GENERAL GUIDELINES FOR HSR IN FRESNO

Trackway Conditions

Typical Trackway Conditions
Where the HSR track is adjacent to UPRR freight track, its track, ballast, switches and other equipment are similar in appearance to the UPRR environment.

We have no recommended changes to the at-grade HSR alignment.

Tunnel
There is a short tunnel under SR180.

We have no alternative recommendation for tunnel treatments.

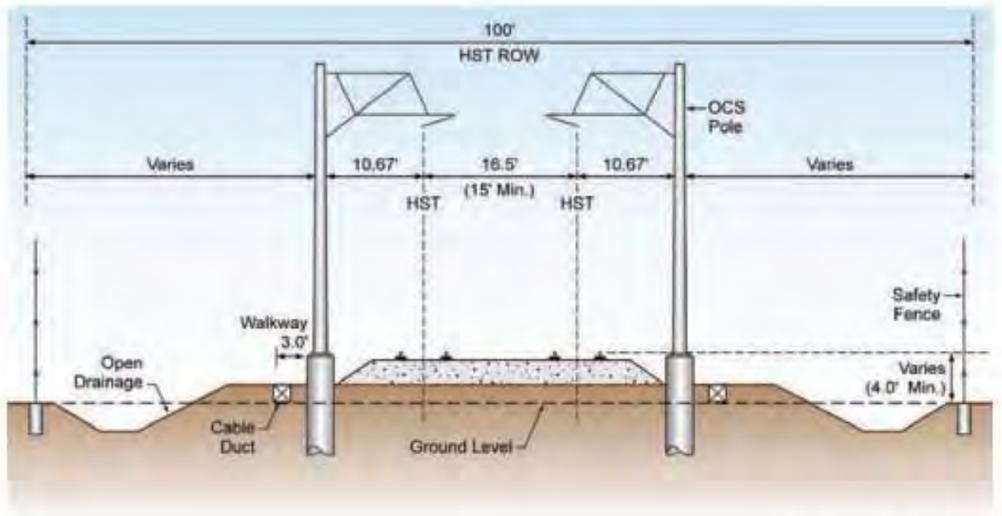


Figure 2-6
At-grade Typical Cross Section

GENERAL GUIDELINES FOR HSR IN FRESNO

Elevated Structures • Typical Guideway

The design of elevated structures and bridges will be a key element in the overall image of high speed rail as it passes through Fresno. These very visible elements should be coordinated with one another in Fresno, and with the rest of the system throughout the state.

The typical elevated portion of the alignment throughout much of the state-wide alignment and portions of Fresno is a single or twin box girder structure on single, flared piers. As indicated in the Concept Approach to HSR Design above and building on the CHSRA Architectural Guidelines, the recommended aesthetic design is aerodynamic, monolithic and curved/softened edges. The primary components are piers, a flared box section, deck overhangs with parapet type edge barriers and twin OCS poles. Steel superstructure box girder options may require additional work with deck and pier top to create a smooth relationship between pier and flared girders.

Recommendations: aerodynamic forms; curved edges; monolithic surfaces.

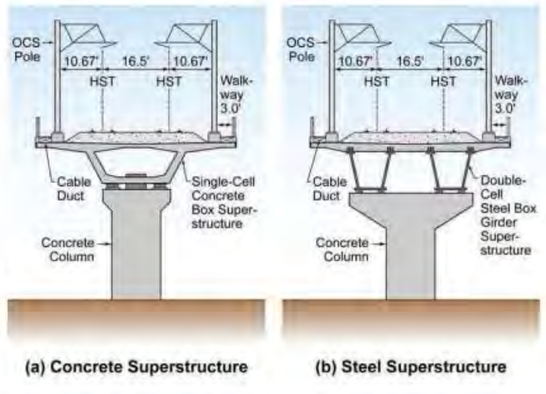
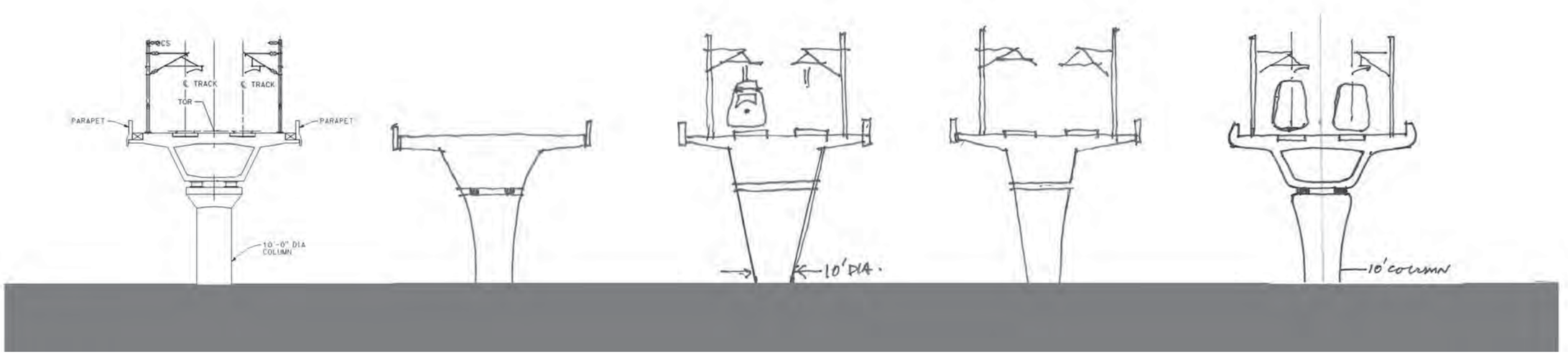
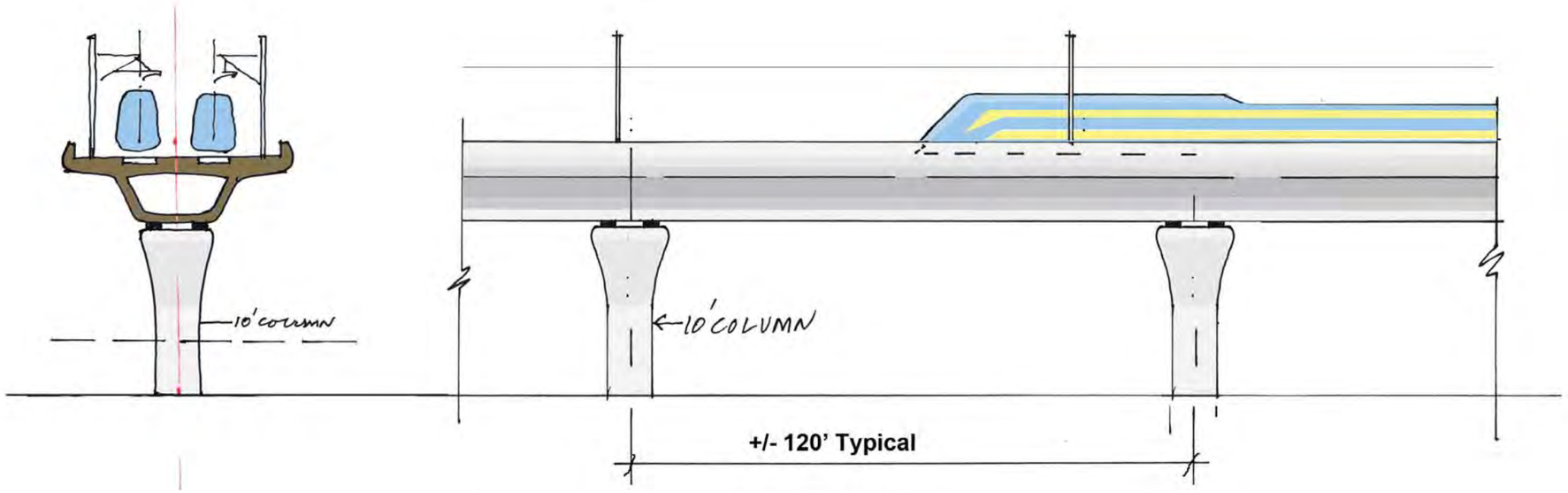


Figure 2-8
Elevated Structure Typical Cross Sections

Example: Flared piers



Evolution of the Design Concept: Several variations were explored for the basic form of columns, viaducts and parapet walls.



Recommended Viaduct Section/Elevation: Curved, smooth elevated structures, to match the speed and design of HSR vehicles.

GENERAL GUIDELINES FOR HSR IN FRESNO

Elevated Structures • Barriers & Piers

Deck/Barrier Edge

The recommended design calls for the edge between deck bottom and parapet barrier face to be rounded to complete the aerodynamic shape of the composite guideway. The solid parapet barrier also screens views of the track bed, rails and other equipment at track grade from the first few floors of adjacent buildings.

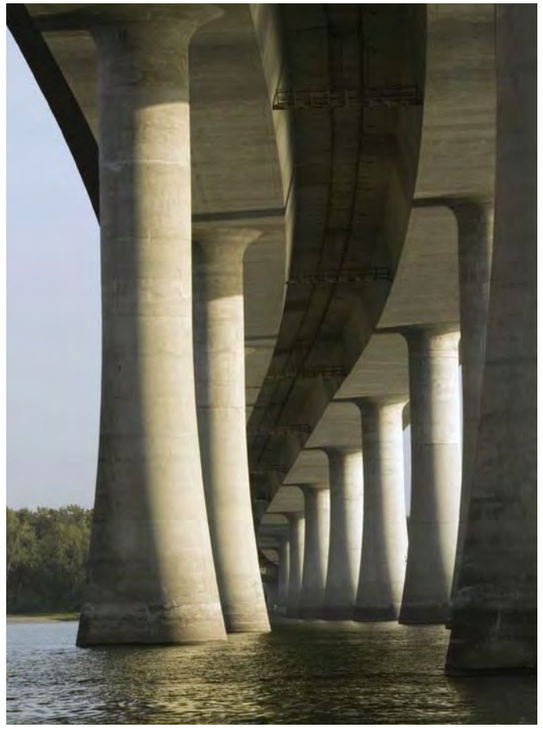
Recommendations: aerodynamic forms; curved edges; monolithic surfaces; solid concrete barrier.

Piers

The recommended pier design is round in cross section, flaring out at the top before intersecting with the box girder.

Recommendations: round section; aerodynamic forms; monolithic surfaces.

Example: Integrated viaduct and rounded parapet barrier



Example: Rounded, flared piers

GENERAL GUIDELINES FOR HSR IN FRESNO

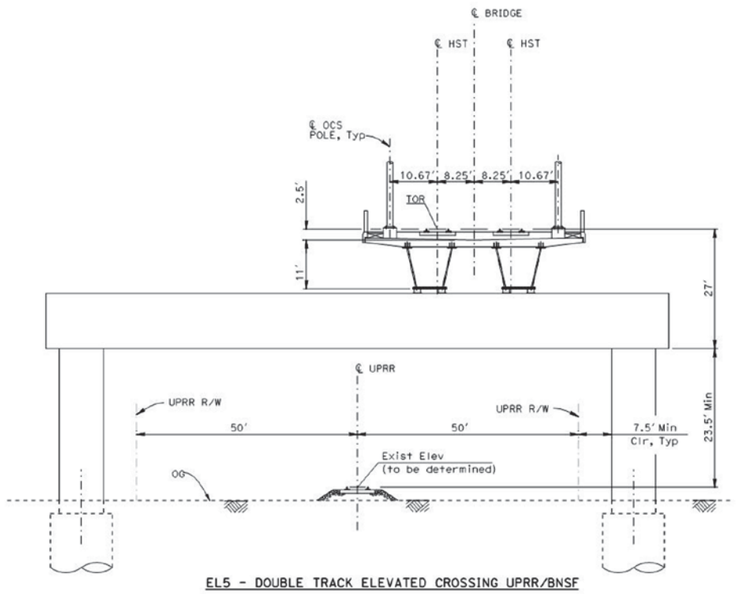
Elevated Structures • Straddle Bents

In several critical segments of the HST project, where single, center piers are impossible due to conflicts at grade such as property, rights-of-way, highway and street lanes, straddle bents will be used to provide for continuity of support. While the scale and form of straddle bents will diverge from many of the other standard elevated structures, straddle bents should be viewed as being in the same family as viaduct and bridge structures.

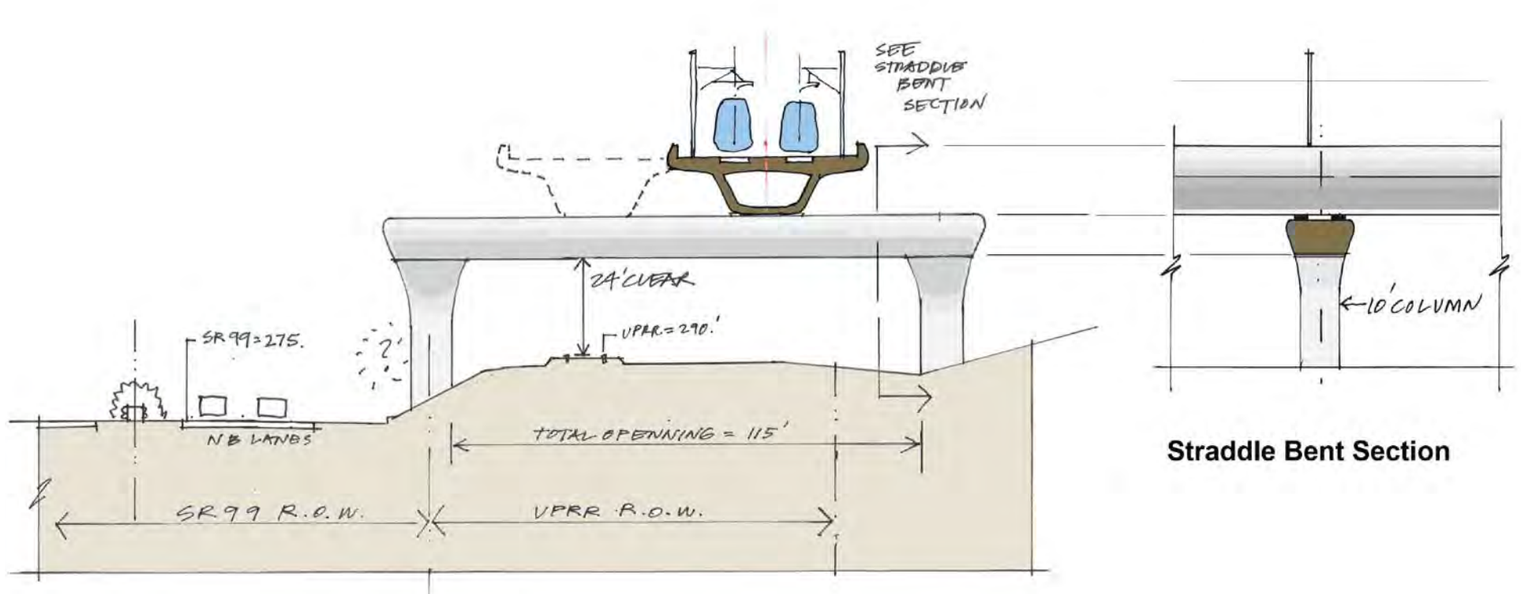
Our recommendation is that straddle bents follow the same aesthetic guidelines applied to the general guideway: twin piers of the same flared form as the single, center pier, joined by a robust beam with curved edges and ends and cross section that approximate the flare of the piers. In order to convey the uniform and smooth appearance, integrated bents are preferred over composite bents. This will give a continuous line to both structures and keep straddle bents in the unified family of forms.

Recommendations: round pier section; aerodynamic forms; curved edges; monolithic surfaces.

Example: Straddle bents over two roadways



15% Engineering Drawings: Typical straddle bent design concept



Recommendation: Curved, smooth saddle bents to match the speed and design of HSR vehicles.

GENERAL GUIDELINES FOR HSR IN FRESNO

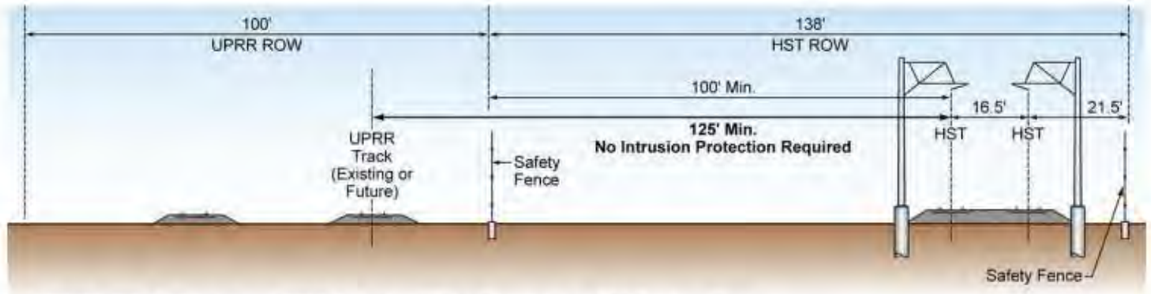
Train Crash Barriers

Intrusion Barrier Wall

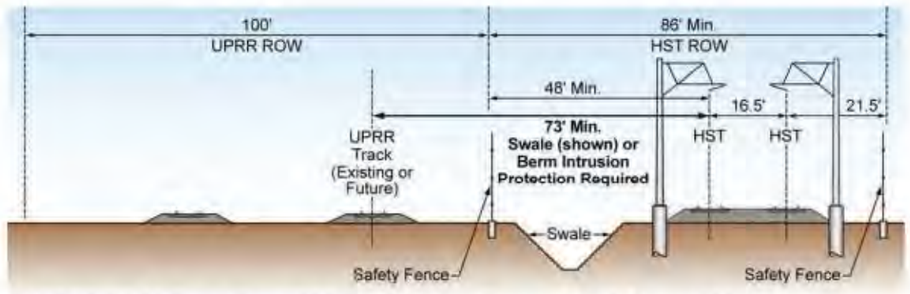
To prevent head-on collisions between opposing trains in a derailment, Federal Railroad Administration and California Public Utilities Commission requires mitigating design features: one, a significant horizontal distance between tracks; two, a deep swale between tracks; three, a heavy duty crash barrier called an Intrusion Barrier Wall. In Fresno, the HSR and UPRR tracks are close enough that the alignment will require approximately 8 miles of Intrusion Barrier Wall. These walls are made of cast-in-place (CIP). In the HSR trench section going under SR 180 at Roeding Park and north of the Stanislaus Viaduct, the Intrusion Barrier Wall is on top of the eastside retaining wall and creates a combined height of 15'. From street level on Golden Gate Blvd. and at Roeding Park the Intrusion Barrier Wall is tall enough to be above the horizon line. An 8 mile long Intrusion Barrier Wall is one of the most significant elements of CHSR in Fresno.

Recommendation

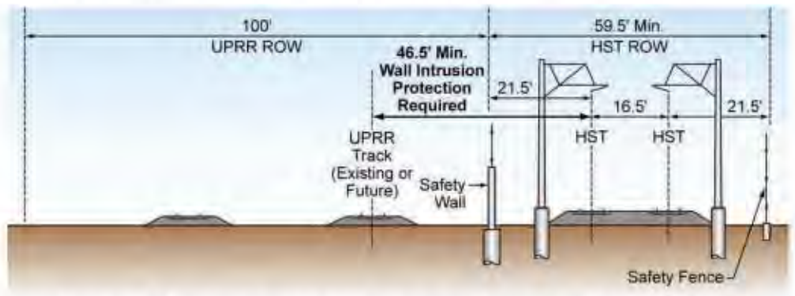
Similar to the other cast-in-place (CIP) or MSE walls of the project (see CHSR Typical Treatments), the Intrusion Barrier Wall should use a fractured fin texture, supplemented by an architectural jointing system corresponding to construction joints vertically and horizontally and a pre-determined module. At street crossings where the Intrusion Barrier Wall is most visible, an opportunity exists for site specific, commissioned, art projects.



(a) UPRR/SR 99 Centerline-UPRR Right-of-Way Separation 100 Feet or More
(No Intrusion Protection Required)



(b) UPRR/SR 99 Centerline-UPRR Right-of-Way Separation 48 Feet to 100 Feet
(Swale or Berm Intrusion Protection Required)



(c) UPRR/SR 99 Centerline-UPRR Right-of-Way Separation 21.5 Feet (Min.) to 48 Feet
(Wall Intrusion Protection Required)

Figure 2-29
UPRR/SR 99 Alternative – UPRR Right-of-way Cross Section Configurations
Recommended train-to-train crash protection required for HSR

GENERAL GUIDELINES FOR HSR IN FRESNO

Fill Wall Sections

Fill wall sections/approaches to overcrossings
Either cast in place or Mechanically Stabilized Earth (MSE) are acceptable. For either type, a fractured fin texture is preferred to deter graffiti.

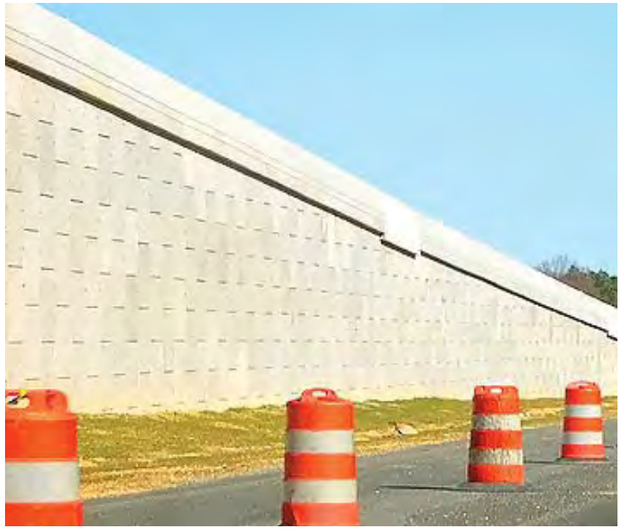
- MSE Fill walls: typical required elements are cast-in-place corner pilasters (unless special corner pieces are available) and a cast in place wall cap/railing or barrier foundation. The independent design team recommends the combined wall cap/parapet type barriers be designed to look similar to the parapet barriers in the HSR guideway.
- Cast-in-place (CIP) Fill walls: a fractured fin texture can be supplemented by an architectural jointing system corresponding to construction joints vertically and horizontally and a pre-determined module. The parapet barrier can be integral with the wall top since it does not have to cover the tops of saw-cut MSE panels.
- Fill wall visual impact can be reduced by using landscape berms to diminish the amount of wall surface shown. Berms should use xeriscape (desert/drought-resistant) landscape for erosion control.

Recommendations: fractured fin concrete wall texture; coordinated joint pattern; concrete cap at MSE options; finished wall top at CIP options; integrate design of wall top with other elements such as railing, lights and sign bridge mounts.

Example: Cast-in-place wall with architectural modulation

Example: MSE wall with fractured fin finish

Example: MSE Fill Wall with custom texture



Example: Combined wall cap and parapet barrier

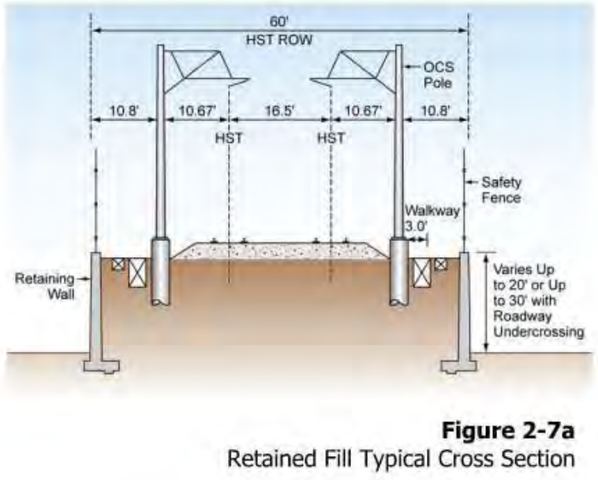


Figure 2-7a
Retained Fill Typical Cross Section

Example: Typical fill wall from CHSR Design Guidelines

GENERAL GUIDELINES FOR HSR IN FRESNO

Trench/Cut Walls

Trench/Cut Walls
Trench/Cut Walls will likely be cast-in-place construction using technologies to mitigate excavation for tie backs and water table. Similar broken fin texture and jointing modules should be applied. In some cases the wall top may be a vehicular parapet type barrier. In other cases, the wall top will include a pedestrian-only railing. The module of railing sections, light poles and wall joints should be coordinated to achieve architectural resolution between all elements.

Recommendation: broken fin texture; modular jointing; coordinate jointing with railing and light fixture spacing; refer to general recommendations for downtown undercrossings on page 6.

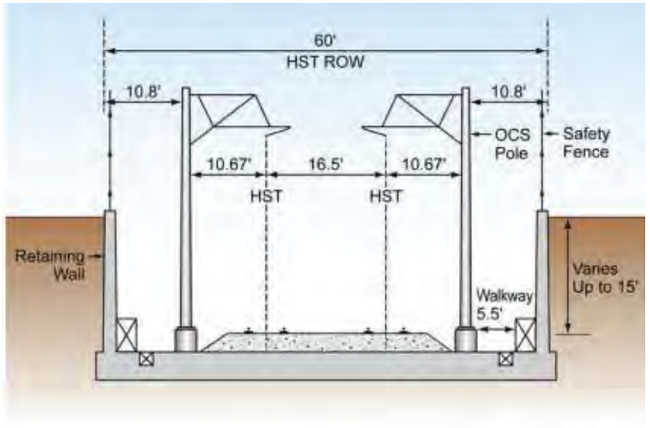


Figure 2-7b
Retained Cut Typical Cross Section

Example: Typical cut wall from CHSR Design Guidelines

Example: Cast-in-place wall with exposed aggregate finish

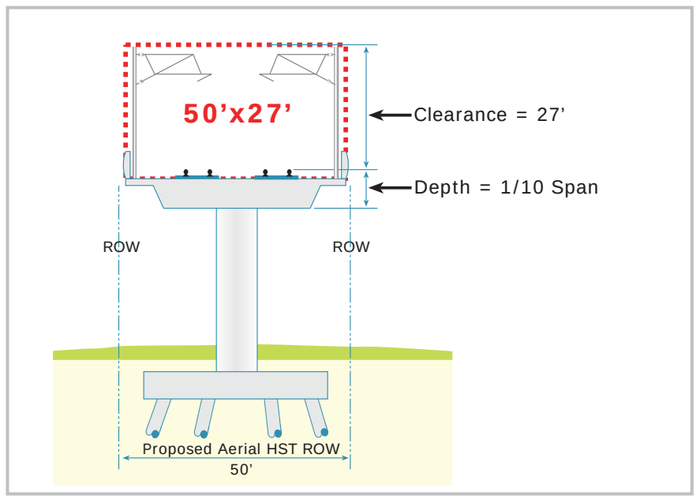
Example: Board-form finish

GENERAL GUIDELINES FOR HSR IN FRESNO

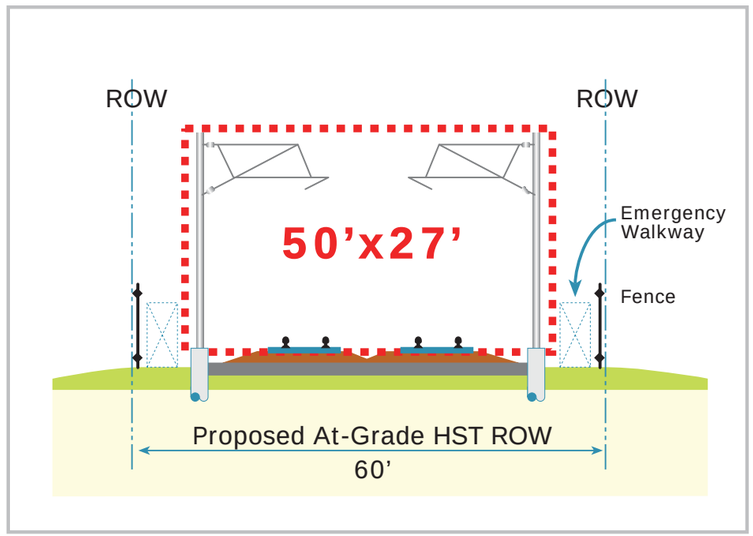
Overhead Catenary System

Overhead Catenary System (OCS)
The basic components of OCS are twin, ground-mounted steel poles with cantilever arms over the individual trackways to hold the contact wire. At the trench section on either side of SR180, a pole and overhead beam is proposed to suspend the contact wire assemblies. The independent design team acknowledges the basic support system.

No recommendations



Typical: OCS on aerial structure
(San Jose Visual Design Guidelines)



Typical: OCS on at-grade segment
(San Jose Visual Design Guidelines)

Example: OCS with cantilever arms

GENERAL GUIDELINES FOR HSR IN FRESNO

Traction Power SubStations

Traction Power Substations (TPSS)
Two TPSS locations are proposed: one is proposed near the Clinton overcrossing and the other, near the Ventura undercrossing. The independent design team considers Clinton within the Downtown Fresno influence area, hence attention needs to given to its appearance from surrounding properties and buildings. Landscape screening with trees may be considered or required by the City. The Ventura TPSS is particularly critical to blend into surroundings that are going to change as Fresno redevelops former railroad industrial lands to mixed use. This TPSS also includes a 100' electrical service tower which needs to be in its appearance. See Fencing below.

Recommendations: evaluate site plans and landscape screening plans for TPSS and provide additional screening as needed to blend facilities into their surroundings.

Example: Traction Power Substation

Example: Switching Station

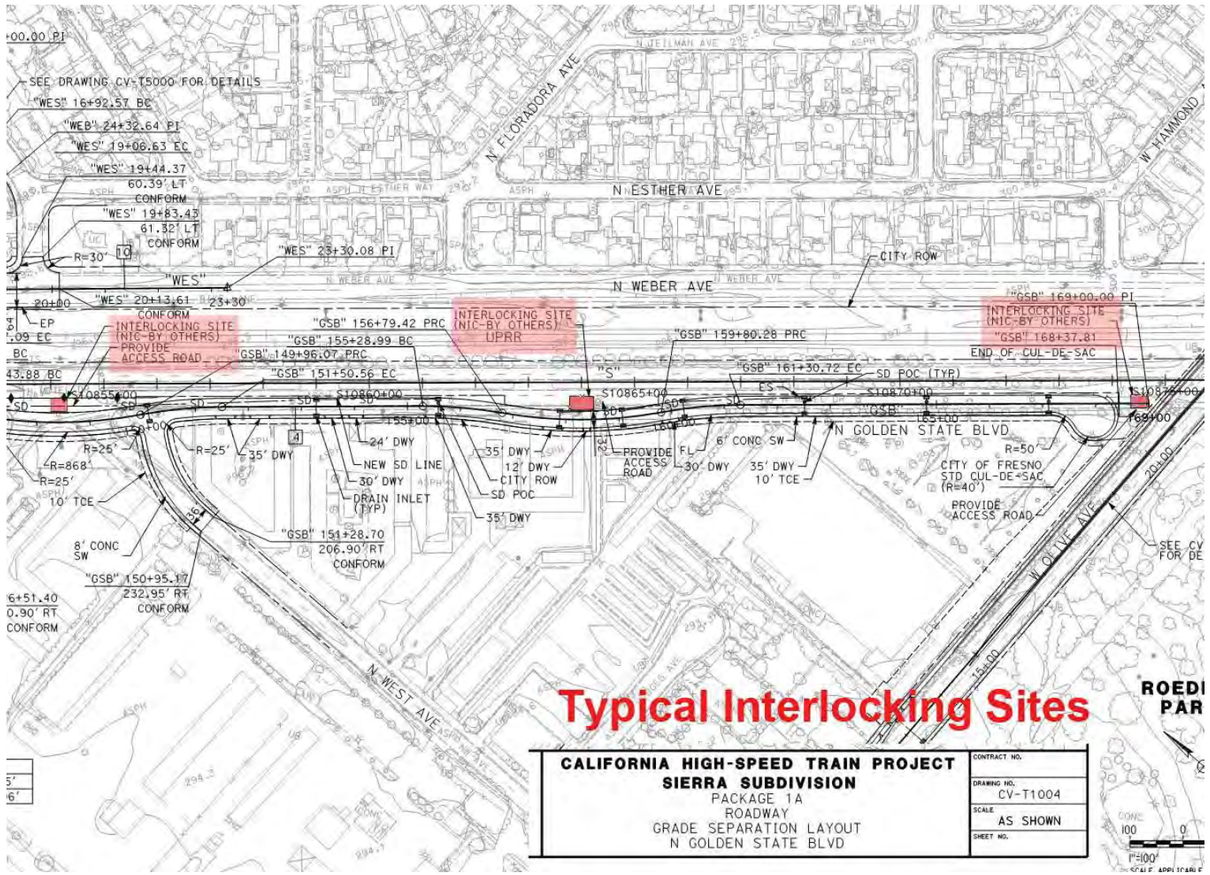
Example: Paralelling Station

GENERAL GUIDELINES FOR HSR IN FRESNO

Interlocking Sites

Interlocking Sites
These include a smaller equipment enclosure and are often co-located with TPSS. We recommend that its fencing be coordinated with and look similar to security fencing in other locations.

Recommendations: evaluate site plans and landscape screening plans for Interlocking Sites and provide additional screening as needed to blend facilities into their surroundings; integrate interlocking sites into the HSR ROW and avoid causing streets or other infrastructure outside the ROW to make "eccentric" accommodations.



Typical: Proposed conceptual engineering for a segment of HSR alignment, illustrating approximate spacing and orientation

GENERAL GUIDELINES FOR HSR IN FRESNO

Lighting

Street Lighting

Fresno has a limited number of fixtures that are used for street and sidewalk lighting that should be incorporated into lighting requirements for overcrossing structures. See included photographs. As part of the Fulton Corridor Specific Plan and Downtown Neighborhoods Plan, there are recommendations to add pedestrian scale light fixtures on some streets. These new light fixtures could be appropriate to include with undercrossing pedestrian facilities in the Downtown area. They can be sidewalk mounted or pedestal mounted where concrete pedestals are used as a secondary railing support at wider intervals. It is assumed these new fixtures will meet current energy, performance, dark sky and light pollution criteria.

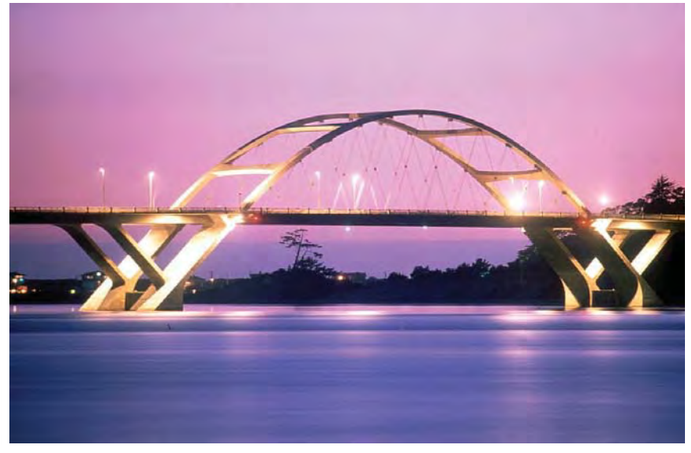
Recommendations: incorporate new Downtown Fresno pedestrian lights on new overcrossings and undercrossing where called for in recent downtown planning documents as designated street types; incorporate current City street lights as continuity of existing lighting treatments on crossing corridors.

Decorative Bridge Lighting

Decorative lighting of the North and South Gateway structures is encouraged. Design should emphasize the major structure components such as the through arch and convergence of the through-arch and return-arch where the bridge begins and ends. To the extent the fixtures can be concealed or de-emphasized visually, is also encouraged. Finally, design should take into account dark skies principles and not waste lighting energy where significant light pattern is spread into the sky; keep light patterns focused on bridge structure.

Example: Newer cobra-style light with attached signals

Existing: Pedestrian-scaled lighting



Example: decorative lighting of major bridge structure features

GENERAL GUIDELINES FOR HSR IN FRESNO

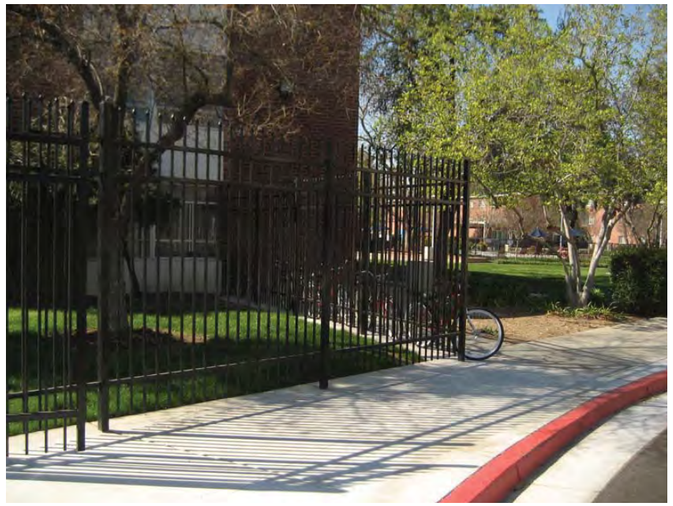
Fencing

Fencing

Fencing will be a substantial element in the HSR corridor to control access for safety. There are several fence applications in the project:

- HSR Right-of-Way fencing: any mesh type fences will have robust post and rails to carry the overturning and sag forces. Provision for dark vinyl coatings or paint will help make this fence less conspicuous in the at-grade, urban landscape.
- Security Fencing at TPSS, Interlocking Sites and other HSR equipment sites: should be related to the r.o.w. fencing.
- Fencing at overcrossing structures over trackways: the adopted design by CHSRA is the tight mesh, backstop style fencing that curves back, partially over the pedestrian zone to minimize a bridge user from inadvertently reaching over and touching high voltage contract wires and as a discouragement for throwing any objects from the bridge onto passing trains.

Recommendations: provide a consistent material and design for right-of-way fencing through the Fresno city limits. Dark colors for mesh are recommended for the Downtown Area and at all new overcrossings.



Example: Standard iron fence along an urban street ROW

Example: Decorative screen along an urban street

Example: Required fencing for overcrossings of HSR ROW

Example: Wall and decorative screen along an urban street

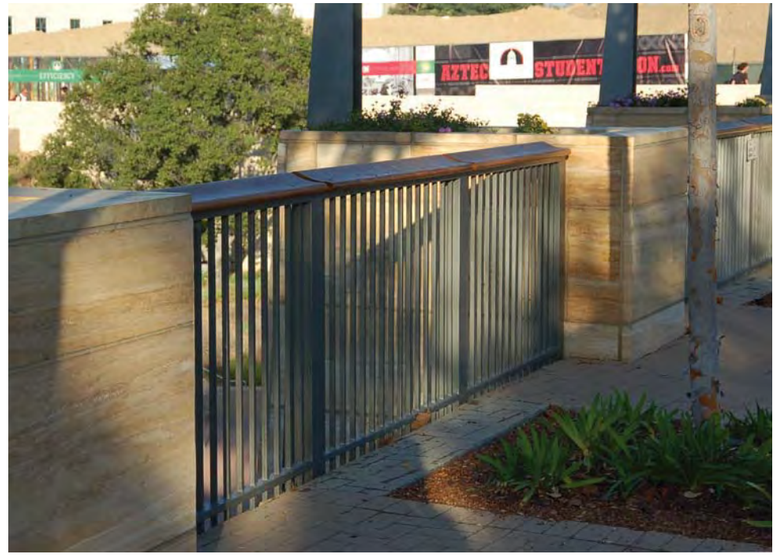
GENERAL GUIDELINES FOR HSR IN FRESNO

Railings

Railings
Some of the undercrossings in the downtown area will require pedestrian railing at sidewalk/ top of retaining wall for fall protection. These should be architecturally designed to complement their setting, relate to wall jointing module, integrate with the wall top and be straightforward to install and replace panels in the future. These railings will be required to meet International Building Code and California requirements for height above paving and maximum opening dimension.

Recommendation: coordinate railing design to be derivative of Downtown's best steel picket railing designs.

Example: Existing railing on Stanislaus Bridge that does not meet current code



Example: Pedestrian railing and wall barrier

GENERAL GUIDELINES FOR HSR IN FRESNO

Integrated Railings & Barriers

Railing and Barriers

As described previously, reinforced concrete parapet-type barriers are planned for the edge of HSR guideway, HSR bridge structures and overcrossing structures with vehicular traffic. There are two primary applications:

- An all-concrete parapet at the HSR guideway and bridge structures where there should be no public access
- A combination concrete parapet with added tubular steel top rails to meet the pedestrian height requirements; the top railing assembly would be bolted or embedded to the top of concrete barrier.
- Crash attenuators: at locations on the approach spans where the outside travel lanes and proximity of barrier is relatively close, a barrier transition is required to prevent a vehicle from ramming the end of a barrier. The highway industry has several mechanical designs for this application from collapsing metal barrier segments to water filled tubes. The requirement for these may be able to be mitigated by re-designing the approach sections for wider sidewalks where the travel is now further from the barrier end. Options to minimize these devices should be explored. They are not appropriate elements in a pedestrian-oriented downtown streetscape.

Recommendations: concrete parapet-type barrier at HSR guideway and bridge structures.

Example: Integrated concrete parapet HSR guideway

Example: Crash attenuator/cushion at barrier end

Example: Concrete parapet, tube rail, fence and light pedestal

Example: Combination concrete parapet with metal tube railing

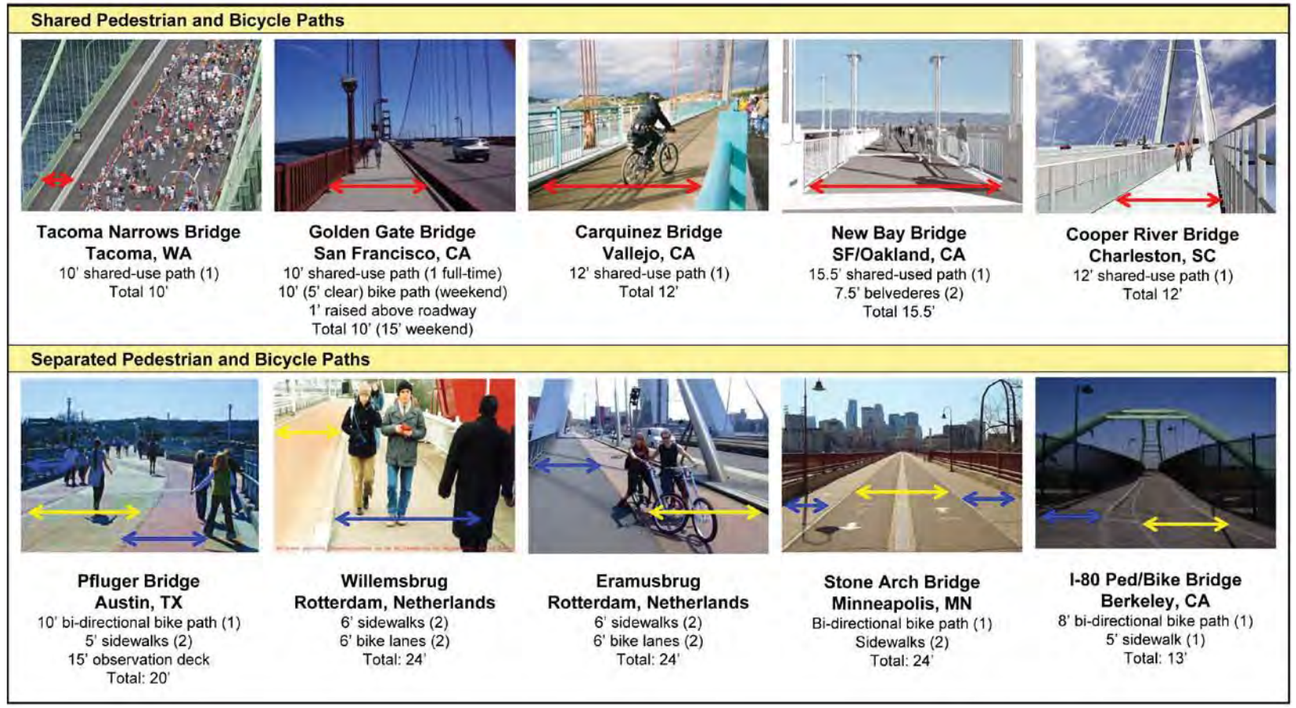
GENERAL GUIDELINES FOR HSR IN FRESNO

Sidewalks, Pedestrian Bridges and Bike Facilities

Most of the local street crossings over and under the HST corridor are high volume streets. Where possible, bike and pedestrian facilities on high-volume streets should be separated vertically and horizontally from auto lanes.

When pedestrians and bicyclists share a multi-use facility, at least 12' of width should be provided, but 14' is preferable. 14' of width provides space to delineate separate bicycle and pedestrian zones within the facility, and to provide enough room for users traveling in opposite directions to pass one another safely.

The 15% engineering documents currently show two new pedestrian bridges crossing the CHSR alignment, with one adjacent to Ventura, and the other between Stanislaus and the Tuolomne right-of-way. In general, pedestrian access should be provided in line with the downtown street grid, rather than midblock or separated from the street network. Circulation is most intuitive and convenient when it is organized in street rights-of-way, or in a way that reinforces the patterns established by a grid of rights-of-way.



Example: Columbia River Crossing Project pedestrian-bicycle reference image

GENERAL GUIDELINES FOR HSR IN FRESNO

Other Opportunities for Unique-to-Fresno HSR Design Treatments

Public Art
HSR in Fresno is a very large and conspicuous element of infrastructure and should consider inclusion of public art at appropriate locations. The process for a public art program associated with HSR should be taken up with the City, local arts commissions and CHSRA.

Special Materials
In general, material recommendations follow those of CHSRA and its Architectural Design Guidelines with minor exceptions noted in this summary.

Signage or branding
To be determined in another contract.