APPENDIX D.6: PASSING TRACKS REPORT AND EXHIBITS – ALTERNATIVE B

Part 1 of 5

CALIFORNIA HIGH SPEED TRAIN PROJECT

APPENDIX D.6 PASSING TRACKS ALTERNATIVE B REPORT AND EXHIBITS

March 2019

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APPENDIX D.6 PASSING TRACKS ALTERNATIVE B REPORT AND EXHIBITS

Index

1 PASSING TRACKS AREA ENVIRONMENT 1
2 PASSING TRACKS AREA SINGULAR ELEMENTS 1
3 CONSTRUCTION STAGING 8
3.1 Phase 1 9
3.2 Phase 2 10
3.3 Phase 3 11
3.4 Phase 4 12
3.5 Phase 5 13
3.6 Phase 6 13
3.7 Phase 7 14
3.8 Final Phase 14

EXHIBITS

Plan
Scheme
Plan and profile Scheme

1 PASSING TRACKS AREA ENVIRONMENT

The design Alternative B for the corridor between San Francisco and San Jose proposes to have four tracks instead of the two current ones between Hayward Park and San Carlos stations.

The reason for this action is to enable the overtaking of the slow units by the high-speed circulations. It involves modifying the Hayward Park, Hillsdale, Belmont and San Carlos stations.

The proposed modification also affects the alignment in elevation, lifting the future tracks with respect to the current ones, in order to increase the transverse permeability.

The location of the stations is the same for Hayward Park and Belmont stations and is modified in Hillsdale and San Carlos stations.

These stations are intended to be used only by Caltrain.

2 PASSING TRACKS AREA SINGULAR ELEMENTS

To enable the construction of this new railway infrastructure in any of the sections in which the section is divided, it will be necessary to build a provisional track where the different units will circulate while the final tracks are partially built.

The construction of this provisional track will be carried out, as far as possible, in parallel to one of the existing tracks so that the existing catenary poles can be used to electrify the provisional track. Therefore, the same pole can have two brackets, one on each side.

These works of execution of the provisional track can be executed without cutting the railway traffic, since they are located outside the safety zone. Only some of the phases of the assembly of the catenary must be done while nighttime traffic cuts.

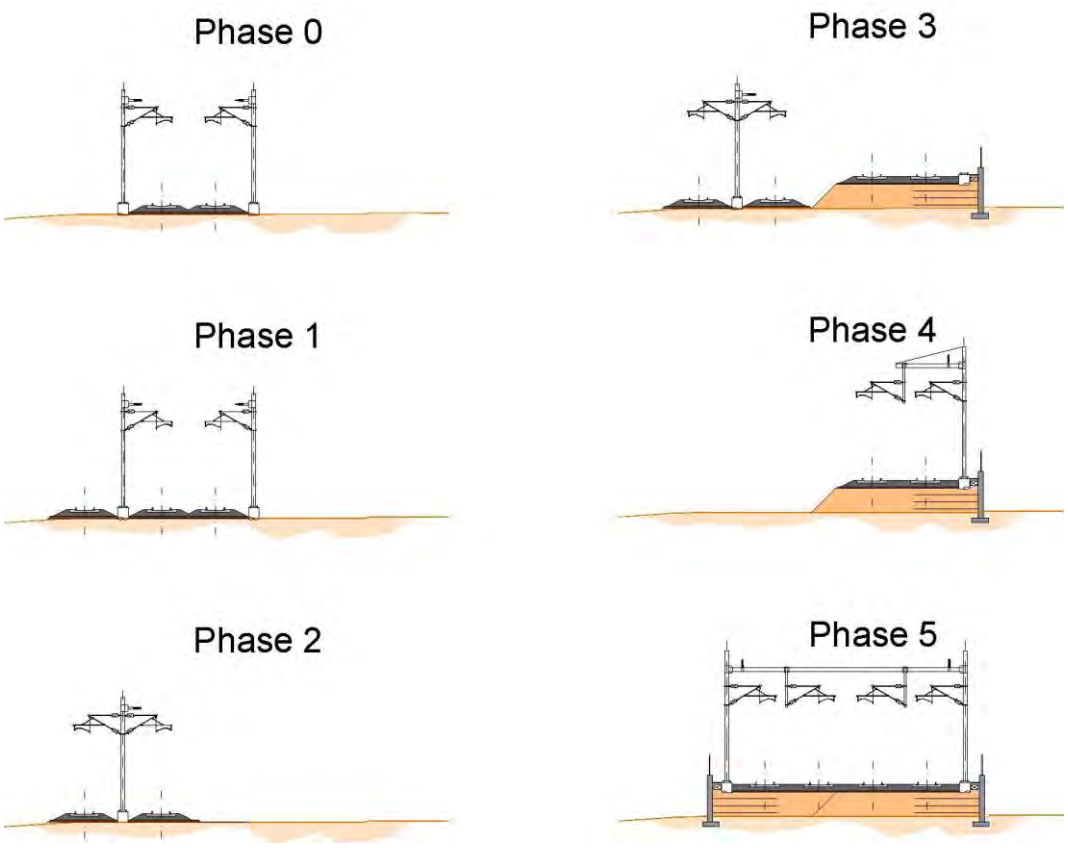


Figure 1. Typical section

Once the provisional track has been executed and the traffic has been diverted, the entire section can be built in phases.

The relative position of the existing tracks with respect to the final ones, along with other factors such as ROW availability, existence of structures and the impossibility of executing provisional roads, are going to make impossible to implement two continuous axis, one by direction, so it will be necessary to execute them by sections.

Once these sections have been built, they must be joined by temporary tracks that guarantee the continuity of the railway traffic.

The length of these railway connections is limited for constructive reasons, since they must be made in extraordinary traffic cut periods that, depending on their magnitude will be executed during the nighttime or during the weekend.

The geometry of this provisional track must comply with the minimum parameters of layout in both plan and elevation. Therefore, the quality of the layout will condition the speed of passing through these diversions.

A great difficulty of these actions is the adaptation of the longitudinal profile since it can imply the excavation or the dismantling of the existing trackbed until reaching the necessary height. In addition to the railway superstructure, the catenary must be adapted as well.

Almost the whole layout runs elevated, with a cross-section between walls. Building this section-type and maintaining the traffic involves executing it by phases.

In order to reduce the cost, whenever it is possible, one of the walls will be executed first and part of the section will be filled in to the accurate level according to the longitudinal profile. In the side without wall, a slope will be given.

Subsequently, the traffic will be diverted by the built axis and the remaining part of the section will be executed.

There are going to be cases in which the elevation of the tracks will be so high that the natural slope of land would occupy the tracks in service, so it will be necessary to define provisional earth containment elements such as sheet piles, driven rails, piles.

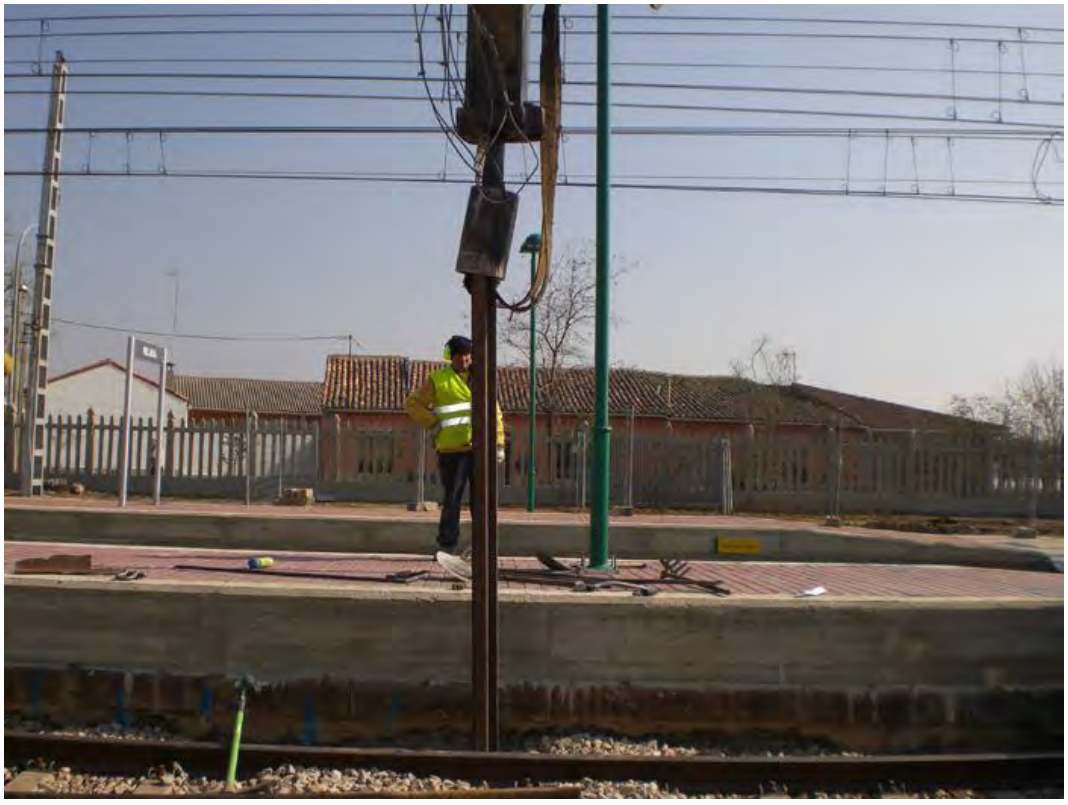


Figure 2. Driven rail execution in a station

Figure 3. Wall of driven rails

Another conclusion that emerges from the analysis of constructability is the definition of the structural typology of the different walls to be executed.

The constructive typology of reinforced earth walls in some of the sections of the layout is impossible to be executed since its straps are incompatible with the position of the tracks in service. For these cases, the structural typology must be different.

Figure 4. Reinforced earth wall execution

As previously mentioned, a large part of the route will run between walls and, in order to maintain the railway traffic during the works, it will be necessary to execute a provisional track.

The characteristics of the existing layout, elevated with respect to the bordering streets, requires retaining walls for the temporary tracks.

The design of these walls, whenever possible, will serve for intermediate phases and for the final phase.

As shown in the following image:

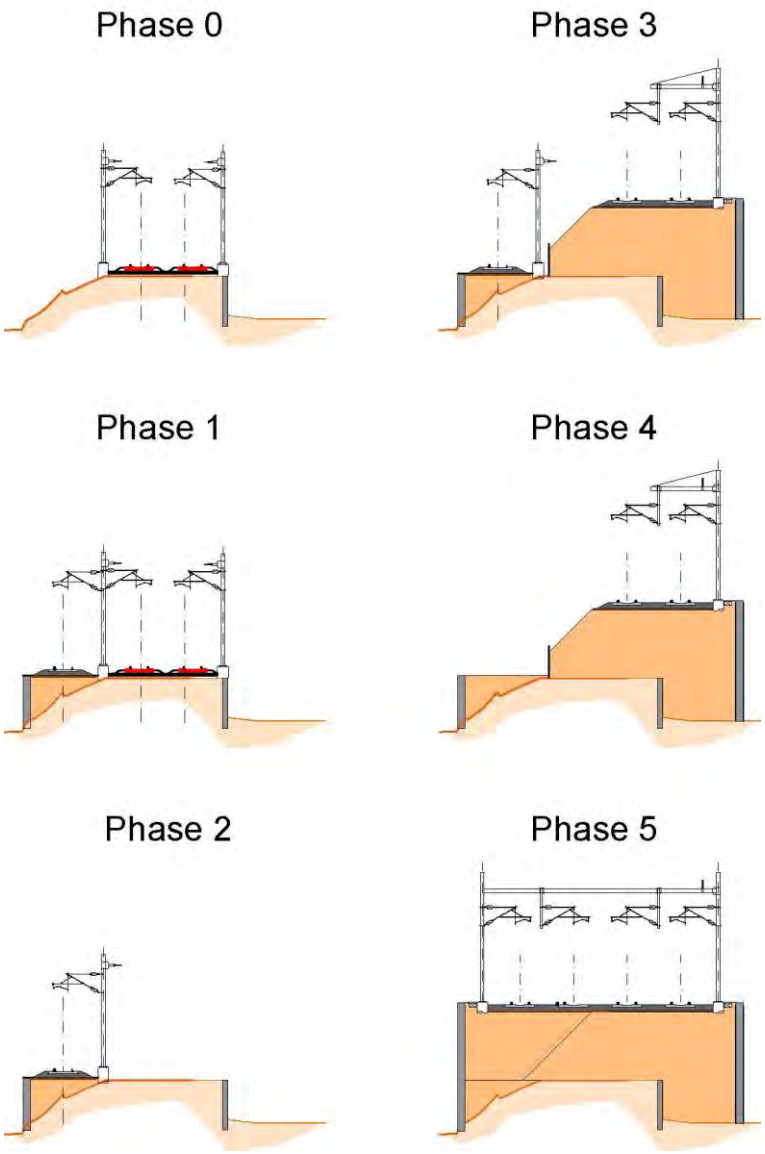


Figure 5. Typical section

As a point of particular importance, the overpass of the HWY-92 road, located next to Hayward Park Station is highlighted.

This overpass stays and the change from two tracks to four is carried out through a single span.

Figure 6. HWY-92 overpass from Hayward Park station

Another point of special complexity of execution and that will condition the railway operation during some of the intermediate phases is the section that runs between Belmont and San Carlos stations.

In this area, the existing tracks are centered but located below the two central ones of the solution to be developed.

Space constraints make it extremely difficult to provide two tracks for railway traffic during this phase, since having a second provisional track would involve affecting the street Old County Rd, street that cannot be affected because it is the only road access to a parallel urban development.

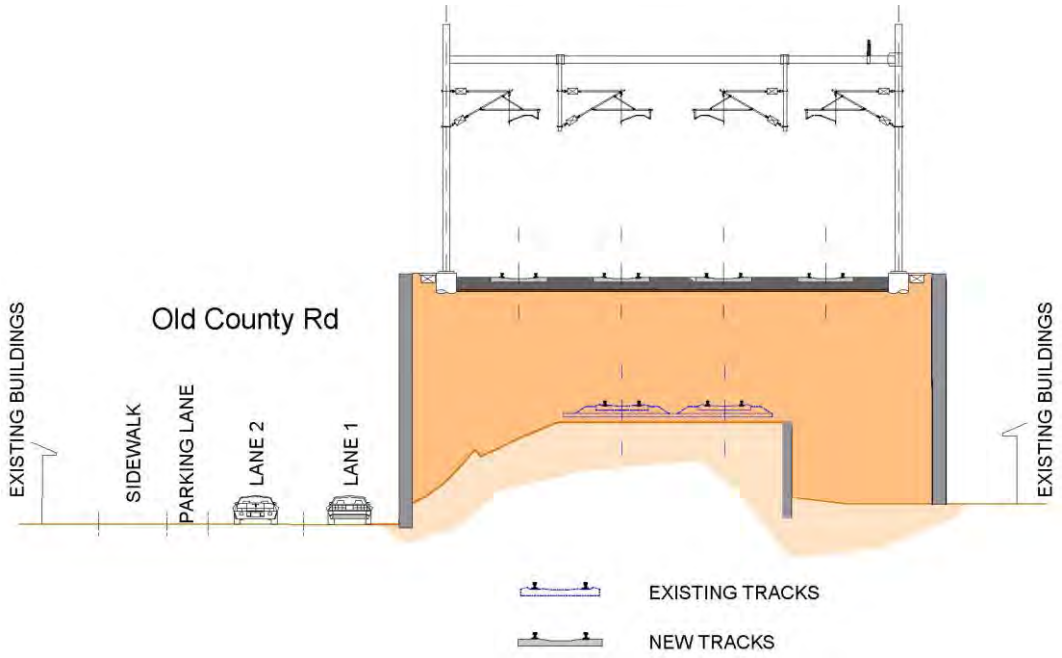


Figure 7. Section in Old County Rd

The consequence is that, in this area, during some of the intermediate phases, it will be unavoidable to have a single track section with the limitations that this situation causes in the capacity and the circulation of the line. The section is approximately 0.73 miles long.

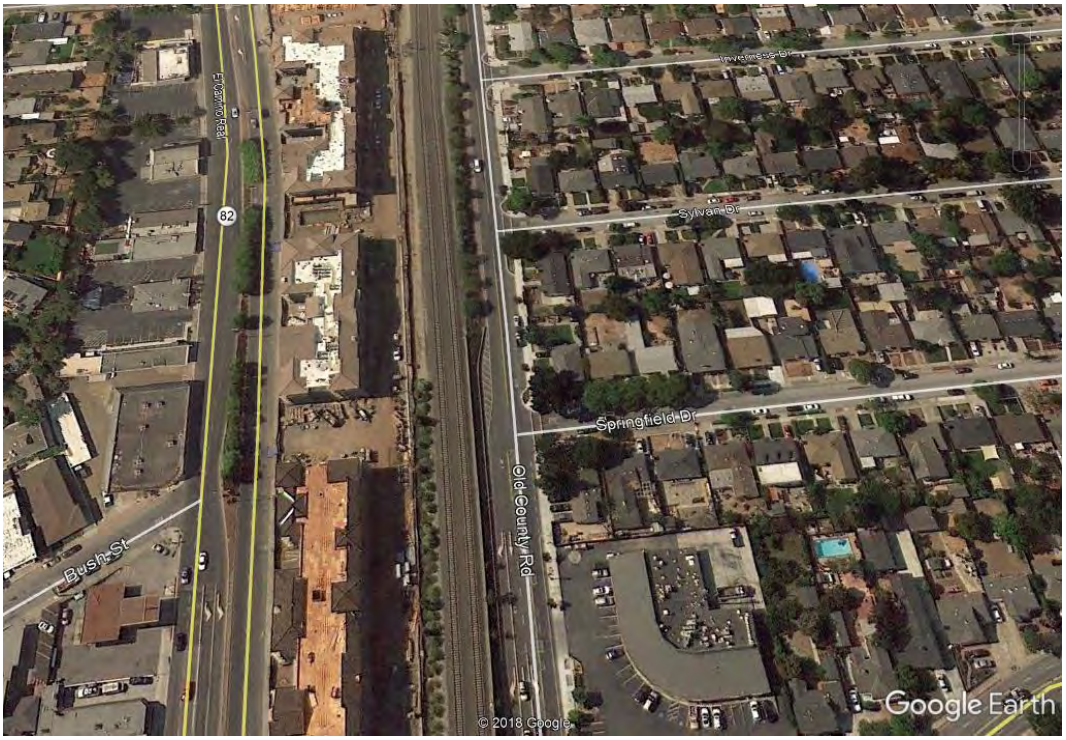


Figure 8. Old County Rd Area

Along the current layout, the crossing with roads at different levels occurs. In most cases the crossing is disposed with the railway line passing over the road. These crossings are designed in such a way that their execution is compatible with the railway traffic.

The only one of the underpasses that is maintained is located at 42nd Ave, where a new one is located next to the existing structure. For the rest of the cases the existing structures are incompatible with the planned layout, so it is necessary to demolish them and rebuild them afterwards.

In some of the phases, it is going to be necessary the execution of provisional platforms that, due to its temporary character, can be executed by means of removable elements.

To achieve this, a series of intermediate phases have been defined, in which the lateral displacements acquire importance. The execution of the lateral displacements will be done during extraordinary periods of traffic-cut, during the night-time period.

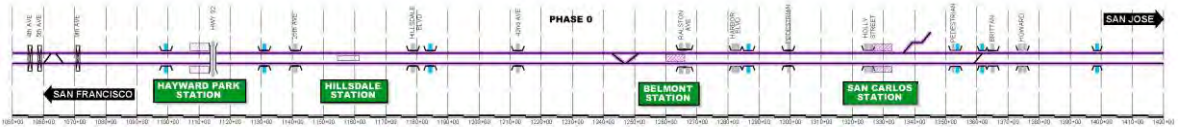
When the lateral displacements are made, they must be perfectly planned, in the sense that there will be situations in which this lateral displacement will serve to join an in use existing track to another one previously executed and that in the next morning must be in use. So, to keep the railway traffic into service it will be necessary to duplicate the equipment so that the tracks are connected at both ends.

3 CONSTRUCTION STAGING

The high-speed line from San Francisco to San Jose is currently being developed. This railway line will share infrastructure with the existing Caltrain railway line.

The different characteristics of the high-speed circulations and Caltrain ones make necessary to establish areas that enables the overtaking of Caltrain's slow circulations by the high speed ones.

This is the main reason for designing the duplication of the existing tracks in the area between the stations of Hayward Park, Hillsdale, Belmont and San Carlos.



The environment where this line is located is an area of great urban density.

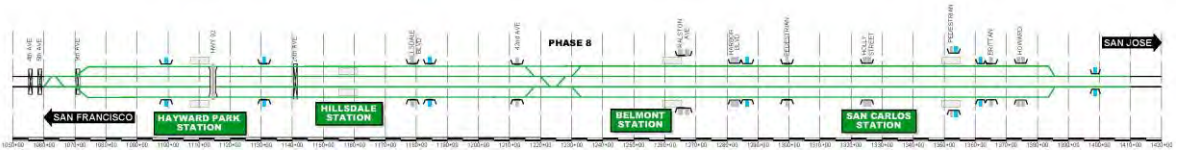
This railway line is in an elevated position with respect from the surroundings in most of its layout through an embankment and it is crossed by different roads and water courses.

Regarding all the crosses, only one of them is an overpass (HWY 92) and the rest are underpasses.

Of the four affected stations, Hillsdale and Belmont stations have a central platform, the other, have side platforms.

Figure 13. Belmont Station

The planned actions consist of providing four tracks in the section between the Hayward Park and San Carlos stations and relocating the existing stations by adapting them to the new position of the tracks



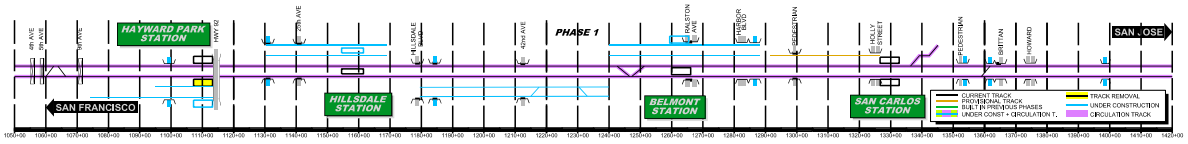
3.1 Phase 1

At this stage, all the tracks that do not interfere with the existing ones and a section of the provisional track that will be used in later phases will be built.

The track sections to be built are:

- Tracks towards San Jose, in the surroundings of Hayward Park station and between Hillsdale and Belmont stations.
- Tracks to San Francisco, in the surroundings of the Belmont station.
- Provisional track near San Carlos station.

The platform in San José direction of Hayward Park station and the platform towards San Francisco, of San Carlos station, will be dismantled.



During this stage, there are no restrictions on railway traffic, so the capacity of the line will not be affectated. All the works may be executed with railway traffic except for the driving of provisional elements for earth containment that must be carried out during night-time periods.

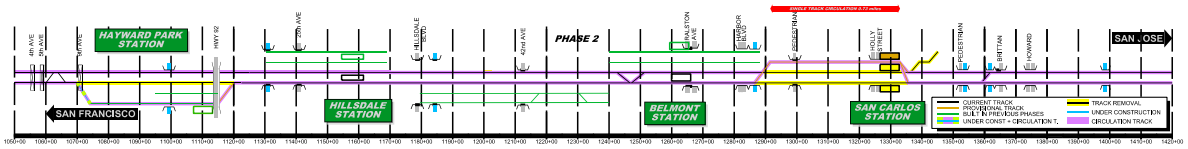
3.2 Phase 2

In this stage, the railway traffic will be reorganized by using part of the tracks built in the previous phase and the existing ones, which requires the execution of a series of provisional connections.

Moreover, tracks that will be definitely out of order, will be dismantled.

The works to be executed during this phase are:

- Connection of the definitive right track (towards San José) with the existing right track before reaching the Hayward Park station.
- Execution of the connection between the definitive right track (towards San José) and the existing right track in the same direction, once the HWY 92 structure has been passed.
- Grouping of existing tracks to a single provisional track once past the Belmont station.
- Split of the provisional track to the two existing ones, once the San Carlos station has been passed.
- Dismantling of the platform of San Carlos station.
- Removal of the existing right track (towards San Jose) in Hayward Park approach and the existing tracks in the surroundings of San Carlos station.



All these works must be coordinated to be carried out during one or two extraordinary periods of traffic cut that, due to their magnitude, must coincide on weekends. Once the connections are executed, the railway line will be reopened with the following restrictions:

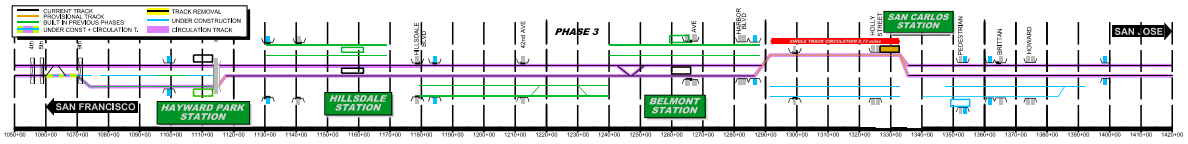
- Circulation in single-track way in the surroundings of San Carlos station. The affected section has a length of 0.73 miles.
- Limitations on the speed while passing over the connections between the existing and provisional tracks.

To enable the passenger's usage of San Carlos station, it is necessary to execute provisional platforms.

3.3 Phase 3

In this stage, the diversions of the railway traffic executed in the previous phase are used to build new segments of track. The works carried out in these phases are:

- Execution of connection of San Jose tracks at the beginning of segment.
- Carrying out of the right tracks (towards San Jose) from Belmont station until connection with existing track to San Jose.
- Assembly of the central right track (towards San Jose) in Hayward Park station approach.



All works will be carried out during normal working time without restrictions to railway traffic.

The construction works of the right central track must be carried out during nighttime period without traffic, because of being located between two tracks in use, as well as the driving of provisional land contention elements.

During this phase, restrictions on traffic are due to the presence of a single-track section next to San Carlos that will cause the decrease of the line capacity. Other limitations are

those established in the speed while passing over the provisional diversions of connection between existing and provisional tracks.

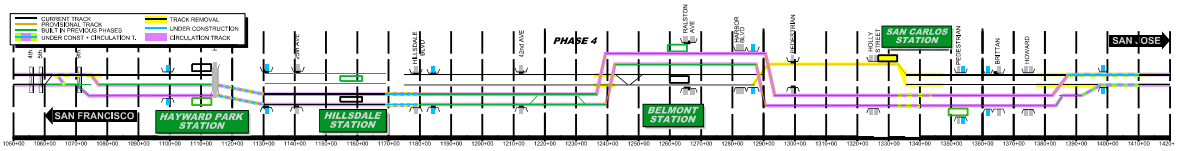
San Carlos station will be executed by means of provisional platforms.

3.4 Phase 4

In this phase, continuity is given to the tracks executed in the previous phase and they are connected to the existing tracks at the end of the area of operation.

The executed works are:

- Connection of the existing tracks with the right-hand tracks built in the section before Hayward Park station. This junction is definitive for the right track and provisional for the central right track.
- Joint of right-hand tracks, once the crossing with the HWY-92 is passed.
- Connection between right-hand tracks, once the Hillsdale station is passed.
- Provisional connection between the right and left tracks in the area of Belmont station.
- Execution of the right tracks section that was still to be executed in the previous phase near San Carlos station.
- Connection of the right-hand tracks with the existing ones to maintain the railway continuity, definitively on the right-hand track and temporarily on the right central one.
- Dismantling of sections of track where the new tracks, to be executed, will intercept the existing ones.



This phase is characterized by its great difficulty, because there are seven actions on track that must be done at the same time in order to avoid prolonged railway traffic cuts.

All these actions must be carried out during a single traffic cut, which will coincide with a weekend.

Of the seven actions, the one that affects the stretch of track to be duplicated next to the San Carlos station stands out, since it is necessary to execute an embankment prior to the assembly of the track.

Once all the connections have been made, there are no restrictions on the traffic, except for speed limits while passing over the provisional track sections.

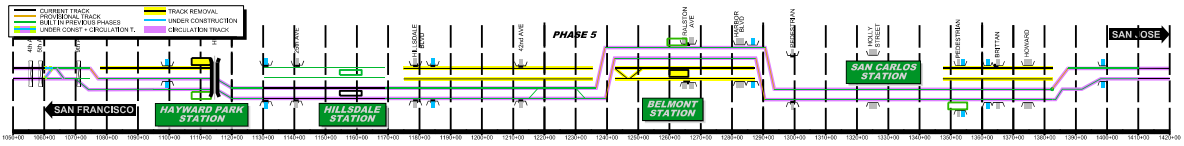
In this phase the stations will operate through the use of definitive and provisional platforms previously executed.

3.5 Phase 5

This phase is linked to the previous one, where the tracks left out of service are dismantled.

The works executed in this phase are:

- Removal of existing tracks that currently are not into service.
- Dismantling of the left platforms of Hayward Park station and the central platform of Belmont station.



All work will be carried out during the usual working time, so there are no affectations on railway traffic except for the speed limits established in the previous phase while passing over provisional diversions due to its restrictive layout.

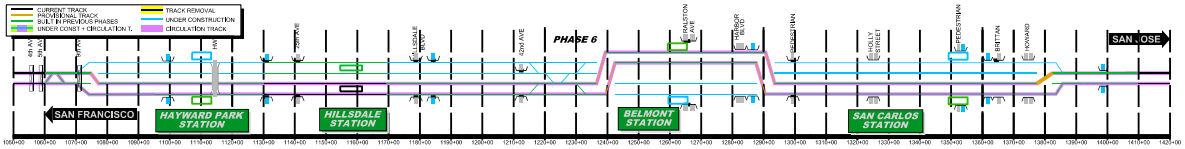
The capacity of the line is not affected.

The stations will operate with the same platforms as in the previous phase.

3.6 Phase 6

In this phase, the following activities will be carried out:

- Execution of all left tracks except segments assembled in previous phases.
- Construction of the right-hand tracks in the area of Belmont station.



The works to be executed in this phase will be carried out during the daytime.

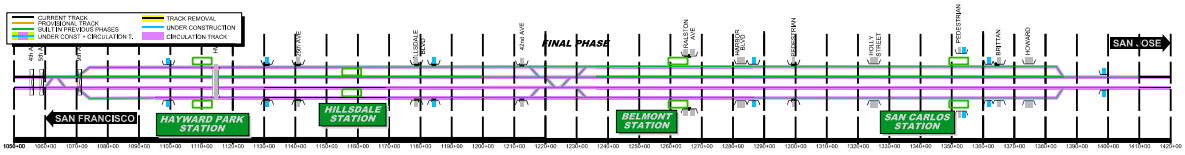
Therefore, no restrictions will be imposed on traffic, except for the speed limits required in the sections of provisional track that connect definitive track sections.

In this phase the capacity of the line is not affected.

The stations operate in the same way as in the previous phase.

3.7 Phase 7

In this phase, all the tracks are already built, so only the provisional connections used in previous phases have to be dismantled and continuity must be given to the definitive axis.



These actions can be carried out by acting twice, affecting one track in each direction per action.

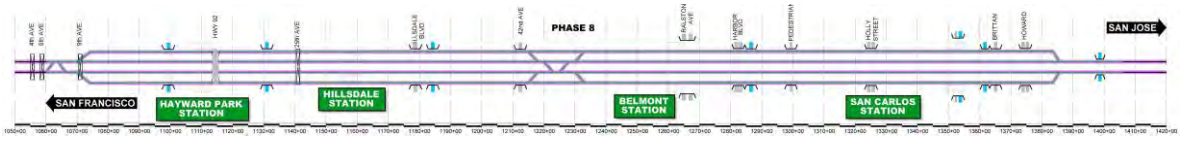
Its execution will be carried out in extraordinary periods of traffic cut during the weekend.

There will be neither restrictions on traffic, nor limitations on the capacity of the line.

With the completion of this phase, overtaking by the high-speed circulations are enabled.

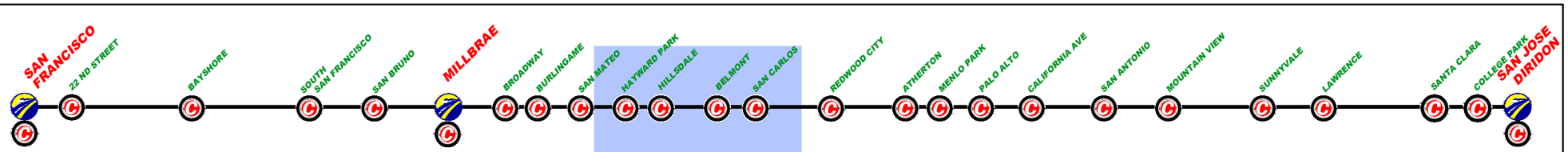
3.8 Final Phase

Once the works are finished, the railway traffic returns to its usual state, and in these stations there is a differentiation of the traffic between Caltrain and HSR.



EXHIBITS

CURRENT TRACK
PROVISIONAL TRACK
BUILT IN PREVIOUS PHASES
UNDER CONST + CIRCULATION T.
TRACK REMOVAL
UNDER CONSTRUCTION
CIRCULATION TRACK
OVERHEAD BRIDGE
TUNNEL
MAJOR UNDERPASS
GRADE CROSSING
CREEK UNDERPASS
CURRENT ROW
TCE
ROW



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DATE MAR/2019

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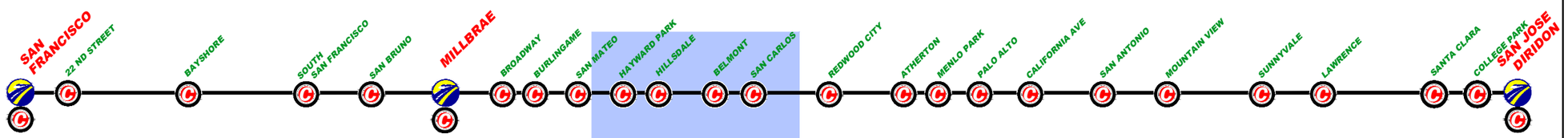
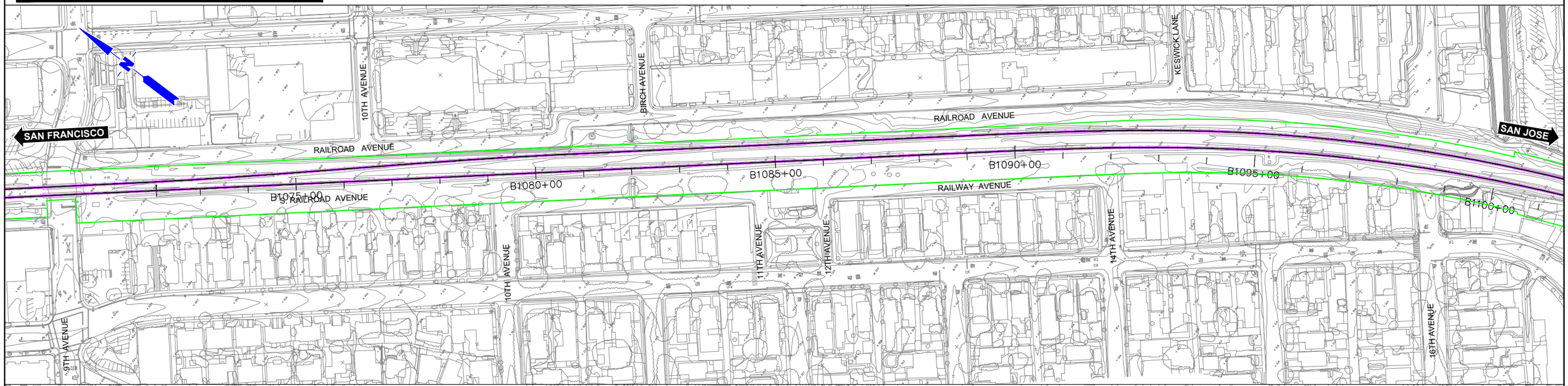
CALIFORNIA High-Speed Rail Authority

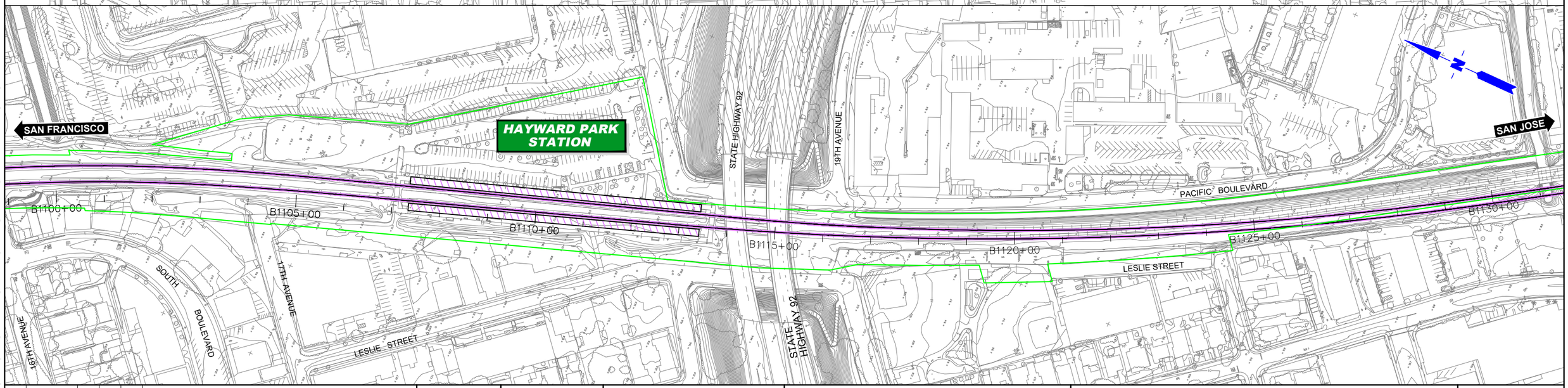
CALIFORNIA HIGH-SPEED TRAIN PROJECT
SAN FRANCISCO TO SAN JOSE
PASSING TRACKS ALTERNATIVE B
CONSTRUCTION PHASES
PLAN
INITIAL PHASE

CONTRACT NO.
DRAWING NO. CV-I1PTB-PH0-01
SCALE 1" = 200'
SHEET NO. 1 OF 7

CURRENT TRACK
PROVISIONAL TRACK
BUILT IN PREVIOUS PHASES
UNDER CONST + CIRCULATION T.
TRACK REMOVAL
UNDER CONSTRUCTION
CIRCULATION TRACK
OVERHEAD BRIDGE
TUNNEL
MAJOR UNDERPASS
GRADE CROSSING
CREEK UNDERPASS
CURRENT ROW
TCE
ROW







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PASSING TRACKS ALTERNATIVE B
CONSTRUCTION PHASES
PLAN
INITIAL PHASE

CONTRACT NO.
DRAWING NO. CV-I1PTB-PH0-02
SCALE 1" = 200'
SHEET NO. 2 OF 7

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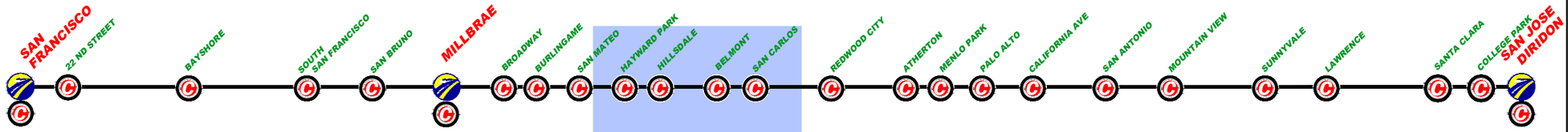
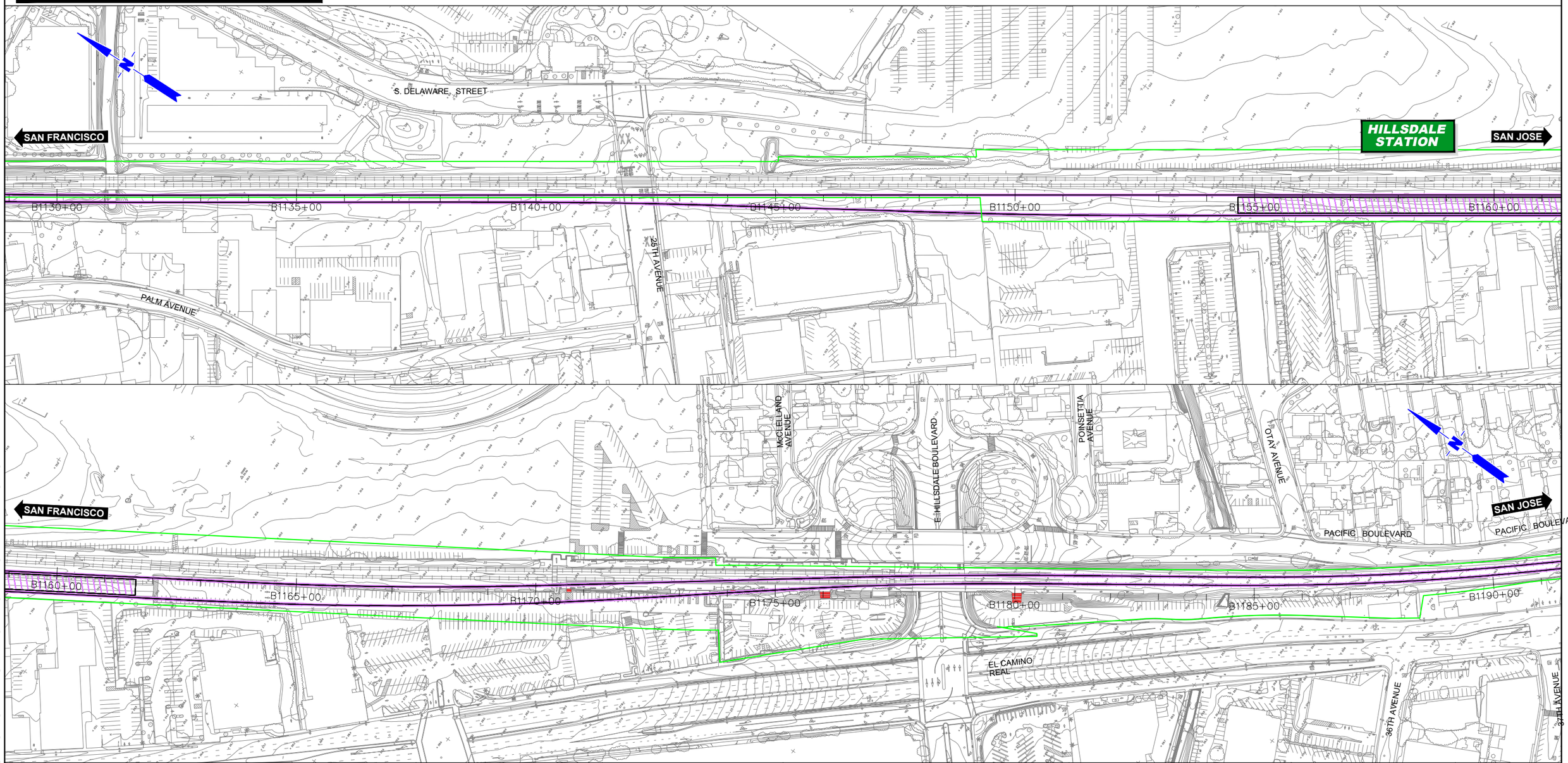
PROVISIONAL TRACK
BUILT IN PREVIOUS PHASES
UNDER CONST + CIRCULATION T.
TRACK REMOVAL
UNDER CONSTRUCTION
CIRCULATION TRACK
OVERHEAD BRIDGE
MAJOR UNDERPASS
CREEK UNDERPASS
TUNNEL
GRADE CROSSING
CURRENT ROW
TCE
ROW





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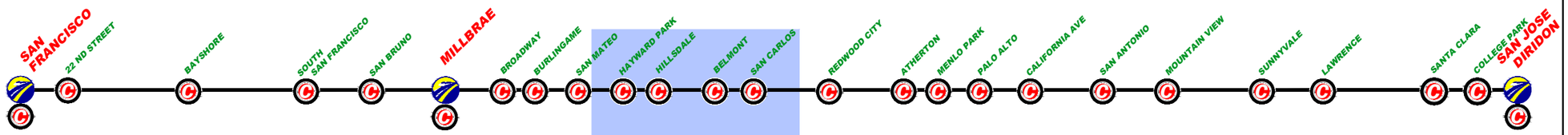
PASSING TRACKS ALTERNATIVE B
CONSTRUCTION PHASES
PLAN
INITIAL PHASE

CONTRACT NO.
DRAWING NO. CV-I1PTB-PH0-03
SCALE 1" = 200'
SHEET NO. 3 OF 7

CURRENT TRACK
PROVISIONAL TRACK
BUILT IN PREVIOUS PHASES
UNDER CONST + CIRCULATION T.
TRACK REMOVAL
UNDER CONSTRUCTION
CIRCULATION TRACK
OVERHEAD BRIDGE
MAJOR UNDERPASS
CREEK UNDERPASS
TUNNEL
GRADE CROSSING
CURRENT ROW
TCE
ROW



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CONSTRUCTION PHASES
PLAN
INITIAL PHASE

CONTRACT NO.
DRAWING NO. CV-I1PTB-PH0-04
SCALE 1" = 200'
SHEET NO. 4 OF 7

CURRENT TRACK
PROVISIONAL TRACK
BUILT IN PREVIOUS PHASES
UNDER CONST + CIRCULATION T.
TRACK REMOVAL
UNDER CONSTRUCTION
CIRCULATION TRACK
OVERHEAD BRIDGE
TUNNEL
MAJOR UNDERPASS
GRADE CROSSING
CREEK UNDERPASS
CURRENT ROW
TCE
ROW

SAN FRANCISCO
22 ND STREET
BAYSHORE
SOUTH SAN FRANCISCO
SAN BRUNO
MILLBRAE
BROADWAY
BURLINGAME
SAN MATEO
HAYWARD PARK
HILLSDALE
BELMONT
SAN CARLOS
REDWOOD CITY
ATHERTON
MENLO PARK
PALO ALTO
CALIFORNIA AVE
SAN ANTONIO
MOUNTAIN VIEW
SUNNYVALE
LAWRENCE
SANTA CLARA
COLLEGE PARK
SAN JOSE DIRIDON

OLD COUNTY ROAD
SAN FRANCISCO
BELMONT STATION
SAN JOSE
MASONIC WAY
BALSTON AVENUE
WALTERMIRE STREET
CITY OF BELMONT
ONEILL AVENUE
CITY OF SAN CARLOS
B1250+00
B1255+00
B1260+00
B1265+00
B1270+00
B1275+00
B1280+00
MIDDLE ROAD
HILL STREET
RALSTON AVENUE
EMMETT AVENUE
WALTERMIRE STREET
ONEILL AVENUE

HARBOR BOULEVARD
QUARRY ROAD
BRAGATO ROAD
TAYLOR WAY
NORTHWOOD DRIVE
OLD COUNTY ROAD
SAN FRANCISCO
SAN JOSE
B1280+00
B1285+00
B1290+00
B1295+00
B1300+00
B1305+00
B1310+00
EL CAMINO REAL
CITY OF BELMONT
CITY OF SAN CARLOS

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$PLTDRVS$
$PENTBLS$
$TIME$
$DATE$
$USER$

REV	DATE	BY	SUB	APP	DESCRIPTION

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DATE MAR/2019

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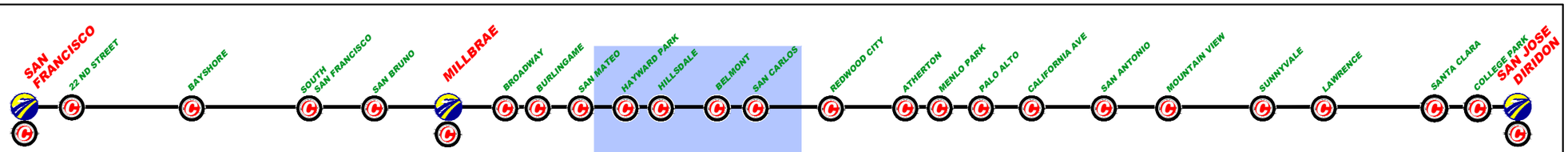
HNTB 1111 Broadway 9th Floor Oakland, CA 94607

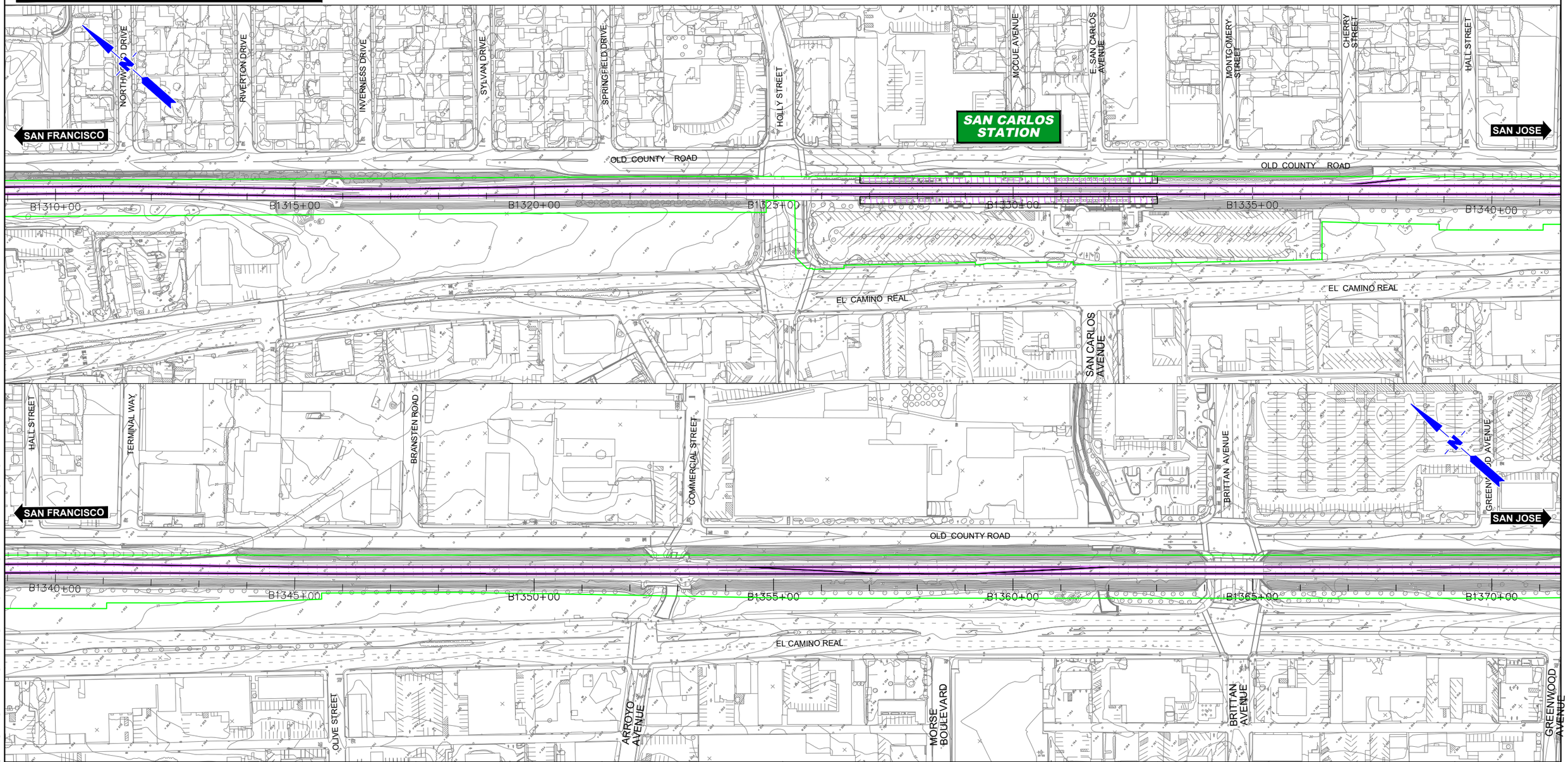
CALIFORNIA High-Speed Rail Authority

CALIFORNIA HIGH-SPEED TRAIN PROJECT
SAN FRANCISCO TO SAN JOSE
PASSING TRACKS ALTERNATIVE B
CONSTRUCTION PHASES
PLAN
INITIAL PHASE

CONTRACT NO.
DRAWING NO. CV-I1PTB-PH0-05
SCALE 1" = 200'
SHEET NO. 5 OF 7

CURRENT TRACK
PROVISIONAL TRACK
BUILT IN PREVIOUS PHASES
UNDER CONST + CIRCULATION T.
TRACK REMOVAL
UNDER CONSTRUCTION
CIRCULATION TRACK
OVERHEAD BRIDGE
MAJOR UNDERPASS
CREEK UNDERPASS
TUNNEL
GRADE CROSSING
CURRENT ROW
TCE
ROW





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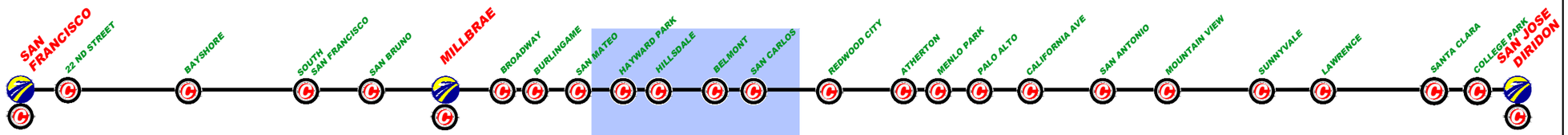
PASSING TRACKS ALTERNATIVE B
CONSTRUCTION PHASES
PLAN
INITIAL PHASE

CONTRACT NO.
DRAWING NO. CV-I1PTB-PH0-06
SCALE 1" = 200'
SHEET NO. 6 OF 7

CURRENT TRACK
PROVISIONAL TRACK
BUILT IN PREVIOUS PHASES
UNDER CONST + CIRCULATION T.
TRACK REMOVAL
UNDER CONSTRUCTION
CIRCULATION TRACK
OVERHEAD BRIDGE
TUNNEL
MAJOR UNDERPASS
GRADE CROSSING
CREEK UNDERPASS
CURRENT ROW
TCE
ROW



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$DATE$
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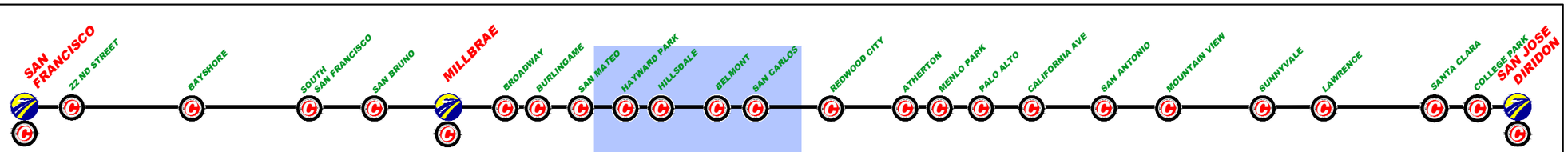
SAN FRANCISCO TO SAN JOSE
PASSING TRACKS ALTERNATIVE B
CONSTRUCTION PHASES
PLAN
INITIAL PHASE

CONTRACT NO.
DRAWING NO. CV-I1PTB-PH0-07
SCALE 1" = 200'
SHEET NO. 7 OF 7

CURRENT TRACK
PROVISIONAL TRACK
BUILT IN PREVIOUS PHASES
UNDER CONST + CIRCULATION T.
TRACK REMOVAL
UNDER CONSTRUCTION
CIRCULATION TRACK
OVERHEAD BRIDGE
TUNNEL
MAJOR UNDERPASS
GRADE CROSSING
CREEK UNDERPASS
CURRENT ROW
TCE
ROW



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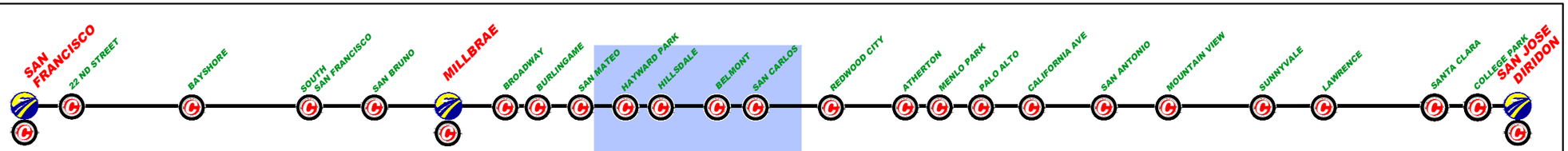
SAN FRANCISCO TO SAN JOSE
PASSING TRACKS ALTERNATIVE B
CONSTRUCTION PHASES
PLAN
PHASE 1

CONTRACT NO.
DRAWING NO. CV–I1PTB–PH1–01
SCALE 1" = 200'
SHEET NO. 1 OF 7

CURRENT TRACK
PROVISIONAL TRACK
BUILT IN PREVIOUS PHASES
UNDER CONST + CIRCULATION T.
TRACK REMOVAL
UNDER CONSTRUCTION
CIRCULATION TRACK
OVERHEAD BRIDGE
TUNNEL
MAJOR UNDERPASS
GRADE CROSSING
CREEK UNDERPASS
CURRENT ROW
TCE
ROW



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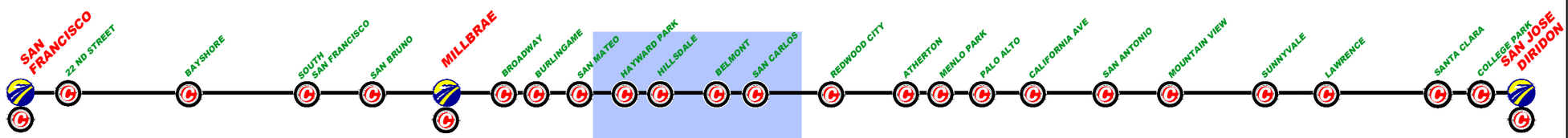
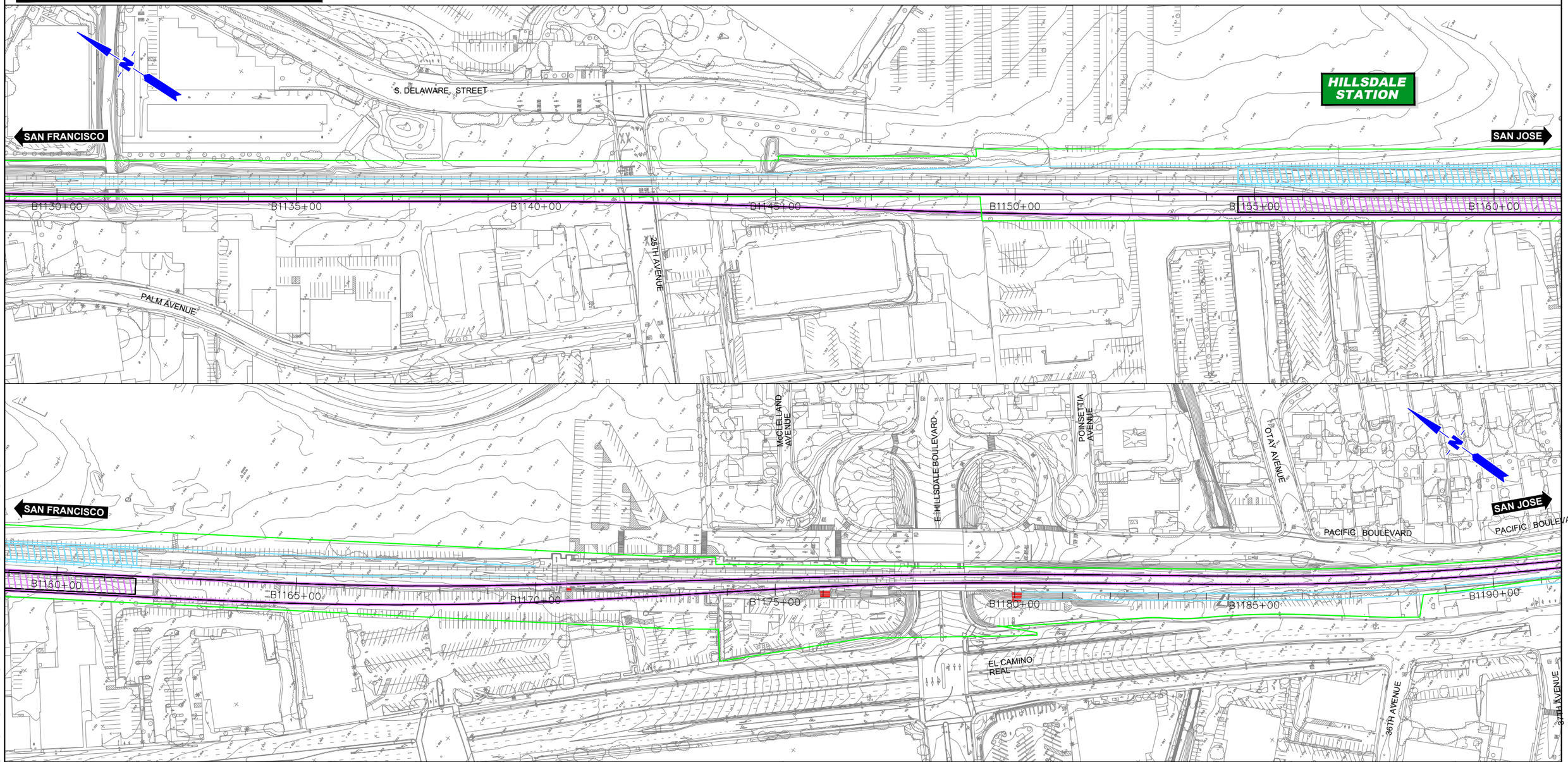
SAN FRANCISCO TO SAN JOSE
PASSING TRACKS ALTERNATIVE B
CONSTRUCTION PHASES
PLAN
PHASE 1

CONTRACT NO.
DRAWING NO. CV-I1PTB-PH1-02
SCALE 1" = 200'
SHEET NO. 2 OF 7

CURRENT TRACK
PROVISIONAL TRACK
BUILT IN PREVIOUS PHASES
UNDER CONST + CIRCULATION T.
TRACK REMOVAL
UNDER CONSTRUCTION
CIRCULATION TRACK
OVERHEAD BRIDGE
MAJOR UNDERPASS
CREEK UNDERPASS
TUNNEL
GRADE CROSSING
CURRENT ROW
TCE
ROW





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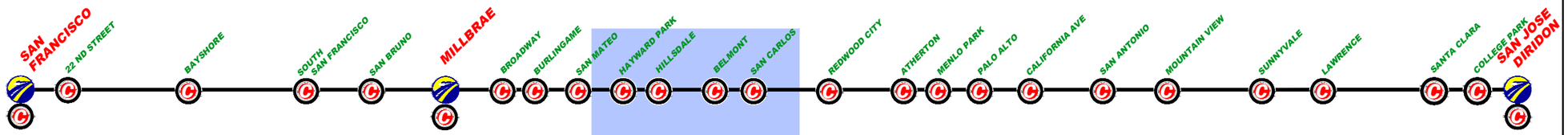
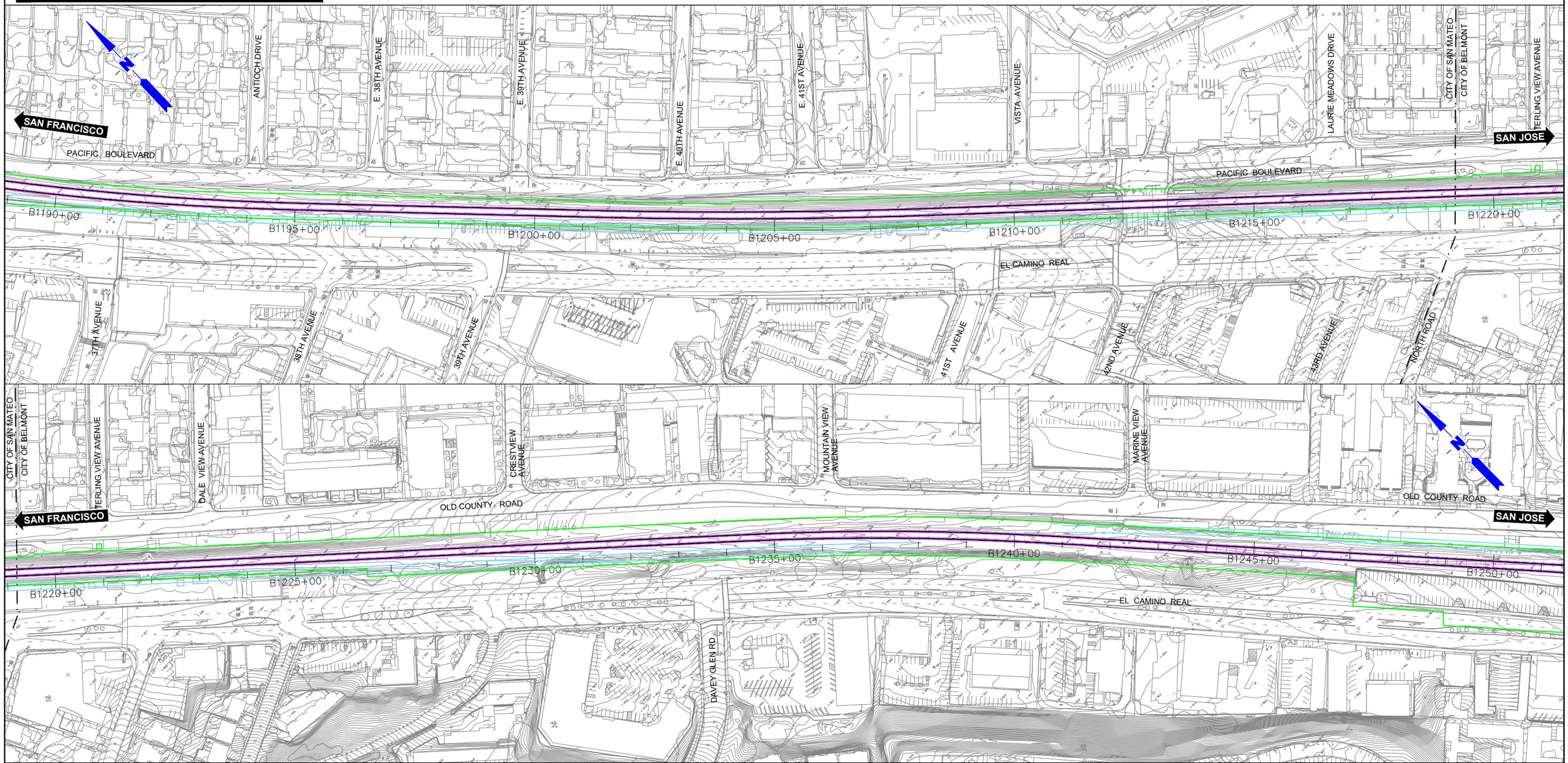
PLAN
PHASE 1

CONTRACT NO.
DRAWING NO. CV-I1PTB-PH1-03
SCALE 1" = 200'
SHEET NO. 3 OF 7

CURRENT TRACK
PROVISIONAL TRACK
BUILT IN PREVIOUS PHASES
UNDER CONST + CIRCULATION T.
TRACK REMOVAL
UNDER CONSTRUCTION
CIRCULATION TRACK
OVERHEAD BRIDGE
TUNNEL
MAJOR UNDERPASS
GRADE CROSSING
CREEK UNDERPASS
CURRENT ROW
TCE
ROW





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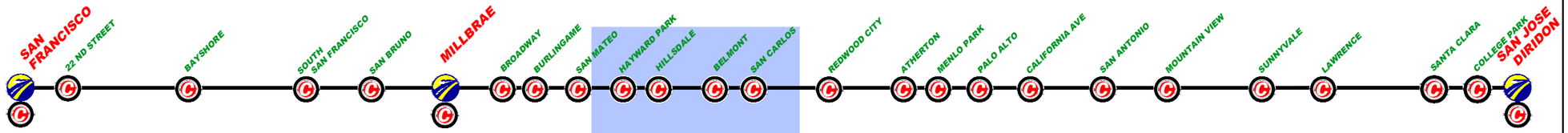
PLAN
PHASE 1

CONTRACT NO.
DRAWING NO. CV-I1PTB-PH1-04
SCALE 1" = 200'
SHEET NO. 4 OF 7

CURRENT TRACK
PROVISIONAL TRACK
BUILT IN PREVIOUS PHASES
UNDER CONST + CIRCULATION T.
TRACK REMOVAL
UNDER CONSTRUCTION
CIRCULATION TRACK
OVERHEAD BRIDGE
TUNNEL
MAJOR UNDERPASS
GRADE CROSSING
CREEK UNDERPASS
CURRENT ROW
TCE
ROW



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PHASE 1

CONTRACT NO.
DRAWING NO. CV-I1PTB-PH1-05
SCALE 1" = 200'
SHEET NO. 5 OF 7