bus stops should be demarcated with red curb and/or no parking signs to ensure the bus stop zone remains clear. The red curb and the no-parking zone should extend for the entire length of the bus stop. Keeping the bus stop zone clear allows buses to access the stop and provide efficient and accessible loading of passengers.

Many of SamTrans’ school-oriented bus stops are located in residential areas with a high demand for parking. Given that school-oriented bus stops are only serviced a handful of times per day, these stops may be marked as a time-restricted passenger loading zone (white curb) as opposed to a no-parking zone (red curb). Signage should clearly indicate passenger loading only during the hours the bus stop is operating, allowing for midday or overnight parking if desired.

Near-Level Boarding

If installing a bus boarding island or bus bulb, consider providing near-level boarding. Near-level boarding allows for faster boarding and alighting for all passengers by mitigating the need for wheelchair ramp deployment. To provide near-level boarding, the bus bulb/boarding island curb height should be between 8 and 11 inches to meet the floor of the transit vehicle , typically done by gradually sloping up from sidewalk level (6 inches typical). Ensure that the stop is accessible via a ramp with a maximum cross slope of 2%.

Bus Pads

The weight and heat generated by repeated, frequent heavy vehicle movements at bus stops can distort the asphalt-based pavement at bus stops, leading to wave-shaped mounds in the pavement at the stop location. Concrete bus pads are more durable than asphalt against wear and tear, which can ease maintenance needs over the long term.

SamTrans suggests that cities or other roadway owners/operators install bus pads at bus stops, with Frequent bus stops being the highest priority. While concrete bus pads may reduce maintenance costs in the long term, they can be costly to implement. Prior to installation, reach out to SamTrans to confirm the bus stop location is optimal and no service changes are anticipated.

Bus pad construction should adhere to Caltrans-published standards. Bus pads should have a minimum width of 10 feet and a minimum length of 80 feet (for an articulated bus) to allow for all wheels of the vehicle to be on the pad when at a stop. Local conditions must still be considered when developing engineering diagrams for specific bus pad installations.

Step 4

Facilitate Pedestrian & Bicycle Access

Pedestrian Access to Bus Stops

SamTrans riders should be provided comfortable access to bus stops throughout the service area, including a sidewalk, curb ramps, and places to cross the street. SamTrans may pursue relocation of any bus stop where the local jurisdiction has not provided safe and accessible pedestrian access, and no plans exist to improve conditions.

Sidewalks and Curb Ramps

Sidewalks surrounding the stop should be in good condition: free of gaps, obstructions, cracks, and deterioration. While a minimum clear width of 4 feet is required, a width of at least 5 to 8 feet is suggested. Curb ramps should be provided at all intersections. Sidewalks and curb ramps should comply with all standards in the **Accessibility Requirements** and **Regulatory Standards** sections of these guidelines.

Crosswalks

Crosswalks should be provided adjacent to all SamTrans stops such that riders can comfortably cross the street to access the stop. Crosswalks should comply with all standards in the **Accessibility Requirements** and **Regulatory Standards** sections of these guidelines. The preferred placement of crosswalks is upstream from (behind) the bus stop to provide adequate sightlines for pedestrians and approaching vehicles. If crosswalks must be placed downstream from (in front of) the bus stop, they should be placed with adequate stopping sight distance (refer to the **Bus Stop Visibility and Stopping Distance** section of these guidelines).

For crosswalks at uncontrolled or mid-block locations, refer to FHWA's Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations and local plans and policies for guidance on the appropriate crosswalk enhancements to consider.

Bus/Bicycle Interface

Buses and bicyclists often have a similar average speed (10 to 15 miles per hour) when traveling along a corridor, creating a "leapfrogging" effect where buses and bikes repeatedly pass each other when buses move to the curb to board and alight passengers. This increases the number of interactions between transit vehicles and people on bikes, resulting in safety risks and discomfort for both bicyclists and bus operators, making consideration of their interface a particularly important consideration for transit planning and bus stop design.

Bus Bulb and Boarding Island Design

Separation of buses and bicyclists is recommended via protected bike lanes (Class IV facilities), striped bike lanes (Class II facilities), or multi-use trails (Class I facilities). This separation should be maintained at bus stops through bus boarding islands that provide a bike bypass zone.

The following pages provide design guidance for bus boarding islands. Refer to the flow chart in the **Bus Stop Position** section to determine if a bus boarding island is recommended at your stop location. SamTrans recommends a bus boarding island with a fully separated bike bypass zone; however, if the location is space-constrained, a shared bike/bus boarding island may be considered. Contact SamTrans at bus.stops@samtrans.com for support in determining layouts for bus/bicycle lane interactions.

Integrating Bus Stop Design into Multimodal Corridor Projects

Many bus stop design features have co-benefits that extend to pedestrians and cyclists and can be valuable additions to multimodal corridor projects. The table on the following page summarizes the benefits, co-benefits, and trade-offs of the design elements discussed in these guidelines.

Benefits, Co-Benefits, and Trade-Offs of Bus Stop Improvements

Bus Stop Improvement	Transit Travel Time & Reliability	Pedestrian Safety & Access	Bike Safety & Access
Bus bulb	**Benefit.** Can provide significant travel time savings on congested corridors by facilitating in-lane stopping and removing the need for the bus to weave into and out of traffic.	**Co-benefit.** If extended to the intersection, bus bulbs double as curb extensions for pedestrians. They also create additional waiting space for riders and bus stop amenities, as well as help make riders more visible to operators approaching the stop.	**Trade-off on high-frequency bus routes and corridors with existing/planned protected bikeways.** Bus bulbs preclude the ability for cyclists to bypass the bus stop and instead require cyclists to either wait or merge into the general-purpose lane. Mitigate this trade-off by providing bus boarding islands with bypass zones instead. Bus bulbs may be acceptable on corridors with no bike facilities or standard bike lanes, especially if there are low transit frequencies.
Boarding islands with bike bypass zone	**Benefit.** Same travel time savings as a bus bulb.	**Co-benefit.** Same benefits as a bus bub.	**Benefit.** Boarding islands allow cyclists to bypass the bus stop in a dedicated, separated space.
Shared bike/bus boarding islands	**Benefit.** Same travel time savings as a bus bulb.	**Trade-off.** Riders are required to board and alight in a bike mixing zone which can be uncomfortable and potentially lead to pedestrian/bicycle conflicts.	**Co-benefit.** Cyclists bypass the bus stop via a pedestrian/bike mixing zone, minimizing conflicts with autos but creating a less comfortable experience than a fully separated bypass zone.
Stop optimization & consolidation	**Benefit.** Can provide significant travel time savings by relocating stops to the far-side and minimizing how many times the bus needs to stop.	**Trade-off.** May result in some riders needing to walk further to access transit, which may be particularly challenging for riders with disabilities. Mitigate this trade-off by pairing with sidewalk and crossing improvements.	**Co-benefit.** Minimizes the amount of "leapfrogging" between cyclists and buses, when they share a lane, by reducing the total number of stops.
Transit signal priority/queue jumps	**Benefit.** Can provide significant travel time savings. Should be paired with stop optimization (relocating near-side stops to the far-side) and transit approach lanes to maximize the benefits.	**Co-benefit.** Transit signal priority provides an opportunity to also install Leading Pedestrian Intervals (LPIs) with little to no additional impacts to auto delay. LPIs provide pedestrians a head-start and increase their visibility when crossing.	**Trade-off**. Curb-adjacent queue jumps on corridors with Class II bike facilities and mixing zones at the intersections can be particularly complex to navigate. Mitigate this trade-off by providing separated space for cyclists at the intersection.

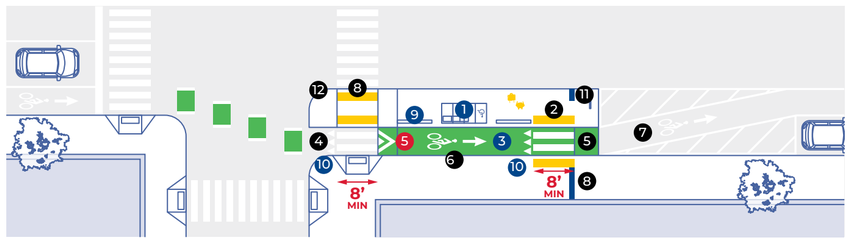
Specifications for Bike/Bus Interactions at Bus Stops

Bus boarding Island
Raised bike lane or street-level bike lane based on jurisdiction preference. Alternative curb rampdesign would need to be used for street-level bike lanes. Refer to the **Bus Stop Length** section for all measurements not shown directly on the graphics.

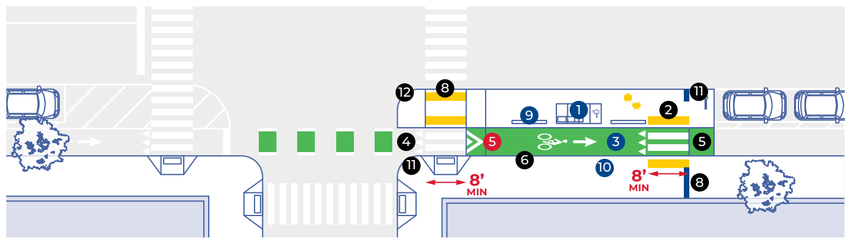
Optional item

1. **Bus shelter**
2. **Accessible landing zone**
   Minimum: 5' x 8'
3. **Green pavement**
4. **Bicyclist yield area**
5. **Bicycle ramp**
   Maximum: 1:10 slope
6. **Furnishing zone/ detectable edge**
7. **Bike lane taper**
   Preferred: 1:10 / Maximum: 1:5
8. **Detectable warning surface (yellow) or tactile directional indicators (blue)**
9. **Vertical railing**
10. **Bikes yield to peds sign**
11. **Bus stop sign**
12. **Reflective Markers**

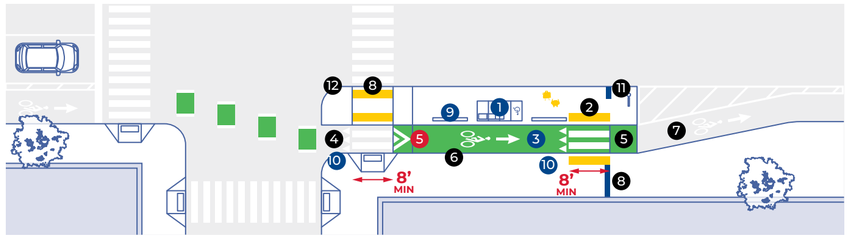
Bikeway with On-Street Parking



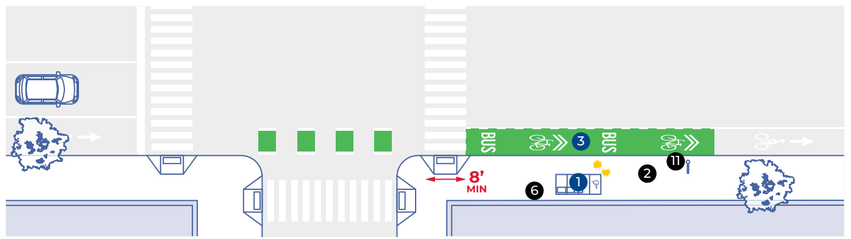
Bikeway between Curb and On-Street Parking Lane



Bikeway between Curb and General Traffic Lane

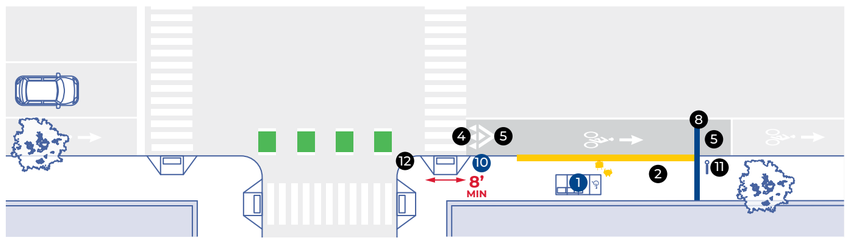


Bikeway between Curb and General Traffic Lane with Bus Pull-Out



Shared Bike/Bus Platform

This design has significant accessibility and waiting environment trade offs and should be reserved for constrained conditions.



Attachments

TOLAR MANUFACTORING COMPANY INC

258 MARIAH CIRCLE CORONA, CA 92879

INSTALLATION INSTRUCTIONS
FOR
12' CLASSIC EUROPEAN SHELTER WITH REAR GLASS WALL

SAN MATEO, CA

Attachment A-1, Advertising Shelter

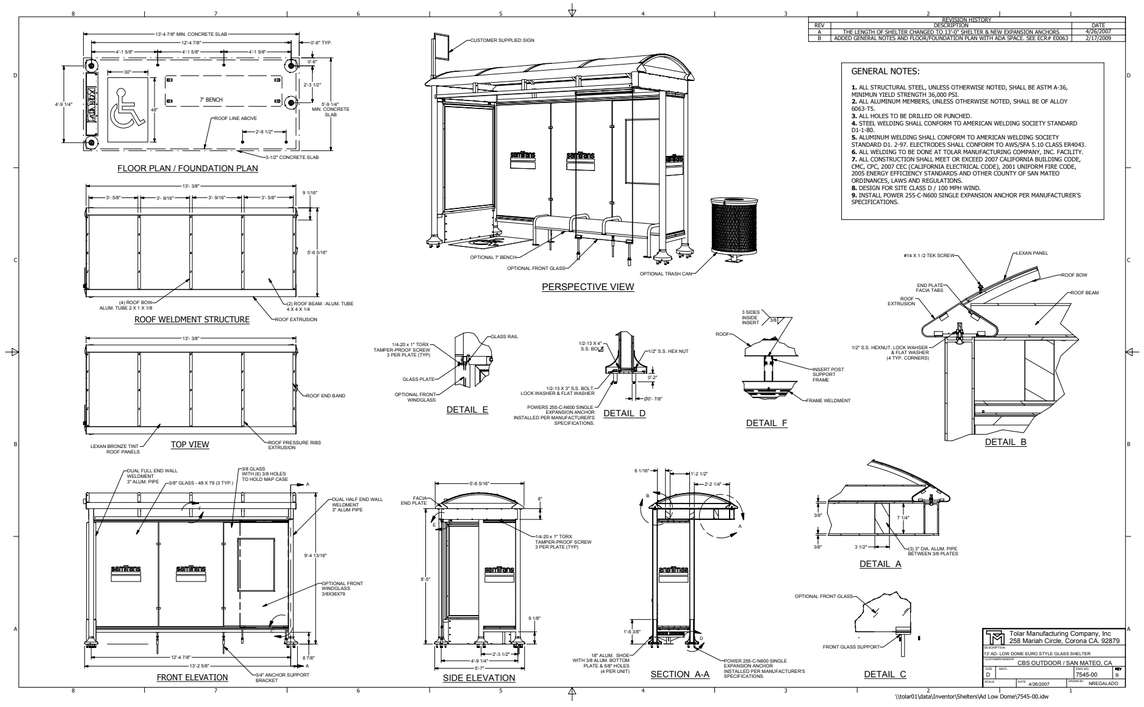
CLIENT:	CBS OUTDOOR SAN MATEO COUNTY
INST.:	CITY: SAN MATEO STATE: CALIFORNIA
CONTACT:	
APPROVED:	BY: DATE:
REVISIONS:	TYPE / BY / DATE
TOLAR CONTACT:	SALES: PATRICK MERRICK (951) 808-0081 EXT.229 ENGINEER: NICK REGALADO (951) 808-0081 EXT.235
ITEM #:	
MANUFACTURING DESC.:	12' BUS SHELTER W/ FLAT AD BOX EURO, BRONZE LEXAN ROOF PANELS DRAWING NO: 7545-00
ACCESS.:	BENCH: 6' PERF W/ TWO VAGRANT BARS MAP CASE: AS SHOWN TRASH CAN: EXPANDED METAL MISC.:
COLOR	RAL 6002 LEAF GREEN

TOLAR® SHELTERS

TOLAR MANUFACTURING COMPANY, INC.
WWW.TOLARMFG.COM

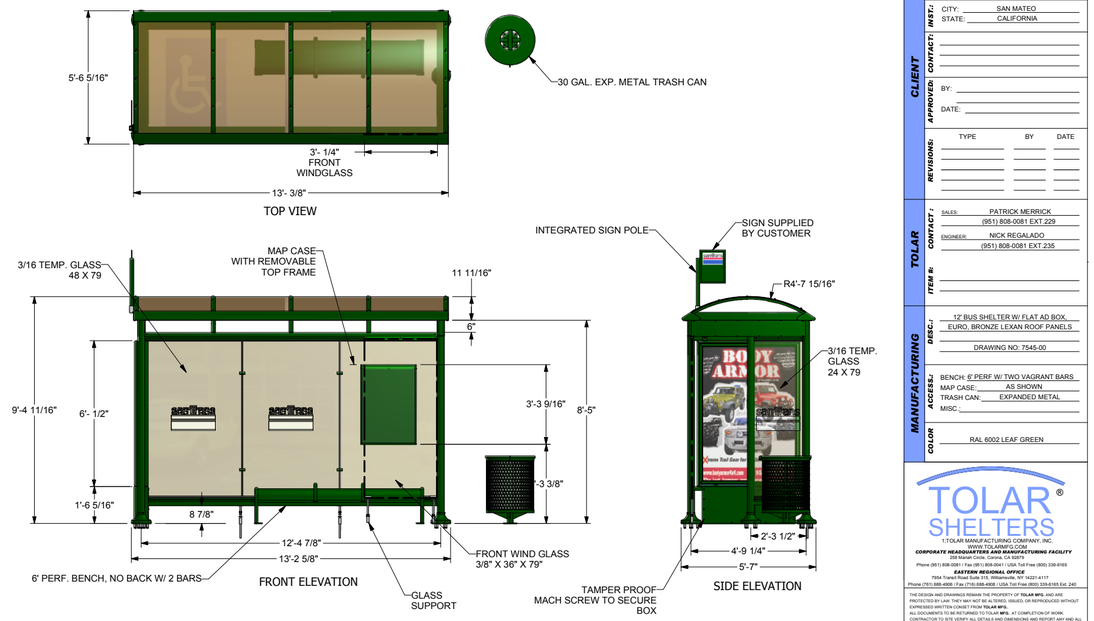
CORPORATE HEADQUARTERS AND MANUFACTURING FACILITY
258 Mariah Circle, Corona, CA 92879
Phone (951) 808-0081 / Fax (951) 808-0041 / USA Toll Free (800) 339-6165

EASTERN REGIONAL OFFICE
7954 Transit Road Suite 315, Williamsville, NY, 14221-4117
Phone (761) 688-4906 / Fax (716) 688-4906 / USA Toll Free (800) 339-6165 Ext. 240



Attachment A-1, Advertising Shelter

Attachment A-1, Advertising Shelter



CLIENT

CLIENT: CBS OUTDOOR / SAN MATEO COUNTY

INST.: CITY: SAN MATEO / STATE: CALIFORNIA

CONTACT:

APPROVED: BY: / DATE:

REVISIONS:

TYPE	BY	DATE

TOLAR

CONTACT: SALES: PATRICK MERRICK (951) 808-0081 EXT.229

ENGINEER: NICK REGALADO (951) 808-0081 EXT.235

ITEM #:

MANUFACTURING

DESC.: 12' BUS SHELTER W/ FLAT AD BOX, EURO, BRONZE LEXAN ROOF PANELS

DRAWING NO: 7545-00

ACCESS.: BENCH: 6' PERF W/ TWO VAGRANT BARS

MAP CASE: AS SHOWN

TRASH CAN: EXPANDED METAL

MISC.:

COLOR: RAL 6002 LEAF GREEN

TOLAR® SHELTERS

1TOLAR MANUFACTURING COMPANY, INC.
WWW.TOLARMFG.COM
CORPORATE HEADQUARTERS AND MANUFACTURING FACILITY
258 Mariah Circle, Corona, CA 92879
Phone (951) 808-0081 / Fax (951) 808-0041 | USA Toll Free (800) 339-6165
EASTERN REGIONAL OFFICE
7954 Transit Road Suite 315, Williamsville, NY 14221-4117
Phone (781) 588-4908 / Fax (716) 588-4908 / USA Toll Free (800) 339-6165 Ext. 240

Attachment A-1, Advertising Shelter

Columbia Equipment Company inc.
180-10 93rd Avenue Jamaica, New York 11433-1499
718/658-5900
FAX 718/526-4110
www.columbiaequipment.com
e-mail: shelterpr@aol.com

Re: Bus Shelters for Sam Trans

SPECIFICATIONS

GENERAL: All Bus Shelters shall be Model #7005bs /Series, as manufactured by the Columbia Equipment Company, Inc., Jamaica, New York. Dimensions shall be: 12' 6 1/4" minimum overall length (outside of facia to outside of facia) by 5'- 11 1/2" minimum overall width (outside of facia to outside of facia), by 7'-0" high to underside of facia. (Please specify all dimensions.) Shelters shall be ~~XXXXXXXXXXXXXXXXXX~~ non-cantilevered (cross out one). Shelters shall ~~be constructed from~~ have a front windscreen (~~XXXXXXXXXXXXXXXXXX~~).

CONSTRUCTION MATERIALS: All structural frame and window frame members shall be extruded aluminum of 6061-T6 or 6063-T52 (for duranodic) alloy. Structural framing shall be one-piece seamless 2-1/2" x 2-1/2" hollow aluminum tubes of .125" minimum thickness. SNAP-TOGETHER OR TWO-PIECE CHANNELS WILL NOT BE ACCEPTED. Mullions shall be one-piece seamless 1-1/2" x 2-1/2" x .125" members. Window frames shall be separate extruded aluminum members with integral self-alignment lips and corner key slots. FRAMELESS GLAZING IN RECESSED POCKETS WILL NOT BE ACCEPTED. SNAP-ON GLAZING STOPS OR STONEFRONT GLAZING DETAILS WILL NOT BE ACCEPTED. Facias shall be one-piece seamless extruded aluminum sections of .125 thickness with integral gutter, raindrip molding, weep holes - cantilevered beyond face of glazing panels below double corner key slots and alignment lip. Shelters shall be prefabricated in four or five sections, completely glazed (so that total erection time at site requires only about one hour). Skylight domed roofs shall be one-piece completely prefabricated units with domes mounted into facias and caulked and gasketed before shipping. All joints shall be neat and clean and all edges shall be free of burrs.

STANDARDS: All aluminum shall conform to the standards of the Aluminum Association, 750 3rd Avenue, New York, New York. Standards complied with in the design and construction of Columbia Shelters include AISC, Aluminum Association, ASTM, UL, etc., as applicable to the aluminum, steel, plastics and other parts. Shelter construction shall conform to construction standards of ASCE. Columbia Shelters are designed to withstand dead loads of 40 pfs min. and wind load over 75 mph.

STRUCTURAL FRAMING: All framing, both vertical and horizontal, shall be the same size. Minimum size shall be 2-1/2" X 2-1/2" X 1/8" structural tubes. Mullions shall be concealed. Connections shall be by means of 1/4" thick minimum extruded aluminum channels, 2-1/4" X 2-1/4" X 2-1/4" high with tapered edges, or 1-1/4" X 2-1/4" X 2-1/4" high with tapered edges. Each main structural joint shall be fastened with two high strength stainless steel bolts of 1/4" diameter with washers, lockwashers and nuts and 1/4" countersunk aluminum hammer rivets at each joint. SELF-TAPPING CONNECTORS WILL NOT BE ACCEPTED. Base connections shall be adjustable to varying sidewalk or mounting conditions. Base of Shelter columns shall be designed to accept both internal and external base flankes. Where external flanges are used, they shall have same anodized or duranodic finish as Shelter. PAINTED FLANGES WILL NOT BE ACCEPTABLE WITH ANODIZED OR DURANODIC FINISHED SHELTERS. Shelter posts shall contain internal drainage weep holes to prevent condensation build-up.

WINDOW FRAMING: Windows shall be factory installed in window frame which shall be factory installed into the separate structural frame. Window frames shall have mitered corners and shall be connected internally by extruded aluminum corner keys or screw bosses with concealed stainless steel screws for positive tamper-proof fastening. Window frames shall be affixed to Shelter frame with 3/16" shallow head aluminum rivets, at approximately 13-1/4" O.C. Rivets shall grip both surfaces being joined continuously for a full 360°. RIVETS FASTENED INTO "SLOTS" WILL NOT BE PERMITTED. Window frames shall be independent so that windows with gasketing (mounted in frames) can be removed or installed as a complete unit without affecting any other member of the Shelters. FIN TUBES, SNAP-ON OR SCREW-ON GLAZING BEADS ARE NOT ACCEPTABLE. Where polycarbonate windows are used, specially deep frames with

Attachment A-2, SamTrans Shelter

Attachment A-2, SamTrans Shelter

SPECIFICATIONS
Page 2 continued

specially deep continuous PVC dry set splines shall be used for gasketing. Design of window framing shall be such that only authorized personnel may remove window units.

FINISHES: All aluminum framing shall have a #313 Dark Bronze Duranodic finish to conform to "Aluminum Association Standards for anodically Coated Aluminum Alloys for Architectural Applications". Facias shall have a #313 Dark Bronze Duranodic finish. Duranodic finishes shall conform to the standards of the Aluminum Company of America.

GLAZING: All glazing shall be 1/4" bronze tempered glass. Gasketing around windows shall be continuous specially extruded polyvinyl cloride PVC dry set splines. Where polycarbonate (not applicable) glazing is used, specially deep continuous PVC dry set splines shall be used, as shall deep window frames. Glazing shall be fully gasketed and framed in independent, interchangeable factory assembled units for ease of maintenance and repair. Maximum glazing panel widths shall be 29".

ROOF: Roof shall be one-piece molded acrylic skylight dome. Thickness of acrylic shall be 1/4" nominal. Color shall be translucent white.
Roof shall be completely enclosed - both top and bottom - by continuous, compressed gaskets of expanded EPT rubber or neoprene SCE41, with adhesive backing and shall be leak and condensation proof. All roof seams and joints between dome and aluminum shall be continuously sealed with premium construction grade silicone such as Dow #780 or GE #1200. Roof dome shall be factory mounted into facia/gutter assembly. Roof dome shall be removable without removing facia. Roof dome(s) shall NOT be held in place with snap-in members.

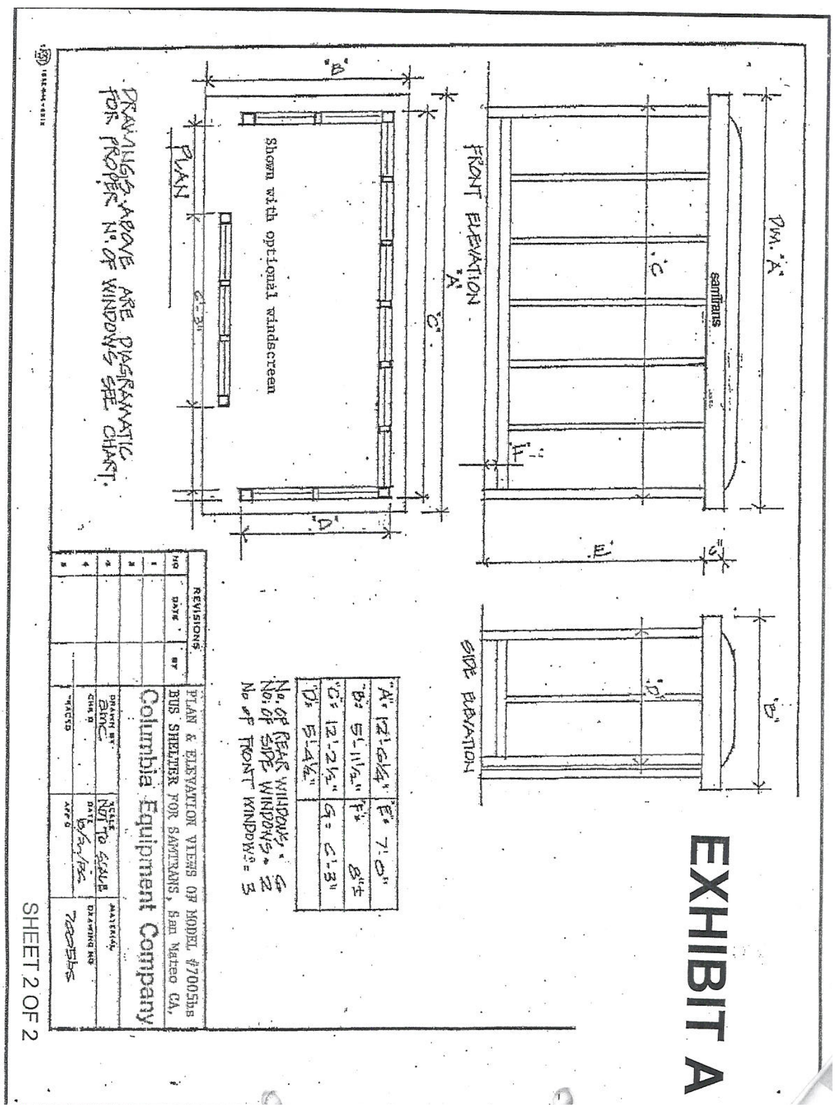
ROOF/FACIA: Facia member shall be 6" high minimum. Facias shall be one-piece continuous extruded members with mitered corners; connection in facias shall be with two (2) aluminum angle corner keys and four (4) threaded stainless steel Allenhead set screws at each corner. FACIA MEMBERS SHALL HAVE NO EXPOSED FASTENINGS OF ANY SORT. Joints shall be mechanically fastened, NOT WELDED, to facilitate future maintenance. Facia members shall have integral self-aligning lips for perfect alignment. Weep holes in facia shall be located on a custom basis to prevent drainage from crossing through Shelter on sidewalk. Drainage shall take place through cantilevered weep holes to an external reveal inside the facia but outside the Shelter, to prevent streaking on the exterior surface of the facia. For safety, top edge of facia shall be rounded. Roof assembly shall be attached to roof beams with ¼" minimum diameter stainless steel gasketed roof bolts approximately 13" o.c.

ADDITIONAL: Design of Shelter shall be such that the structure is stable with all windows, roof, facia and ground fastenings remove. Shelters shall be designed by Registered Architect and engineered by Licensed Engineers. Shelters shall be vandal-resistant, maintenance-free and completely weather-proof. The design shall permit integration of light fixture, bench, radiant heater, transit map and schedule panels, telephone, graphic treatments and other integrated street furniture. All installation hardware and ground anchors shall be supplied with Shelter.

MAP/SCHEDULE DISPLAY PANEL: All shelters to be furnished with integrated hinged display panel full window width (approx. 30") x50" high. One side to have continuous aluminum piano hinge finished to match shelter. Opposite side to have tamper-proof stainless steel screws and a special tool provided. Frame to be extruded aluminum with integral screw bosses at corners and approx. 1/2" wide X 1/8" thick. Finsih of frame to match shelter. Glazing to be 3/16" clear tempered glass in continuous black PVC gasket. Bottom edge of rame to havae aluminum cleat.
BENCH: All shelters to be furnished with 8'-0" independent bronze aluminum bench with back. Seat and backs to be 1-piece seamless extruded planks w/flutted surfaces, rounded edges, capp ends and hidden stainless steel hardware.
Shelters to match previous shelters by Columbia furnished to SamTrans in the past.

Graphics: All shelters to have white diecut SamTrans logos on front facia members. Artwork to be provided by SamTrans.

Attachment A-2, SamTrans Shelter



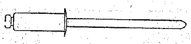
Attachment A-2, SamTrans Shelter

THE FOLLOWING TOOLS ARE REQUIRED FOR INSTALLATION

-Drill Motor w/ #11 and 1/4" Drill Bits
-Heavy Duty Drill Motor w/ 1/2" Masonry Drill Bit
-Steel Hammer
-Dead Blow Hammer
-Heavy Duty Pop Rivet Tool
-Bubble Level
-7/16" and 3/4" Sockets w/ Wrench
-Caulk Gun

SUMMARY OF SHELTER FASTENERS PROVIDED

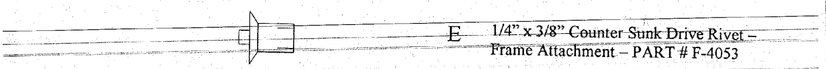
A 3/16"x 3/16" G.R. Aluminum Blind Rivet Window Sash and Ground Windskirt Attachment – PART # F-4029



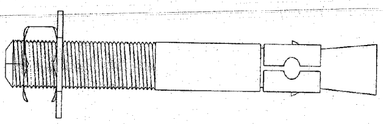
B 3/16" x 3/8" Stainless Steel Blind Rivet – Bench and Backrest Bracket Attachment Grillwork Attachment – PART # F-4066

C 1/4" x 1/4" Dome Head Drive Rivet – Roof Module Attachment – PART # F-4045

D 1/4" x 3/8" Dome Head Drive Rivet – Anchor Boot Attachment – PART # F-4043

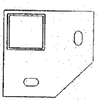


E 1/4" x 3/8" Counter Sunk Drive Rivet – Frame Attachment – PART # F-4053

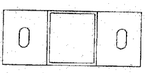


F 1/2" x 3 3/4" Stainless Steel Wedge Anchor Bolt Ground Attachment – PART # F-4050

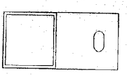
SHELTER ANCHOR BOOT STYLES:



CORNER BOOT
Part # B4642



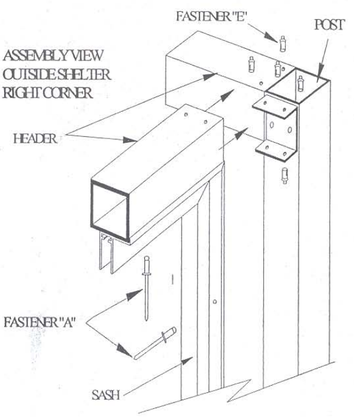
INTERMEDIATE BOOT
Part # B4630

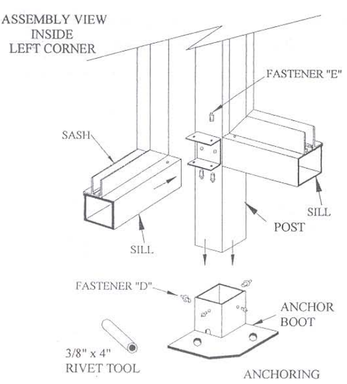


DOORWAY BOOT
Part # B4643

Attachment A-2, SamTrans Shelter

SHELTER WALL SECTION ASSEMBLY





For proper orientation of the shelter, wall sections are viewed by standing in front of the shelter looking in. All wall sections are labeled for assembly.

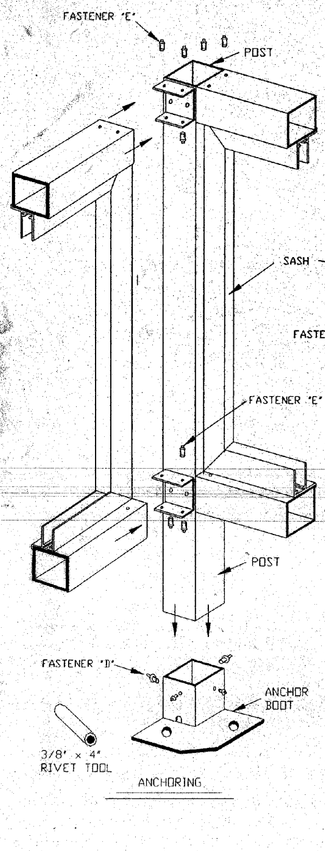
- Start with the left side wall and the left rear wall sections.
- Begin by setting vertical posts into anchor boots. Orient anchor boot so flanges of boot and eventual anchor bolts will align under the sill.
- Slide header and sill tubes onto corresponding structural clips. Fully engage wall sections until sash lip covers column edge.

These shelters are precision manufactured. Some tapping may be necessary to fully engage tubes over structural clips. Countersunk drive rivet holes will be at a slight offset to hold tube and clip in tension.

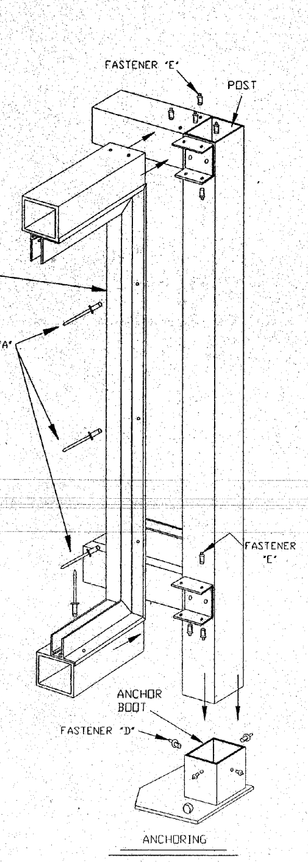
- Using tool provided, seat rivets into predrilled holes. Secure connection with (3) 1/4" countersunk drive rivets at each clip.
- Repeat connection technique for all remaining back wall or side wall sections.
- Insert roof cross brace tube(s) over structural clip(s) on back wall header beam.
- Attach front header or optional front windscreen by spreading side wall sections until header tube engages over structural clip(s). Insert roof cross brace tube(s) over front structural clips. Secure with countersunk drive rivets.
- Where wall sections connect, Use #11 drill bit (.191 dia) and drill through pilot holes in sash into corresponding tube.
- Secure sash to tube with 3/16" x 3/8" aluminum blind rivets.
- With wall sections assembled; square and plumb wall sections. Use 1" shims provided to pitch shelter drainage to the rear. Shims should be placed inside anchor boots to maintain sufficient pitch so water cannot pool. Final leveling can take place prior to anchoring shelter in place.

SHELTER WALL SECTION ASSEMBLY

ASSEMBLY VIEW INSIDE SHELTER – LEFT CORNER



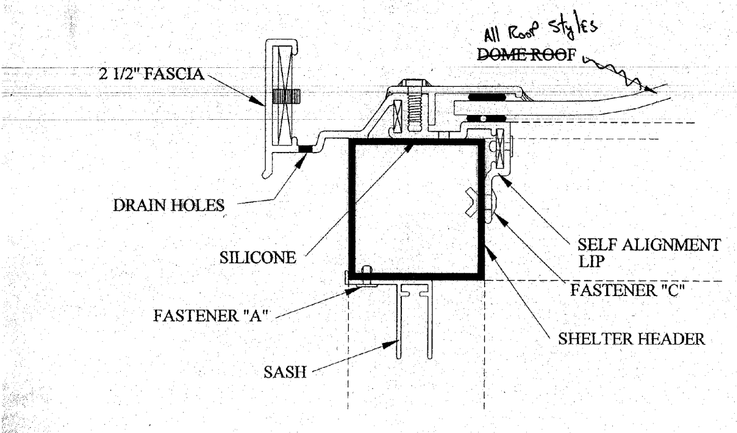
ASSEMBLY VIEW OUTSIDE SHELTER – RIGHT COR-



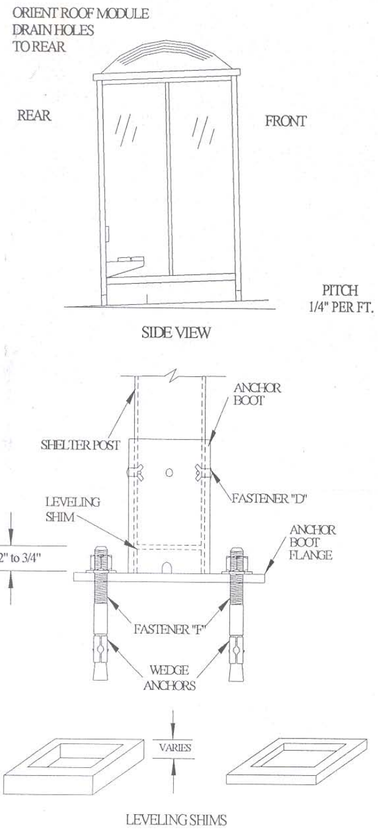
Attachment A-2, SamTrans Shelter

SINGLE ROOF MODULE INSTALLATION

- Be sure shelter frame is square and level
- Clean top of header beams around the entire perimeter of shelter.
- With drain holes located to the rear of the shelter, set roof module onto shelter wall sections.
- Be sure roof module is set completely into shelter frame. Pull down from outside if necessary and hold firm.
- From inside the shelter, using 1/4" drill bit, drill through pilot holes in the self alignment lip of the roof modules into shelter header beams.
- Secure entire perimeter with 1/4" x 1/4" dome head drive rivets. (Fastener "C")



FINAL LEVELING / ANCHORING SHELTER



- With the shelter in the proper location, square and plumb wall sections. This can be done using a bubble level and the 3-4-5 squaring formula (from a corner, measure and mark 3' along the side wall, measure and mark 4' along the back wall. The distance between the marks (forming a triangle) needs to be 5'. Adjust accordingly.
- Using a bubble level and leveling shims provided in the hardware kit, pitch shelter to the rear for drainage. Sufficient pitch should be maintained not to pool water in the roof module.
- Mark concrete through holes in anchor boot flanges.
- Move shelter over allowing ample room to drill holes in concrete. Using a 1/2" masonry bit, drill a 3" -3 1/2" deep hole.
- Relocate shelter over drilled holes.
- Set wedge anchors (Fastener "F") into holes leaving 1/2" to 3/4" exposed thread above surface of anchor boot flange. Apply flat washer, lock washer, and nut onto bolt. Tighten securely.
- Drill through pilot holes in anchor boot into shelter leg (1/4" bit). Secure each anchor boot with (4) 1/4" x 3/8" dome head drive rivets. (Fastener "D")

Attachment A-2, SamTrans Shelter

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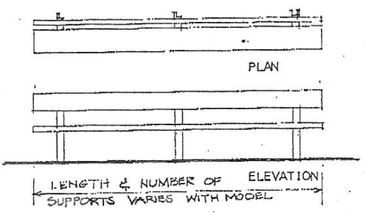
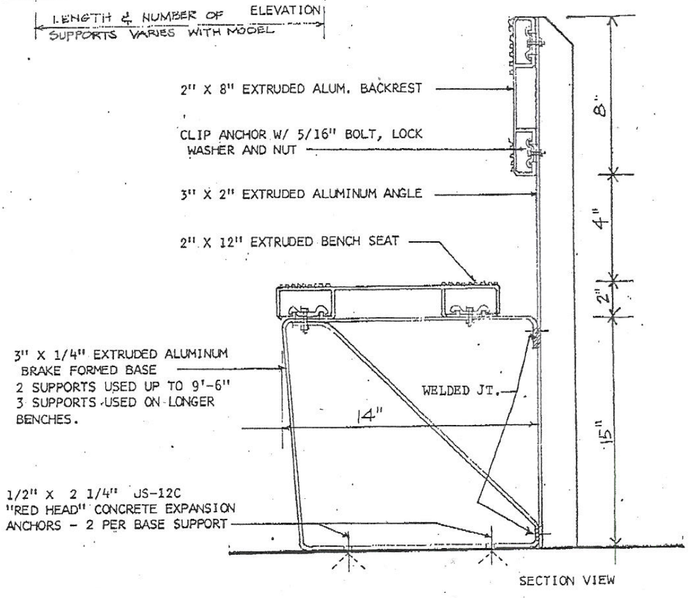
Columbia Equipment Company



NOTES: 1. ALL MEMBERS ARE OF EXTRUDED ALUMINUM.

2. ALL SEAT AND BACKRESTS TO BE CAPPED ON ENDS. THERE SHALL BE NO ROUGH EDGES.

3. FINISH OF ALUMINUM TO BE CLEAR ANODIZED



ALUMINUM BENCH

SK-3b

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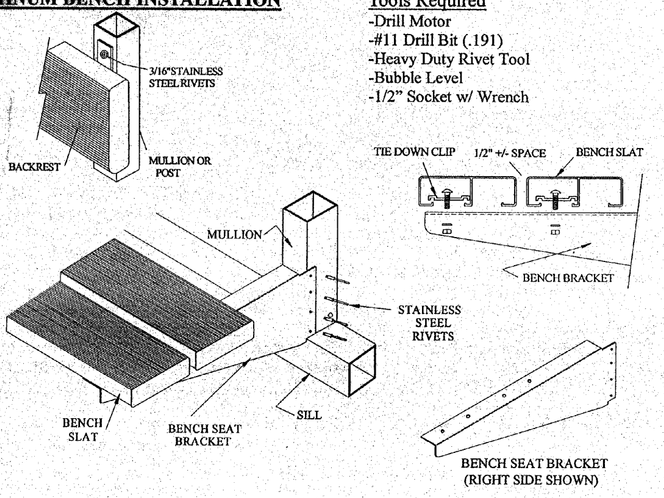
EXHIBIT B

ALUMINUM BENCH INSTALLATION

Tools Required
-Drill Motor
-#11 Drill Bit (.191)
-Heavy Duty Rivet Tool
-Bubble Level
-1/2" Socket w/ Wrench



ALUMINUM BENCH INSTALLATION

Begin by laying out the bench brackets in your shelter.

Typical bench installation is the entire back wall of your shelter, for ADA consideration, some shelters will only have a partial length bench and backrest. The end brackets attach to the corner columns with the top support flange facing away from the adjacent glass. The intermediate brackets align to the right of the vertical mullions with the top support flange aligning directly in front of the vertical mullion.

Starting in the corner locate bottom alignment notch on sill with bracket firmly against column.
Drill (4) #11 holes (.191 dia.) through bracket pilot holes into vertical column.
Apply (4) 3/16" x 3/8" stainless steel pop rivets. (FASTENER "B") (DO NOT SUBSTITUTE)

Locate the next bench bracket on the right hand side of the next vertical mullion Repeat above directions to attach. Locate bench slats onto brackets (as shown above)

Place bench tie down clip over alignment leg of bench slat. Insert 5/16" carriage bolt down through tie down clip into bench bracket. Repeat for each bracket. Once all tie down clips are attached and hand tightened, make adjustments to planks to insure proper alignment. Tighten securely once aligned.

Locate backrest slat against wall with attachment straps aligning with vertical mullions. Top of backrest slat should be 16" above top of bench slats.

Attachment A-2, SamTrans Shelter

CLEANING TIPS

This information is intended to serve as a guide and will be useful in understanding the proper care and maintenance of anodized aluminum. As with any finished product, anodized aluminum requires reasonable care prior to and during installation. Anodized aluminum possesses exceptional resistance to corrosion, discoloration and wear. Upon final installation routine maintenance should commence. The more frequently aluminum is cleaned the easier and less costly succeeding maintenance is:

1. Over-cleaning or excessive rubbing can do more harm than good.
2. Strong solvents or strong cleaner concentrations can cause damage to the finished surface.
3. Avoid abrasive cleaners. Do not use household cleaners that contain abrasives.
4. Abrasive materials like steel wool, abrasive brushes, etc. can wear and harm finishes.
5. Avoid drips and splashes. Remove excess solvents as quickly as possible.
6. Avoid temperature extremes. Heat accelerates chemical reactions and may evaporate water from cleaning solutions. Extremely low temperatures may result in poor cleaning results. Cleaning under adverse conditions may result in streaking or staining. Ideally, cleaning should be done in shade at moderate temperatures.
7. Do not substitute a heavy-duty cleaner for a frequently used mild cleaner.
8. Do not scour surface.
9. Never use paint removers, aggressive alkaline, acid or abrasive cleaners.
10. Do not use tri-sodium phosphate, highly alkaline, high acid based cleaners.
11. Always do a surface test in an inconspicuous area.
12. Follow manufactures recommendations for mixing and diluting cleaners.
13. Never mix cleaners.
14. To prevent marring, make sure cleaning sponges, cloths, etc. are grit free.
15. Consideration must be given to the effects of drips, splashes and run down to shrubbery, personal equipment, vehicles and other items located near by. Such conditions may affect the timing of the cleaning schedule.

Attachment A-2, SamTrans Shelter

PRODUCTS FOR THE CARE OF ALUMINUM

The following list of proprietary products for the care and cleaning of aluminum has been provided by member companies of the Aluminum Association, and is included merely as an aide in identifying such products and the categories described in the text. No attempt has been made by the Association to evaluate their effectiveness, nor does listing here constitute an endorsement. The list is not to be considered all-inclusive: other products equally suitable for the intended purpose may be available. The responsibility for the selection, determination of suitability, and proper use of the cleaning product is left to the user.

Cleaners

mild soaps and detergents and non-etching cleaners

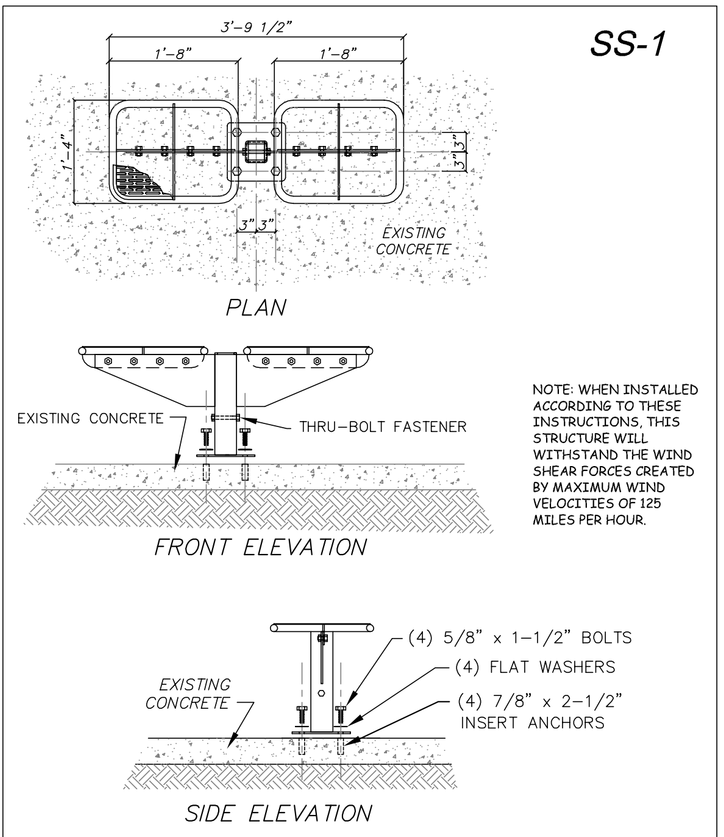
Aero wash	BASF Wyandotte Corporation, Wyandotte, MI 48192
Aluma-Clean	Coricone Corporation, 550 Frontage Rd., Northfield, IL 60093
Aluminum Cleaner HC-22	Klenzade Products, Div. of Economics Labs, Beloit, WI 48192
ARCAL 101	ARCAL Chemicals, Inc., 223 Westhampton Ave., Seat Pleasant, MD 20027
Cascade/Ivory Liquid/Ivory Snow/ Joy/Thrill	The Procter & Gamble Co., P.O. Box 599 Cincinnati, OH 45202
Cee-Bee A-69m/Cee-Bee A-13/Cee-Bee 280	McGean Chemical Co., 9520 East Cee Bee Dr., Downey, CA 90241
Clepo 83-M 8-S	Frederick Gumm Chemical Co., Inc., 1280 Wall Street West, Lyndhurst, NJ 07071
Fantastic	Toxizo, Division of Morton Norwick Products, Inc., P.O. Box 368, Greenville, SC 29602
Fels Soap Granules	Fels & Co. Div., Purex Corp., 73rd & Woodland Ave., Philadelphia, PA 19138
Fleetline JC4/JCS/111/204	Oakite Products, Inc., 50 Valley Rd., Berkeley Heights, NJ 07922
Flow	Dubois Chemicals, DuBois Tower, Cincinnati, OH 45202
General Surface Cleaner	Fruehauf Division, Fruehauf Corp., Detroit, MI 48232
Glim	Babbit Products, Inc., Lakewville, CT 06039
Lux Liquid/Swan Liquid/Dove Liquid/ Dishwasher All	Lever Bros. Co., 390 Park Ave., New York, NY 10022
Magnuwash/NZL/155-X/1156/921-X3	Magnus Division, Economics Laboratory, Inc., Osborn Bldg, St. Paul, MN 55102
Melo-Mighty	Klix Chemical Co., Inc., 551 Railroad Ave. South, San Francisco, CA 94080
No. 203 Aluminum Cleaner	Solventol Chemical Products, Inc., Romulus, MI 48174
#840-1691 Purg-All	Parr, Inc., 18400 Syracuse Ave., Cleveland, OH 44110
Penesolve 5/Power Cleaner/Powerlene	Penelone Corp., 74 Hudson Ave., Tenafly, NJ 07670
Pex Liquid Detergent	Peck's Products Co., 610 E. Clarence Ave., St. Louis, MO 63147
Ridosol/Ridoline 53/57/357, P3 Almoxo 18, 19,36	Amchem Products, Inc., Amber, PA 19002
Spray Nine	Knight Oil Corp., 251 North Comrie Ave., Johnstown, NY 12095
Super 815, 815MX	Brulin & Company, Inc., P.O. Box 270-B, Indianapolis,IN 46206
Texolite 100/584	Texo Corporation, 2801 Highland Ave., Cincinnati, OH 45212
Trail-R-Wash	Kool Seal, 8001 Franklin Blvd., Cleveland, OH 44102
Vari-Kleen, Spray White	Richardson Company, Allied-Kelite Products Div. 2400 E. Denon Ave., Des Plaines, IL 60018
West Glo	West Chemical Products Inc., Orchard & West Sts., Long island City, NY 11101

solvent and emulsion cleaners

Airshow Grl	Brulin & Company, P.O. Box 270-B, Indianapolis, IN 46206
Actusol/Super-Mul, Expedite, Zolu, Lectro SAF	Dubois, Div. Of chemed Corp., DuBois Tower, Fountain Square, Cincinnati OH 45202
Cee-Bee R-677/Cee-Bee C-50	McGean Chemical Co., 9520 East Cee Bee Dr., Downey, CA 90241
468/Emlon	BASF Wyandotte Corp., Chemical Specialties Div., Wyandotte, MI 48192
Inhibisol/old Salt Degreaser/ Navee 42/Navitone	Penelone Corp., 74 Hudson St., Tenafly, NJ 07670
Tri-Ethane	PPG Industries, One Gateway Center, Pittsburgh, PA 15222
Turco Solv/Kwik Solv	Turco Products, Div. Of Purex Corp. Ltd. Wilmington, CA 09749
W64 C C1	The Sherwin Williams Co. 101 Propect Ave. N.W., Cleveland, OH 44101

8

Attachment A-3, Simme-Seat

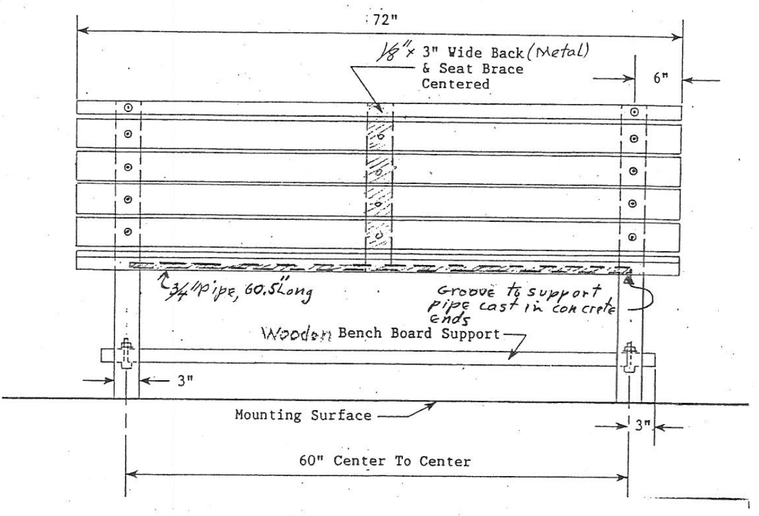


Appendix 1

Attachment A-4, Composite Wood Bench

Agana of California
Box 434 SR 2
La Honda Ca 94020
650 851 1243

May 2002

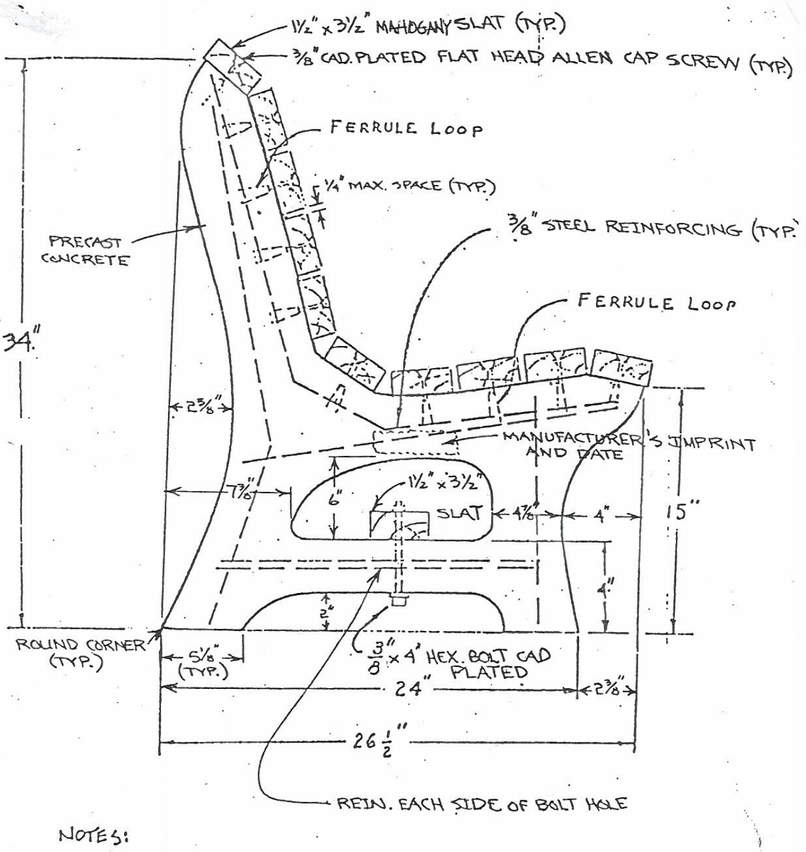


Front View
N.T.S.

NOTES:

1. All ferrule loops shall lie in the same straight line. Said line shall pass through the middle of the concrete ends.
2. All ten (10) plastic slats ends shall lie along the same straight line at both ends.
3. Metal back and seat plate attached with 5/8 x 1½ hex Lag screw,
4. Provide Samtrans logo as per Section 02870, 2.02.E.

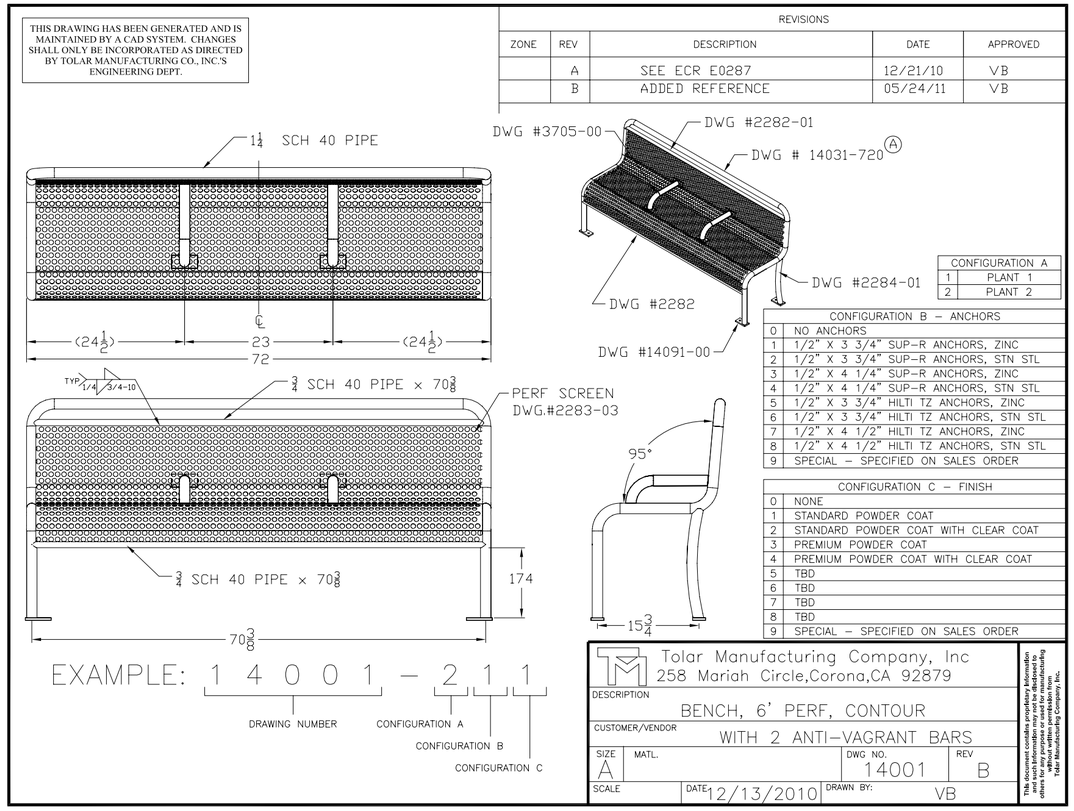
Attachment A-4, Composite Wood Bench



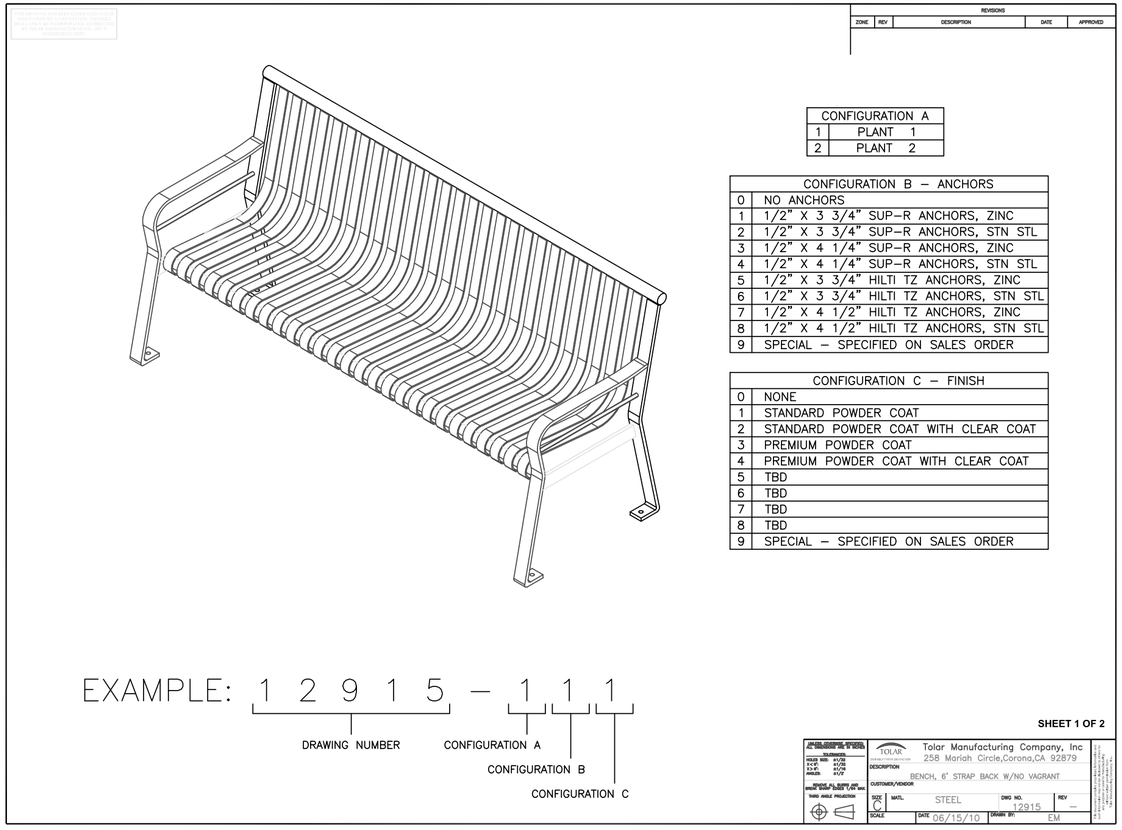
NOTES:

1. Rebar shall pass through the loop in the ferrule loop.

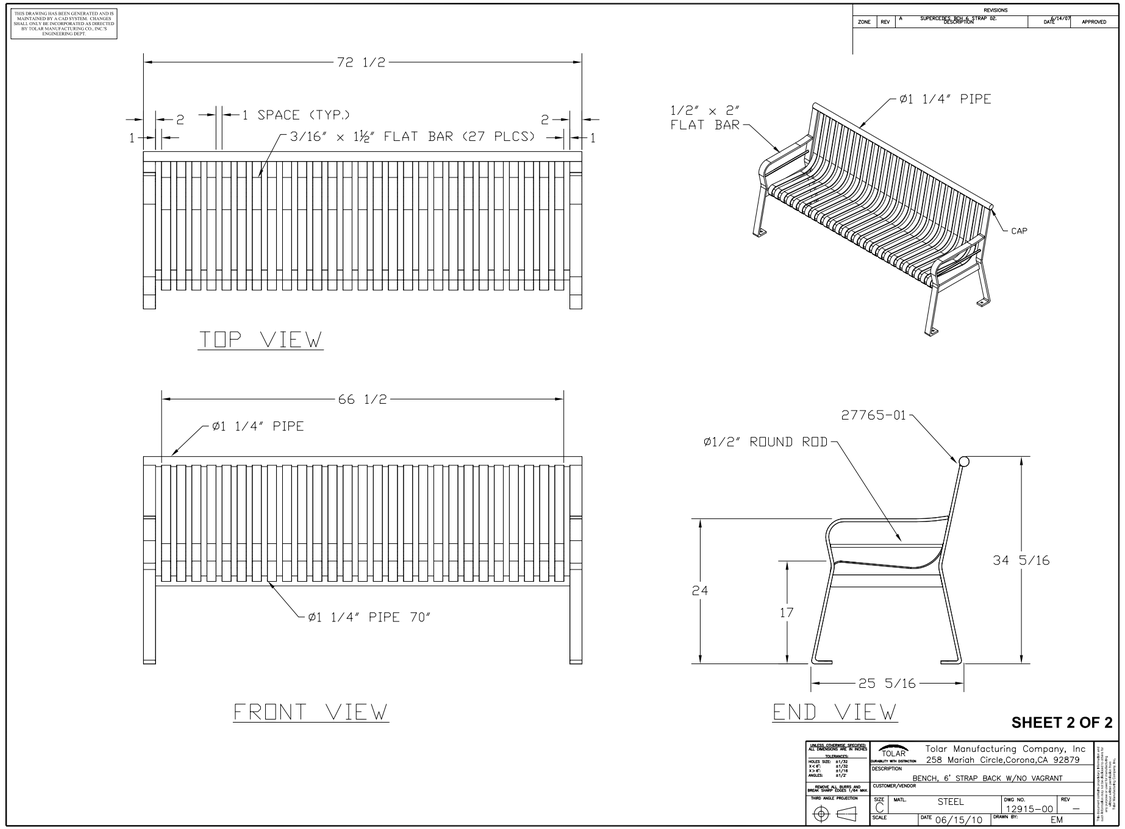
SIDE VIEW



Attachment A-5, Green Perforated Bench



Attachment A-6, Green Bench



Attachment A-6, Green Bench

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samTrans