

APPENDIX H: TRACK SHIFT WORKS

CALIFORNIA HIGH SPEED TRAIN PROJECT

CONSTRUCTABILITY ANALYSIS

APPENDIX E. GRADE CROSSING ANALYSIS

December 2018



APPENDIX E. GRADE CROSSING ANALYSIS

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1. INTRODUCTION

The existing rail corridor between the stations of San Jose and Gilroy has a semi-urban configuration that causes interference with the regulation of automobile traffic. Therefore, several structures are located that allow the passage to different levels, as well as grade crossings.

These grade crossing resolve intersections at the same level of the roads, both with minor roads, and streets with several lanes in each direction. Many of these grade crossing will remain in the final designed solution.

In this document, the execution methods are analyzed in such a way that the remodeling works of the grade crossing, the works of the railroad and the traffic through the grade crossing are compatible.

2. DESCRIPTION OF EXISTING GRADE CROSSING

The existing grade crossings are characterized by having the necessary elements that allow the circulation of railroads, vehicles and people, with adequate safety conditions.



Figure 1. General configuration of grade crossing

To allow the passage of vehicles on the road, a series of prefabricated concrete or metal plates are placed on the sleepers and level with the upper rail. Continuity is given to the resulting platform with concrete or asphalt, forming a continuous surface and adapting the access wedges.



Figure 2. Platform for vehicular passage on the tracks.

To condition the access to the grade crossing, they are equipped with the necessary safety systems, which vary according to the characteristics of the railway corridor and the roads.

In the case of major roads, there are automatic barriers, light and acoustic beacons, horizontal and vertical signage, as well as previous warnings to reduce the speed of vehicles.



Figure 3. Access to grade crossing from urban road.



Figure 4. Access to grade crossing from non-urban road.

For pathways and roads of inferior characteristics, vertical signaling of warning and detention is placed.

3. ACTIONS DURING THE WORKS

The design of the new railway corridor contemplates the affection of the different grade crossing it intercepts. Various solutions are proposed, ranging from the remodeling of the existing crossing to the suppression of some of them.

The premise is to reduce to the minimum possible the interruption of the railway service as well as of vehicles and pedestrians, undertaking and coordinating the work as described below:

- Railway: In the case of track cuts, night work is planned during the week days, extending the period on weekends from Friday afternoon to Sunday night. In these periods of stoppage, as appropriate, proceed to:
 - Horizontal and vertical displacement of existing tracks.
 - Construction of new tracks.
 - Electrification conditioning.
 - Placement of plates to form the passage platform.
- Vehicles: The main traffic directions will be maintained, undertaking the necessary detours.
 - Signposting of the different detours according to the construction phases.

- Conditioning of the road platform in accordance with the new railway layout.
- Pedestrians: Special attention will be given to pedestrian traffic, not only by the traffic of trains and vehicles, also by the construction machinery.

4. DESCRIPTION OF FINISHED GRADE CROSSING

Both the level crossing and the accesses must remain fully operational once the works are completed, in such a way that the necessary movements of railway, vehicular and pedestrian traffic are allowed, always preserving their safety.

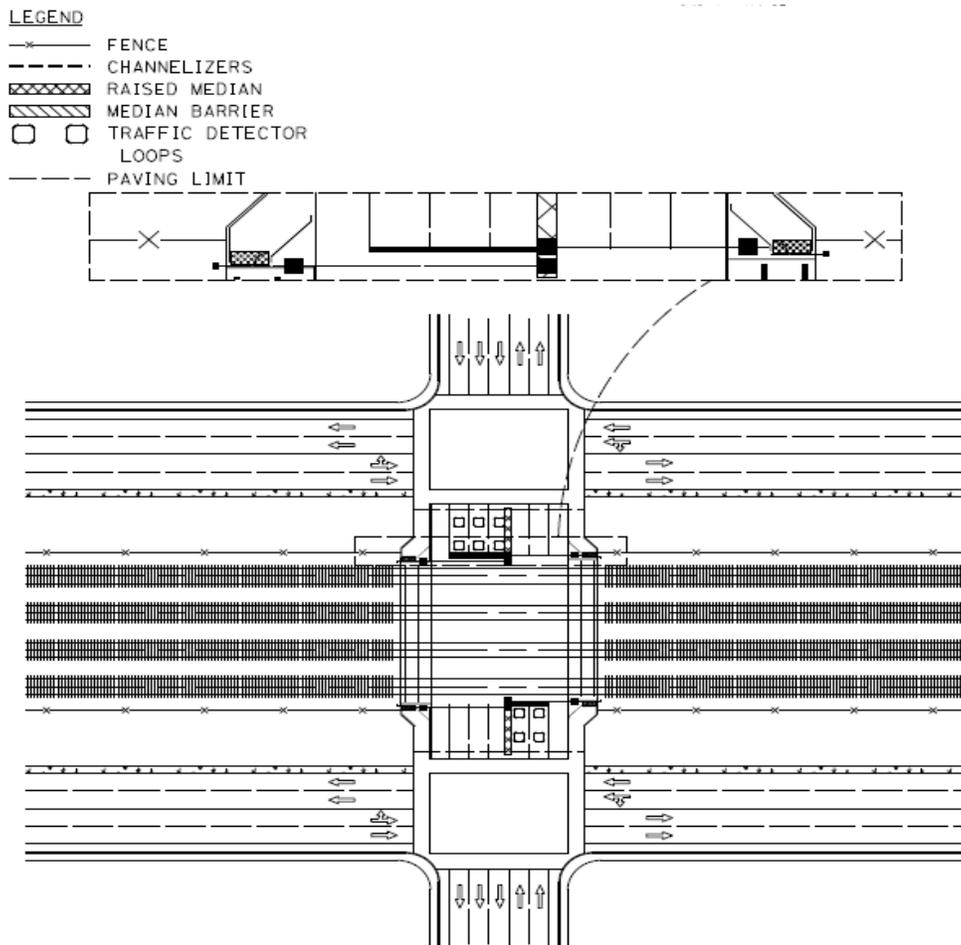


Figure 5. Scheme of grade crossing finished.

To this end, the whole of the intersection will be equipped, as the case may be, with:

- Railway corridor enclosure fence.
- Automatic barriers for the regulation of vehicle traffic.
- Loops under the pavement for the detection of vehicles in the accesses.

- Horizontal, vertical, luminous and acoustic signaling.
- Steel gates for pedestrians.

In those cases in which the existing grade crossing is suppressed, the necessary physical systems that impede the access of vehicles to the tracks will be available.

**CALIFORNIA HIGH SPEED TRAIN PROJECT
CONSTRUCTABILITY ANALYSIS**

APPENDIX F. ALTERNATIVE 4 CONSTRUCTABILITY ANALYSIS

December 2018



APPENDIX F. ALTERNATIVE 4 CONSTRUCTABILITY ANALYSIS

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1. INTRODUCTION

The Alternative 4 is a layout proposal between Scott Boulevard and Gilroy that is characterized by building on the existing UPRR Corridor to establish a new layout where two high speed and one UPRR tracks will go through.

The area in which this corridor is located presents a high urban density. The new railway layout will share the UPRR ROW. Generally the ROW is 60 ft. wide, space where the three tracks shall be accommodated. Due to the ROW limitation, and to avoid exceeding the current limits, the section adopted is usually located between walls.

The section type proposed has a width of 60 ft. This width will accommodate two tracks intended for high speed service (MT-2 and MT-3) and a third track aimed at maintaining the UPRR service (MT-1). Only the HSR tracks will be electrified.

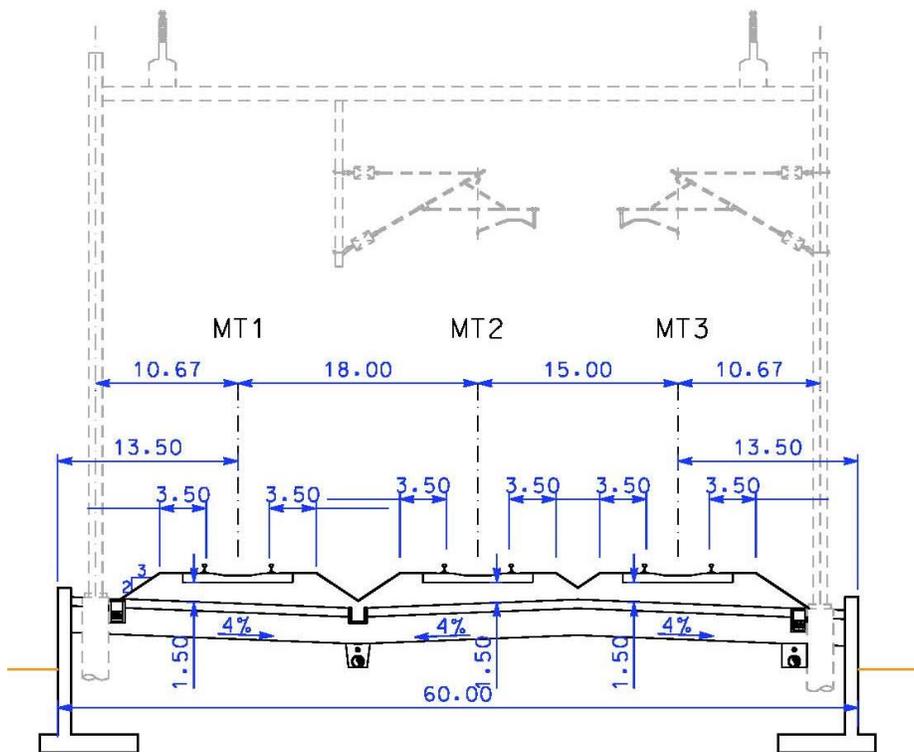


Figure 1. Typical section 60 ft.

2. BASELINE

Files used as baseline are listed below:

- Existing layout:
 - X-FJ-TT-ALGN-EXST-Caltrain-2016.dgn
Information from this file is limited, it establishes the entire layout in the ground plan, but the profile is only available between Scott Boulevard and Tamien Station.
- Future layouts:
 - X-JM-TT-ALGN-PROP-ALT4-CPCST-CPLK.dgn
 - X-JM-TT-ALGN-PROP-ALT4-CPLK.dgn
These files set axes MT-1, MT-2 and MT-3 in the ground plan. The profile of axis MT-3 is the only one established.

3. INITIAL HYPOTHESIS

Currently, the railway layout is not electrified, though the electrification of one of the tracks to CP Michael is foreseen in the near future. As baseline for the design solution, the section between Scott Boulevard and CP Michael will be assumed as electrified, all Caltrain tracks between and Scott and San Jose Station and only one track (right) between San Jose and CP Michael.

During works execution, at least one track will remain operational for passengers and freight.

Outage periods concerning track works will be determined following the same criteria as in San Francisco-San Jose corridor (PCEP, Caltrain).

The section between Scott and CP Lick will remain operational as long as possible, so the possibility of shifting the track will be studied. Concerning the section from CP Lick up to the end, the working hypothesis is to dismantle the existing tracks and place new ones.

4. LAYOUT GENERAL DESCRIPTION

As mentioned above, the new layout runs parallel to the UPRR line, sharing both the same corridor. The study begins on Scott Boulevard, near Santa Clara Station. Building on the existing tracks, it goes on to San Jose Station, where it adapts to high speed circulation conditions. Having passed San Jose, the layout is parallel to the UPRR double track to Tamien Station. An additional axis is designed for this area, located west (MT-3) to the

existing ones. Leaving Tamien Station, an area is included to ease parking and trains turnaround headed to San Jose.

The layout is parallel to Monterrey Rd from the Capitol Station to Morgan Hill. After passing Morgan Hill, the corridor is placed next to the road through Railroad Ave until it crosses Llagas Creek, where it becomes parallel again to Monterrey Rd to Gilroy. In Gilroy, the layout moves away from Monterrey Rd to the Station, which is adapted to high speed services through the placement of two 800 ft. platforms intended for high speed traffic and another two of 600 ft. for Caltrain.

From Gilroy Station, two UPRR axes are set, besides another two of high speed. These axes go in parallel building on the existing layout until the I-101 crossing. From the I-101 crossing, the high speed alignment is designed alone, through agricultural lands until it meets the line defined in Segment 9.

5. CONSTRUCTABILITY

For purposes of analyzing Alternative 4 Constructability, eight sections are distinguished:

- WS 1. Section from Scott Boulevard to San Jose Station.
- WS 2. Section San Jose Station.
- WS 3. Section from San Jose Station to CP Lick.
- WS 4. Section from CP Lick to 725+00.
- WS 5. Section from 725+00 to 1265+00.
- WS 6. Section from 1265+00 to Gilroy Station.
- WS 7. Section Gilroy Station. 2027 Configuration
- WS 8. Section 1700+00 to 1922+90. 2027 Configuration

The last two sections have been considered for 2027 configuration. In 2027, the HSR will be operational from San Jose to Gilroy. In this year the Gilroy MOWF will be connected to existing UPRR. The connection of Gilroy MOWF to HSR tracks will be executed in 2031.

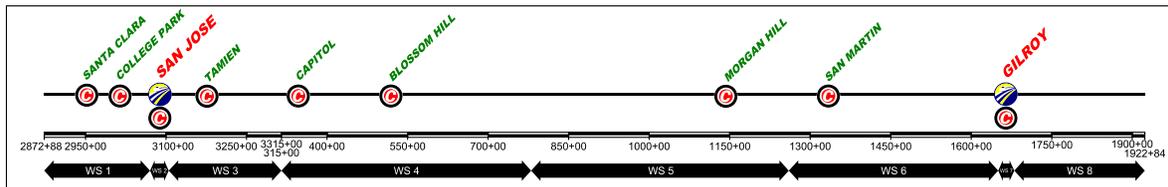


Figure 2. Works Sections scheme.

In parallel, a study of track shift works is being developed between Scott and CP Lick. The object of this analysis is to define susceptible areas of use without big adaptation works. This study analyzes lateral and vertical displacement between existing and future axis, areas of adaptation of existing OCS and actions on grade crossing and turnouts.

This section is marked by the presence of a series of wildlife transversal passages. The description of construction methods to be executed is presented in Appendices B, C and D.

It also stands out due to the maintenance of a large number of level crossings. These level crossings will be adjusted to the new tracks geometry. The description of construction methods to be executed is presented in Appendix E.

The appendix I show graphic information about construction phases for built the alternative 4. This appendix is divided in the segments indicated in this point. For each segment the appendix display plans, schemes, profile and sections organized by phases.

5.1 Section Scott Boulevard - San Jose

This section uses practically every existing track. Only a new UPRR track will be placed from the Caltrain workshops area to San Jose Station. The execution of a new track outside the existing ones requires a reconfiguration of the UPRR connection to tracks bound to Fremont.

In order to adapt the connectivity between the diverse existing tracks, the number of existing switch gears will increase.

This area currently has two Caltrain stations, Santa Clara and Collage Park. The first one remains unchanged, whereas, in the second one, the removal of existing platforms is foreseen as well as executing a single platform servicing track MT-3.

Initial assumptions in this area are that Caltrain tracks are electrified, whilst the rest aren't. Due to the high number of current tracks, electrification is supposed to be executed by using gantries.

Execution works consist in adapt the existing electrification systems in the first place, for the line to remain electrified during works and so it can be used later, in the future situation. These works will essentially consist in increasing the size of the current gantries so another axis can be added. Information on these works execution is described in Appendix A Electrification.

Once the electrification adaptation works are executed, a new UPRR axis will be placed in parallel to the existing ones.

New shifting gears will be installed in this area, and some of the current ones will be replaced by new gears. In order to install the new gears, and considering that tracks are in use, assembly systems proposed will allow to carry out a preassembly of the shifting gear in an assembling facility at an early stage to subsequently move it to its definitive location through special railway machinery. Once the gear is installed in its definitive position, the electrification system will need to be adapted. These works are generally executed in extraordinary outage periods, at night or on a weekend.

5.2 San Jose Station

Changes on San Jose Station aim at extending the available length of the platform. For this reason, east and west station heads will be modified. Works have been foreseen in such a way as that at least one platform remains in use.

East station head presents grater changes that the west one, since besides the head modification, including a double crossover is also foreseen. This double crossover must be executed on a weekend, during which the connection to Campbell will be closed to the traffic.

5.3 Section San Jose-CP Lick.

This section is characterized by its complexity. Having passed San Jose Station and up to Tamien Station, a new axis will be placed west of the existing ones. The execution of this new axis requires building a series of parallel structures to the current ones.

Currently, CP Lick layout has two tracks. As initial assumption it's been established that the right track until CP Michael is electrified.

This section shows an Station in Tamien that also has a series of siding tracks to facilitate rebound to San-Jose.

The introduction of a new axis is foreseen in the future to provide the layout with a (left) axis for UPRR only, and two axis (central and right) for the high-speed and Caltrain lines.

A significant part of the layout is based on the existing horizontal alignment, so it is partially usable. The degree of utilization is analyzed in parallel with Appendix G Track Shift Works Scott to CP Lick.

The studied section is divided in three distinct areas. A first area to the Tamien Station, the second one from Tamien Station to crossing with HWY-87 and a last area from HWY-87 to CP-Lick.

The first area builds partially on the current layout, and a parallel track will be executed on the right side of the existing tracks. The execution of this parallel track requires developing a series of structures parallel to the current track, except for those structures crossing over Bird Ave and Delmas Ave which will be demolished in order to build the definite ones. The execution of these structures will be phased to avoid closing the line.

The section between Tamien Station and the HWY-87 undercrossing currently has several siding tracks of both UPRR and Caltrain types. These tracks will be rearranged in the future creating a UPRR set of tracks around track MT-1. Between tracks MT-2 and MT-3 two siding tracks will be installed aiming at facilitating trains rebound to San Jose. **The constructability analysis has kept at least four rebound tracks in all intermediate stages.**

The final part of the section is marked by the tracks increase from two to three. The left track will be used for the execution. A new track is built on the right and the central one is carried out building on the displacement of the existing right track. Tamien Station platforms will not be affected.

As pointed earlier, the track side is electrified until CP Michael. According to work stages required to execute the tracks assembly in their definitive position, it will be necessary to execute a provisional assembly of an electrification system of the existing left track. Poles position must be compatible with the definitive position of track MT-1. Provisional electrification will be dismantled in the set of tracks location area around MT-1.

5.4 Section 315+00-785+00

This section runs from CP Lick to crossing with Bayley Rd. Almost the whole section runs in a double track. It contains the Capitol and Blossom Hill Stations, both with platforms currently on the left track. This section runs in parallel to Monterey Rd.

For the execution it is assumed that at least one track must remain operational. That's why, construction phases are based on the idea of constructing all possible track sections located on the left side of the current compatible tracks.

Once tracks on the left are executed, service will only be restored through the current left track, which allows to dismantle the right side and start the execution works of the future right track. During this phase, the definitive platforms right half on Capitol and Blossom Hill Stations will be executed.

Once the right track is installed, traffic can be restored. Thus, the left track can be dismantled and executing the rest of MT-1 and MT-2 track sections. Platforms will be finished at this stage.

The singularity of this section is its three wildlife passages. These passages are marked by being transversal works to the alignment, crossing the existing track and Monterey Rd.

From the point of view of railway traffic alterations it is planned to divide works execution in two phases, ensuring railway traffic. Planned methods for works execution are shown in Appendixes B and C.

Monterey Rd. underpass presents a greater complexity. Monterey Rd. is a two-lane road in each direction so, to secure traffic, a part of the road must be closed reducing traffic to a single lane or a temporary detour must be built in order to maintain the road capacity. Choosing one or another system will be established by the road traffic intensity and the wildlife underpass characteristics (dimensions, prefabricated or executed on site). Proposed construction procedures are included in Appendix D.

In case of track transversal crossings, Appendix D describes different execution methods of transversal crossings under circulation roads. In our case, the best method is to divide execution in several parts, since planned construction phases considered keeping one line in use.

5.5 Section 785+00-1265+00

This section is characterized by running in an almost completely single road, only one track section at the end is double, from San Pedro Ave. crossing. In this section covers Morgan Hill Station.

It can be transversely crossed through eight level passages and it overpasses Monterey Rd, as well as Fisher Creek and Little Llagas Creek courses.

Track runs on the right of Monterey Rd until their cross with San Pedro Ave, the railway layout runs on the right side of Railroad Ave.

Over time, the section will have three tracks in its entire length and will be crossed by 5 wildlife passages.

Construction phases are based on installing the left track in the area occupied by the single track. The extension of Morgan Hill Station platforms will be carried out in this phase, as well as works of those wildlife passages that do not affect the operational track.

The structure over Monterey Rd will also be executed which will accommodate track MT-1.

Next phase establishes a provisional connection, after leaving behind Morgan Hill Station between the new track MT-1, executed during the previous phase, and the right track of the existing double track section. After entry into service these tracks, the dismantling of the non-operational track follows, particularly the structure over Monterey Rd.

During phase three, tracks MT-2 and MT-3 are executed to San Pedro Ave, and track MT-3 from San Pedro Ave right up to the end. Morgan Hill right platform will also be executed in this phase.

Provisional connection of track MT-1 with track MT-3 is performed in phase four in San Pedro Ave surroundings. Once done, traffic will be restored on this continuous axis. When the line is in operation, the existing left track is dismantled from San Pedro Ave up to the end, and tracks MT-1 and MT-2 to San Pedro Ave. The structure of tracks MT-2 and MT-3 over Monterey Rd. will also be executed in this phase.

Phase five provides continuity to track MT-3 by restoring this track traffic, and also proceeds to execute tracks MT-1 and MT-2 in their final section, from San Pedro Ave.

All information regarding wildlife passages explained in the previous section is applicable to this one.

5.6 Section 1265+00 to Gilroy Station

This section runs entirely in a single track, except for a little part at the beginning. It has one station (San Martin Station), and the most singular point is the passage over Llagas Creek. It is marked by the elevated number of grade crossings.

Construction phases are conditioned by the Llagas Creek overpassage. Currently, crossing is carried out through a single track bridge. The future layout improves its existing geometry and rises the future grade elevation in the crossing point on Llagas Creek, so the existing structures must be demolished.

The first phase of the construction process raises the left track of the section and carries out the first stage of the structure over Llagas Creek as well as the embankment–structure transitions. In this area temporary earth support systems will be used to prevent the operational track to be filled by earth moving slides of the new track MT-3.

The second phase firstly executes provisional connections of the installed track MT-3 with the current track in the Llagas Creek surroundings, which is put in service. Subsequently, the previously operational track is removed and the existing structure over Llagas Creek is demolished. This phase is completed by the execution of the entire MT-1 axis that involves developing another part of the structure over Llagas Creek.

In phase three the rail traffic is moved to the MT-1 axis. Having a provisional platform available is required to maintain in service San Martin Station. This phase ends by removing the entire existing track that is no longer operational.

The fourth phase maintains the traffic in track MT-1. Tracks MT-2 and MT-3 are executed in this phase together with the San Martin Station platform between tracks MT-2 and MT-3. The structure over Llagas Creek is completed in this phase.

Phase five puts all tracks into service. Works to be executed are the dismantling of the provisional platform and the execution of a footbridge giving access to platforms, since it is placed in an area occupied by the provisional platform.

5.7 Section Gilroy Station

Gilroy Station section covers the area affected by the execution of the Gilroy Station. The analysis is conducted for the 2027 configuration. This configuration is the same as the definitive configuration except for the high-speed connection to Merced.

At present, Gilroy Station has only one passengers platform. Next to the platform there is a series of tracks to rebound to San Jose. The UPRR track arrives from Watsonville at the Gilroy Station in a single track where there is a siding track.

In the definitive situation, Gilroy Station has two high-speed platforms located outside tracks MT-2 and MT-3, and another two platforms for Caltrain circulations in two MT-2 and MT-3 siding tracks. Track MT-1, used by UPRR is doubled from the Gilroy Station. Additionally, there is a set of three tracks intended for Caltrain trains stabling.

In the definitive configuration, the UPRR track duplication and the high-speed connection to Merced are both finished.

Phasing execution in this section enables to maintain the connection service with San Jose and with the UPRR track to Watsonville throughout all phases stages.

In phase 1 all tracks not affecting the existing tracks are executed. Tracks MT-1 and MT-2 to Gilroy, UPRR tracks from Gilroy and siding tracks on the right side of track MT-3.

In phase 2, one of the UPRR tracks and two of the Gilroy rebound tracks are dismantled.

In phase 3, Caltrain and high-speed left platforms are executed as well as their corresponding tracks.

In phase 4, track MT-1 is continued by shifting the existing track. This phase will be carried out during an extraordinary outage period of the UPRR track.

In phase 5, tracks MT-1 and MT-2 are put into service. All existing tracks are dismantled except for an initial section where connection with track MT-2 is located.

In phase 6, the entirety of tracks is finished with the exception of the coincident section with the initial section of the existing track. A temporary connection of new and existing UPRR tracks is put in place.

In phase 7, traffic circulation runs on tracks MT-1 and MT-3. The initial section that hadn't been dismantled will in this phase be removed.

Phase 8 finishes track MT-2.

In the future, the connection with Merced will be performed by prolonging axis MT-2 and MT-3.

5.8 Section 1700+1922+00

It corresponds to the execution of a regular track section on embankment, highlighting the presence of the Gilroy maintenance facility. This facility will enter into service before the segment from Gilroy to Merced. During this time period, access to the facility will only be possible from the UPRR line bound for Gilroy, so it will be necessary to define two constructive solutions to allow access to the maintenance facility in the two temporary scenarios.

2027 configuration: Connection of the existing UPRR track with the MOWF. In this case, works consist in connecting the current UPRR to Hollister together with the maintenance facility:

- It is adapted to the grade alignment of the current UPRR track, so to install a switch gear to gain the facility, in the road environment of Bloomfield Rd. Planet's configuration remains. This phase must be performed during a special outage period since the only existing track could be affected.
- Construction of tracks and MOWF.

2031 configuration: Connection of the new high speed infrastructure with the existing MOWF. This scenario requires the execution of a track detour to Hollister, as existing high speed design may be affected:

- Restoration of the UPRR track to Hollister in the area of the junction and the high speed tracks by means of a newly designed branch.
- Connection of new branch with the UPRR track in both ends, during a single extraordinary outage period.

- This detour allows building without interference the high speed corridor and the access branch to MOWF. Two metallic structures prevent the disruption between the high speed tracks and the access branch, with UPRR to Watsonville and the new layout to Hollister.

**CALIFORNIA HIGH SPEED TRAIN PROJECT
CONSTRUCTABILITY ANALYSIS**

APPENDIX G. TRACK SHIFT WORKS SCOTT BOULEVARD TO CP LICK.

December 2018

APPENDIX G. TRACK SHIFT WORKS SCOTT BOULEVARD TO CP LICK

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1. ACTIONS ON THE SCOTT BOULEVARD TO CP LICK SECTION.	1
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1. ACTIONS ON THE SCOTT BOULEVARD TO CP LICK SECTION.

The section studied, between Scott Boulevard to CP Lick, presents two zones clearly differentiated by their current and future features.

The first of them covers from Scott Boulevard to San Jose station, which takes advantage of the current configuration of tracks in this area, where the station of Santa Clara, College Park and the Caltrain workshops are located. The works planned for the adaptation of the corridor to the high speed consist mainly in horizontal and vertical adjustments of the existing infrastructure.

The second zone includes from San Jose station to CP Lick. In this section, in which the Tamien station is located, a third track has been designed to the right of the current ones. Horizontal and vertical displacements of the track, of greater magnitude than the previous section, are expected in the works on this area.

Initial Hypothesis

For design the proposed solution, the files used as baseline are listed below:

- Existing layout:
 - X-FJ-TT-ALGN-EXST-Caltrain-2016.dgn.
- Existing geometry:
 - TT-existing-2016.alg. This file set axes MT-1 and MT-2 in the ground plan. The profile of axis MT-1 is the only one established.

Information from this file is limited, it establishes the entire layout in the ground plan, but the profile is only available between Scott and CP Lick.

- Future layouts:
 - X-JM-TT-ALGN-PROP-ALT4-CPCST-CPLK.dgn
- Future geometry:
 - Alt4-CPCST-CPLK.alg. This file set axes MT-0, MT-1, MT-2 and MT-3 in the ground plan. The profiles of axis MT-1 and MT-3 are established.

The collection of construction drawings that accompanies this document shows graphically the different degrees of impact to main tracks in the Scott Boulevard to CP Lick corridor. In them, the scope of the adaptation work for horizontal and vertical layout, turnouts, stations and at-grade crossings is shown.

The distance between existing and proposed tracks is shown on the drawings organized by tracks. The tracks analyzed are:

- College Park Station - San Jose Station. MT-0 new track.
- San Jose to CP Lick. MT-1, MT-2 y MT-3 tracks.

The track shift work analyses is completed with the first three segments of construction phases. From these construction phases is possible establish the action over tracks:

- Displace the existing tracks
- Build new tracks

These actions are shown on the track shift works drawings (JM-CV-I6SSC-TSW). Its used different color to distinguish between both solutions.

The range of track displacements is show with different color. The construction method to use is according to value of displacement. The description of construction methods is show in the General Considerations for Track Works. Point 3.1: *Actions in the horizontal layout*.

The actions in the **longitudinal profile** have been classified by whether the track is raised or lowered. The document General Considerations for Track Works point 3.2 *Actions in elevation* shows the range of vertical displacements. According to vertical displacement this document indicates the construction method to use. The construction methods vary from profile adjust by tamping to rebuild entire section. The range of vertical displacement is show in track shift works drawings.

The initial hypothesis considers that the electrification system to be installed by Caltrain will be executed with catenary posts. This system is not compatible with the proposed final solution because the final solution is proposed with gantries. Therefore, the removal of poles and the installation of a new electrification system executed by gantries has been contemplated.

Due to the number of stations and diversions existing along the track, impacts to the existing **track turnouts** is significant. Changes to turnouts can be classified as those that will remain on the track but that will be adjusted in their horizontal and vertical position, those that will be dismantled and the installation of new turnouts.

All the adjustments that have to do with the turnouts will be carried out in parallel with the actions on the track where it is located. Generally, the actions in turnouts are made during the weekend, since these operations are complex and if any adversity occurs there is more time available to solve it.

There is a large number of turnouts where profile changes are required. The major changes in the horizontal plane are associated with the disassembly and assembly of new turnouts.

LEGEND

-  CALTRAIN PLATFORM
-  HSR PLATFORM
-  MT-0
-  MT-1
-  MT-2
-  MT-3
-  SIDING TRACK
-  OVERHEAD BRIDGE
-  MAJOR UNDERPASS
-  CREEK UNDERPASS
-  TUNNEL
-  GRADE CROSSING

LATERAL DISTANCE BETWEEN EXISTING AND PROPOSED TRACKS

-  LESS THAN 1 ft.
-  MORE THAN 1 ft. AND LESS THAN 10 ft.
-  MORE THAN 10 ft. AND LESS THAN 21,34 ft.
-  MORE THAN 21,34 ft.

PROFILE

-  INCREASE SUBGRADE
-  DECREASE SUBGRADE
-  INCREASE BALLAST THICKNESS
-  DECREASE BALLAST THICKNESS

CONSTRUCTION PHASES AFECTION

-  LATERAL DISPLACEMENT CONSIDERED IN CONSTRUCTION PHASES ANALYSIS
-  NEW TRACK CONSIDERED

ANALYSIS OF SPECIAL EQUIPMENT

-  REMOVE
-  REMAIN VERTICAL ADAPTATION
-  NEW EQUIPMENT

GRADE CROSSING TREATMENT

-  ADAPT
-  USABLE

\$USER\$ \$DATE\$ \$TIME\$ \$PENTBL\$ \$PLTDVRS\$ \$FILE\$

REV	DATE	BY	SUB	APP	DESCRIPTION

DESIGNED BY
DRAWN BY
CHECKED BY
IN CHARGE
DATE DEC/2018

DRAFT PEPD
SUBMITTAL
FOR INTERNAL
USE ONLY

NOT FOR
CONSTRUCTION

prontec 12 Burgos Ave.
11th Floor
Madrid, SP 28038

HNTB 1111 Broadway
9th Floor
Oakland, CA 94607



CALIFORNIA
High-Speed Rail Authority

CALIFORNIA HIGH-SPEED TRAIN PROJECT
SAN FRANCISCO TO MERCED
SCOTT TO CP LICK
TRACK SHIFT WORKS
LEGEND

CONTRACT NO.
DRAWING NO. CV-I6SSC-TSW-01
SCALE NOT TO SCALE
SHEET NO. 1 OF 13

LATERAL DISTANCE BETWEEN EXISTING AND PROPOSED TRACKS

- LESS THAN 1 ft.
- MORE THAN 1 ft. AND LESS THAN 10 ft.
- MORE THAN 10 ft. AND LESS THAN 21,34 ft.
- MORE THAN 21,34 ft.

CONSTRUCTION PHASES AFECTION

- LATERAL DISPLACEMENT CONSIDERED IN CONSTRUCTION PHASES ANALYSIS
- NEW TRACKS CONSIDERED

PROFILE

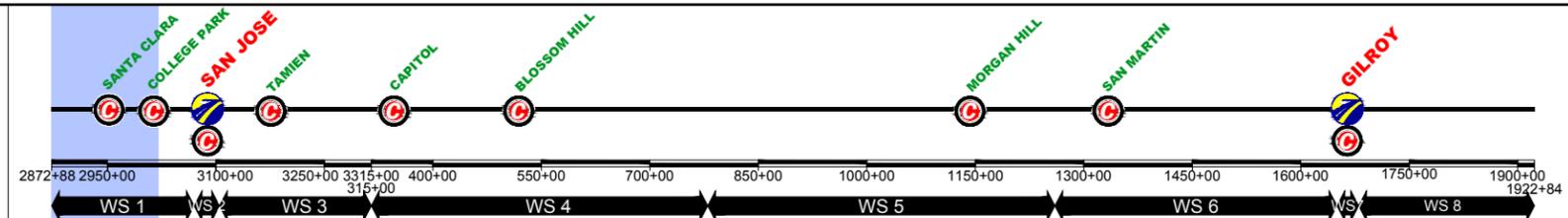
- INCREASE SUBGRADE
- DECREASE SUBGRADE
- INCREASE BALLAST THICKNESS
- DECREASE BALLAST THICKNESS

ANALYSIS OF SPECIAL EQUIPMENT

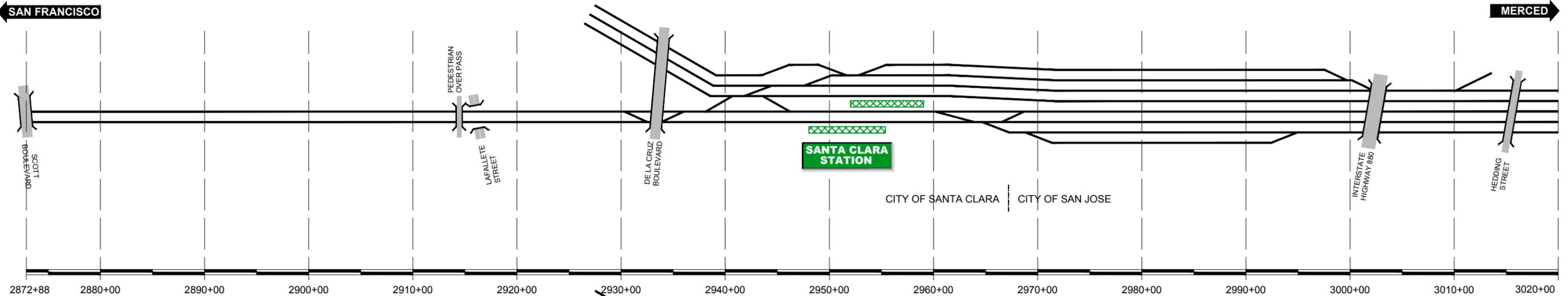
- REMOVE
- REMAIN VERTICAL ADAPTATION
- NEW EQUIPMENT

GRADE CROSSING TREATMENT

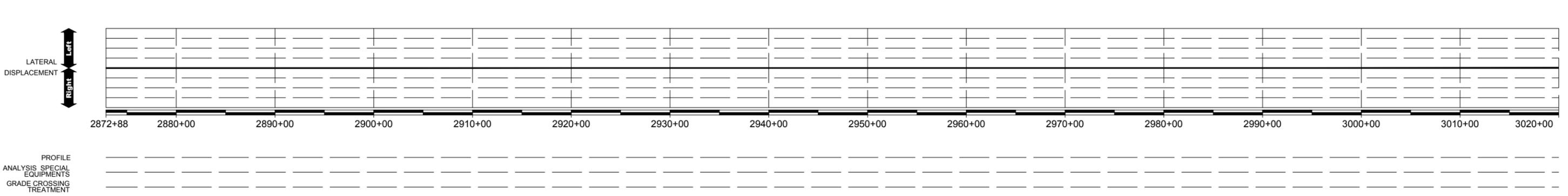
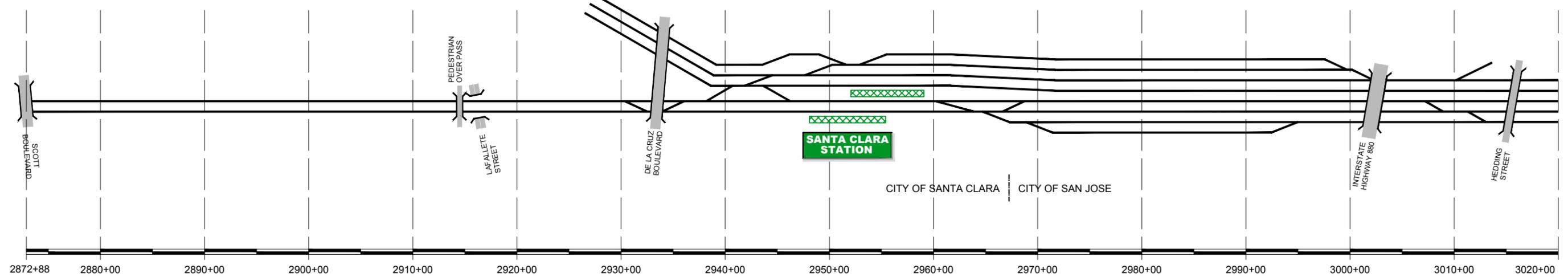
- ADAPT
- USABLE



EXISTING SCOTT TO CP LICK SCHEME



PROPOSED SCOTT TO CP LICK SCHEME



CONSIDERATED PROFILE PROJECTED FROM MT-3

DESIGNED BY	
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CALIFORNIA HIGH-SPEED TRAIN PROJECT
SAN FRANCISCO TO MERCED
SCOTT TO CP LICK
TRACK SHIFT WORKS
MT-0

CONTRACT NO.	
DRAWING NO.	CV-16SSC-TSW-02
SCALE	NOT TO SCALE
SHEET NO.	2 OF 13

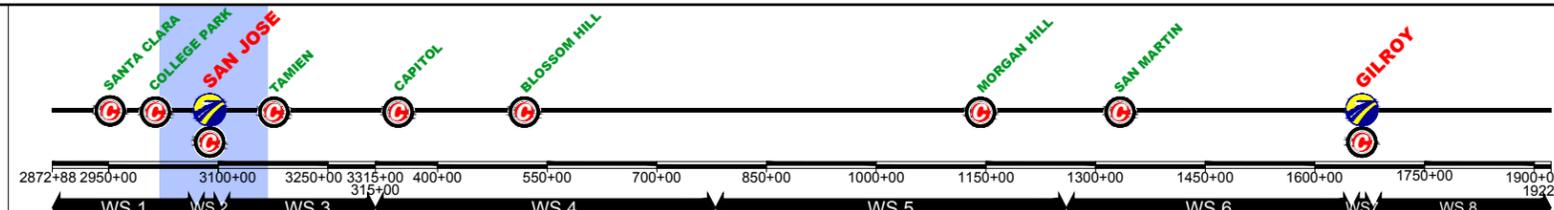
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\$PENTBLS\$
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\$DATE\$
\$USER\$

REV	DATE	BY	SUB	APP	DESCRIPTION

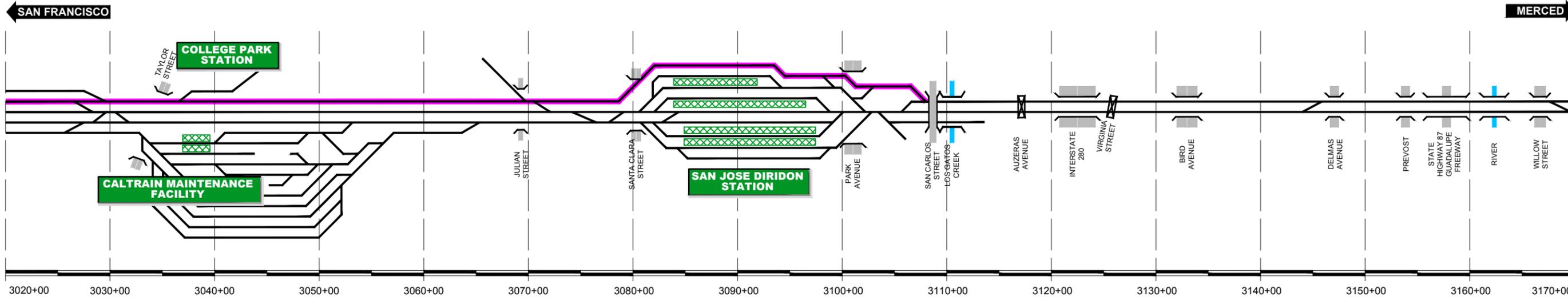
- LATERAL DISTANCE BETWEEN EXISTING AND PROPOSED TRACKS**
- LESS THAN 1 ft.
 - MORE THAN 1 ft. AND LESS THAN 10 ft.
 - MORE THAN 10 ft. AND LESS THAN 21,34 ft.
 - MORE THAN 21,34 ft.
- CONSTRUCTION PHASES AFECTION**
- LATERAL DISPLACEMENT CONSIDERED IN CONSTRUCTION PHASES ANALYSIS
 - NEW TRACKS CONSIDERED

- PROFILE**
- INCREASE SUBGRADE
 - DECREASE SUBGRADE
 - INCREASE BALLAST THICKNESS
 - DECREASE BALLAST THICKNESS
- ANALYSIS OF SPECIAL EQUIPMENT**
- REMOVE
 - REMAIN VERTICAL ADAPTATION
 - NEW EQUIPMENT

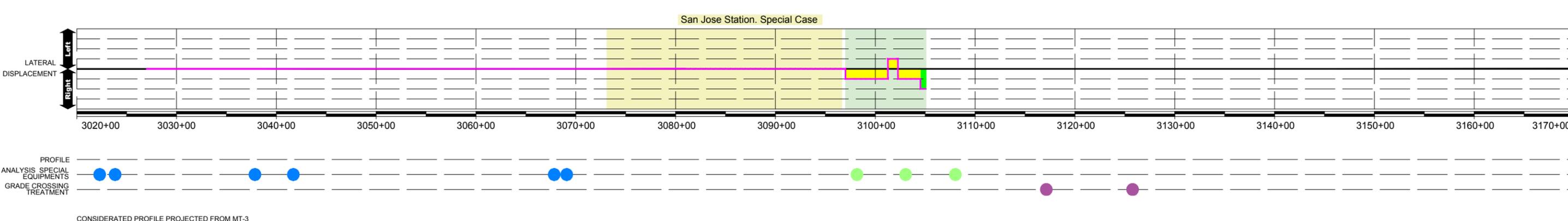
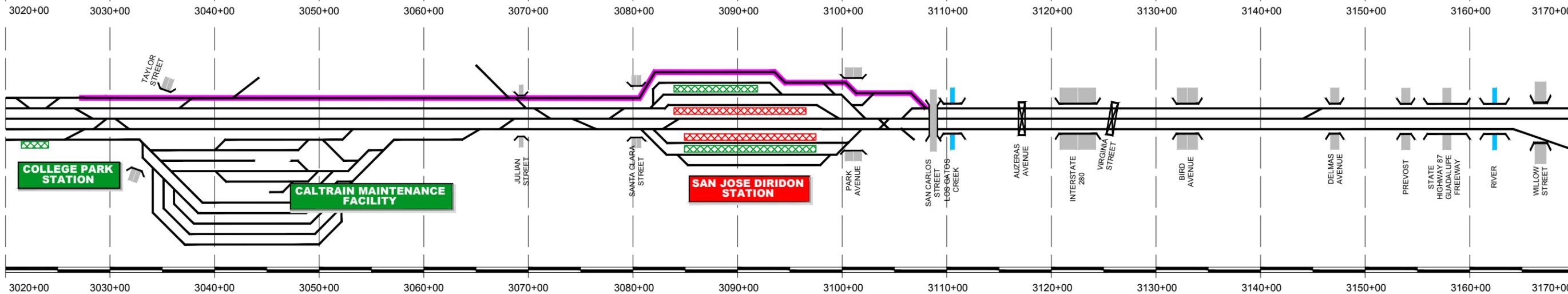
- GRADE CROSSING TREATMENT**
- ADAPT
 - USABLE



EXISTING SCOTT TO CP LICK SCHEME



PROPOSED SCOTT TO CP LICK SCHEME



FILE \$
 PLTDRVS \$
 PENTBL \$
 TIME \$
 DATE \$
 USER \$

REV	DATE	BY	SUB	APP	DESCRIPTION

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SAN FRANCISCO TO MERCED
 SCOTT TO CP LICK
 TRACK SHIFT WORKS
 MT-0

CONTRACT NO.
DRAWING NO. CV-16SSC-TSW-03
SCALE NOT TO SCALE
SHEET NO. 3 OF 13

LATERAL DISTANCE BETWEEN EXISTING AND PROPOSED TRACKS

- LESS THAN 1 ft.
- MORE THAN 1 ft. AND LESS THAN 10 ft.
- MORE THAN 10 ft. AND LESS THAN 21,34 ft.
- MORE THAN 21,34 ft.

CONSTRUCTION PHASES AFECTION

- LATERAL DISPLACEMENT CONSIDERED IN CONSTRUCTION PHASES ANALYSIS
- NEW TRACKS CONSIDERED

PROFILE

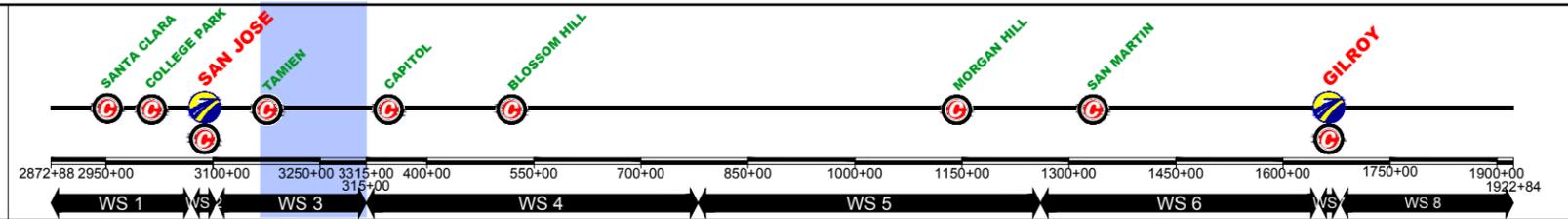
- INCREASE SUBGRADE
- DECREASE SUBGRADE
- INCREASE BALLAST THICKNESS
- DECREASE BALLAST THICKNESS

ANALYSIS OF SPECIAL EQUIPMENT

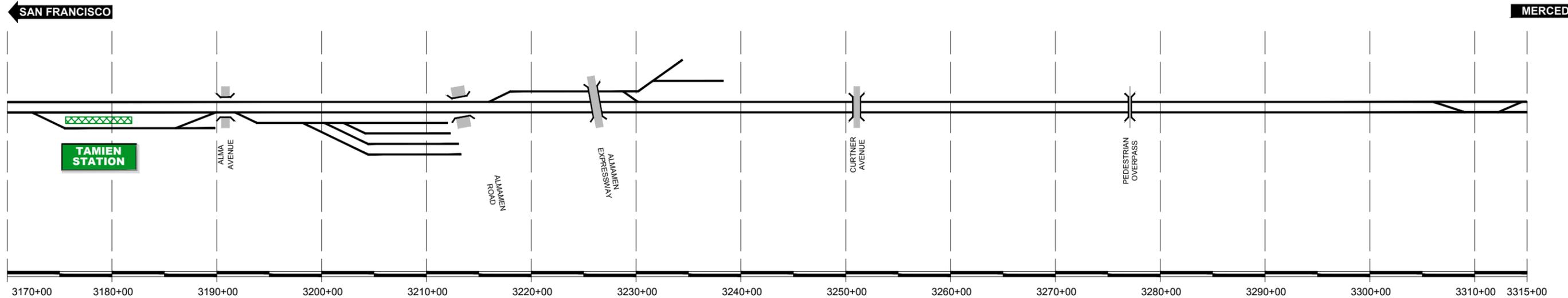
- REMOVE
- REMAIN VERTICAL ADAPTATION
- NEW EQUIPMENT

GRADE CROSSING TREATMENT

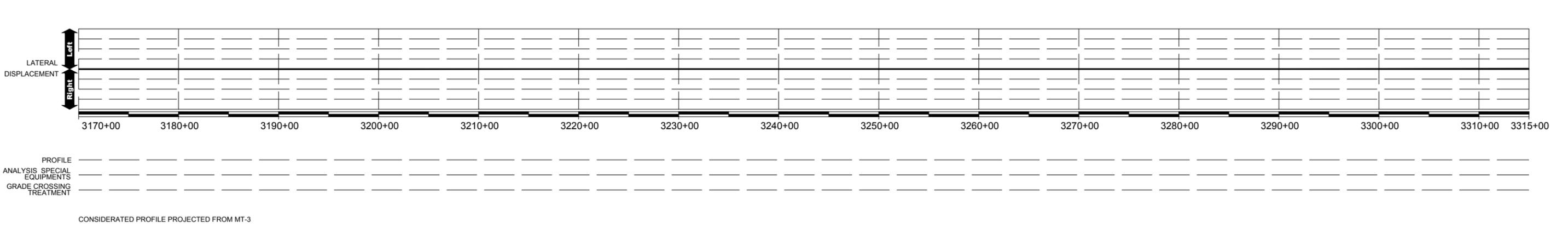
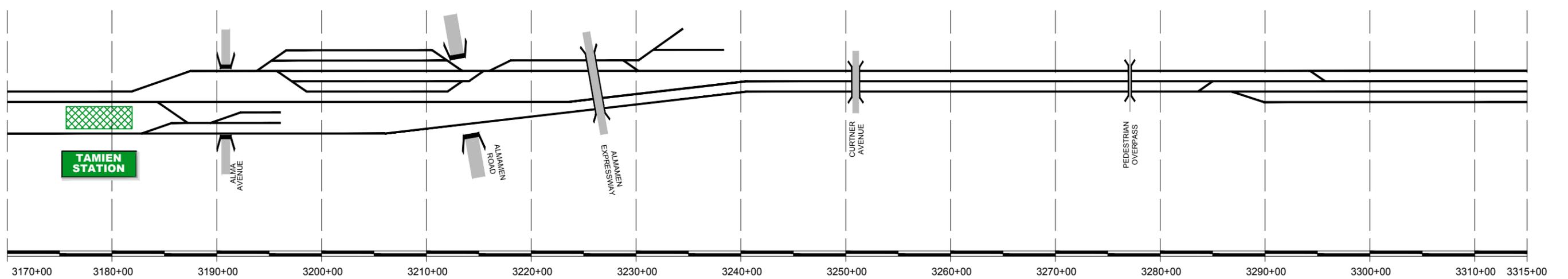
- ADAPT
- USABLE



EXISTING SCOTT TO CP LICK SCHEME



PROPOSED SCOTT TO CP LICK SCHEME



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CALIFORNIA HIGH-SPEED TRAIN PROJECT
SAN FRANCISCO TO MERCED
SCOTT TO CP LICK
TRACK SHIFT WORKS
MT-0

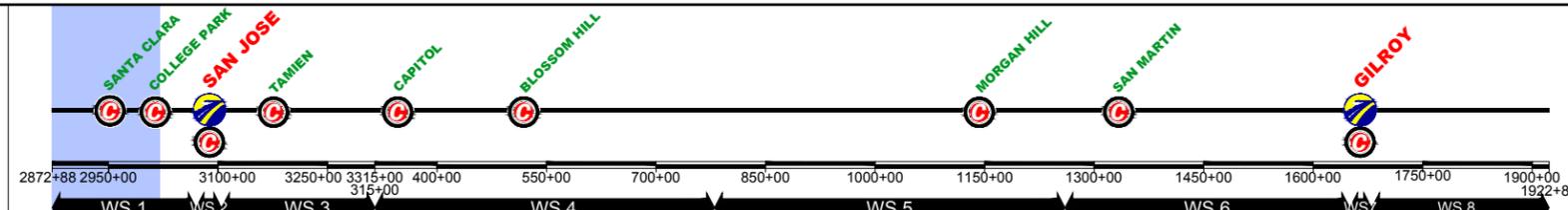
CONTRACT NO.	
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SCALE	NOT TO SCALE
SHEET NO.	4 OF 13

REV	DATE	BY	SUB	APP	DESCRIPTION

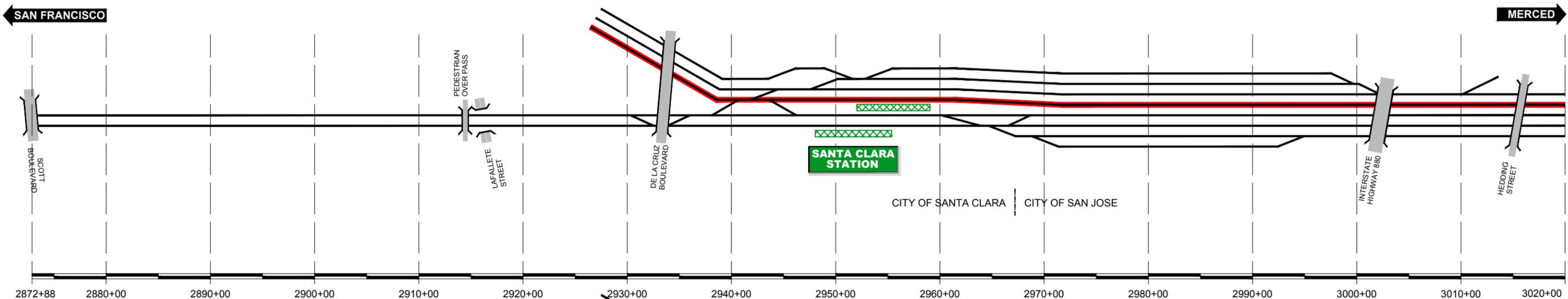
- LATERAL DISTANCE BETWEEN EXISTING AND PROPOSED TRACKS**
- LESS THAN 1 ft.
 - MORE THAN 1 ft. AND LESS THAN 10 ft.
 - MORE THAN 10 ft. AND LESS THAN 21,34 ft.
 - MORE THAN 21,34 ft.
- CONSTRUCTION PHASES AFECTION**
- LATERAL DISPLACEMENT CONSIDERED IN CONSTRUCTION PHASES ANALYSIS
 - NEW TRACKS CONSIDERED

- PROFILE**
- INCREASE SUBGRADE
 - DECREASE SUBGRADE
 - INCREASE BALLAST THICKNESS
 - DECREASE BALLAST THICKNESS
- ANALYSIS OF SPECIAL EQUIPMENT**
- REMOVE
 - REMAIN VERTICAL ADAPTATION
 - NEW EQUIPMENT

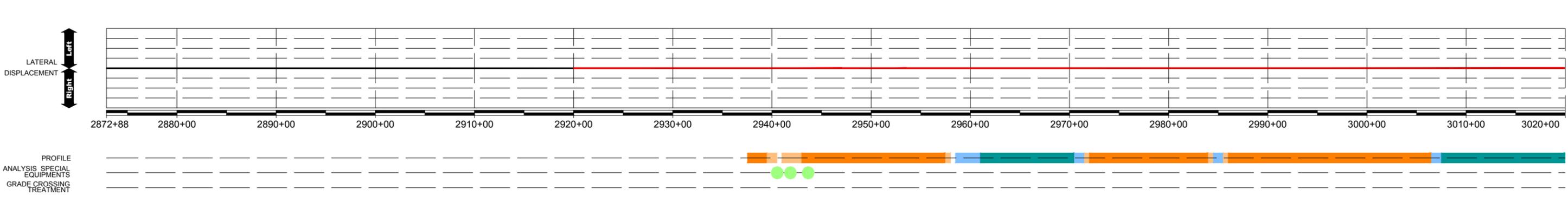
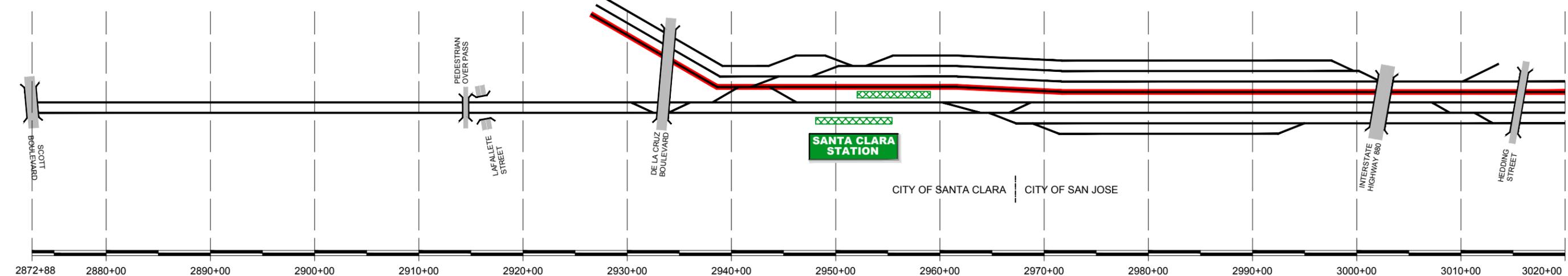
- GRADE CROSSING TREATMENT**
- ADAPT
 - USABLE



EXISTING SCOTT TO CP LICK SCHEME



PROPOSED SCOTT TO CP LICK SCHEME



CONSIDERED PROFILE PROJECTED FROM MT-3

\$FILE\$
 \$PLTDVRS\$
 \$PENTBLS\$
MT-1
 \$TIME\$
 \$DATE\$
 \$USER\$

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SAN FRANCISCO TO MERCED
 SCOTT TO CP LICK
 TRACK SHIFT WORKS
 MT-1

CONTRACT NO.	
DRAWING NO.	CV-16SSC-TSW-05
SCALE	NOT TO SCALE
SHEET NO.	5 OF 13

REV	DATE	BY	SUB	APP	DESCRIPTION

LATERAL DISTANCE BETWEEN EXISTING AND PROPOSED TRACKS

- LESS THAN 1 ft.
- MORE THAN 1 ft. AND LESS THAN 10 ft.
- MORE THAN 10 ft. AND LESS THAN 21,34 ft.
- MORE THAN 21,34 ft.

CONSTRUCTION PHASES AFECTION

- LATERAL DISPLACEMENT CONSIDERED IN CONSTRUCTION PHASES ANALYSIS
- NEW TRACKS CONSIDERED

PROFILE

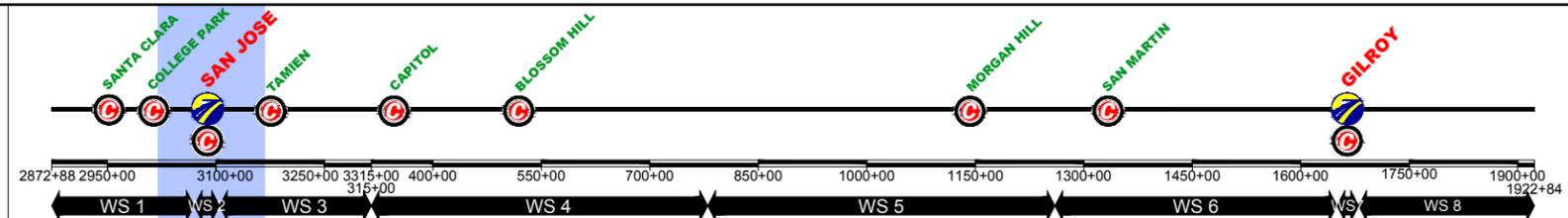
- INCREASE SUBGRADE
- DECREASE SUBGRADE
- INCREASE BALLAST THICKNESS
- DECREASE BALLAST THICKNESS

ANALYSIS OF SPECIAL EQUIPMENT

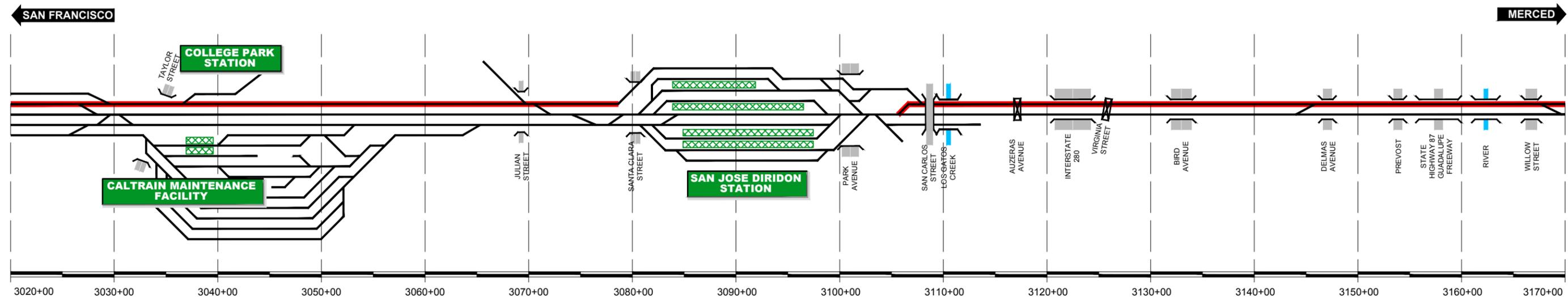
- REMOVE
- REMAIN VERTICAL ADAPTATION
- NEW EQUIPMENT

GRADE CROSSING TREATMENT

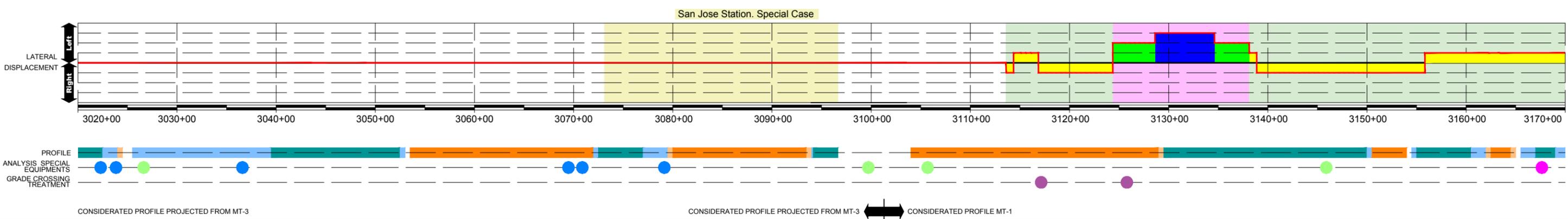
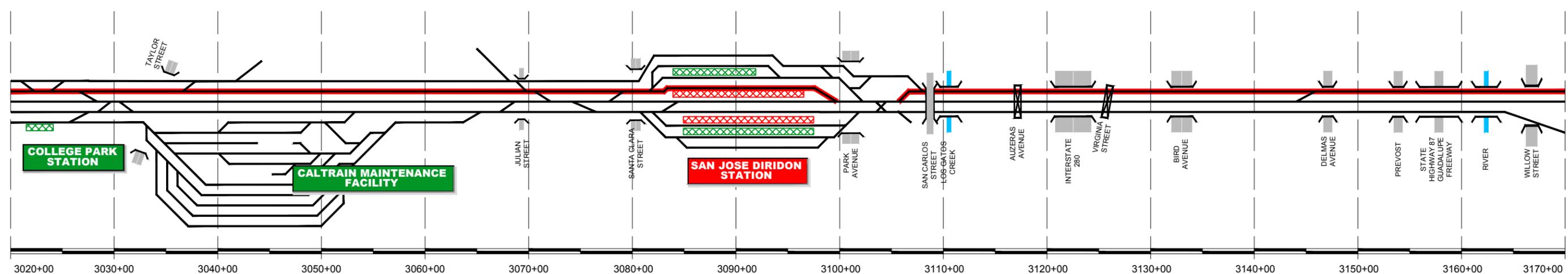
- ADAPT
- USABLE



EXISTING SCOTT TO CP LICK SCHEME



PROPOSED SCOTT TO CP LICK SCHEME



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SCOTT TO CP LICK
TRACK SHIFT WORKS
MT-1

CONTRACT NO.
DRAWING NO.
CV-16SSC-TSW-06
SCALE
NOT TO SCALE
SHEET NO.
6 OF 13

LATERAL DISTANCE BETWEEN EXISTING AND PROPOSED TRACKS

- LESS THAN 1 ft.
- MORE THAN 1 ft. AND LESS THAN 10 ft.
- MORE THAN 10 ft. AND LESS THAN 21,34 ft.
- MORE THAN 21,34 ft.

CONSTRUCTION PHASES AFECTION

- LATERAL DISPLACEMENT CONSIDERED IN CONSTRUCTION PHASES ANALYSIS
- NEW TRACKS CONSIDERED

PROFILE

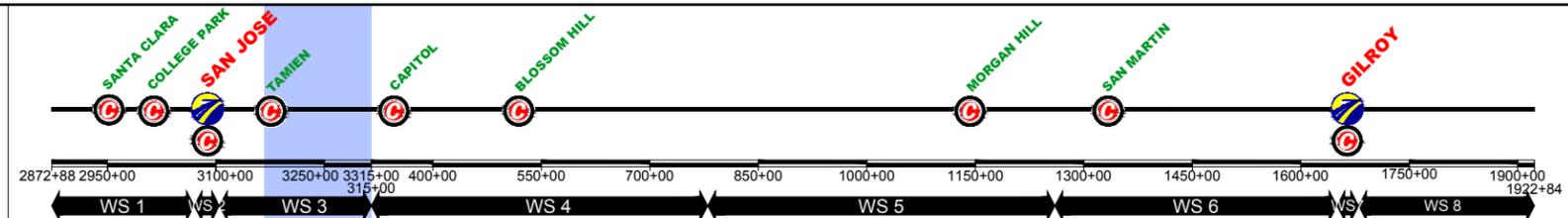
- INCREASE SUBGRADE
- DECREASE SUBGRADE
- INCREASE BALLAST THICKNESS
- DECREASE BALLAST THICKNESS

ANALYSIS OF SPECIAL EQUIPMENT

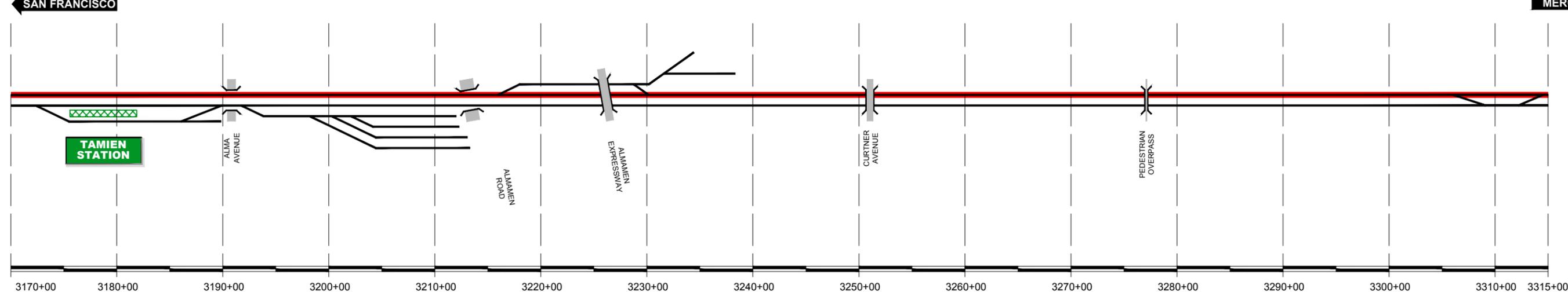
- REMOVE
- REMAIN VERTICAL ADAPTATION
- NEW EQUIPMENT

GRADE CROSSING TREATMENT

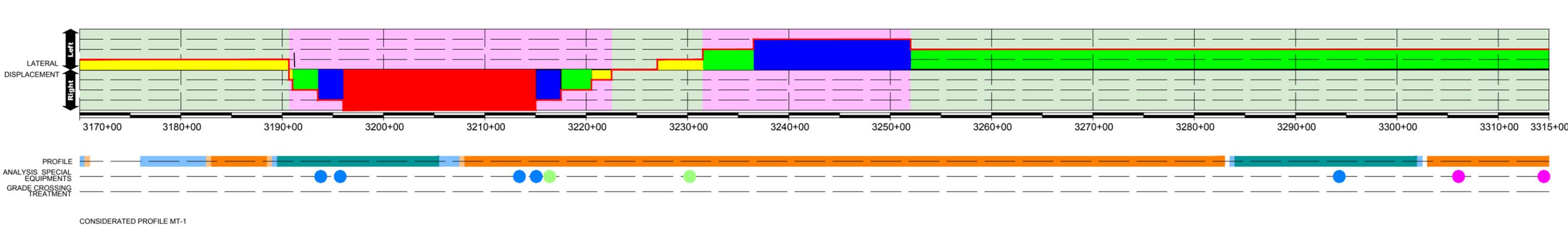
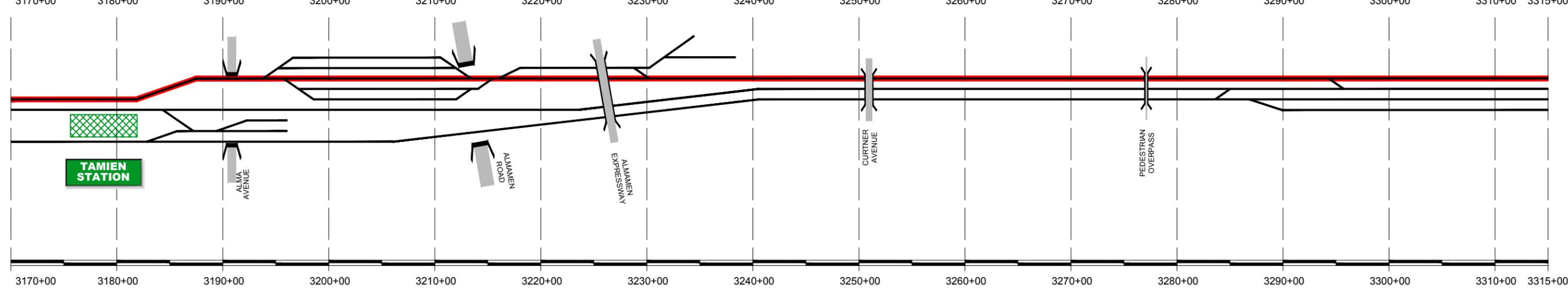
- ADAPT
- USABLE



EXISTING SCOTT TO CP LICK SCHEME



PROPOSED SCOTT TO CP LICK SCHEME



\$FILE\$
 \$PENTBL\$ \$PLTDV\$ \$
 \$MT-1\$
 \$PENTBL\$ \$PLTDV\$ \$
 \$TIME\$ \$
 \$DATE\$ \$
 \$USER\$ \$

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CALIFORNIA HIGH-SPEED TRAIN PROJECT
SAN FRANCISCO TO MERCED
SCOTT TO CP LICK
TRACK SHIFT WORKS
MT-1

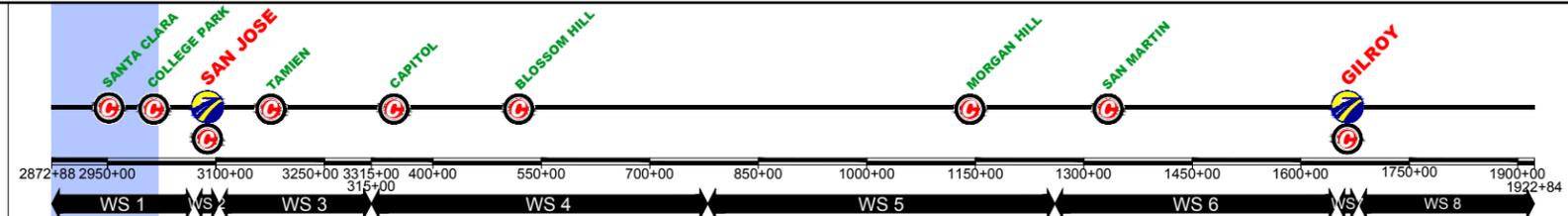
CONTRACT NO.	
DRAWING NO.	CV-16SSC-TSW-07
SCALE	NOT TO SCALE
SHEET NO.	7 OF 13

REV	DATE	BY	SUB	APP	DESCRIPTION

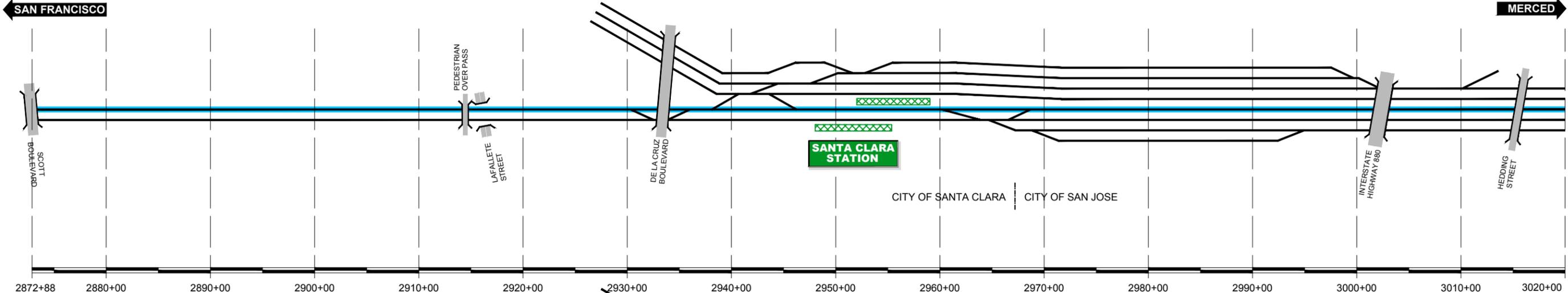
- LATERAL DISTANCE BETWEEN EXISTING AND PROPOSED TRACKS**
- LESS THAN 1 ft.
 - MORE THAN 1 ft. AND LESS THAN 10 ft.
 - MORE THAN 10 ft. AND LESS THAN 21,34 ft.
 - MORE THAN 21,34 ft.
- CONSTRUCTION PHASES AFECTION**
- LATERAL DISPLACEMENT CONSIDERED IN CONSTRUCTION PHASES ANALYSIS
 - NEW TRACKS CONSIDERED

- PROFILE**
- INCREASE SUBGRADE
 - DECREASE SUBGRADE
 - INCREASE BALLAST THICKNESS
 - DECREASE BALLAST THICKNESS
- ANALYSIS OF SPECIAL EQUIPMENT**
- REMOVE
 - REMAIN VERTICAL ADAPTATION
 - NEW EQUIPMENT

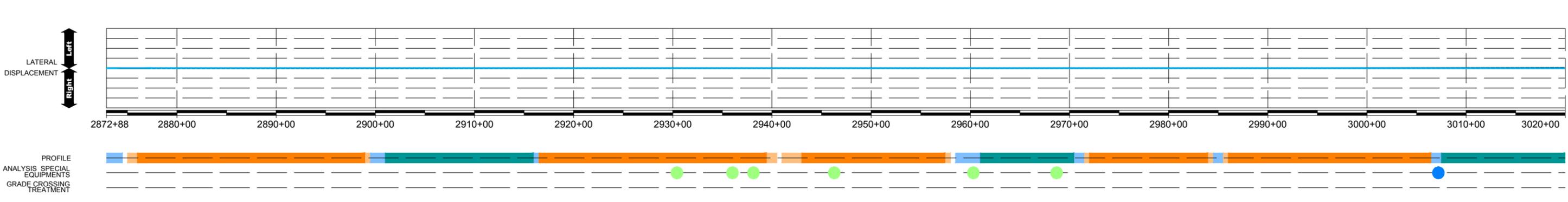
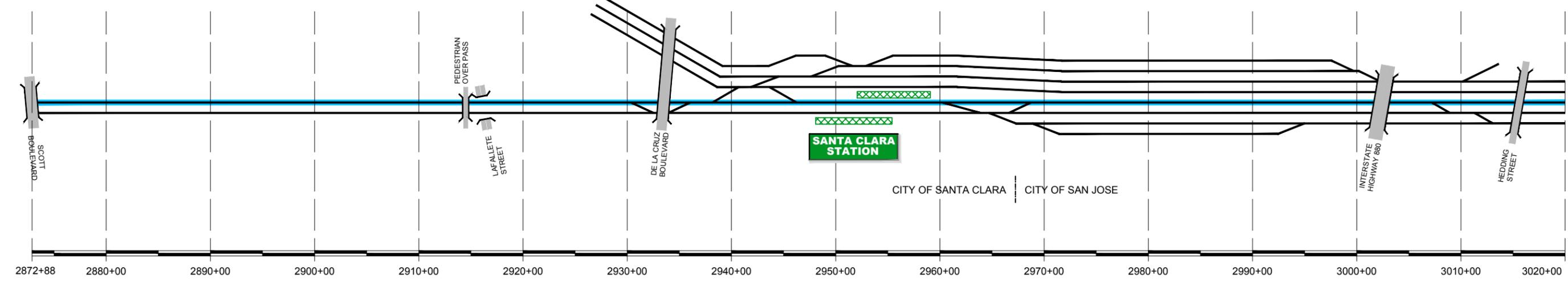
- GRADE CROSSING TREATMENT**
- ADAPT
 - USABLE



EXISTING SCOTT TO CP LICK SCHEME



PROPOSED SCOTT TO CP LICK SCHEME



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REV	DATE	BY	SUB	APP	DESCRIPTION

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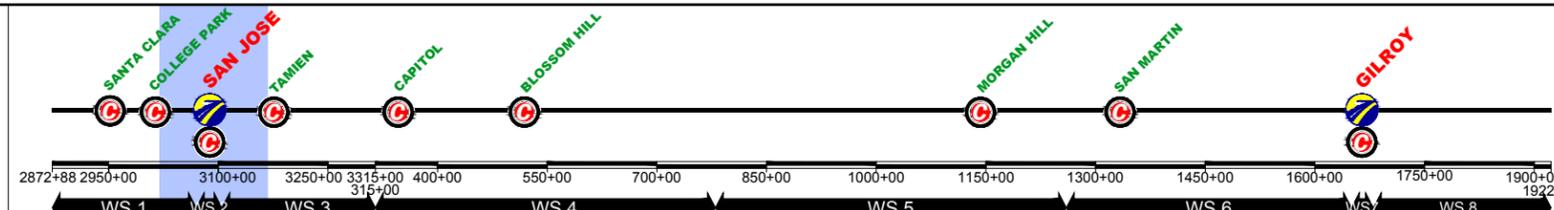
CALIFORNIA HIGH-SPEED TRAIN PROJECT
SAN FRANCISCO TO MERCED
SCOTT TO CP LICK
TRACK SHIFT WORKS
MT-2

CONTRACT NO.	
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SCALE	NOT TO SCALE
SHEET NO.	8 OF 13

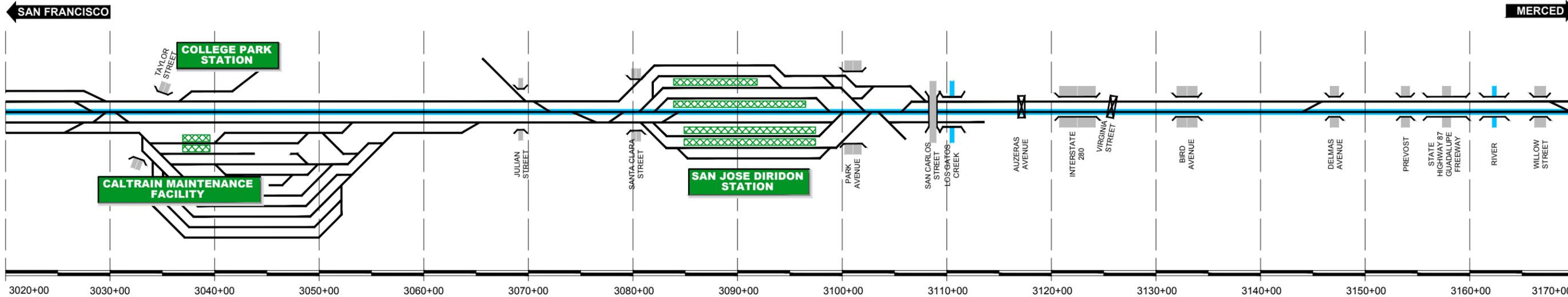
- LATERAL DISTANCE BETWEEN EXISTING AND PROPOSED TRACKS**
- LESS THAN 1 ft.
 - MORE THAN 1 ft. AND LESS THAN 10 ft.
 - MORE THAN 10 ft. AND LESS THAN 21,34 ft.
 - MORE THAN 21,34 ft.
- CONSTRUCTION PHASES AFECTION**
- LATERAL DISPLACEMENT CONSIDERED IN CONSTRUCTION PHASES ANALYSIS
 - NEW TRACKS CONSIDERED

- PROFILE**
- INCREASE SUBGRADE
 - DECREASE SUBGRADE
 - INCREASE BALLAST THICKNESS
 - DECREASE BALLAST THICKNESS
- ANALYSIS OF SPECIAL EQUIPMENT**
- REMOVE
 - REMAIN VERTICAL ADAPTATION
 - NEW EQUIPMENT

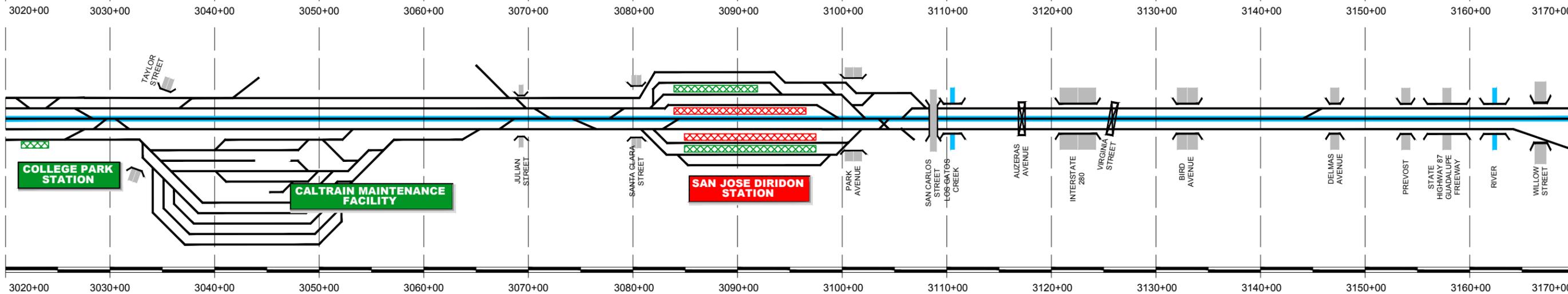
- GRADE CROSSING TREATMENT**
- ADAPT
 - USABLE



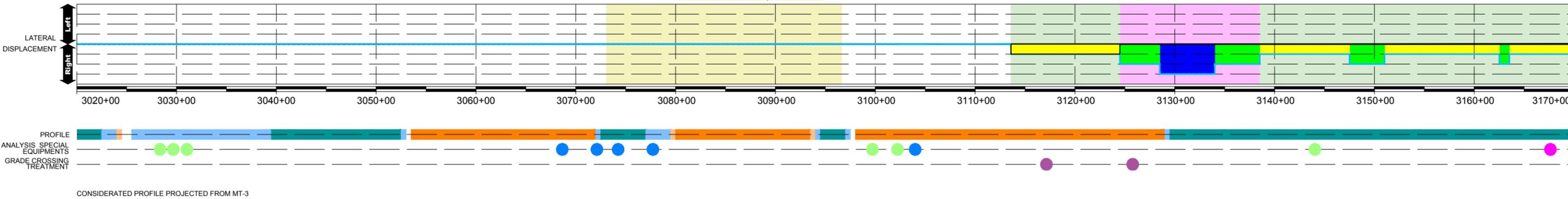
EXISTING SCOTT TO CP LICK SCHEME



PROPOSED SCOTT TO CP LICK SCHEME



San Jose Station. Special Case



CONSIDERED PROFILE PROJECTED FROM MT-3

FILE \$
 PLTDRVS \$
 PENTBLS \$
 TIME \$
 DATE \$
 USER \$

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CALIFORNIA HIGH-SPEED TRAIN PROJECT
SAN FRANCISCO TO MERCED
 SCOTT TO CP LICK
 TRACK SHIFT WORKS
 MT-2

CONTRACT NO.	
DRAWING NO.	CV-16SSC-TSW-09
SCALE	NOT TO SCALE
SHEET NO.	9 OF 13

LATERAL DISTANCE BETWEEN EXISTING AND PROPOSED TRACKS

- LESS THAN 1 ft.
- MORE THAN 1 ft. AND LESS THAN 10 ft.
- MORE THAN 10 ft. AND LESS THAN 21,34 ft.
- MORE THAN 21,34 ft.

CONSTRUCTION PHASES AFECTION

- LATERAL DISPLACEMENT CONSIDERED IN CONSTRUCTION PHASES ANALYSIS
- NEW TRACKS CONSIDERED

PROFILE

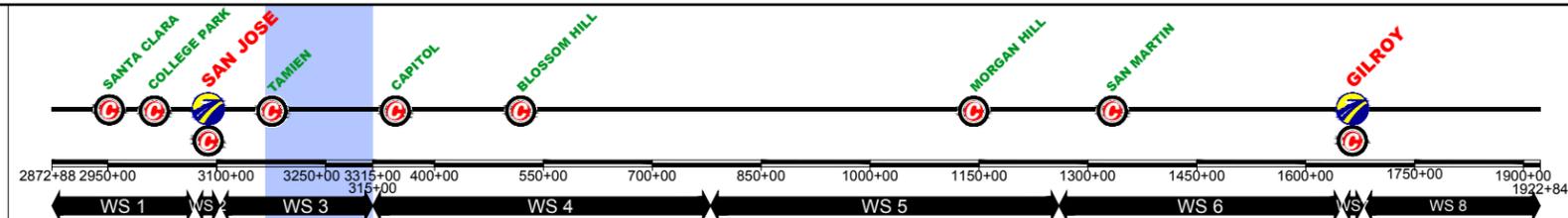
- INCREASE SUBGRADE
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- INCREASE BALLAST THICKNESS
- DECREASE BALLAST THICKNESS

ANALYSIS OF SPECIAL EQUIPMENT

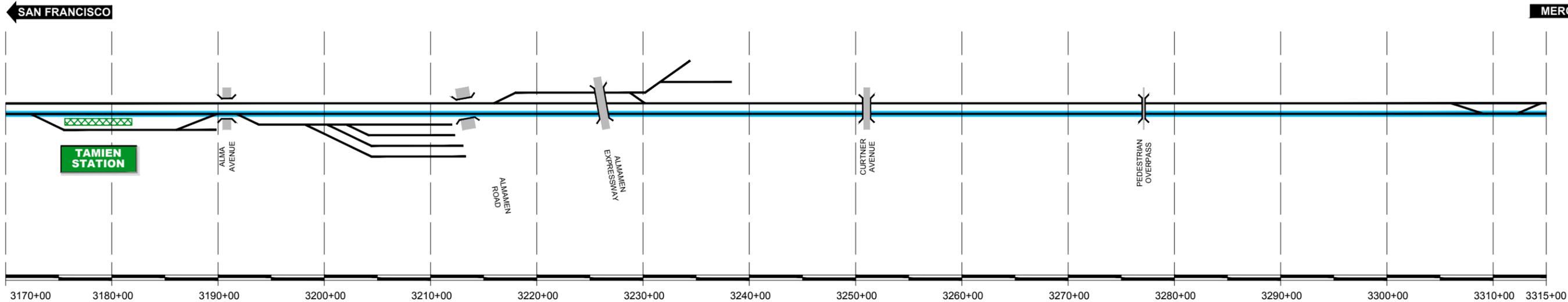
- REMOVE
- REMAIN VERTICAL ADAPTATION
- NEW EQUIPMENT

GRADE CROSSING TREATMENT

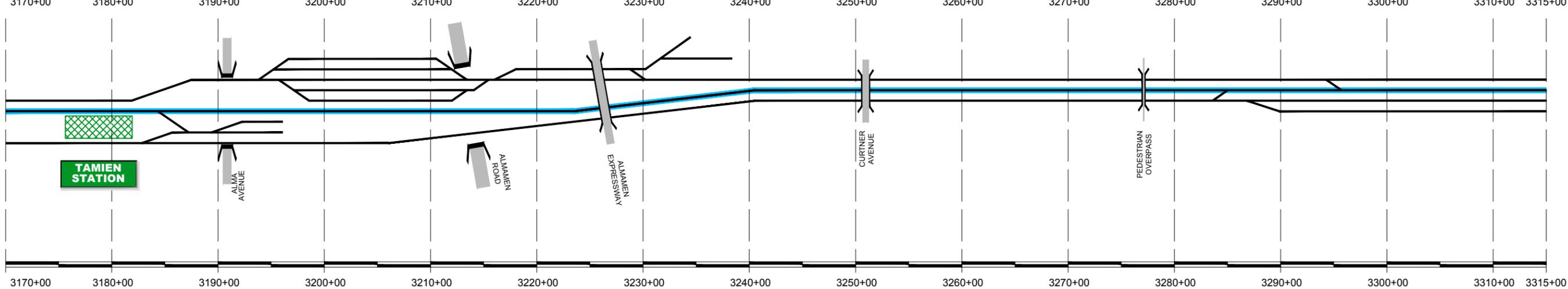
- ADAPT
- USABLE



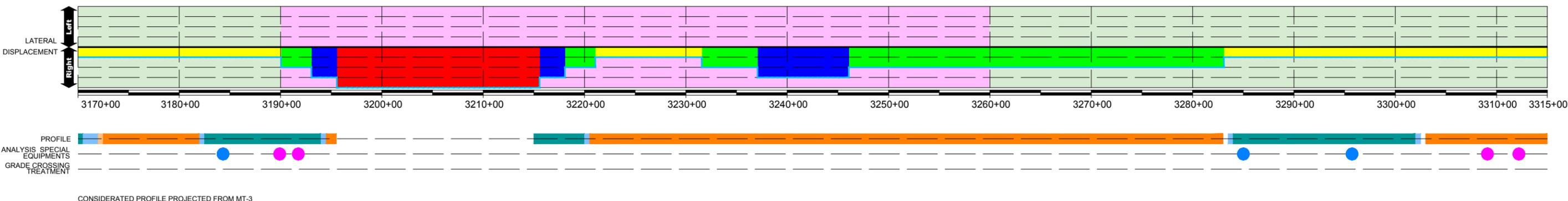
EXISTING SCOTT TO CP LICK SCHEME



PROPOSED SCOTT TO CP LICK SCHEME



\$FILE\$
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\$MT-2
\$PENTBL\$
\$TIME\$
\$DATE\$
\$USER\$



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IN CHARGE	
DATE	DEC/2018

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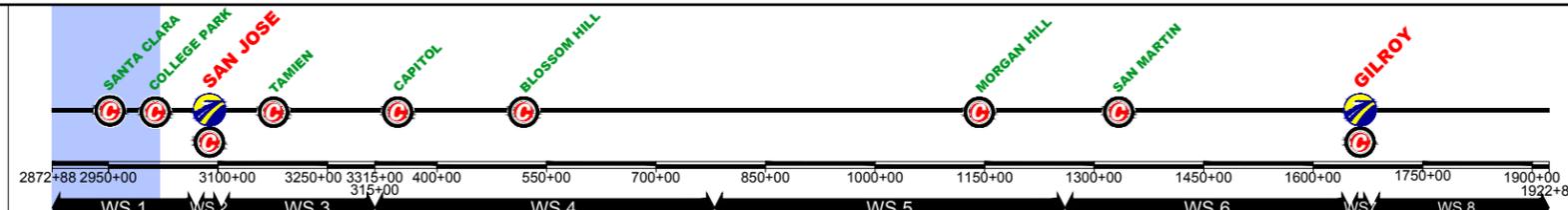
CALIFORNIA HIGH-SPEED TRAIN PROJECT
SAN FRANCISCO TO MERCED
SCOTT TO CP LICK
TRACK SHIFT WORKS
MT-2

CONTRACT NO.	
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SCALE	NOT TO SCALE
SHEET NO.	10 OF 13

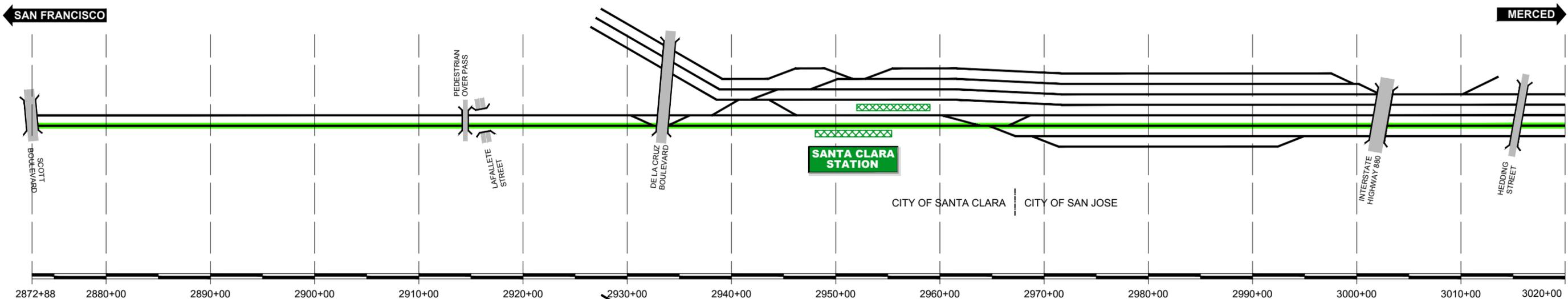
- LATERAL DISTANCE BETWEEN EXISTING AND PROPOSED TRACKS**
- LESS THAN 1 ft.
 - MORE THAN 1 ft. AND LESS THAN 10 ft.
 - MORE THAN 10 ft. AND LESS THAN 21,34 ft.
 - MORE THAN 21,34 ft.
- CONSTRUCTION PHASES AFECTION**
- LATERAL DISPLACEMENT CONSIDERED IN CONSTRUCTION PHASES ANALYSIS
 - NEW TRACKS CONSIDERED

- PROFILE**
- INCREASE SUBGRADE
 - DECREASE SUBGRADE
 - INCREASE BALLAST THICKNESS
 - DECREASE BALLAST THICKNESS
- ANALYSIS OF SPECIAL EQUIPMENT**
- REMOVE
 - REMAIN VERTICAL ADAPTATION
 - NEW EQUIPMENT

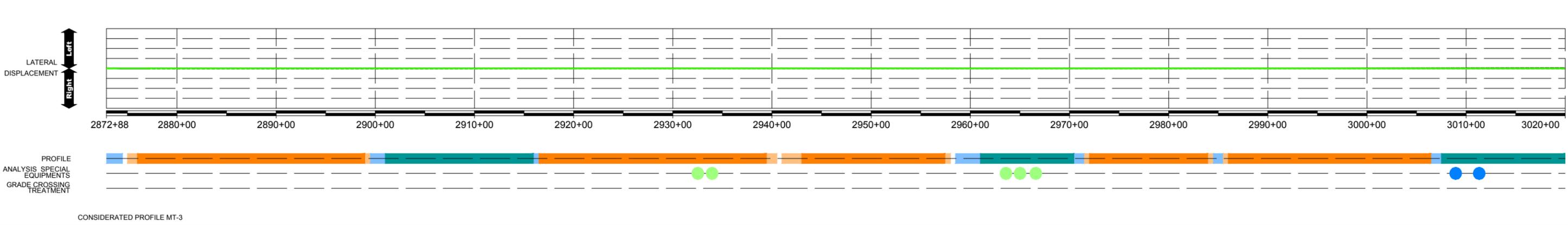
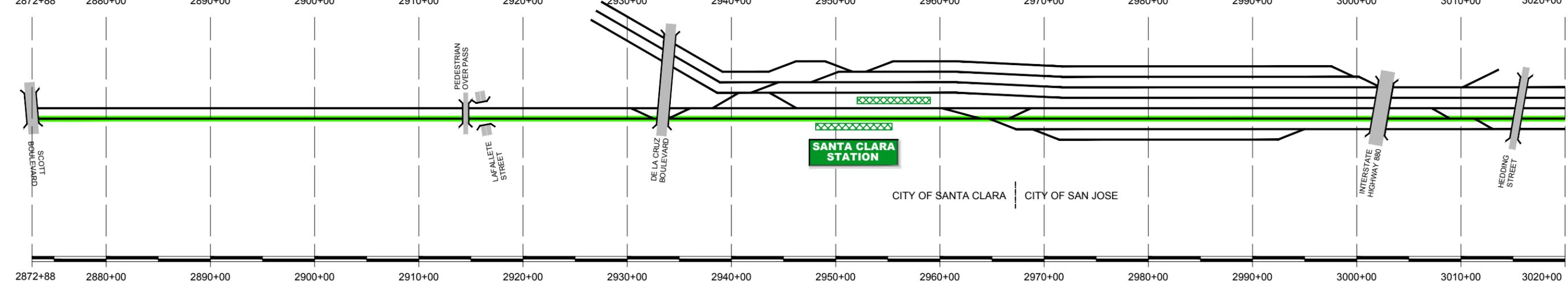
- GRADE CROSSING TREATMENT**
- ADAPT
 - USABLE



EXISTING SCOTT TO CP LICK SCHEME



PROPOSED SCOTT TO CP LICK SCHEME



\$FILE\$
 \$PLTDVRS\$
 \$PENTBLS\$
 \$TIME\$
 \$DATE\$
 \$USER\$

REV	DATE	BY	SUB	APP	DESCRIPTION

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IN CHARGE	
DATE	DEC/2018

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CALIFORNIA HIGH-SPEED TRAIN PROJECT
SAN FRANCISCO TO MERCED
 SCOTT TO CP LICK
 TRACK SHIFT WORKS
 MT-3

CONTRACT NO.	
DRAWING NO.	CV-16SSC-TSW-11
SCALE	NOT TO SCALE
SHEET NO.	11 OF 13

LATERAL DISTANCE BETWEEN EXISTING AND PROPOSED TRACKS

- LESS THAN 1 ft.
- MORE THAN 1 ft. AND LESS THAN 10 ft.
- MORE THAN 10 ft. AND LESS THAN 21,34 ft.
- MORE THAN 21,34 ft.

PROFILE

- INCREASE SUBGRADE
- DECREASE SUBGRADE
- INCREASE BALLAST THICKNESS
- DECREASE BALLAST THICKNESS

GRADE CROSSING TREATMENT

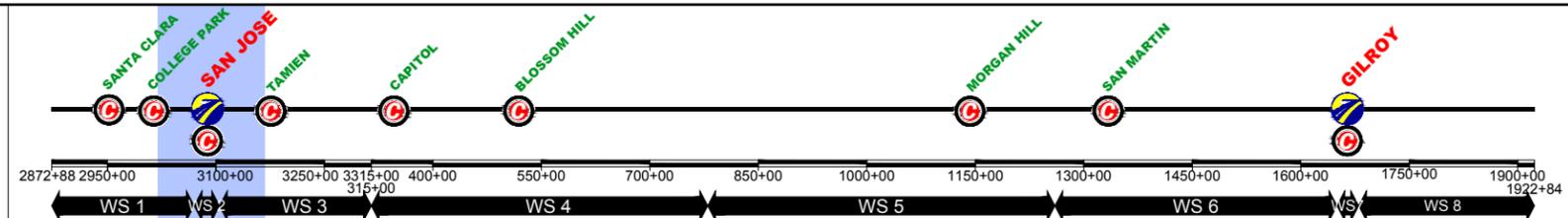
- ADAPT
- USABLE

CONSTRUCTION PHASES AFECTION

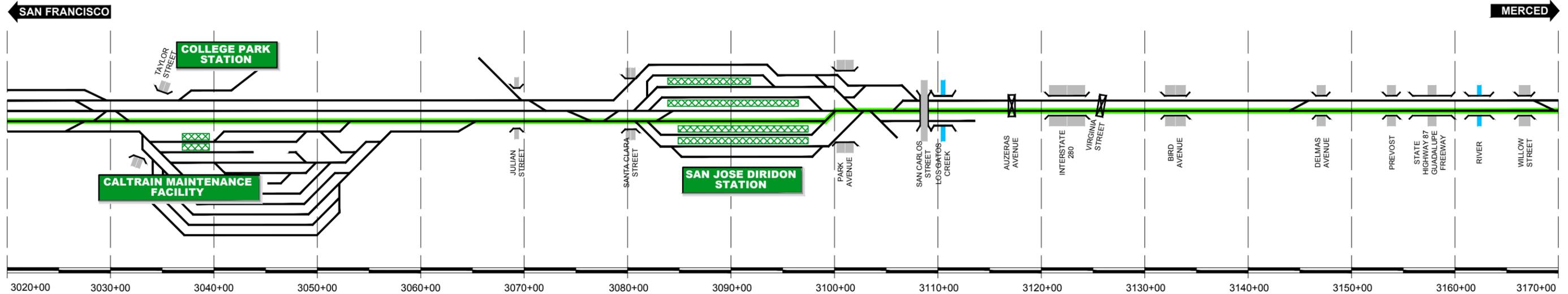
- LATERAL DISPLACEMENT CONSIDERED IN CONSTRUCTION PHASES ANALYSIS
- NEW TRACKS CONSIDERED

ANALYSIS OF SPECIAL EQUIPMENT

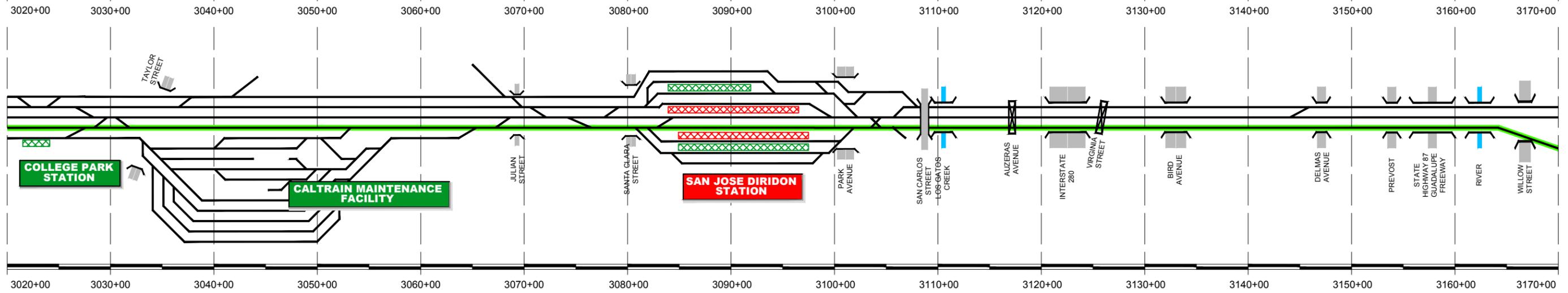
- REMOVE
- REMAIN VERTICAL ADAPTATION
- NEW EQUIPMENT



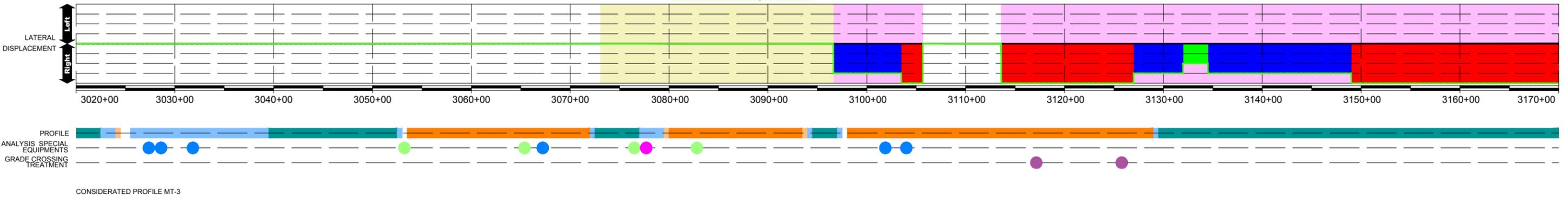
EXISTING SCOTT TO CP LICK SCHEME



PROPOSED SCOTT TO CP LICK SCHEME



San Jose Station. Special Case



CONSIDERED PROFILE MT-3

DESIGNED BY	
DRAWN BY	
CHECKED BY	
IN CHARGE	
DATE	DEC/2018

DRAFT PEPD SUBMITTAL FOR INTERNAL USE ONLY
NOT FOR CONSTRUCTION

prontec 12 Burgos Ave. 11th Floor Madrid, SP 28038
HNTB 1111 Broadway 9th Floor Oakland, CA 94607



CALIFORNIA HIGH-SPEED TRAIN PROJECT
SAN FRANCISCO TO MERCED
SCOTT TO CP LICK
TRACK SHIFT WORKS
MT-3

CONTRACT NO.	
DRAWING NO.	CV-16SSC-TSW-12
SCALE	NOT TO SCALE
SHEET NO.	12 OF 13

FILE \$
PLTDRVS \$
PENTBL \$
TIME \$
DATE \$
USER \$

REV	DATE	BY	SUB	APP	DESCRIPTION

LATERAL DISTANCE BETWEEN EXISTING AND PROPOSED TRACKS

- LESS THAN 1 ft.
- MORE THAN 1 ft. AND LESS THAN 10 ft.
- MORE THAN 10 ft. AND LESS THAN 21,34 ft.
- MORE THAN 21,34 ft.

CONSTRUCTION PHASES AFECTION

- LATERAL DISPLACEMENT CONSIDERED IN CONSTRUCTION PHASES ANALYSIS
- NEW TRACKS CONSIDERED

PROFILE

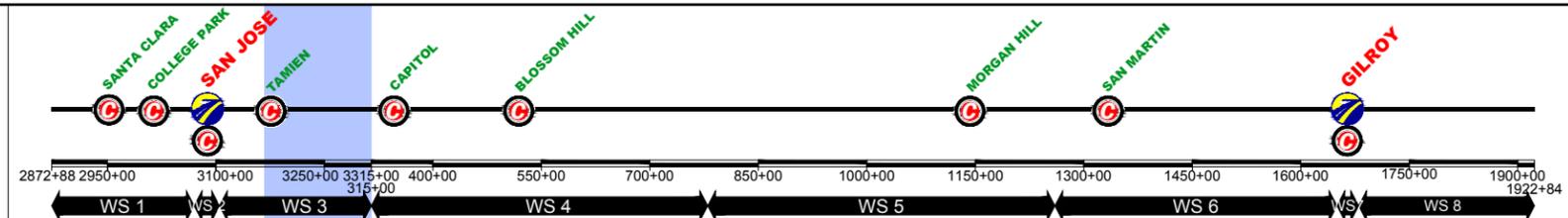
- INCREASE SUBGRADE
- DECREASE SUBGRADE
- INCREASE BALLAST THICKNESS
- DECREASE BALLAST THICKNESS

ANALYSIS OF SPECIAL EQUIPMENT

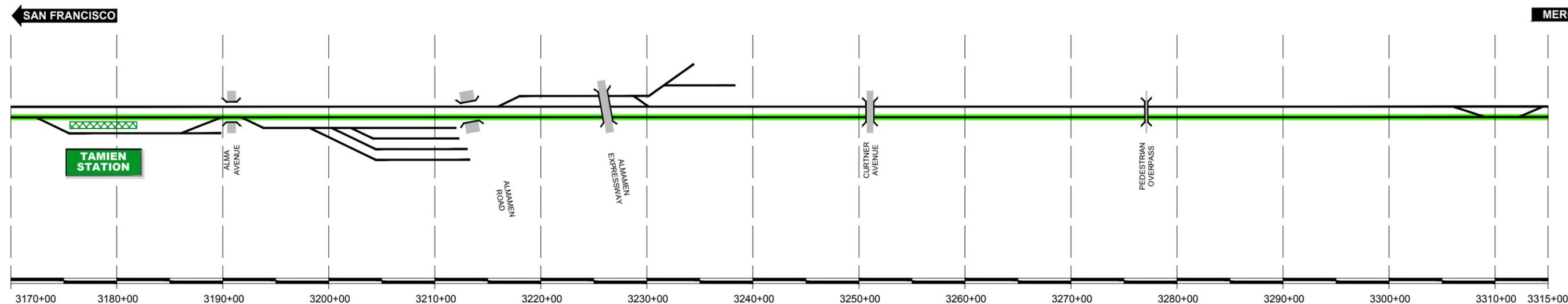
- REMOVE
- REMAIN VERTICAL ADAPTATION
- NEW EQUIPMENT

GRADE CROSSING TREATMENT

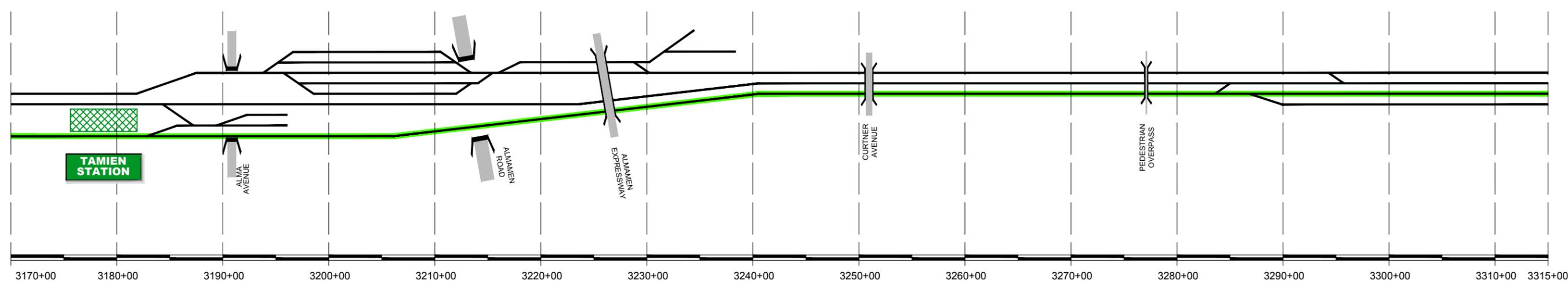
- ADAPT
- USABLE



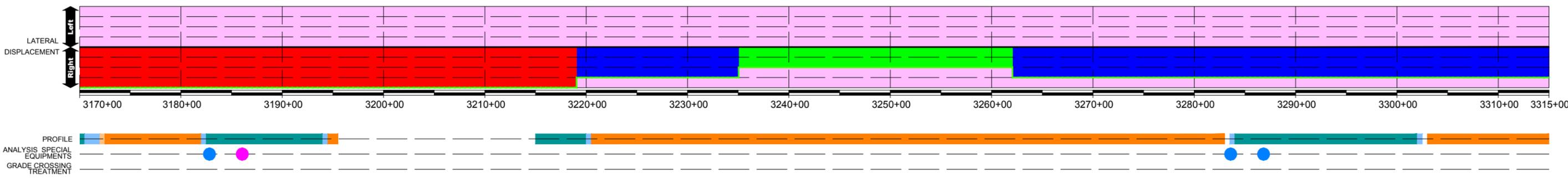
EXISTING SCOTT TO CP LICK SCHEME



PROPOSED SCOTT TO CP LICK SCHEME



\$FILE\$
\$PENTBL\$
\$PLTDV\$
\$MT-3\$
\$TIME\$
\$DATE\$
\$USER\$



CONSIDERED PROFILE MT-3

REV	DATE	BY	SUB	APP	DESCRIPTION

DESIGNED BY	
DRAWN BY	
CHECKED BY	
IN CHARGE	
DATE	DEC/2018

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HNTB 1111 Broadway 9th Floor Oakland, CA 94607

CALIFORNIA High-Speed Rail Authority

CALIFORNIA HIGH-SPEED TRAIN PROJECT
SAN FRANCISCO TO MERCED
SCOTT TO CP LICK
TRACK SHIFT WORKS
MT-3

CONTRACT NO.	
DRAWING NO.	CV-16SSC-TSW-13
SCALE	NOT TO SCALE
SHEET NO.	13 OF 13

**CALIFORNIA HIGH SPEED TRAIN PROJECT
CONSTRUCTABILITY ANALYSIS**

APPENDIX H. PROPOSED CONSTRUCTION STAGING AREAS.

December 2018

APPENDIX H. PROPOSED CONSTRUCTION STAGING AREAS

Index

1. PROPOSED AREAS.....	1
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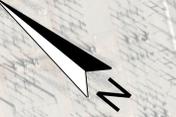
1. PROPOSED AREAS.

It has been defined four construction staging areas. These areas are characterized by access to existing roads and proximity to the rail tracks.

The proposed areas are:

1. Lafayette street st 2302+00 near of Santa Clara station
2. Coyote area st 745+00
3. Bailey Ave st 795+00
4. Llagas Creek st 1300+00

These areas and their limits are shown in the follow sheets.



**PROPOSED CONSTRUCTION FACILITIES
COYOTE AREA**

770+00 TO 874+00, TYPICAL SECTION 3

**PROPOSED CONSTRUCTION FACILITIES
COYOTE AREA**

Stationing markers along the road: B695+00, B700+00, B705+00, B710+00, B715+00, B720+00, B725+00, B730+00, B735+00, B740+00, B745+00, B750+00, B755+00, B760+00, B765+00, B770+00, B775+00, B780+00, B785+00, B790+00, B795+00, B800+00, B805+00, B810+00, B815+00, B820+00, B825+00, B830+00, B835+00.



**PROPOSED CONSTRUCTION FACILITIES
BAILEY AV**

BAILEY AV

ACCESS ROAD

**PROPOSED CONSTRUCTION FACILITIES
BAILEY AV**



**PROPOSED CONSTRUCTION FACILITIES
1288+00 - 1300+00**

**PROPOSED CONSTRUCTION FACILITIES
1288+00 - 1300+00**

E MIDDLE AVE

MONTEREY AVE

