

11-1-10

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Dear Mr. Bernstein:

The California High Speed Rail Authority (Authority) welcomes and will continue to promote public and agency dialogue and collaboration as we develop the California High Speed Train (HST) system. Thank you for your September 29, 2010 letter submitted on behalf of a number of organizations and for your continued interest in San Jose's HST station and alignment options.

Your letter generally requests the Authority to include an underground station option/ alternative in its pending project Environmental Impact Reports/Environmental Impact Statement (EIR/EIS) for the San Francisco to San Jose and the San Jose to Merced section. This response letter and its attachment review the major themes contained in your letter and provide an overview of the Authority's evaluation of the tunnel and other alternatives in the San Jose station area.

The Authority and its federal partner, the Federal Railroad Administration (FRA), are completing an Alternatives Analysis (AA) for each section of the proposed California HST system before proceeding with the preparation of draft EIR/EISs. This AA process is designed to identify potential alignment alternatives and station options for an initial evaluation, and to receive public and agency input, before recommending the alternatives and stations to be studied in the project EIR/EIS. This process is consistent with federal and state law governing the preparation of EIR/EIS documents, as discussed in more detail in the attachment to this letter. Importantly, the AA process is part of the EIR/EIS process. No decisions regarding alternatives are final until the Authority Board and FRA make decisions at the end of that EIR/EIS process.

The Authority staff and FRA completed a Preliminary AA (PAA) for the San Jose to Merced Section that includes descriptions and evaluations of alignment and station alternatives considered. The PAA for the San Jose to Merced Section was presented to the Authority Board on June 3, 2010 for information and posted on the Authority's web site that day (at [http://www.cahighspeedrail.ca.gov/Lib\\_San\\_Jose\\_Merced.aspx](http://www.cahighspeedrail.ca.gov/Lib_San_Jose_Merced.aspx)). The Authority received comments requesting examination of tunnel options in downtown San Jose early during the EIR/EIS scoping process, at subsequent public and stakeholder meetings in San Jose, and in written correspondence from neighborhoods and the City of San Jose. In response, the Authority staff and consultants studied several tunnel alternatives. Some were found to be highly impractical and not constructable (e.g., the "5100m" and

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"Thread the Needle" alternatives), so did not warrant additional analysis, while two tunnel alternatives were evaluated in detail. These alignments were developed to nearly a 15% level of engineering, which is beyond what is typically done for a preliminary review of potential alternatives.

First, a deep mined station was evaluated and staff found the station to be not reasonable or realistic. Following this analysis, the City of San Jose and downtown neighborhoods requested a review of a shallower cut-and-cover option with the proposed BART station 140 feet deep below the HST station. This alternative was also developed for preliminary evaluation in the AA process. The shallow tunnel was located to accommodate construction of a cut and cover station box and station track work, minimize impacts to existing development in downtown San Jose, avoid to the extent possible conflicts with I-280 foundations, and avoid impacts to residential areas south of I-280. Additionally, five above-ground alignment options were evaluated in the PAA, also in response to input from the City of San Jose and communities near the downtown station.

The evaluation of the below ground alternatives is documented in Chapter 4 of the PAA, and more detail regarding the downtown tunnel alternatives is provided in Appendix C – the "Downtown San Jose Tunnel Alternatives." With regard to the tunnel options, the PAA recognized that local agencies, community groups and the public all proposed underground options for the San Jose Diridon Station and Approach, and that the City of San Jose would prefer to continue investigation of the most viable tunnel concept. After considerable study of both deep mined stations and shallower cut-and-cover options, however, the preliminary alternatives analysis indicated that underground options are not practicable due to unsafe mining conditions (poor soils combined with high groundwater), construction schedule, potential for settlement, extensive surface disruption and very high construction cost and should be eliminated from further evaluation. In the case of the shallow tunnel option, the proposed BART station and extensions north to Santa Clara and east to downtown would also have to be redesigned and placed much lower in the existing poor ground conditions. Locating the HST Station above the existing Diridon Station platforms would maximize connectivity and development potential in the station area. The AA Report also recommends no further study of the program alignment through the Greater Gardner community because of potential impacts to the neighborhoods including community cohesion, noise/vibration, visual, impacts on Fuller Park and displacement of a nonprofit (house of worship). Instead further study is recommended of an alternative (SR-87/I-280) that would minimize impacts by utilizing the existing freeway corridors for much of the approach to the station and would move the alignment away from the Greater Gardner neighborhood. More detailed reasons for these recommendations are contained in Chapter 4 of the PAA and are included in the attachment.

The severe construction issues associated with tunneling in this area (e.g., possible groundwater infiltration, potential settlement over tunnel portion, closure of cross streets, channelization of Los Gatos Creek during construction, reduced parking areas for sports activities, utility relocation, extended construction period and associated delays in downtown redevelopment, etc.) are such that they cannot be

materially lessened by modifications of the shallow tunnel alignment/location. In short, these problems would remain regardless of tunnel location. Certain less fundamental issues may vary and, to the extent they are problems, could be ameliorated to a degree (e.g., distance to or below freeway pier foundations, location of surface injections, location of ventilation and fire/life/safety shafts, location of construction sites, etc.), but the major issues noted in the PAA report would still remain.

Given the underground conditions, locating the proposed downtown BART station at a depth of 140 feet under the shallow tunnel HST alternative would introduce for BART/VTA many of the same issues identified above for the HST deep tunnel alternative. In addition, the HST station and tunnel design requirements involve removal of a volume of material that is six times greater than that required for BART (for similar lengths).

The Authority is taking very seriously local concerns regarding aesthetics for proposed HST facilities in San Jose, including the elevated HST alignment and station. The Authority has met on many occasions with various stakeholders, including neighborhoods along the potential San Jose alignments, and will continue to do so. The Authority is committed to providing a high quality visual design for HST facilities in San Jose and to working cooperatively with the City and its residents toward such an end. Authority staff and City staff have negotiated a proposed cooperative agreement on this very point and anticipate that soon the City Council will consider it for approval.

The Authority staff will be issuing a Supplemental AA to the Board over the next few months, and we will report to the Board what we have heard regarding the PAA, including your request to include a tunnel alternative in the Draft EIS/EIR.

Again, thank you for your letter. I hope that we can continue to move forward working collaboratively on the HST project. I ask that you continue to work with our team to address the issues, and find solutions to help build this system in a manner that best enhances San Jose.

Sincerely



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## FREQUENTLY ASKED QUESTIONS ON HIGH-SPEED TRAIN FACILITIES FOR SAN JOSE

The Federal Railroad Administration (FRA) together with the California High-Speed Rail Authority (Authority) have developed the following responses to frequently asked questions regarding the development of alternatives for the proposed high-speed train project in the San Jose area. The process and evaluation used by the Authority and FRA to identify the San Jose-related alternatives to be studied in the DEIR/EIS was presented in the "Preliminary Alternatives Analysis Report, San Jose to Merced Section High-Speed Train EIR/EIS," June 2010 (PAA). The PAA incorporated engineering and environmental information and identified potentially feasible and practicable alternatives to be carried forward in the Draft Environmental Impact Report/Environmental Impact Statement (DEIR/EIS). Appendix C of the PAA includes the "Downtown San Jose Tunnel Alternatives." The PAA and the appendix should be referred to in support of the following responses. The PAA can be viewed on the Authority's website [http://www.cahighspeedrail.ca.gov/Lib\\_San\\_Jose\\_Merced.aspx](http://www.cahighspeedrail.ca.gov/Lib_San_Jose_Merced.aspx).

### **How are alternatives selected for full analysis in the Project EIR/EIS documents?**

For almost any proposed public or private project, there could be a large number of conceivable potential alternatives, but including a detailed analysis of every conceivable alternative in a project EIR/EIS is neither practical nor required. What is required is that a draft EIR/EIS analyze a reasonable range of potentially feasible alternatives. Thus, before preparing a draft EIR/EIS, the Authority and the FRA must identify the alternatives to be analyzed in the document.

Under the California Environmental Quality Act (CEQA) that governs EIRs, and the National Environmental Policy Act (NEPA) that governs EISs, alternatives need not be studied in an EIR/EIS if they would not substantially reduce significant environmental impacts, would not attain most of the basic project objectives, would not be potentially feasible or are not reasonable or realistic. This process of narrowing alternatives prior to public circulation of an EIR is often largely an internal agency process with limited public input and without public hearings. The results of that process are then briefly described in the draft EIR/EIS.

Instead of this typical approach, the Authority and FRA have chosen to seek extensive public and agency input on preliminary alternatives. For all sections of the California HST system, the initial development of potential HST alternatives for study in EIR/EISs is being described in public reports presented to the Authority Board. Those reports, moreover, are the subject of one or more rounds of public and agency comment. The Authority has actively sought input from the public and affected government agencies – both through written requests for input and public information meetings. The Authority and FRA have taken that input into account in their initial review of potential alternatives for study and summarized these reviews in Alternatives Analyses (AA) documents. These AA documents are issued well before any draft EIR is published. The first public AA reports are called Preliminary.

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Many are followed by Supplemental AA reports, which are also presented to the Authority Board in public meetings. In addition, the Authority and FRA consult with federal regulatory agencies in determining the alternatives ultimately to be analyzed in draft EIR/EISs. All of the AA documentation informs the draft EIR/EISs and the final EIR/EISs, and then becomes part of the EIR/EIS written record to be considered by the Authority Board in making future decisions.

### **How were the San Jose Station Approach Alignment Alternatives defined?**

The alternative analysis for the San Jose Station approach has followed the process described in the preceding question.

In order to identify a reasonable number of alternatives, the project staff prepared an initial range of alternatives based on the input received during the scoping process. The initial alternatives included the program alignment, four aerial alternatives and three underground alternatives. The team then met with the various stakeholders that proposed the alternatives, including the tunnel alternatives proposed by the San Jose Department of Transportation (SJDOT) and the community group the Voices of San Jose (VSJ), to better understand the objectives of each proposal. The two tunnel alternatives proposed by VSJ (Thread the Needle and 5100 m Tunnel) both included an underground HST station to be constructed below the existing Caltrain station and tracks. Due to the high probability of ground collapse given the poor soils in the area, construction under the active Caltrain and UPRR platforms and tracks was considered not practicable and not reasonable or realistic. Following a request by the City of San Jose, the Authority staff agreed to conduct additional investigation of the deep tunnel alternative and when staff determined that would not be constructable, developed a shallower tunnel alternative to be considered in the initial alternatives evaluation. Each remaining alignment went through a refinement process during the evaluation in order to minimize adverse impacts. The alternatives analysis then reviewed the program alignment, four aerial alternatives and two underground alternatives. A more detailed description of all the alternatives considered is included in the PAA.

For this early alternatives analysis, the designs were advanced to a 5% design – sufficient to identify the footprint and hence impacts of each alternative. This level of design is an industry standard for early evaluation of alternatives. Due to the complexity of the tunnel alternatives and following the request by the City of San Jose for additional study of the underground options, the designs of the deep and shallow tunnel alternatives were advanced closer to a 15% level. This level of design is typically used for a full alternatives analysis in a DEIR/EIS. Working with SJDOT, the project team developed a shallower cut-and-cover option with the proposed BART station 140 feet deep below it as an alternative to the deep tunnel because the deep tunnel was considered not constructable given the prevailing site conditions.

Extensive public outreach was conducted during the development of these alternatives. In March 2009, three scoping meetings were held in San Jose, Gilroy and Merced to receive input on the scope of issues that should be analyzed in the EIR/EIS for the San Jose to Merced section. Following scoping, the project team initiated several rounds of outreach meetings and workshops to inform the Alternatives Analysis process. In September 2009, Technical Working Group (TWG) meetings with

local, transportation, and resource agency representatives throughout the corridor were held in Gilroy and Merced. In October 2009, three community Public Information Meetings (PIMs) were held in San Jose, Gilroy and Merced. In December 2009, two more TWG meetings were held in Gilroy and Merced. In December 2009/January 2010, an additional three PIMs were held Merced, Gilroy and San Jose. In March, a workshop was held on the downtown San Jose alignments (specifically the deep tunnel alignment) followed by two additional open house meetings in San Jose in May that focused on a shallow tunnel. Between March 2009 and June 1, 2010, approximately 1,200 people attended the public meetings. Over 95 meetings were also conducted with public agencies, cities, city councils, chambers of commerce, neighborhood representatives and other stakeholders.

Following the release of the Preliminary Alternatives Analysis Report (Preliminary AA Report) on June 3, 2010, the project team met with elected officials and staff, key stakeholders and the public throughout the San Jose to Merced section. Two TWG meetings were held in June 2010 in Merced and Gilroy. Community open houses were hosted in San Jose, Gilroy, Los Banos, Dos Palos and Merced in June/July 2010 for the general public to review and comment on the alignment alternatives and station location options released in the Preliminary AA Report. Approximately 325 people attended these public meetings. In addition, the project team met with a variety of stakeholders (cities, agencies, and neighborhood representatives) during approximately 35 individual meetings.

The reasons for the location of the alignments reviewed in the PAA are as follows:

- **Refined Program Alignment:** The Program Alignment (along the Caltrain Corridor) was developed as from 2008 Program EIR for the Bay Area to Central Valley. This alignment maximizes the use of the publically owned Caltrain Corridor rights-of-way
- **Deep Tunnel:** the deep tunnel alignment generally followed the tunnel alignment proposed by the City of San Jose. The depth of the alignment was set to avoid the foundations of the I-280/SR-87 interchange and the proposed BART station. As surface restrictions were avoided, the horizontal alignment was straightened to maximize operating speeds, with a connection to proposed intermodal hub at the north end of the HST station.
- **Shallow Tunnel:** The initial alignment for the shallow tunnel proposed by San Jose Redevelopment Agency was to locate the station box parallel and to the east of the existing Diridon Station but this did not achieve the necessary design criteria for the HST platforms and trackwork. The HST platforms are required to be straight (on tangent) to permit level boarding with minimal gaps between the train carriages and the platform edge. The HST stations have separate station tracks to allow express trains to pass through the station while other trains are stopped. The turnouts where the station tracks diverge from the mainline also need to be on tangent and far enough away from the station to allow the trains to slow down or speed up within acceptable passenger comfort limits. Because of the tight curves on the San Jose station approaches these track were designed much shorter than typical 6000 feet required for an HST station. As TBM construction cannot be used for diverging alignments, the turnouts would need to be constructed using cut and cover methods. To be able to use cut and cover construction the alignment would need to be as shallow as possible and hence the need to cross under I-280 where there were no deep foundations. This location was between Bird Avenue and the I-280/SR-87

interchange. The tangent length between this location crossing under I-280 to the curve north of the Alameda was just long enough to accommodate the turnouts, station tracks and platforms.

The shallow tunnel alternative would be in a mined tunnel north of Tamien station to pass under SR 87, the residential neighborhood of Greater Gardner, and I-280. The cut and cover box would begin north of W. San Carlos St. to avoid homes immediately north of I-280 and extend north to the Alameda, over a relocated BART tunnel and station. From the Alameda, the alignment would then be mined as it passes under the active railroad tracks on a curve and then a separate cut and cover box would be constructed to accommodate the turn outs north of the station where the station tracks rejoin the mainline.

A major impact of the shallow tunnel option is the requirement to move the BART tunnel and station deeper and to avoid the I-280 freeway foundation piles. One of the consequences is that this alignment would be placed under the proposed ballpark.

It should be noted that a change in the proposed tunnel portal at the Tamien Station to avoid a National Register Archeological site would require additional tunnel lengths, acquisition of additional easements and private property for a new portal and additional tunnel lengths, and associated potential increases in impacts and costs.

- **Downtown Aerial:** The aerial alignment was developed along the same alignment as the deep tunnel alignment, but in an aerial configuration. (Please note that both the SR 87/I280 and the Program Alignment also include an aerial station and alignment.)
- **SR 87 / I-280:** This alignment was initially proposed by the City of San Jose to follow, to the extent possible, the rights-of-way for these two freeways and to locate the HST station above the existing Caltrain station platforms.
- **Three Track:** this proposal from the City would reduce the number of tracks in the Caltrain Corridor from four to three – one for Caltrain/UPRR and two for high-speed rail with the intent to minimize impacts to adjacent properties.

### What are the property impacts of each alternative?

The alternatives evaluation estimated a range of the number of affected properties to provide a broad comparative assessment of the potential alternatives and to reflect the possibility of further design refinements (see Table 1). Although not quantified in the PAA, the City of San Jose staff in a report to council did estimate that there would be a need for approximately 80 property easements for any tunnel option. These easements would be to protect the tunnel from future deep underground activities such as foundation piles, basements, and well drilling that could adversely impact the integrity of the HST tunnels. Typically there would be a one-time payment for the easement rights based on an appraisal of the property value at the time of acquisition to compensate the property owners.

North of the station property, impacts to abutting properties (e.g., need for easements, etc.) were assessed based on the width of the Caltrain right of way. Where that right of way is 100 feet or greater, there would be no direct impact to property rights. As that right of way narrows below 100 feet, impacts to properties are expected to occur and to increase as the right of way width decreases.

**TABLE 1: SAN JOSE STATION APPROACH SUBSECTION EVALUATION MATRIX**

Measurement Criteria	REFINED PROGRAM ALIGNMENT (WITHDRAWN)	DEEP TUNNEL (WITHDRAWN)	SHALLOW TUNNEL (WITHDRAWN)	SR 877 I-280 (CARRIED FORWARD)
<b>◆ Displacements</b>				
<b>Residential Displacement</b>	<ul style="list-style-type: none"> <li>◆ 0-2 dwelling units - Single-Family Residential (SFR)</li> <li>◆ 0 dwelling units - Multi-Family Residential (MFR)</li> <li>◆ 0 dwelling units – Mobile Home Parks (MHP)</li> </ul>	<ul style="list-style-type: none"> <li>◆ 0 dwelling units - SFR</li> <li>◆ 0 dwelling units - MFR</li> <li>◆ 0 dwelling units – MHP</li> </ul>	<ul style="list-style-type: none"> <li>◆ 0 dwelling units - SFR</li> <li>◆ 0 dwelling units - MFR</li> <li>◆ 0 dwelling units – MHP</li> </ul>	<ul style="list-style-type: none"> <li>◆ 0-1 dwelling unit - SFR</li> <li>◆ 0 dwelling units - MFR</li> <li>◆ 0 dwelling units - MHP</li> </ul>
<b>Business Displacement</b>	<ul style="list-style-type: none"> <li>◆ 0 units – Commercial</li> <li>◆ 0 units – Industrial</li> <li>◆ 1 unit – Nonprofit</li> </ul>	<ul style="list-style-type: none"> <li>◆ 0 units - Commercial</li> <li>◆ 0-1 units - Industrial</li> </ul>	<ul style="list-style-type: none"> <li>◆ 0-1 units - Commercial</li> <li>◆ 0-3 units – Industrial</li> </ul>	<ul style="list-style-type: none"> <li>◆ 0-1 units - Commercial</li> <li>◆ 10-15 units - Industrial</li> </ul>
<b>Properties with Access Affected</b>	<ul style="list-style-type: none"> <li>◆ 10 parcels</li> </ul>	<ul style="list-style-type: none"> <li>◆ 0 parcels</li> </ul>	<ul style="list-style-type: none"> <li>◆ 0 parcels</li> </ul>	<ul style="list-style-type: none"> <li>◆ 6 parcels</li> </ul>

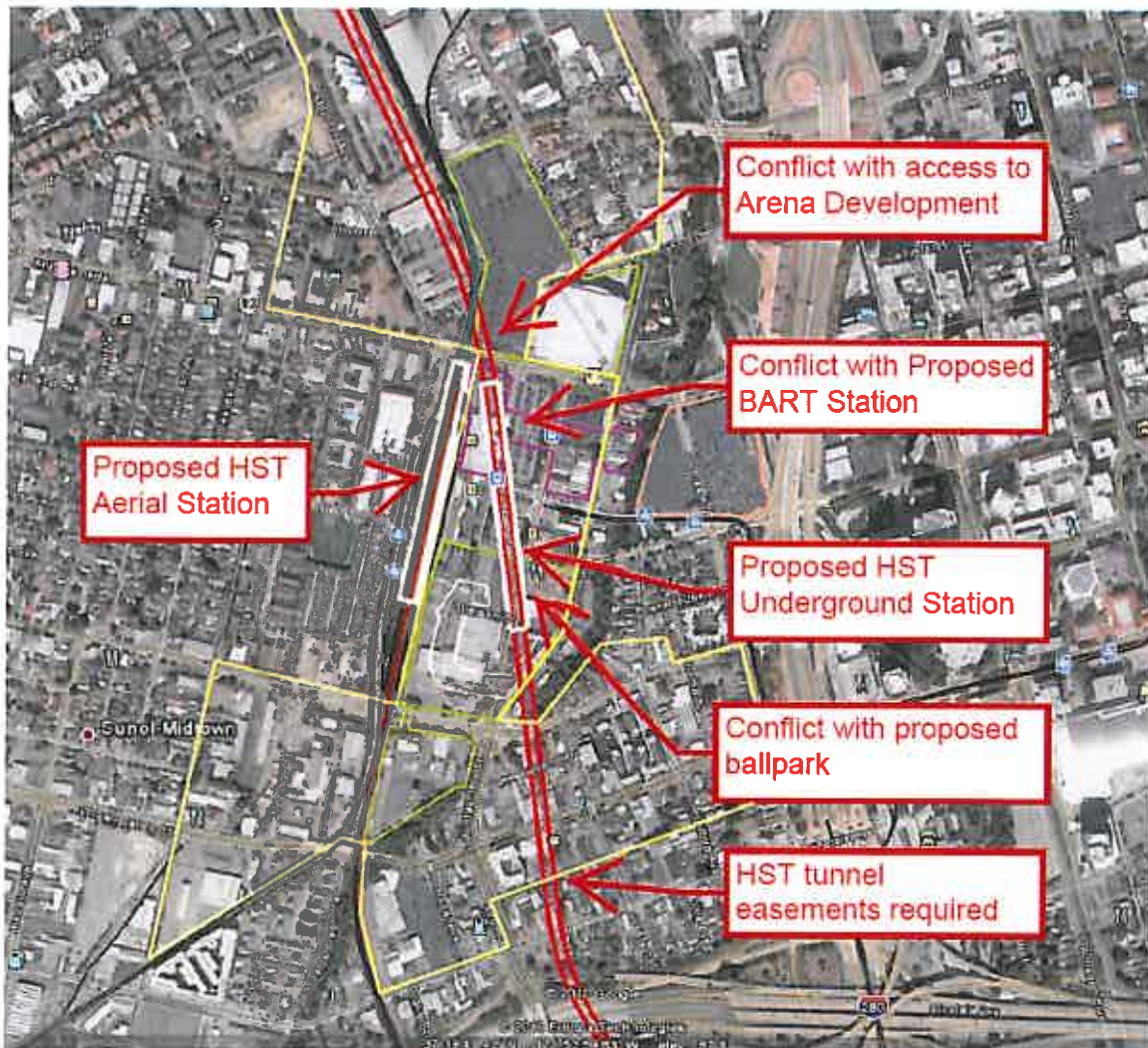
To ensure that property owners are aware of the project, the teams have compiled mailing lists initially comprised of properties adjacent to the proposed right of way for all the alternatives and within 500 feet of a station location. This initial list has been greatly expanded with attendees at HST events and requests for information through multiple media. The mailing list related to San Jose includes approximately 26,600 San Jose residences and businesses.

In addition to the potential impacts to existing residential and commercial properties, there could be impacts to the planned redevelopment of the Diridon Station and surrounding area. The City of San Jose, in coordination with the San Jose Redevelopment Agency, and other local and regional transportation agencies, are developing a plan for a ½-mile radius around Diridon Station (approximately 500 acres of land). The objective of this process is to provide a vision and framework for higher intensity/transit-oriented development (TOD) in the area. The process involves developing a Station Area Plan around Diridon Station with related transit and station-area planning activities, and includes environmental clearance under CEQA. The Diridon Station Area Plan will provide a vision and guidance for this unique destination with a broad mix of transit-supportive uses. In addition, the Plan anticipates pedestrian, bicycle, open space, and street connections from the greater downtown and surrounding neighborhoods.

The estimated construction period for the shallow tunnel alternative is seven years including four to five years for the station box. The underground station would be positioned diagonally across the heart of the redevelopment area in order to provide sufficient tangent track length to accommodate

the station platform tracks and turnouts. As shown in Figure 1, construction of this alternative would severely disrupt concurrent implementation of the Diridon Station Area Plan. In addition to the construction of the station box would be extensive relocation of utilities and other enabling works to support the VTA LRT and Los Gatos Creek.

**FIGURE 1: LOCATION OF UNDERGROUND HST STATION RELATIVE TO PROPOSED DIRIDON STATION AREA DEVELOPMENT**



### Why can BART be built in a tunnel but not High-Speed Train?

A question often asked is, "Why can BART propose to build a Diridon Station using cut and cover methods, yet the Authority finds this impractical for HST?" The major reason the HST cut and cover facility is impractical is the magnitude of the HST tunnel and station complex in comparison to the proposed BART tunnel and station complex. The HST complex has over five times longer length of

tunnels, which are twice the diameter of the BART tunnels, and the HST station is almost twice as long as the BART station and two times wider. In all, the total volume of the HST tunnels and station approach six times larger than the BART tunnels and station. Table 2 compares the size of the HST Tunnel/Station facility to the size of the proposed BART tunnel/station facility (for the same total length).

**TABLE 2: VOLUME COMPARISON TABLE OF HST TUNNEL/STATION VERSUS BART TUNNEL / STATION**

Facility Component	HST (LxWxD)	BART (LxWxD) for Same total length as HST	Volume HST Tunnel/Station (Cubic Yards)	Volume BART Tunnel/Station (Cubic yards)
Tunnels	21,200 linear feet LF x 30 ft Diameter	8,800 linear feet x 15 ft Diameter.	554,700	115,200
Station	1,400LF x 140FT x 60FT	900FT x 70FT x 60FT	436,000	140,000
Track Transition Structures	North of HST station box = 600FT x 150FT x 60FT South of HST station box = 800FT x 200FT x 60FT	None Required	555,000	N/A
Tunnel Crossovers, Vent Shafts, Access Shafts	9 each x 40FT x 30FT Diameter.	None required in Diridon Station Area	9,420	N/A
<b>Total Volume</b>			<b>1,555,555</b>	<b>255,000</b>
<b>Ratio of Volumes</b>			<b>6.10</b>	<b>1.00</b>

The scale of the HST facility compared to a BART facility is represented in Figures 2 and 3. To fit this HST tunnel and station facility in this downtown area would introduce impacts, as described above, but at an order of magnitude substantially larger than the proposed BART surface station. The impacts resulting from the scale and magnitude of building the HST Tunnel/Station facility in the San Jose Diridon Station area are the most important reason why it is impractical.

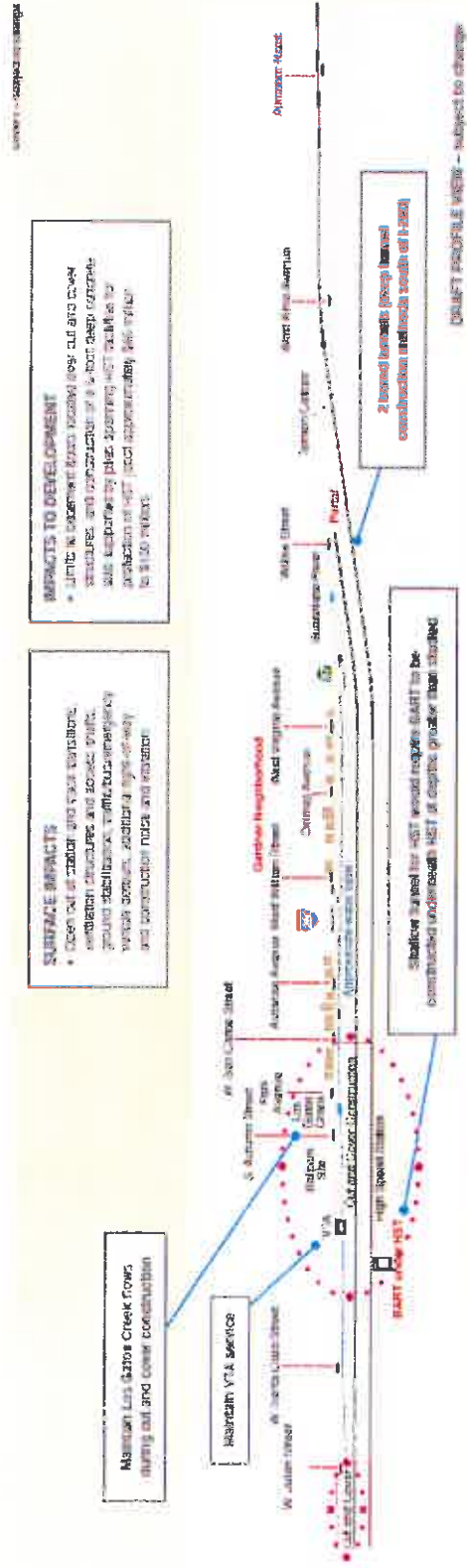
The depth of the HST Deep Tunnel Alternative makes the soils much more unstable than what the more shallow BART tunnel and station would experience. The soil boring logs available from the BART project and I280/SR87 interchange provided sufficient soil information to characterize the soil without the need for additional sampling and were adequate for preliminary engineering.



FIGURE 2: PLAN OF HST SHALLOW TUNNEL/STATION ALTERNATIVE



FIGURE 3: PROFILE OF SHALLOW TUNNEL/STATION ALTERNATIVE

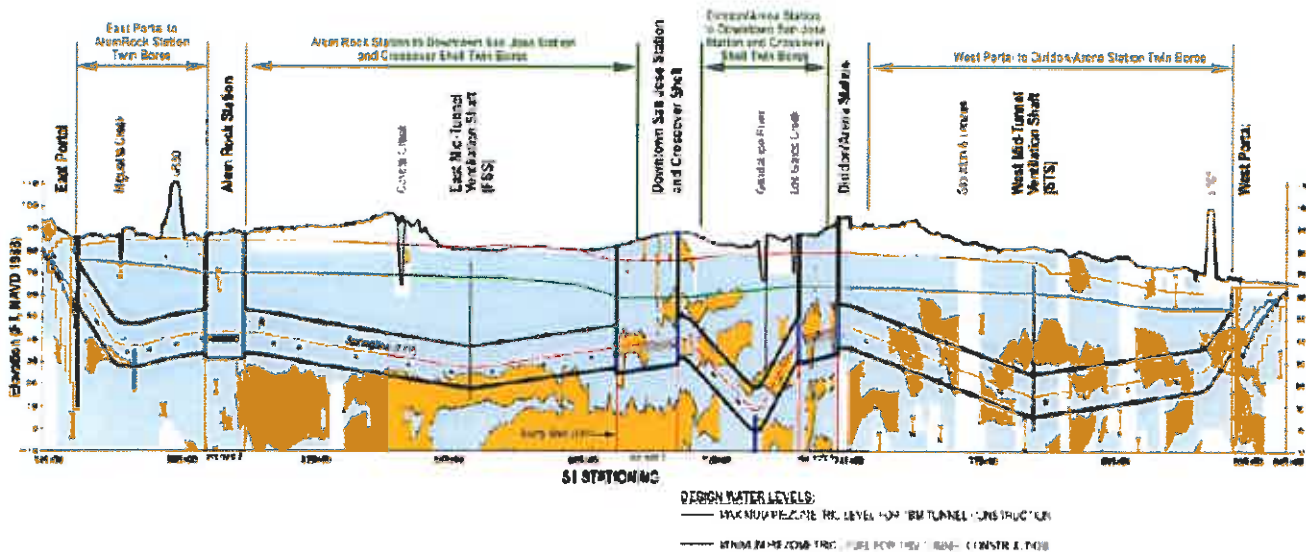


The high construction risk for the deep mined station in unstable soils, and a high water table, was a major factor in determining the deep tunnel alternative to be impractical. The size of the cut and cover excavation for the HST facility below the water table would increase risks in the following areas:

- Increased settlement in the area due to extensive dewatering of cut and cover excavations
- Potential for collapse in the excavations due to loose, saturated, and gravelly soils in the area.

Figure 4 shows the prevalent high water table for the BART soil profile in the area of the Diridon Station. The maximum hydrostatic head (i.e., depth under top of water table) of the BART tunnels and station is approximately 40 feet, which equals a water pressure of 17 pounds per square inch. The Deep HST tunnels and station would encounter a hydrostatic head of approximately 140 feet, which equals a water pressure of 61 pounds per square inch or four times higher water pressure than the proposed BART complex. For the foregoing reasons and others detailed in the PAA, the Authority and FRA determined not to carry forward the Deep Tunnel Alternative.

**FIGURE 4: SOIL PROFILE ALONG BART ALIGNMENT**



The Shallow Tunnel Alternative would be constructed using tunnel boring machines (TBMs) and cut and cover methods similar to the BART system, however on a much larger scale – see Table 2 of volume comparisons. The distinct difference in comparisons between HST facilities and BART facilities in combination with major surface disruption in the prime redevelopment area (discussed earlier), and other factors identified in the Tunnel Alternatives Report (Appendix C to the PAA) led the Authority and FRA to determine not to carry forward the Shallow Tunnel Alternative. It is noted that placing the HST Tunnel/Station above the BART Tunnel/Station (as the Shallow Alternative would do) increases the risks and difficulty of building BART through San Jose.

The estimated construction duration for the HST Tunnel/Station alternatives was based on construction of similar type/facilities and proportioned to the size of the HST underground facility. As described in

the Tunnel Alternatives Report, many different tunnel configurations and construction methods were considered to develop the most cost effective solution, and a thorough analysis was performed to locate the alignment in a location with the least amount of impacts.

Construction of the tunnels north of the station was assumed to be similar to the approach from the south, using TBMs. As described in the Tunnel Alternatives Report, it is the construction of the station box and associated special trackwork that would have the majority of the impacts and construction risk. These issues further supported the determination not to carry the tunnel alternatives forward.

### **Why were the tunnel alternatives not recommended for study in the Draft EIS/EIR?**

For the deep tunnel alternative, Chapter 4 of the PAA states, "This type of station construction is not under consideration for any of the stations in the 800-mile California HST system and has not been used for any HST Station in the world. Subsurface HST stations are constructed using cut-and-cover techniques rather than mining. Existing HST stations were constructed using cut-and-cover techniques (e.g., HST stations in Taiwan, Berlin Central Station) or the pipe roof arch method and "sheeted trench" method (e.g., Antwerp HST station in Belgium) rather than traditional mining methods." Thus, the deep tunnel alternative with the mined station was determined to be neither feasible or reasonable.

The shallow tunnel alternative was not recommended for study in the draft EIR/EIS "because it is impracticable due to major constructibility issues, surface disruption to surface land uses, additional right-of-way requirements, limits to future development, the relocation and redesign of the proposed BART Diridon Station and associated tunnels along with much greater construction risk, impacts to Los Gatos Creek, impacts to VTA and Caltrain, high cost factors, and lengthy construction schedules and construction impacts." See Chapter 4 of the PAA.

An evaluation of foreseeable potential risks and impacts associated with the different types of proposed HST San Jose Tunnel/Station alternatives is provided in Table 3 (which is Table 4.1-2 from the PAA). Seven evaluation criteria including 24 potential risk items are considered. The evaluation indicates that "Deep Mined option" and "Shallow Cut-and-Cover option" carry far more "high" risks and less "low" risks than "Aerial option", in particular for the evaluation criteria of "cost and schedule", "constructability" and "geotechnical constraints".

Thus the underground options are not practicable due to unsafe mining conditions (poor soils combined with high groundwater), construction schedule, potential for settlement, extensive surface disruption and very high construction cost and should be eliminated from further evaluation. In the case of the shallow tunnel option, the proposed BART station and extensions north to Santa Clara and east to downtown would also have to be redesigned and placed much lower in the existing poor ground conditions.

**TABLE 3: RISK/IMPACT EVALUATION MATRIX FOR SAN JOSE TUNNEL/STATION ALTERNATIVES**

Evaluation Criteria		Aerial Option <sup>1</sup>		Deep Mined Option <sup>2</sup>		Shallow Cut & Cover Option <sup>3</sup>		
Cost and Schedule	Operating Costs	L			H	M		
	Capital Costs	L			H	M		
	Schedule	L			H	M		
Constructability	Constructability	L			H	M		
	Surface Disruption		M		M		H	
	Disruption to Existing Railroads		M	L			H	
	Damage to Surface/Near Surface Structure	L			H	M		
	Impact to Existing Foundations	L			H	M		
	Disruption to and Relocation of Utilities		M	L			H	
Geotechnical Constraints	Ground Type	L			H	M		
	Settlement	L		M		L		
	Flooding/Inrush of Water to the Excavation	L			H	M		
	Groundwater	L			H	M		
Disruption to Communities	Residential/Business Impact		M	L			H	
	Local Traffic Maintenance & Detour Routing		M	L			H	
	City Division		M	L		L		
Environmental Impacts	Noise/ Vibration/ Dust			H	L		H	
	Visual/Aesthetic Issues			H	L		M	
Environmental Resources	Biological Resources		M		L		L	
	Cultural Archaeological Resources	L			M	H	M	H
Others	Emergency Response	L			H		M	
	Staging	L			L		L	
	Future Development	L			M			H
	Right-of-way		M		M		M	
Notes:	1. SR-87/I-280 Aerial Alternative and Refined Program Alignment 2. Deep Tunnel Option, 5100m Tunnel & Thread the Needle Tunnel 3. Shallow Tunnel Option  <b>Risk/Impact Rating</b> <span style="display: inline-block; width: 15px; height: 15px; background-color: #90EE90; border: 1px solid black; margin-right: 5px;"></span> <span style="display: inline-block; width: 15px; height: 15px; background-color: #FFFF00; border: 1px solid black; margin-right: 5px;"></span> <span style="display: inline-block; width: 15px; height: 15px; background-color: #FF0000; border: 1px solid black;"></span> Low Medium High							

**What was used in the cost comparison for each alternative?**

The cost comparison in the PAA used the program base unit costs in 2009 dollars. The 2009 unit prices were increased in the California High-Speed Rail 2009 Business Plan to account for program implementation, final design and contingencies in addition to escalation to year of expenditure. However, as the PAA evaluation used relative cost factors, the 2009 unit prices gave a good basis for comparison.

Included in the estimate for all tunnel alternates were:

- Track Items
- Earthwork
- Structures, Tunnels and Walls
- Mechanical & Electrical
- Grade Separations
- Building Items
- Rail and Utility Relocation
- Right of Way items
- Environmental Mitigation
- System Elements
- Electrification Items

A summary of the capital costs for the downtown San Jose area are provided in Table 4.

**TABLE 4 – CAPITAL COST ESTIMATE (2009 DOLLARS MILLIONS)**

	Construction (\$2009)	Program & Contingency (35%)	Total Capital Cost (\$2009)	Cost Factor
<b>North of De La Cruz to Diridon</b>				
Aerial	\$151	\$53	\$204	1.00
Tunnel	\$455	\$160	\$615	3.01
<b>South of Diridon to Tamien</b>				
Program Alignment	\$288	\$103	\$398	1.00
I280/SR87	\$359	\$126	\$485	1.22
Deep Tunnel	\$2,127	\$762	\$2,941	7.39
Shallow Tunnel	\$1,461	\$524	\$2,020	5.08
<b>Combined Total Capital Cost</b>				
<b>Aerial North and I280/SR87 South</b>			<b>\$689</b>	<b>1.00</b>
<b>Tunnel North and Shallow Tunnel South</b>	Total does not include additional cost of \$140 addition to BART <sup>+</sup> and \$100 HST protection*		<b>\$2,635</b>	<b>3.82</b>

+ Estimated additional costs to construct deeper BART station box

\* To prevent potential damage to the HST station/tunnel from above, a pile supported, 5 foot thick, 200 feet wide, 2,300 feet long, reinforced concrete slab would be constructed above the facility. This would allow flexibility for future development of the Diridon Station Area that has not been yet determined with an assumed building height limit of ten stories.

One item not included in the PAA cost evaluation of a tunnel is a protective covering slab that would permit surface development. If included (as is done in Table 4), the added cost would further support the decision not to carry forward tunnel alternatives. A major consideration for the shallow tunnel option was the potential disruption to the future redevelopment of the Diridon Station Area. As a master plan or specific development has not been approved for the area, a protective slab was assumed over the full extent of the underground station and part of the tunnels. This would not preclude the development of future “air rights” over the station. But as development plans have yet to be determined so a precise slab size and thickness could not be determined, this item was not factored in to the PAA evaluation. Any slab would be costly, however, and would limit (regardless of slab engineering) surface development flexibility. For these reasons, the aerial option over the existing Diridon Station train platforms was determined by the project team in conjunction with City of San Jose staff to better support future development of the area as construction conflicts would be avoided and the HST station would act a focal point of activity.

Standard structure types were assumed for the cost estimate used in the evaluation. Should enhanced structure types be considered due to local participation or as visual mitigation, the cost estimate will need to be revised. The Authority and City of San Jose are developing an agreement that will address the design and aesthetics of the above ground structures.

A common question is how the cost for the shallow tunnel increased from \$1.3 billion to over \$2.6 billion, as shown in Table 4, which includes the costs north of the Diridon Station. One needs to understand the source of the numbers. The specialist tunnel consultants estimated the cost of the shallow tunnel and station box at \$1.3 billion. This estimate did not include the station structure or finishes, tunnel portals, trackwork, ventilation, communication systems, electrification, right-of-way, mitigation, and program implementation costs as these are based on system wide costs. When all the costs are added together, the total program cost of the shallow tunnel was slightly over \$2.6 billion as shown in Table 4.

Combining HST and BART facilities was considered for potential cost savings. With the BART extension from Berryessa to Santa Clara not planned for construction before 2018, there would be little opportunity for construction savings as the HST infrastructure would be completed before then. The potential for shared facilities will continue to be explored through the development of the vision for Diridon Station as an integrated multimodal transportation hub.

Standard structure types were assumed for the cost estimate used in the evaluation. Should enhanced structure types be considered due to local participation or as visual mitigation, the cost estimate will need to be revised. The Authority and City of San Jose are developing an agreement that will address the design and aesthetics of the above ground structures.

The primary cost factor in the evaluation was the capital cost of the construction. The ongoing operations and maintenance costs were also considered. Tunnels and underground facilities have higher operating costs due to the need for fire/life/safety systems, drainage and pumping systems, communication systems, ventilation, lighting, emergency lighting, and restricted access. Aerial

structures also have associated maintenance costs, but by encouraging active uses around and under the structures, the Authority expects to minimize graffiti or other undesirable activities.

**How will public input on the Preliminary Alternatives Report be addressed since the Authority Board has already approved it?**

Due to the importance that the Authority places on public input, each step of the alternative analysis process has included opportunities for public review and comment. Public input substantially informed the preparation of the PAA, and will continue to inform the development of documents for the Authority. As discussed above, extensive public input has been gathered by the project team and used to refine the alternatives and identify areas for further study. The detailed evaluation matrices included in the PAA provide the results of the evaluation of each alternative based on the identified objectives and evaluation measures. Certain data were provided as a range to reflect the preliminary nature of the design and the evaluation. The documents were prepared at a level of detail appropriate to the development of the design. The program alignment was based on high-level criteria that have been refined through the alternatives analysis phase. The alternatives recommended for further study will now be subject to detailed analysis that will be presented in the DEIR/EIS.

The public input gathered through the meetings and direct correspondence will be summarized and presented to the Board for information along with any recommended adjustment to the alternatives as part of the Supplemental Alternatives Analysis (SAA). Consistent with CEQA's requirements, the Draft EIR/EIS will include a brief discussion of alternatives considered pre-EIR/EIS but not studied in more detail in the document. Following public circulation of the Draft EIR/EIS documents, the Authority will respond to comments received and include those responses in a Final EIR/EIS. The Final EIR/EIS, including public comment and responses, and all the AA documentation will be considered by the Authority Board in making decisions regarding project alternatives and approval. The process, and thus also any decision regarding alternatives, is not final until the completion of the Final EIR/EIS and certification by the Board, followed by decisions on the final placement of HST facilities.

