Project Study Report (PSR)

To

Request Approval to Proceed to the Project Approval and Environmental Document Phase

On Broadway in the City of Burlingame, CA

Between US 101 Interchange

And Laguna Avenue

APPROVAL RECOMMENDED:

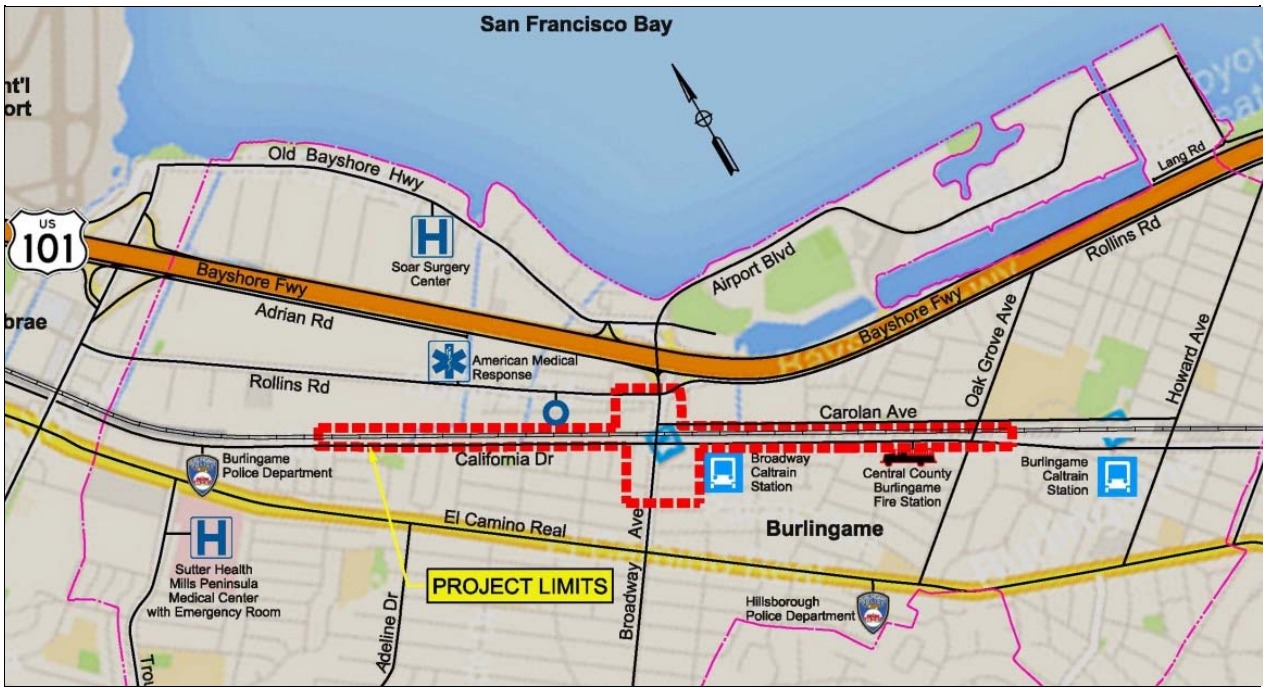
Augustine Chou, *City of Burlingame, Project Manager*

APPROVED:

Syed Murtuza, *City of Burlingame, Director of Public Works*

1/27/17
DATE

Vicinity Map



Executive Summary

The Broadway corridor between US Highway 101 and California Drive is heavily travelled and is the most congested roadway in Burlingame. With over 10,000 at-grade railroad crossings throughout the state, the City of Burlingame's Broadway at-grade railroad crossing was ranked second in priority overall by the California Public Utilities Commission (CPUC), and number one priority for Northern California.

This report describes and evaluates six alternatives for a grade separation that eliminates the at grade crossing in order to improve traffic circulation and safety, improve pedestrian and bicycle circulation and safety, and provide an opportunity for a gateway treatment. Six design alternatives were initially evaluated and two, Alternative A – Partially Elevate Railroad and Partially Depress Roadway, and Alternative B – Partially Elevate Roadway and Partially Depress Railroad, were chosen for final evaluation. A comparison of A and B based on project issues and concerns such as construction costs, right of way impacts and construction impacts to the Broadway Business District identified Alternative A as the preferred alternative. Overall, the public and City Council are in support of Alternative A.

This study concludes that Alternative A is the optimal solution for a grade separation at Broadway in the City of Burlingame.

This project study report-project development support has been prepared under the direction of the following registered civil engineer. The registered civil engineer attests to the technical information contained herein and the engineering data upon which recommendations, conclusions, and decisions are based.

1/26/2017

REGISTERED CIVIL ENGINEER *DATE*

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1. INTRODUCTION

Project Description:

The City of Burlingame, in cooperation with the San Mateo County Transportation Authority (SMCTA), and Caltrain proposes to construct a grade separation structure at the Broadway railroad crossing (Milepost 15.17 / DOT #754879V) in the City of Burlingame.

Project Limits	*On Broadway between Laguna Avenue or Chula Vista Ave and just east of Rollins Road (depending on Build Alternative)* *On the Caltrain corridor between Dufferin Avenue and Burlingame Avenue (maximum limits, depending on Build Alternative)*
Number of Alternatives	*Six Build and One No-Build*
Current Capital Outlay Support Estimate for PA&ED	*$4.3M-$16.5M*
Current Capital Outlay Construction Cost Range	*$81M-$551M*
Current Capital Outlay Right-of-Way Cost Range	*$13M-$186M*
Funding Source	*Federal, State and Local (SMCTA Measure A)*
Type of Facility	*Broadway – local arterial, # lanes vary from 2 to 7 within project limits*
Number of Structures	*1 bridge, various retaining walls*
Anticipated Environmental Determination or Document	*CEQA Statutory Exemption (SE) and NEPA Categorical Exemptions (CEs) or an EA to support approval of a FONSI (See Section 10)*

2. BACKGROUND

The railroad along the San Francisco Bay Area's peninsula was originally constructed in the 1860s and the grade crossing at Broadway was built in the early 1900's.

Broadway serves as the gateway to the City of Burlingame from US 101 and provides direct connection to the Downtown Broadway Business District, the Rollins Road Industrial District, the Burlingame auto dealerships, and numerous hotels, and hospitality services along the bay front. As a result of these services and amenities, the traffic volume on Broadway is relatively high. The 2015 Average Daily Traffic (ADT) on Broadway at the at-grade railroad crossing is estimated at 27,000 vehicles per day. And the number of vehicles traveling through the three study intersections (Broadway/Rollins, Broadway/Carolan and Broadway/California) is estimated at 50,000 to 60,000 per day.

These volumes result in significant traffic queuing on Broadway, which extends back to the US 101 ramps. These conditions are further exacerbated by the existing at-grade railroad crossing at Broadway.

A study for a grade separation at Broadway was first conceived over 50 years ago. The City of Burlingame and Southern Pacific Railroad conducted a study in 1965. The City and Caltrain reinitiated studies in the late 1990's and SMCTA conducted a "Footprint Study" of grade separation alternatives in 2009.

Within the vicinity of the railroad crossing, Broadway has six lanes (three eastbound (EB), three westbound (WB)), with widths varying between 10 and 12 feet. There are no shoulders or bike lanes and each side of Broadway contains a sidewalk that varies from six to eight feet in width.

Immediately west of the railroad crossing, Broadway intersects with California Drive at a signalized four-legged intersection. East of the intersection, Broadway contains one WB left turn, one WB through, one WB right turn, and three EB through lanes. West of the intersection, Broadway contains one WB through lane, one EB left turn, one EB through, and one EB through/right turn lane.

Immediately east of the railroad crossing, Broadway intersects with Carolan Avenue at a signalized T-intersection. West of the intersection, Broadway contains three WB through, one EB left turn (into a commercial driveway) and three EB through lanes. East of the intersection, lanes are currently being reconstructed due to the US 101/Broadway Interchange Project (see details below). When the project is complete, Broadway will contain two WB through lanes, two WB left turn lanes, and three EB through lanes.

Approximately 650 feet east of the railroad crossing, Broadway intersects with Rollins Road at a signalized intersection, currently under construction for the US 101/Broadway Interchange Project. West of the intersection, Broadway will contain two EB left turn lanes, two EB through lanes, one EB shared right/through lane, and three WB through lanes. East of the intersection, Broadway will contain one WB right turn lane, three WB through lanes, two WB left turn lanes, and three EB through lanes.

The US 101/Broadway interchange is just east of the Broadway/Rollins Road intersection. This interchange is currently under reconstruction with Caltrans as the lead agency. The US 101 SB off-ramp terminus contains one WB through and one WB through/right lane. The existing Broadway Overcrossing is approximately 1000 feet east of the railroad crossing. The US 101 Broadway Interchange Project will remove the existing four-lane Broadway overcrossing and construct a new seven-lane overcrossing approximately 170 feet north of the existing structure. Broadway will be realigned to extend straight across US 101 from the Broadway/Rollins Road intersection on the west to the Bayshore Highway/Airport Boulevard intersection on the east. This project is anticipated for completion in late 2017.

Currently, there are a total of 92 Caltrain trains every weekday (both directions combined), 36 every Saturday and 32 every Sunday. By 2020, the weekday train volume is anticipated to be 114 Caltrain trains. The weekday train volume is expected to more than double the 2015 volume in 2040 after the Peninsula Corridor Electrification Project is complete and after the high speed rail trains are in service.

In addition to Caltrain service, Union Pacific Railroad (UPRR) operates freight trains in the corridor. Approximately five UPRR freight trains run daily for five days per week and generally operate at night when Caltrain is not in operation, but they also run at other times of the day when Caltrain can accommodate them.

The Broadway Train Station is located in the southeast corner of Broadway and California Drive and west of the tracks. Because of the narrow center platform, a Hold-out rule is in effect at this station – i.e., when a train is stopped for passengers, other trains cannot pass it, even on the track away from the platform. The station provides weekend and holiday service only.

Burlingame Train Station is located approximately 6,000 feet south of Broadway and west of the tracks. The station is designated as a California State Registered Landmark and listed in the National Register of Historic Places.

The topography along the existing railroad crossing is relatively level. Elevations along Broadway range gradually from approximately 13 feet to 18 feet, increasing to the west away from the bay. The surrounding developments are at a similar grade as Broadway and are primarily spaces for local businesses and restaurants. The San Francisco Bay's shoreline is about 1,800 feet northeast of the rail crossing.

According to the *Preliminary Geotechnical Report* (AECOM 2015), the available groundwater monitoring well data provided by the California State Water Resources Board at a nearby Arco service station at 1101 Broadway Street indicate groundwater levels varied from Elevation +1 to 7 feet (North American Vertical Datum of 1988 [NAVD 88]), between December 2002 and December 2014.

There are three natural drainage crossings within the project study area: Mills Creek, Easton Creek, and Sanchez Creek. They are all receiving water bodies of the Project and all ultimately drain to San Francisco Bay. There are also three culvert crossings along the track alignment within the project's limits.

The rail corridor is surrounded by large trees, particularly to the south towards Oak Grove Avenue where a row of mature, Eucalyptus trees lie.

3. PURPOSE AND NEED

Need

Broadway connects US 101 to the City of Burlingame and provides a key access route for the City - particularly for its Downtown Business and Rollins Road Industrial Districts. As the City's population has grown, major traffic congestion and safety issues have developed at the current at-grade railroad crossing. In addition, pedestrian and cyclist access has deteriorated. Future Caltrain service to the Broadway station is planned to increase and can be expected to further exacerbate these problems. In the 1960s, the City conducted a rail study which recommended a grade separation at Broadway.

Broadway is the only gateway to the City of Burlingame with direct connection to the Downtown Business District, the Rollins Road Industrial District, and numerous auto dealerships, hotels, and hospitality services. The concentration of these major destinations generates high traffic volumes that are compounded by the at-grade railroad crossing serving Caltrain and Union Pacific Railroad (UPRR) which experiences some of the worst traffic congestion in the area. Between 1985 and 2016, there have been a total of 8 recorded accidents involving a train hitting a vehicle at the grade crossing. One accident involved a fatality. In addition, there has been an average of 23 accidents per year at the adjacent Broadway intersections. This at-grade railroad crossing needs improved safety and circulation, reduced congestion, and increased operational efficiency which would reduce response times for police and emergency services.

On June 9, 2016, the at-grade crossing at Broadway (PUC ID 105E-15.20) was listed second (out of 38 projects nominated) on the CPUC's fund priority list for fiscal year 2016-2017. This list establishes the relative priorities for allocation of funds to qualified projects for eliminating or altering hazardous railroad crossings. The list is used by the Commission to determine which projects are most urgently in need of separation, alteration, or reconstruction.

Purpose

The purpose of the proposed project is to create a grade separation that eliminates the existing at-grade crossing in order to reduce congestion and improve traffic operations on Broadway, thereby enhancing safety and mobility for all travel modes in the area. Specific elements include:

- Remove the at-grade crossing and replace it with a grade separation at Broadway, which will increase the safety of pedestrians, bicyclists and operators of motor vehicles by eliminating the conflict with the trains.
- Improve traffic operations, reduce queuing and thus, reduce the average delay at the nearby intersections on Broadway at California Drive, Carolan Avenue and Rollins Road.
- Reduce traffic congestion, which will result in lower motor vehicle emissions.
- Improve access to/from local destinations including the residential and business communities within the project area.

- Improve bicycle and pedestrian access/circulation within the project limits.
- Offer an opportunity to provide a gateway entrance into the Downtown Broadway Business District.

4. EVALUATION OF TRAFFIC CONDITIONS

Technical Memorandum – Evaluation of Traffic Conditions (AECOM Traffic Memo, 2016) was prepared using readily-available information and applying macro-level analysis and evaluation techniques to provide a technical foundation for developing a preliminary purpose and need statement for the project, and to outline the scope and magnitude of the more detailed traffic studies to be conducted as part of the "Project Approval and Environmental Document" (PA&ED) phase of project development. The key findings of the traffic technical memorandum include:

A. Field Observations

Field observations were conducted in January 2015. During the weekday AM peak hour minor queues were observed along southbound Broadway between California Drive and Carolan Avenue. Six westbound trains and six eastbound trains were observed from 7:30 AM to 8:30 AM with an average gate down time of approximately 40 seconds when trains did not stop at the Broadway Caltrain station.

During the PM peak hour, queues were observed in the westbound right turn lane at Broadway/California Drive intersection. Heavy queues were observed along southbound Broadway from California Drive spilling back beyond Rollins Road. Four westbound trains and four eastbound trains were observed from 4 PM to 5 PM with an average gate down time of approximately 40 seconds when trains did not stop at the Broadway Caltrain station.

During the weekend midday, queues were observed along southbound Broadway at Carolan Avenue and California Drive intersections clearing up every cycle. One westbound train and two eastbound trains were observed from 11:30 AM to 12:30 PM with an average gate down time of approximately 140 seconds when trains stopped at Broadway Caltrain station.

During field observations, it was observed that many vehicles stopped on the rail tracks in the southbound direction on Broadway while waiting for a green signal at California Drive creating an unsafe scenario with the potentially serious injury accident.

B. Current Operating 2015 Conditions

Table 4-1 summarizes the results of the Level of Service (LOS) analysis at the study intersections. As illustrated in Table 4-1, all of the study intersections except Broadway/Carolan are operating at an unacceptable (E or F) level of service.

Table 4-1:Existing Level of Service and Delay							
Intersection Name	Weekday AM		Weekday PM		Weekend Midday		Weekly Delay Hours
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	
Broadway/US 101 Off-Ramp/ Rollins Road	65.4	E	243.1	F	152.6	F	1575
Broadway/ Carolan Ave	25.8	C	21.2	C	23.2	C	184
Broadway/ California Dr	68.2	E	60.3	E	68.5	E	587

Table 4-2 summarizes the existing queue lengths at the study intersections. As observed in the field, the queue lengths from the model show that there are heavy queues at the Broadway/Carolan and Broadway/California intersections. The values in **red bold** indicate the queue lengths that exceed the storage capacity.

Table 4-2: Existing Queue Length (feet)															
Intersection	Peak Hour	Movements													
Broadway/ US 101 Off-Ramp/ Rollins Road		EBLT	EBT	EBR	WBLT	WBR	NBL	NBL	NBT	NBT	NBR	SBT	SBTR	SER	SER
	AM	185	147	66	201	265	129	169	218	230	206	996	1036	378	326
	PM	347	290	333	296	62	25	57	124	135	158	**1432**	**1423**	**539**	**561**
	Midday	205	131	141	143	62	27	56	142	148	147	516	500	**545**	**565**
Broadway/ Carolan Ave		WBLT	WBR	NBL	NBT	NBT	NBTR	SBL	SBT	SBT	SBTR				
	AM	179	324	63	**176**	**173**	**222**	**206**	**244**	**256**	**256**				
	PM	73	118	25	**175**	**124**	**212**	**227**	**245**	**262**	194				
	Midday	100	112	25	**174**	**218**	**234**	**209**	**260**	**258**	**250**				
Broadway/ California Dr		EBL	EBL	EBTR	WBL	WBT	WBT	WBR	NBL	NBT	NBTR	SBL	SBT	SBR	
	AM	**287**	**345**	**595**	77	190	159	387	36	**161**	**779**	**172**	**167**	**151**	
	PM	228	361	**653**	172	306	278	280	99	**854**	**106**	**190**	**173**	**148**	
	Midday	**313**	**341**	**764**	103	173	126	391	23	**163**	572	**200**	**186**	**86**	

C. Accident Summaries

Accidents in the three-year period (2011-2013) at the study intersections are summarized in **Table 4-3**. Many accidents related to unsafe lane changes, unsafe turns, unsafe backing, and driving left of double yellow lines could be a result of the short distance between California Drive and Carolan Ave to the rail tracks.

Table 4-3: Intersection Accident Summary											
No.	Intersection	Total	Speeding	Unsafe/ Improper Turn	Unsafe Lane Change	DUI	Red Light Crossing	Unknown	Unsafe Backing/ Starting	Failure to Yield ROW	Driving Left of Double Yellow
1	Broadway/ US 101 Off-Ramp/ Rollins Road	24	7	1	1	0	3	8	0	2	2
2	Broadway/ Carolan Ave	11	2	0	2	3	0	4	0	0	0
3	Broadway/ California Dr	34	6	5	2	2	2	12	3	2	0

According to the Federal Railroad Administration (FRA) Highway-Rail Grade Crossing Accident/Incident Reports (between July 17, 1985 and March 28, 2016), there were a total of eight (8) recorded accidents involving a motor vehicle struck by train at the Broadway grade crossing. One of the accidents involved a fatality and one involved an injury. Six of the accidents did not have any injuries or fatalities. The short distance between the intersections combined with the traffic congestion could be contributing factors to the accidents at the grade crossing.

D. Forecasted Conditions

Table 4-4 shows the projected future 2040 traffic conditions if the existing Broadway at-grade railroad crossing remains unchanged (No Build Alternative) with a projected total delay of over 15,000 hours per week.

The total delay is calculated by taking the total number of vehicles traveling through the three study intersections each week and multiplying by the average delay experienced by each vehicle. 15,000 hours of delay in one week is the equivalent of 182,000 vehicles (26,000 vehicles per day x 7 days) experiencing an average delay of approximately five minutes.

Travel times within the Broadway corridor will be very high in 2040 if the grade separation is not constructed. For example, in the 2040 PM peak hour, a vehicle exiting US 101 will take approximately 20-25 minutes to reach the downtown Broadway business district from the time it reaches the off-ramp's intersection with Broadway. This is largely due to both the increase in traffic and the overall length of gate down times due to the additional number of trains each day in 2040.

With the project, that same travel route from the US 101 off-ramp to the downtown Broadway business district will take approximately 2-4 minutes.

Table 4-4: Future Traffic Conditions without the Grade Separation Project (2040)

Intersection Name	Weekday AM		Weekday PM		Weekend Midday		Weekly Delay (hours)
	Delay (sec/veh)	Volume	Delay (sec/veh)	Volume	Delay (sec/veh)	Volume	
Broadway/Rollins Rd	249.2	4,504	744.2	5,485	381.3	3,613	7,994
Broadway/Carolan Ave	206.6	3,293	36.8	3,531	37.9	2,905	1,187
Broadway/California Dr	550.0	3,502	451.5	4,035	430.5	3,312	5,998

Note: sec/veh = seconds per vehicle
Source: AECOM Traffic Memo, 2016

Table 4-5 shows the projected future traffic conditions in 2040 with the Grade Separation Project at Broadway (All Build Alternatives).

Table 4-5: Future Traffic Conditions with the Grade Separation Project (2040)

Intersection Name	Weekday AM		Weekday PM		Weekend Midday		Weekly Delay (hours)
	Delay (sec/veh)	Volume	Delay (sec/veh)	Volume	Delay (sec/veh)	Volume	
Broadway/Rollins Rd	36.8	4,358	48.1	5,401	24.1	3,589	632
Broadway/Carolan Ave	43.0	3,254	21.7	3,488	14.8	2,878	323
Broadway/California Dr	38.2	3,542	41.0	4,079	33.4	3,264	481

Note: sec/veh = seconds per vehicle
Source: AECOM Traffic Memo, 2016

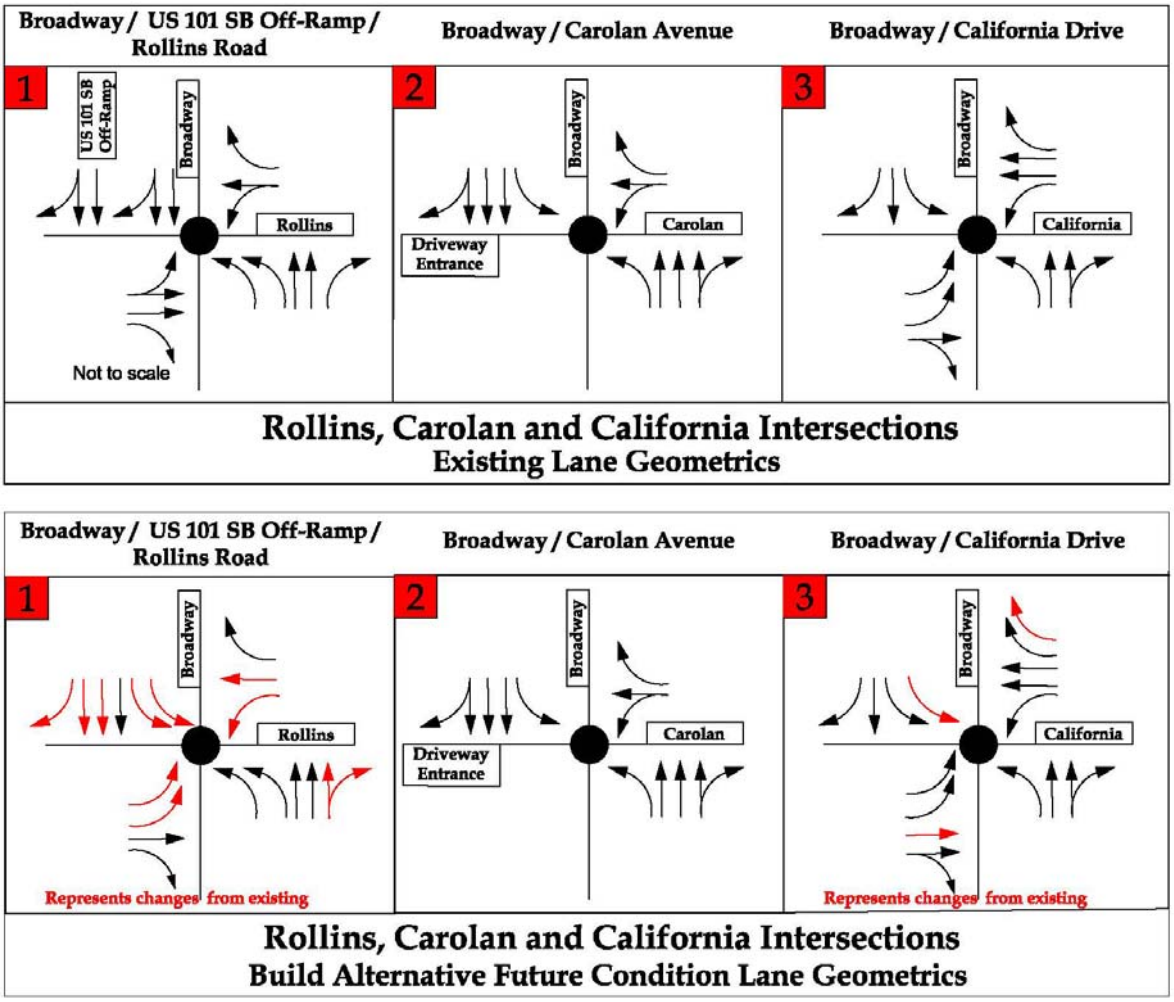
The grade separation project is expected to reduce traffic delays by over 90 percent in 2040 to a total of approximately 1,436 hours per week, compared to 15,179 hours if no improvement is made to the crossing. The projected total delay in 2040 is expected to be 910 hours less than the current weekly delays despite the fact that 2040 traffic volumes are projected to increase. In addition, the 2040 total delay with the Project is expected to be nearly 40 percent less than the total weekly delay under existing conditions.

Table 4-6 shows the comparison of total weekly delays under the following conditions: Existing (2015), With Project (2040) and Without Project (2040).

Table 4-6: Weekly Traffic Delays

Operating Condition	Weekly Delay (hours)	Notes
Existing (2015)	2,346	
With Project (2040)	1,436	~ 60% of "Existing" ~ 10% of "Without Project (2040)"
Without Project (2040)	15,179	

Traffic conditions in 2040 (With Project) include modifications to the lane configurations at the Broadway/Rollins and the Broadway/California intersections. The following diagrams indicate changes in lane configurations (shown in red) between the existing and future lane configurations with the Build Alternatives at the three study intersections.



After this project is complete, modernization of the Broadway station is expected, which will include removal of the hold-out rule.

E. Traffic Operations and Safety

AECOM Traffic Memo, 2016 supports the project's purpose and need. Under existing conditions, two intersections operate at an unacceptable level of service. Heavy queues were observed on westbound Broadway from California Drive spilling back beyond Rollins Road during the PM peak hours. Many accidents related to unsafe lane changes, unsafe turns, etc. could be a result of the short distance between California Drive and Carolan Ave to the rail tracks. In addition, the grade crossing created potential collisions between trains and motor vehicles due to vehicles stopped on the rail tracks while waiting for the green signal at California Drive. Constructing a grade separation structure at the railroad crossing will improve the safety and operations along Broadway and the adjacent roads and intersections.

5. DEFICIENCIES

Traffic Operations

As indicated in the previous section, two intersections – Broadway/US 101 Off-Ramp/Rollins Ave and Broadway/California Drive operate at LOS E or F depending on time of day under existing conditions. In addition, traffic analysis results indicate that there are currently total delays of 2,345 hours per week for vehicles using the crossing. At all three intersections, the queue lengths exceed the available storage. Under Future Year 2040 conditions without the Project improvements, all the intersections will operate at LOS F in all peak hours except the intersection of Broadway/Carolan Avenue which will operate at LOS D in Weekday PM and Weekend Midday peak hours. Overall, the level of service at all intersections is expected to worsen.

Pedestrian and Bicycle Access

There are no shoulders or bike lanes along each side of Broadway. The traffic congestion creates potentially unsafe conditions and inhibits access for pedestrians and bicyclists.

6. CORRIDOR AND SYSTEM COORDINATION

The proposed project is consistent with the City of Burlingame *General Plan Circulation Element* (adopted by the City Council on October 1969) which recommended a railroad grade separation at Broadway. In addition, the project would accommodate the realigned, seven-lane Broadway overcrossing over US 101 that is currently under construction as part of the US 101/ Broadway Interchange Project and the City's Carolan Avenue Complete Street Project. The proposed project would also incorporate bicycle facilities in accordance with the City of Burlingame *Bicycle Transportation Plan* (as approved by City Council Resolution No. 91-2004 dated October 18, 2004).

The proposed project is also consistent with the San Mateo County Transportation Authority (SMCTA) *Grade Separation Program Footprint Study* (September 2009) which covers grade separation alternatives to replace seven existing at-grade crossings of Caltrain tracks (Broadway to Peninsula Ave) in the City of Burlingame. The study identified technical feasible alternatives but did not rank or prioritize alternatives.

The proposed project also assumes that the Broadway Caltrain Station will be included in the design.

7. ALTERNATIVES

Six Build alternatives and the No-Build were evaluated for the grade separation to determine conformance with the project's purpose and need. See Attachment B for plans and typical sections of the Build Alternatives. Engineering design features, construction staging, preliminary geotechnical conclusions/recommendations, hydrology and hydraulics, water quality, economic and community impact assessment, right-of-way and utilities associated with the Build Alternatives are discussed in this section.

Roadway Design Criteria

Roadway design criteria (lane widths, shoulder widths, sidewalk widths, taper lengths, stopping sight distance, etc.) are based on the latest edition of the **Caltrans' Highway Design Manual (HDM)** (last updated December 30, 2015) except for sag vertical curves. Sag vertical curves were designed for passenger comfort in lieu of headlight sight distance. The following roadway design assumptions were included as part of the design for all of the Build Alternatives:

- Through Lane Width = 12 feet
- Turning Pocket Lane Width = 11 feet
- Right Shoulder/Bike Lane Width = 5 feet
- Sidewalk Width = 6 feet
- Crosswalk Width = 10 feet
- Minimum Vertical Clearance over Roadway = 15 feet 6 inches[1]
- Minimum Vertical Curve Length = 50 feet
- Roadway profile grades of 4.8% (maximum) were used, where feasible, to accommodate bicyclists and pedestrians.
- The crest vertical curves were based on a stopping sight distance of 150 feet (design speed of 25 mph).
- Structure depths assumed:
  i. Roadway over railroad: 4% x span length
  ii. Railroad over roadway: 8% x span length + 2.45 feet

Railroad Design Criteria

Railroad design assumptions were based on **Caltrain Design Criteria** and the California High-Speed Train Project technical memorandums **TM 1.1.21 – Typical Cross Sections for 15% Design,** and **TM 2.1.2 – Alignment Design Standards for High-Speed Train Operation.** The horizontal track geometry is designed for 90 mph and FRA Class 5 track standards.

The maximum continuous profile (vertical) grade along the main line track is 1%. At stations, a maximum level grade of 1% is used throughout the length of the platform.

The vertical clearance over the railroad from the top of rail to the bottom of the grade separation structure is 27'-0", which meets California High Speed Rail Authority's design standards.

Vertical curves of the rail were governed by the 80 mph design speed for freight. It is understood that a lower design speed for freight (60 mph) can be used during preliminary engineering, which will allow the preferred alternative to be refined.

Engineering Features

A detailed description of each alternative is presented in the following paragraphs along with a summary of the analysis performed to evaluate the alternatives.

[1] The roadway profiles developed for the alternatives conservatively used a minimum vertical clearance of 17 feet 6 inches per UPRR guidelines. This portion of the railroad is governed by Caltrain criteria and not UPRR guidelines and the proposed project will adopt 15 feet 6 inches for design.

Alternative A: Partially Elevate Railroad and Partially Depress Roadway

This alternative proposes to partially elevate the railroad approximately 12 feet (maximum) above existing ground and partially depress Broadway approximately 14 feet (maximum) below existing ground. The railroad would be raised for a length of approximately 7,300 feet (1.38 miles) from just north of Oxford Road to just north of Oak Grove Avenue. Broadway would be depressed for a length of approximately 730 feet.

The railroad structure over Broadway would be comprised of two spans with a total length of approximately 125 feet. The span over the westbound lanes would be slightly longer (67'-6") than the span over the eastbound lanes. This results in a structure depth of approximately 7.8 feet.

Broadway would be comprised of 4 westbound lanes, 3 eastbound lanes, a 5-foot wide Class II bike lane in each direction and an 8-foot wide sidewalk on each side of the roadway under the railroad structure. Retaining walls would be constructed on each side of the railroad in order to minimize impacts to adjacent local roads and properties. The profiles of Carolan Avenue and California Drive would be depressed to match the elevation of the depressed roadway along Broadway. Driveways to businesses would have to be modified also to match the elevation of the adjoining roadway.

The grades along Broadway, Carolan Avenue and California Drive would be a maximum of 4.8 percent to accommodate pedestrians. The grades along the railroad would be approximately 0.75 percent north of Broadway and 0.3 percent to 0.59 percent south of Broadway.

Alternative B: Partially Elevate Roadway and Partially Depress Railroad

This alternative proposes to partially elevate Broadway approximately 16 feet above existing ground and partially depress Broadway approximately 16 feet below existing ground. Broadway would be raised for a length of about 780 feet. The railroad would be depressed for length of approximately 7,550' (1.43 miles) from just north of Oxford Road to just north of Oak Grove Avenue.

The proposed 5-foot deep roadway structure would span a length of approximately 100 feet over the two mainline tracks and railroad right-of-way. The structure would have a total width of 112 feet which includes four westbound lanes, 4 eastbound lanes, one 5-foot wide bike lane in each direction and an 8-foot wide sidewalk on each side of the roadway. Retaining walls would be constructed on each side of the railroad in order to minimize impacts to adjacent local roads and properties.

The profiles of Carolan Avenue and California Drive would be elevated to match the elevation of the elevated roadway along Broadway. Driveways to businesses would have to be modified also to match the elevation of the adjoining roadway. Some business parcels would require full acquisition where the elevation differences are significant such as Mike Harvey Acura dealership at the northeast quadrant of the grade separation. Discussions of right of way impacts are found in this section under **Right-of Way** and in Section 8 under **Local Issues and Right-of-Way**.

The grades along Broadway, Carolan Avenue and California Drive would be a maximum of 4.8 percent to accommodate pedestrians. The grades along the railroad would be approximately 0.75 percent north of Broadway and 0.59 percent south of Broadway.

Alternative C: Railroad At-Grade and Depress Roadway

Alternative C proposes to maintain the railroad at the existing grade and depress Broadway below the railroad for a maximum excavation depth of approximately 28 feet. Broadway would be depressed for a length of 1,180 feet, which would require reconstruction of the intersections at Carolan Avenue, California Drive, Chula Vista Avenue, Rhinette Avenue and Cadillac Way.

The grades would range along Broadway from approximately 4.8 percent at the west approach to approximately 6 percent at the east approach of the separation. Grades along the reconstructed portions of Carolan Avenue, California Drive, Chula Vista Avenue, Rhinette Avenue and Cadillac Way would range from 1.5 to 4.8 percent.

The lowering and reconstruction of the intersections and roads would prohibit access from the existing driveways to numerous commercial and residential properties. This would result in the acquisition of nearly 40 parcels and 10 acres of land in total.

Alternative D: Railroad At-Grade and Elevate Roadway

Alternative D would maintain the railroad at the existing grade and elevate the roadway approximately 32 feet above the railroad with a vertical clearance of 27’-0” above the top of rail. Broadway would be elevated for a length of 1,310 feet, which would require reconstruction of the intersections at Carolan Avenue, California Drive, Chula Vista Avenue and Rollins Road. Other intersections requiring reconstruction include Juanita Avenue, Rhinette Avenue and Cadillac Way.

The grades along Broadway would be approximately 4.8 percent at both approaches of the separation. Grades along the reconstructed portions of Carolan Avenue, California Drive, Chula Vista Avenue, Rhinette Avenue and Cadillac Way would range from 2.0 to 4.8 percent.

The raising and reconstruction of the intersections and roads would prohibit access from the existing driveways to numerous commercial and residential properties. This would result in the acquisition of 45 parcels and nearly 13 acres of land in total.

Alternative E: Roadway At-Grade and Depress Railroad

Alternative E would maintain Broadway at the existing grade and depress the railroad approximately 32 feet below the roadway with a 27’-0” vertical clearance from the bottom of the 5-foot deep roadway structure. The railroad would be depressed for a length of approximately 10,800 feet (2.04 miles) from just north of Dufferin Avenue to just north of Burlingame Avenue. Retaining walls on each side of the tracks would be constructed to minimize impacts to local roads and adjacent properties.

The grades along the railroad would be approximately 1.0 percent at both approaches of the separation.

Alternative F: Roadway At-Grade and Elevate Railroad

Alternative F would maintain the Broadway at the existing grade and raise the railroad approximately 25 feet above Broadway. The railroad would be raised for a length of approximately 9,350' (1.77 miles) from north of Dufferin Avenue to just north of Oak Grove Avenue. Retaining walls on each side of the tracks would be constructed to minimize impacts to local roads and adjacent properties.

The grades along the railroad would be approximately 1.0 percent at the north approach and 0.75 percent at the south approach of the separation.

Alternative G: No Build

Alternative G proposes no grade separation improvements within the project limits. The at-grade railroad crossing would remain as it exists today.

Construction Staging

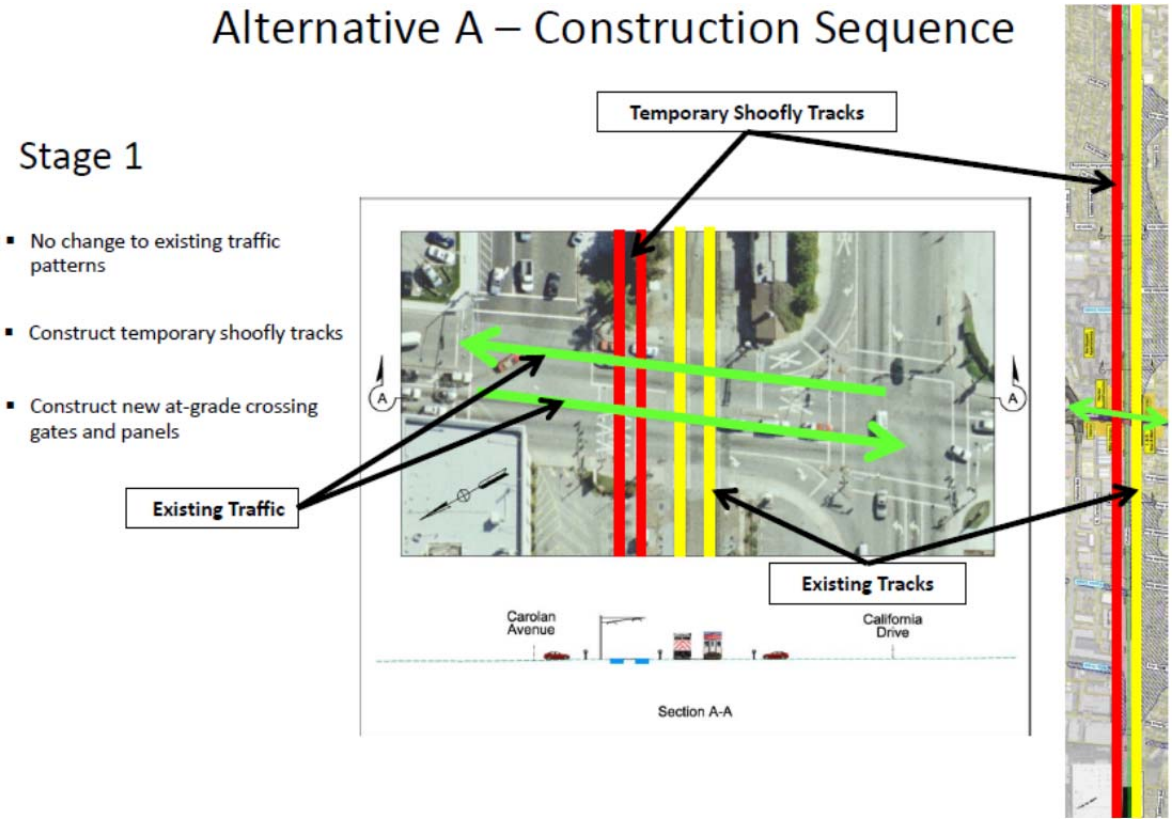
In order to minimize disruption to the traveling public, it is anticipated that the Broadway Grade Separation Project would be constructed in stages. The precise timing and limits of each construction stage may vary. Construction of the grade separation will require temporary shoofly tracks around the limits of the construction zone in order to maintain train service under all Build alternatives except for Alternative D.

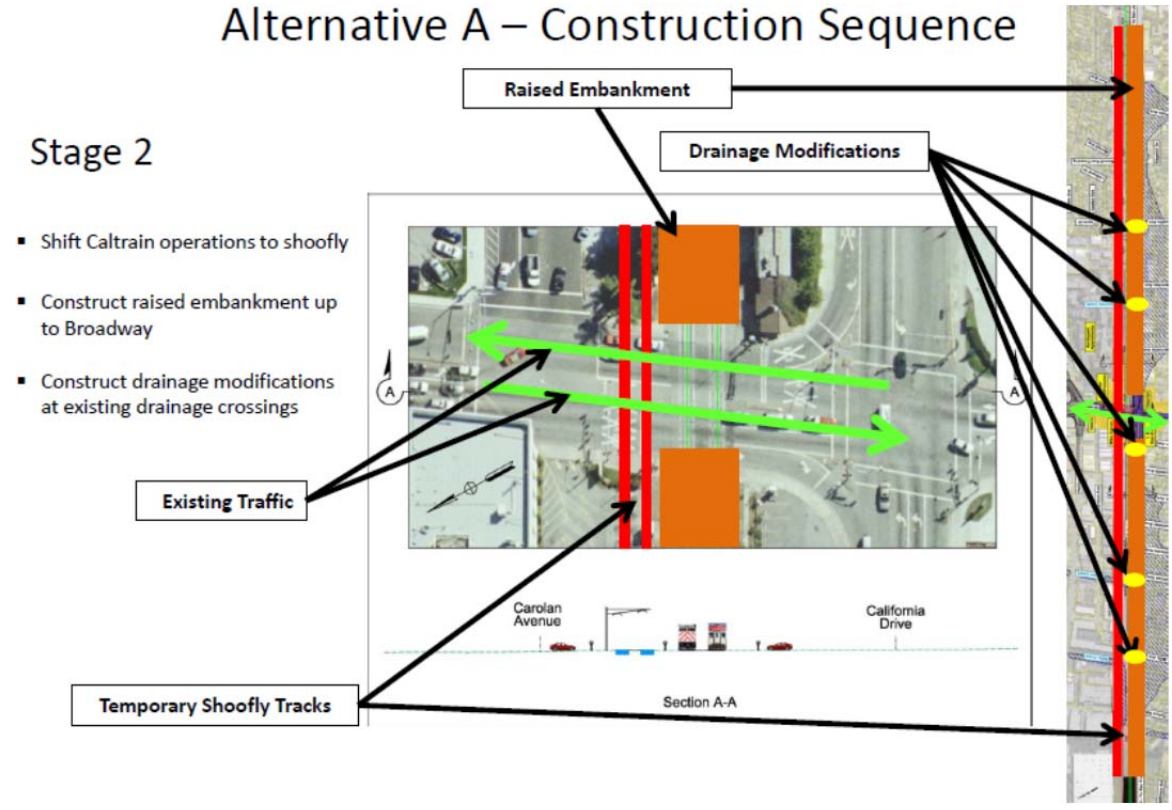
The shoofly tracks will include a temporary at-grade crossing at Broadway. Retaining walls and/or temporary shoring would be used, where required, to prevent any conflicts between the construction activities of the track structures and the active shoofly tracks.

Traffic handling of vehicular traffic on Broadway, Carolan Avenue and California Drive would be evaluated for each of the alternatives. Existing turning movements, access to existing properties would need to be considered and maintained to the greatest extent possible.

The following diagrams present construction staging concepts evaluated for Alternatives A and B, respectively.

ALTERNATIVE A STAGING CONCEPT

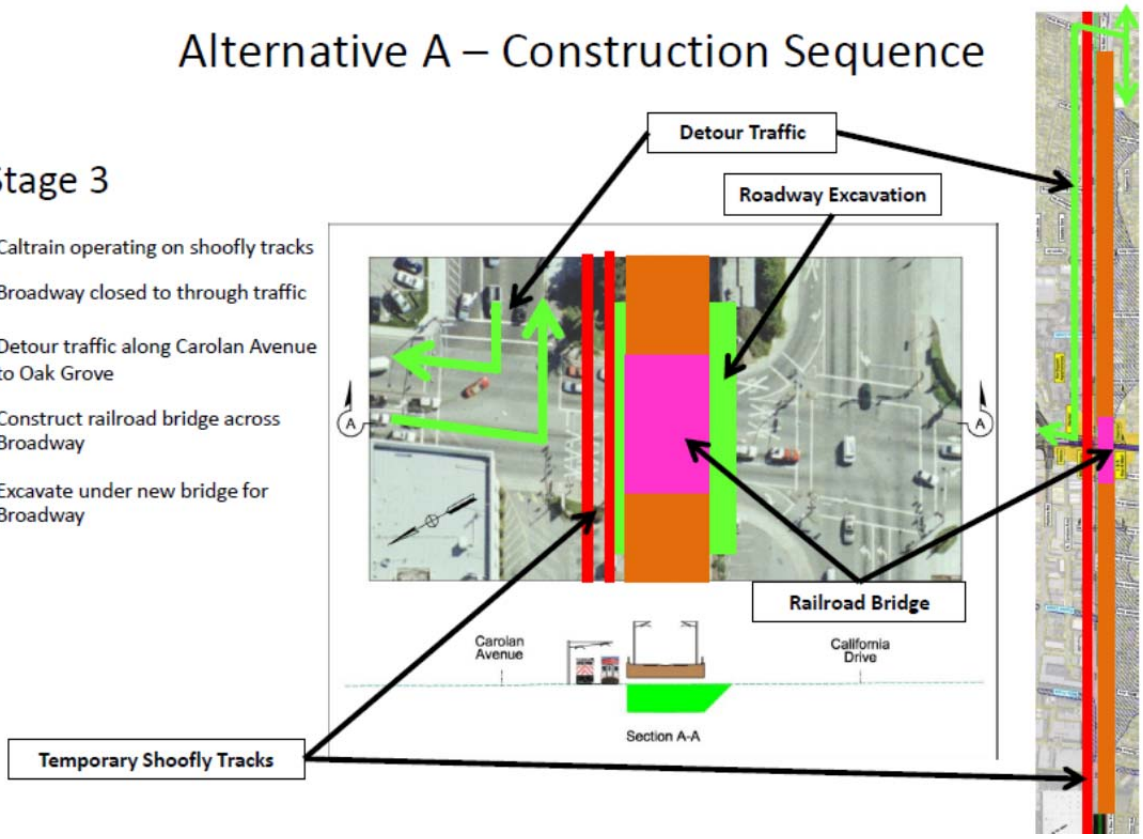




Alternative A – Construction Sequence

Stage 3

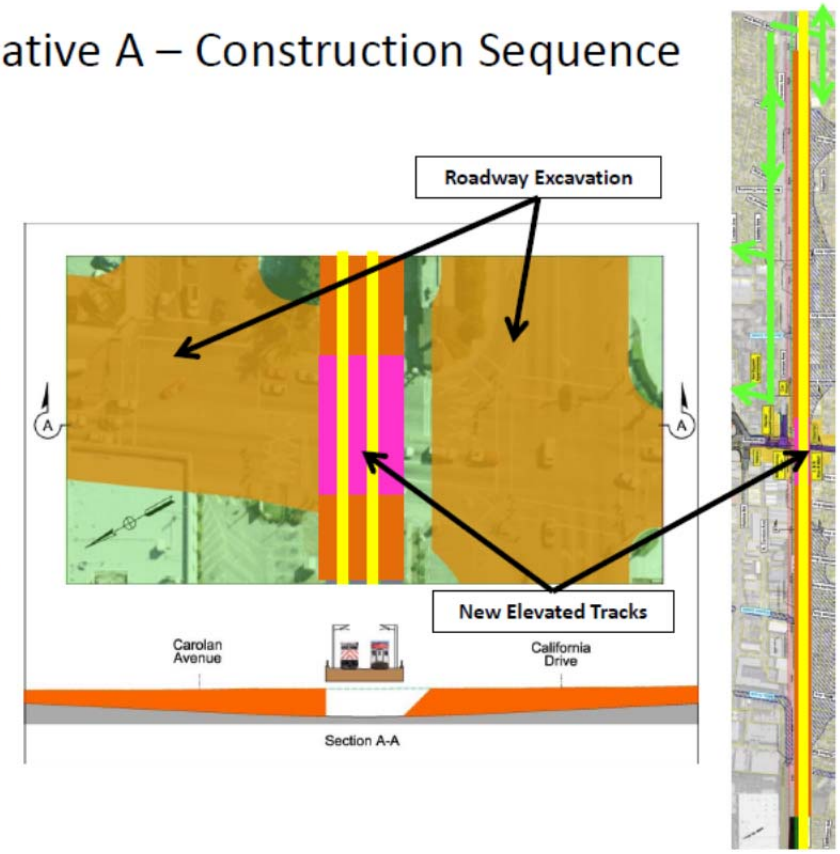
- Caltrain operating on shoofly tracks
- Broadway closed to through traffic
- Detour traffic along Carolan Avenue to Oak Grove
- Construct railroad bridge across Broadway
- Excavate under new bridge for Broadway



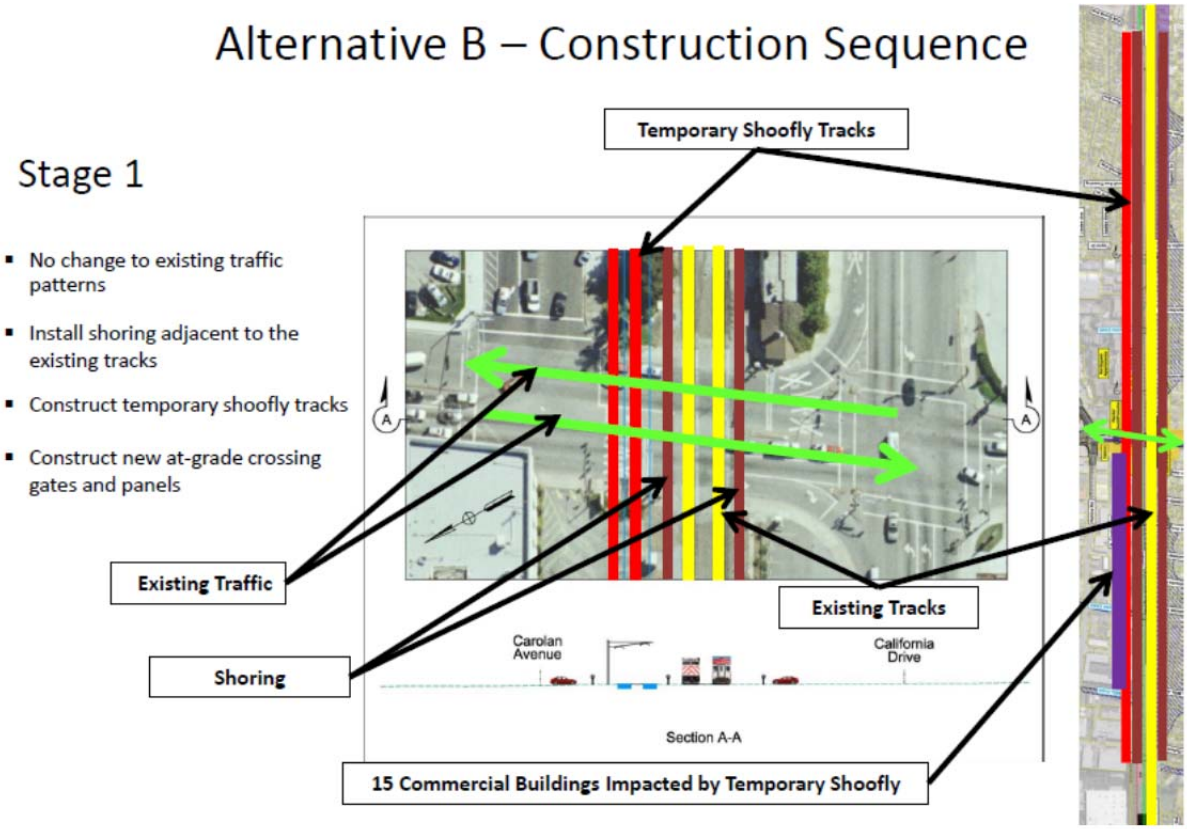
Alternative A – Construction Sequence

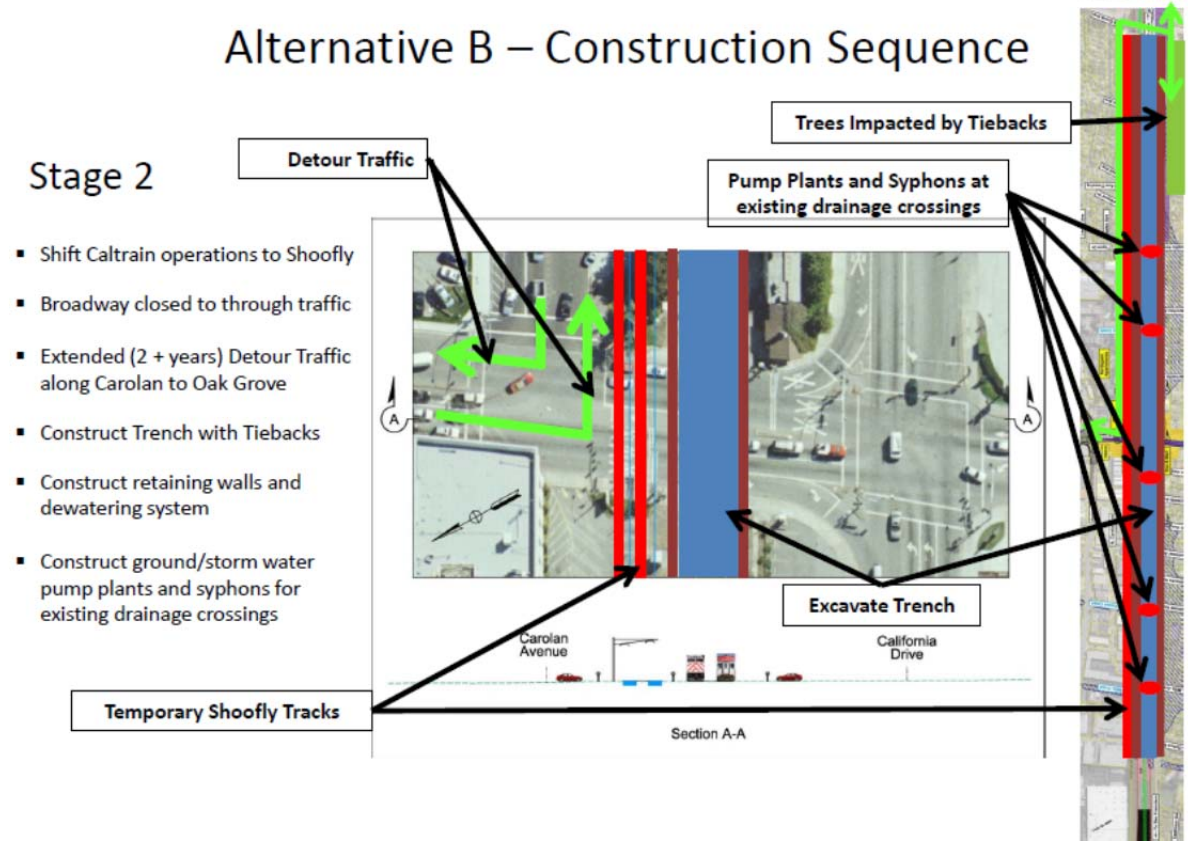
Stage 4

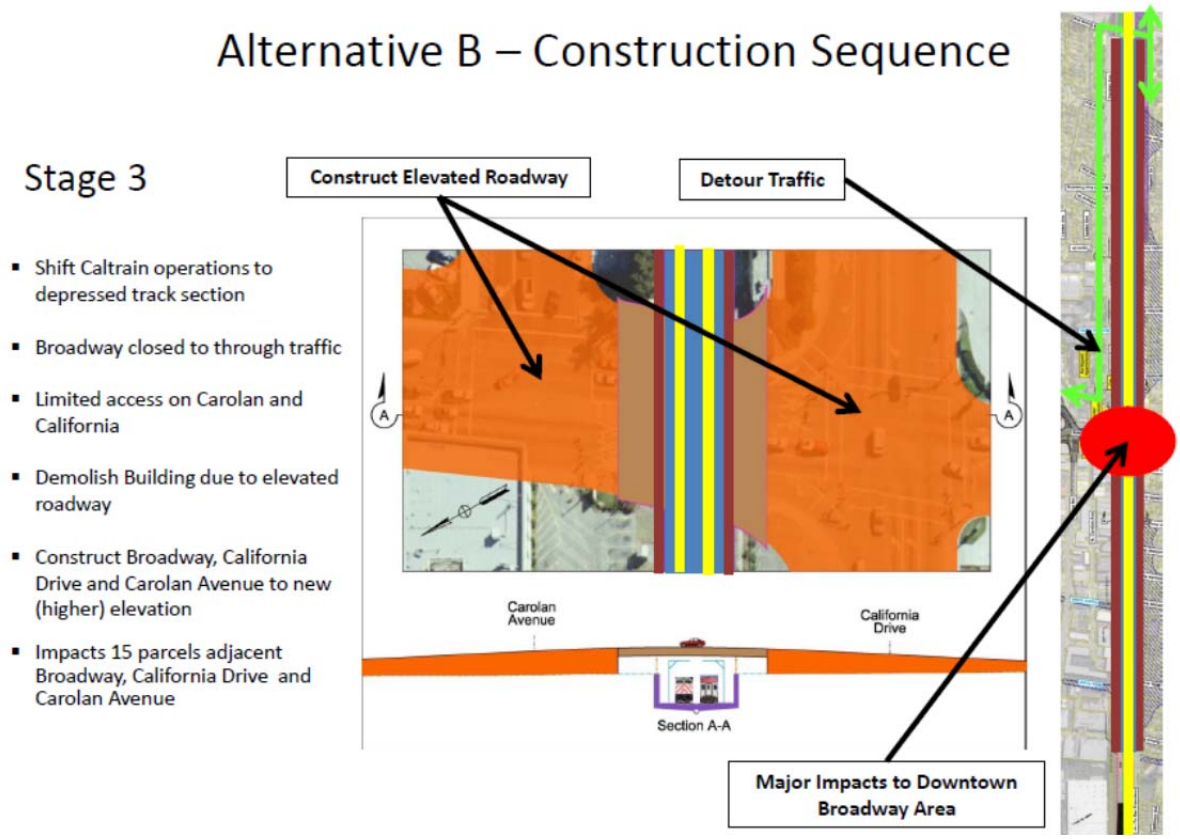
- Shift Caltrain operations to elevated track
- Broadway closed to through traffic
- Limited access on Carolan Avenue and California Drive
- Detour shifted to Cadillac Way and/or Toyon Drive
- Construct Broadway, California Drive, and Carolan Avenue to new (lower) elevation



ALTERNATIVE B STAGING CONCEPT







The construction duration for Alternative A is anticipated to be 2 years. The construction duration for Alternative B is anticipated to be 4 years. The duration of closure of Broadway during construction is anticipated to be 1 to 3 months for Alternative A, and 18 to 24 months for Alternative B.

Geotechnical

A *Preliminary Geotechnical Report (PGR)* (May 2015) was prepared by AECOM to present potential geological and geotechnical hazards for the proposed project. The following is a summary of preliminary geotechnical conclusions and recommendations to the Project and Build Alternatives:

- Surface rupture due to faulting at the site is not expected to occur.
- Proximity to the San Andreas Fault creates a high risk for strong ground shaking from fault movement.
- Site materials are not considered susceptible to landslides.
- The site vicinity generally contains soils with moderate to very high liquefaction susceptibility. Detailed liquefaction evaluation and potential for cyclic densification of unsaturated fill soils should be completed at planned foundation locations of the depressed or elevated structures and associated retaining walls.
- Potential for lateral spreading is considered low;
- Impact of consolidation settlement due to fill placement should be considered during the design phase due to the potential presence of soft bay clays and history of surface subsidence.

- Analysis of compaction settlement due to strong ground shaking should be completed during the design phase to determine mitigation measures through appropriate foundation design and ground improvements.
- General soil conditions should be capable of supporting a standard embankment slope inclination of 2:1 (H:V), 20 to 30 feet high, but impact of potentially liquefiable soils on embankment stability during earthquakes should be evaluated during the design phase.
- Temporary cut slopes in the existing embankment fills should not exceed 1.5:1 during construction. Where excavation with sloping sides is not viable, or in areas where temporary slopes steeper than 1.5:1 are planned, shoring will be required.
- Dewatering may be required where foundation excavations for the support of overcrossing, underpass and/or depressed structures will likely encounter groundwater. Additional evaluation of construction dewatering should be included during the design phase depending on the Build Alternative selected.
- Future field exploration should include borings or cone penetration test (CPT) per support of any bridge structure, along the alignment of any proposed earth retaining systems and along the alignment to investigate new roadway pavement or track subgrade.

Hydrology and Hydraulics

A preliminary *Hydrology and Hydraulics Report* (November 2015) was prepared by WRECO for the Project Alternatives. Under all Build Alternatives, the flow pattern along the Caltrain alignment, Broadway and adjacent streets would change due to the grade separation; however, the grade changes are expected only near the grade separation. With the use of pump stations, where necessary, the general flow pattern for all of the Build Alternatives will be maintained.

Because the project is located in both Caltrain and the City's right-of-way, the drainage design and calculations would be based on design criteria by Caltrain and the City depending upon location of the proposed drainage facilities.

Existing runoff from the Caltrain tracks drains into ditches adjacent to the tracks and then to the three creek crossings: Mills Creek, Easton Creek and Sanchez Creek, within the project site and ultimately to the Bay. The existing runoff from the local streets are intercepted by inlets and conveyed by underground storm drain pipes and open channels into the various culverts crossing the Caltrain tracks.

All Build Alternatives would require drainage improvements. **Table 7-2** provides a summary of drainage improvements for each Build Alternative and approximate construction costs for these improvements.

Table 7-2: Proposed Drainage Improvements and Approximate Costs		
ALTERNATIVE	**PROPOSED DRAINAGE IMPROVEMENTS**	**APPROXIMATE DRAINAGE CONSTRUCTION COST**
A - Partially Elevate Railroad and Partially Depress Roadway	- New track drainage within project limits which include inlets and pipes - New drainage systems along Broadway, California Drive and Carolan Ave within limits of lowering Broadway profile. - Pump station potentially required at California Drive (may require additional right-of-way) - Modifications to drainage system on Broadway and Rollins Road - Modifications to drainage system on the corner of Carolan Ave and Cadillac Way - Temporary creek diversion system required	$7,500,000
B - Partially Elevate Roadway and Partially Depress Railroad	- Extensive pump stations required at all three creek crossings and low point of the track along the Caltrain alignment (will require several agency permits, may require additional right-of-way). High maintenance costs are associated with pump stations. - New track drainage within project limits which include inlets and pipes (may require additional right-of-way). - Modifications to existing drainage systems along Broadway, California Drive and Carolan Avenue - Modifications to drainage system on Broadway and Rollins Road - Modifications to drainage system on the corner of Carolan Ave and Cadillac Way - Temporary creek diversion system required	$32,100,000
C - Railroad At-Grade and Depress Roadway	- New and modified drainage systems along Broadway, California Drive, Carolan Ave, Cadillac Way, Chula Vista Ave, Laguna Ave and Rhinette Ave - Pump station potentially needed at California Ave (may require additional right-of-way) - Potential modifications to drainage system at the corner of Carolan Ave and Cadillac Way. - Modifications to drainage system at Broadway and Rollins Road intersection.	$7,200,000
D - Railroad At-Grade and Elevate Roadway	- New and modified drainage systems along Broadway, California Drive, Chula Vista, Carolan Ave, Laguna Ave, Juanita Ave, Rhinette Ave - Modifications to drainage system on the corner of Carolan Ave and Cadillac Way - Modifications to drainage system on Broadway and Rollins Road intersection	$1,170,000

Table 7-2: Proposed Drainage Improvements and Approximate Costs		
ALTERNATIVE	**PROPOSED DRAINAGE IMPROVEMENTS**	**APPROXIMATE DRAINAGE CONSTRUCTION COST**
E - Roadway At-Grade and Depress Railroad	- Extensive pump stations required at all three creek crossings and low point of track along Caltrain alignment (will require several agency permits, may require additional right-of-way). Higher lift than Alt B increases pump station costs. High maintenance costs involved with pump stations. - New track drainage within project limits which include inlets and pipes (may require additional right-of-way). - Temporary creek diversion system required	$41,000,000
F - Roadway At-Grade and Elevate Railroad	- Modifications to track drainage within project limits. - Temporary creek diversion system required.	$750,000
G – No Build	- None.	N/A

As indicated above, extensive pump stations would be required for Alternatives B and E. High construction, operation and maintenance costs are associated with these pump stations. Alternatives A and C would likely require a pump station for drainage at the low point on Broadway, but it will not be as extensive and costly compared to the ones needed for Alternatives B and E. Detailed analysis on size and type of pump would be determined in the design phase of the selected alternative. Operation and maintenance (O&M) costs for the pump station are not included in the values shown in **Table 7-2**. These costs include power, labor and maintenance. The pump station costs for the three creek crossings and low point under Alternative E are higher than Alternative B due to the higher amount of lift required.

Work within the creeks will require several agency permits which include, but not limited to, California Department of Fish and Game (CDFG), US Army Corps of Engineers (USACE), and San Francisco Bay Regional Water Quality Control Board (SFBRWQCB).

Groundwater levels encountered in the vicinity of the project site are relatively shallow (Elevation +1 to 8 feet). Foundation excavations for the support of the overcrossing, underpass and/or depressed structures will likely encounter groundwater. Dewatering may be necessary depending on the Build Alternative selected and a comprehensive evaluation of construction dewatering should be included as part of the field investigations during the design phase.

Preliminary floodplain risk assessment was conducted using Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) Maps for San Mateo County and Incorporated Areas. See Attachment C for FIRM Maps for San Mateo County and Incorporated Areas. **Table 7-3** summarizes potential impacts on the floodplain for each Build Alternative. In general, where the project encroaches on flood

zones, particularly at the creek crossings, detailed hydraulic analysis would be needed to determine if the encroachment would result in any increase in the Base Flood Elevations (BFEs) within the creek as well as to determine the actual increase in BFEs. This applies to all Build Alternatives except for Alternative C. In general, an increase in BFE would result in a change of the FIRM Maps, which may increase the flood risk and insurance premiums for the neighborhood within the base floodplain.

Table 7-3: Floodplain Risk Assessment Summary

ALTERNATIVE	POTENTIAL PROJECT IMPACTS ON FLOODPLAIN
A - Partially Elevate Railroad and Partially Depress Roadway	- Proposed retaining wall on north side of Caltrain alignment would result in transverse encroachment on the Zone A at the Easton Creek crossing which would increase the BFE and flood risk which may increase the flood insurance premiums for the neighborhood within the flood plain. - Proposed roadway modifications would encroach on Zone AH southeast of Broadway, but roadway modifications would likely result in cut to the floodplain and the BFE is not anticipated to increase.
B - Partially Elevate Roadway and Partially Depress Railroad	- High risk for flooding if pump stations fail during storm event. - Proposed retaining wall on north side of Caltrain alignment would result in transverse encroachment on the Zone A at the Easton Creek crossing which would increase the BFE and flood risk which may increase the flood insurance premiums for the neighborhood within the flood plain. - Roadway modifications would likely result in fill to the floodplain which would potentially raise the BFE in this area. - Proposed roadway modifications would encroach on Zone AH southeast of Broadway.
C - Railroad At-Grade and Depress Roadway	- Proposed roadway depression would encroach on Zone AH southeast of Broadway - Proposed roadway modifications would encroach on Zone AH southeast of Broadway, but roadway modifications would likely result in cut to the floodplain and the BFE is not anticipated to increase.
D - Railroad At-Grade and Elevate Roadway	- Proposed roadway elevation would encroach on Zone AH southeast of Broadway. - Roadway modifications would likely result in fill to the floodplain which would potentially raise the BFE in this area.
E - Roadway At-Grade and Depress Railroad	- High risk for flooding if pump stations fail during storm event. - Proposed retaining wall on the north side of the Caltrain alignment would result in transverse encroachment on Zone A at the Easton Creek crossing which would increase the BFE and flood risk which may increase the flood insurance premiums for the neighborhood within the flood plain.
F - Roadway At-Grade and Elevate Railroad	- Proposed retaining wall on the north side of the Caltrain alignment would result in transverse encroachment on Zone A at the Easton Creek crossing which would increase the BFE and flood risk which may increase the flood insurance premiums for the neighborhood within the flood plain.
G – No Build	- None.

Water Quality

Based on the San Mateo Countywide C.3 Stormwater Technical Guidance, the project is exempt for hydromodification requirements. In addition, stormwater treatment may be required depending on the amount of added and/or replaced impervious area for the Build Alternative.

Economic and Community Impact Assessment

The economic and community impact (ECI) assessment was prepared by AECOM which provided an initial and high-level analysis of the potential costs and benefits of the proposed project. The baseline conditions for the study area were identified and used to determine the net impacts of each Build Alternative. The proposed project's benefits were based on the expected changes in traffic and related conditions compared to the "No Build" baseline conditions. The analysis monetized the value of the impacts using accepted economic analysis approaches and standard values. Monetized project benefits of the Build Alternatives include shorter time travels, decreased fuel use, air quality improvements, and reductions in traffic-related accidents.

In addition, the alternatives were evaluated qualitatively for comparison purposes and the impacts were categorized into four basic impact groups: users, environmental, local and right-of-way, and railroad operations. Each impact was rated using a rating system into one of the following six categories: significant improvement, no improvement, minimal improvement, moderate impact, severe impact, or fatal flaw. Overall, the fully depressed/elevated rail or roadway alternatives (Alternatives C, D, E, and F) would have the most severe adverse impacts.

An evaluation of the Build Alternatives, based on this rating system, is described in more detail in Section 8 of this report. A detailed comparison of Alternatives A and B are also presented in Section 8.

Right-of-Way

The right-of-way requirements vary depending on the alternative. The proposed Build Alternatives would require permanent and temporary right-of-way, and business relocations for construction of the grade separation. Alternatives C and D would also require residential relocations. The right-of-way impacts and acquisitions are shown in the plans in Attachment B and associated costs are shown in Attachment E for each Build Alternative. Right-of-way impacts are defined as requiring modifications to a driveway or sidewalk to access the property, due to the roadway and/or track work. Full or partial acquisition may not be required. Right-of-way takes are associated with a full or partial acquisition of the property due to the roadway and/or track work.

Estimate of right-of-way costs were based on the following:

- Right of way acquisitions:
  $5M* per acre
- Right of way impacts (temporary construction easements, driveway modifications, etc.):
  $1M per acre
- Right of way easements from SMCTA, Caltrain or City/County of San Francisco:
  No cost to project
- Contingencies: 50%

  * The lone exception is the parcel of the Mike Harvey Acura dealership. Based on a recent (2016) appraisal of the building on this parcel, the acquisition cost was estimated at $24M per acre.

Table 7-4 summarizes the potential right-of-way impacts related to number of parcels with takes, total acres and type of right of way impact (full/partial takes, Temporary Construction Easements (TCE's) for each Alternative.

Table 7-4: Potential Right-Of-Way Impacts

ALTERNATIVE	# PARCELS with R/W TAKES (TOTAL ACRES)	POTENTIAL RIGHT-OF-WAY IMPACTS
A - Partially Elevate Railroad and Partially Depress Roadway	4 (0.1 acres)	- Permanent easement from SMCTA (Auto Pride Hand Car Wash and Gas Station at the southeast quadrant of separation) - Partial take and temporary construction easement (TCE) of Valero Gas Station and TCE of Mike Harvey Acura at northeast quadrant of separation. - Partial take and TCE of Rector Audi/Porsche at southeast quadrant of separation - Partial take and TCE of A&A Gas and Mart, TCEs of Goodwill and multi-use commercial building at the northwest quadrant of separation - Partial take and TCE of Chevron Gas Station, TCEs of First Republic and Wells Fargo banks at the southwest quadrant of separation - Permanent easements from Caltrain and the City/County of San Francisco - Partial encroachment on Caltrain parking lot; removal of parking spaces within Caltrain's Broadway Station parking lots at northwest and southwest quadrants of separation
B - Partially Elevate Roadway and Partially Depress Railroad	8 (2.6 acres)	- Full take of Mike Harvey Acura at the northeast quadrant of separation - Permanent easement from SMCTA (Auto Pride Hand Car Wash and Gas Station at the southeast quadrant of separation) - Full takes of A&A Gas and Mart and Goodwill and TCE of multi-use commercial building at the northwest quadrant of separation - Full takes of Chevron Gas Station and First Republic Bank, and TCEs of Wells Fargo Bank and multi-use commercial buildings at the southwest quadrant of separation - Partial take and TCE of Valero Gas Station northeast quadrant of separation. - Partial take and TCE of Rector Audi/Porsche at southeast quadrant of separation - Permanent easements from Caltrain and the City/County of San Francisco - Partial encroachment on Caltrain parking lot; removal of parking spaces within Caltrain's Broadway Station parking lots at northwest and southwest quadrants of separation

Table 7-4: Potential Right-Of-Way Impacts		
ALTERNATIVE	**# PARCELS with R/W TAKES (TOTAL ACRES)**	**POTENTIAL RIGHT-OF-WAY IMPACTS**
C - Railroad At-Grade and Depress Roadway	33 (8.3 acres)	- Full takes of Valero Gas Station and Mike Harvey Acura at northeast quadrant of separation. - Full take of Rector Audi/Porsche and TCE of Northpark Apartments at southeast quadrant of separation - Permanent easement from SMCTA (Auto Pride Hand Car Wash and Gas Station at the southeast quadrant of separation) - Full takes of A&A Gas and Mart, Goodwill and multi-use commercial building at the northwest quadrant of separation - Full take and TCEs of commercial and residential properties fronting Rhinette Avenue and TCEs of commercial property fronting California Drive at northwest quadrant of separation - Full takes of Chevron Gas Station, First Republic Bank, three commercial parcels, and TCEs of two commercial buildings at the southwest quadrant of separation fronting California Ave - Full takes of Wells Fargo and four commercial parcels, and TCEs of four commercial parcels fronting Chula Vista Avenue and full take of one commercial parcel fronting Broadway at the southwest quadrant of separation - Permanent easements from Caltrain and the City/County of San Francisco - Partial encroachment on Caltrain parking lot; removal of parking spaces within Caltrain's Broadway Station parking lots at northwest and southwest quadrants of separation

Table 7-4: Potential Right-Of-Way Impacts		
ALTERNATIVE	**# PARCELS with R/W TAKES (TOTAL ACRES)**	**POTENTIAL RIGHT-OF-WAY IMPACTS**
D - Railroad At-Grade and Elevate Roadway	40 (11.1 acres)	- Full takes of Valero Gas Station, Mike Harvey Acura and industrial buildings, and TCEs of commercial parcels at northeast quadrant of separation. - Full take of Rector Audi/Porsche and TCE of Northpark Apartments at southeast quadrant of separation - Permanent easement from SMCTA (Auto Pride Hand Car Wash and Gas Station at the southeast quadrant of separation) - Full takes of A&A Gas and Mart, Goodwill and multi-use commercial building and TCE of commercial property fronting Broadway at the northwest quadrant of separation - Full takes and TCEs of commercial and residential properties fronting Rhinette Avenue, California Drive an d Juanita Ave at northwest quadrant of separation - Full takes of Chevron Gas Station, First Republic Bank, and five commercial parcels, and TCEs of three commercial parcels fronting California Ave at the southwest quadrant of separation - Full takes of Wells Fargo and five commercial parcels, TCEs of two commercial parcels fronting Chula Vista Avenue, and TCE of commercial parcel fronting Broadway at the southwest quadrant of separation - Permanent easements from Caltrain and the City/County of San Francisco - Partial encroachment on Caltrain parking lot; removal of parking spaces within Caltrain's Broadway Station parking lots at northwest and southwest quadrants of separation
E - Roadway At-Grade and Depress Railroad	4 (0.1 Acres)	- Partial take of Valero Gas Station at northeast quadrant of separation. - Partial take of Rector Audi/Porsche at southeast quadrant of separation - Permanent easement from SMCTA (Auto Pride Hand Car Wash and Gas Station at the southeast quadrant of separation) - Partial take of A&A Gas and Mart - Partial take of Chevron Gas Station - Permanent easements from Caltrain and the City/County of San Francisco - Partial encroachment on Caltrain parking lot; removal of parking spaces within Caltrain's Broadway Station parking lots at northwest and southwest quadrants of separation

Table 7-4: Potential Right-Of-Way Impacts		
ALTERNATIVE	**# PARCELS with R/W TAKES (TOTAL ACRES)**	**POTENTIAL RIGHT-OF-WAY IMPACTS**
F - Roadway At-Grade and Elevate Railroad	4 (0.1 Acres)	- Partial take of Valero Gas Station at northeast quadrant of separation. - Partial take of Rector Audi/Porsche at southeast quadrant of separation - Permanent easement from SMCTA (Auto Pride Hand Car Wash and Gas Station at the southeast quadrant of separation) - Partial take of A&A Gas and Mart - Partial take of Chevron Gas Station - Permanent easements from Caltrain and the City/County of San Francisco - Partial encroachment on Caltrain parking lot; removal of parking spaces within Caltrain's Broadway Station parking lots at northwest and southwest quadrants of separation
G – No Build		- None.

Utilities
Utilities within the project limits include:

- 12-inch Water
- Wave Broadband TV
- Comcast Overhead Cable
- Comcast TV Underground
- Comcast Fiber Optic
- 16 kV PG&E Overhead Electrical
- 16 kV and 21 kV PG&E Underground Electrical
- PG&E Gas
- Verizon and Sprint Underground Telecommunication and Fiber Optic Lines
- XO Underground Fiber Optic
- CenturyLink Fiber Optic
- Zayo Underground Telecommunication
- Sanitary Sewer
- AT&T Cable
- Caltrain's Positive Train Control (PTC) Fiber Optic Line

Depending on the Build Alternative, these utilities will be impacted by the Project. Utility location (Potholing) will be conducted during the PA&ED phase to determine the exact location of the utilities. A summary of utility relocations and costs are included under Attachment D.

8. ALTERNATIVES EVALUATION AND RECOMMENDATION

Initial Evaluation

The six Build alternatives were initially presented at a public meeting on September 16, 2015. The alternatives were then evaluated based on impacts under the following major categories:

- Environmental
- Railroad Operations
- Users
- Local Issues and Right-of-Way

The team developed impact matrices and utilized a color-coded rating system based on qualitative and quantitative assessment of the specific impact. The color-coded system is shown below.

Impact Matrix Color Coding System

Significant Improvement
No Improvement
Minimal Impact
Moderate Impact
Severe Impact
Fatal Flaw

The results were presented at the January 19, 2016 Burlingame City Council and are displayed in the following matrices.

Environmental

Evaluation of environmental impacts included greenhouse gas emissions, air pollutants, noise, tree removal, historic structures and aesthetics.

Environmental

Alternatives F → A	F	E	D	C	B	A
Greenhouse Gas Emissions						
Criteria Air Pollutants						
Noise						
Tree Removal						
Historic Structures						
Aesthetics						

Alternative F has severe impacts to noise and aesthetics due to the height of the rail above ground level. In addition, Alternative D has severe impacts with regards to aesthetics

because the roads would have to be elevated more than 30 feet above the existing terrain. Alternative E has a severe impact to historic structures because the shoofly needed for construction would impact the existing structures at the Burlingame Train Station.

Railroad Operations

The evaluation of railroad operations included service outage during construction, closure of the Burlingame Station, Caltrain and BART operational impacts, long-term maintenance, accommodation of a future station at Broadway, accommodation of Caltrain electrification, accommodation of the future High Speed Rail (HSR) and the capability to maintain the pedestrian crossing at Morrell Avenue. Caltrain and BART operational impacts include a variety of elements such as, impacts to Caltrain's Millbrae Station and impacts to BART's facilities at the north end of the project and the need for a bus bridge during construction due to temporary closure of Caltrain's Burlingame Station.

Railroad Operations

Alternatives F → A	F	E	D	C	B	A
Service Outage During Construction						
Burlingame Station Closure						
Caltrain and BART Operations						
Long Term Maintenance						
Accommodates Broadway Station						
Caltrain Electrification						
Accommodates HSR						
Existing Pedestrian Xing at Morrell						

In general, Alternatives E and F have severe and fatal flaw impacts related to railroad operations. These impacts include temporary impacts to Caltrain operations during construction related to the control point signals, turnouts, crossovers and derailleurs between Broadway and the Millbrae Station. Alternatives E and F also impact BART's facilities at the north end of the project due to construction of the shoofly tracks.

The shoofly tracks for Alternative E also result in a temporary closure of Caltrain's Burlingame Station in the northbound direction, requiring temporary bus service between the San Mateo and Millbrae stations; creating an inconvenience to the public and potential loss in ridership and revenue for Caltrain.

Users

Evaluation of user impacts included safety, community connectivity, pedestrian and bicycle access, fuel use, reliability of the facility, and traffic delays during and after construction.

Users

Alternatives F → A	F	E	D	C	B	A
Safety						
Community Connectivity						
Pedestrian & Bike Access						
Fuel Use						
Reliability						
Traffic Delays (During Construction)						
Traffic Delays (After Construction)						

Alternatives C and D have fatal flaws related to traffic delays during construction, because Broadway would require long-term closures and detours during construction. Detours and street closures would adversely affect traffic operations along the local streets.

Local Issues and Right-of-Way

Evaluation of impacts to local issues and right-of-way included parcels with potential right-of-way impacts (i.e., driveway or sidewalk access relocation or reconstruction), parcels with right-of-way acquisitions (partial or full), traffic in local neighborhoods, business and resident disruption during construction, existing utility infrastructure, flooding and groundwater issues.

Local Issues and Right-of-Way

Alternatives F → A	F	E	D	C	B	A
Parcels with Potential R/W Issues	0	0	16	12	10	13
Parcels with R/W Takes	4 (0.1 Acres)	4 (0.1 Acres)	40 (11.1 Acres)	33 (8.3 Acres)	8 (2.6 Acres)	4 (0.1 Acres)
Traffic in Local Neighborhoods						
Business Disruption (During Construction)						
Resident Disruption (During Construction)						
Existing Utility Infrastructure						
Flooding & Groundwater Issues						

Alternatives C and D have fatal flaws regarding business and resident disruption during construction. Both alternatives require closure of Broadway and adjoining streets during construction which would adversely impact business and residential access. In addition, Alternatives C and D have the highest number of parcels with right of way acquisitions (partial and full), and the total acreage of these acquisitions is significant compared to the other alternatives.

Summary of Impacts
Based on the degree of impacts evaluated in the above major categories, an impacts summary was developed and is shown below.

Impacts Summary

Alternatives F → A	F	E	D	C	B	A
Environmental						
Railroad Operations						
Users						
Local & Right-of-Way Issues						
Order of Magnitude Cost	$495M	$910M	$370M	$345M	$465M	$250M

The summary results indicated that four of the six alternatives, Alternatives C through F, had fatal flaw impacts, and were rejected from further study. Alternatives E and F had severe to fatal flaw impacts regarding environmental, railroad operations and total cost. Additional discussions regarding costs are included in Section 11 - Funding. Alternatives C and D had severe impacts to users and fatal flaw impacts for local and right of way issues due to traffic, business and residential impacts with the anticipated closure of Broadway during construction as well as a significant number of right of way acquisitions. Alternatives A and B were the only alternatives without fatal flaws.

Final Evaluation and Recommendation
As indicated above, Alternatives A and B were the only two alternatives without fatal flaws and were selected for further evaluation to determine the preferred alternative. The team developed a comparison matrix based on the following project issues:

- Visibility of train from local roads
- Impacts to downtown Broadway
- Inconvenience during construction with local roadway closures
- Construction duration
- Potential for flooding and Caltrain service disruption
- Long-term maintenance impacts and costs
- Right-of-way impacts
- Acceptance by Caltrans
- Order of Magnitude Cost

In addition, photo simulations and 3D animations were prepared and presented to the community to help clarify the design and project issues. The photo simulations are provided under Attachment G and the 3D animations can be found on the City's website at http://www.burlingame.org/broadwaygradesep.

Results of the comparison and justification for the preferred alternative are indicated in the following matrix.

Alternatives A and B Comparison

Project Issues/Concerns	A	B
Visibility of Train from Local Roads		✓
Impacts to Downtown Broadway	✓	
Inconvenience during Construction with Local Roadway Closures	✓	
Construction Duration	✓	
Potential for Flooding & Caltrain Service Disruption	✓	
Long-Term Maintenance Impacts and Cost	✓	
Right-of-Way Impacts	✓	
Acceptance by Caltrain	✓	
Order of Magnitude Cost	**$250M**	**$465M**

Under almost all project issues, Alternative A has the clear advantage over Alternative B. The impacts to the Broadway Business District are greater in Alternative B than A because Alternative B would require full acquisitions of commercial properties. The closure duration of Broadway during construction is estimated to be 18 to 24 months for Alternative B compared to 1 to 3 months for Alternative A. Construction duration for Alternative B would be approximately 4 years while Alternative A would be approximately 2 years.

Alternative B is more susceptible to flooding due to the potential of pump station failure during a major storm event. This would result in flooding of the tracks, a disruption to train service and potential flooding of the residential and business districts west of California Drive. Furthermore, Alternative B has long term maintenance issues and costs associated with the pump stations, sewer and drainage syphons, and flooding.

In addition, Alternative B has 60-70% more initial costs (excluding long term maintenance) than Alternative A. Lastly, Caltrain prefers Alternative A because it minimizes construction impacts and risk to its operations, has less risk for flooding and has less long-term maintenance costs.

Public and City Council Support
Overall, the public and City Council are in support of Alternative A.

A total of 25 comment cards from the March 31, 2016 Public Meeting were received. The results showed twenty (20) supported Alternative A, two (2) supported Alternative B, and three (3) were in favor of the No-Build Alternative.

A petition was submitted during the March 31, 2016 Public Meeting. The petition was signed by 36 community members representing businesses along Broadway. The petition supported Alternative A.

During the Burlingame City Council Meeting on May 16, 2016, all five councilmembers voiced their support for Alternative A.

Recommendation

Based on the alternatives evaluation and support from the public and City Council, it is recommended that the project proceed with Alternative A for the environmental document and preliminary engineering design phase.

9. PUBLIC COORDINATION

Three public outreach workshops for the Project were held on March 11, 2015, September 16, 2015, and March 31, 2016. The proposed project alternatives were presented to the Burlingame City Council on January 19, 2016 and May 16, 2016.

Shortly prior to the March 31, 2016 outreach meeting, several questions were presented by the councilmembers. Answers to these questions were distributed to attendees at that meeting and later posted onto the City's website as "Frequently Asked Questions" (FAQs). These FAQs are included as Attachment F.

Alternative A was unanimously adopted as the preferred alternative by the Burlingame City Council during the May 16, 2016 meeting.

10. ENVIRONMENTAL DETERMINATION/DOCUMENT

A grade separation project is exempt from requirements of the California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA). A CEQA Statutory Exemption (SE) applies to any railroad grade separation project which eliminates an existing at grade crossing or reconstructs such a crossing (CEQA Statute 21080.13 for Railroad Grade Separation Projects, and the corresponding CEQA Guidelines Section 15282). The proposed project appears to meet the definition of this SE, making it exempt from CEQA. Caltrain will likely be the Lead Agency for this approval.

If the project involves federal transportation funding, NEPA includes Categorical Exemptions (CEs) that also may apply to this project. Caltrain or the Federal Railroad Administration would function as the Lead Agency approving the NEPA document, and would determine the appropriate documentation. A CE defined under (23 USC 326 (c)(28) is "Bridge rehabilitation, reconstruction, or replacement or the construction of grade separation to replace existing at-grade railroad crossings, if the actions meet the constraints in paragraph (e) of this section [771.117(e)]." The referenced constraints limiting the use of this NEPA CE include the acquisition of more than a minor amount of right-of-way or could result in a residence or non-residential displacement. Some, if not all, of the alternatives would require new right-of-way for the construction of the

temporary railroad shoofly, and acquisition of the property and relocation of the existing use (e.g., a gas station and a car wash). If Broadway is raised or lowered substantially, the design would require retaining walls and/or right-of-way take to accommodate the slopes and supporting embankments, or retaining wall structures, depending on the alternative and design. Alternatively, a NEPA CE under 23 CFR 771.117(d) could be considered, but use of this CE would require additional environmental review and documentation (technical studies or memos) to demonstrate that no substantial or significant impacts would occur. If a CE does not qualify for this project, the next appropriate environmental document would be an Environmental Assessment (EA) to support approval of a Finding of No Significant Impact (FONSI).

Key environmental studies to support a NEPA CE or an EA for this project would likely involve technical reports for cultural resources, biological resources, hazardous materials, noise, visual/aesthetics, and community impacts. Depending on the alternative, the project would require removal of trees and shrubs (non-native landscaping) along California Drive, Carolan Avenue, and/or Broadway. Right-of-way requirements could affect, or require acquisition of, local businesses and possibly some residences, again depending on the alternative design. Properties along California Drive, Carolyn Avenue, and Broadway near the tracks have records of leaking underground storage tanks, and although the investigative regulatory cases appear to be closed (completed), the previous leaks may have left residual contamination where further investigation is necessary prior to property acquisition or excavation. There are also records of previously identified cultural resource sites in proximity to the existing tracks that would require evaluation with respect to any proposed excavation.

The alternatives could involve excavation at Easton, Mills, and/or Sanchez creeks to accommodate a lowered railroad, specifically for Alternatives B and E. These drainages travel through box culverts, and concrete and open channels at the railroad and roadway crossings. Pump stations and creek diversions would be required, involving construction work within the creeks. Evaluation of the biological habitat at each crossing would be necessary, and regulatory permits may be required from the Army Corps of Engineers, US Fish and Wildlife Service, Regional Water Quality Control Board, and/or California Department of Fish and Wildlife.

The San Mateo Bay shoreline will be subject to future sea level rise, and several on-line mapping tools indicate the project area would be at risk at about 30 to 40 inches of sea level rise. The time frame for this to occur is subject to a wide range of assumptions, but should be considered during the next phase of project design with respect to design year, investment, and vulnerability of the facility, among other factors.

11. FUNDING

The current PSR-level phase of the project is funded through San Mateo County Transportation Authority's Measure A (voter-approved half-cent sales tax for countywide transportation projects and programs). The City intends to request additional Measure A and State grade separation funds in future programming years for subsequent milestones.

Capital Outlay Project and Support Estimate

Table 11-1 summarizes order of magnitude construction, right-of-way and support cost estimates for each Build Alternative. Capital outlay project cost estimates for each alternative are included in Attachment E.

Table 11-1: Capital Outlay Project and Support Estimate

Cost Estimate (Values shown in Millions)					
Alternative	**Construction**	**R/W & Utility**	**Support**	**Escalation**	**Total #**
A	$142.3	$15.5	$49.6	$42.6	$250
B	$232.3	$67.4	$84.5	$78.8	$465
C	$95.2	$148.8	$42.6	$58.8	$345
D	$80.9	$186.4	$39.8	$63.0	$370
E	$550.6	$13.5	$189.5	$154.7	$910
F	$293.0	$13.1	$100.9	$83.5	$495

Total rounded up to the nearest $5M.

The level of detail available to develop these capital outlay project estimates is only accurate to within the above ranges and is useful for long-range planning purposes only. According to the table above, Alternative A (Partially Elevate Railroad and Partially Depress Roadway) would have the lowest total capital costs, and Alternative E (Roadway At-Grade and Fully Depress Railroad) would have the highest total capital costs.

Capital Cost Factors

Typically, a longer development schedule may result in a higher final project cost from cost escalation effects and greater interest during construction incurred during the interim period before the project's completion. In addition, if properly managed, a shorter period of construction can reduce the disruption and adverse economic impacts from the construction activities on the local community and businesses.

Currently, two opportunities for potential substantial development cost savings have been identified:

- Project completion and/or coordination with Caltrain electrification may both eliminate/reduce some facility construction ($20-25M, including escalation and support costs) and reduce the overall construction period. However, as of January 2017, the opportunity window to construct this project in conjunction with or prior to Caltrain's Electrification Project has passed.
- NEPA compliance requirements would result in additional environmental compliance costs and add at least 18 months to the project schedule. NEPA compliance is only necessary if federal funding is sought for the project. This option is likely not feasible because federal funding will be sought after by the City for this project.

As a result, "fast-track" development is not a feasible strategy for reducing the project's future funding requirement.

Potential Funding Sources

Funding for transportation and other major infrastructure projects is increasingly difficult to obtain due to limited availability of funds as well as the greater demand and competition for the funding that is available. Moreover, the funding environment is highly volatile, and changes in administration priorities and the economy can affect the type and availability of funds. For instance, changes in energy prices can alter gasoline-tax funded opportunities, while changes in administration priorities can change project selection criteria for existing funds. Additionally, many agencies will only evaluate "shovel ready" projects for funding consideration. Together these factors recommend proceeding with project design and environmental compliance completion as the project's capital funding strategy is developed, refined and implemented.

There are three major categories of potential project funding sources:

- **Federal:** The Highway Safety Improvement Program (HSIP) is a federal aid program under the FAST Act. The California apportionment of over $200 million is administered by the Caltrans Division of Local Assistance through a competitive call for projects every two years. The maximum federal reimbursement amount per project is $10 million, and may be utilized for preliminary engineering, right-of-way and construction. Completion of the application is expected to take place in mid-2018, as the next call for projects is scheduled to occur in May 2018.

  A small percentage of the HSIP funds are set aside for the Railway-Highway Crossing (Section 130) Program specifically for use in grade crossing projects. California apportionment of the Section 130 Program is approximately $16 million per year and the maximum federal reimbursement level may be up to 100 percent of project work to eliminate the identified hazards at an eligible crossing. It is administered by the Caltrans Division of Rail and CPUC, and requires CPUC Priority and FTIP listings. Due to the project's #2 ranking on CPUC's priority list, this project is well positioned to obtain these funds for environmental and engineering design support in 2018 and funds for right of way and construction in 2019 and beyond. Completion of an application for these funds is expected to take place in mid-2017 after the project establishes a Federal Transportation Improvement Program (FTIP) identification number.

  California apportionment of federal funds from the Surface Transportation Program (STP)/ Congestion Mitigation and Air Quality Improvement Program (CMAQ) and other FAST Act Programs are now distributed across the nine Bay Area Counties through the One Bay Area Grant Program (OBAG).On November 18, 2015, the Metropolitan Transportation Commission (MTC) adopted the funding and policy framework for the second round of the OBAG program. Known as OBAG 2 for short, the second round of OBAG funding is projected to total roughly $916 million to fund projects from 2017-18 through 2021-22.

  The OBAG 2 program is divided into a Regional Program, managed by MTC, and a County Program, managed by the nine Bay Area Congestion Management Agencies (CMAs). The City/County Association of Governments of San Mateo

County (C/CAG) is projected to receive $32.5 million in OBAG 2 funds to be committed to projects throughout the County in FY 2017/18 and FY 2018/19. Due to the project's location within the *Burlingame El Camino Real* Priority Development Area (PDA), this project is well positioned to receive some funding commitment from the C/CAG County Program, which is anticipated to release a competitive call for capital projects in early to mid-2017.

Other potential federal contribution to project funding can be expected to be limited and from highly competitive grants like TIGER and FASTLANE. These are nationally competitive grants with an annual call for applications. While these grants are highly selective, grade separation projects have been successful in securing funding through these mechanisms in the past. Project completeness is an important selection criterion, and grant applications will be completed when the project approaches the final stages of its engineering/design phase.

Generally the maximum federal reimbursement ratio for projects is 90 percent, although it can be lower. If a project uses multiple counter measures which have different maximum federal reimbursement ratios, the lowest ratio applies. Among the various federal funds identified for this project, the maximum reimbursement ratio is 90 percent, and as such state and/or regional funding will be required and is identified below.

- **State:** Successful project development will require obtaining substantial state funding to supplement the federal contribution. Section 190 Streets and Highway Code, required Caltrans to include $15 million in each budget for grade separation projects on state highways and local streets and roads. This Grade Separation Program is jointly administered by Caltrans and CPUC. CPUC develops the priority list of projects that would be eligible for funding, which receive funding allocations from Caltrans. As the project is already categorized as a top priority by CPUC, the project is eligible to receive up to $5 million per year and no more than $20 million cumulatively, for use in construction. The application will be completed when the project approaches the latter stages of the final design phase.

  In addition to the Grade Separation Program (Section 190) funds, an important source of state funding is the California High Speed Rail Authority (through Prop 1A), which has made substantial funding contributions to key grade separation projects, and has committed up to 50 percent of total project funds for other grade separation projects in San Mateo County.

  Funding contributions from Caltrain and Cap and Trade may also offer some potential funding opportunities.

- **Regional/Local:** Significant regional and local funding contribution will also be necessary. San Mateo's Measure A Grade Separation Program has been identified as a key funding source for the project. The fund has $235 million pending commitment and will be allocated to grade separation projects throughout the county on a rolling basis, and may be used to fund pre-construction and

construction related activities. Application for Measure A funds will be completed in early 2017.

In addition, the City of Burlingame will also likely contribute to the project's design and construction. To supplement City General Funds and other local contributions, it could be worthwhile to investigate the potential for some limited project funding support from innovative funding mechanisms, including transportation impact fees and value capture funding if future project related development (e.g. transportation oriented residential or retail development) can be expected to occur.

Further analysis of the applicable funding program requirements, their funding potential and likelihood of success will be necessary to develop and implement an effective funding strategy to obtain capital funding required for future project development.

12. SCHEDULE

Project Milestones	Estimated Scheduled Delivery Date (Month /Year)
Draft PSR	January 2016
2nd Draft PSR	August 2016
Final PSR	January 2017
Preliminary Engineering/Project Report and Environmental Document	September 2019
PS&E (Final Design)	September 2021
Begin Construction	January 2022
End Construction	April 2024

13. CALTRAIN COORDINATION

All railroad involvement will be coordinated with Caltrain. Caltrain staff has attended monthly project meetings and has participated in the three public outreach workshops as well as reviewed the design criteria and the PSR.

14. PROJECT REVIEWS

Caltrain: Jill Gibson, Chiachi Chen & Bill Hoeckendorf — Date: February 2016
City of Burlingame: Augustine Chou & Syed Murtuza — Date: July 2016

15. PROJECT PERSONNEL

Syed Murtuza, Director of Public Works, City of Burlingame	(650) 558-7230
Augustine Chou, Project Manager, City of Burlingame	(650) 558-7236
Jill Gibson, Caltrain, Principal Planner	(650) 295-6846
Etty Mercurio, Project Manager, AECOM	(510) 874-1773
Peter DeStefano, Project Engineer, AECOM	(510) 874-3143

16. ATTACHMENTS

A. Project Location Map
B. Preliminary Plans
   1. Alternative A
   2 Alternative B
   3 Alternative C
   4. Alternative D
   5. Alternative E
   6. Alternative F
C. FIRM Maps for San Mateo County and Incorporated Areas
D. Preliminary Utility Plans and Relocation Costs
   1. Alternative A
   2. Alternative B
   3. Alternative C
   4. Alternative D
   5. Alternative E
   6. Alternative F
E. Preliminary Project Cost Estimates
   1. Alternative A
   2. Alternative B
   3. Alternative C
   4. Alternative D
   5. Alternative E
   6. Alternative F
F. Frequently Asked Questions
G. Photo Simulations

REFERENCES

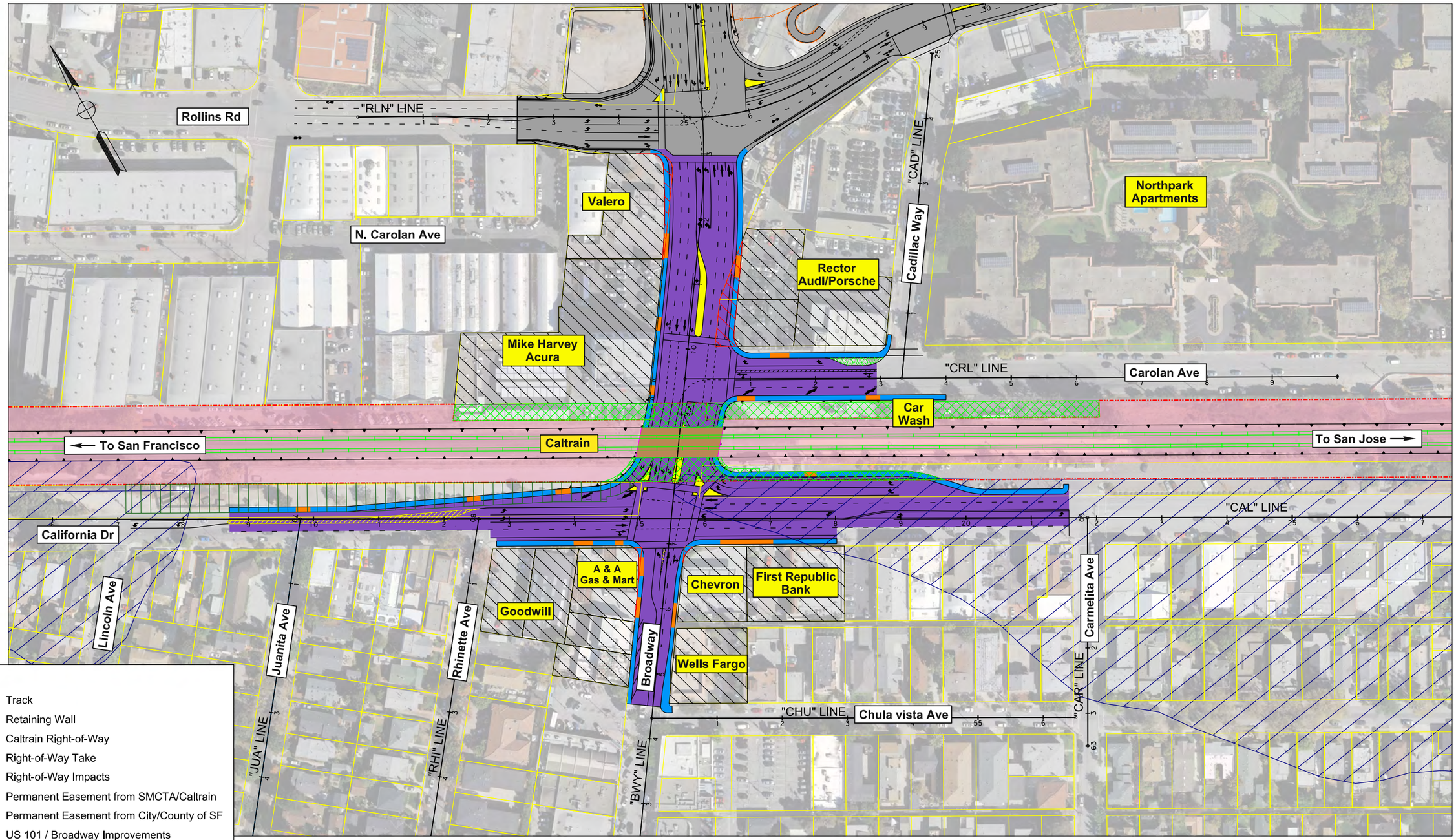
a. *City of Burlingame, Broadway Grade Separation Project, Technical Memorandum, Evaluation of Traffic Conditions,* August 2016, AECOM.
b. *Preliminary Geotechnical Report (PGR), Broadway Grade Separation, Burlingame, California,* May 2015, AECOM.
c. *Broadway Grade Separation Study, City of Burlingame, California, Preliminary Hydrology and Hydraulics Report,* November 2015, WRECO.
d. *City of Burlingame, Broadway Grade Separation Project, Technical Memorandum, Economic and Community Impact Assessment,* November 2015, AECOM.

ATTACHMENT A – PROJECT LOCATION MAP

PRELIMINARY
FOR DISCUSSION PURPOSES ONLY
September 16, 2015

Location Map
Exhibit

ATTACHMENT B – PRELIMINARY PLANS



LEGEND:

- Track
- Retaining Wall
- Caltrain Right-of-Way
- Right-of-Way Take
- Right-of-Way Impacts
- Permanent Easement from SMCTA/Caltrain
- Permanent Easement from City/County of SF
- US 101 / Broadway Improvements
- Structure for Railroad
- Limits of Roadway Modifications
- Median / Curbed Island
- Sidewalk
- Driveway Access Issues
- Limits of Railroad Modifications
- Railroad Operations Conflict
- 100 Year Flood Zone

Broadway Grade Separation Study

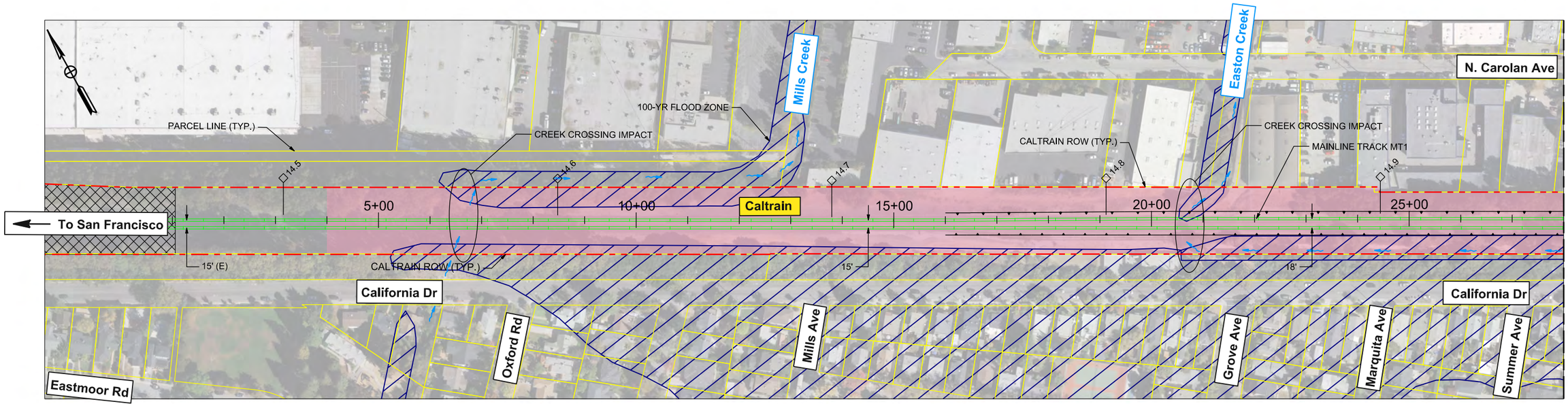
PRELIMINARY
FOR DISCUSSION PURPOSES ONLY

SCALE: 1" = 150'

BROADWAY GATEWAY · Caltrain · San Mateo County Transportation Authority · AECOM

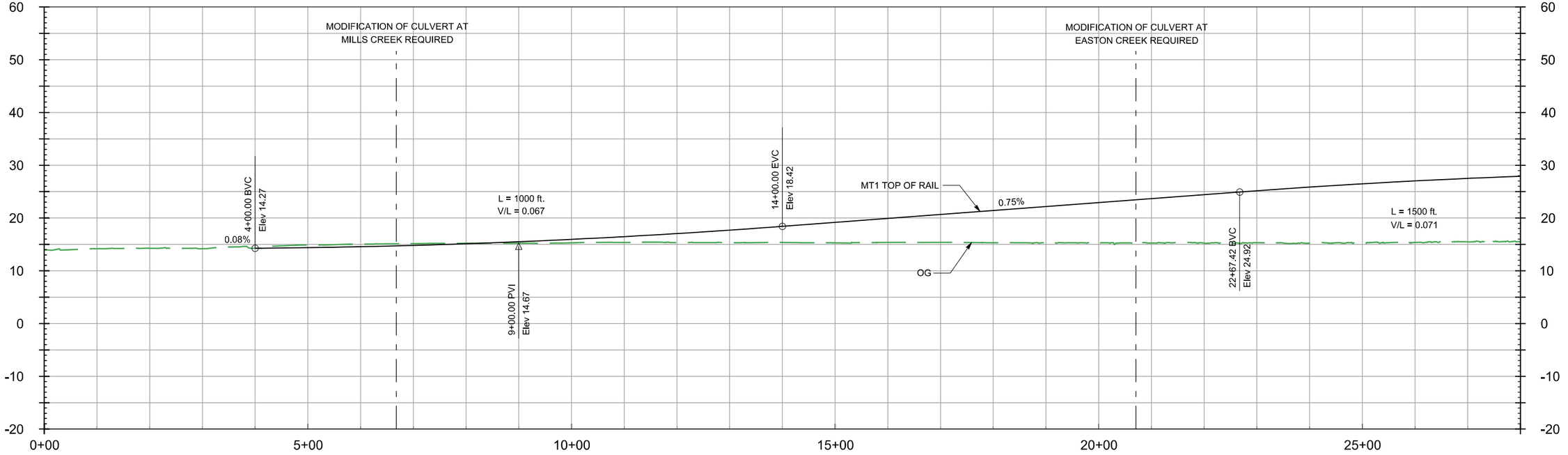
ALTERNATIVE A
RAIL PARTIALLY ELEVATED / ROADWAY PARTIALLY DEPRESSED

Alternative A
Roadway Plan



MATCHLINE SEE ALT. A SHEET 2 OF 3

PLAN



PROFILE

Broadway Grade Separation Study

PRELIMINARY
FOR DISCUSSION PURPOSES ONLY

SCALE: 1" = 200'

FOR LEGEND, SEE
"ALTERNATIVE A ROADWAY PLAN"

BROADWAY GATEWAY

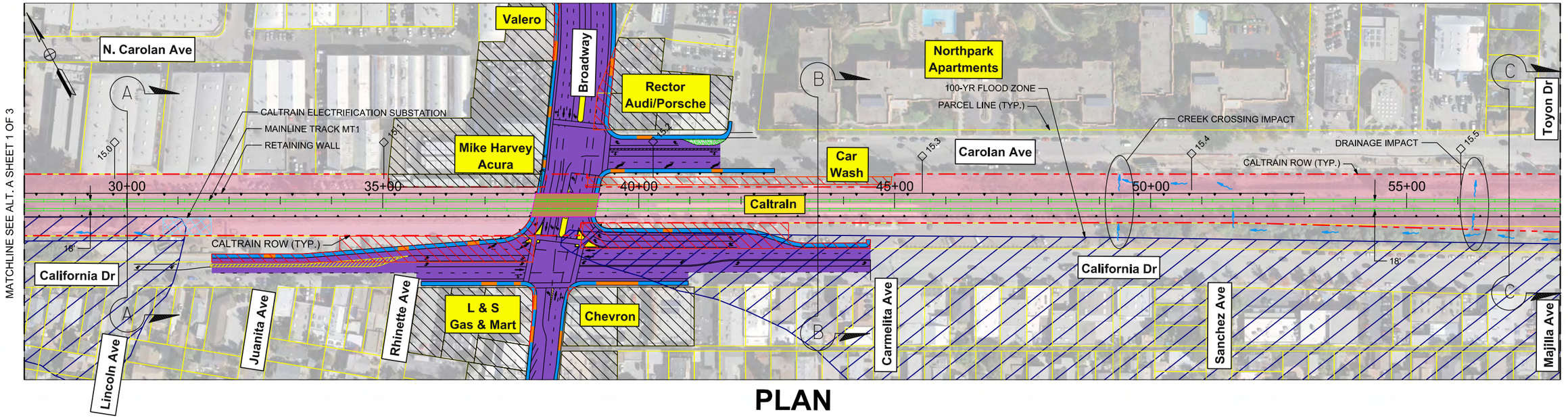
Caltrain

SAN MATEO COUNTY Transportation Authority

AECOM

ALTERNATIVE A
RAIL PARTIALLY ELEVATED / ROADWAY PARTIALLY DEPRESSED

Alternative A
Track Plan and Profile
Sheet 1 of 3



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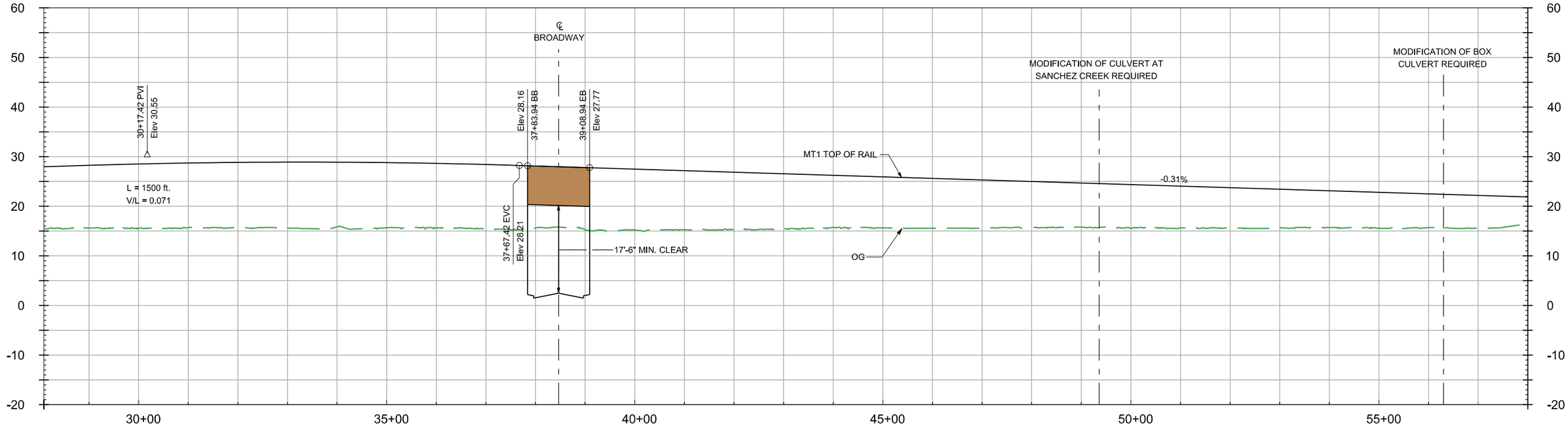


PROFILE
Broadway Grade Separation Study

PRELIMINARY
FOR DISCUSSION PURPOSES ONLY

SCALE: 1" = 200'

FOR LEGEND, SEE "ALTERNATIVE A ROADWAY PLAN"

BROADWAY GATEWAY

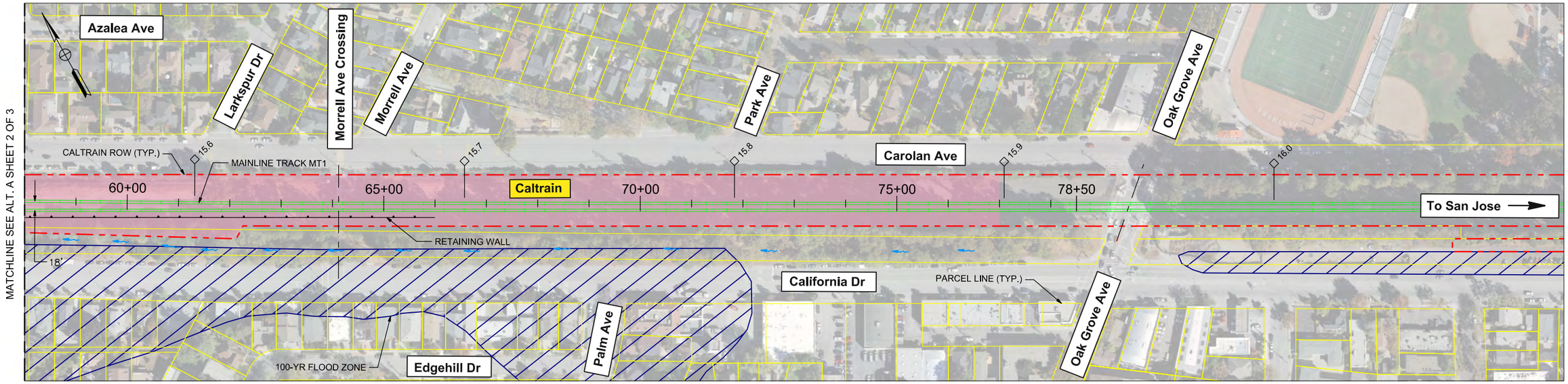
Caltrain

SAN MATEO COUNTY Transportation Authority

AECOM

ALTERNATIVE A
RAIL PARTIALLY ELEVATED / ROADWAY PARTIALLY DEPRESSED

Alternative A
Track Plan and Profile
Sheet 2 of 3



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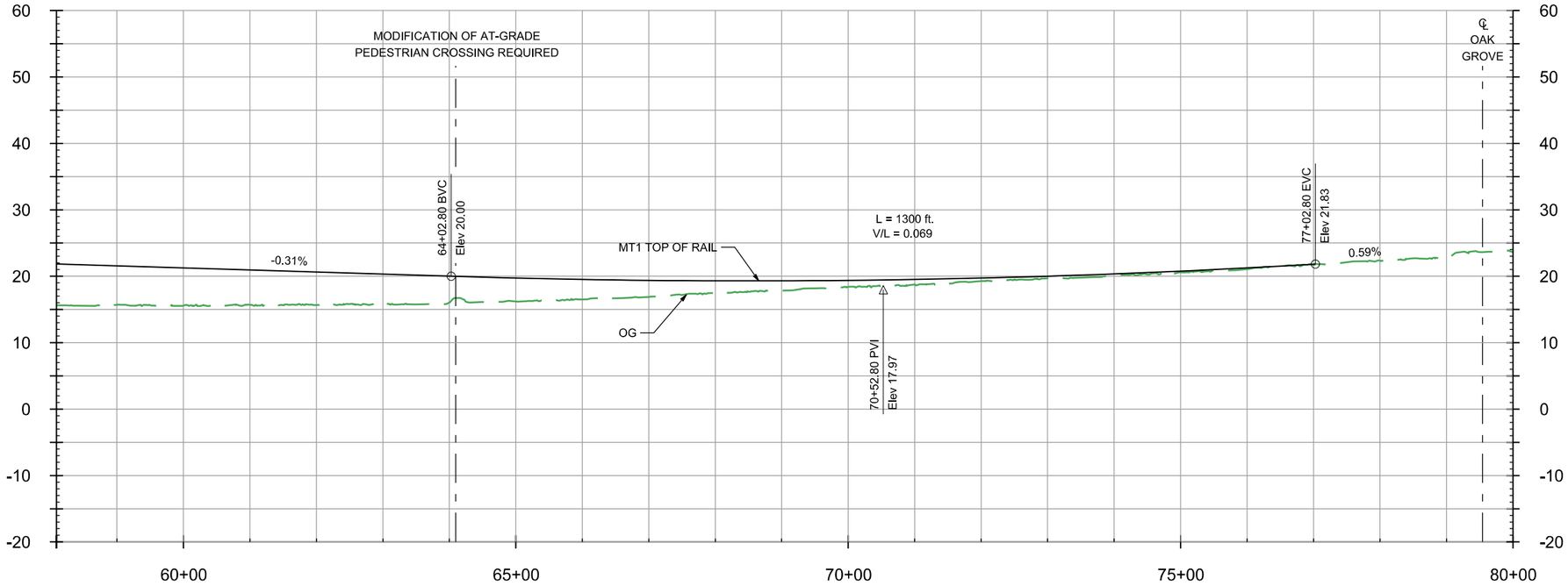


PROFILE
Broadway Grade Separation Study

PRELIMINARY
FOR DISCUSSION PURPOSES ONLY

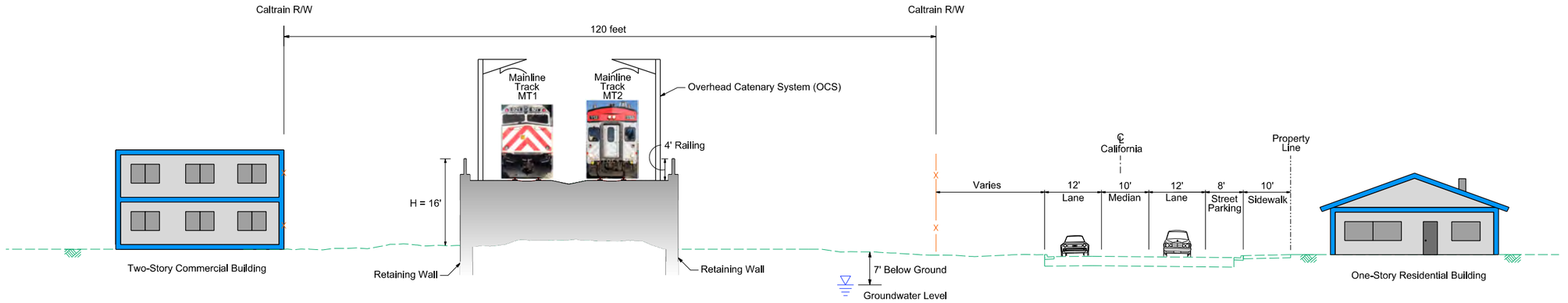
SCALE: 1" = 200'

FOR LEGEND, SEE
"ALTERNATIVE A ROADWAY PLAN"

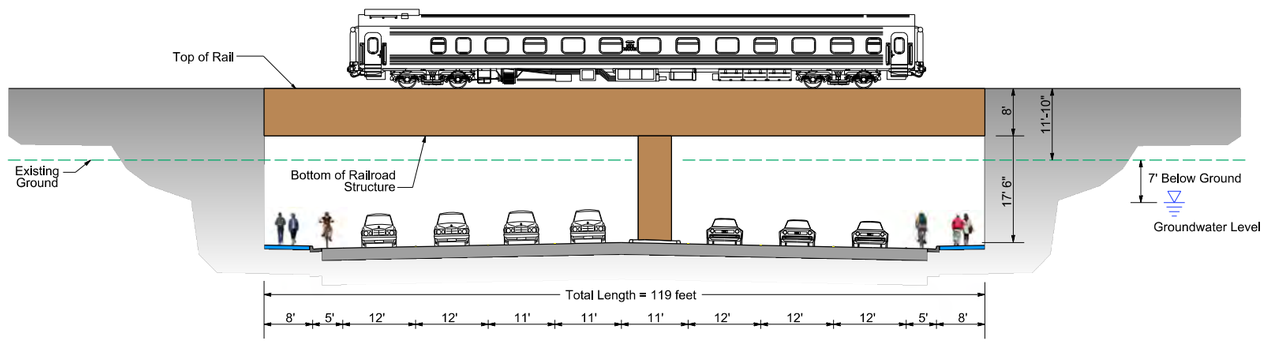
BROADWAY GATEWAY
Caltrain
SAN MATEO COUNTY Transportation Authority
AECOM

ALTERNATIVE A
RAIL PARTIALLY ELEVATED / ROADWAY PARTIALLY DEPRESSED

Alternative A
Track Plan and Profile
Sheet 3 of 3



CROSS SECTION A-A AT LINCOLN
LOOKING SOUTH TOWARDS BURLINGAME



CROSS SECTION AT BROADWAY
LOOKING EAST

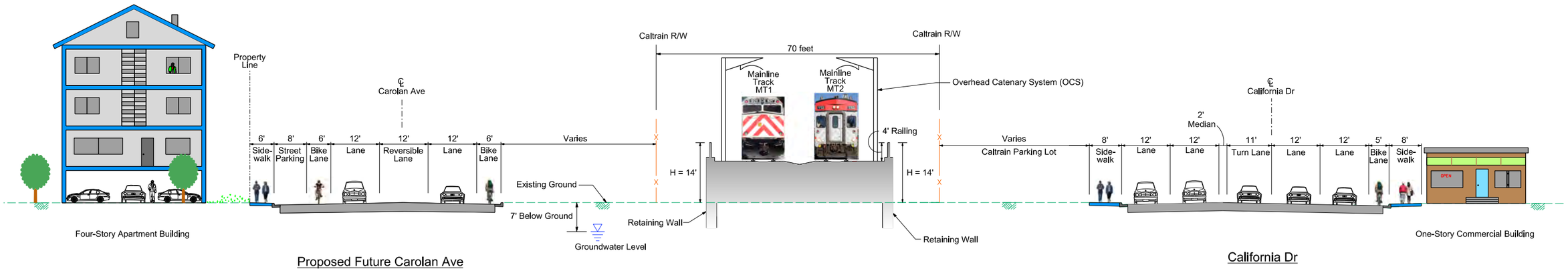
Broadway Grade Separation Study

PRELIMINARY
FOR DISCUSSION PURPOSES ONLY

BROADWAY GATEWAY
Caltrain
SAN MATEO COUNTY Transportation Authority
AECOM

ALTERNATIVE A
RAIL PARTIALLY ELEVATED / ROADWAY PARTIALLY DEPRESSED

Alternative A
Typical Sections
Sheet 1 of 2



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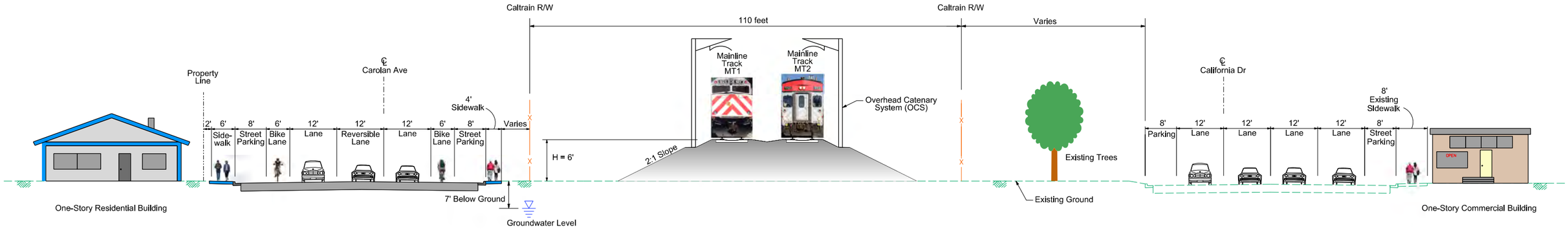
NORTHPARK APARTMENTS
LOOKING SOUTH TOWARDS BURLINGAME STATION



CROSS SECTION C-C AT
CAROLAN AVE AND TOYON DR INTERSECTION
LOOKING SOUTH TOWARDS BURLINGAME STATION

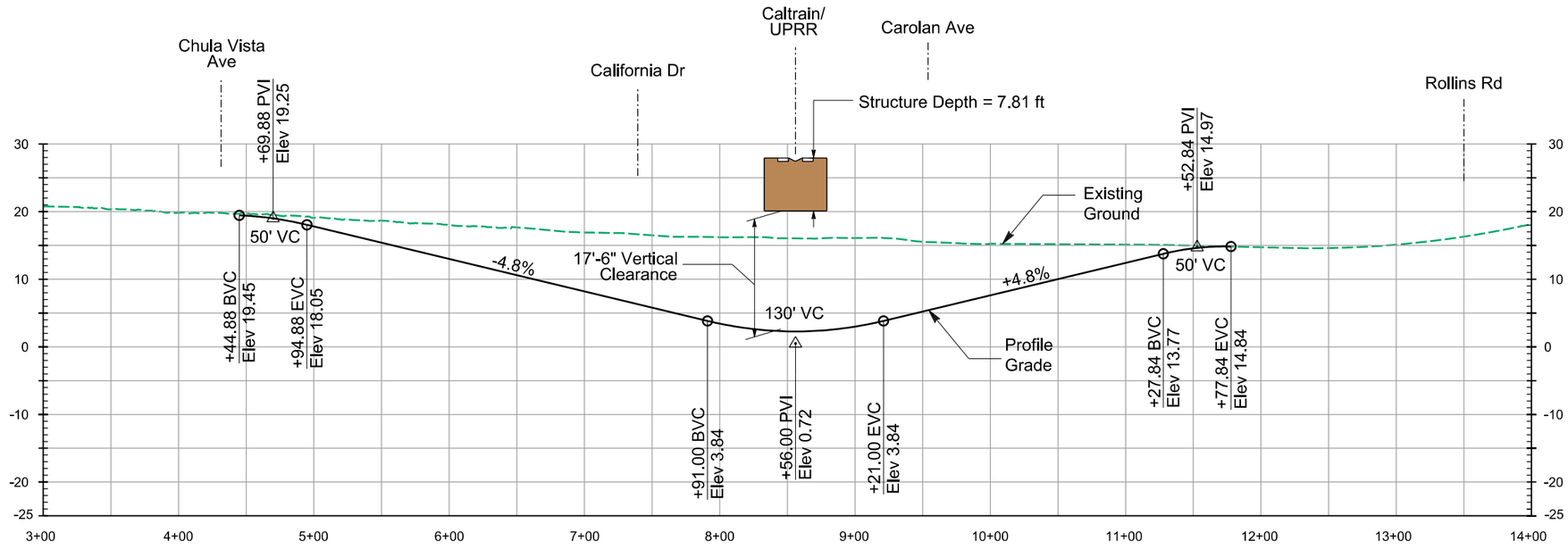
Broadway Grade Separation Study

PRELIMINARY
FOR DISCUSSION PURPOSES ONLY

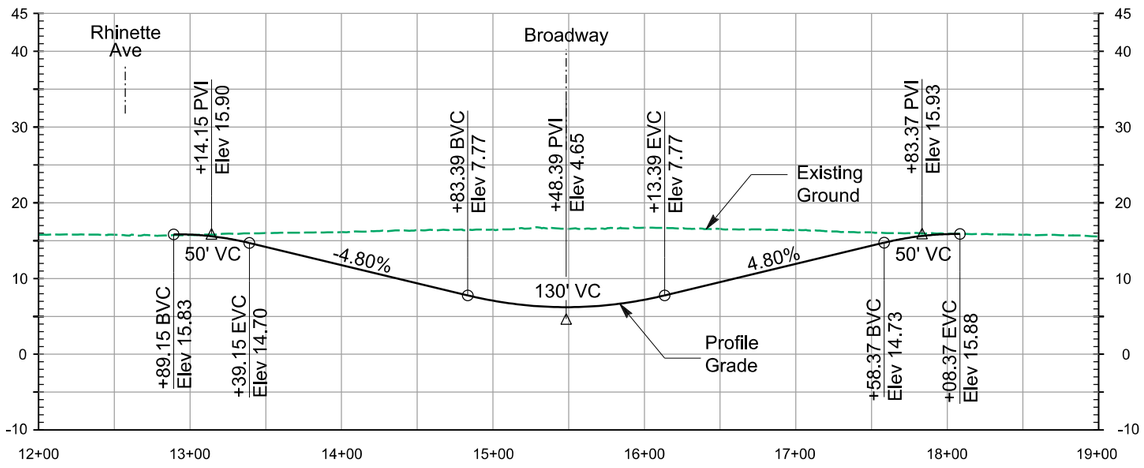
BROADWAY GATEWAY · Caltrain · SAN MATEO COUNTY Transportation Authority · AECOM

ALTERNATIVE A
RAIL PARTIALLY ELEVATED / ROADWAY PARTIALLY DEPRESSED

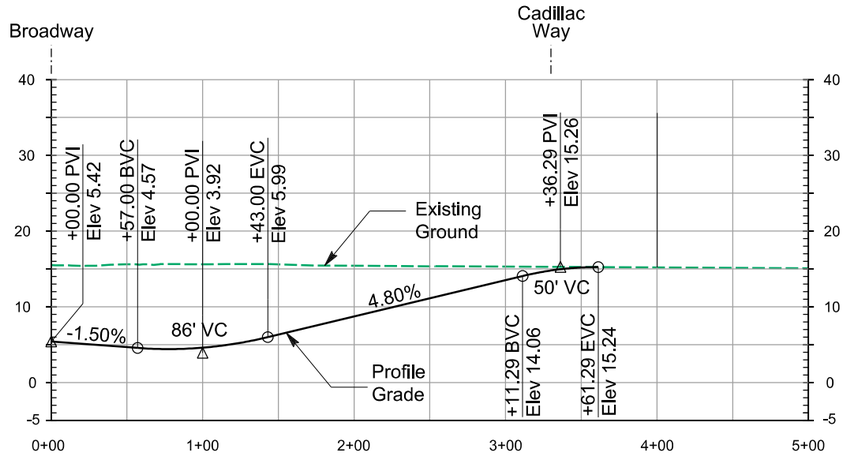
Alternative A
Typical Sections
Sheet 2 of 2



BROADWAY



CALIFORNIA DR



CAROLAN AVE

Broadway Grade Separation Study

PRELIMINARY
FOR DISCUSSION PURPOSES ONLY

SCALE: Horiz 1" = 100'
Vert 1" = 10'

BROADWAY GATEWAY
Caltrain
SAN MATEO COUNTY Transportation Authority
AECOM

ALTERNATIVE A
RAIL PARTIALLY ELEVATED / ROADWAY PARTIALLY DEPRESSED

Alternative A
Roadway Profiles

Rollins Rd
"RLN" LINE
N. Carolan Ave
Valero
Rector Audi/Porsche
"CAD" LINE
Cadillac Way
Northpark Apartments
Mike Harvey Acura
"CRL" LINE
Carolan Ave
Car Wash
To San Francisco
Caltrain
To San Jose
California Dr
Lincoln Ave
Juanita Ave
Rhinette Ave
A & A Gas & Mart
Goodwill
Chevron
First Republic Bank
Broadway
Wells Fargo
"CAL" LINE
Carmelita Ave
"CAR" LINE
"JUA" LINE
"RHI" LINE
"BWY" LINE
"CHU" LINE
Chula vista Ave

LEGEND:

- Track
- Retaining Wall
- Caltrain Right-of-Way
- Right-of-Way Take
- Right-of-Way Impacts
- Permanent Easement from SMCTA/Caltrain
- Permanent Easement from City/County of SF
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- Structure for Railroad
- Limits of Roadway Modifications
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- Sidewalk
- Driveway Access Issues
- Limits of Railroad Modifications
- Railroad Operations Conflict
- 100 Year Flood Zone

Broadway Grade Separation Study

PRELIMINARY
FOR DISCUSSION PURPOSES ONLY

SCALE: 1" = 150'

BROADWAY GATEWAY

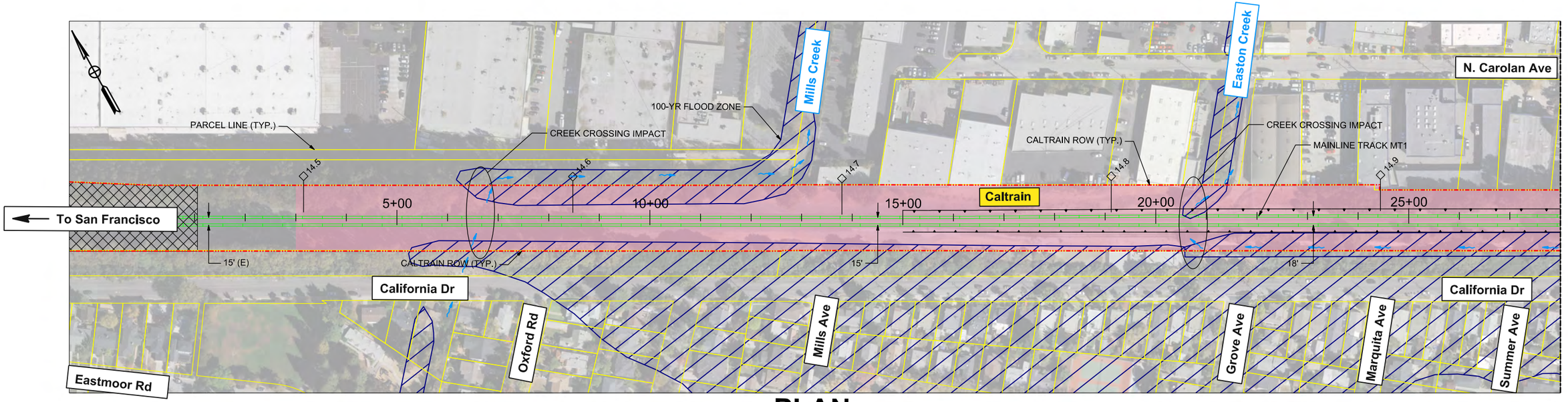
Caltrain

SAN MATEO COUNTY Transportation Authority

AECOM

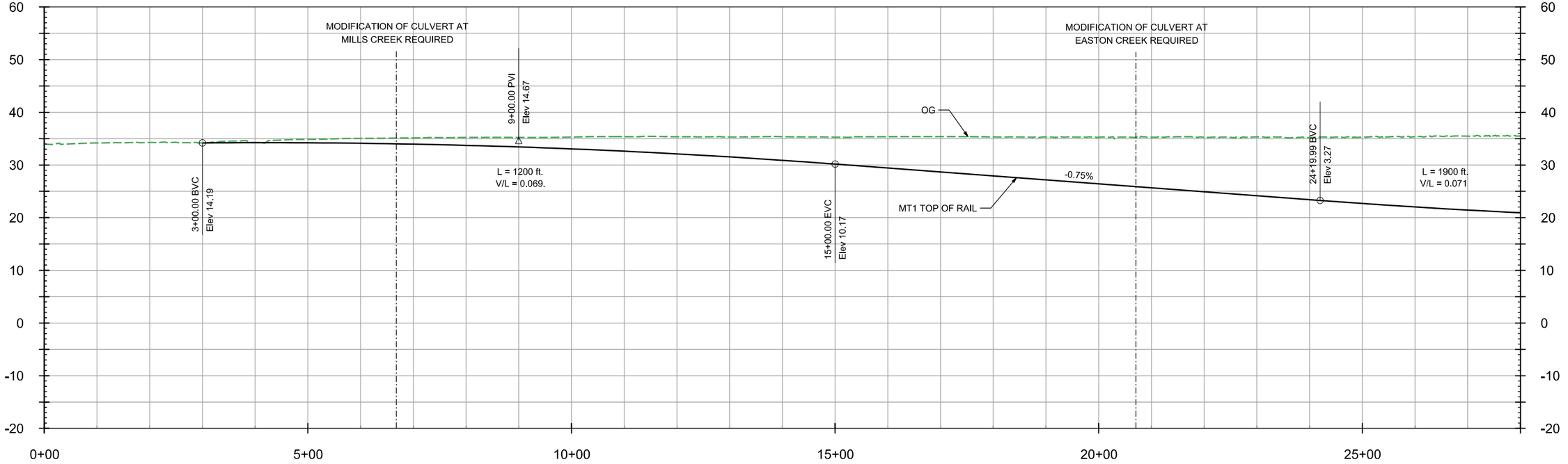
ALTERNATIVE B
RAIL PARTIALLY DEPRESSED / ROADWAY PARTIALLY ELEVATED

Alternative B
Roadway Plan



MATCHLINE SEE ALT. B SHEET 2 OF 3

PLAN



PROFILE

Broadway Grade Separation Study

PRELIMINARY
FOR DISCUSSION PURPOSES ONLY

SCALE: 1" = 200'

FOR LEGEND, SEE "ALTERNATIVE B ROADWAY PLAN"

BROADWAY GATEWAY

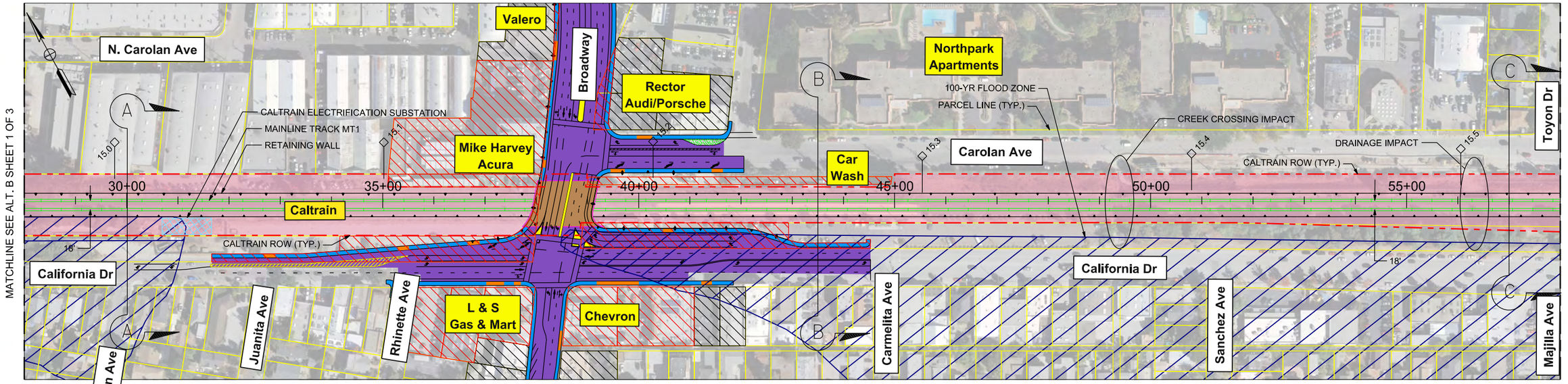
Caltrain

SAN MATEO COUNTY Transportation Authority

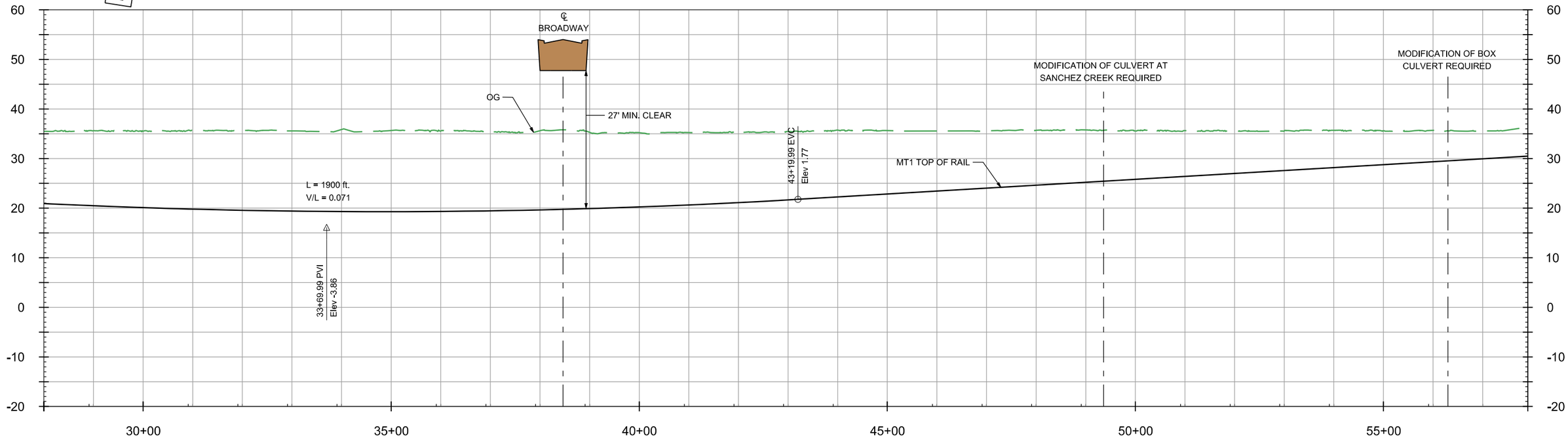
AECOM

ALTERNATIVE B
RAIL PARTIALLY DEPRESSED / ROADWAY PARTIALLY ELEVATED

Alternative B
Track Plan and Profile
Sheet 1 of 3



PLAN



PROFILE

Broadway Grade Separation Study

PRELIMINARY
FOR DISCUSSION PURPOSES ONLY

SCALE: 1" = 200'

FOR LEGEND, SEE
"ALTERNATIVE B ROADWAY PLAN"

BROADWAY GATEWAY

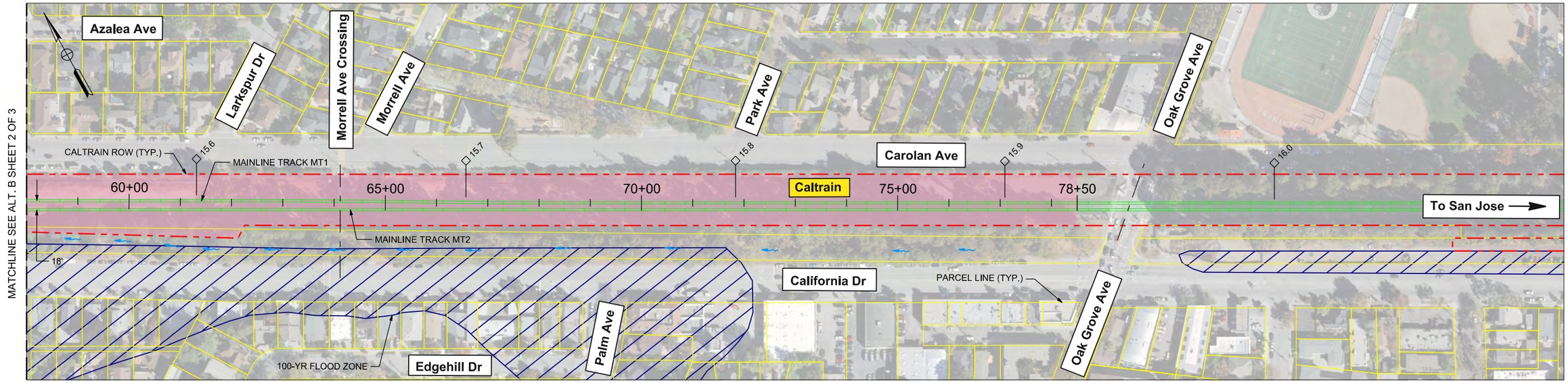
Caltrain

SAN MATEO COUNTY Transportation Authority

AECOM

ALTERNATIVE B
RAIL PARTIALLY DEPRESSED / ROADWAY PARTIALLY ELEVATED

Alternative B
Track Plan and Profile
Sheet 2 of 3



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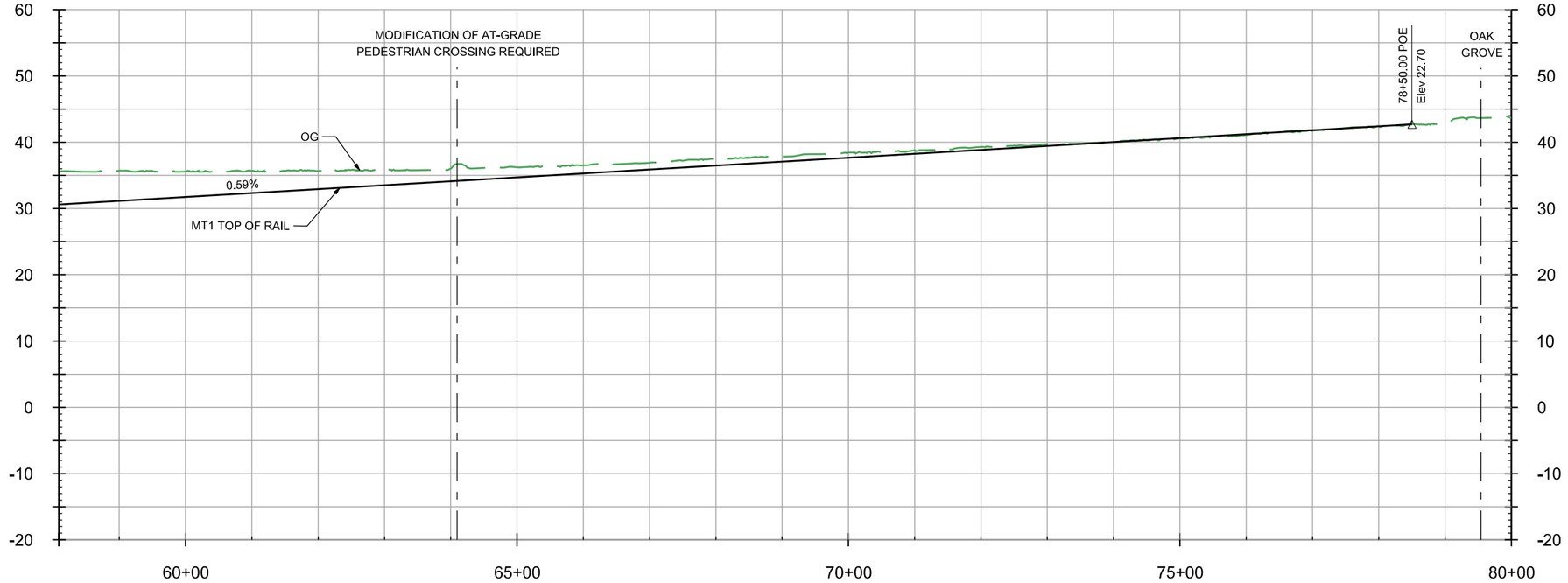


PROFILE

Broadway Grade Separation Study

PRELIMINARY
FOR DISCUSSION PURPOSES ONLY

SCALE: 1" = 200'

FOR LEGEND, SEE
"ALTERNATIVE B ROADWAY PLAN"

BROADWAY GATEWAY

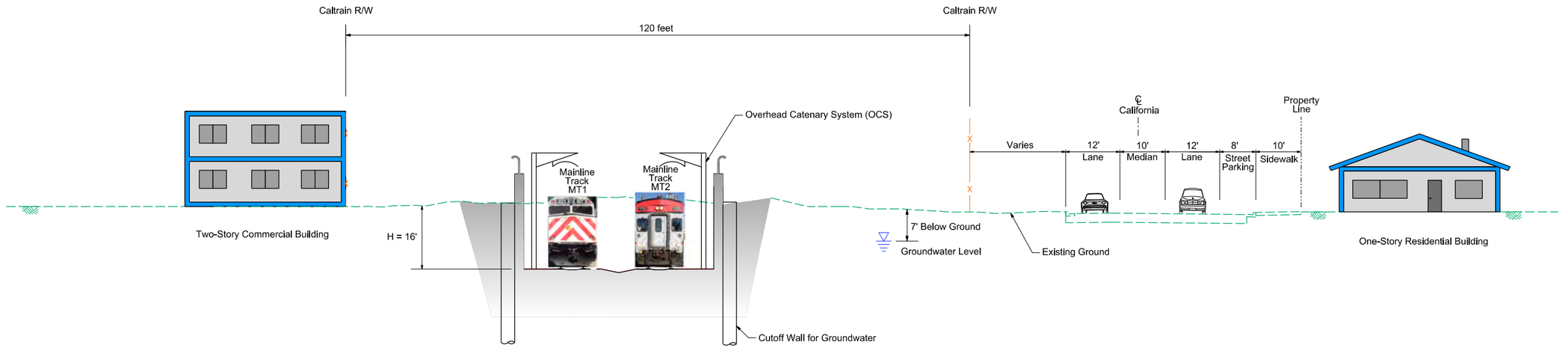
Caltrain

SAN MATEO COUNTY Transportation Authority

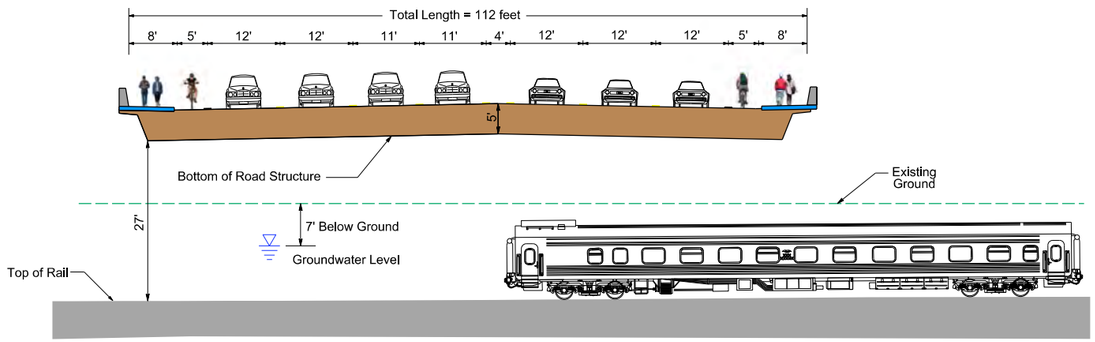
AECOM

ALTERNATIVE B
RAIL PARTIALLY DEPRESSED / ROADWAY PARTIALLY ELEVATED

Alternative B
Track Plan and Profile
Sheet 3 of 3



CROSS SECTION A-A AT LINCOLN
LOOKING SOUTH TOWARDS BURLINGAME



CROSS SECTION AT BROADWAY
LOOKING EAST

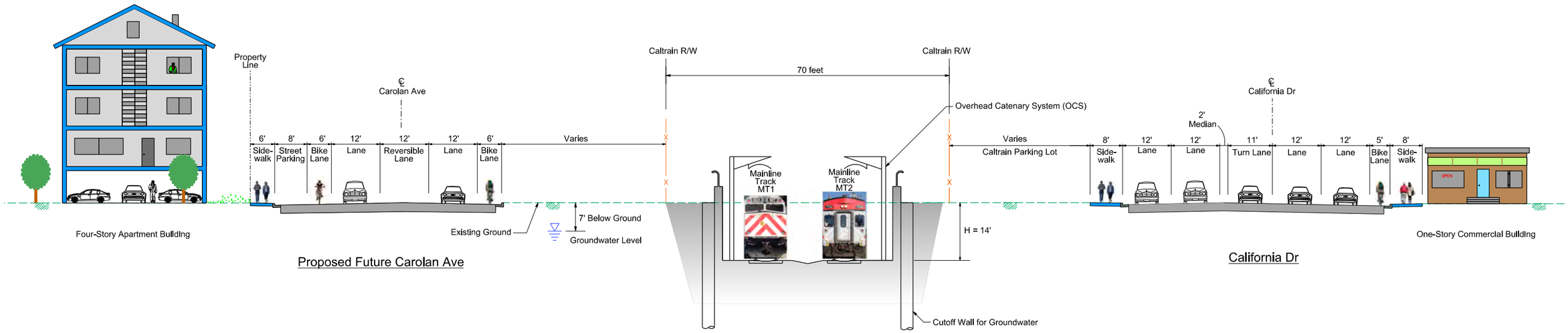
Broadway Grade Separation Study

PRELIMINARY
FOR DISCUSSION PURPOSES ONLY

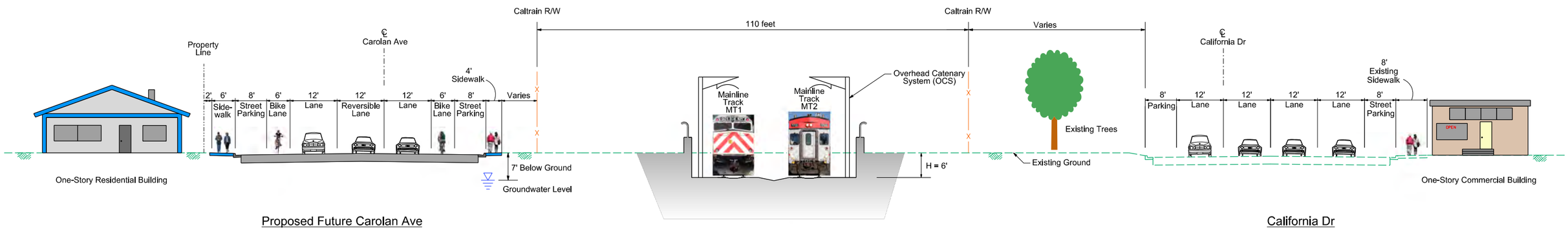
BROADWAY GATEWAY
Caltrain
SAN MATEO COUNTY Transportation Authority
AECOM

ALTERNATIVE B
RAIL PARTIALLY DEPRESSED / ROADWAY PARTIALLY ELEVATED

Alternative B
Typical Sections
Sheet 1 of 2



CROSS SECTION B-B AT
NORTHPARK APARTMENTS
LOOKING SOUTH TOWARDS BURLINGAME STATION



CROSS SECTION C-C AT
CAROLAN AVE AND TOYON DR INTERSECTION
LOOKING SOUTH TOWARDS BURLINGAME STATION

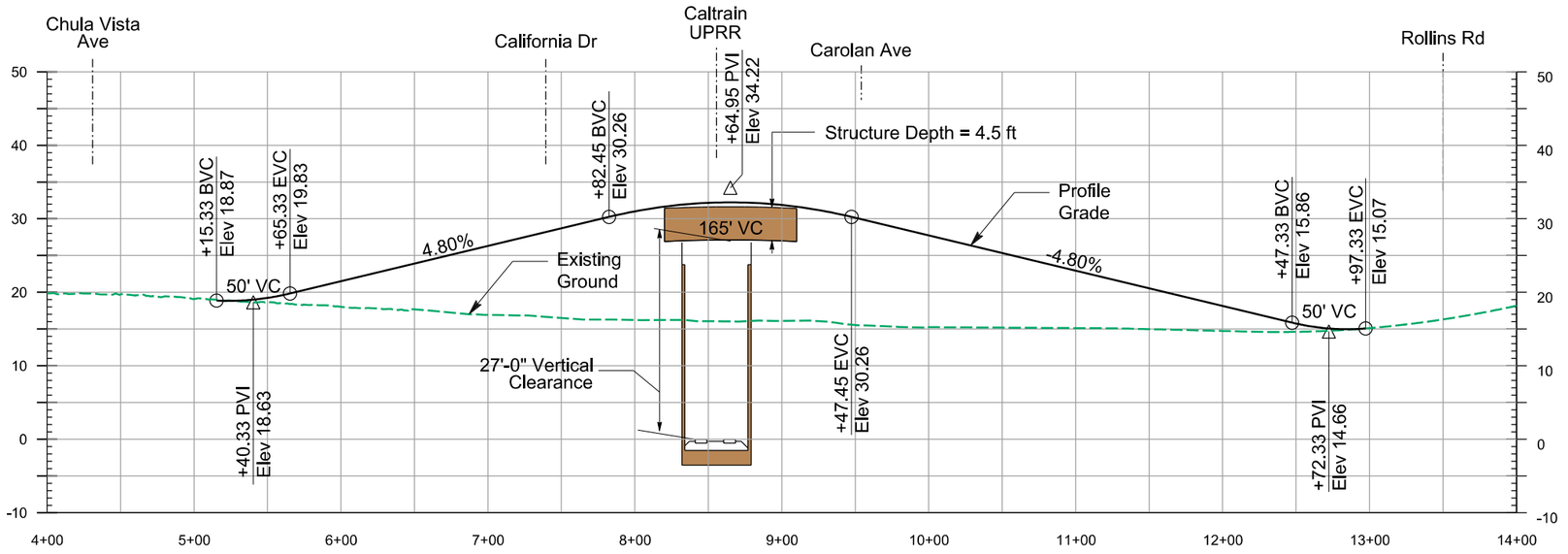
Broadway Grade Separation Study

PRELIMINARY
FOR DISCUSSION PURPOSES ONLY

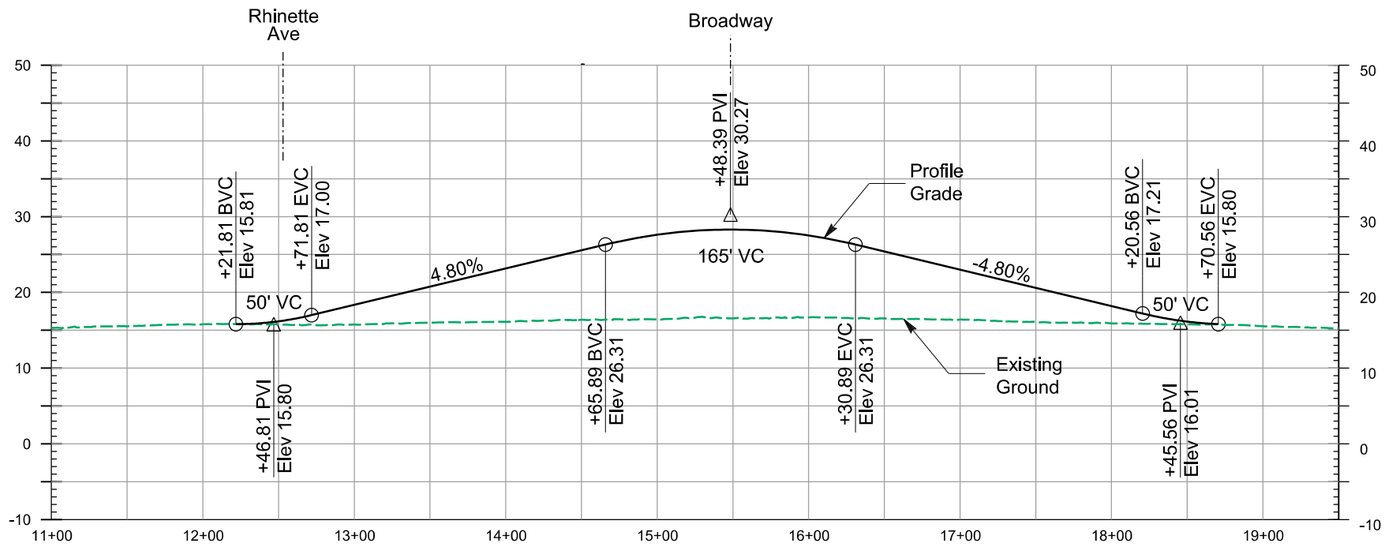
BROADWAY GATEWAY · Caltrain · SAN MATEO COUNTY Transportation Authority · AECOM

ALTERNATIVE B
RAIL PARTIALLY DEPRESSED / ROADWAY PARTIALLY ELEVATED

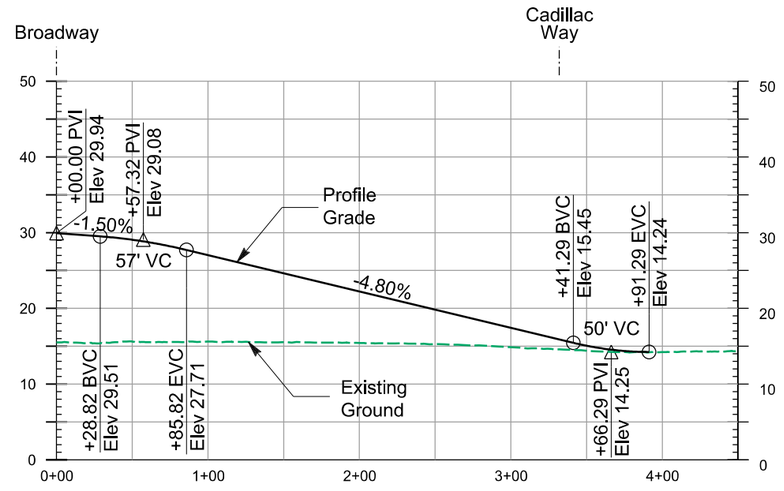
Alternative B
Typical Sections
Sheet 2 of 2



BROADWAY



CALIFORNIA DR



CAROLAN AVE

Broadway Grade Separation Study

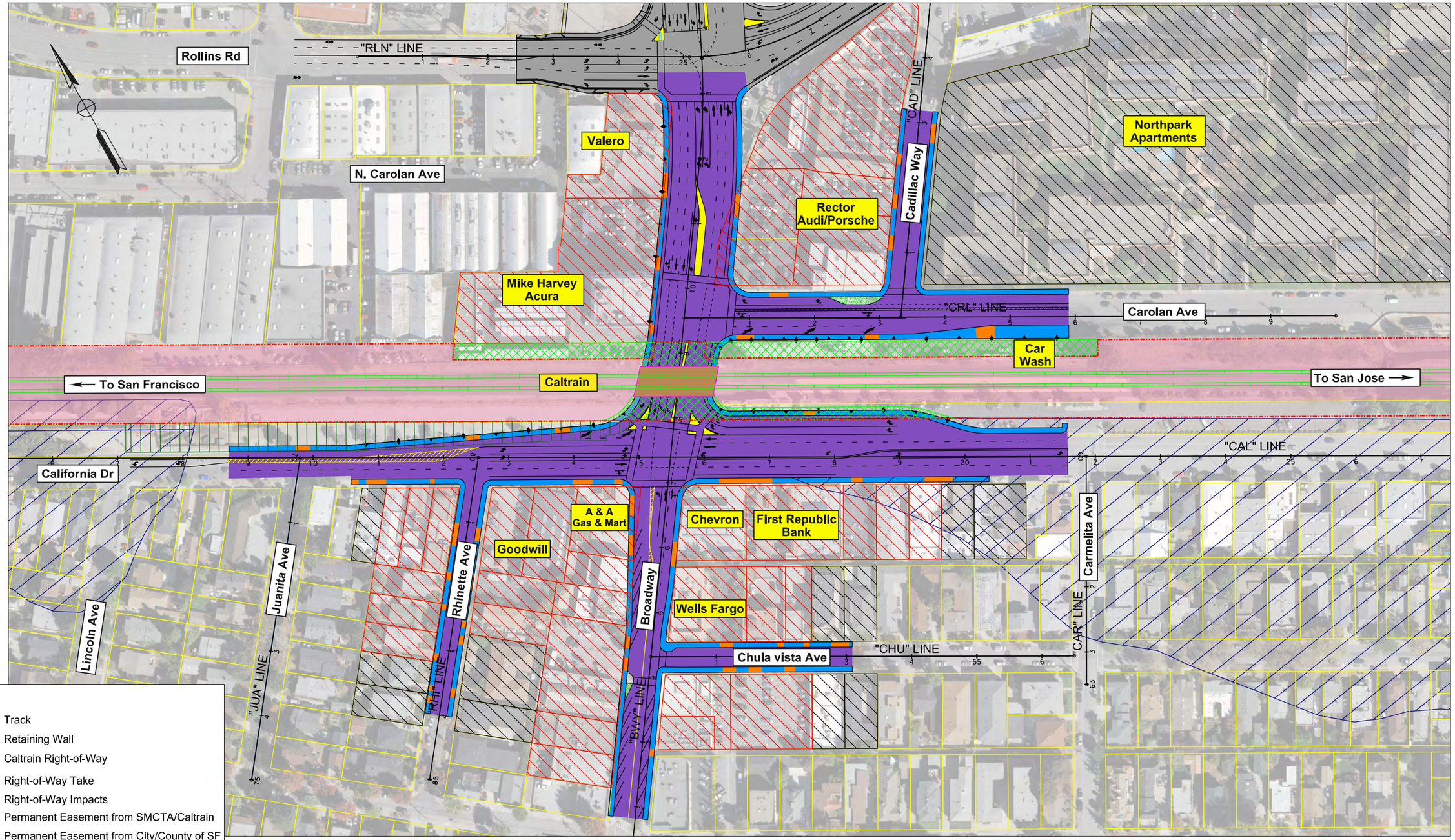
PRELIMINARY
FOR DISCUSSION PURPOSES ONLY

SCALE: Horiz 1" = 100'
Vert 1" = 10'

BROADWAY GATEWAY · Caltrain · SAN MATEO COUNTY Transportation Authority · AECOM

ALTERNATIVE B
RAIL PARTIALLY DEPRESSED / ROADWAY PARTIALLY ELEVATED

Alternative B
Roadway Profiles



LEGEND:

- Track
- Retaining Wall
- Caltrain Right-of-Way
- Right-of-Way Take
- Right-of-Way Impacts
- Permanent Easement from SMCTA/Caltrain
- Permanent Easement from City/County of SF
- US 101 / Broadway Improvements
- Structure for Railroad
- Limits of Roadway Modifications
- Median / Curbed Island
- Sidewalk
- Driveway Access Issues
- Limits of Railroad Modifications
- 100 Year Flood Zone

Broadway Grade Separation Study

PRELIMINARY
FOR DISCUSSION PURPOSES ONLY

SCALE: 1" = 150'

BROADWAY GATEWAY

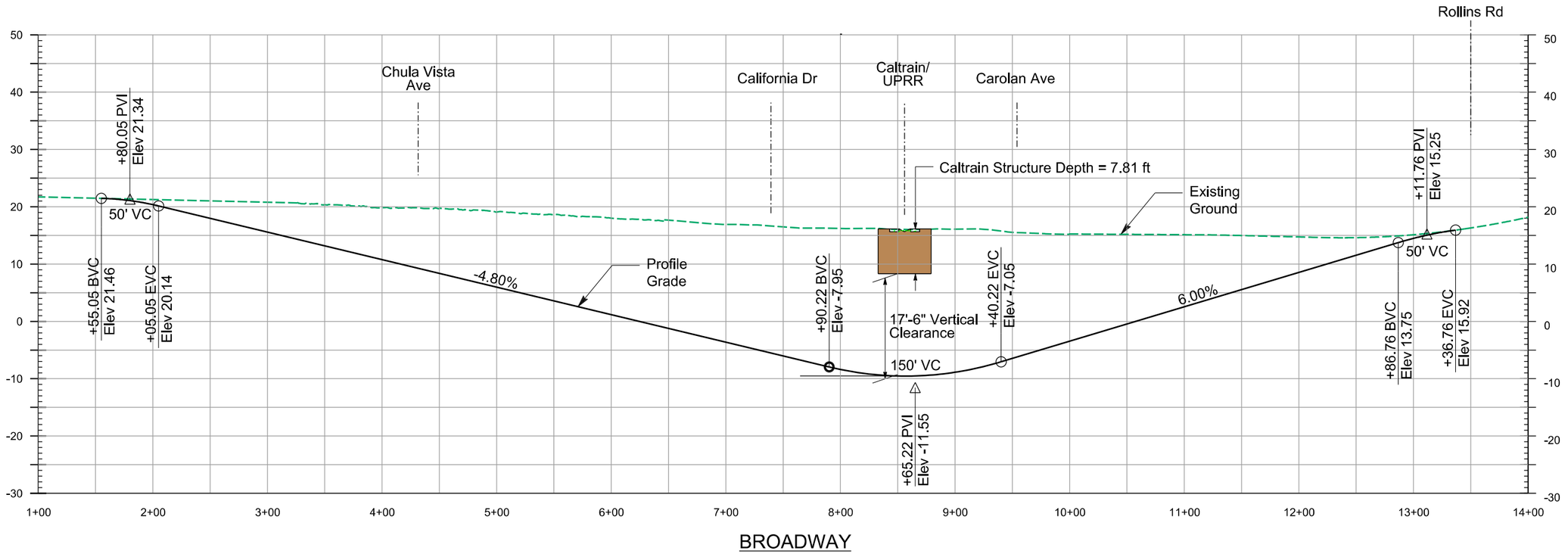
Caltrain

SAN MATEO COUNTY Transportation Authority

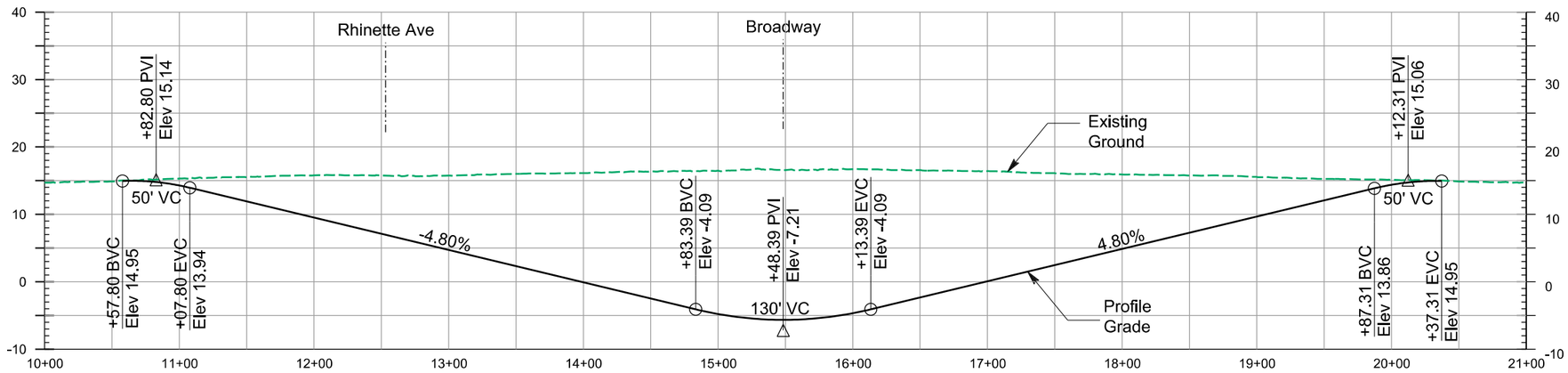
AECOM

ALTERNATIVE C
RAIL AT-GRADE / ROADWAY DEPRESSED

Alternative C
Roadway Plan



BROADWAY



CALIFORNIA DR

Broadway Grade Separation Study

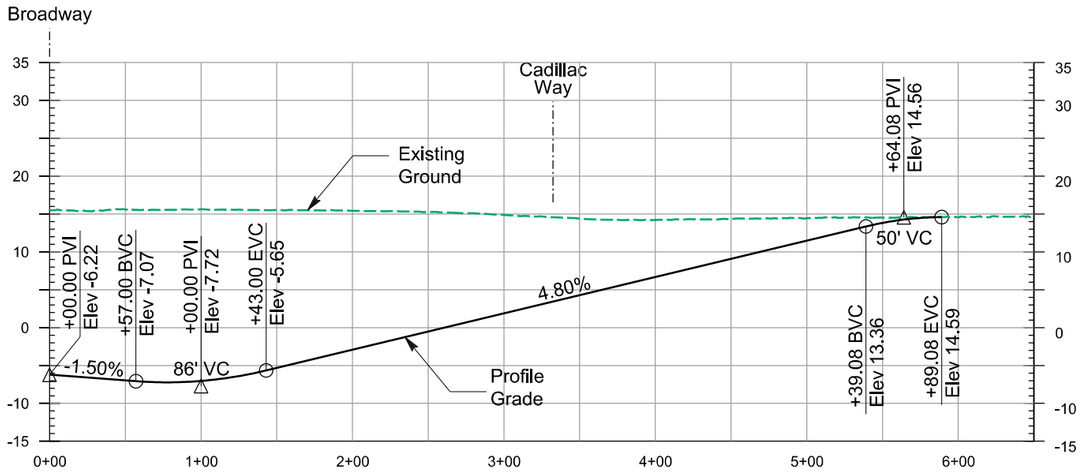
PRELIMINARY
FOR DISCUSSION PURPOSES ONLY

SCALE: Horiz 1" = 100'
Vert 1" = 10'

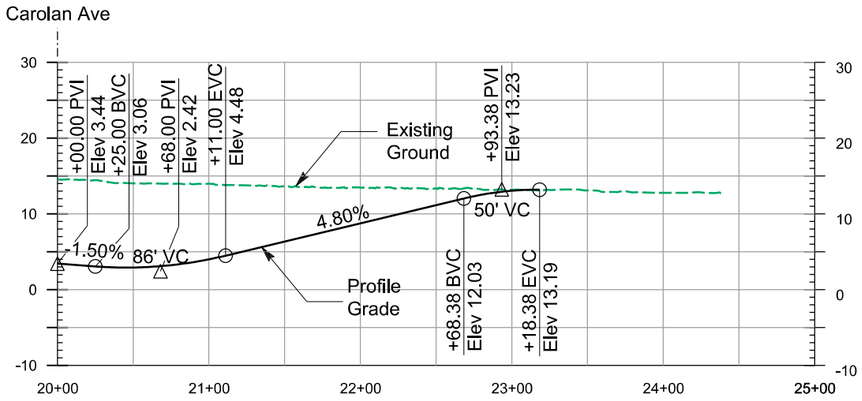
BROADWAY GATEWAY · Caltrain · SAN MATEO COUNTY Transportation Authority · AECOM

ALTERNATIVE C
RAIL AT-GRADE / ROADWAY DEPRESSED

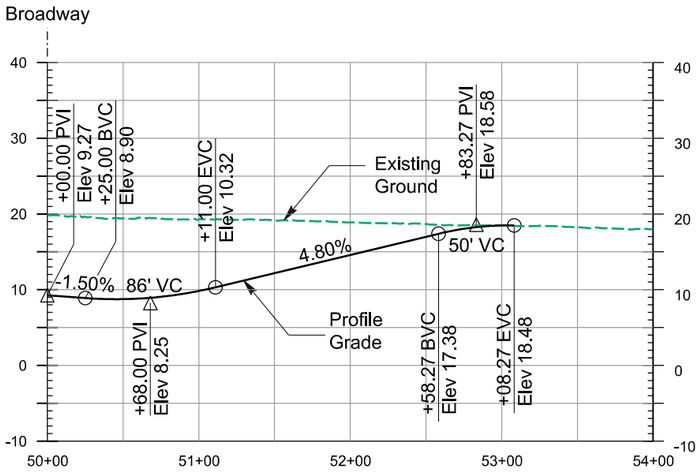
Alternative C
Roadway Profiles
Sheet 1 of 2



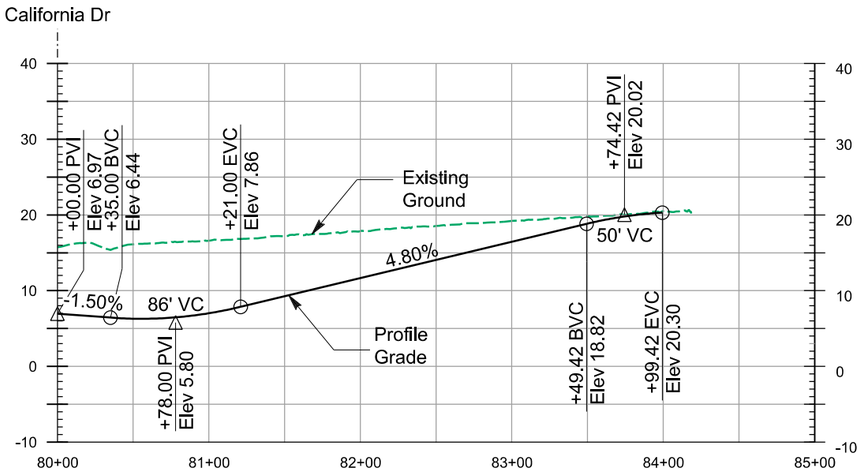
CAROLAN AVE



CADILLAC WAY



CHULA VISTA AVE



RHINETTE AVE

Broadway Grade Separation Study

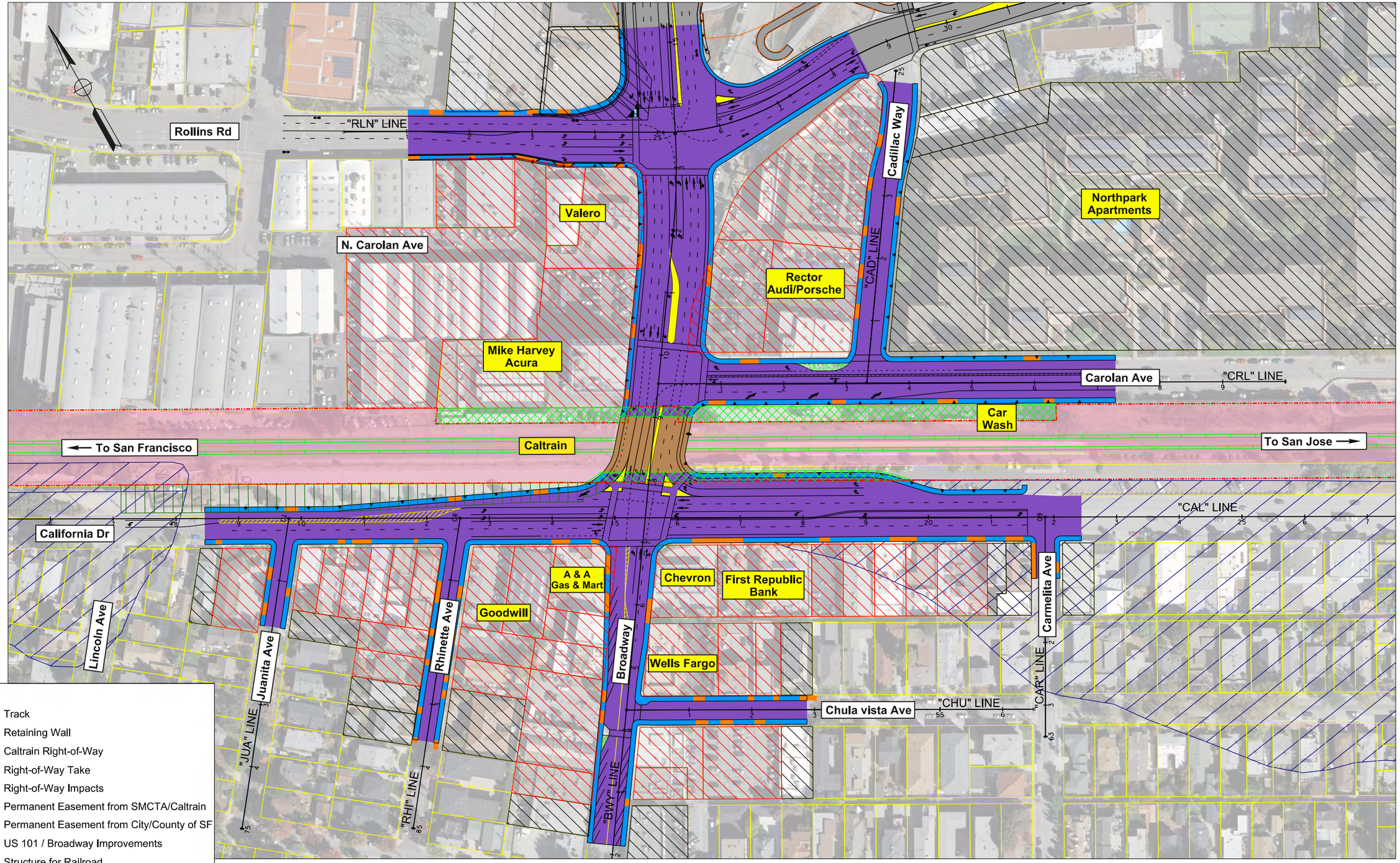
PRELIMINARY
FOR DISCUSSION PURPOSES ONLY

SCALE: Horiz 1" = 100'
Vert 1" = 10'

BROADWAY GATEWAY · Caltrain · San Mateo County Transportation Authority · AECOM

ALTERNATIVE C
RAIL AT-GRADE / ROADWAY DEPRESSED

Alternative C
Roadway Profiles
Sheet 2 of 2



LEGEND:

- Track
- Retaining Wall
- Caltrain Right-of-Way
- Right-of-Way Take
- Right-of-Way Impacts
- Permanent Easement from SMCTA/Caltrain
- Permanent Easement from City/County of SF
- US 101 / Broadway Improvements
- Structure for Railroad
- Limits of Roadway Modifications
- Median / Curbed Island
- Sidewalk
- Driveway Access Issues
- Limits of Railroad Modifications
- 100 Year Flood Zone

Broadway Grade Separation Study

PRELIMINARY
FOR DISCUSSION PURPOSES ONLY

SCALE: 1" = 150'

BROADWAY GATEWAY

Caltrain

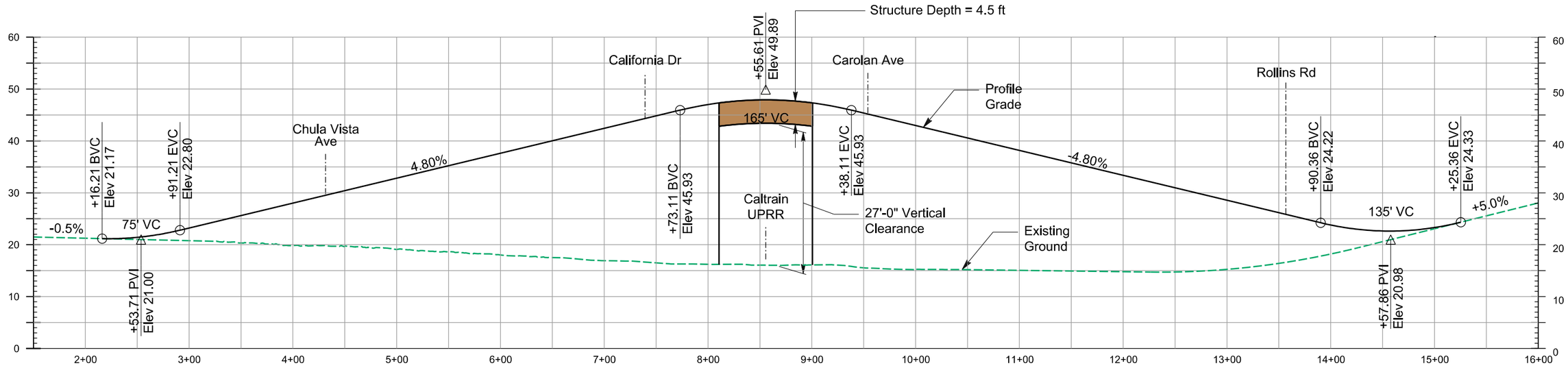
SAN MATEO COUNTY Transportation Authority

AECOM

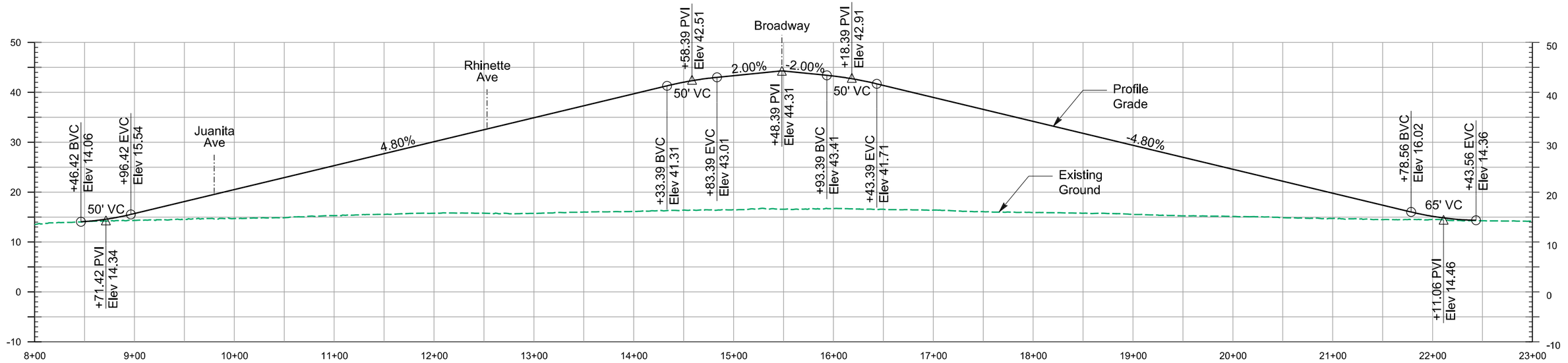
ALTERNATIVE D
RAIL AT-GRADE / ROADWAY ELEVATED

Alternative D

Roadway Plan



BROADWAY



CALIFORNIA DR

Broadway Grade Separation Study

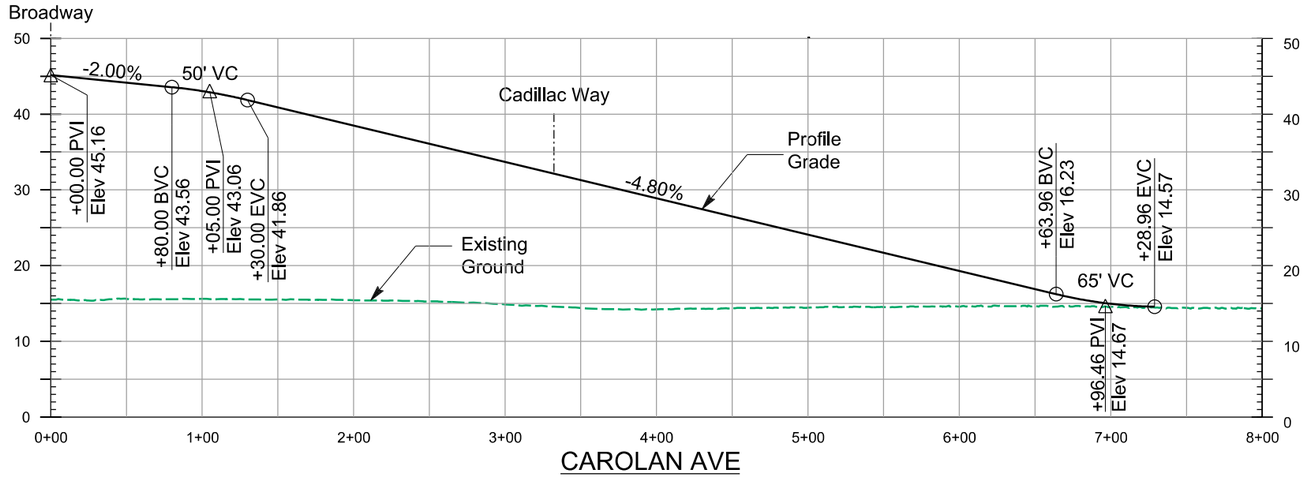
PRELIMINARY
FOR DISCUSSION PURPOSES ONLY

SCALE: Horiz 1" = 100'
Vert 1" = 10'

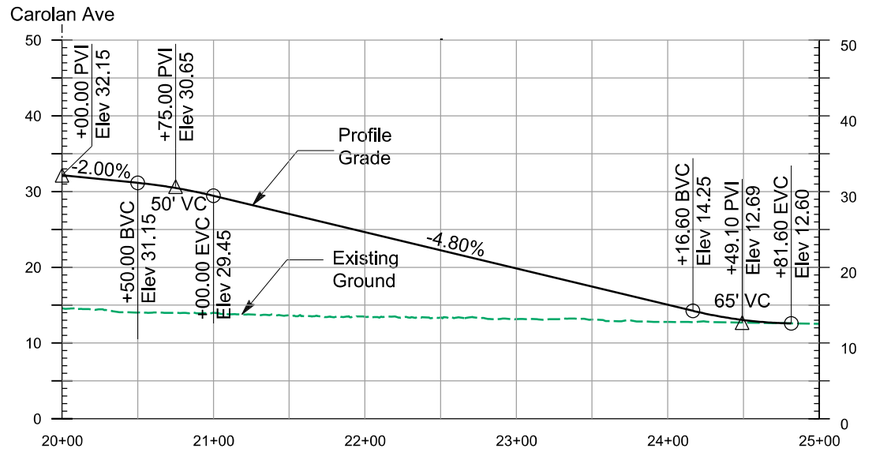
BROADWAY GATEWAY · Caltrain · San Mateo County Transportation Authority · AECOM

ALTERNATIVE D
RAIL AT-GRADE / ROADWAY ELEVATED

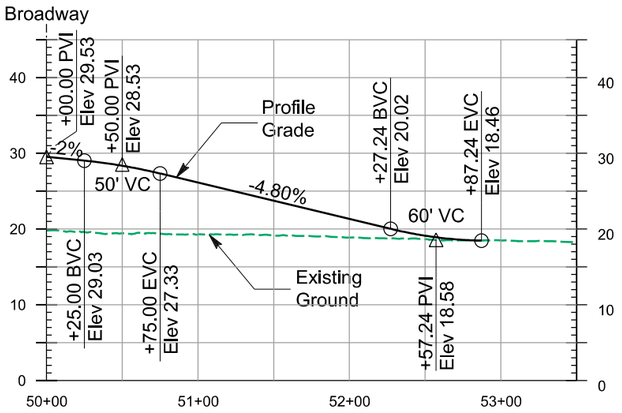
Alternative D
Roadway Profiles
Sheet 1 of 2



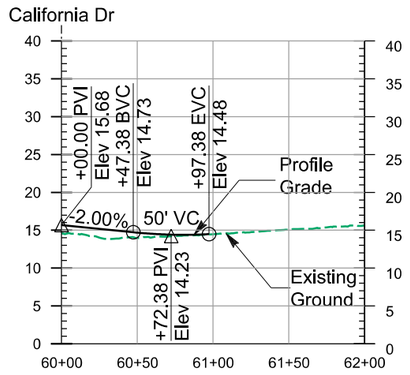
CAROLAN AVE



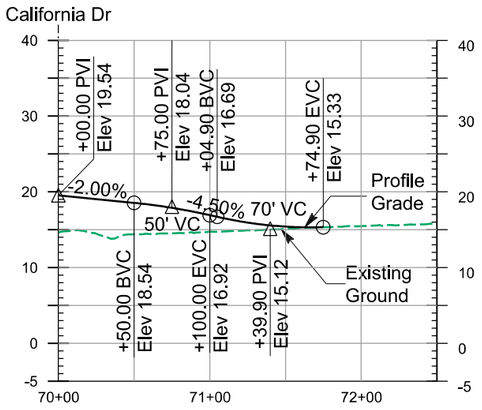
CADILLAC WAY



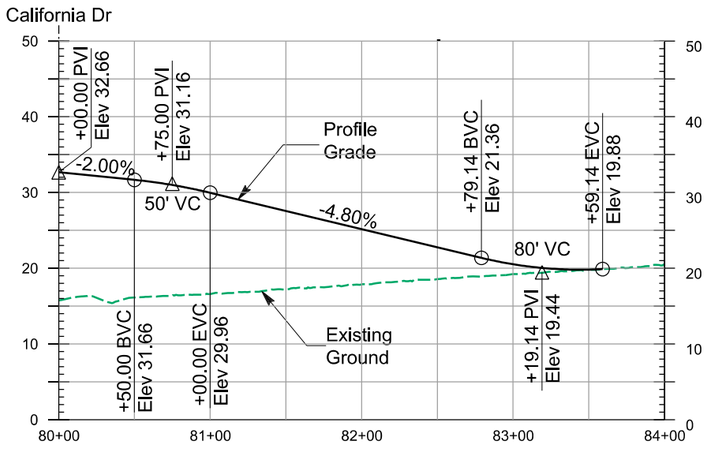
CHULA VISTA AVE



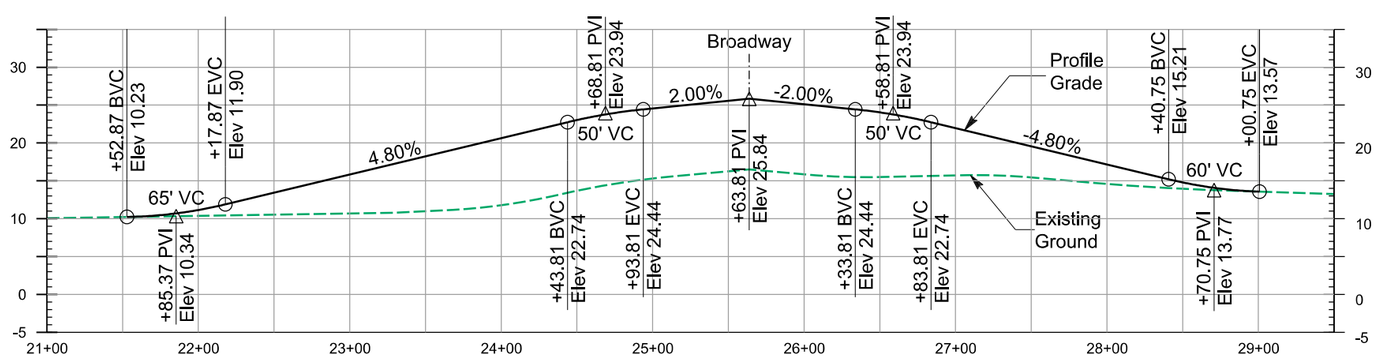
CARMELITA AVE



JUANITA AVE



RHINETTE AVE



ROLLINS RD

Broadway Grade Separation Study

PRELIMINARY
FOR DISCUSSION PURPOSES ONLY

SCALE: Horiz 1" = 100'
Vert 1" = 10'

BROADWAY GATEWAY · Caltrain · SAN MATEO COUNTY Transportation Authority · AECOM

ALTERNATIVE D
RAIL AT-GRADE / ROADWAY ELEVATED

Alternative D
Roadway Profiles
Sheet 2 of 2

Rollins Rd
"RLN" LINE
N. Carolan Ave
Valero
Mike Harvey Acura
Rector Audi/Porsche
"CAD" LINE
Cadillac Way
Northpark Apartments
Carolan Ave
"CRL" LINE
Car Wash
Caltrain
To San Francisco
To San Jose
California Dr
Lincoln Ave
"JUA" LINE
Juanita Ave
Rhinette Ave
"RHI" LINE
Goodwill
A & A Gas & Mart
Broadway
"BWY" LINE
Chevron
First Republic Bank
Wells Fargo
Chula vista Ave
"CHU" LINE
"CAL" LINE
Carmelita Ave
"CAR" LINE

LEGEND:

- Track
- Retaining Wall
- Caltrain Right-of-Way
- Right-of-Way Take
- Permanent Easement from SMCTA/Caltrain
- Permanent Easement from City/County of SF
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- Median / Curbed Island
- Sidewalk
- Driveway Access Issues
- Limits of Railroad Modifications
- Railroad Operations Conflict
- 100 Year Flood Zone

Broadway Grade Separation Study

PRELIMINARY
FOR DISCUSSION PURPOSES ONLY

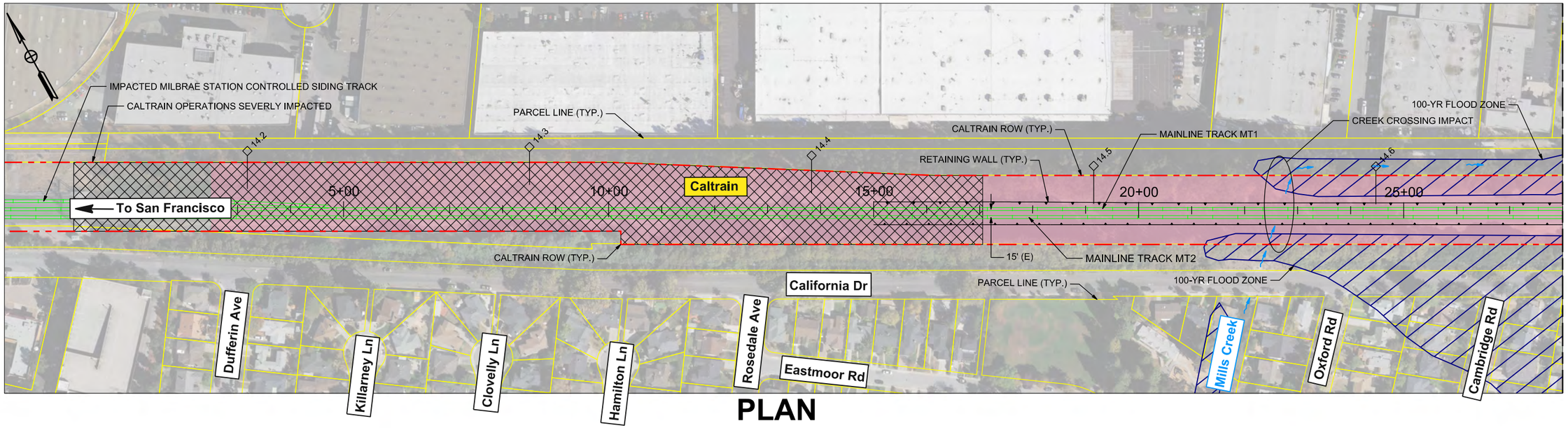
SCALE: 1" = 150'

BROADWAY GATEWAY
Caltrain
SAN MATEO COUNTY Transportation Authority
AECOM

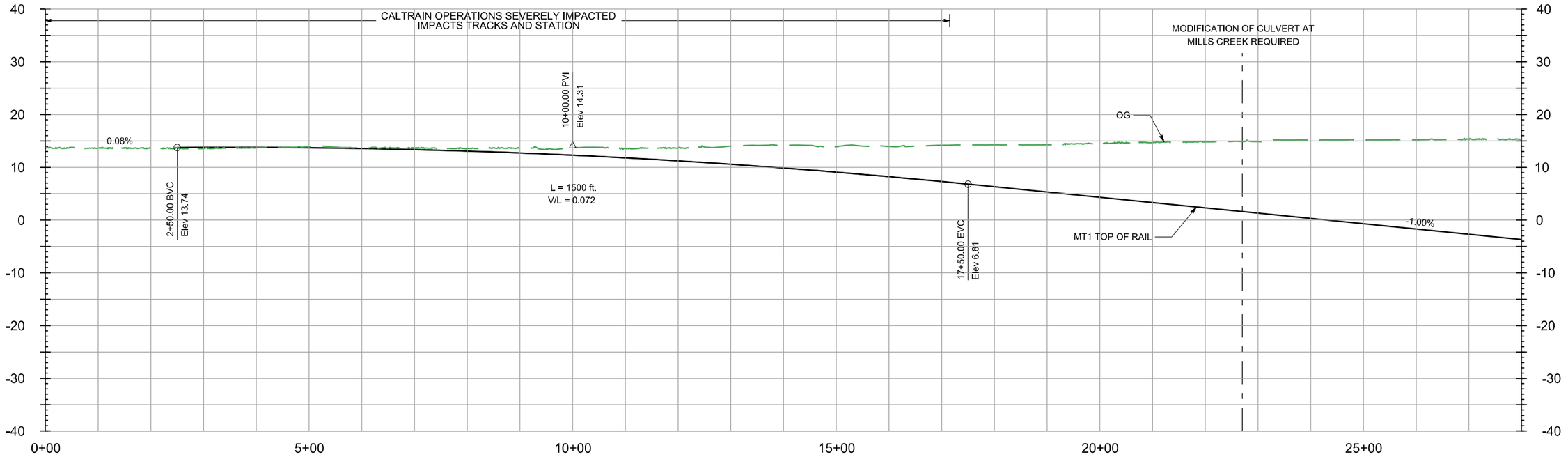
ALTERNATIVE E
RAIL DEPRESSED / ROADWAY AT-GRADE

Alternative E

Roadway Plan



PLAN



PROFILE

Broadway Grade Separation Study

PRELIMINARY
FOR DISCUSSION PURPOSES ONLY

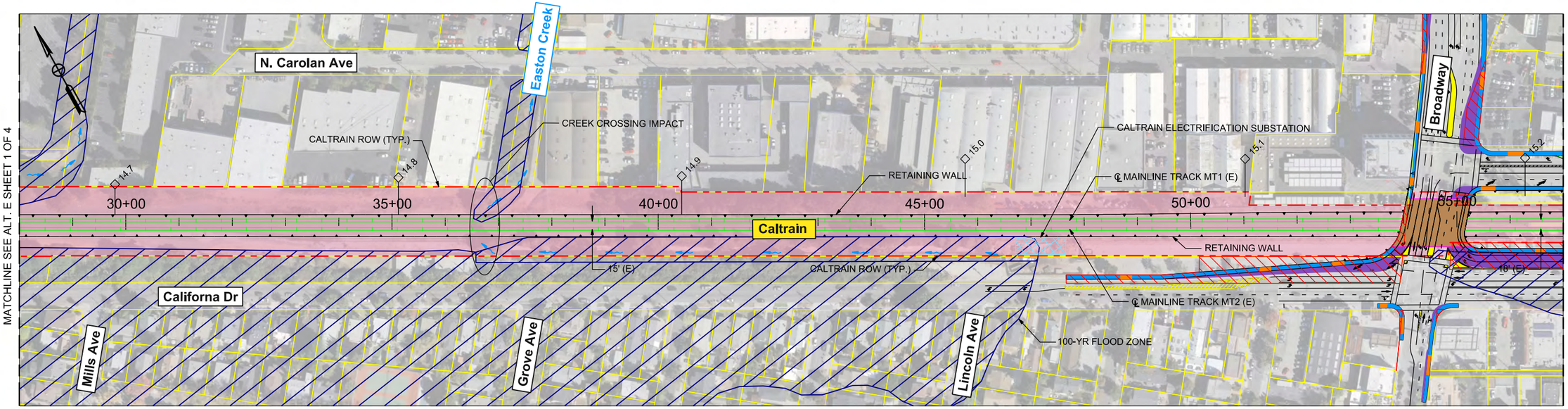
SCALE: 1" = 200'

FOR LEGEND, SEE
"ALTERNATIVE E ROADWAY PLAN"

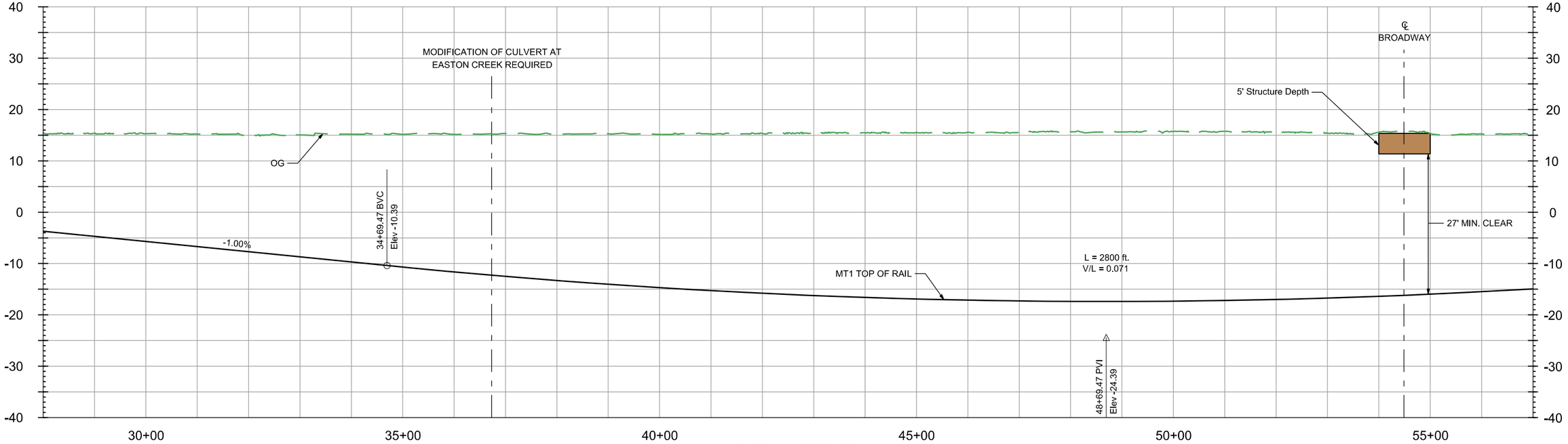
BROADWAY GATEWAY
Caltrain
SAN MATEO COUNTY Transportation Authority
AECOM

ALTERNATIVE E
RAIL DEPRESSED / ROADWAY AT-GRADE

Alternative E
Track Plan and Profile
Sheet 1 of 4



PLAN



PROFILE

Broadway Grade Separation Study

PRELIMINARY
FOR DISCUSSION PURPOSES ONLY

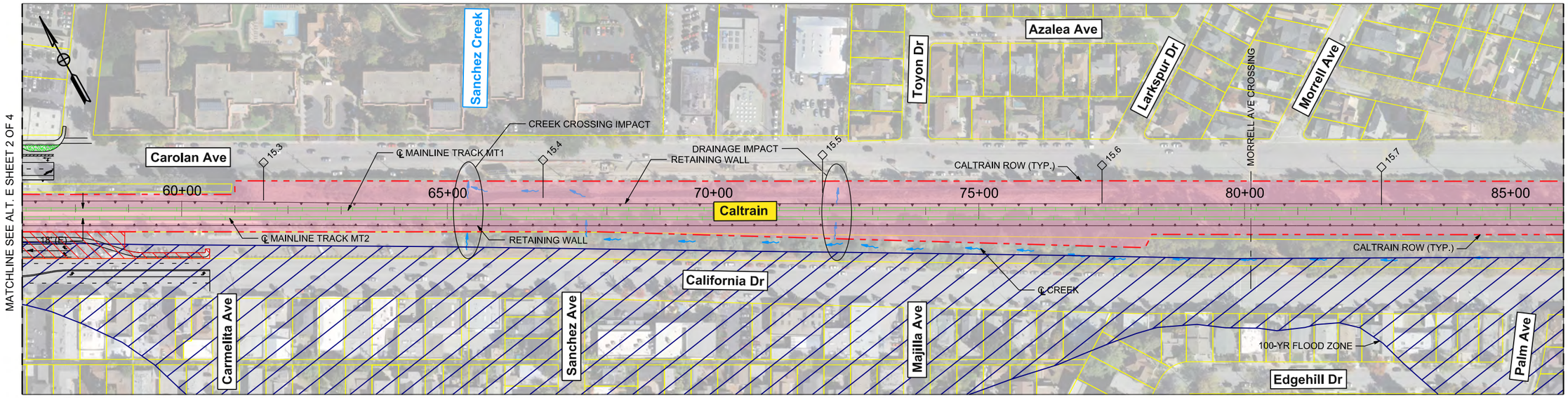
SCALE: 1" = 200'

FOR LEGEND, SEE
"ALTERNATIVE E ROADWAY PLAN"

BROADWAY GATEWAY
Caltrain
SAN MATEO COUNTY Transportation Authority
AECOM

ALTERNATIVE E
RAIL DEPRESSED / ROADWAY AT-GRADE

Alternative E
Track Plan and Profile
Sheet 2 of 4



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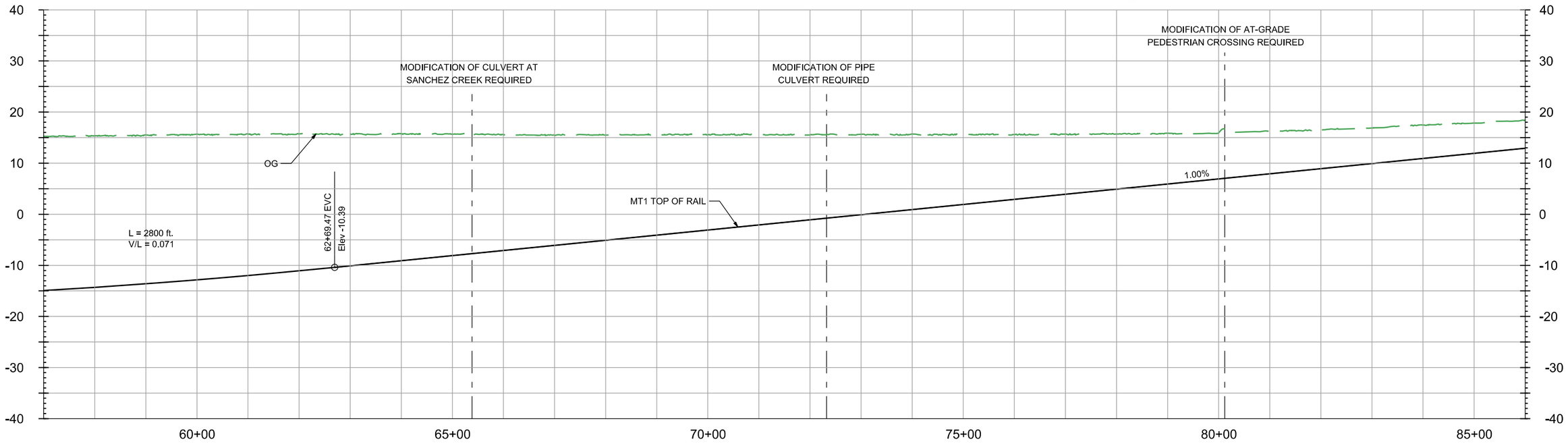


PROFILE

Broadway Grade Separation Study

PRELIMINARY
FOR DISCUSSION PURPOSES ONLY

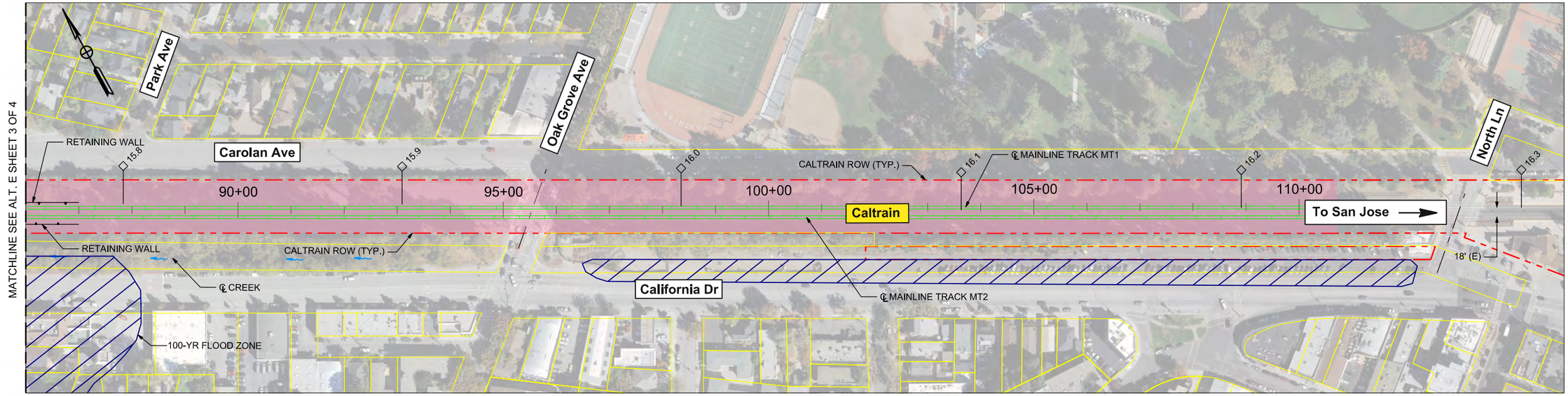
SCALE: 1" = 200'

FOR LEGEND, SEE
"ALTERNATIVE E ROADWAY PLAN"

BROADWAY GATEWAY
Caltrain
SAN MATEO COUNTY Transportation Authority
AECOM

ALTERNATIVE E
RAIL DEPRESSED / ROADWAY AT-GRADE

Alternative E
Track Plan and Profile
Sheet 3 of 4



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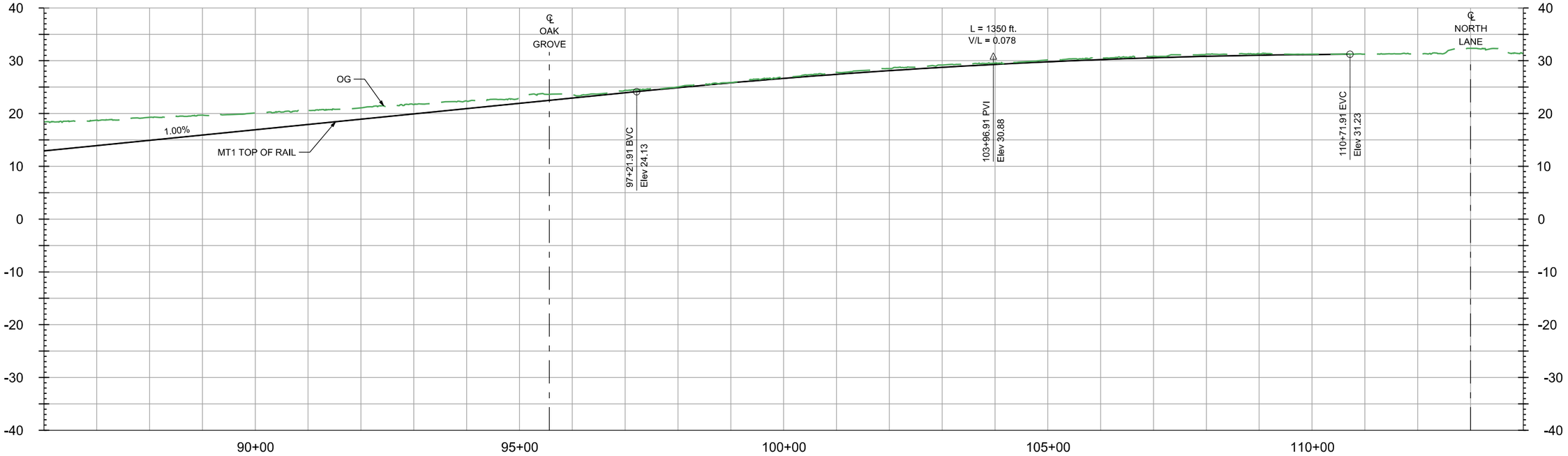

PROFILE

Broadway Grade Separation Study

PRELIMINARY
FOR DISCUSSION PURPOSES ONLY

SCALE: 1" = 200'

FOR LEGEND, SEE
"ALTERNATIVE E ROADWAY PLAN"

BROADWAY GATEWAY
Caltrain
SAN MATEO COUNTY Transportation Authority
AECOM

ALTERNATIVE E
RAIL DEPRESSED / ROADWAY AT-GRADE

Alternative E
Track Plan and Profile
Sheet 4 of 4

Rollins Rd

"RLN" LINE

N. Carolan Ave

Valero

Mike Harvey Acura

Rector Audi/Porsche

"CAD" LINE

Cadillac Way

Northpark Apartments

Carolan Ave

"CRL" LINE

Car Wash

To San Francisco

Caltrain

To San Jose

California Dr

Lincoln Ave

"JUA" LINE

Juanita Ave

Rhinette Ave

"RHI" LINE

Goodwill

A & A Gas & Mart

Broadway

"BWY" LINE

Chevron

First Republic Bank

Wells Fargo

Chula vista Ave

"CHU" LINE

"CAL" LINE

Carmelita Ave

"CAR" LINE

LEGEND:

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- Caltrain Right-of-Way
- Right-of-Way Take
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- Permanent Easement from City/County of SF
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- Sidewalk
- Driveway Access Issues
- Limits of Railroad Modifications
- Railroad Operations Conflict
- 100 Year Flood Zone

Broadway Grade Separation Study

PRELIMINARY
FOR DISCUSSION PURPOSES ONLY

SCALE: 1" = 150'

BROADWAY GATEWAY

Caltrain

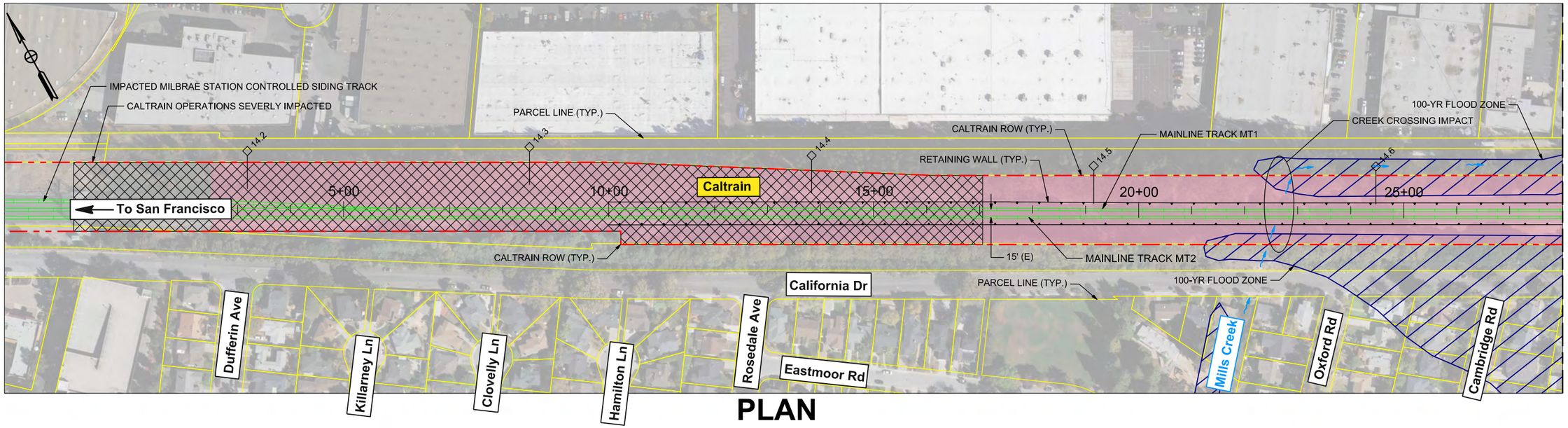
SAN MATEO COUNTY Transportation Authority

AECOM

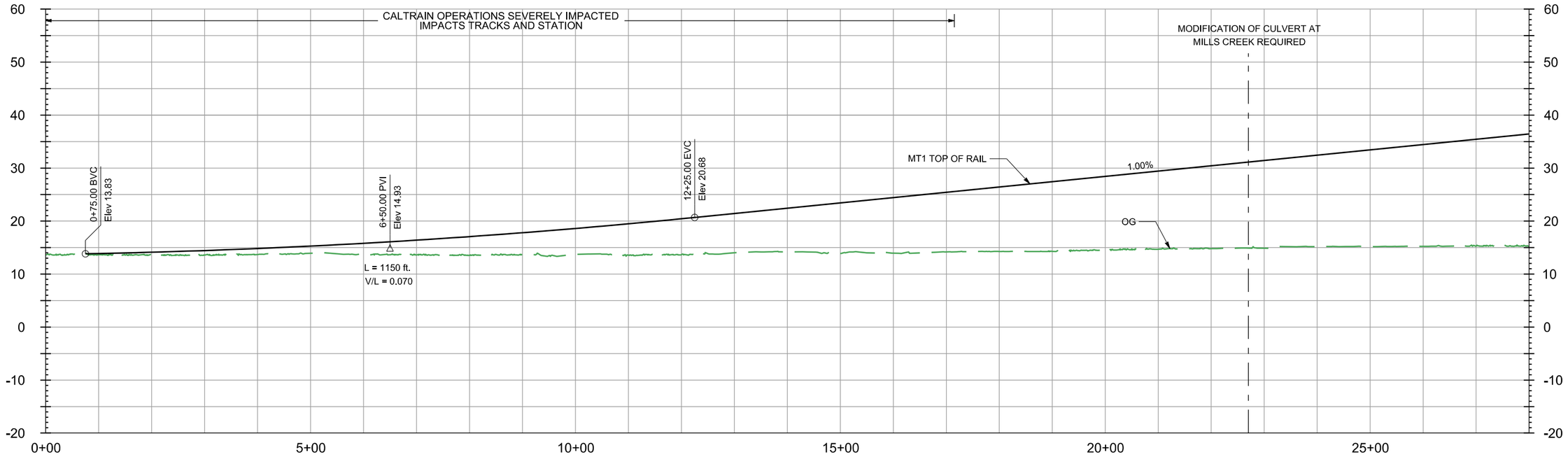
ALTERNATIVE F
RAIL ELEVATED / ROADWAY AT-GRADE

Alternative F

Roadway Plan



PLAN



PROFILE

Broadway Grade Separation Study

PRELIMINARY
FOR DISCUSSION PURPOSES ONLY

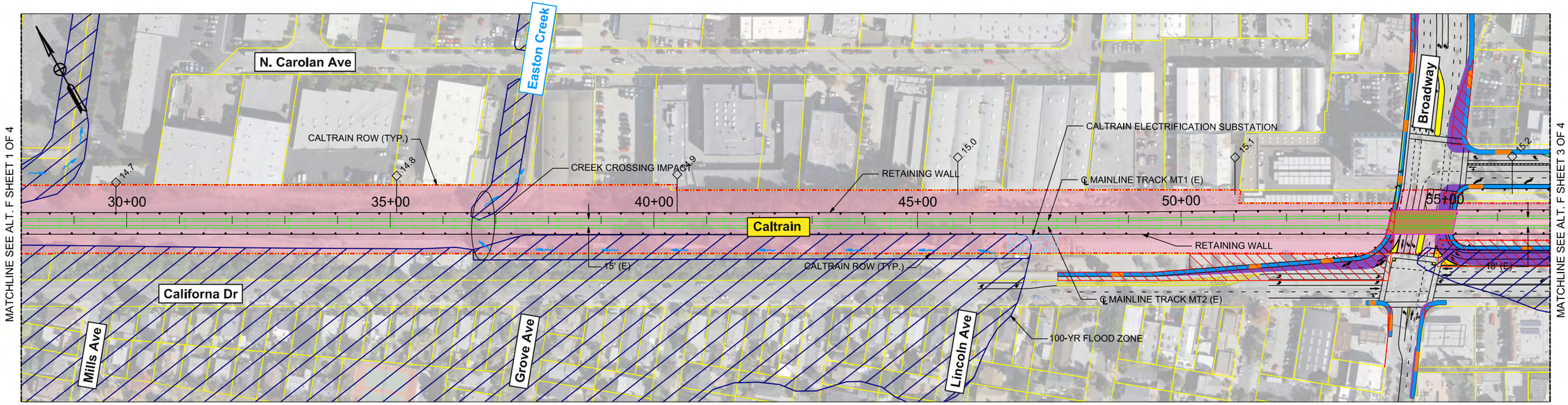
SCALE: 1" = 200'

FOR LEGEND, SEE
"ALTERNATIVE F ROADWAY PLAN"

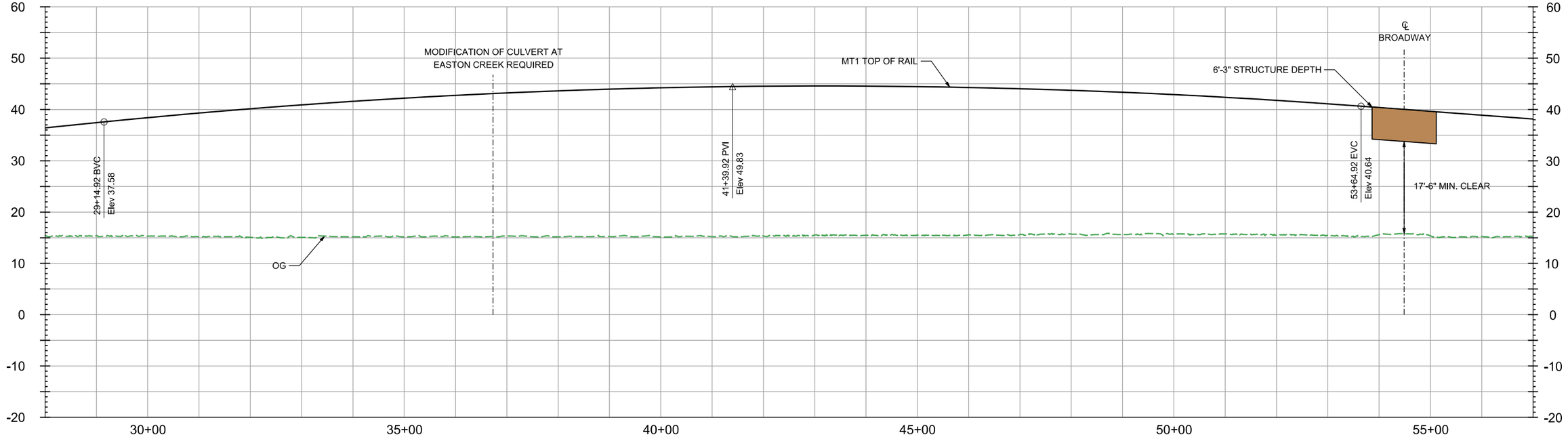
BROADWAY GATEWAY
Caltrain
SAN MATEO COUNTY Transportation Authority
AECOM

ALTERNATIVE F
RAIL ELEVATED / ROADWAY AT-GRADE

Alternative F
Track Plan and Profile
Sheet 1 of 4



PLAN



PROFILE

Broadway Grade Separation Study

PRELIMINARY
FOR DISCUSSION PURPOSES ONLY

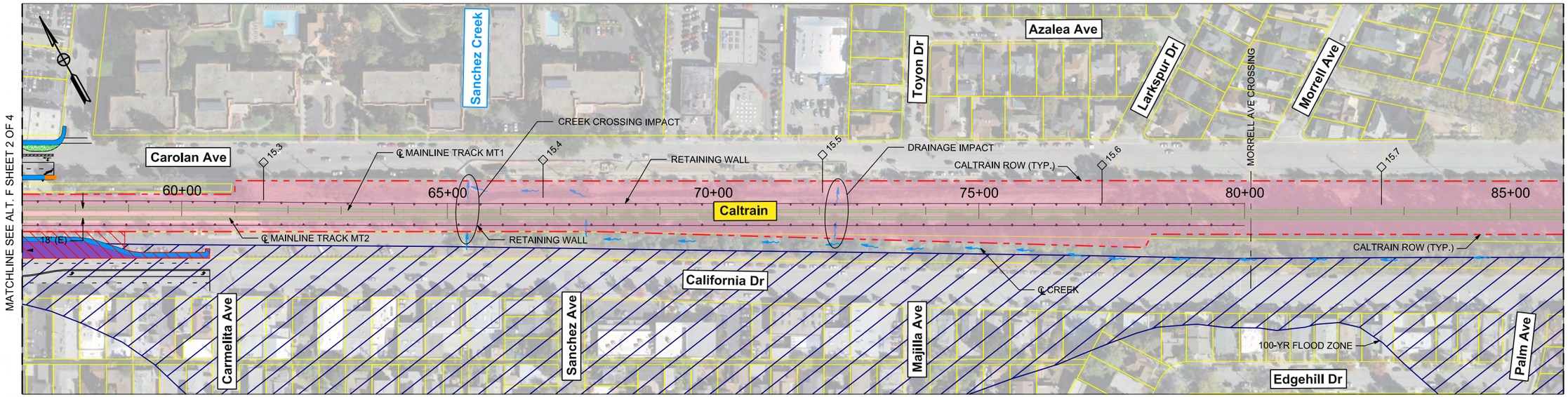
SCALE: 1" = 200'

FOR LEGEND, SEE
"ALTERNATIVE F ROADWAY PLAN"

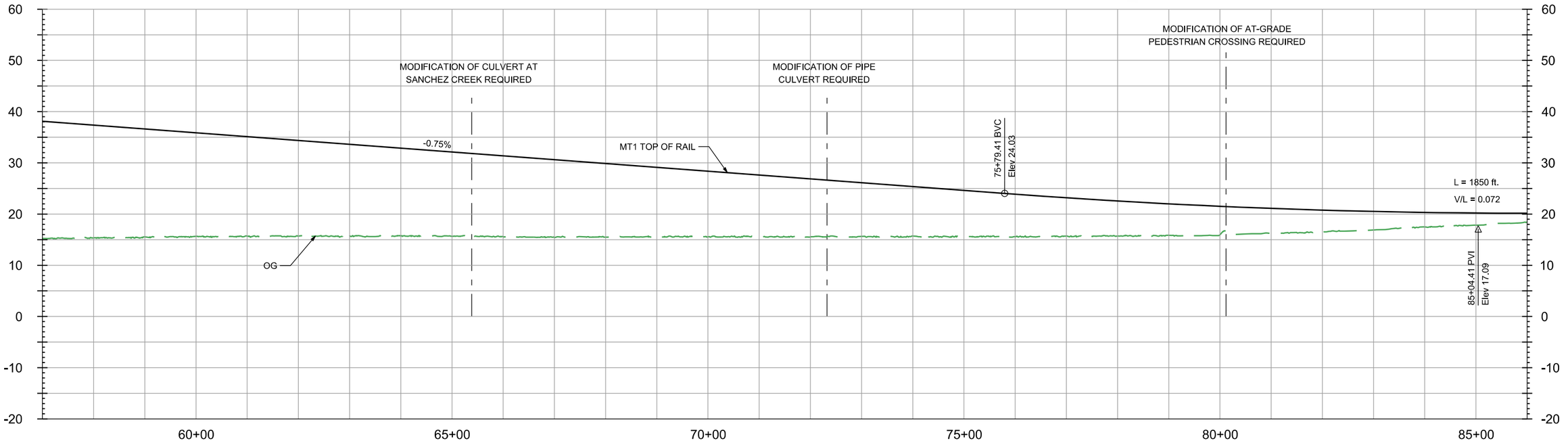
BROADWAY GATEWAY
Caltrain
SAN MATEO COUNTY Transportation Authority
AECOM

ALTERNATIVE F
RAIL ELEVATED / ROADWAY AT-GRADE

Alternative F
Track Plan and Profile
Sheet 2 of 4



PLAN



PROFILE

Broadway Grade Separation Study

PRELIMINARY
FOR DISCUSSION PURPOSES ONLY

SCALE: 1" = 200'

FOR LEGEND, SEE "ALTERNATIVE F ROADWAY PLAN"

BROADWAY GATEWAY

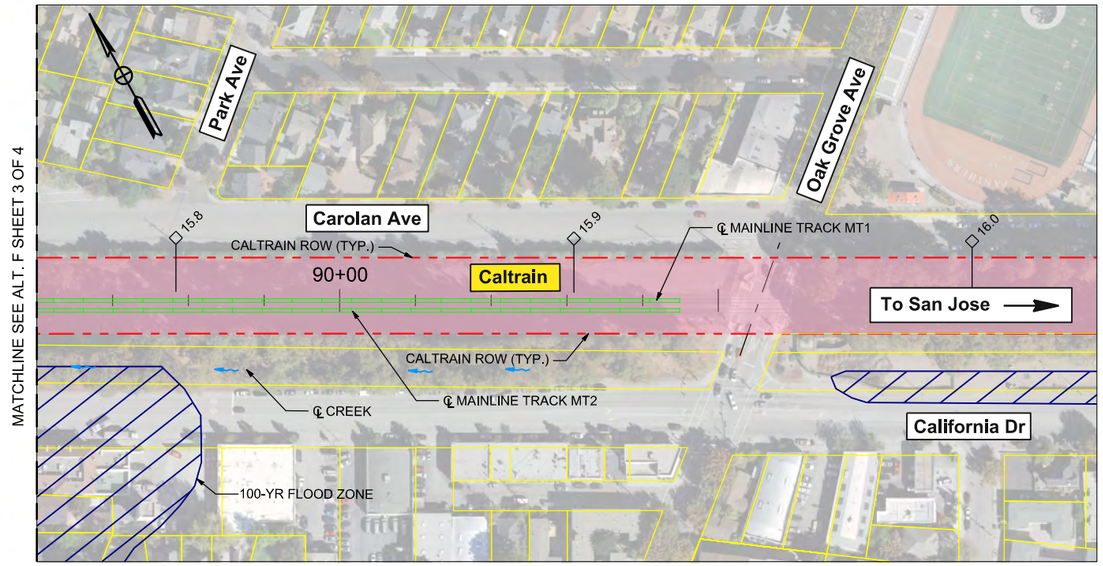
Caltrain

SAN MATEO COUNTY Transportation Authority

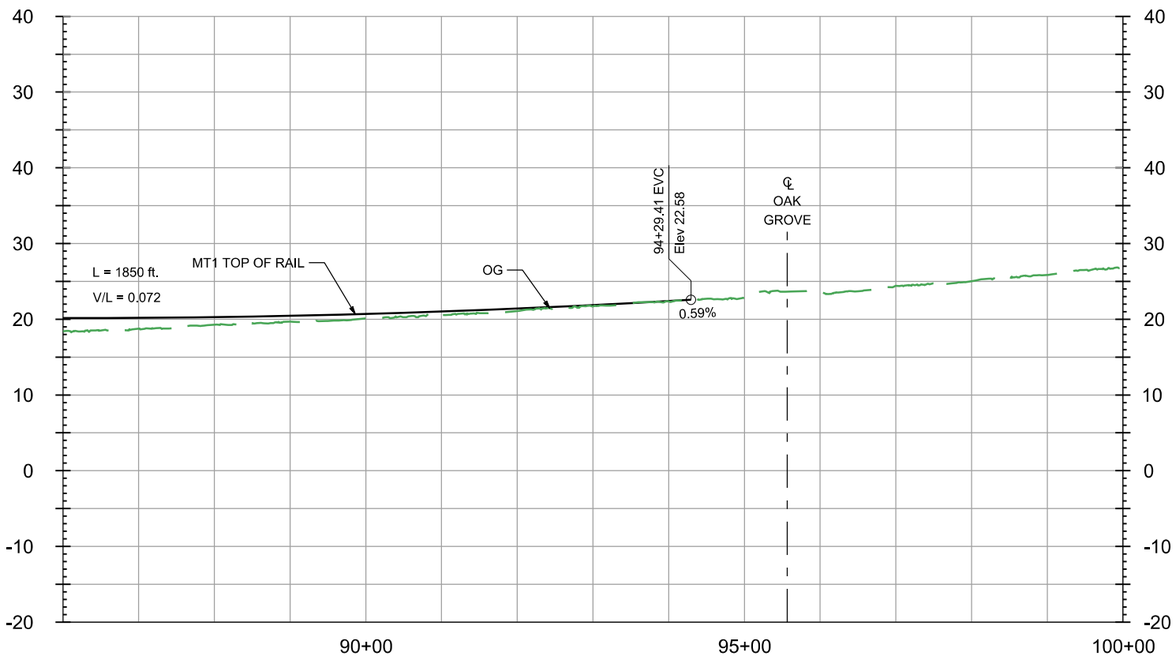
AECOM

ALTERNATIVE F
RAIL ELEVATED / ROADWAY AT-GRADE

Alternative F
Track Plan and Profile
Sheet 3 of 4



PLAN



PROFILE

Broadway Grade Separation Study

PRELIMINARY
FOR DISCUSSION PURPOSES ONLY

SCALE: 1" = 200'

FOR LEGEND, SEE "ALTERNATIVE F ROADWAY PLAN"

BROADWAY GATEWAY

Caltrain

SAN MATEO COUNTY Transportation Authority

AECOM

ALTERNATIVE F
RAIL ELEVATED / ROADWAY AT-GRADE

Alternative F
Track Plan and Profile
Sheet 4 of 4

ATTACHMENT C – FIRM MAPS FOR SAN MATEO COUNTY AND INCORPORATED AREAS

JOINS PANEL 0132

6015000 FT

122°22'30"

37°35'37.5"

1% ANNUAL CHANCE FLOOD DISCHARGE CONTAINED IN CHANNEL

S ASHTON AVENUE

ZONE X

82

ZONE X

MEADOW LANE

ALBEMARLE WAY

WESTMOOR ROAD

BALBOA WAY

CORONADO WAY

1% ANNUAL CHANCE FLOOD DISCHARGE CONTAINED IN CHANNEL

ZONE A

LASSEN WAY

MARCO POLO WAY

RAY DRIVE

MCDONALD WAY

ZONE A

ZONE A

MONTE CORVINO WAY

DEVEREUX DRIVE

CORTEZ AVENUE

QUESADA WAY

CABRILLO AVENUE

DRAKE AVENUE

CITY OF MILLBRAE

CITY OF BURLINGAME

Mills Creek

BERNAL AVENUE

LIMIT OF STUDY

VANCOUVER AVENUE

ADELINE DRIVE

ZONE A

VALDIVIA WAY

COLUMBUS AVENUE

VALDIVIA COURT

4160 000m N

1% ANNUAL CHANCE FLOOD DISCHARGE CONTAINED IN CULVERT

TROUSDALE DRIVE

HOOVER AVENUE

ZONE X

MAP SCALE 1" = 500'

250 0 500 1000 FEET

0 150 300 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0134E

FIRM

FLOOD INSURANCE RATE MAP

SAN MATEO COUNTY, CALIFORNIA AND INCORPORATED AREAS

PANEL 134 OF 510

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
BURLINGAME, CITY OF	065019	0134	E
MILLBRAE, CITY OF	065045	0134	E
HILLSBOROUGH, TOWN OF	060320	0134	E
SAN MATEO COUNTY	060311	0134	E

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
06081C0134E

EFFECTIVE DATE
OCTOBER 16, 2012

Federal Emergency Management Agency

2°22'30"
5'
6020000 FT
JOINS PANEL 0151

MAP SCALE 1" = 500'
250 0 500 1000 FEET
0 150 300 METERS

ZONE X
1% ANNUAL CHANCE FLOOD DISCHARGE CONTAINED IN CHANNEL
Mills Creek
Culvert
ZONE A
EDWARDS COURT
ZONE A
Underground Storm Drain
ZONE X
Easton Creek
ZONE VE
(EL 10)
BAYSHORE HIGHWAY
ZONE AE
(EL 10)
Culvert
ZONE A
1% ANNUAL CHANCE FLOOD DISCHARGE CONTAINED IN CHANNEL
Culvert
OXFORD ROAD
Culvert
ZONE A
Culvert
ZONE X
ZONE X
CAMBRIDGE ROAD
MILLS AVENUE
1% ANNUAL CHANCE FLOOD DISCHARGE CONTAINED IN CHANNEL
ZONE AH
(EL 14)
ROLLINS ROAD
ZONE A
ZONE X
HIGHWAY ROAD
MARQUITA AVENUE
HT0554
WHITEHORN WAY
CALIFORNIA DRIVE
CADILLAC WAY
ZONE AE
(EL 10)
82
SUMMER AVENUE
Underground Storm Drain
GROVE AVENUE
JUANITA AVENUE
RHINETTE AVENUE
LINCOLN AVENUE
CAROLAN AVENUE
ROSE COURT
ZONE X
HILLSIDE DRIVE
BALBOA AVENUE
CORTEZ AVENUE
EASTON DR
BROADWAY ROAD
CHULA VISTA AVENUE
LAGUNA AVENUE
TOYON DRIVE
AZALEA AVENUE
LARKSPUR DRIV
CABRILLO AVENUE
Culvert
ZONE A
ZONE A
SHERMAN AVENUE
PALOMA AVENUE
ZONE AH
(EL 16)
ZONE X
1% ANNUAL CHANCE FLOOD DISCHARGE CONTAINED IN CHANNEL
Culvert
CAPUCHINO AVENUE
DRAKE AVENUE
Culvert
Underground Storm Drain
SANCHEZ AVENUE
MAJILLA AVENUE
BERNAL AVENUE
ZONE A
1% ANNUAL CHANCE FLOOD DISCHARGE CONTAINED IN CHANNEL
ZONE A
ZONE X
ACACIA DRIVE
VANCOUVER AVENUE
Underground Storm Drain
Sanchez Creek
Culvert
NEUCHATE
1% ANNUAL CHANCE FLOOD DISCHARGE CONTAINED IN CHANNEL
ZONE A
EDGEHILL DRIVE
CROSSWAY ROA
ZONE A
Culvert
FARRINGDON LANE
EASTON DRIVE
Easton Creek
ZONE X
Culvert
Culvert
FOREST VIEW AVENUE
PALM DRIVE
CITY OF

NFIP
PANEL 0153E

FIRM
FLOOD INSURANCE RATE MAP
SAN MATEO COUNTY, CALIFORNIA
AND INCORPORATED AREAS

PANEL 153 OF 510

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
BURLINGAME, CITY OF	065019	0153	E
SAN MATEO, CITY OF	060328	0153	E
HILLSBOROUGH, TOWN OF	060320	0153	E

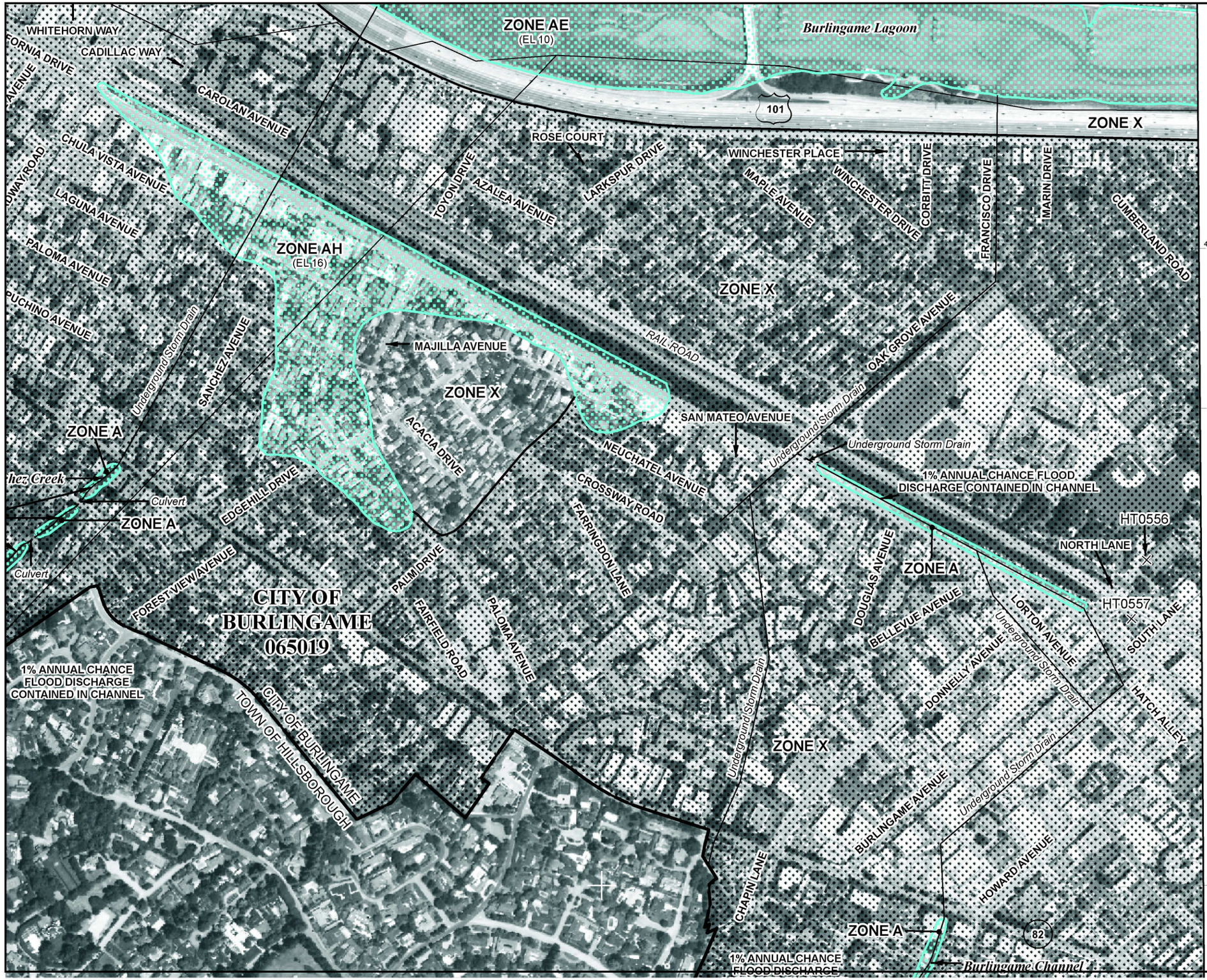
Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
06081C0153E

EFFECTIVE DATE
OCTOBER 16, 2012

Federal Emergency Management Agency

NATIONAL FLOOD INSURANCE PROGRAM



MAP SCALE 1" = 500'

250 0 500 1000 FEET

0 150 300 METERS

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0153E

FIRM

FLOOD INSURANCE RATE MAP

SAN MATEO COUNTY, CALIFORNIA AND INCORPORATED AREAS

PANEL 153 OF 510

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
BURLINGAME, CITY OF	065019	0153	E
SAN MATEO, CITY OF	060328	0153	E
HILLSBOROUGH, TOWN OF	060320	0153	E

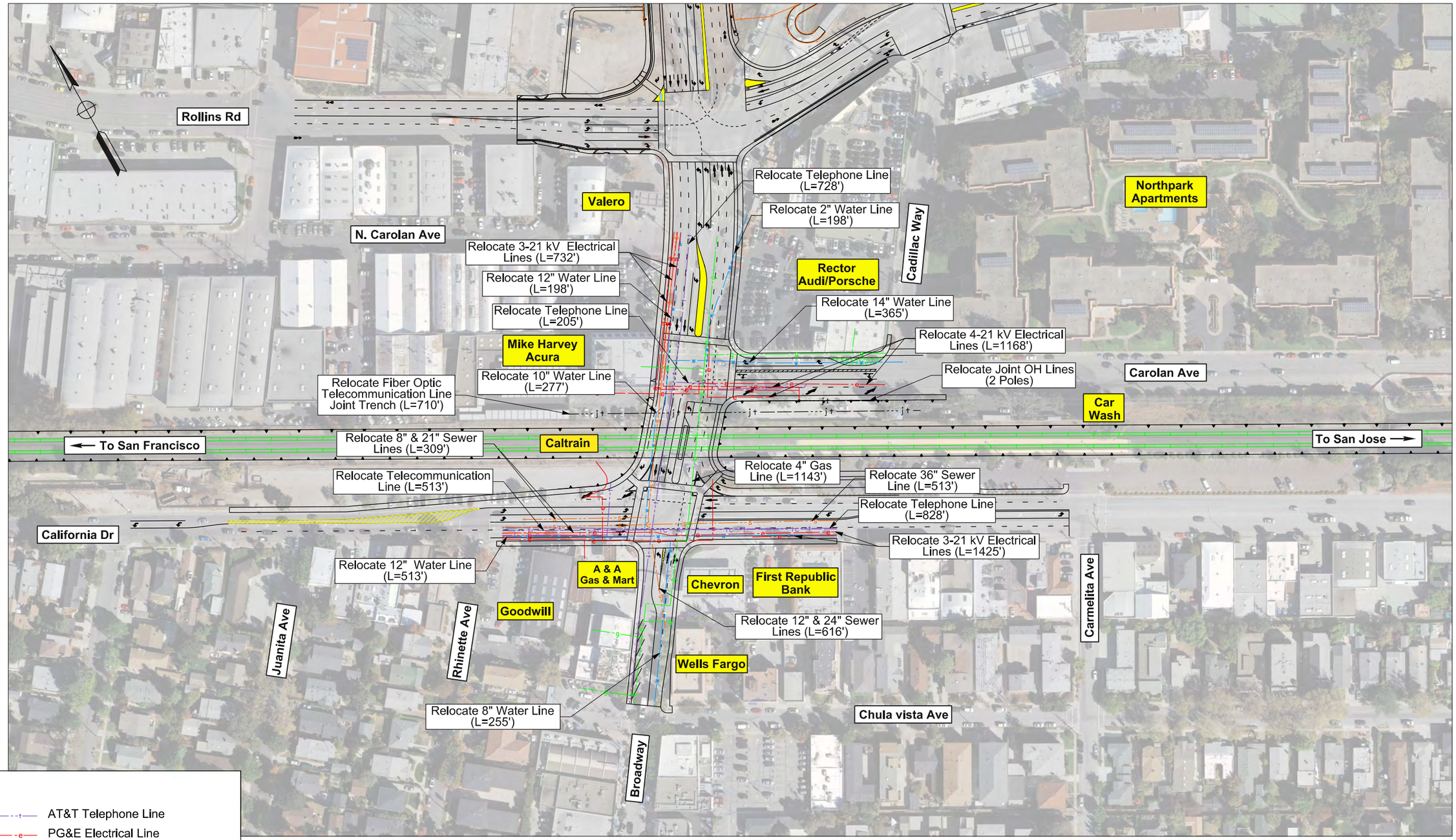
Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
06081C0153E

EFFECTIVE DATE
OCTOBER 16, 2012

Federal Emergency Management Agency

ATTACHMENT D – PRELIMINARY UTILITY PLANS AND RELOCATION COSTS



LEGEND:

- AT&T Telephone Line
- PG&E Electrical Line
- PG&E Gas Line
- UG Joint Trench (Sprint Fiber Optic and Verizon Telecommunication)
- Zayo Telecommunication Line
- Water Line
- Sanitary Sewer Line
- Joint Overhead Line (PG&E Electrical, Comcast TV and Wave Broadband)

NOTE: For clarity, only existing utilities to be relocated for this alternative are shown.

Broadway Grade Separation Study

PRELIMINARY
FOR DISCUSSION PURPOSES ONLY

SCALE: 1" = 150'

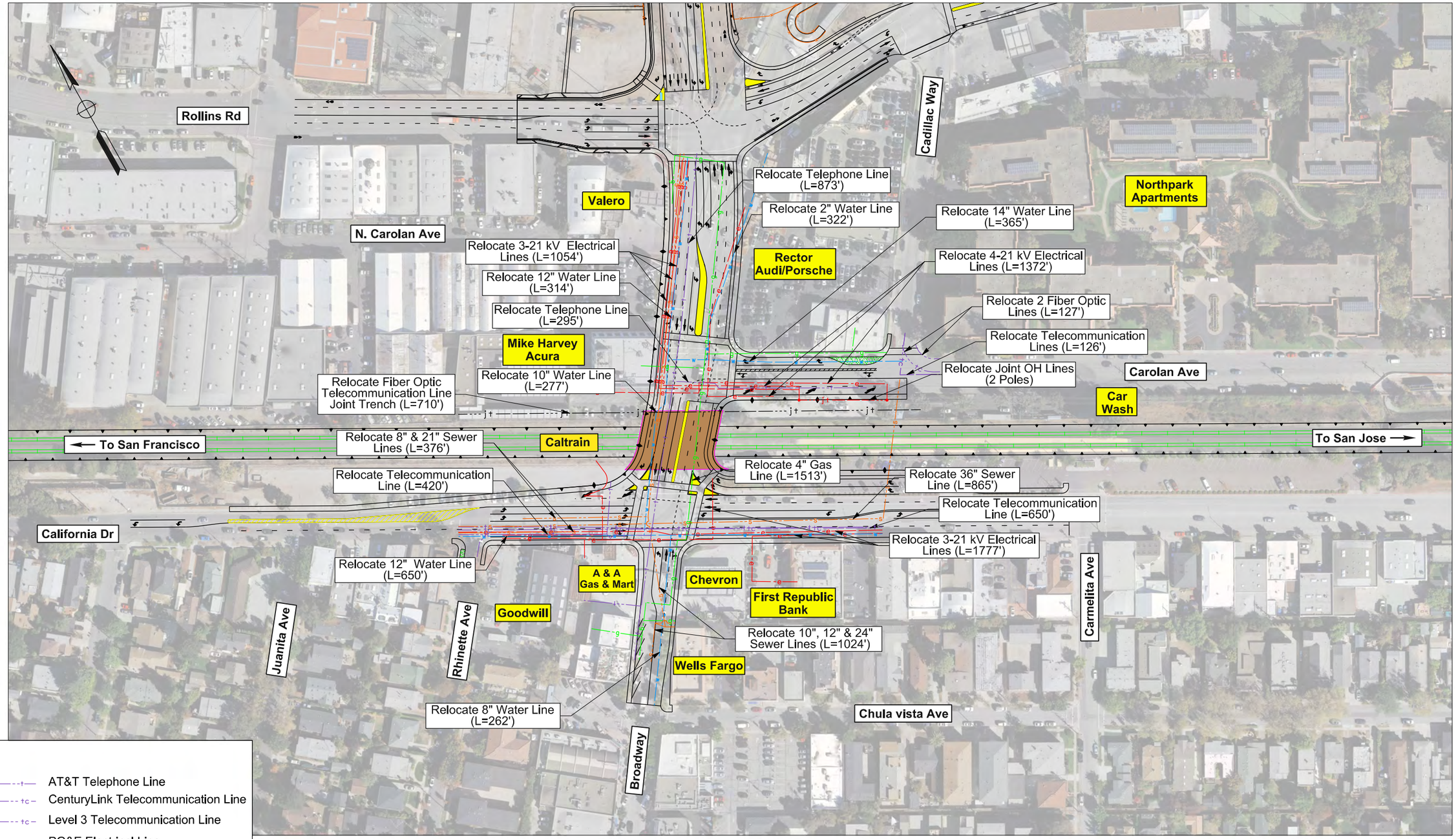
Alternative A
Utility Plan

ALTERNATIVE A
RAIL PARTIALLY ELEVATED / ROADWAY PARTIALLY DEPRESSED

Utility Relocation Summary - Alternative A				
Utility Description	Quantity	Unit	Unit Cost	Total Cost
12" Water & 14" Water	1076	LF	$ 350	$ 376,600
10" Water	277	LF	$ 300	$ 83,100
8" Water	255	LF	$ 250	$ 63,750
2" Water	234	LF	$ 230	$ 53,820
Wave Broadband TV OH (Joint Pole with PG&E & Comcast)	2	EA	$ 50,000	$ 100,000
Comcast OH (Joint Pole with PG&E & Wave Broadband)	2	EA	$ 50,000	$ 100,000
16 kV PG&E Electrical OH (Joint Pole Relocations)	2	EA	$ 80,000	$ 160,000
16kV & 21kV PG&E Underground Electrical	3325	LF	$ 500	$ 1,662,500
PG&E Gas	1143	LF	$ 500	$ 571,500
Verizon & Sprint UG Joint line (Telecommunication & Fiber Optic)	538	LF	$ 500	$ 269,000
Zayo UG Telecommunication	513	LF	$ 500	$ 256,500
Sanitary Sewer Relocation (8", 12", 24" & 36")	1437	LF	$ 500	$ 718,500
Sanitary Sewer Pump Station	1	EA	$ 250,000	$ 250,000
AT&T Cable	1761	LF	$ 300	$ 528,300
			Subtotal	$ 5,193,570

50% Contingency	$ 2,596,785
Grand Total*	$ 7,800,000

* Rounded up to the nearest $100k.



LEGEND:

- AT&T Telephone Line
- CenturyLink Telecommunication Line
- Level 3 Telecommunication Line
- PG&E Electrical Line
- PG&E Gas Line
- UG Joint Trench (Sprint Fiber Optic and Verizon Telecommunication)
- Zayo Telecommunication Line
- Water Line
- Sanitary Sewer Line
- Joint Overhead Line (PG&E Electrical, Comcast TV and Wave Broadband)

Broadway Grade Separation Study

PRELIMINARY
FOR DISCUSSION PURPOSES ONLY

SCALE: 1" = 150'

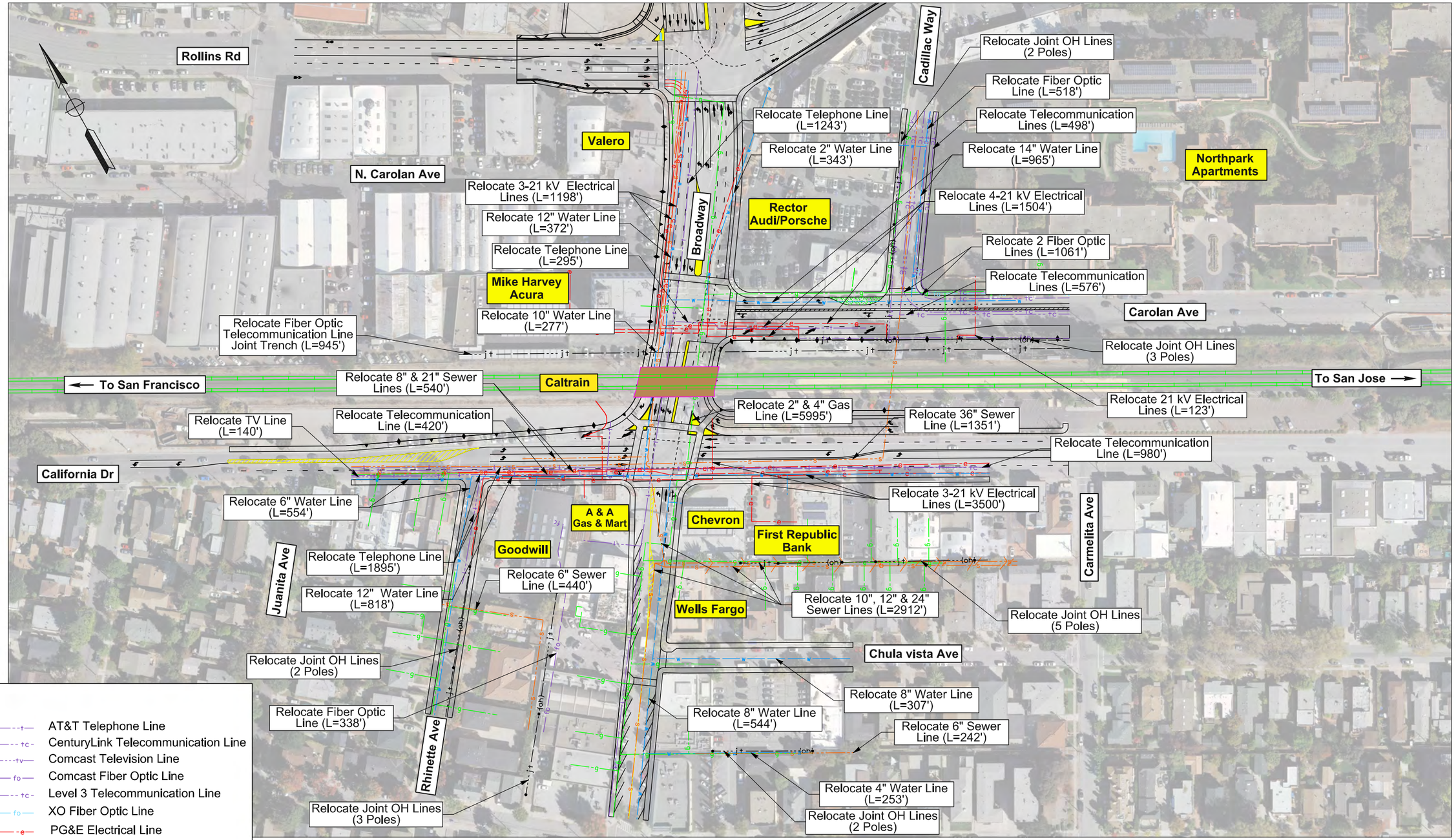
NOTE: For clarity, only existing utilities to be relocated for this alternative are shown.

ALTERNATIVE B
RAIL PARTIALLY DEPRESSED / ROADWAY PARTIALLY ELEVATED

Alternative B
Utility Plan

Utility Relocation Summary - Alternative B				
Utility Description	Quantity	Unit	Unit Cost	Total Cost
12" Water & 14" Water	1329	LF	$ 350	$ 465,150
10" Water	277	LF	$ 300	$ 83,100
8" Water	262	LF	$ 250	$ 65,500
2" Water	322	LF	$ 230	$ 74,060
Wave Broadband TV OH (Joint Pole with PG&E & Comcast)	2	EA	$ 50,000	$ 100,000
Comcast OH (Joint Pole with PG&E & Wave Broadband)	2	EA	$ 50,000	$ 100,000
Level 3 Fiber Optic	127	LF	$ 600	$ 76,200
16 kV PG&E Electrical OH (Pole Relocations)	2	EA	$ 80,000	$ 160,000
16kV & 21kV PG&E Underground Electrical	4203	LF	$ 500	$ 2,101,500
PG&E Gas	1513	LF	$ 500	$ 756,500
Verizon & Sprint UG Joint line (Telecommunication & Fiber Optic)	710	LF	$ 500	$ 355,000
Zayo UG Telecommunication	650	LF	$ 500	$ 325,000
Sanitary Sewer Relocation (8", 12", 24" & 36")	2265	LF	$ 500	$ 1,132,500
Sanitary Sewer Pump Station	1	EA	$ 350,000	$ 350,000
AT&T Cable	2238	LF	$ 300	$ 671,400
CenturyLink Telecommunication	126	LF	$ 600	$ 75,600
			Subtotal	$ 6,891,510
50% Contingency				$ 3,445,755
Grand Total*				$ 10,400,000

* Rounded up to the nearest $100k.



LEGEND:

- AT&T Telephone Line
- CenturyLink Telecommunication Line
- Comcast Television Line
- Comcast Fiber Optic Line
- Level 3 Telecommunication Line
- XO Fiber Optic Line
- PG&E Electrical Line
- PG&E Gas Line
- UG Joint Trench (Sprint Fiber Optic and Verizon Telecommunication)
- Verizon Telecommunication Line
- Zayo Telecommunication Line
- Water Line
- Sanitary Sewer Line
- Joint Overhead Line (PG&E Electrical, Comcast TV and Wave Broadband)

NOTE: For clarity, only existing utilities to be relocated for this alternative are shown.

Broadway Grade Separation Study

PRELIMINARY
FOR DISCUSSION PURPOSES ONLY

SCALE: 1" = 150'

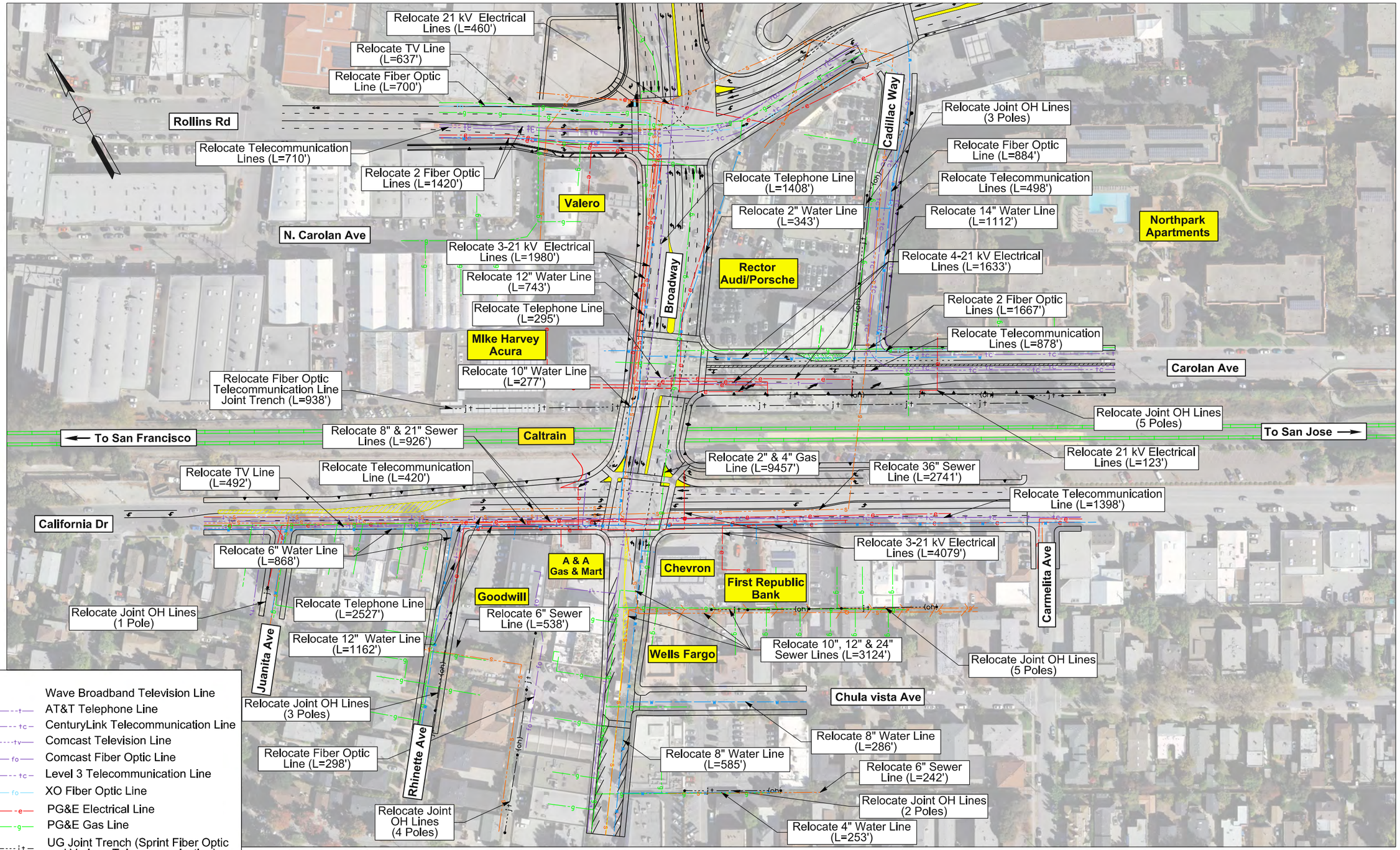
Alternative C
Utility Plan

ALTERNATIVE C
RAIL AT-GRADE / ROADWAY DEPRESSED

Utility Relocation Summary - Alternative C				
Utility Description	Quantity	Unit	Unit Cost	Total Cost
12" Water & 14" Water	2155	LF	$ 350	$ 754,250
10" Water	277	LF	$ 300	$ 83,100
6" & 8" Water	1405	LF	$ 250	$ 351,250
4" & 2" Water	596	LF	$ 230	$ 137,080
Wave Broadband TV OH (Joint Pole with PG&E & Comcast)	18	EA	$ 50,000	$ 900,000
Comcast OH (Joint Pole with PG&E & Wave Broadband)	18	EA	$ 50,000	$ 900,000
Comcast TV UG	140	LF	$ 350	$ 49,000
Comcast Fiber Optic	338	LF	$ 350	$ 118,300
PG&E Electrical OH (Pole Relocations)	18	EA	$ 80,000	$ 1,440,000
16kV & 21kV PG&E Underground Electrical	6325	LF	$ 500	$ 3,162,500
PG&E Gas	5995	LF	$ 500	$ 2,997,500
Verizon & Sprint UG Joint line (Telecommunication & Fiber Optic)	945	LF	$ 500	$ 472,500
Verizon UG Telecommunicatoin	498	LF	$ 350	$ 174,300
Zayo UG Telecommunication	980	LF	$ 500	$ 490,000
Sanitary Sewer Relocation (8", 10", 12", 24" & 36")	5485	LF	$ 500	$ 2,742,500
Sanitary Sewer Pump Station	1	EA	$ 500,000	$ 500,000
XO UG Fiber Optic	518	LF	$ 350	$ 181,300
Level 3 UG Telecommunication	1061	LF	$ 350	$ 371,350
CenturyLink Fiber Optic	576	LF	$ 350	$ 201,600
AT&T Cable	3433	LF	$ 300	$ 1,029,900
			Subtotal	$ 17,056,430

50% Contingency	$ 8,528,215
Grand Total*	$ 25,600,000

* Rounded up to the nearest $100k.



LEGEND:

- Wave Broadband Television Line
- AT&T Telephone Line
- CenturyLink Telecommunication Line
- Comcast Television Line
- Comcast Fiber Optic Line
- Level 3 Telecommunication Line
- XO Fiber Optic Line
- PG&E Electrical Line
- PG&E Gas Line
- UG Joint Trench (Sprint Fiber Optic and Verizon Telecommunication)
- Verizon Telecommunication Line
- Zayo Telecommunication Line
- Water Line
- Sanitary Sewer Line
- Joint Overhead Line (PG&E Electrical, Comcast TV and Wave Broadband)

Broadway Grade Separation Study

PRELIMINARY
FOR DISCUSSION PURPOSES ONLY

SCALE: 1" = 150'

NOTE: For clarity, only existing utilities to be relocated for this alternative are shown.

Alternative D
Utility Plan

ALTERNATIVE D
RAIL AT-GRADE / ROADWAY ELEVATED

Utility Relocation Summary - Alternative D				
Utility Description	Quantity	Unit	Unit Cost	Total Cost
12" Water & 14" Water	3017	LF	$ 350	$ 1,055,950
10" Water	277	LF	$ 300	$ 83,100
6" & 8" Water	1739	LF	$ 250	$ 434,750
4" & 2" Water	596	LF	$ 230	$ 137,080
Wave Broadband UG TV	637	LF	$ 350	$ 222,950
Wave Broadband TV OH (Joint Pole with PG&E & Comcast)	23	EA	$ 50,000	$ 1,150,000
Comcast OH (Joint Pole with PG&E & Wave Broadband)	23	EA	$ 50,000	$ 1,150,000
Comcast TV UG	492	LF	$ 350	$ 172,200
Comcast Fiber Optic	298	LF	$ 350	$ 104,300
PG&E Electrical OH (Pole Relocations)	23	EA	$ 80,000	$ 1,840,000
16kV & 21kV PG&E Underground Electrical	8275	LF	$ 500	$ 4,137,500
PG&E Gas	9457	LF	$ 500	$ 4,728,500
Verizon & Sprint UG Joint line (Telecommunication & Fiber Optic)	938	LF	$ 500	$ 469,000
Verizon UG Telecommunicatoin	498	LF	$ 350	$ 174,300
Zayo UG Telecommunication	1398	LF	$ 500	$ 699,000
Sanitary Sewer Relocation (6", 8", 10", 12", 24" & 36")	7571	LF	$ 500	$ 3,785,500
Sanitary Sewer Pump Station	1	EA	$ 500,000	$ 500,000
XO UG fiber optic	1584	LF	$ 350	$ 554,400
Level 3 UG Telecommunication	3087	LF	$ 350	$ 1,080,450
CenturyLink fiber optic	1588	LF	$ 350	$ 555,800
AT&T Cable	4230	LF	$ 300	$ 1,269,000
			Subtotal	$ 24,303,780

50% Contingency	$ 12,151,890
Grand Total*	$ 36,500,000

* Rounded up to the nearest $100k.

LEGEND:

- Wave Broadband OH Line
- AT&T Telephone Line
- PG&E Electrical OH Line
- PG&E Electrical Line
- PG&E Gas Line
- UG Joint Trench (Sprint Fiber Optic and Verizon Telecommunication)
- Water Line
- Sanitary Sewer Line

NOTE: For clarity, only existing utilities to be relocated for this alternative are shown.

Broadway Grade Separation Study

PRELIMINARY
FOR DISCUSSION PURPOSES ONLY

SCALE: 1" = 150'

BROADWAY GATEWAY

Caltrain

SAN MATEO COUNTY Transportation Authority

AECOM

ALTERNATIVE E
RAIL DEPRESSED / ROADWAY AT-GRADE

Alternative E
Utility Plan

Utility Relocation Summary - Alternative E				
Utility Description	Quantity	Unit	Unit Cost	Total Cost
12" Water	150	LF	$ 350	$ 52,500
Wave Broadband TV	145	LF	$ 350	$ 50,750
16 kV PG&E Electrical OH (Pole Relocations)	6	EA	$ 80,000	$ 480,000
16kV & 21kV PG&E Underground Electrical	410	LF	$ 500	$ 205,000
PG&E Gas	300	LF	$ 500	$ 150,000
Verision & Sprint UG Joint line (Telecommunication & Fiber Optic)	13614	LF	$ 500	$ 6,807,000
Sanitary Sewer Relocation	350	LF	$ 500	$ 175,000
AT&T Cable	150	LF	$ 300	$ 45,000
			Subtotal	$ 7,965,250
50% Contingency				$ 3,982,625
Grand Total*				$ 12,000,000

* Rounded up to the nearest $100k.

LEGEND:

- Wave Broadband OH Line
- PG&E Electrical OH Line
- PG&E Electrical Line
- PG&E Gas Line
- UG Joint Trench (Sprint Fiber Optic and Verizon Telecommunication)
- Sanitary Sewer Line

NOTE: For clarity, only existing utilities to be relocated for this alternative are shown.

Broadway Grade Separation Study

PRELIMINARY
FOR DISCUSSION PURPOSES ONLY

SCALE: 1" = 150'

BROADWAY GATEWAY

Caltrain

SAN MATEO COUNTY Transportation Authority

AECOM

ALTERNATIVE F
RAIL ELEVATED / ROADWAY AT-GRADE

Alternative F
Utility Plan

Utility Relocation Summary - Alternative F				
Utility Description	Quantity	Unit	Unit Cost	Total Cost
12" Water	0	LF	$ 350	$ -
Wave Broadband TV	145	LF	$ 350	$ 50,750
16 kV PG&E Electrical OH (Pole Relocations)	6	EA	$ 80,000	$ 480,000
16kV & 21kV PG&E Underground Electrical	410	LF	$ 500	$ 205,000
PG&E Gas	0	LF	$ 500	$ -
Verision & Sprint UG Joint line (Telecommunication & Fiber Optic)	13614	LF	$ 500	$ 6,807,000
Sanitary Sewer Relocation	350	LF	$ 500	$ 175,000
AT&T Cable	0	LF	$ 300	$ -
			Subtotal	$ 7,717,750

50% Contingency	$ 3,858,875
Grand Total*	$ 11,600,000

* Rounded up to the nearest $100k.

ATTACHMENT E – PRELIMINARY PROJECT COST ESTIMATES

PRELIMINARY PROJECT COST ESTIMATE SUMMARY

Type of Estimate: PSR

Project Description: Broadway Grade Separation Project - Alternative A

Limits: On Broadway from Rollins Road to Paloma Avenue, on California Drive from Grove Avenue to Majilla Avenue, on Carolan Avenue from Broadway to Toyon Drive and within Caltrain Right of Way from Dufferin Avenue to Burlingame Avenue in the City of Burlingame.

Proposed Improvement: (Scope) Grade separate Broadway with the railroad by partially depressing Broadway and partially elevating the railroad.

CONSTRUCTION PHASE		
TOTAL ROADWAY & RAILROAD ITEMS		$137,783,000
TOTAL STRUCTURE ITEMS		$4,480,000
TOTAL CONSTRUCTION COSTS		**$142,300,000**
TOTAL RIGHT OF WAY & UTILITY		$15,500,000
TOTAL CAPITAL COST		**$157,800,000**
ENGINEERING SERVICES (PA&ED)	3.0%	$4,269,000
ENGINEERING SERVICES (PS&E)	9.4%	$13,376,000
FLAGGING (TASI)	7.0%	$9,961,000
R/W SERVICES	8.0% ^	$619,000
CONSTRUCTION ADMINISTRATION	15.0%	$21,345,000
TOTAL SUPPORT COST		**$49,600,000**
SUBTOTAL (CAPITAL + SUPPORT)		**$207,400,000**
ESCALATION* TO 2023		**$42,600,000**
TOTAL PROJECT COST		**$250,000,000**

^ 8% of "Total Right of Way & Utility" minus Utility Relocation Costs

* Escalation to mid-point of construction (6 years at 3.16% per year)

Reviewed by Project Engineer	Peter DeStefano, P.E	(510) 874-3143	01/16/17
Approved by Project Manager	Etty Mercurio, P.E.	(510) 874-1773 (Phone)	01/16/17 (Date)

PRELIMINARY PROJECT COST ESTIMATE SUMMARY

	Quantity	Unit	Unit Price	Unit Cost	Section Cost
Section 1 - Earthwork					
Imported Borrow	37,000	CY	$30	$1,110,000	
Excavation	42,000	CY	$18	$756,000	
Clearing & Grubbing	1	LS	$300,000	$300,000	
Develop Water Supply	1	LS	$25,000	$25,000	
Remove Unsuitable Materials	1	LS	$500,000	$500,000	
				Total Earthwork	$2,691,000
Section 2 - Structural Section *					
HMA (Type A)	4,800	TON	$90	$432,000	
Aggregate Base (Cl 2)	4,200	CY	$40	$168,000	
Aggregate Subbase (Cl 4)	4,500	CY	$20	$90,000	
				Total Structural Section	$690,000
Section 3 - Drainage					
Project Drainage ^	1	LS	$7,500,000	$7,500,000	
				Total Drainage	$7,500,000

^ Includes cost for pump station

PRELIMINARY PROJECT COST ESTIMATE SUMMARY

Section 4 - Specialty Items	Quantity	Unit	Unit Price	Unit Cost	Section Cost
Retaining Wall	85,762	SF	$50	$4,288,100	
Prepare SWPPP	1	LS	$30,000	$30,000	
Water Pollution Control	1	LS	$2,100,000	$2,100,000	
Permanent Treatment BMPs and Hydromodification	1	LS	$3,200,000	$3,200,000	
Dewatering	1	LS	$2,500,000	$2,500,000	
Temporary Creek Diversion	1	LS	$150,000	$150,000	
Temporary Train Station (Not Required)			$0	$0	
Broadway Train Station	1	LS	$30,000,000	$30,000,000	
Railroad Track**	14,600	TF	$400	$5,840,000	
Overhead Contact System (OCS)	7,300	RF	$300	$2,190,000	
Trousdale Siding	1	LS	$400,000	$400,000	
Temporary Shoofly Track**	16,000	TF	$550	$8,800,000	
Temporary OCS	8,000	RF	$400	$3,200,000	
Temporary Modification of PS3	1	LS	$500,000	$500,000	
Permanent Modification of PS3	1	LS	$750,000	$750,000	
Impacts to CBOSS/PTC	1	LS	$1,600,000	$1,600,000	
Temporary Shoring (Roadway)	25,000	SF	$40	$1,000,000	
Temporary Shoring (Railroad)	45,000	SF	$40	$1,800,000	
			Total Specialty Items		$68,348,100

** Unit price based on a single track. Unit cost for shoofly track includes $150/TF for removal.

Section 5 - Traffic Items					
Lighting	1	LS	$250,000	$250,000	
Signals	1	LS	$800,000	$800,000	
Traffic Control System	1	LS	$1,600,000	$1,600,000	
Striping	1	LS	$70,000	$70,000	
TMP (Inc. COZEEP, CMS etc.)	1	LS	$1,600,000	$1,600,000	
Roadway Signs	1	LS	$40,000	$40,000	
			Total Traffic Items		$4,360,000

Section 6 - Planting and Irrigation					
Planting	1	LS	$1,100,000	$1,100,000	
Irrigation	1	LS	$400,000	$400,000	
			Total Planting & Irrigation Items		$1,500,000

PRELIMINARY PROJECT COST ESTIMATE SUMMARY

	Quantity	Unit		Unit Price		Unit Cost	Section Cost
Section 7 - Roadside							
Management & Safety							
Vegetation Control		SQYD		$0		$0	
Erosion Control	1	LS		$120,000		$120,000	
					Total Roadside Management & Safety		$120,000
					SUBTOTAL SECTIONS 1 - 7:		$85,209,100
Section 8 - Minor Items							
Subtotal Sections 1 - 7		$85,209,100	X	10%		$8,520,910	
					TOTAL MINOR ITEMS:		$8,521,000
Section 9 - Mobilization							
Subtotal Sections 1 - 7		$85,209,100					
Minor Items		$8,521,000					
	Sum	$93,730,100	X	10%		$9,373,010	
					TOTAL MOBILIZATION		$9,373,000
Section 10 - Additions							
Supplemental							
Subtotal Sections 1 - 7		$85,209,100					
Minor Items		$8,521,000					
	Sum	$93,730,100	X	7%		$6,561,107	
Contingencies							
Subtotal Sections 1 - 7		$85,209,100					
Minor Items		$8,521,000					
	Sum	$93,730,100	X	30%		$28,119,030	
					TOTAL ADDITIONS		$34,680,000
					TOTAL ROADWAY & RAILROAD ITEMS (Total of Sections 1 - 10)		$137,783,000

Estimate Prepared By:	Peter DeStefano, P.E	(510) 874-3143	01/16/17
	(Print Name)	(Phone)	(Date)

PRELIMINARY PROJECT COST ESTIMATE SUMMARY

II. STRUCTURES ITEMS	#1	#2	#3
Bridge Name	Broadway UP	Morrell Ave Ped UP	
Structure Type	PC/PS Girder		
Width (ft) - out to out	Var		
Span Length (ft)	Var		
Total Area (SqFt)	5,800		
Footing Type (pile/spread)	Pile		
Cost per Sq. Ft.	$600		
Including:			
Bridge Removal			
Mobilization: 10%			
Contingency: 25%			
Bridge Removal			
Total Cost For Structure	$3,480,000	$1,000,000	

SUBTOTAL THIS PAGE $4,480,000

TOTAL STRUCTURES ITEMS $4,480,000

Railroad Related Costs

COMMENTS:

Estimate Prepared By: Jan Hueser, P.E. (916) 993-7614 01/16/17

(Print Name) (Phone) (Date)

PRELIMINARY PROJECT COST ESTIMATE SUMMARY

III. RIGHT OF WAY & UTILITY

	Current Values (Future Use)	Escalation Rate (%/yr)	Escalated Value (2018)
Acquisition, including excess lands TCE and damages to remainders	$7,100,000	0.00%	$7,100,000
Utility Relocation ^	$7,800,000	0.00%	$7,800,000
Clearance / Demolition	$500,000	0.00%	$500,000
RAP	$100,000	0.00%	$100,000
R/W Services - Title and Escrow Fees	$40,000	0.00%	$40,000
CONSTRUCTION CONTRACT WORK			$0
SB1210		0.00%	$0
Section 83 Transfers		0.00%	$0
		0.00%	$0
TOTAL RIGHT OF WAY (CURRENT VALUE)	$15,540,000	TOTAL ESCALATED RIGHT OF WAY	$15,540,000

^ See Attachment D for details.

Estimate prepared by:	Peter DeStefano, P.E	(510) 874-3143	01/16/17
	(Print Name)	(Phone)	(Date)

PRELIMINARY PROJECT COST ESTIMATE SUMMARY

Type of Estimate: PSR

Project Description: Broadway Grade Separation Project - Alternative B

Limits: On Broadway from Rollins Road to Paloma Avenue, on California Drive from Grove Avenue to Majilla Avenue, on Carolan Avenue from Broadway to Toyon Drive and within Caltrain Right of Way from Dufferin Avenue to Burlingame Avenue in the City of Burlingame.

Proposed Improvement (Scope): Grade separate Broadway and the railroad by partially elevating Broadway and partially depressing the railroad.

CONSTRUCTION PHASE		
TOTAL ROADWAY & RAILROAD ITEMS		$223,991,000
TOTAL STRUCTURE ITEMS		$8,352,000
TOTAL CONSTRUCTION COSTS		**$232,300,000**
TOTAL RIGHT OF WAY & UTILITY		$67,400,000
TOTAL CAPITAL COST		**$299,700,000**
ENGINEERING SERVICES (PA&ED)	3.0%	$6,969,000
ENGINEERING SERVICES (PS&E)	9.4%	$21,836,000
FLAGGING (TASI)	7.0%	$16,261,000
R/W SERVICES	8.0% ^	$4,560,000
CONSTRUCTION ADMINISTRATION	15.0%	$34,845,000
TOTAL SUPPORT COST		**$84,500,000**
SUBTOTAL (CAPITAL + SUPPORT)		**$384,200,000**
ESCALATION* TO 2023		**$78,800,000**
TOTAL PROJECT COST		**$463,000,000**

^ 8% of "Total Right of Way & Utility" minus Utility Relocation Costs

* Escalation to mid-point of construction (6 years at 3.16% per year)

Reviewed by Project Engineer	Peter DeStefano, P.E	(510) 874-3143	01/16/17
Approved by Project Manager	Etty Mercurio, P.E.	(510) 874-1773 (Phone)	01/16/17 (Date)

PRELIMINARY PROJECT COST ESTIMATE SUMMARY

	Quantity	Unit	Unit Price	Unit Cost	Section Cost
Section 1 - Earthwork					
Imported Borrow	0	CY	$30	$0	
Excavation	99,527	CY	$18	$1,791,486	
Clearing & Grubbing	1	LS	$300,000	$300,000	
Develop Water Supply	1	LS	$25,000	$25,000	
Remove Unsuitable Materials	1	LS	$3,200,000	$3,200,000	
				Total Earthwork	$5,316,000
Section 2 - Structural Section *					
HMA (Type A)	5,360	TON	$90	$482,000	
Aggregate Base (Cl 2)	4,727	CY	$40	$189,000	
Aggregate Subbase (Cl 4)	5,000	CY	$20	$100,000	
				Total Structural Section	$771,000
Section 3 - Drainage					
Project Drainage^	1	LS	$32,100,000	$32,100,000	
				Total Drainage	$32,100,000

^ Includes cost for three pump stations

PRELIMINARY PROJECT COST ESTIMATE SUMMARY

Section 4 - Specialty Items	Quantity	Unit	Unit Price	Unit Cost	Section Cost
Retaining Wall	111,185	SF	$100	$11,118,500	
Bottom Slab of Trench	12,400	CY	$150	$1,860,000	
Prepare SWPPP	1	LS	$30,000	$30,000	
Water Pollution Control	1	LS	$3,900,000	$3,900,000	
Permanent Treatment BMPs and Hydromodification	1	LS	$5,800,000	$5,800,000	
Dewatering	1	LS	$7,000,000	$7,000,000	
Temporary Creek Diversion	1	LS	$300,000	$300,000	
Temporary Train Station (Not Required)			$0	$0	
Broadway Train Station	1	LS	$35,000,000	$35,000,000	
Railroad Track**	15,000	TF	$400	$6,000,000	
Overhead Contact System (OCS)	7,500	RF	$300	$2,250,000	
Trousdale Siding	1	LS	$400,000	$400,000	
Temporary Shoofly Track**	16,000	TF	$550	$8,800,000	
Temporary OCS	8,000	RF	$400	$3,200,000	
Temporary Modification of PS3	1	LS	$500,000	$500,000	
Permanent Modification of PS3	1	LS	$750,000	$750,000	
Impacts to CBOSS/PTC	8,000	RF	$200	$1,600,000	
Temporary Shoring (Roadway)	25,000	SF	$40	$1,000,000	
Temporary Shoring (Railroad)	51,000	SF	$40	$2,040,000	

** Unit price based on a single track. Unit cost for shoofly track includes $150/TF for removal.

Total Specialty Items $91,548,500

Section 5 - Traffic Items					
Lighting	1	LS	$250,000	$250,000	
Signals	1	LS	$800,000	$800,000	
Traffic Control System	1	LS	$2,900,000	$2,900,000	
Striping	1	LS	$70,000	$70,000	
TMP (Inc. COZEEP, CMS etc.)	1	LS	$2,900,000	$2,900,000	
Roadway Signs	1	LS	$45,000	$45,000	

Total Traffic Items $6,965,000

Section 6 - Planting and Irrigation					
Planting	1	LS	$1,200,000	$1,200,000	
Irrigation	1	LS	$500,000	$500,000	

Total Planting & Irrigation Items $1,700,000

PRELIMINARY PROJECT COST ESTIMATE SUMMARY

	Quantity	Unit		Unit Price	Unit Cost	Section Cost
Section 7 - Roadside						
Management & Safety						
Vegetation Control		SQYD		$0	$0	
Erosion Control	1	LS		$122,000	$122,000	
					Total Roadside Management & Safety	$122,000
					SUBTOTAL SECTIONS 1 - 7:	$138,522,500
Section 8 - Minor Items						
Subtotal Sections 1 - 7		$138,522,500	X	10%	$13,852,250	
					TOTAL MINOR ITEMS:	$13,852,000
Section 9 - Mobilization						
Subtotal Sections 1 - 7		$138,522,500				
Minor Items		$13,852,000				
	Sum	$152,374,500	X	10%	$15,237,450	
					TOTAL MOBILIZATION	$15,237,000
Section 10 - Additions						
Supplemental						
Subtotal Sections 1 - 7		$138,522,500				
Minor Items		$13,852,000				
	Sum	$152,374,500	X	7%	$10,666,215	
Contingencies						
Subtotal Sections 1 - 7		$138,522,500				
Minor Items		$13,852,000				
	Sum	$152,374,500	X	30%	$45,712,350	
					TOTAL ADDITIONS	$56,379,000
					TOTAL ROADWAY & RAILROAD ITEMS (Total of Sections 1 - 10)	$223,991,000

Estimate Prepared By:	Peter DeStefano, P.E	(510) 874-3143	01/16/17
	(Print Name)	(Phone)	(Date)

PRELIMINARY PROJECT COST ESTIMATE SUMMARY

II. STRUCTURES ITEMS	#1	#2	#3
Bridge Name	Broadway OH	Morrell Ave Ped OH	
Structure Type	PC/PS Girder		
Width (ft) - out to out	Var		
Span Length (ft)	Var		
Total Area (SqFt)	11,172		
Footing Type (pile/spread)	Pile		
Cost per Sq. Ft.	$300		
Including:			
Bridge Removal			
Mobilization: 10%			
Contingency: 25%			
Bridge Removal			
Total Cost For Structure	$3,351,600	$5,000,000	

SUBTOTAL THIS PAGE $8,351,600

TOTAL STRUCTURES ITEMS $8,352,000

Railroad Related Costs

COMMENTS:

Estimate Prepared By: Jan Hueser, P.E. (916) 993-7614 01/16/17

(Print Name) (Phone) (Date)

PRELIMINARY PROJECT COST ESTIMATE SUMMARY

III. RIGHT OF WAY & UTILITY

	Current Values (Future Use)	Escalation Rate (%/yr)	Escalated Value (2018)
Acquisition, including excess lands TCE and damages to remainders	$54,700,000	0.00%	$54,700,000
Utility Relocation^	$10,400,000	0.00%	$10,400,000
Clearance / Demolition	$1,200,000	0.00%	$1,200,000
RAP	$1,000,000	0.00%	$1,000,000
R/W Services - Title and Escrow Fees	$100,000	0.00%	$100,000
CONSTRUCTION CONTRACT WORK			$0
SB1210		0.00%	$0
Section 83 Transfers		0.00%	$0
		0.00%	$0
TOTAL RIGHT OF WAY (CURRENT VALUE)	$67,400,000	TOTAL ESCALATED RIGHT OF WAY	$67,400,000

^ See Attachment D for details.

Estimate prepared by:	Peter DeStefano, P.E	(510) 874-3143	01/16/17
	(Print Name)	(Phone)	(Date)

PRELIMINARY PROJECT COST ESTIMATE SUMMARY

Type of Estimate: PSR

Project Description: Broadway Grade Separation Project - Alternative C

Limits: On Broadway from Rollins Road to Paloma Avenue, on California Drive from Grove Avenue to Majilla Avenue, on Carolan Avenue from Broadway to Toyon Drive and within Caltrain Right of Way from Dufferin Avenue to Burlingame Avenue in the City of Burlingame.

Proposed Improvement (Scope): Grade separate Broadway and the railroad by depressing Broadway and maintaining the railroad at-grade.

CONSTRUCTION PHASE		
TOTAL ROADWAY & RAILROAD ITEMS		$91,900,000
TOTAL STRUCTURE ITEMS		$3,336,000
TOTAL CONSTRUCTION COSTS		**$95,200,000**
TOTAL RIGHT OF WAY & UTILITY		$148,800,000
TOTAL CAPITAL COST		**$244,000,000**
ENGINEERING SERVICES (PA&ED)	3.0%	$2,856,000
ENGINEERING SERVICES (PS&E)	9.4%	$8,949,000
FLAGGING (TASI)	7.0%	$6,664,000
R/W SERVICES	8.0% ^	$9,852,000
CONSTRUCTION ADMINISTRATION	15.0%	$14,280,000
TOTAL SUPPORT COST		**$42,600,000**
SUBTOTAL (CAPITAL + SUPPORT)		**$286,600,000**
ESCALATION* TO 2023		**$58,800,000**
TOTAL PROJECT COST		**$345,000,000**

^ 8% of "Total Right of Way & Utility" minus Utility Relocation Costs

* Escalation to mid-point of construction (6 years at 3.16% per year)

Reviewed by Project Engineer		(510) 874-3143	01/16/17
	Peter DeStefano, P.E		
Approved by Project Manager		(510) 874-1773	01/16/17
	Etty Mercurio, P.E.	(Phone)	(Date)

PRELIMINARY PROJECT COST ESTIMATE SUMMARY

	Quantity	Unit	Unit Price	Unit Cost	Section Cost
Section 1 - Earthwork					
Imported Borrow	0	CY	$30	$0	
Excavation	154,000	CY	$18	$2,772,000	
Clearing & Grubbing	1	LS	$200,000	$200,000	
Develop Water Supply	1	LS	$25,000	$25,000	
Remove Unsuitable Materials	1	LS	$2,000,000	$2,000,000	
				Total Earthwork	$4,997,000
Section 2 - Structural Section *					
HMA (Type A)	8,700	TON	$90	$783,000	
Aggregate Base (Cl 2)	7,700	CY	$40	$308,000	
Aggregate Subbase (Cl 4)	8,100	CY	$20	$162,000	
				Total Structural Section	$1,253,000
Section 3 - Drainage					
Project Drainage^	1	LS	$7,200,000	$7,200,000	
				Total Drainage	$7,200,000

^ Includes cost for pump station.

PRELIMINARY PROJECT COST ESTIMATE SUMMARY

Section 4 - Specialty Items	Quantity	Unit	Unit Price	Unit Cost	Section Cost
Retaining Wall	26,230	SF	$100	$2,623,000	
Prepare SWPPP	1	LS	$30,000	$30,000	
Water Pollution Control	1	LS	$3,100,000	$3,100,000	
Permanent Treatment BMPs and Hydromodification	1	LS	$4,600,000	$4,600,000	
Dewatering	1	LS	$5,000,000	$5,000,000	
Temporary Creek Diversion	1	LS	$150,000	$150,000	
Temporary Train Station (Not Required)			$0	$0	
Upgraded Broadway Station	1	LS	$10,000,000	$10,000,000	
Railroad Track**	0	TF	$400	$0	
Overhead Contact System (OCS)	0	RF	$300	$0	
Trousdale Siding	0	LS	$0	$0	
Temporary Shoofly Track**	8,000	TF	$550	$4,400,000	
Temporary OCS	4,000	RF	$400	$1,600,000	
Temporary Modification of PS3	1	LS	$500,000	$500,000	
Permanent Modification of PS3	1	LS	$0	$0	
Impacts to CBOSS/PTC	1	LS	$930,000	$930,000	
Temporary Shoring (Roadway)	100,000	SF	$40	$4,000,000	
Temporary Shoring (Railroad)	12,500	SF	$40	$500,000	
				Total Specialty Items	$37,433,000

** Unit price based on a single track. Unit cost for shoofly track includes $150/TF for removal.

Section 5 - Traffic Items					
Lighting	1	LS	$300,000	$300,000	
Signals	1	LS	$2,300,000	$2,300,000	
Traffic Control System	1	LS	$800,000	$800,000	
Striping	1	LS	$84,000	$84,000	
TMP (Inc. COZEEP, CMS etc.)	1	LS	$2,300,000	$2,300,000	
Roadway Signs	1	LS	$60,000	$60,000	
				Total Traffic Items	$5,844,000

Section 6 - Planting and Irrigation					
Planting	1	LS	$70,000	$70,000	
Irrigation	1	LS	$30,000	$30,000	
				Total Planting & Irrigation Items	$100,000

PRELIMINARY PROJECT COST ESTIMATE SUMMARY

	Quantity	Unit		Unit Price	Unit Cost	Section Cost
Section 7 - Roadside						
Management & Safety						
Vegetation Control		SQYD		$0	$0	
Erosion Control	1	LS		$7,000	$7,000	
					Total Roadside Management & Safety	$7,000
					SUBTOTAL SECTIONS 1 - 7:	$56,834,000
Section 8 - Minor Items						
Subtotal Sections 1 - 7		$56,834,000	X	10%	$5,683,400	
					TOTAL MINOR ITEMS:	$5,683,000
Section 9 - Mobilization						
Subtotal Sections 1 - 7		$56,834,000				
Minor Items		$5,683,000				
	Sum	$62,517,000	X	10%	$6,251,700	
					TOTAL MOBILIZATION	$6,252,000
Section 10 - Additions						
Supplemental						
Subtotal Sections 1 - 7		$56,834,000				
Minor Items		$5,683,000				
	Sum	$62,517,000	X	7%	$4,376,190	
Contingencies						
Subtotal Sections 1 - 7		$56,834,000				
Minor Items		$5,683,000				
	Sum	$62,517,000	X	30%	$18,755,100	
					TOTAL ADDITIONS	$23,131,000
					TOTAL ROADWAY & RAILROAD ITEMS (Total of Sections 1 - 10)	$91,900,000

Estimate Prepared By:	Peter DeStefano, P.E	(510) 874-3143	01/16/17
	(Print Name)	(Phone)	(Date)

PRELIMINARY PROJECT COST ESTIMATE SUMMARY

II. STRUCTURES ITEMS	#1	#2	#3
Bridge Name	Broadway Underpass		
Structure Type	PC/PS Girder		
Width (ft) - out to out	Var		
Span Length (ft)	Var		
Total Area (SqFt)	5,560		
Footing Type (pile/spread)	Pile		
Cost per Sq. Ft.	$600		
Including:			
Bridge Removal			
Mobilization: 10%			
Contingency: 25%			
Bridge Removal			
Total Cost For Structure	$3,336,000		

SUBTOTAL THIS PAGE $3,336,000

TOTAL STRUCTURES ITEMS $3,336,000

Railroad Related Costs

COMMENTS:

Estimate Prepared By:	Jan Hueser, P.E.	(916) 993-7614	01/16/17
	(Print Name)	(Phone)	(Date)

PRELIMINARY PROJECT COST ESTIMATE SUMMARY

III. RIGHT OF WAY & UTILITY

	Current Values (Future Use)	Escalation Rate (%/yr)	Escalated Value (2018)
Acquisition, including excess lands TCE and damages to remainders	$114,000,000	0.00%	$114,000,000
Utility Relocation^	$25,600,000	0.00%	$25,600,000
Clearance / Demolition	$7,000,000	0.00%	$7,000,000
RAP	$2,000,000	0.00%	$2,000,000
R/W Services - Title and Escrow Fees	$150,000	0.00%	$150,000
CONSTRUCTION CONTRACT WORK			$0
SB1210		0.00%	$0
Section 83 Transfers		0.00%	$0
		0.00%	$0
TOTAL RIGHT OF WAY (CURRENT VALUE)	$148,750,000	TOTAL ESCALATED RIGHT OF WAY	$148,750,000

^ See Attachment D for details.

Estimate prepared by:	Peter DeStefano, P.E	(510) 874-3143	01/16/17
	(Print Name)	(Phone)	(Date)

PRELIMINARY PROJECT COST ESTIMATE SUMMARY

Type of Estimate: PSR

Project Description: Broadway Grade Separation Project - Alternative D

Limits: On Broadway from Rollins Road to Paloma Avenue, on California Drive from Grove Avenue to Majilla Avenue, on Carolan Avenue from Broadway to Toyon Drive and within Caltrain Right of Way from Dufferin Avenue to Burlingame Avenue in the City of Burlingame.

Proposed Improvement (Scope): Grade separate Broadway and the railroad by elevating Broadway and maintaining the railroad at-grade.

CONSTRUCTION PHASE		
TOTAL ROADWAY & RAILROAD ITEMS		$77,703,000
TOTAL STRUCTURE ITEMS		$3,200,000
TOTAL CONSTRUCTION COSTS		**$80,900,000**
TOTAL RIGHT OF WAY & UTILITY		$186,400,000
TOTAL CAPITAL COST		**$267,300,000**
ENGINEERING SERVICES (PA&ED)	3.0%	$2,427,000
ENGINEERING SERVICES (PS&E)	9.4%	$7,605,000
FLAGGING (TASI)	7.0%	$5,663,000
R/W SERVICES	8.0% ^	$11,994,000
CONSTRUCTION ADMINISTRATION	15.0%	$12,135,000
TOTAL SUPPORT COST		**$39,800,000**
SUBTOTAL (CAPITAL + SUPPORT)		**$307,100,000**
ESCALATION* TO 2023		**$63,000,000**
TOTAL PROJECT COST		**$370,000,000**

^ 8% of "Total Right of Way & Utility" minus Utility Relocation Costs

* Escalation to mid-point of construction (6 years at 3.16% per year)

Reviewed by Project Engineer	Peter DeStefano, P.E	(510) 874-3143	01/16/17
Approved by Project Manager	Etty Mercurio, P.E.	(510) 874-1773 (Phone)	01/16/17 (Date)

PRELIMINARY PROJECT COST ESTIMATE SUMMARY

	Quantity	Unit	Unit Price	Unit Cost	Section Cost
Section 1 - Earthwork					
Imported Borrow	447,000	CY	$30	$13,410,000	
Roadway Excavation	0	CY	$18	$0	
Clearing & Grubbing	0	LS	$0	$0	
Develop Water Supply	1	LS	$25,000	$25,000	
Remove Unsuitable Materials	0	LS	$0	$0	
				Total Earthwork	$13,435,000
Section 2 - Structural Section *					
HMA (Type A)	12,830	TON	$90	$1,155,000	
Aggregate Base (Cl 2)	11,320	CY	$40	$453,000	
Aggregate Subbase (Cl 4)	11,910	CY	$20	$238,000	
				Total Structural Section	$1,846,000
Section 3 - Drainage					
Project Drainage	1	LS	$1,170,000	$1,170,000	
				Total Drainage	$1,170,000

PRELIMINARY PROJECT COST ESTIMATE SUMMARY

Section 4 - Specialty Items	Quantity	Unit	Unit Price	Unit Cost	Section Cost
Retaining Wall	60,900	SF	$100	$6,090,000	
Prepare SWPPP	1	LS	$30,000	$30,000	
Water Pollution Control	1	LS	$3,400,000	$3,400,000	
Permanent Treatment BMPs and Hydromodification	1	LS	$5,000,000	$5,000,000	
Dewatering	1	LS	$0	$0	
Temporary Creek Diversion	1	LS	$0	$0	
Temporary Train Station (Not Required)			$0	$0	
Upgrade Broadway Station	1	LS	$10,000,000	$10,000,000	
Railroad Track**	0	TF	$0	$0	
Overhead Contact System (OCS)	0	RF	$300	$0	
Trousdale Siding	0	LS	$400,000	$0	
Temporary Shoofly Track**	0	TF	$550	$0	
Temporary OCS	0	RF	$400	$0	
Temporary Modification of PS3	0	LS	$0	$0	
Permanent Modification of PS3	0	LS	$0	$0	
Impacts to CBOSS/PTC	1	LS	$0	$0	
Temporary Shoring (Roadway)	0	SF	$0	$0	
Temporary Shoring (Railroad)	0	SF	$0	$0	
				Total Specialty Items	$24,520,000

** Unit price based on a single track. Unit cost for shoofly track includes $150/TF for removal.

Section 5 - Traffic Items					
Lighting	1	LS	$337,500	$337,500	
Signals	1	LS	$1,400,000	$1,400,000	
Traffic Control System	1	LS	$2,500,000	$2,500,000	
Striping	1	LS	$125,000	$125,000	
TMP (Inc. COZEEP, CMS etc.)	1	LS	$2,500,000	$2,500,000	
Roadway Signs	1	LS	$100,000	$100,000	
				Total Traffic Items	$6,962,500

Section 6 - Planting and Irrigation					
Planting	1	LS	$80,000	$80,000	
Irrigation	1	LS	$30,000	$30,000	
				Total Planting & Irrigation Items	$110,000

PRELIMINARY PROJECT COST ESTIMATE SUMMARY

	Quantity	Unit		Unit Price	Unit Cost	Section Cost
Section 7 - Roadside						
Management & Safety						
Vegetation Control		SQYD		$0	$0	
Erosion Control	1	LS		$10,000	$10,000	
					Total Roadside Management & Safety	$10,000
					SUBTOTAL SECTIONS 1 - 7:	$48,053,500
Section 8 - Minor Items						
Subtotal Sections 1 - 7		$48,053,500	X	10%	$4,805,350	
					TOTAL MINOR ITEMS:	$4,805,000
Section 9 - Mobilization						
Subtotal Sections 1 - 7		$48,053,500				
Minor Items		$4,805,000				
	Sum	$52,858,500	X	10%	$5,285,850	
					TOTAL ROADWAY MOBILIZATION	$5,286,000
Section 10 - Additions						
Supplemental						
Subtotal Sections 1 - 7		$48,053,500				
Minor Items		$4,805,000				
	Sum	$52,858,500	X	7%	$3,700,095	
Contingencies						
Subtotal Sections 1 - 7		$48,053,500				
Minor Items		$4,805,000				
	Sum	$52,858,500	X	30%	$15,857,550	
					TOTAL ADDITIONS	$19,558,000
					TOTAL ROADWAY & RAILROAD ITEMS (Total of Sections 1 - 10)	$77,703,000

Estimate Prepared By:	Peter DeStefano, P.E	(510) 874-3143	01/16/17
	(Print Name)	(Phone)	(Date)

PRELIMINARY PROJECT COST ESTIMATE SUMMARY

II. STRUCTURES ITEMS	#1	#2	#3
Bridge Name	Broadway Overhead		
Structure Type	PC/PS Girder		
Width (ft) - out to out	Var		
Span Length (ft)	Var		
Total Area (SqFt)	10,665		
Footing Type (pile/spread)	Pile		
Cost per Sq. Ft.	$300		
Including:			
Bridge Removal			
Mobilization: 10%			
Contingency: 25%			
Bridge Removal			
Total Cost For Structure	$3,199,500		

SUBTOTAL THIS PAGE $3,199,500

TOTAL STRUCTURES ITEMS $3,200,000

Railroad Related Costs

COMMENTS:

Estimate Prepared By:	Jan Hueser, P.E.	(916) 993-7614	01/16/17
	(Print Name)	(Phone)	(Date)

PRELIMINARY PROJECT COST ESTIMATE SUMMARY

III. RIGHT OF WAY & UTILITY

	Current Values (Future Use)	Escalation Rate (%/yr)	Escalated Value (2018)
Acquisition, including excess lands TCE and damages to remainders	$138,500,000	0.00%	$138,500,000
Utility Relocation^	$36,500,000	0.00%	$36,500,000
Clearance / Demolition	$8,227,800	0.00%	$8,227,800
RAP	$3,000,000	0.00%	$3,000,000
R/W Services - Title and Escrow Fees	$200,000	0.00%	$200,000
CONSTRUCTION CONTRACT WORK			$0
SB1210		0.00%	$0
Section 83 Transfers		0.00%	$0
		0.00%	$0
TOTAL RIGHT OF WAY (CURRENT VALUE)	$186,427,800	TOTAL ESCALATED RIGHT OF WAY	$186,428,000

^ See Attachment D for details.

Estimate prepared by:	Peter DeStefano, P.E	(510) 874-3143	01/16/17
	(Print Name)	(Phone)	(Date)

PRELIMINARY PROJECT COST ESTIMATE SUMMARY

Type of Estimate: PSR

Project Description: Broadway Grade Separation Project - Alternative E

Limits: On Broadway from Carolan Ave to California Drive, on California from Lincoln Ave to Carmelita, and within Caltrain Right of Way from Dufferin Ave to North Lane.

Proposed Improvement: (Scope) Grade separate Broadway and the railroad by depressing the railroad under Broadway.

CONSTRUCTION PHASE		
TOTAL ROADWAY & RAILROAD ITEMS		$543,265,000
TOTAL STRUCTURE ITEMS		$7,352,000
TOTAL CONSTRUCTION COSTS		**$550,600,000**
TOTAL RIGHT OF WAY & UTILITY		$13,500,000
TOTAL CAPITAL COST		**$564,100,000**
ENGINEERING SERVICES (PA&ED)	3.0%	$16,518,000
ENGINEERING SERVICES (PS&E)	9.4%	$51,756,000
FLAGGING (TASI)	7.0%	$38,542,000
R/W SERVICES	8.0% ^	$123,000
CONSTRUCTION ADMINISTRATION	15.0%	$82,590,000
TOTAL SUPPORT COST		**$189,500,000**
SUBTOTAL (CAPITAL + SUPPORT)		**$753,600,000**
ESCALATION* TO 2023		**$154,700,000**
TOTAL PROJECT COST		**$908,000,000**

^ 8% of "Total Right of Way & Utility" minus Utility Relocation Costs

* Escalation to mid-point of construction (6 years at 3.16% per year)

Reviewed by Project Engineer	Peter DeStefano, P.E.	(510) 874-3143	01/16/17
Approved by Project Manager	Etty Mercurio, P.E.	(510) 874-1773 (Phone)	01/16/17 (Date)

PRELIMINARY PROJECT COST ESTIMATE SUMMARY

	Quantity	Unit	Unit Price	Unit Cost	Section Cost
Section 1 - Earthwork					
Imported Borrow	0	CY	$30	$0	
Excavation	230,000	CY	$18	$4,140,000	
Clearing & Grubbing	1	LS	$500,000	$500,000	
Develop Water Supply	1	LS	$25,000	$25,000	
Remove Unsuitable Materials	1	LS	$7,500,000	$7,500,000	
				Total Earthwork	$12,165,000
Section 2 - Structural Section *					
HMA (Type A)	1,010	TON	$90	$91,000	
Aggregate Base (Cl 2)	900	CY	$40	$36,000	
Aggregate Subbase (Cl 4)	940	CY	$20	$19,000	
				Total Structural Section	$146,000
Section 3 - Drainage					
Project Drainage ^	1	LS	$41,000,000	$41,000,000	
				Total Drainage	$41,000,000

^ Includes cost for three pump stations

PRELIMINARY PROJECT COST ESTIMATE SUMMARY

Section 4 - Specialty Items	Quantity	Unit	Unit Price	Unit Cost	Section Cost
Retaining Wall	300,000	SF	$100	$30,000,000	
Bottom Slab of Trench	21,000	CY	$150	$3,150,000	
Prepare SWPPP	1	LS	$30,000	$30,000	
Water Pollution Control	1	LS	$7,300,000	$7,300,000	
Permanent Treatment BMPs and Hydromodification	1	LS	$10,900,000	$10,900,000	
Dewatering	1	LS	$15,000,000	$15,000,000	
Temporary Creek Diversion	1	LS	$300,000	$300,000	
Temporary Train Station (Not Required)			$0	$0	
Broadway Train Station	1	LS	$50,000,000	$50,000,000	
Railroad Track**	22,200	TF	$400	$8,880,000	
Overhead Contact System (OCS)	11,100	RF	$300	$3,330,000	
Trousdale Siding	1	LS	$400,000	$400,000	
Temporary Shoofly Track**	25,000	TF	$550	$13,750,000	
Temporary OCS	12,500	RF	$400	$5,000,000	
Temporary Modification of PS3	1	LS	$500,000	$500,000	
Permanent Modification of PS3	1	LS	$750,000	$750,000	
Impacts to CBOSS/PTC	1	LS	$2,400,000	$2,400,000	
Temporary Shoring (Roadway)	0	SF	$1,000,000	$0	
Temporary Shoring (Railroad)	151,000	SF	$40	$6,040,000	
Railroad Operations Impacts	1	LS	$120,000,000	$120,000,000	
				Total Specialty Items	$277,730,000

** Unit price based on a single track. Unit cost for shoofly track includes $150/TF for removal.

Section 5 - Traffic Items					
Lighting	1	LS	$250,000	$250,000	
Signals	1	LS	$800,000	$800,000	
Traffic Control System	1	LS	$1,100,000	$1,100,000	
Striping	1	LS	$20,000	$20,000	
TMP (Inc. COZEEP, CMS etc.)	1	LS	$1,100,000	$1,100,000	
Roadway Signs	1	LS	$40,000	$40,000	
				Total Traffic Items	$3,310,000

Section 6 - Planting and Irrigation					
Planting	1	LS	$1,100,000	$1,100,000	
Irrigation	1	LS	$400,000	$400,000	
				Total Planting & Irrigation Items	$1,500,000

PRELIMINARY PROJECT COST ESTIMATE SUMMARY

	Quantity	Unit		Unit Price	Unit Cost	Section Cost
Section 7 - Roadside Management & Safety						
Vegetation Control		SQYD		$0	$0	
Erosion Control	1	LS		$120,000	$120,000	
					Total Roadside Management & Safety	$120,000
					SUBTOTAL SECTIONS 1 - 7:	$335,971,000
Section 8 - Minor Items						
Subtotal Sections 1 - 7		$335,971,000	X	10%	$33,597,100	
					TOTAL MINOR ITEMS:	$33,597,000
Section 9 - Mobilization						
Subtotal Sections 1 - 7		$335,971,000				
Minor Items		$33,597,000				
	Sum	$369,568,000	X	10%	$36,956,800	
					TOTAL ROADWAY MOBILIZATION	$36,957,000
Section 10 - Additions						
Supplemental						
Subtotal Sections 1 - 7		$335,971,000				
Minor Items		$33,597,000				
	Sum	$369,568,000	X	7%	$25,869,760	
Contingencies						
Subtotal Sections 1 - 7		$335,971,000				
Minor Items		$33,597,000				
	Sum	$369,568,000	X	30%	$110,870,400	
					TOTAL ADDITIONS	$136,740,000
					TOTAL ROADWAY & RAILROAD ITEMS (Total of Sections 1 - 10)	$543,265,000

Estimate Prepared By:	Peter DeStefano, P.E.	(510) 874-3143	01/16/17
	(Print Name)	(Phone)	(Date)

PRELIMINARY PROJECT COST ESTIMATE SUMMARY

II. STRUCTURES ITEMS	#1	#2	#3
Bridge Name	Broadway OH	Morrell Ave Ped OH	
Structure Type	PC/PS Girder		
Width (ft) - out to out	Var		
Span Length (ft)	Var		
Total Area (SqFt)	11,172		
Footing Type (pile/spread)	Pile		
Cost per Sq. Ft.	$300		
Including:			
Bridge Removal			
Mobilization: 10%			
Contingency: 25%			
Bridge Removal			
Total Cost For Structure	$3,351,600	$4,000,000	

SUBTOTAL THIS PAGE $7,351,600

TOTAL STRUCTURES ITEMS $7,352,000

Railroad Related Costs

COMMENTS:

Estimate Prepared By: Jan Hueser, P.E. (916) 993-7614 01/16/17

(Print Name) (Phone) (Date)

PRELIMINARY PROJECT COST ESTIMATE SUMMARY

III. RIGHT OF WAY & UTILITY

	Current Values (Future Use)	Escalation Rate (%/yr)	Escalated Value (2018)
Acquisition, including excess lands TCE and damages to remainders	$900,000	0.00%	$900,000
Utility Relocation ^	$12,000,000	0.00%	$12,000,000
Clearance / Demolition	$500,000	0.00%	$500,000
RAP	$100,000	0.00%	$100,000
R/W Services - Title and Escrow Fees	$40,000	0.00%	$40,000
CONSTRUCTION CONTRACT WORK			$0
SB1210		0.00%	$0
Section 83 Transfers		0.00%	$0
		0.00%	$0
TOTAL RIGHT OF WAY (CURRENT VALUE)	$13,540,000	TOTAL ESCALATED RIGHT OF WAY	$13,540,000

^ See Attachment D for details.

Estimate prepared by:	Peter DeStefano, P.E.	(510) 874-3143	01/16/17
	(Print Name)	(Phone)	(Date)

PRELIMINARY PROJECT COST ESTIMATE SUMMARY

Type of Estimate: PSR

Project Description: Broadway Grade Separation Project - Alternative F

Limits: On Broadway from Carolan Ave to California Drive, on California from Lincoln Ave to Carmelita, and within Caltrain Right of Way from Dufferin Ave to North Lane.

Proposed Improvement (Scope): Grade separate Broadway with the railroad by elevating the railroad over Broadway.

CONSTRUCTION PHASE		
TOTAL ROADWAY & RAILROAD ITEMS		$288,522,000
TOTAL STRUCTURE ITEMS		$4,480,000
TOTAL CONSTRUCTION COSTS		**$293,000,000**
TOTAL RIGHT OF WAY & UTILITY		$13,100,000
TOTAL CAPITAL COST		**$306,100,000**
ENGINEERING SERVICES (PA&ED)	3.0%	$8,790,000
ENGINEERING SERVICES (PS&E)	9.4%	$27,542,000
FLAGGING (TASI)	7.0%	$20,510,000
R/W SERVICES	8.0% ^	$123,000
CONSTRUCTION ADMINISTRATION	15.0%	$43,950,000
TOTAL SUPPORT COST		**$100,900,000**
SUBTOTAL (CAPITAL + SUPPORT)		**$407,000,000**
ESCALATION* TO 2023		**$83,500,000**
TOTAL PROJECT COST		**$491,000,000**

^ 8% of "Total Right of Way & Utility" minus Utility Relocation Costs

* Escalation to mid-point of construction (6 years at 3.16% per year)

Reviewed by Project Engineer	Peter DeStefano	(510) 874-3143	01/16/17
Approved by Project Manager	Etty Mercurio, P.E.	(510) 874-1773 (Phone)	01/16/17 (Date)

PRELIMINARY PROJECT COST ESTIMATE SUMMARY

	Quantity	Unit	Unit Price	Unit Cost	Section Cost
Section 1 - Earthwork					
Imported Borrow	204,000	CY	$30	$6,120,000	
Excavation	0	CY	$18	$0	
Clearing & Grubbing	1	LS	$400,000	$400,000	
Develop Water Supply	1	LS	$25,000	$25,000	
Remove Unsuitable Materials	1	LS	$0	$0	
				Total Earthwork	$6,545,000
Section 2 - Structural Section *					
HMA (Type A)	1,010	TON	$90	$91,000	
Aggregate Base (Cl 2)	900	CY	$40	$36,000	
Aggregate Subbase (Cl 4)	940	CY	$20	$19,000	
				Total Structural Section	$146,000
Section 3 - Drainage					
Project Drainage	1	LS	$750,000	$750,000	
				Total Drainage	$750,000

PRELIMINARY PROJECT COST ESTIMATE SUMMARY

Section 4 - Specialty Items	Quantity	Unit	Unit Price	Unit Cost	Section Cost
Retaining Wall	272,000	SF	$50	$13,600,000	
Prepare SWPPP	1	LS	$30,000	$30,000	
Water Pollution Control	1	LS	$4,000,000	$4,000,000	
Permanent Treatment BMPs and Hydromodification	1	LS	$6,000,000	$6,000,000	
Dewatering	1	LS	$0	$0	
Temporary Creek Diversion	1	LS	$150,000	$150,000	
Temporary Train Station (Not Required)			$0	$0	
Broadway Train Station	1	LS	$33,000,000	$33,000,000	
Railroad Track**	18,800	TF	$400	$7,520,000	
Overhead Contact System (OCS)	9,400	RF	$300	$2,820,000	
Trousdale Siding	1	LS	$400,000	$400,000	
Temporary Shoofly Track**	20,000	TF	$550	$11,000,000	
Temporary OCS	10,000	RF	$400	$4,000,000	
Temporary Modification of PS3	1	LS	$500,000	$500,000	
Permanent Modification of PS3	1	LS	$750,000	$750,000	
Impacts to CBOSS/PTC	1	LS	$2,000,000	$2,000,000	
Temporary Shoring (Roadway)	0	SF	$40	$0	
Temporary Shoring (Railroad)	136,000	SF	$40	$5,440,000	
Railroad Operations Impact	1	LS	$70,000,000	$70,000,000	
				Total Specialty Items	$161,210,000

** Unit price based on a single track. Unit cost for shoofly track includes $150/TF for removal.

Section 5 - Traffic Items					
Lighting	1	LS	$250,000	$250,000	
Signals	1	LS	$800,000	$800,000	
Traffic Control System	1	LS	$600,000	$3,500,000	
Striping	1	LS	$70,000	$70,000	
TMP (Inc. COZEEP, CMS etc.)	1	LS	$600,000	$3,500,000	
Roadway Signs	1	LS	$40,000	$40,000	
				Total Traffic Items	$8,160,000

Section 6 - Planting and Irrigation					
Planting	1	LS	$1,100,000	$1,100,000	
Irrigation	1	LS	$400,000	$400,000	
				Total Planting & Irrigation Items	$1,500,000

PRELIMINARY PROJECT COST ESTIMATE SUMMARY

	Quantity	Unit		Unit Price	Unit Cost	Section Cost
Section 7 - Roadside						
Management & Safety						
Vegetation Control		SQYD		$0	$0	
Erosion Control	1	LS		$120,000	$120,000	
					Total Roadside Management & Safety	$120,000
					SUBTOTAL SECTIONS 1 - 7:	$178,431,000
Section 8 - Minor Items						
Subtotal Sections 1 - 7		$178,431,000	X	10%	$17,843,100	
					TOTAL MINOR ITEMS:	$17,843,000
Section 9 - Mobilization						
Subtotal Sections 1 - 7		$178,431,000				
Minor Items		$17,843,000				
	Sum	$196,274,000	X	10%	$19,627,400	
					TOTAL MOBILIZATION	$19,627,000
Section 10 - Additions						
Supplemental						
Subtotal Sections 1 - 7		$178,431,000				
Minor Items		$17,843,000				
	Sum	$196,274,000	X	7%	$13,739,180	
Contingencies						
Subtotal Sections 1 - 7		$178,431,000				
Minor Items		$17,843,000				
	Sum	$196,274,000	X	30%	$58,882,200	
					TOTAL ADDITIONS	$72,621,000
					TOTAL ROADWAY & RAILROAD ITEMS (Total of Sections 1 - 10)	$288,522,000

Estimate Prepared By:	Peter DeStefano	(510) 874-3143	01/16/17
	(Print Name)	(Phone)	(Date)

PRELIMINARY PROJECT COST ESTIMATE SUMMARY

II. STRUCTURES ITEMS	#1	#2	#3
Bridge Name	Broadway UP	Morrell Ave Ped UP	
Structure Type	PC/PS Girder	Box	
Width (ft) - out to out	Var		
Span Length (ft)	Var		
Total Area (SqFt)	5,800		
Footing Type (pile/spread)	Pile		
Cost per Sq. Ft.	$600		
Including:			
Bridge Removal			
Mobilization: 10%			
Contingency: 25%			
Bridge Removal			
Total Cost For Structure	$3,480,000	$1,000,000	

SUBTOTAL THIS PAGE $4,480,000

TOTAL STRUCTURES ITEMS $4,480,000

Railroad Related Costs

COMMENTS:

Estimate Prepared By: Jan Hueser, P.E. (916) 993-7614 01/16/17

(Print Name) (Phone) (Date)

PRELIMINARY PROJECT COST ESTIMATE SUMMARY

III. RIGHT OF WAY & UTILITY

	Current Values (Future Use)	Escalation Rate (%/yr)	Escalated Value (2018)
Acquisition, including excess lands TCE and damages to remainders	$900,000	0.00%	$900,000
Utility Relocation ^	$11,600,000	0.00%	$11,600,000
Clearance / Demolition	$500,000	0.00%	$500,000
RAP	$100,000	0.00%	$100,000
R/W Services - Title and Escrow Fees	$40,000	0.00%	$40,000
CONSTRUCTION CONTRACT WORK			$0
SB1210		0.00%	$0
Section 83 Transfers		0.00%	$0
		0.00%	$0
TOTAL RIGHT OF WAY (CURRENT VALUE)	$13,140,000	TOTAL ESCALATED RIGHT OF WAY	$13,140,000

^ See Attachment D for details.

Estimate prepared by:	Peter DeStefano	(510) 874-3143	01/16/17
	(Print Name)	(Phone)	(Date)

ATTACHMENT F – FREQUENTLY ASKED QUESTIONS

Broadway Grade Separation Project

Frequently Asked Questions (FAQs)

1. **Other than cost, can you thoroughly explain the engineering challenges and risks associated with Alternative B (trenching the train, and running the cars above?) Some people understand that the "water table" (groundwater) is an issue in a broad sense, but can you elaborate?**

   The PowerPoint presentation at the March 31, 2016 public meeting went over the construction sequencing and challenges. The major ones are:

   - Significant disruption to traffic circulation and Caltrain operations
   - Extended duration of construction
   - Excavation for a trench several thousand feet long and the difficulty in keeping the trench dry (from ground water) during construction
   - Shoofly* construction to maintain Caltrain operations while excavating trench
   - Significant impacts to private properties due to right-of-way acquisitions
   - Significant impacts to Broadway Commercial District and Auto Dealerships

   ** Note: A shoofly is a temporary railroad track built to maintain train service operations while constructing new permanent railroad tracks.*

   a. **Would there be additional ongoing expensive maintenance? How costly would that likely be to the city on an annual basis?**

      Yes, there would be additional long term maintenance costs associated with maintaining pump plants for drainage. These costs would be borne by the City. We do not have a definite number on the cost, but with at least 5 pump stations/siphons, we estimate that additional maintenance staff would cost a minimum of $300K to $400K per year. In addition, there will be ongoing costs associated with back-up power such as mobile generators for each location (see response to d below).

   b. **Would there be high probability of leaks that could affect train service?**

      Leaks are to be expected due to the relatively high groundwater within the project area. This is one of BART's main issues with maintenance and causes many system failures due to water intrusion into electrical systems and corrosion of materials, such as trackways and other metals. There is one stretch of tunnel in BART between Civic Center and 16th Street that has required track replacement within 2 years due to corrosion.

c. Is FEMA's flood zone an issue?

The project is within the FEMA 100-year floodplain. Any change in drainage patterns would need to be modeled and submitted to FEMA to show that the project does not alter FEMA floodplains. This may require adding downstream capacity (i.e. expanding drainage facilities to the east).

d. What happens when major storms hit?

When a major storm hits, the mechanical reliability of pumps to pump (lift) water is an issue as well as electrical power to run the pumps. If either of these fails, then the water will start to fill the trench and there could be service disruption. At a minimum, a maintenance engineer would need to be on-call during these events to manage and assess the situation. Back-up power sources such as mobile generators would be required to be on call for all five pump station locations.

In addition, pumps will be relied upon to lift water from storm drainage runoff in the creeks. If the pumps fail, this creates flooding risks to business and residential properties west of the railroad tracks.

e. Is there a safety risk in operating an electrified train in a potentially flooded trench?

Yes, there is potential safety risk in operating electrified trains in flooded trench. This also affects reliability of train operations.

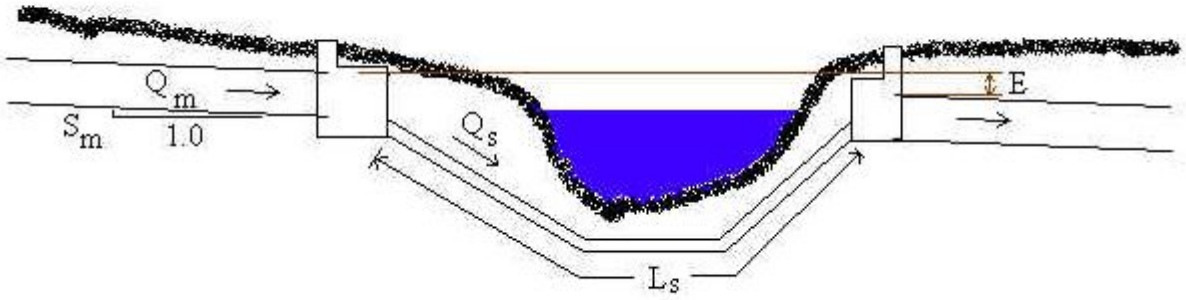
f. Is sea level rise a long-term concern?

Yes it is a concern. Sea level rise numbers for the Bay Area are projected to increase approximately 2-4 feet by the end of the century. This may further exacerbate the risk of operating trains in a trench.

g. **How do sewers and creeks play into the Alternative B scenario etc., beyond the initial engineering costs and time?**

Sewers, creeks, and drainage facilities would require a siphon to pump water/sewer down and under the trench (see below sketch) with lift stations at either side of the trench. These types of systems are expensive to maintain and have reliability issues as well. Many flood control agencies discourage the use of these systems because of long term maintenance and reliability.

Overall Diagram:



2. **If trenching is so challenging from an engineering point of view, how does BART do it?**

Trenching is a challenging engineering issue especially in developed areas that add constraints on how construction is implemented. In the 1960's, BART used cut-and-cover excavation to construct in Downtown Oakland and San Francisco. This construction lasted many years and disrupted City streets for years – impacting businesses and local circulation.

Currently, SFMTA is building the Central Subway, which is a drilled shaft below BART from South of Market to Chinatown. Many streets nearby are disrupted, and there have been several street closures for long periods of time. The cost is in the billions. There are also long term maintenance issues for these underground facilities such as groundwater infiltration that affects services and reliability.

3. **Is CalTrain trenched anywhere else along the line?**

Caltrain tracks are not trenched anywhere along their line.

4. **What does Burlingame propose to do with the other Burlingame train crossings when electrification comes? Would some likely be eliminated? Would we likely advocate for grade separation at other crossings too?**

   The Caltrain Electrification Project does not propose any grade separations in Burlingame. Except for the Broadway crossing, there is no identified need for a grade separation for other railroad crossings in Burlingame. Broadway is the only railroad crossing identified in the CPUC's statewide priority list; no other Burlingame grade crossing is on the grade separation list. The other grade crossings in Burlingame include: Oak Grove Ave., North Lane, Bayswater Ave., Howard Ave. and Peninsula Ave.

   Implementing a grade separation at Broadway does not preclude grade separating these other crossings in the future. The issues and costs would be comparable for these streets, but the distances between Oak Grove Ave., North Lane, Howard Ave., Bayswater Ave., and Peninsula Ave. may require that these be all grade separated or a combination of grade separation and closure. Further circulation studies would be needed to assess these sites.

5. **The January 19, 2016 presentation to City Council suggested scenarios A & B minimize right-of-way takes / eminent domain. Which one would require more land? Can you elaborate?**

   Alternative B would require significantly more ROW takes especially in the Broadway Commercial Area. The elevation difference for the elevated roadway would take the first block of the downtown area due to access impacts to those buildings and businesses. In addition, the temporary shoofly for the railroad tracks would impact several buildings that are built up to Caltrain ROW (about 15+ commercial buildings).

6. **Is the cost to build Broadway station included in the estimates for grade separation A & B scenarios? (Broadway station does not appear in the fly-over presentation.)**

   There is a place holder for the cost of the station in the estimates for both. There is a building shown in both Alternatives that represents the station as a place holder.

7. **Alternative A has tracks that will be 13' higher than street level. But how high will the entire train and wires be above ground at the highest point?**

   The overhead wires are about 22 feet above the track level. This is a safer design as people cannot inadvertently touch wires. In Alternative B the high-voltage wires will be at a level that someone could touch them which will require high fencing and armoring to prevent people from touching or damaging wires.

8. **Are you concerned about graffiti along a large berm or elevated tracks?**

   The best type of anti-graffiti is to use plantings (such as ivy) as was done on Holly Street in San Carlos. Where possible, we would look to use berms in lieu of wall if there is enough ROW for grading of the embankment slopes.

9. **Will train noise be quieter with Alternative A or B?**

   In Alternative B (railroad trench), the concrete walls tend to reflect the train noise and this can lead to properties experiencing more noise than they currently experience. It's possible for Alternative A to have acoustical panels installed at the train wheel level to attenuate noise.

10. **If the Council OK's Alternative A, some community members are concerned it would be against Council's letter to HSR Authority (from 2010) opposing any kind of elevated alignment -- prior to blended system compromise.**

    The City Council letter in 2010 was in response to the Aerial Viaduct Alignment of High Speed Rail throughout the entire corridor in Burlingame proposed by CHSRA at that time. Based on the best information available at this time, the CHSRA is not proposing to elevate the tracks along the Caltrain corridor like they did in their previous attempt. They plan to run High Speed Trains at existing grade without making changes to the existing alignment. Alternative A for Broadway Grade Separation partially raises the railroad tracks and partially depresses the roadway to minimize visual impacts, and significantly limits the raised portion railroad tracks, which is completely different than what was proposed in 2010 by CHSRA. If the City were to choose to not grade separate Broadway, and leave the situation as it is, the projected increase in the overall number of trains from currently at 92 per day to 220 per day by 2030 (information per PCJPB and CHSRA) will result in a significant traffic circulation failure and cause safety problems. This is particularly significant because Broadway is the gateway to Burlingame from US 101, and the only direct access to it. Additionally, this will affect the entire Broadway corridor, including the commercial district and the Bayfront hotels' patrons and businesses that use Broadway to visit our downtown areas.

11. **Some community members are concerned that the City is rushing this proposal decision in order to get a shovel-ready project in the pipeline, and we may not be researching all the alternatives carefully enough.**

    The City issued a Request for Proposal (RFP) and hired a well-qualified engineering consultant to identify and evaluate all alternatives available to address the Broadway grade crossing problem. The consultant firm URS/AECOM comprehensively studied the issues, performed analysis, and identified six potential alternatives, of which four were discarded because of severe flaws in them, and narrowed their focused on two alternatives with extensive details including 3D animation of buildout-concepts. The amount of work done to provide details of renderings on this project is beyond the original scope and unusual at this stage per industry standards. Staff and the project team believe that all feasible alternatives have been adequately studied and presented at this time. Staff welcomes hearing from anyone with a better idea of a feasible alternative that hasn't been studied as of yet, which would solve the Broadway grade crossing problem in a more effective and efficient manner, with fewer challenges and issues.

12. **Why was Alternative E ruled out completely? Some people prefer this over the other alternatives presented by the City.**

    An alternative that lowers the railroad completely, such that the roads (Broadway, California, etc.) can remain at-grade has been studied previously. There are a handful of fatal flaws associated with this alternative:

- The rail's profile limits extend to the north and south to the point where it impacts Oak Grove Avenue, and Caltrain's Millbrae Station and Burlingame Station. As a result, a bus (service) bridge would be needed on a temporary basis during construction. There would also be some impacts to BART's operations to the north.

- As has been well documented, the railroad trench will impede the natural flow of three drainage channels. As a result, pump stations would be needed at these creek crossings and at the low point of the railroad's profile. The cost for the pump stations alone exceeds $35M. And this does not even include long-term maintenance costs.

- During heavy storms, the railroad service would be dependent on the performance of the pump stations. Any failure to the pumps (electrical or mechanical) would put the operations of the railroad in jeopardy… which amounts to an additional risk for Caltrain.

- A U-shaped, underground trench is generally more complex, costly and time-consuming to construct than above-ground retaining walls.

- For all of the reasons stated above, Caltrain supports Alternative A.

- The order of magnitude cost for Alternative E far exceeds the other alternatives.

13. **Why is the maximum grade allowed by Caltrain (1%) not being used for Alternative A? It seems logical that the maximum grade would reduce the overall footprint of the project and minimize impacts to the public.**

    The railroad profile for Alternative A was based on the following design constraints and criteria:

i. The location of the future Broadway Caltrain Station. The most logical (and assumed) location of the station is where it exists today, just south of Broadway.

ii. The standard length for a Caltrain station is 700 feet, but provisions should be made to not preclude expansion of up to 1,000 feet.

iii. The station must be located on a vertical tangent (sag or crest curves of the railroad cannot be located within this 1,000-foot limit).

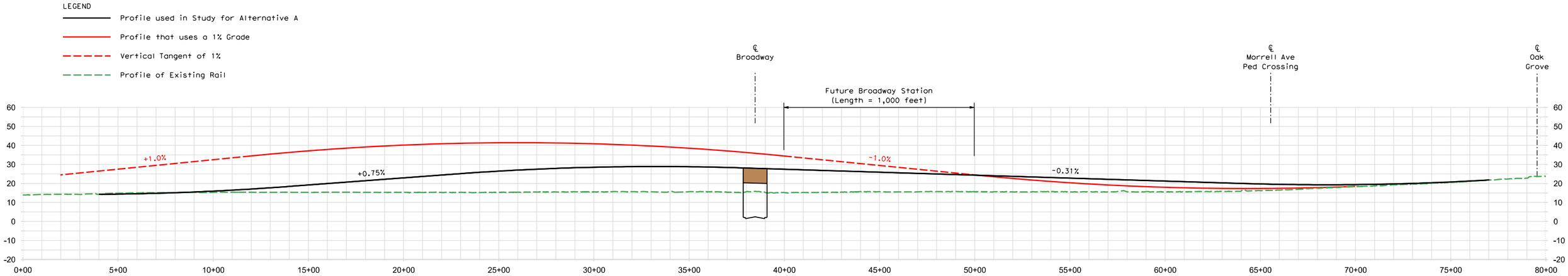
iv. Vertical curves are required to transition from one grade to the next. In short, the minimum length required for a vertical curve is proportional to the grade differential of the two adjacent vertical tangents. For example:

    - A 1% grade that transitions to a 0% grade (flat slope) requires a vertical curve of at least 1,400 feet.
    - A 0.5% grade that transitions to 0% requires a vertical curve length of at least 700 feet.

v. A maximum grade of 1%.

Given these constraints and criteria, using a 1% grade is not the optimal solution. As stated in bullet (iii) above, the vertical curves must be located outside the station limits. As a result, if a 1% grade was used, the profile of the railroad would look similar to the one shown in Exhibit 1 below. This results in a much higher profile than desired. It also pushes the limits of the profile much further north, creating other issues and further adding to the impacts and cost of the project.

If that same profile were lowered to approximately match the desired elevation over Broadway, then there would be impacts to the south (to Oak Grove Avenue and beyond). See Exhibit 2 below.


LEGEND
Profile used in Study for Alternative A
Profile that uses a 1% Grade
Vertical Tangent of 1%
Profile of Existing Rail
℄ Broadway
Future Broadway Station
(Length = 1,000 feet)
℄ Morrell Ave
Ped Crossing
℄ Oak Grove
+1.0%
+0.75%
-1.0%
-0.31%
60
50
40
30
20
10
0
-10
-20
0+00
5+00
10+00
15+00
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25+00
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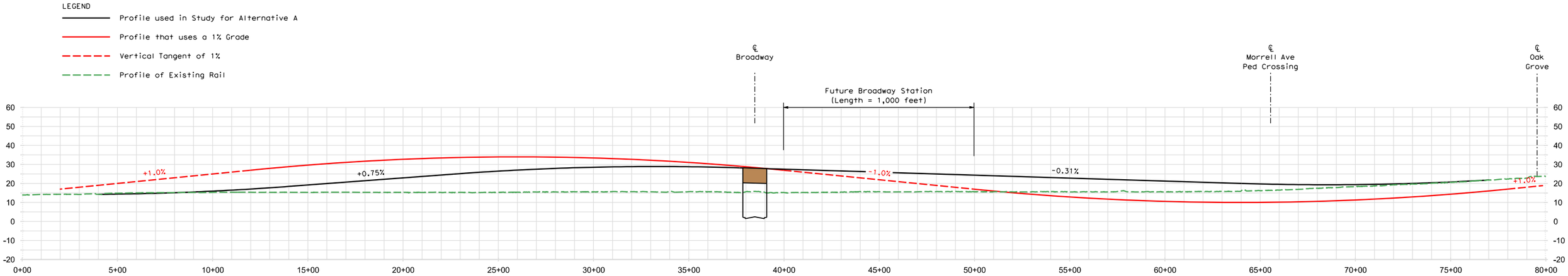
Exhibit 1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Profile of Existing Rail
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Future Broadway Station
(Length = 1,000 feet)
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℄ Oak Grove
+1.0%
+0.75%
-1.0%
-0.31%
+1.0%
60
50
40
30
20
10
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-20
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5+00
10+00
15+00
20+00
25+00
30+00
35+00
40+00
45+00
50+00
55+00
60+00
65+00
70+00
75+00
80+00

Exhibit 2

ATTACHMENT G – PHOTO SIMULATIONS

Existing

Alternative A

Alternative B

1 Southeast Corner of Carolan and Broadway, Looking West

Existing

Alternative A

Alternative B

2 In front of Northpark Apartments, Looking West

Location Map

Broadway Grade Separation Study

PRELIMINARY
FOR DISCUSSION PURPOSES ONLY
March 31, 2016

BROADWAY GATEWAY
Caltrain
SAN MATEO COUNTY Transportation Authority
AECOM

Existing

Alternative A

Alternative B

3 Southwest Corner of California and Broadway, Looking East

Existing

Alternative A

Alternative B

4 On California, Across from Juanita, Looking South

Location Map

Broadway Grade Separation Study

PRELIMINARY
FOR DISCUSSION PURPOSES ONLY
March 31, 2016

BROADWAY GATEWAY
Caltrain
SAN MATEO COUNTY Transportation Authority
AECOM