

Appendix A: CHSRA Plans, Profiles, and original Evaluation Matrix materials

Source: CHSRA Preliminary and Supplemental Alternatives Analysis Reports



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REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY	
DRAWN BY	
CHECKED BY	
IN CHARGE	
DATE	03-24-10



CALIFORNIA HIGH-SPEED TRAIN PROJECT
SAN FRANCISCO
 ALTERNATIVE 3: TRANSBAY
 TRANSIT CENTER
 AA ALTERNATIVE 0A
 FIGURE 3

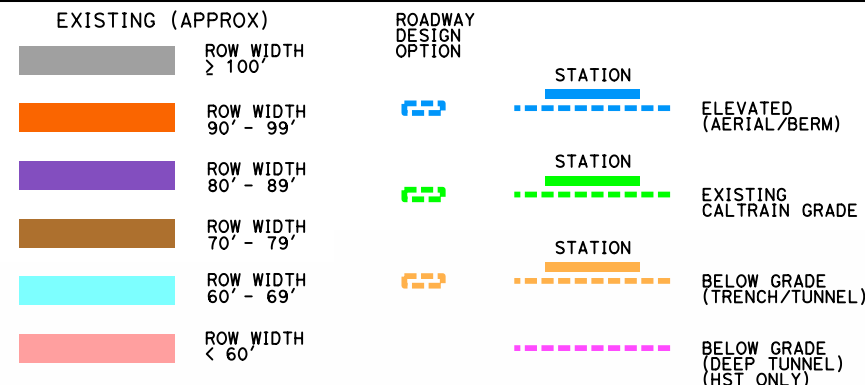
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Subsection #1-1 (San Francisco)

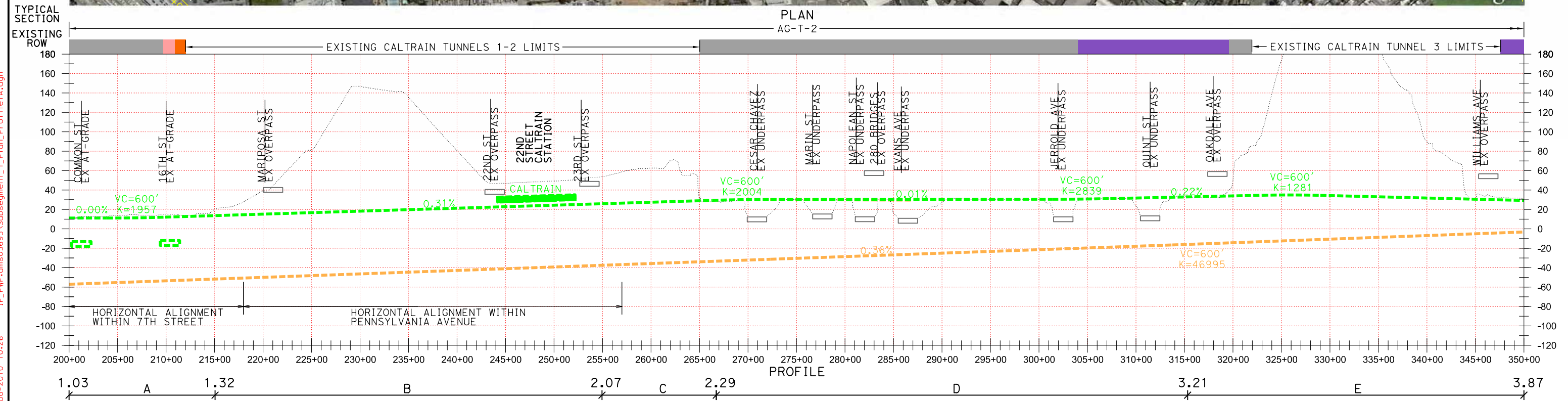
Length: 4.8 miles Land Use: Urban

North of Common Street to South Portal Tunnel No. 4 (MP. 1.03 to MP. 5.77)

This subsection is located within the City and County of San Francisco. Except for two crossings near Mission Bay, all other street crossings in this subsection are grade separated. The existing Caltrain alignment passes through a series of hills and valleys necessitating 4 tunnels and several embankment and trench segments. The I-280 freeway structure above the tracks and its supporting columns are constraints in the northern portion of the subsection.



NOTES:
 1. CENTERLINE SHOWN IS PROPOSED MT2.
 2. PROFILES SHOWN ARE TOR.



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San Francisco - San Jose
 DRAFT Supplemental Vertical Alternatives Discussion - Option A
 August 2010

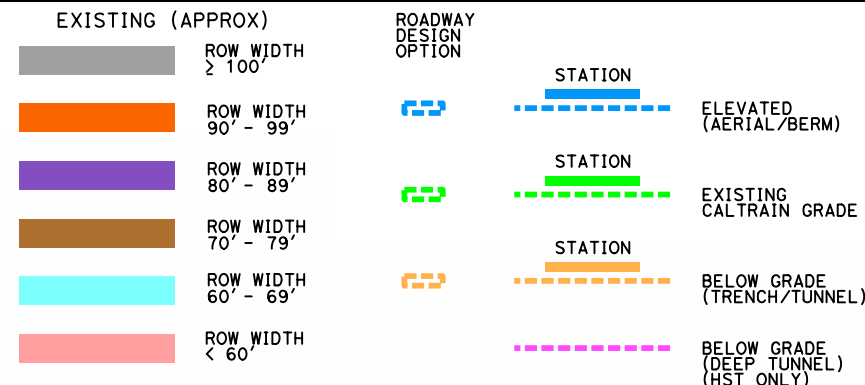


Subsection #1-2 (San Francisco/Brisbane)

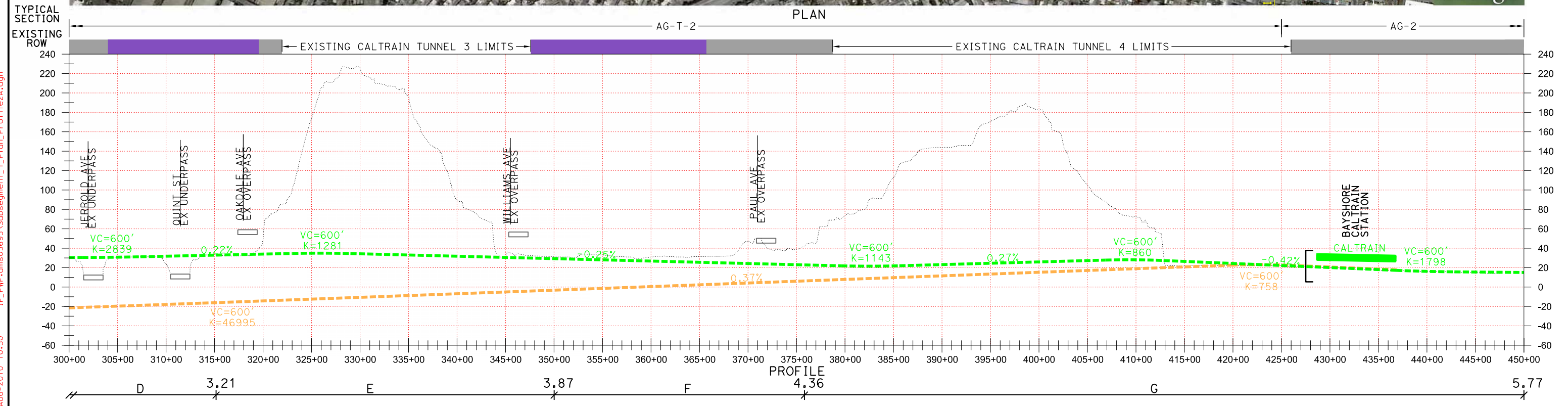
Length: 4.8 miles Land Use: Urban

North of Common Street to South Portal Tunnel No. 4 (MP. 1.03 to MP. 5.77)

This subsection is located within the City and County of San Francisco. Except for two crossings near Mission Bay, all other street crossings in this subsection are grade separated. The existing Caltrain alignment passes through a series of hills and valleys necessitating 4 tunnels and several embankment and trench segments. The I-280 freeway structure above the tracks and its supporting columns are constraints in the northern portion of the subsection.



NOTES:
 1. CENTERLINE SHOWN IS PROPOSED MT2.
 2. PROFILES SHOWN ARE TOR.



San Francisco - San Jose
 DRAFT Supplemental Vertical Alternatives Discussion - Option A
 August 2010



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4.3.1 Subsection 0 – San Francisco

Options Considered

- Option 0(a)A – HST and Caltrain to both Transbay Transit Center (TTC) and 4th & King – This option assumes that tracks will be added in an alignment under Townsend and Second Streets to reach a station in the basement of the new Transbay Transit Center. This option assumes the Transbay Transit Center provides 4 tracks for HST (two center platforms) and 2 tracks for Caltrain (one center platform). The 4th & King station would be reconfigured at-grade to provide longer platforms required by HST. The assumed station layout at 4th & King provides 4 tracks for HST (two center platforms) and 5 tracks for Caltrain (two center platforms and one side platform for special ballpark service), plus an additional center platform for Caltrain along the underground tracks heading to the Transbay Transit Center. See Appendix H for a schematic track diagram of the conceptual improvements at 4th & King Station.
- Option 0(b)A – HST and Caltrain to TTC, Caltrain to 4th & King – This option follows the same alignment as Option 0(a)A. However, in this option, all HST service terminates at the Transbay Transit Center and the 4th & King station is only served by Caltrain. This option assumes the Transbay Transit Center provides 4 tracks for HST (two center platforms) and 2 tracks for Caltrain (one center platform).
- Option 0(c)A – HST to 4th & King, Caltrain to both Transbay and 4th & King – This option is the reverse of Option 0(b)A. All HST service terminates at the 4th & King station; the Transbay Transit Center is only served by Caltrain. HST does not use the track extension under Townsend and Second Streets. The 4th & King station would be reconfigured at-grade to provide longer platforms required by HST. The assumed station layout at 4th & King provides 8 tracks for HST (four center platforms) and 1 track for Caltrain (one side platform for special ballpark service) plus an additional center platform for Caltrain along the underground tracks heading to the Transbay Transit Center. See Appendix H for a conceptual plan of this option.
- Option 0(d)A – HST and Caltrain to both Beale Street and 4th & King – This option assumes that tracks would be added beyond the 4th & King station on an alignment that travels under Townsend Street, The Embarcadero and between Main and Beale Streets. The alignment passes under the Bay Bridge between the anchorage at Beale Street and piers located at Main Street. The alignment would end at an underground terminal oriented 90 degrees from the terminal assumed in Alternatives 0(a)A and 0(b)A. The terminal would be located in a two-block area bordered by Beale Street, Harrison Street, Main Street and Folsom Street.
- Several configurations of the alignment and terminal were investigated to find a configuration that would provide the maximum number of station tracks within the terminal footprint. These configurations are described in Appendix H, which also includes schematic track diagrams, conceptual plans, and conceptual cross sections. The best configuration from the perspective of train operations provides 6 tracks for HST (three center platforms) and 2 tracks for Caltrain (one double-length center platform). The 4th & King station would be reconfigured at-grade to provide the longer platforms required by HST. The assumed station layout at 4th & King is similar to that under Option 0(a)A, and provides 4 tracks for HST (two center platforms) and 5 tracks for Caltrain (two center platforms and one side platform for special ballpark service), plus an additional center platform for Caltrain along the underground tracks heading to the Transbay Transit Center.

Options Carried Forward

Option 0(a)A, in which HST and Caltrain service is offered at the Transbay and 4th & King locations, has been identified to be carried forward into further engineering and environmental analysis. Option 0(a)A is a variant of the TJPA's approved configuration for the Transbay Transit Center with added capacity for HST and Caltrain at the 4th & King station.

Options Not Carried Forward

The following options were not carried forward because they either do not meet project objectives (Options 0(b)A and 0(c)A) or, in the case of Option 0(d)A, provide the same level of service and capacity as Option 0(a)A with significant constructability risks not present with Option 0(a)A.

- Option 0(b)A, with which all HST service goes to the Transbay Transit Center and there is no HST service at the 4th & King station, is not practicable and does not meet project purpose and need and objectives due to insufficient capacity. A conceptual operational analysis of the San Francisco terminal options (see memo in Appendix K) indicated that for most of the day, the terminal capacity is constrained to 4 to 5 trains per hour. This is significantly less than the 10 HST trains per hour objective described in Section 4.1.2.
- Option 0(c)A, which assumes that all HST service terminates at the 4th & King station, does not satisfy Proposition 1A as HST service would not reach the Transbay terminal as a San Francisco terminus. It also lacks sufficient operational capacity, does not connect with regional bus service, and is inconsistent with adopted plans and policies. This inconsistency would result in schedule delays while this option goes through the San Francisco planning and environmental review process. As described in Appendices H and K, Option 0(c)A will not support the operation of the conceptual service plan assumed for this analysis. In the operations analysis simulation, the configuration of the yard throat consistently caused multiple delays of between 45 seconds and 8.5 minutes to both inbound and outbound trains.
- Option 0(d)A with which HST service would go to a Beale Street station at Transbay Terminal and also to a 4th & King station is not practicable because of difficulties constructing the tunnel along The Embarcadero and under the Bay Bridge and because it would have extensive impacts to properties and displacements. It is also inconsistent with adopted plans and policies. This option is not practical to construct due to the proximity of the Bay Bridge anchorage and piers to the tunnel alignment. The tracks that approach the terminal would be located deep underground between the Bay Bridge Anchorage and Pier "A" located on the west side of Main Street. The tunnel structure would be within a "zone of influence" of both bridge support structures, requiring shoring to prevent excavation for the tunnel structure from affecting the stability of both bridge structures. Option 0(d)A would also require substantial right of way acquisition including: a residential condominium development with 287 units at 201 Harrison Street; 201 Folsom Street, which has been approved for a residential development with 725 units; a residential condominium development with 31 units at 501 Beale Street, another residential condominium development with 112 units at 88 Townsend Street and a U.S. Postal Service property owned by the federal government. The TJPA has estimated that the right-of-way acquisition cost for Option 0(d)A would be approximately \$1.02 billion. This compares to an estimated right-of-way acquisition cost for Option 0(a)A of approximately \$280 million.

Table 4-3
Summary Comparison of Design Options for Subsection 0 – San Francisco

Evaluation Measure			0(a)A – HST & Caltrain to both Transbay and 4 th & King	0(b)A – HST to Transbay, Caltrain to both Transbay and 4 th & King	0(c)A – HST to 4 th & King, Caltrain to both Transbay and 4 th & King	0(d)A – HST & Caltrain to both Beale Street and 4 th & King
			Covered Trench/Tunnel	Covered Trench/Tunnel	At Grade	Covered Trench/Tunnel
Design Objectives	Maximize ridership / revenue potential	Travel time	Essentially the same for Options 0(a)A and 0(d)A	Unable to consistently meet travel time objectives due to congestion resulting from insufficient operational capacity	Does not meet project objectives because the Transbay Terminal would not be a San Francisco terminus; insufficient operational capacity	Essentially the same for Options 0(a)A and 0(d)A
		Route length	Essentially the same for Options 0(a)A, 0(b)A and 0(d)A	Essentially the same for Options 0(a)A, 0(b)A and 0(d)A	Shorter than other options	Essentially the same for Options 0(a)A, 0(b)A and 0(d)A
	Maximize connectivity and accessibility	Intermodal connections	Same for Options 0(a)A and 0(b)A	Same for Options 0(a)A and 0(b)A	Does not connect to BART or regional bus service	Platforms not located directly under regional bus terminal
	Minimize operating and capital costs	Operating and Maintenance (O&M) costs (relative costs associated with different options)	Same for Options 0(a)A, 0(b)A and 0(d)A	Same for Options 0(a)A, 0(b)A and 0(d)A	Lower than other options	Same for Options 0(a)A, 0(b)A and 0(d)A
		Capital cost, does not include ROW	Lower than Option 0(d)A since construction would occur at the Transbay Transit Center, higher than Option 0(b) since 4 th & King would be reconfigured for HST	Lower than Option 0(a)A since 4 th & King would not be reconfigured for HST	Lowest since Transbay Transit Center would not be configured for HST	Highest since construction would occur on a separate site from the Transbay Transit Center
		Acquisition cost of additional ROW	Lower than Option 0(d)A, higher than Option 0(c)A	Lower than Option 0(a)A, higher than Option 0(c)A	Lowest	Highest
Land Use	Development potential for TOD within walking distance of station	Development potential for TOD within 1/2 mile of station location	Same for Options 0(a)A and 0(b)A	Same for Options 0(a)A and 0(b)A	Lower than Option 0(d)A since only 4 th & King is served by HST	Lower than Options 0(a)A and 0(b)A since terminal would occupy site of potential TOD planned with Transbay Transit Center
	Consistency with other planning efforts and adopted plans	Qualitative analysis of applicable planning and policy documents	Consistent with adopted plans and policies	Consistent with adopted plans and policies	Inconsistent with adopted plans and policies	Inconsistent with adopted plans and policies
Constructability	Constructability, access for construction, within existing transportation ROW (does not include station constructability impacts)	Need for temporary construction easements (TCE)	Essentially the same for Options 0(a)A and 0(b)A, substantial impacts from cut and cover construction in street ROW	Essentially the same for Options 0(a)A and 0(b)A, substantial impacts from cut and cover construction in street ROW	Lower than other options	Substantial impacts from cut and cover construction in street ROW, federal ownership of Post Office property could delay ROW acquisition
	Disruption to existing railroads	Identify existing freight rail and other rail service connections	None			
	Disruption / relocation of utilities	Identify major utilities requiring relocation	Same for Options 0(a)A and 0(b)A	Same for Options 0(a)A and 0(b)A	Lower than Options 0(a)A and 0(b)A	Potential disruption to Bay Bridge anchorage and pier
Disruption to Communities	Displacements	Potential impact on properties due to ultimate ROW requirements and grade separations	Medium	Medium	Medium	High. Several residential condominium developments would be affected.
	Properties with access affected	Properties with access affected	None			
	Local traffic effects around station	Increase in traffic congestion	Same for Options 0(a)A and 0(d)A	Less than Options 0(a)A and 0(d)A since only Transbay Transit Center would have HST service	Less than Option 0(b)A since HST ridership would be lower	Same for Options 0(a)A and 0(d)A

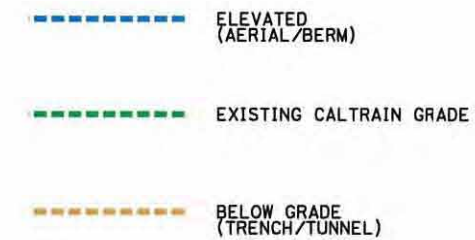
Evaluation Measure			0(a)A – HST & Caltrain to both Transbay and 4 th & King	0(b)A – HST to Transbay, Caltrain to both Transbay and 4 th & King	0(c)A – HST to 4 th & King, Caltrain to both Transbay and 4 th & King	0(d)A – HST & Caltrain to both Beale Street and 4 th & King
			Covered Trench/Tunnel	Covered Trench/Tunnel	At Grade	Covered Trench/Tunnel
	Local traffic effects along alignment and at grade crossings	Identify streets with permanent loss of traffic lanes due to ultimate ROW requirements and identify traffic effects at grade crossings	None			
Environmental Resources	Waterways and wetlands and natural preserves or biologically sensitive habitat areas affected	Waterways (acres of waterways within ultimate ROW)	None			
		Critical habitat (presence of waterways providing critical habitat for coastal steelhead, identified as Present or None)	None			
	Cultural resources	Number of historic structures within ultimate ROW	4	4	4	4
		Archeological Sensitivity (identified as present or not)	Present; potential disturbance depends on siting of vent structures, tunnel portals, and tunnel depth; lower impacts for At Grade option because of less ground disturbance and shorter alignment.			
	Parklands	Acres of parklands within ultimate ROW	None			
Agricultural lands	Acres of farmland	Not applicable				
Environmental Measures	Noise and Vibration effects on sensitive receivers	Noise: Number of residential (R), institutional (I), medical (M), School (S) and park (P) properties within 300' of ultimate ROW	Lower impacts than At Grade option; impacts for this option depend on siting of vent structures, tunnel portals, and tunnel depth	Lower impacts than At Grade option; impacts for this option depend on siting of vent structures, tunnel portals, and tunnel depth	R=101-200	Lower impacts than At Grade option; impacts for this option depend on siting of vent structures, tunnel portals, and tunnel depth
		Vibration: Number of residential (R), institutional (I), medical (M), School (S) and park (P) properties within 200' of ultimate ROW	Low impacts expected, but depends on siting of vent structures, tunnel portals, and tunnel depth	Low impacts expected, but depends on siting of vent structures, tunnel portals, and tunnel depth	R=101-200	Low impacts expected, but depends on siting of vent structures, tunnel portals, and tunnel depth
	Change in visual / scenic resources	Number of residential (R), institutional (I) and park (P) properties immediately adjacent to the ultimate ROW	Visual setting would not be affected by the below-ground alternatives in Subsection 0; the At Grade option would be adjacent to residents who already have direct views of the Caltrain service (R=301-500).			
		Number of scenic roadways that cross the ROW	None			
	Maximize avoidance of areas with geological and soils constraints	Percent of ultimate ROW susceptible to liquefaction	75%	75%	100%	86%
	Maximize avoidance of areas with potential hazardous materials	Number of contaminated properties within ultimate ROW/ within 1/4 mile of ultimate ROW	0/2; impacts depend on siting of vent structures, tunnel portals, and tunnel depth	0/2	0/2	0/2

Subsection #1

Length: 4.8 miles Land Use: Urban

North of Common Street to South Portal Tunnel No. 4 (MP. 1.03 to MP. 5.77)

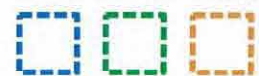
This subsection is located within the City and County of San Francisco. Except for two crossings near Mission Bay, all other street crossings in this subsection are grade separated. The existing Caltrain alignment passes through a series of hills and valleys necessitating 4 tunnels and several embankment and trench segments. The I-280 freeway structure above the tracks and its supporting columns are constraints in the northern portion of the subsection.



POTENTIAL CONSTRAINTS



HST STATION DESIGN OPTION



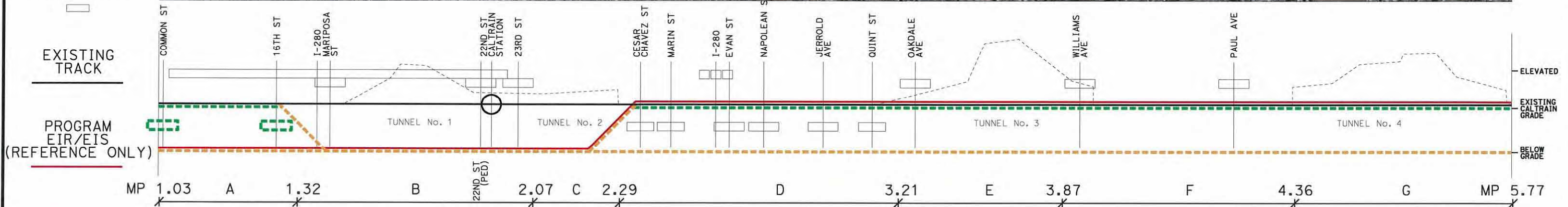
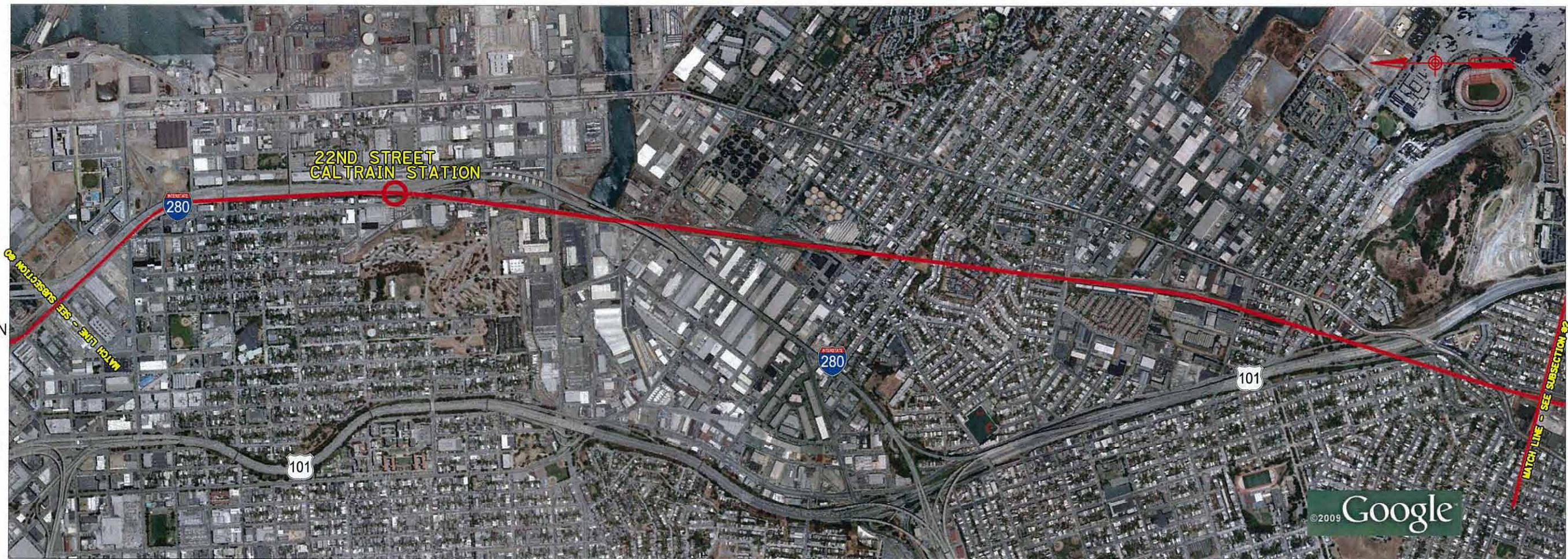
CALTRAIN STATION DESIGN OPTION



ROADWAY DESIGN OPTION



EXISTING GRADE SEPARATION



San Francisco - San Jose
 DRAFT Preliminary Alternatives Discussion
 February 1, 2010

NOT TO SCALE

4.3.2 Subsection 1 – San Francisco

Options Considered

- Subsection 1A – North of Mission Bay Drive to South of 16th Street
 - At Grade
 - Covered Trench/Tunnel
- Subsection 1B – South of 16th Street to South of 23rd Street
 - At Grade
 - Covered Trench/Tunnel
- Subsection 1C – South of 23rd Street to North of Cesar Chavez Street
 - At Grade
 - Covered Trench/Tunnel
- Subsection 1D – North of Cesar Chavez Street to South of Quint Street
 - At Grade
 - Covered Trench/Tunnel
- Subsection 1E – South of Quint Street to North of Williams Street
 - At Grade
 - Covered Trench/Tunnel
- Subsection 1F – North of Williams Street to South of Paul Avenue
 - At Grade
 - Covered Trench/Tunnel
- Subsection 1G – South of Paul Avenue to South of Portal Tunnel No. 4
 - At Grade
 - Covered Trench/Tunnel

Options Carried Forward

The At Grade and Covered Trench/Tunnel options have been identified to be carried forward into further engineering and environmental analysis. Both options include tunnels parallel to existing Caltrain tunnels 1-4. With the At Grade option, the new tunnels would be at approximately the same depth as the existing tunnels, while under the Covered Trench/Tunnel option the new tunnels would be deeper than the existing tunnels. Under either option, Caltrain and freight would continue to use the existing Caltrain tracks. The Covered Trench/Tunnel option would begin as a shallow tunnel under 7th Street and continue as a deeper tunnel under Pennsylvania Avenue. Substantial right-of-way acquisition would be required along 7th Street if the At Grade option was selected in this segment. The existing railroad leads to the Port of San Francisco and Hunters Point would continue to be served by the existing Caltrain tracks under both options.

Options Not Carried Forward

None.

Table 4-4
Summary Comparison of Design Options for Subsection 1 – San Francisco

Evaluation Measure			1A - North of Mission Bay Drive to South of 16th Street		1B & 1C - South of 16th Street to North of Cesar Chavez Street		1D, 1E, 1F & 1G - North of Cesar Chavez Street to South Portal Tunnel No. 4		
			At Grade	Covered Trench/ Tunnel	At Grade	Covered Trench / Tunnel	At Grade	Covered Trench/ Tunnel	
Design Objectives	Maximize ridership / revenue potential	Travel time	Same for all options		Same for all options		Same for all options		
		Route length	Same for all options		Same for all options		Same for all options		
	Maximize connectivity and accessibility	Intermodal connections	Not applicable		Not applicable		Not applicable		
		Minimize operating and capital costs	Operating and Maintenance (O&M) costs (relative costs associated with different vertical alignment options)	Lowest	Higher than At Grade option, due to tunnel walls, drainage, ventilation, life safety, etc	High	High	High	High
			Capital cost (\$ 2009), does not include ROW	114 million	114 million	299 million	299 million	458-1,049 million	978 million
Acquisition cost of additional ROW	Highest	Lowest	Lowest	Lowest	Highest	Lowest			
Land Use	Development potential for TOD within walking distance of station	Development potential for TOD within 1/2 mile of station location	Not applicable		Not applicable		Not applicable		
	Consistency with other planning efforts and adopted plans	Qualitative analysis of applicable planning and policy documents	Consistent with adopted plans and policies		Consistent with adopted plans and policies	Inconsistent with adopted plans and policies	Consistent with adopted plans and policies		
Constructability	Constructability, access for construction, within existing transportation ROW (does not include station constructability impacts)	Need for temporary construction easements (TCE)	Construction would primarily occur within ultimate ROW	Construction would primarily occur within ultimate ROW; TCE required at tunnel portal locations	Construction would primarily occur within ultimate ROW	Construction would primarily occur within ultimate ROW; TCE required at tunnel portal locations	Construction would primarily occur within ultimate ROW	Construction would primarily occur within ultimate ROW; TCE required at tunnel portal locations	
	Disruption to existing railroads	Identify existing freight rail and other rail service connections	None		None				
	Disruption / relocation of utilities	Identify major utilities requiring relocation	None		None		None		
Disruption to Communities	Displacements	Potential impact on properties due to ultimate ROW requirements and grade separations	Low; Approximately 10% of subsection has existing ROW <60', 10% is between 80'-89' and 80% is over 100'. Impacts due to grade separations at Mission Bay Drive and 16 th Street	Low; Approximately 10% of subsection has existing ROW <60', 10% is between 80'-89' and 80% is over 100'. Possibly some impacts due to ventilation structures	Low; Possibly some impacts due to ventilation structures	Low; Possibly some impacts due to ventilation structures	Low; Approximately 30% of subsection has existing ROW is between 80'-89' and 70% is over 100'; Possibly some impacts due to ventilation structures	Low; Nominal width for this option is 96'. Approximately 30% of subsection has existing ROW is between 80'-89' and 70% is over 100'; Possibly some impacts due to ventilation structures	
	Properties with access affected	Properties with access affected	Access for properties affected due to grade separations	None	None		None		
	Local traffic effects around station	Increase in traffic congestion	Not applicable		Not applicable		Not applicable		

Evaluation Measure			1A - North of Mission Bay Drive to South of 16th Street		1B & 1C - South of 16th Street to North of Cesar Chavez Street		1D, 1E, 1F & 1G - North of Cesar Chavez Street to South Portal Tunnel No. 4	
			At Grade	Covered Trench/ Tunnel	At Grade	Covered Trench / Tunnel	At Grade	Covered Trench/ Tunnel
	Local traffic effects along alignment and at grade crossings	Identify streets with permanent loss of traffic lanes due to ultimate ROW requirements and identify traffic effects at grade crossings	Improved traffic conditions with grade separations at Mission Bay Drive and 16th Street		None		None	
Environmental Resources	Waterways and wetlands and natural preserves or biologically sensitive habitat areas affected	Waterways (acres of waterways within ultimate ROW)	None		0.05	0.34, may be avoided depending on siting of vent shafts, tunnel portals, and tunnel depth	0.15	Lower impact than At-Grade option, depending on siting of vent shafts, tunnel portals, and tunnel depth
		Critical habitat (presence of waterways providing critical habitat for coastal steelhead, identified as Present or None)	None		None	2	2	
	Cultural resources	Number of historic structures within ultimate ROW	None		2	None	None	
		Archeological Sensitivity (identified as present or not)	Present		Present		Present	
	Parklands	Acres of parklands within ultimate ROW	None		None		0.68	Lower impacts than At Grade option
Agricultural lands	Acres of farmland	Not applicable		Not applicable		Not applicable		
Environmental Measures	Noise and Vibration effects on sensitive receivers	Noise: Number of residential (R), institutional (I), medical (M) school (S), and park (P) properties within 300' of ultimate ROW	None		R=301-500, I<5, M<5, S<5	R=301-500, I<5, M<5, S<5; impacts depend on siting of vent structures and tunnel portals	R=>1000, I=21-40, S<5, P<5	Lower impacts than At-Grade option, depending on siting of vent structures and tunnel portals
		Vibration: Number of residential (R), institutional (I), medical (M), school (S), and park (P) properties within 200' of ultimate ROW	None		R=201-300, I<5, S<5; M<5	R=201-300, I<5, S<5; M<5; impacts depend on siting of vent structures, tunnel portals, and tunnel depth	R=701-1000, I=21-40, P=5-10	Lower impacts than At-Grade option, depending on siting of vent structures, tunnel portals, and tunnel depth
	Change in visual / scenic resources	Number of residential (R) and park (P) properties immediately adjacent to the ultimate ROW	None		R=60-100	R=60-100	R=60-100	Minimal impacts
		Number of scenic roadways that cross the ROW	1	Minimal impacts	Minimal impacts		1	Minimal impacts
	Maximize avoidance of areas with geological and soils constraints	Percent of ultimate ROW susceptible to liquefaction	0%	0%	Minimal impacts		81%	Minimal impacts
Maximize avoidance of areas with potential hazardous materials	Number of contaminated properties within ultimate ROW/ within 1/4 mile of ultimate ROW	Lower impacts than Covered Trench/Tunnel option	0/1	0/1	0/1	Lower impacts than Covered Trench/Tunnel option	0/6	

4.3 Summary of Evaluation Results

For clarity, the following paragraphs are reprinted from the Preliminary Alternatives Analysis Report:

On the following pages, the study corridor is described from north to south by subsection. When a new subsection is introduced, the first set of facing pages provides an overview of the subsection and the evaluation highlights for that subsection. The top of the left hand page includes a brief description of the subsection, followed by an aerial photograph showing the horizontal placement of the study corridor. Below the aerial is a schematic diagram of the vertical design options considered in the evaluation. The subsection boundaries are shown graphically below the schematic diagram.

At the top of the right hand page, the sub-subsections are listed with the applicable vertical design options that were carried forward into the detailed evaluation. Following this listing, some pages include notes on the feasibility of specific vertical profiles. These notes are derived from the engineering analysis of the plan and profile, as shown in Appendix B. The location corresponding to each note is shown on the schematic diagram on the left hand page. Following the feasibility notes (if present) is a listing and description of the options carried forward into preliminary engineering design and environmental review as part of the EIR/EIS. This is followed by a listing of the options that will not be carried forward, including the primary reasons for this recommendation.

Station alternatives are discussed in the subsection where they are located. The following stations and location alternatives are being carried forward for further engineering and environmental analysis in these respective subsections:

- Downtown San Francisco – Subsection 0A
- Millbrae (SFO) – Subsection 3D
- Potential Mid-Peninsula Station Locations:
 - o Redwood City – Subsection 4C
 - o Palo Alto – Subsection 6A
 - o Mountain View – Subsection 7B
- San Jose Diridon – Subsection 9B

Following the introductory set of facing pages are a series of tables noting the presence, absence, extent, or amount of each impact, resource, hazard, sensitive receptor, or land use. In these tables, the vertical options identified to be carried forward for further engineering and environmental analysis are indicated with a white background in the table heading. Those options which were not carried forward are indicated with a black background in the table heading. In addition, for those options not carried forward, the primary reason(s) for this recommendation is indicated by shading in the table.

4.3.1 Subsection 0 – San Francisco

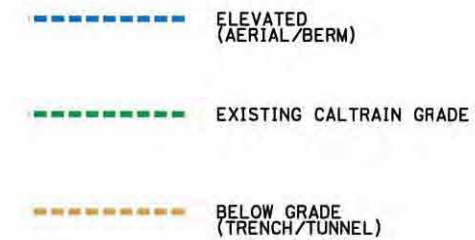
No modifications or updates to this section.

Subsection #1

Length: 4.8 miles Land Use: Urban

North of Common Street to South Portal Tunnel No. 4 (MP. 1.03 to MP. 5.77)

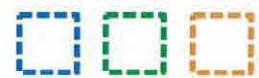
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POTENTIAL CONSTRAINTS



HST STATION DESIGN OPTION



CALTRAIN STATION DESIGN OPTION



ROADWAY DESIGN OPTION



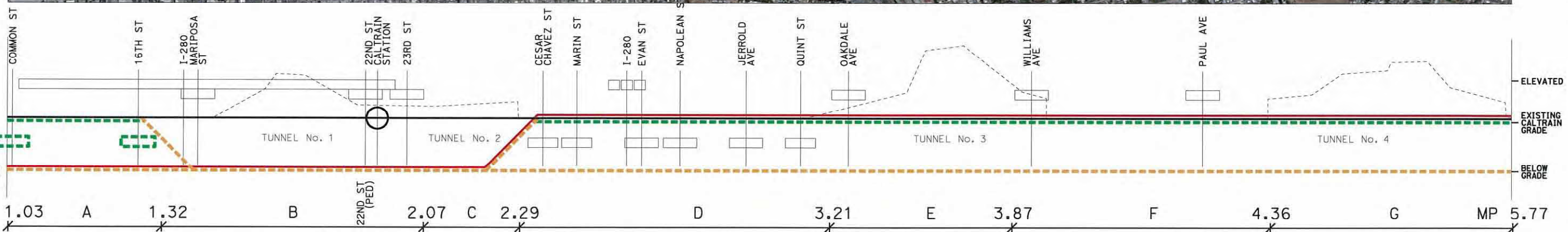
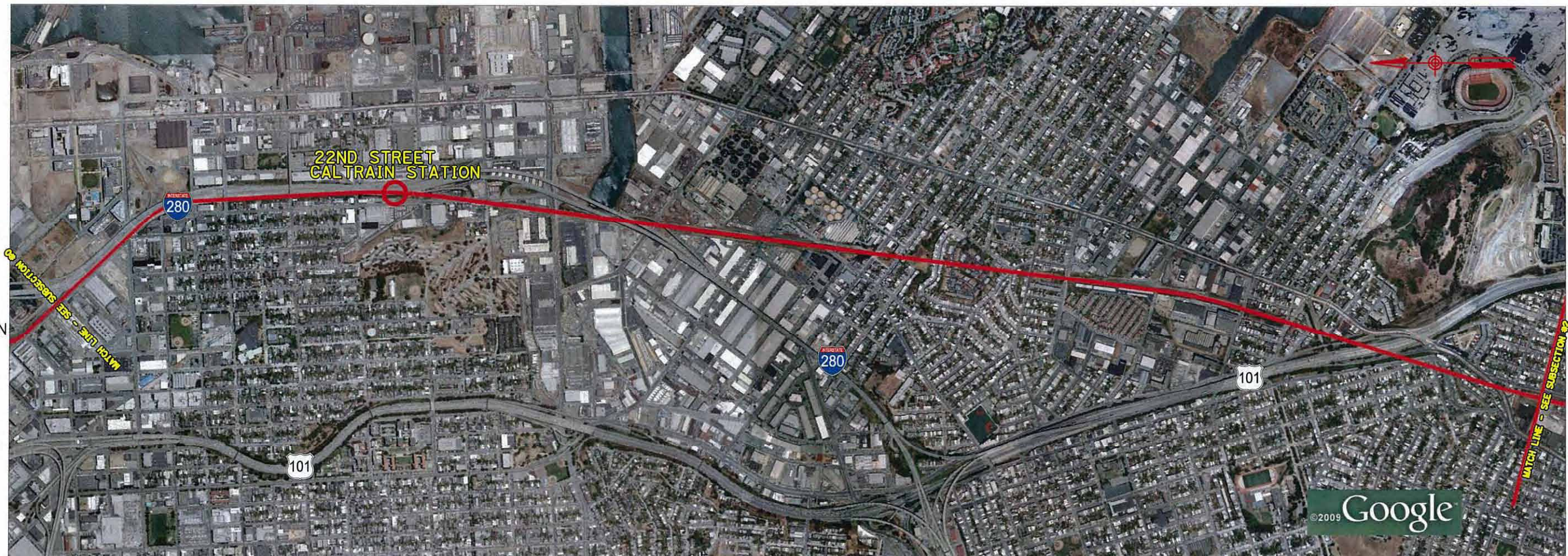
EXISTING GRADE SEPARATION



EXISTING TRACK



PROGRAM EIR/EIS (REFERENCE ONLY)



San Francisco - San Jose

DRAFT Preliminary Alternatives Discussion
February 1, 2010

NOT TO SCALE

4.3.2 Subsection 1 – San Francisco

This section has been modified to read as follows:

Options Considered

- Subsection 1A – North of Mission Bay Drive to South of 16th Street
 - At Grade
 - Covered Trench/Tunnel
- Subsection 1B – South of 16th Street to South of 23rd Street
 - At Grade
 - Covered Trench/Tunnel
- Subsection 1C – South of 23rd Street to North of Cesar Chavez Street
 - At Grade
 - Covered Trench/Tunnel
- Subsection 1D – North of Cesar Chavez Street to South of Quint Street
 - At Grade
 - Covered Trench/Tunnel
- Subsection 1E – South of Quint Street to North of Williams Street
 - At Grade
 - Covered Trench/Tunnel
- Subsection 1F – North of Williams Street to South of Paul Avenue
 - At Grade
 - Covered Trench/Tunnel
- Subsection 1G – South of Paul Avenue to South of Portal Tunnel No. 4
 - At Grade
 - Covered Trench/Tunnel

Options Carried Forward

In this area of hilly terrain, a combined At Grade and Covered Trench/Tunnel option is recommended to be carried forward into further engineering and environmental analysis. This option includes a new 2-track tunnel parallel to existing 2-track Caltrain tunnels 1-4 made necessary by the hills and steep terrain along this alignment. Caltrain and freight would continue to use the existing Caltrain tracks. The new 2-track Covered Trench/Tunnel would begin as a shallow tunnel under 7th Street and continue as a deeper tunnel under Pennsylvania Avenue. Substantial right-of-way acquisition would be required along 7th Street if a 4-track At Grade option was selected in this segment. The existing railroad leads to the Port of San Francisco and Hunters Point would continue to be served by the existing Caltrain tracks.

Options Not Carried Forward

None.

Table 4-1
Summary Comparison of Design Options for Subsection 1 – San Francisco

No modifications or updates to this Table.

Appendix B: Evaluation Matrix of CHSRA Selected Alternative with Comments by SFTWG

Source: CHSRA Preliminary and Supplemental Alternatives Analysis Reports & SFTWG analysis

Evaluation Measure			CHSR Authority Alternative							
			Section 0(a)A: (2.2 miles)		Subsection 1A: (0.28 miles)		Subsection 1B & 1C: (0.99 miles)		Subsection 1D, 1E, 1F, & 1G: (3.46 miles)	
			HST & Caltrain to both Transbay and 4 th /King		North of Mission Bay Drive to South of 16th Street		South of 16th Street to North of Cesar Chavez Street		North of Cesar Chavez Street to South Portal Tunnel No. 4	
			Covered Trench/Tunnel		At Grade to 4th/King	Covered Trench/Tunnel to TTC	At Grade to 4th/King	Mined Tunnel to TTC	At Grade to 4th/King	Covered Trench/Tunnel to TTC
Design Objectives	Maximize ridership / revenue potential	Travel time	Met travel time objectives	Same for all options		Same for all options		Same for all options		
		Route length	Met route length objectives	Same for all options		Same for all options		Same for all options		
	Maximize connectivity and accessibility	Intermodal connections	Connects with both Transbay and 4 th & King	Not applicable		22nd Street Station	Not applicable		Bayshore Station	
	Minimize operating and capital costs	Operating and Maintenance (O&M) costs (relative costs associated with different options)	Higher than at-grade option	Lowest	Higher than At Grade option due to tunnel walls, drainage, ventilation, life safety, etc.	High	High	High	High	
		Capital cost, does not include ROW	\$3,000 million	\$44 million	\$70 million	\$21 million	\$271 million	\$71 million	\$955 million	
	Acquisition cost of additional ROW	Higher than at-grade option	Highest	Lowest	Lowest	Lowest	Highest	Lowest		
Land Use	Development potential for TOD within ½ mile of station location	Development potential for TOD within ½ mile of station location	Yes	Not applicable		Not applicable		Not applicable		
	Consistency with other planning efforts and adopted plans	Qualitative analysis of applicable planning and policy documents	Consistent with adopted plans and policies / Additionally, SFTWG would like to confirm that the PUC Wastewater Master Plan was consulted.	Consistent with adopted plans and policies / SFTWG disagrees with this assessment: grade separations and at-grade rail will divide the neighborhood. Additionally, SFTWG would like to confirm that the PUC Wastewater Master Plan was consulted.		Consistent with adopted plans and policies / SFTWG disagrees with this assessment: grade separations and at-grade rail will divide neighborhood. Additionally, SFTWG would like to confirm that the PUC Wastewater Master Plan was consulted.	Inconsistent with adopted plans and policies / SFTWG doesn't understand why only this option is inconsistent. Additionally, SFTWG would like to confirm that the PUC Wastewater Master Plan was consulted.		Consistent with adopted plans and policies / Additionally, SFTWG would like to confirm that the PUC Wastewater Master Plan was consulted.	
Constructability	Constructability, access for construction, within existing transportation ROW (does not include station constructability impacts)	Need for temporary construction easements (TCE)	Substantial impacts from cut-and-cover construction in street ROW	Construction would primarily occur within ultimate ROW	Construction would primarily occur within ultimate ROW; TCE required at tunnel portal locations	Construction would primarily occur within ultimate ROW	Construction would primarily occur within ultimate ROW; TCE required at tunnel portal locations	Construction would primarily occur within ultimate ROW	Construction would primarily occur within ultimate ROW; TCE required at tunnel portal locations	
	Disruption to existing railroads	Identify existing freight rail and other rail service connections	None / SFTWG disagrees: Caltrain currently operates on this ROW. Construction could impact service.	None / SFTWG disagrees: Caltrain currently operates on this ROW. Construction could impact service.		None / SFTWG disagrees: Caltrain currently operates on this ROW. Construction could impact service.		None / SFTWG disagrees: Caltrain currently operates on this ROW. Construction could impact service.		
	Disruption / relocation of utilities	Identify major utilities requiring relocations	Some	None / SFTWG disagrees with this statement. SF PUC indicates that an approximately 40' by 10' box crosses 7th Street and the rail ROW at Common Street. Additionally, the Wastewater Master Plan currently being implemented by the PUC includes an approximately 18' OD gravity overflow tunnel with an invert of 45' below NAVD88 ground at Berry Street.		None	Some	None	Some	
Disruption to Communities	Displacements	Potential impact on properties due to ultimate ROW requirements and grade separations	Medium	Low; Approximately 10% of subsection has existing ROW<60', 10% is between 80'-89' and 80% is over 100'. Impacts due to grade separations at Mission Bay Drive and 16th Street	Low; Approximately 10% of subsection has existing ROW<60', 10% is between 80'-89' and 80% is over 100'. Possibly some impacts due to ventilation structures	Low; Possibly some impacts due to ventilation structures	Low; Possibly some impacts due to ventilation structures	Low; Approximately 30% of subsection has existing ROW between 80'-89' and 70% is over 100'. Possibly some impacts due to ventilation structures	Low; Nominal width for this option is 96'. Approximately 30% of subsection has existing ROW is between 80'-89' and 70% is over 100'. Possibly some impacts due to ventilation structures	
	Properties with access affected	Properties with access affected	None	Access for properties affected due to grade separations	None	None		None		
	Local traffic effects around stations	Increase in traffic congestion	Some	Not applicable		Not applicable		Not applicable		
	Local Traffic effects along alignment and at grade crossings	Identify streets with permanent loss of traffic lanes due to ultimate ROW requirements and identify traffic effects at grade crossings	None	Improved traffic conditions with grade separations at Mission Bay Drive and 16th Street / SFTWG would like to ensure that impacts on future transit and development in the Mission Bay Redevelopment Area are taken into account. Grade separations at these locations could preclude the development of the 16th Street trolley line and/or future bus connections to this area if not properly accounted for.		None		None		

Evaluation Measure			CHSR Authority Alternative							
			Section 0(a)A: (2.2 miles)		Subsection 1A: (0.28 miles)		Subsection 1B & 1C: (0.99 miles)		Subsection 1D, 1E, 1F, & 1G: (3.46 miles)	
			HST & Caltrain to both Transbay and 4 th /King		North of Mission Bay Drive to South of 16th Street		South of 16th Street to North of Cesar Chavez Street		North of Cesar Chavez Street to South Portal Tunnel No. 4	
			Covered Trench/Tunnel		At Grade to 4th/King	Covered Trench/Tunnel to TTC	At Grade to 4th/King	Mined Tunnel to TTC	At Grade to 4th/King	Covered Trench/Tunnel to TTC
Environmental Resources	Waterways and wetlands and natural preserves or biologically sensitive habitat areas affected	Waterways (acres of waterways within ultimate ROW)	None	None / SFTWG would like to ensure that the HSRA is aware of the current policy for stormwater runoff in San Francisco. Existing wastewater facilities are designed to accommodate a 5-year storm. Anything larger than a 5-year storm is handled using street ROW, effectively turning the streets of the City into overflow storm water drainage. Any points on street ROW below the City's datum of ground level will flood during events greater than a 5-year storm. The grade separations at 16th Street and especially Common Street will be at risk of flooding, a situation that the City will not accept for new design.	0.05	0.34, may be avoided depending on siting of vent shafts, tunnel portals, and tunnel depth	0.15	Lower impact than At Grade option, depending on siting of vent shafts and tunnel portals, and tunnel depth		
		Critical habitat (presence of waterways providing critical habitat for coastal steelhead, identified as Present or None)	None		None	2	2			
	Cultural resources	Number of historic structures within ultimate ROW	4		None	2	None	None		
		Archeological Sensitivity (identified as present or not)	Present; potential disturbance depends on siting of vent structures, tunnel portals, and tunnel depth		Present		Present	Present		
	Parklands	Acres of parklands within ultimate ROW	None		None		None	0.68 Lower impacts than At Grade option		
	Agricultural lands	Acres of farmland	Not Applicable		Not applicable		Not applicable	Not applicable		
Environmental Measures	Noise and Vibration effects on sensitive receivers	Noise: Number of residential (R), institutional (I), medical (M), school (S) and park (P) properties within 200' of ultimate ROW	Less than R=101-200; impacts depend on siting of vent structures, tunnel portals, and tunnel depth		None	R=301-500, I<5, M<5, S<5	R=301-500, I<5, M<5, S<5; impacts depend on siting of vent structures and tunnel portals	R=>1000, I=21-40, S<5, P<5	Lower impacts than At Grade option depending on siting of vent structures and tunnel portals	
		Vibration: Number of residential (R), institutional (I), medical (M), school (S) and park (P) properties within 200' of ultimate ROW	Less than R=101-200; impacts for this option depend on siting of vent structures, tunnel portals, & tunnel depth		None	R=201-300, I<5, M<5, S<5	R=201-300, I<5, M<5, S<5; impacts depend on siting of vent structures and tunnel portals, and tunnel depth	R=701-1000, I=21-40, P=5-10	Lower impacts than At Grade option depending on siting of vent structures, tunnel portals, and tunnel depth	
	Change in visual/scenic resources	Number of residential (R), institutional (I), and park (P) properties immediately adjacent to the ultimate ROW	Visual setting not affected by below-ground alignment		None		R=60-100	R=60-100	R=60-100	Minimal impacts / SFTWG requests additional information on the definition of "Minimal impacts"
		Number of scenic roadways that cross the ROW	None	1	Minimal impacts / SFTWG requests additional information on the definition of "Minimal impacts"		Minimal impacts / SFTWG requests additional information on the definition of "Minimal impacts"	1	Minimal impacts / SFTWG requests additional information on the definition of "Minimal impacts"	
	Maximize avoidance of areas with geological and soils constraints	Percent of ultimate ROW susceptible to liquefaction	75%	0% / SFTWG understands that a good portion of the Mission Bay may have a high ground water level.	0% / SFTWG understands that a good portion of the Mission Bay may have a high ground water level.		Minimal impacts / SFTWG requests additional information on the definition of "Minimal impacts"	81%	Minimal impacts / SFTWG requests additional information on the definition of "Minimal impacts"	
	Maximize avoidance of areas with potential hazardous materials	Number of contaminated properties within ultimate ROW / within ¼ mile of ultimate ROW	0/2; impacts depend on siting of vent structures, tunnel portals, and tunnel depth	Lower impacts than Covered Trench/Tunnel option	0/1		0/1	0/1	Lower impacts than Covered Trench/Tunnel option	0/6