APPENDIX D: SAN JOSE STATION APPROACH CONSTRUCTABILITY ANALYSIS

SAN JOSE STATION APPROACH CONSTRUCTABILITY ANALYSIS

REPORT

APRIL 2017

prointec

SAN JOSE STATION APPROACH CONSTRUCTABILITY ANALYSIS

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SAN JOSE STATION APPROACH CONSTRUCTABILITY ANALYSIS

1. General approach and main criteria

1.1 Current situation description

At present the existing non-electrified double tracked railway line is operated by Caltrain for combined traffic (both passengers and goods). The main purpose of this railway line is to provide a service for commuters and short distance journeys. This line is envisioned to be electrified in a near future.

This railway line runs in a high density urban environment between San Francisco and San Jose Diridon, from where it continues on its way down to Gilroy.

Next to the existing railway alignment, at certain locations, there are other railway infrastructure systems, such as the Bay Area Rapid Transit (BART) and the Light Rail Transit (LRT).

The current railway line has 25 existing railway stations, the main ones being:

- San Francisco. Final stop at the end of the line.
- Millbrae. Railway station for mixed rail traffic together with the BART station, beside San Fransisco International Airport.
- Mountain View. Railway station for mixed rail traffic together with the LRT station.
- San Jose Diridon.

The route is generally at-grade, generating a large number of at-grade crossings with other existing infrastructure. Crossings with major communications routes are resolved by raising the alignment above the existing railway line.

Along the railway scheme there are several railway yards and tie-ins, amongst them for example is the one coming from Oakland and the railway facilities (workshops, garages ...) next to the San Jose station.

1.2 Future situation. Alternative options

The project aims to connect San Francisco and San Jose Diridon by a high-speed corridor, integrating the new high-speed railway (HSR) line with the existing Caltrain railway. For this purpose there will be four tracks in some segments (San Carlos Station, Bayshore Station, San Jose Statión).

Being a high density urban area, the allowance for the Right of Way (ROW) is low, which forces the tracks to be depressed or raised at some locations.

Most of the existing railway station configurations are to be adjusted under the new layout for the Caltrain tracks, because of variations in the functional organization.

Two alternatives have been studied for San Jose Diridon Station (Wide and Narrow), both are similar in San Jose Station and are aerial, the difference is the length of aerial segment.

A four-track, aerial HSR station in San Jose would be located above the existing San Jose Diridon Station. Two 30-foot-wide and 800-foot-long dedicated HSR platforms would be constructed above the existing Caltrain tracks and platforms. The new HSR station facilities, including a station house area for ticketing and support services and an indoor station room for passengers, would be located north of the existing historic Caltrain corridor. The design of the station areas would provide pick-up and drop-off facilities along Cahill St., as well as intermodal connectivity with BART, Santa Clara Valley Transportation Authority (VTA) light rail, proposed Bus Rapid Transit (BRT) lines, and buses. Circulation linkages between the station house and the station platforms may include hallways, an access bridge to cross over railroad tracks, stairs, escalators, elevators, and moving sidewalks. Parking would be provided at two parking lots along Cahill Street and Stockton Avenue, and a net 156 additional parking spaces would be provided.

1.3 Railway services operation and works progress compatibility

The purpose of this constructability analysis is to define a works organization to make the railway service operation feasible during construction. In order to fulfil this goal a number of conceptual sketches and phases have been defined.

This analysis provides solutions to make the work progress compatible with the rail service; however there is more than one way for implementing the final layout and this will be established in more detail in proceeding further steps.

This conceptual works arrangement has been established taking into account a number of criteria:

- Safety. All the works features and components (temporary and final ones) have been defined to guarantee the maximum safety standards. This applies to the railway operations, the construction process and any road users (road traffic, pedestrians...) in the influence area of the line and the works.

- Construction feasibility. To maintain the existing railway corridor in operation, a number of specific construction methods and track layouts have to be taken into consideration. All of them have been devised from the point of view of the works progress feasibility.
- Process economy optimization. The need to maintain trains in operation during construction requires some specific actions. All the solutions have been devised in order to minimize additional cost or time increases.
- Railway operations performance level. To get a realistic balance between the construction cost and the railway´s service performance, some limits on this have to be introduced. Taking into account the temporary nature of the limitations on the railway service, some partial line functionality and capacity will be redefined.
- Temporary additional ROW need minimization.
- Other disturbances limited to a minimum (pedestrians, road traffic...)

To achieve the goal of maintaining the trains in operation in accordance with these criteria, the following main procedures have been applied:

- Temporary railway components construction. In order to make it feasible and efficient to build different pieces of the new system, some additional tracks or platforms will be introduced with a temporary function.

2. Construction activities sequence.

The infrastructure construction process is a complex one that can be organised in order to optimize different parameters (budget flow, time schedule, uncertainties). For this particular railway corridor the construction sequence has been defined in order to optimize the balance between cost, time schedule and railway’s service performance level, **in this study an electrified line is considered**. In accordance with this, the following main criteria have been applied:

- Final elements / temporary layouts. For every single section that the corridor has been divided into, a specific track layout has been proposed that combines future infrastructure elements with those of a temporary nature.

These temporary components and track layouts have been designed specifically for the following different kinds of infrastructure construction:

- at grade
- elevated
- in a trench
- underground or tunnel

- "Railway capacity enlargement" as a main criterion. The construction process sequence has been developed on the basis that the future infrastructure railway capacity will be higher than the current one. To take advantage of this, the sequence has been defined giving priority to build components that contribute to increased operational capacity without disturbing the existing service.

  Temporary tracks are introduced into these segments and phases, where the continuity of the works requires the removal of the existing tracks.

  With this approach, a "construction-demolition-construction" process is introduced. The priority is given to the construction of final additional tracks. After the commissioning of these tracks the existing ones can be removed. Finally the remaining tracks for the final layout can be built where the old ones lie.

- Partial completion and commissioning. The railway operation performance can be optimized through the combination of all of these criteria. Particularly, the combination of splitting the corridor into segments and independent commissioning of ready segments, not only reduces the length where the railway performance is limited but also allows the introduction of a higher level standard of operation that contributes to a balancing out of restrictions existing in other segments.

  A specific treatment is devoted to the different main passenger terminals as they are very specific facilities.

- Railway operation during works. Condition limitation. Maintaining the railway's service performance standards when the corridor is experiencing major works, is a real challenge.

To keep the unavoidable additional costs or works time schedule increase at reasonable levels, the rail operational performance can be temporarily reduced to acceptable limits.

There are two main parameters of the railway that will be influenced by the construction process: the line's functionality and capacity.

- Influence on line’s functionality.

  The line's functionality will be limited to some extent for the different phases and segments. The quantification of this limitation will be linked to the actual time scheduling of the different segments along the corridor.

  As a general rule, this limitation will have common attributes: the speed restrictions that will limit to some value the partial travel times and the availability of platforms at stations that could limit the number of destinations or intermediate stops.

- Influence on line's capacity.

  The line's capacity will also experience some reductions. These will arise from a number of sources and some of them will have to be especially taken into account.

  The main one is the presence of some temporary single track segments. It has to be considered that for longer sections above a certain length, the resulting capacity reduction could be unacceptable.

  Some single platforms stations could contribute to additionally reduce the network capacity.

  Two other sources of capacity reduction would be the speed restrictions along temporary alignments and local track short breaks for connections during non-peak periods.

3. Summary and main comments.

The scope for this constructability analysis is to define a feasible way of organizing the works programme to make it compatible with keeping the railways in-service and in an efficient manner.

The main design criteria takes into account safety, construction feasibility, economical optimization of processes, quality of railway's service and minimization of temporary ROW needs.

The procedures to meet the objective are based on the division of the scheme into independent sections and on temporary railway components construction.

In order to optimize the balance of the cost/time ratio and railway's service performance, the following criteria have been applied: final elements/temporary layouts combination; "railways capacity enlargement" processes; partial completion and commissioning; and acceptable constrains in railways operational conditions.

The works organization will have a limited influence on the railway's service performance. This will have regard specifically for the line's functionality and capacity.

The analysis includes some especially complex segments where specific arrangements and track layouts have to be implemented to make the works progress and railway operation feasible.

At detailed design stage, a more specific analysis for the selected option will contribute to reducing to a minimum the railway's operation restrictions through a more detailed work plan and track layout definition.

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
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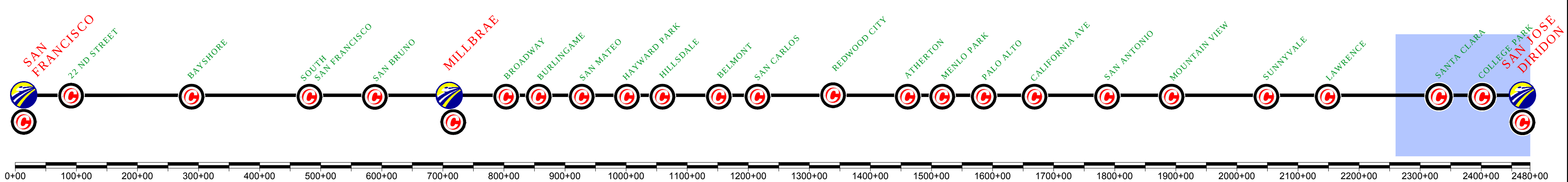

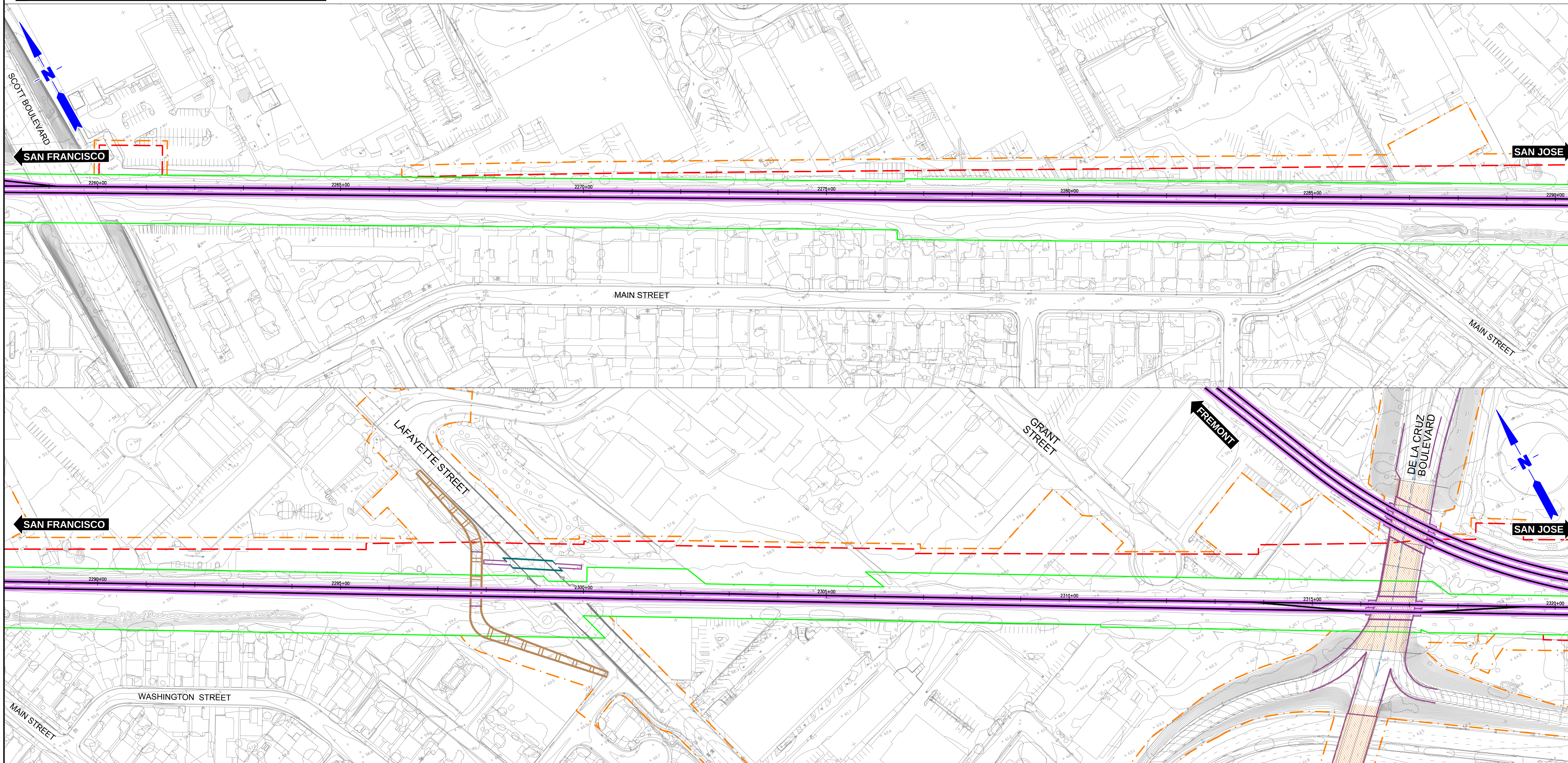

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PLAN
INITIAL PHASE

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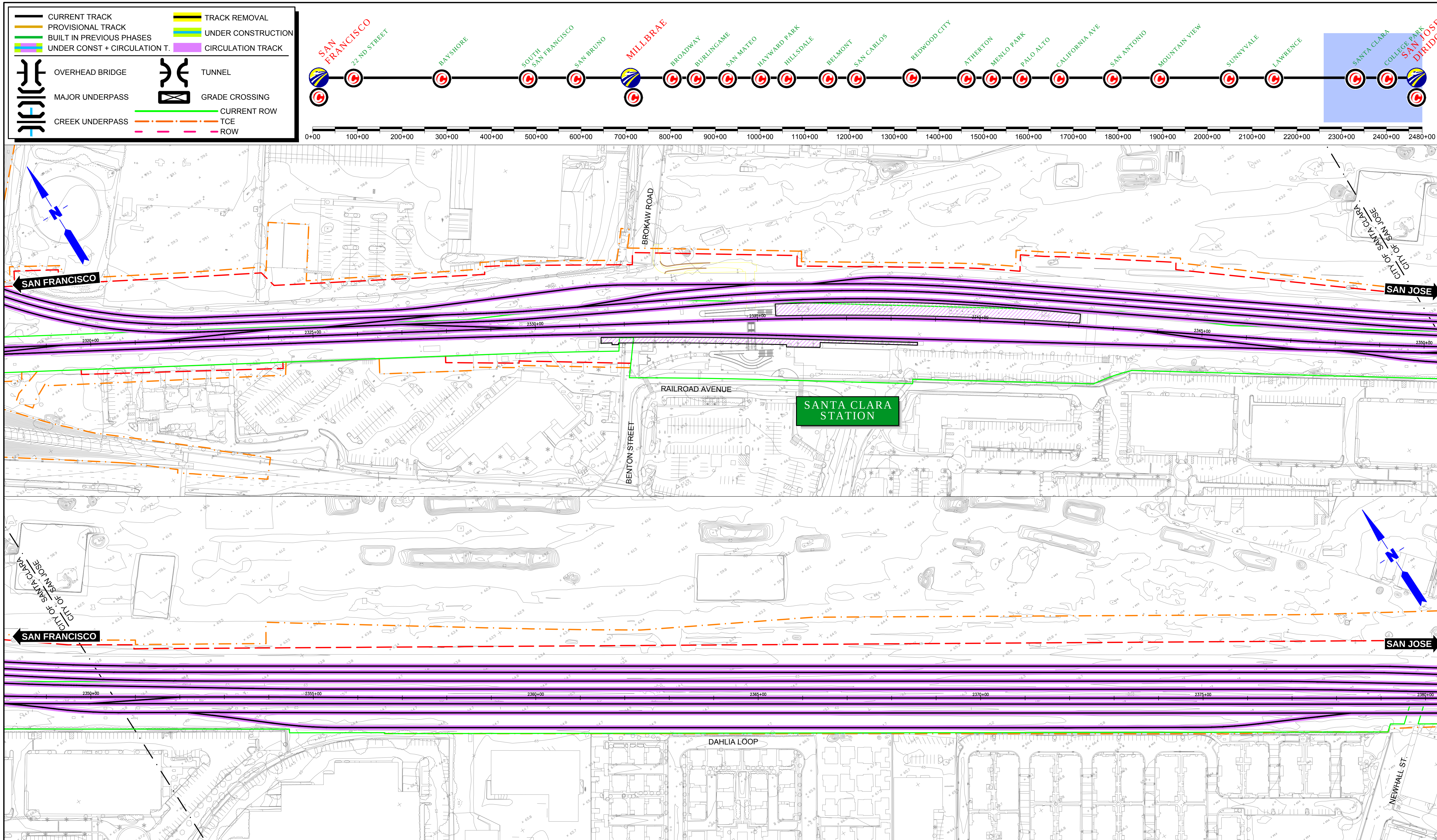

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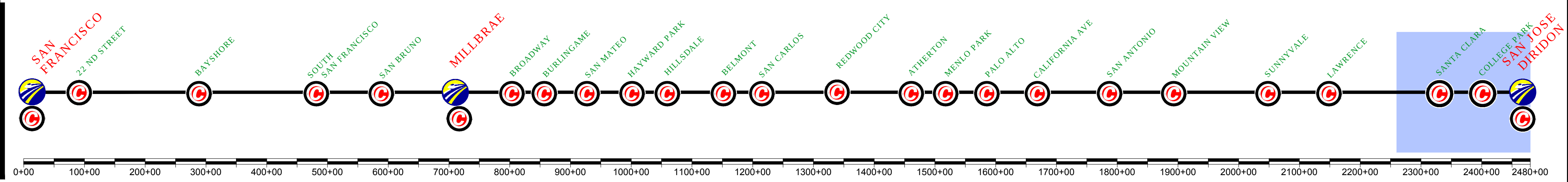

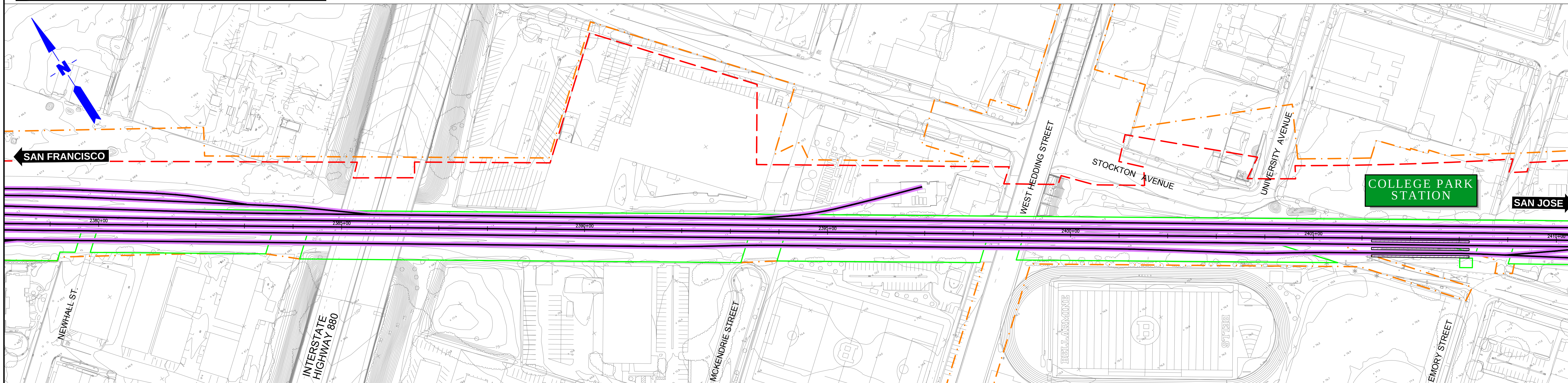

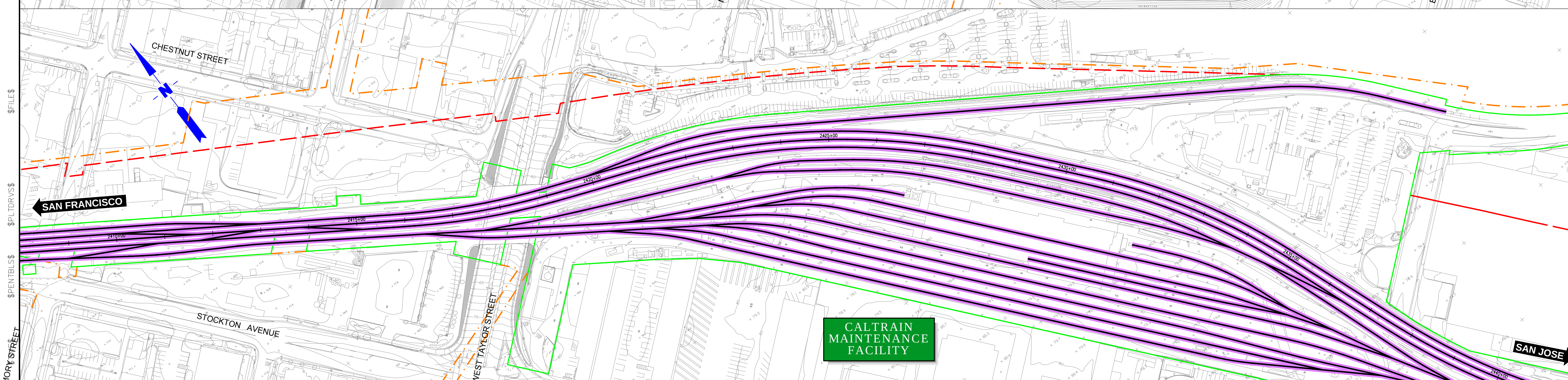

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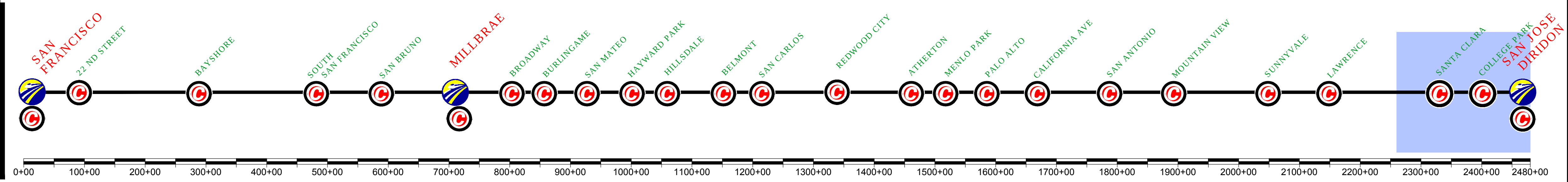

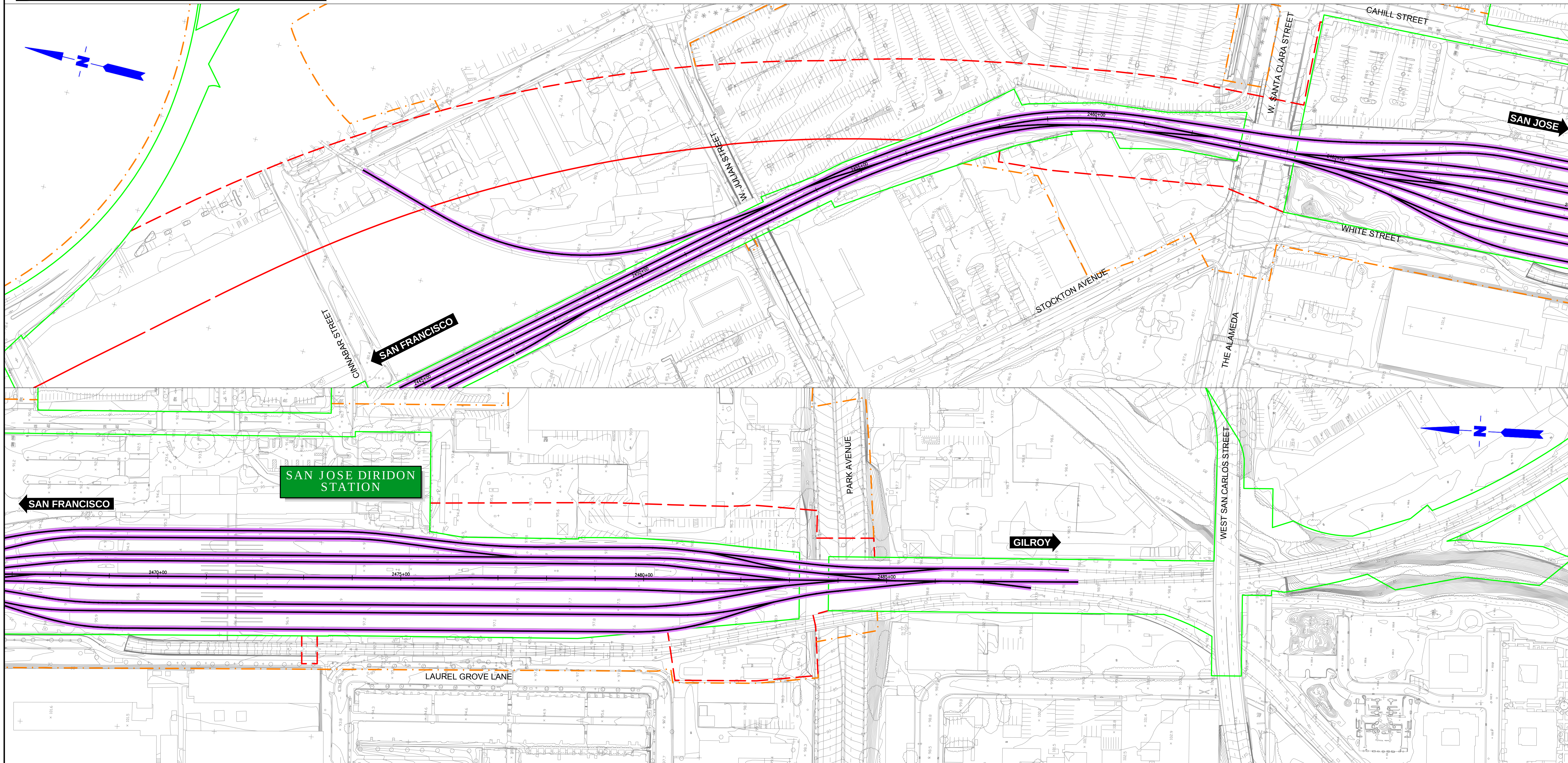

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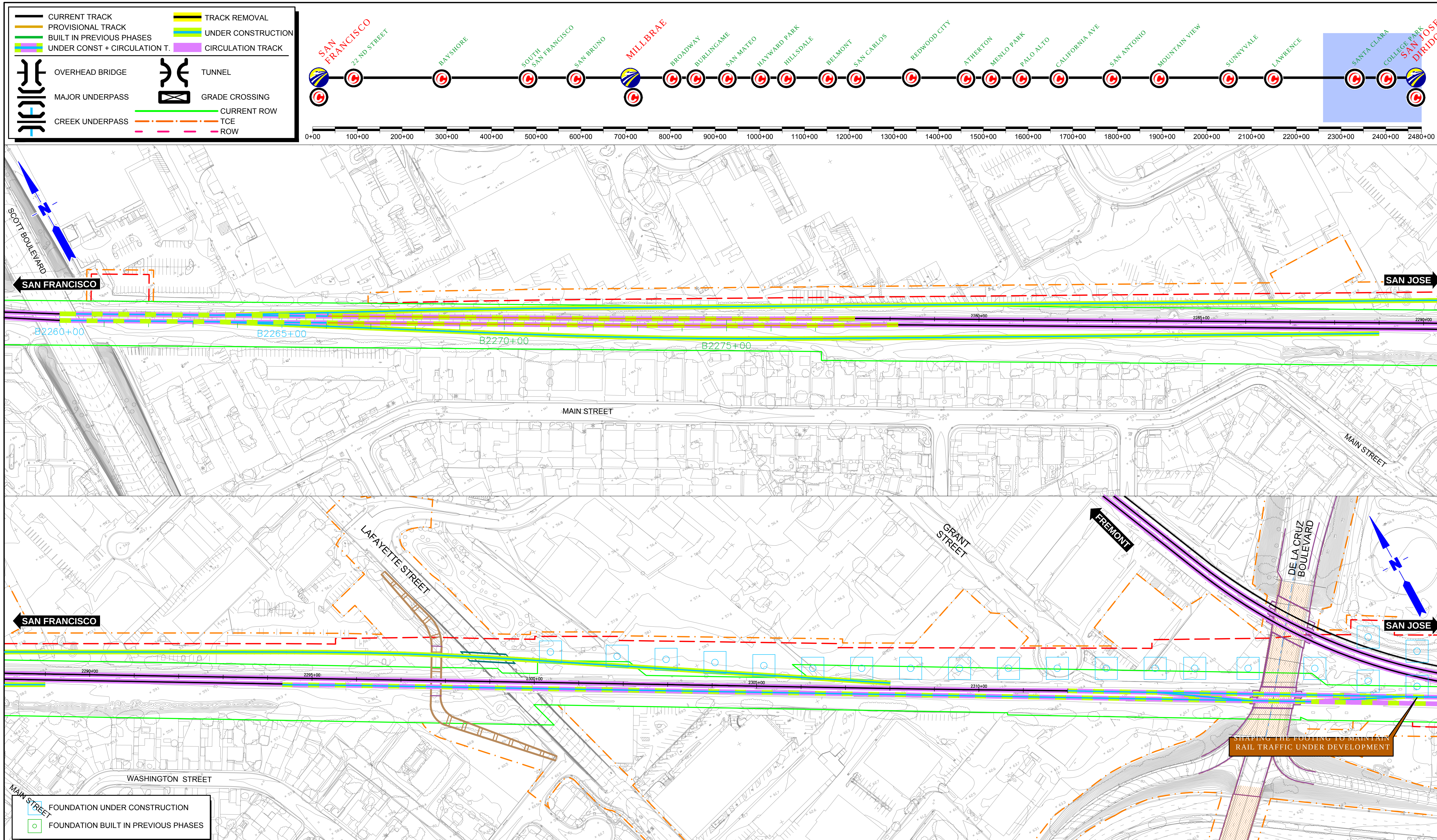

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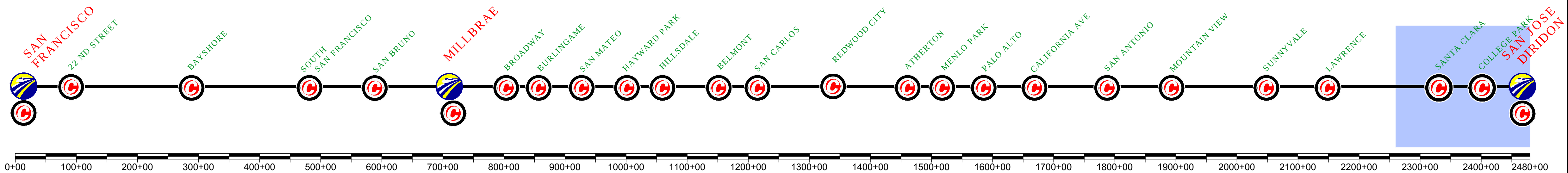

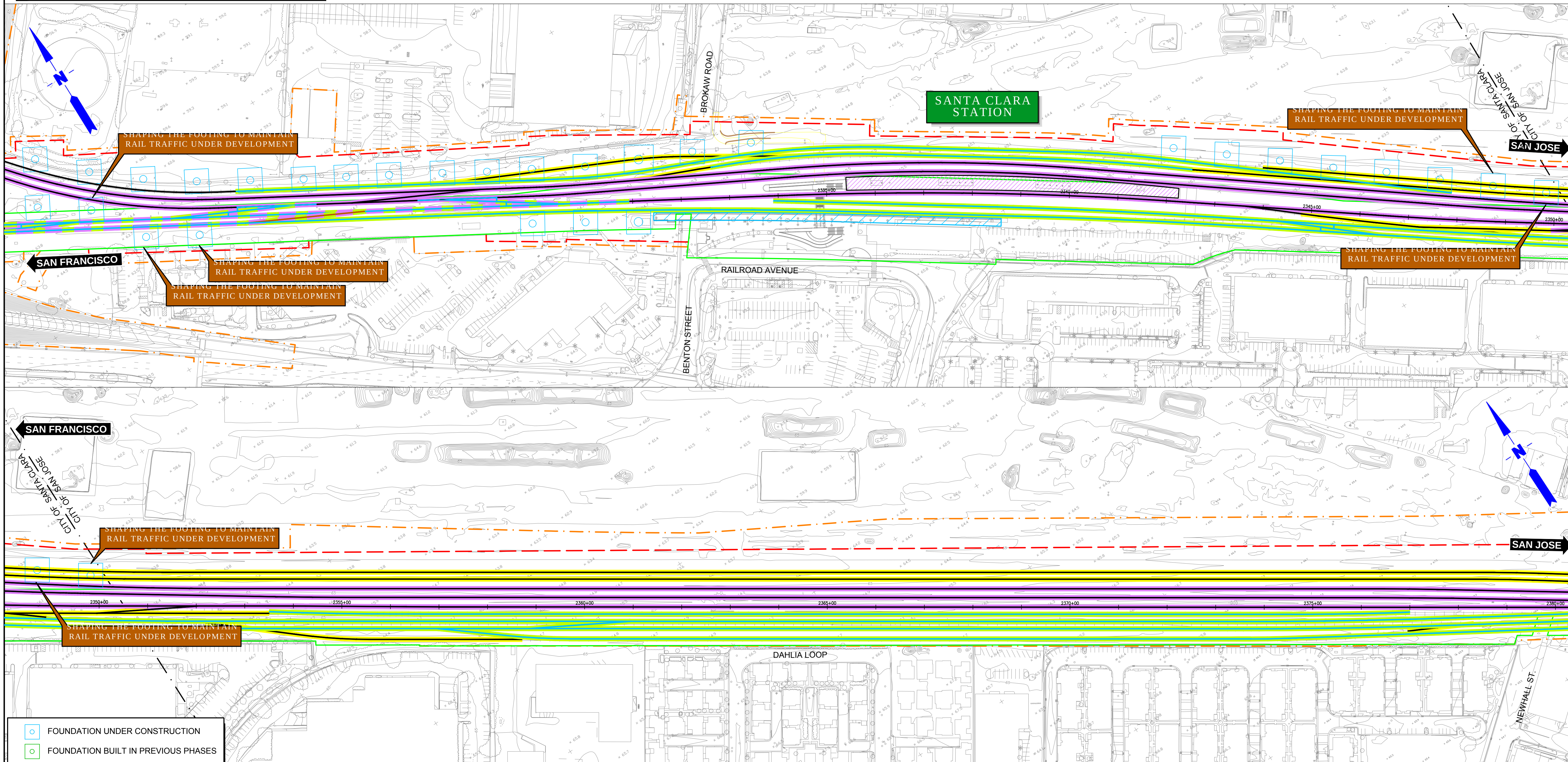

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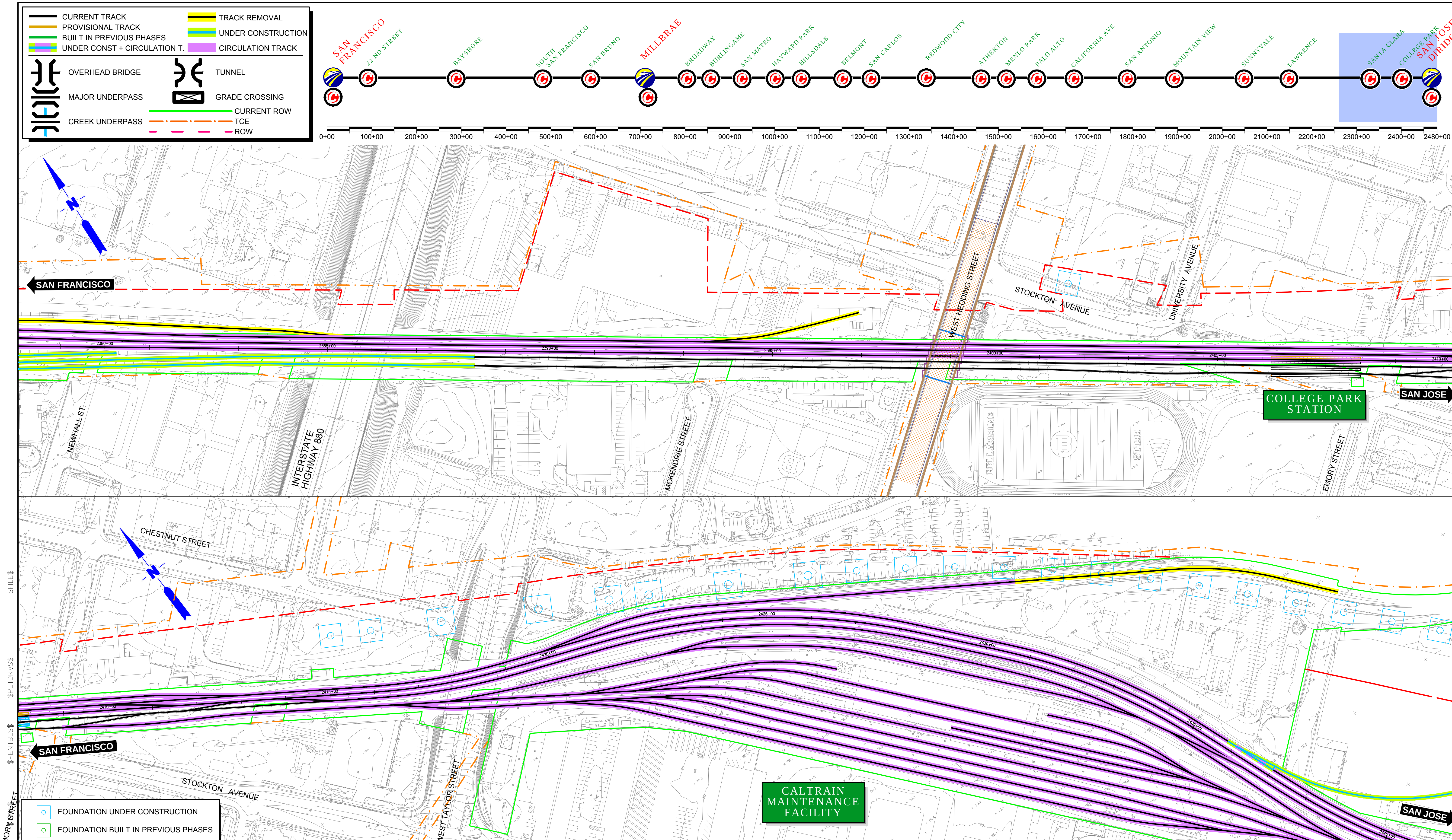

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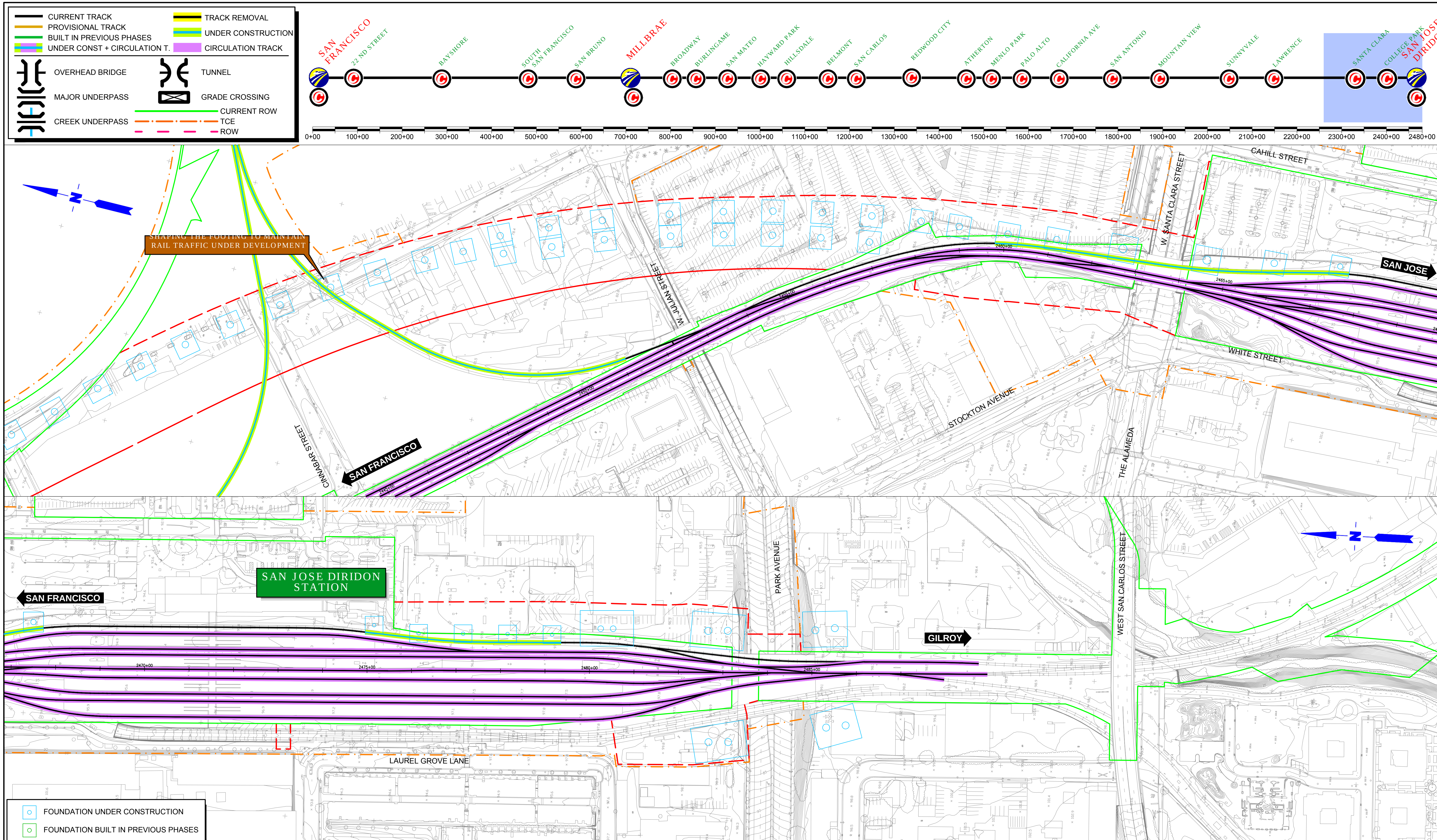

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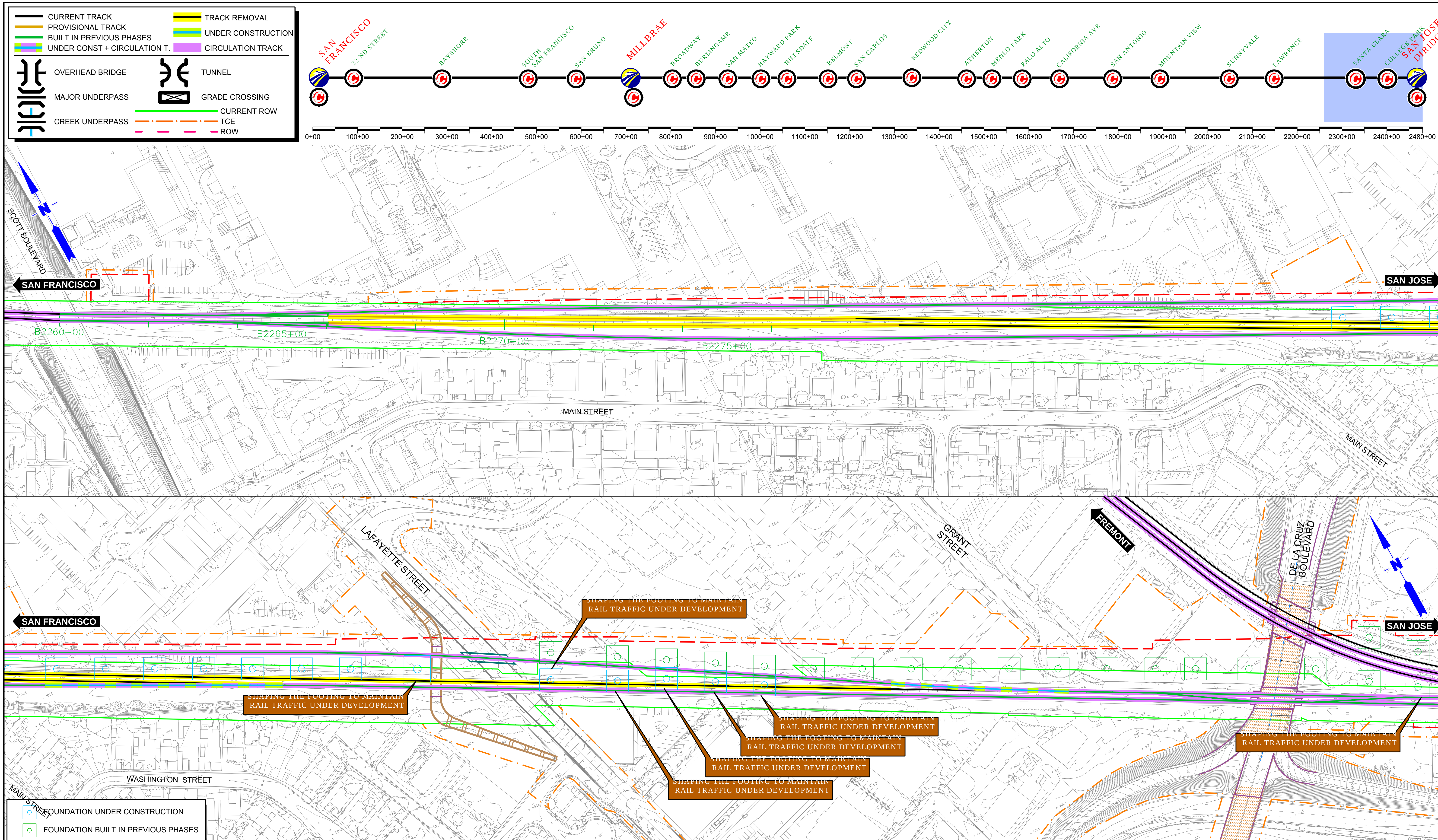

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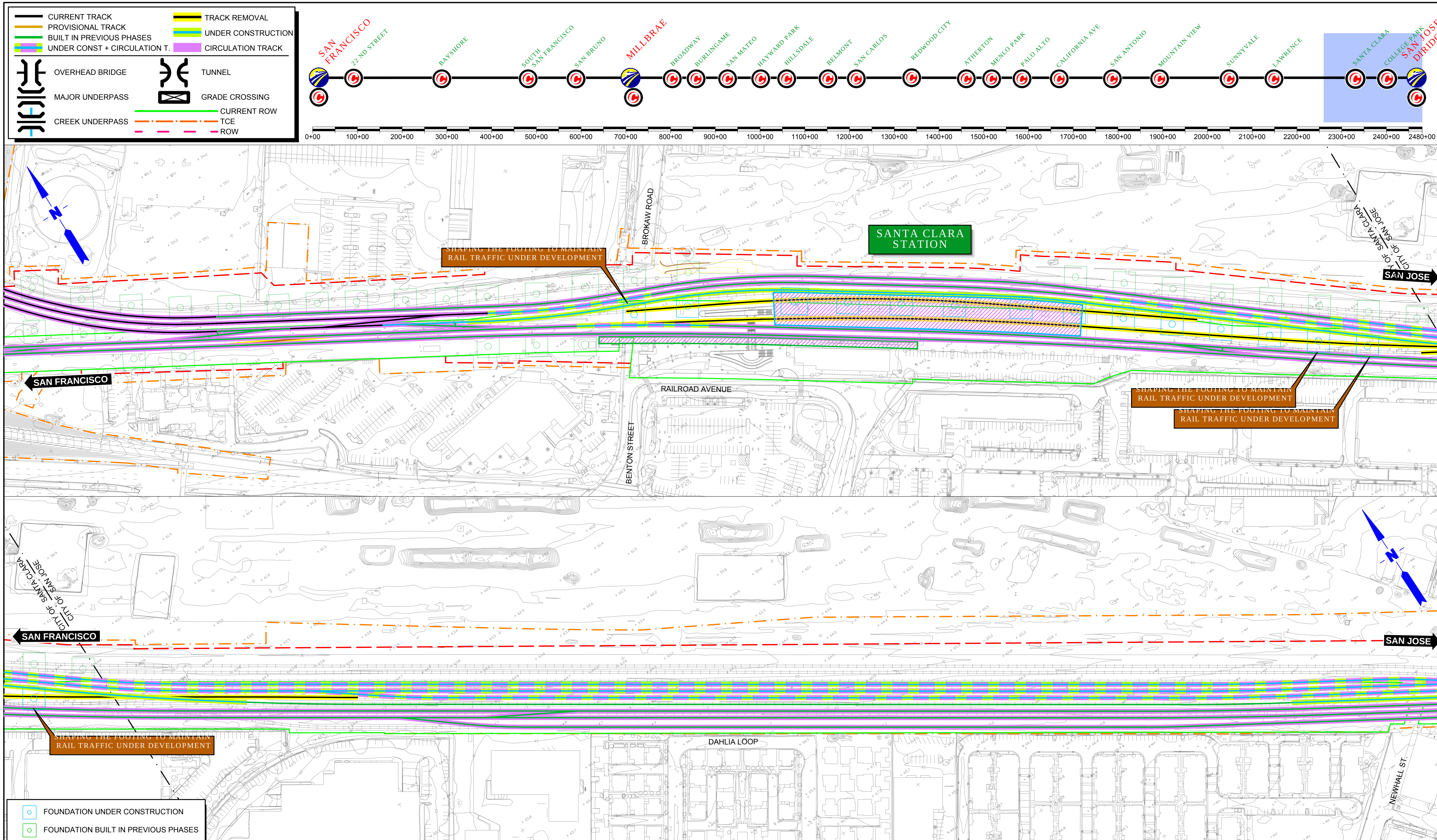

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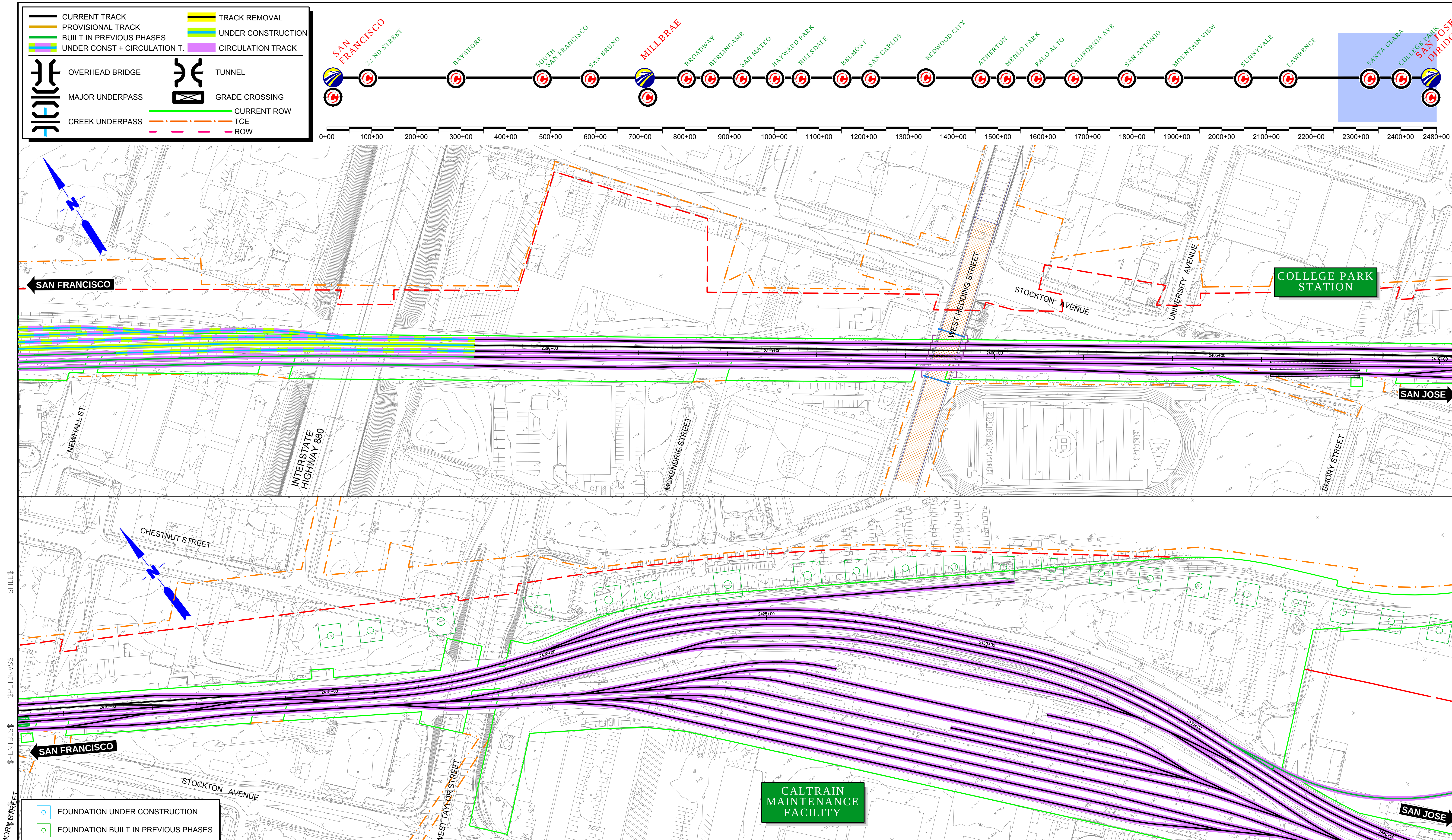

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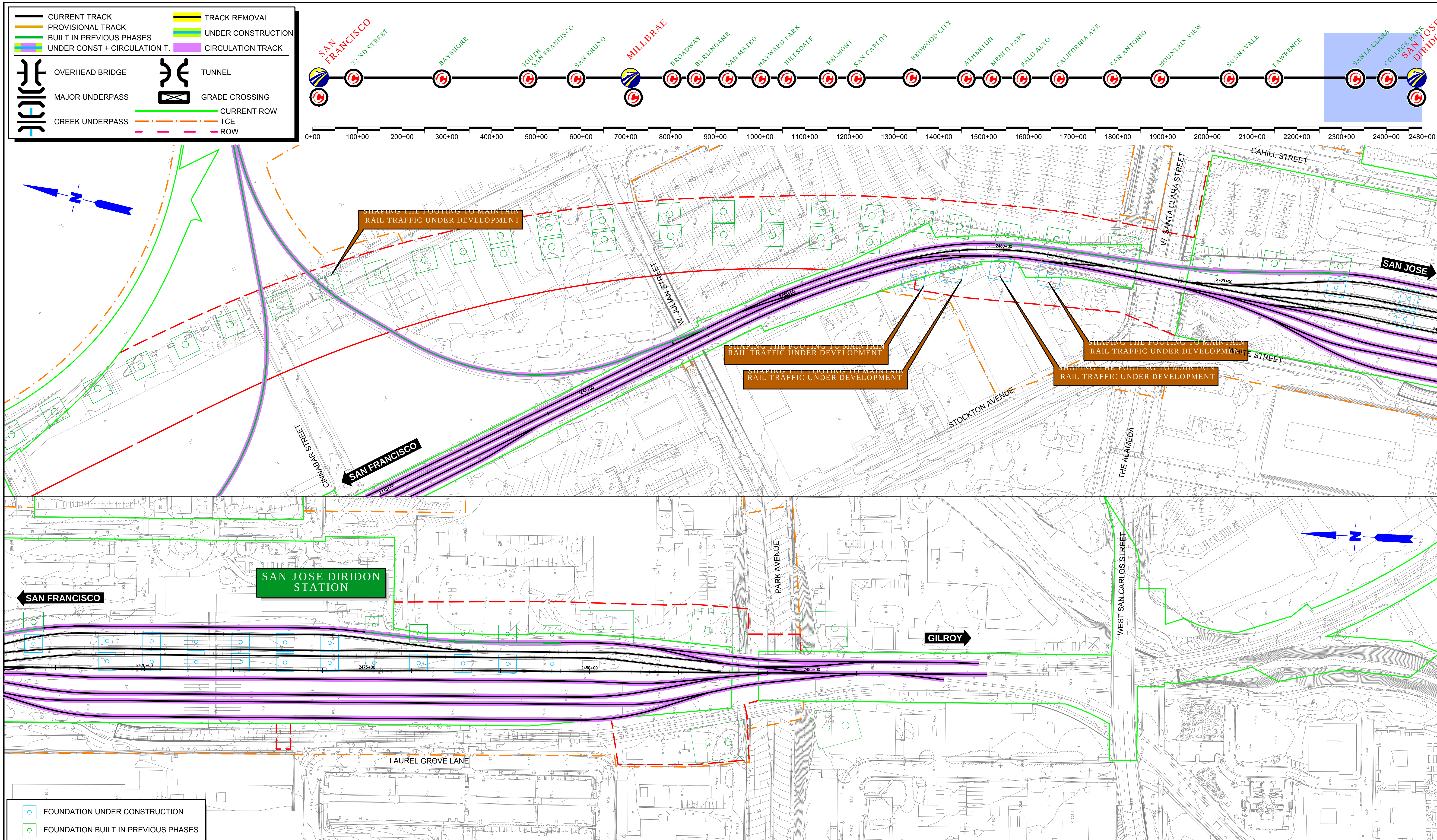

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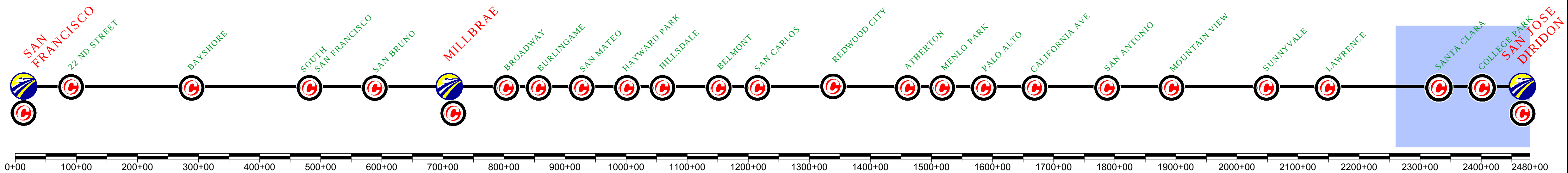

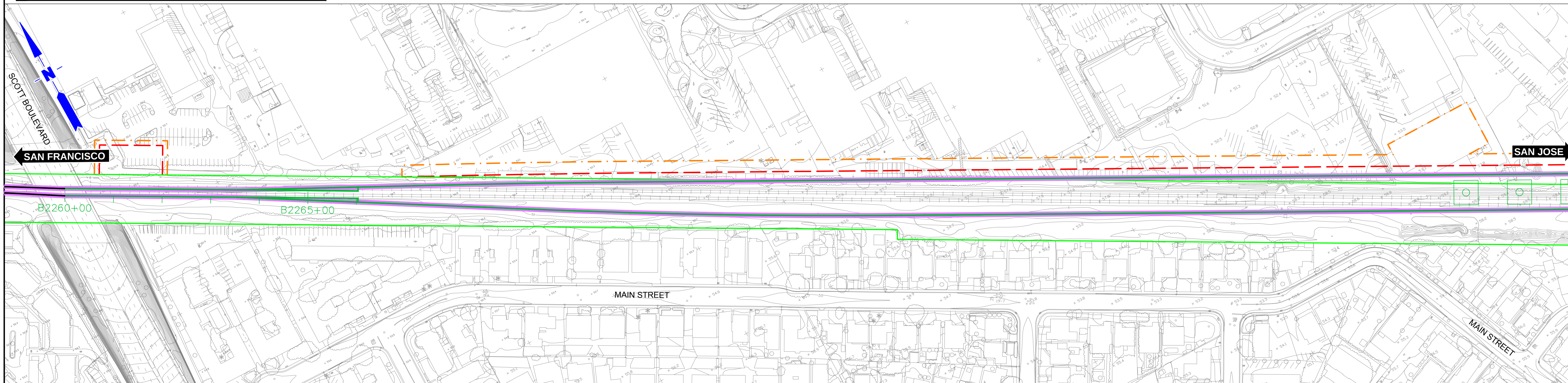

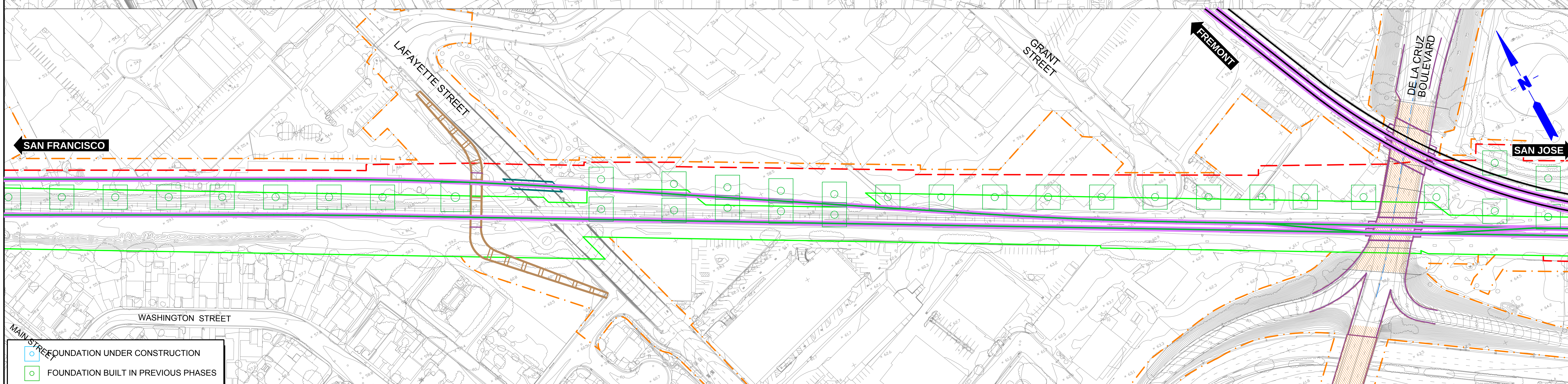

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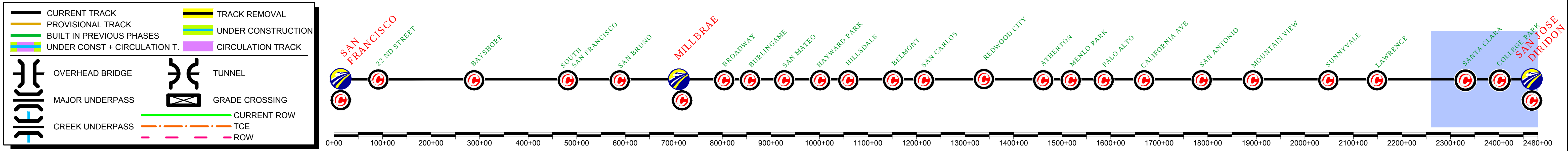

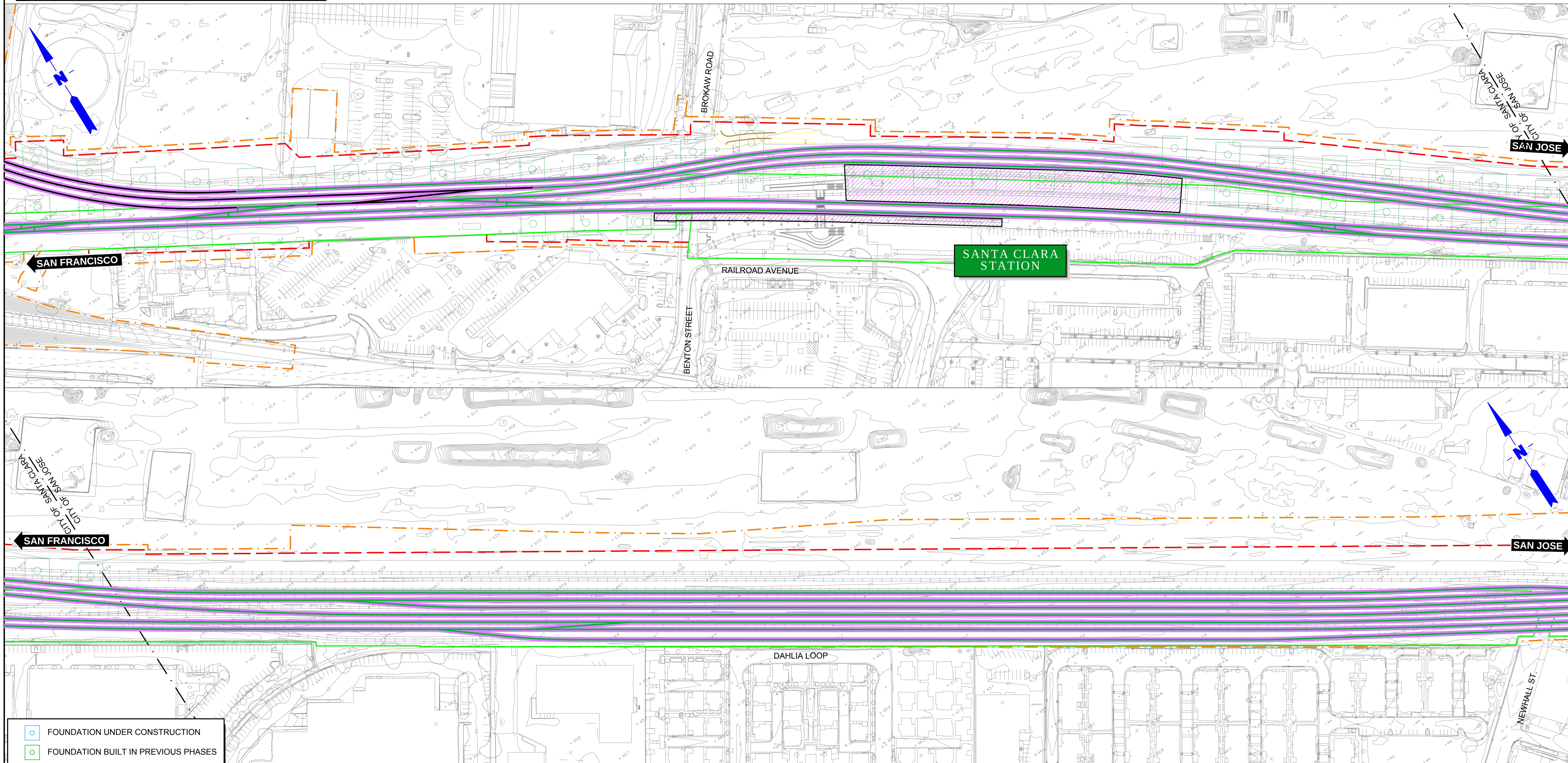

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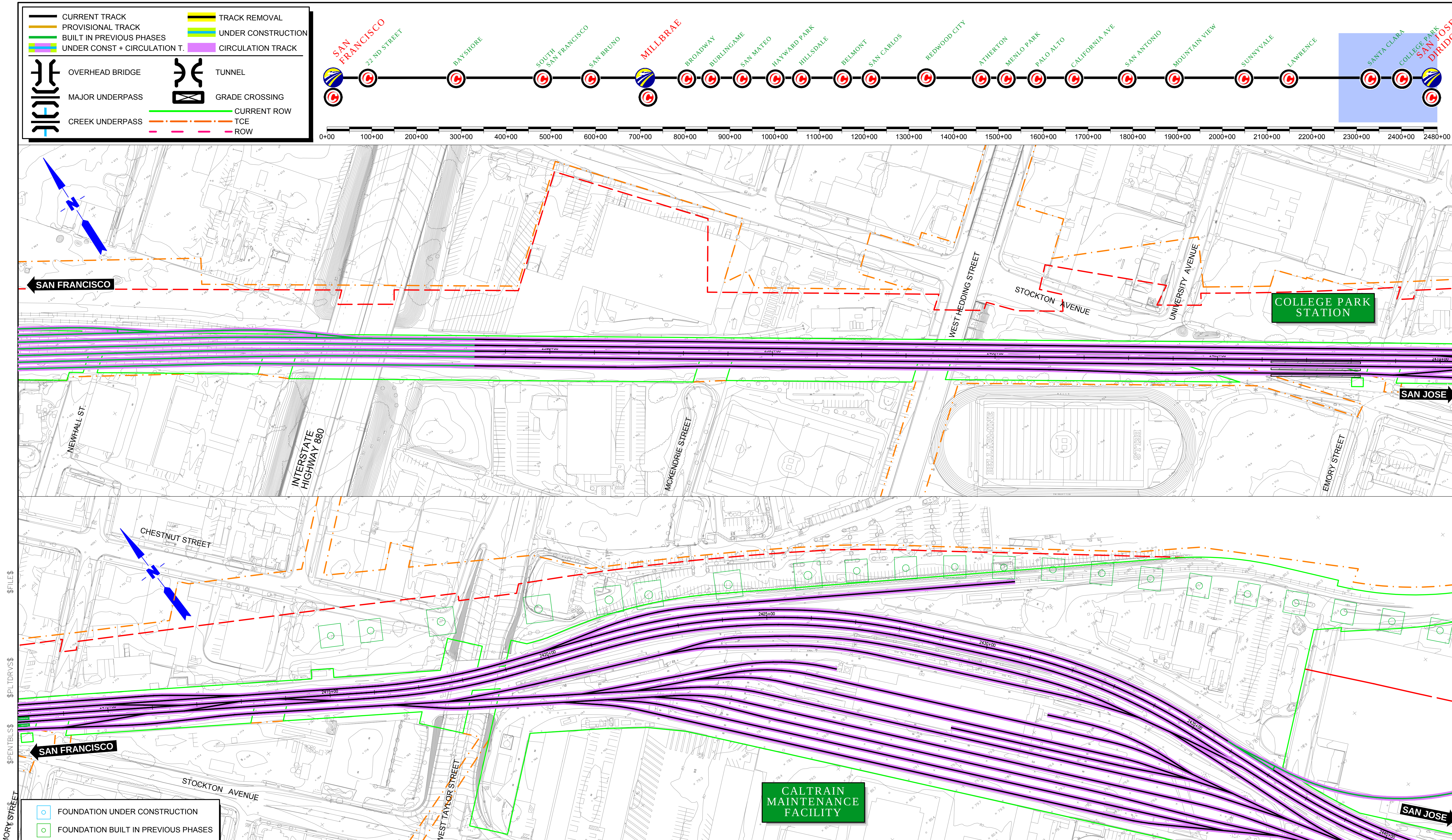

$FILE$ $PLTDRVS$ $PENTBLS$ $DATE$ $USER$

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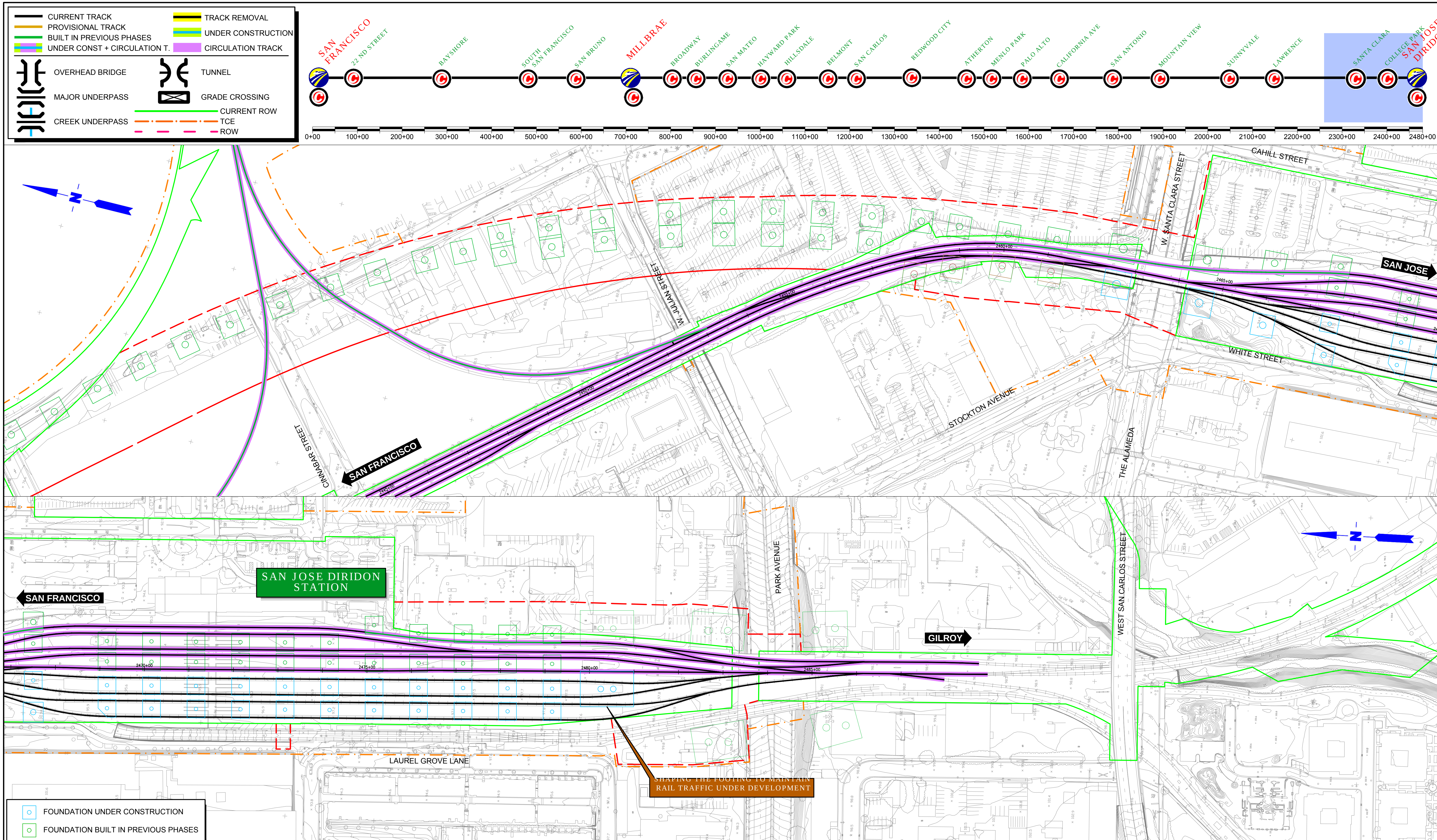
SAN FRANCISCO TO SAN JOSE
SAN JOSE. ALTERNATIVE B
CONSTRUCTION PHASES
PLAN
PHASE 3

CONTRACT NO.
DRAWING NO.
SCALE 1"= 200'
SHEET NO. 3 OF 4



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PHASE 3

CONTRACT NO.

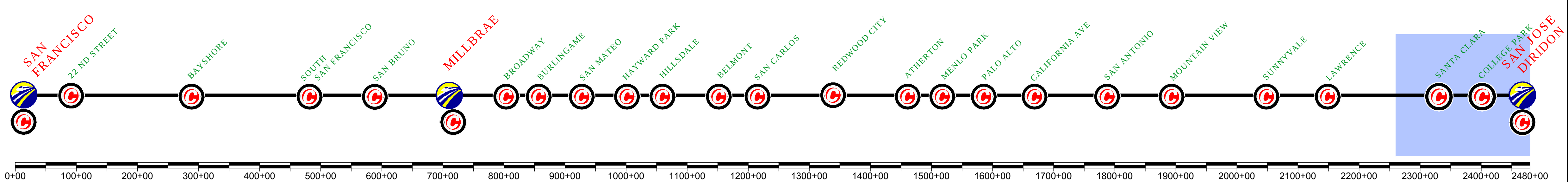
DRAWING NO.

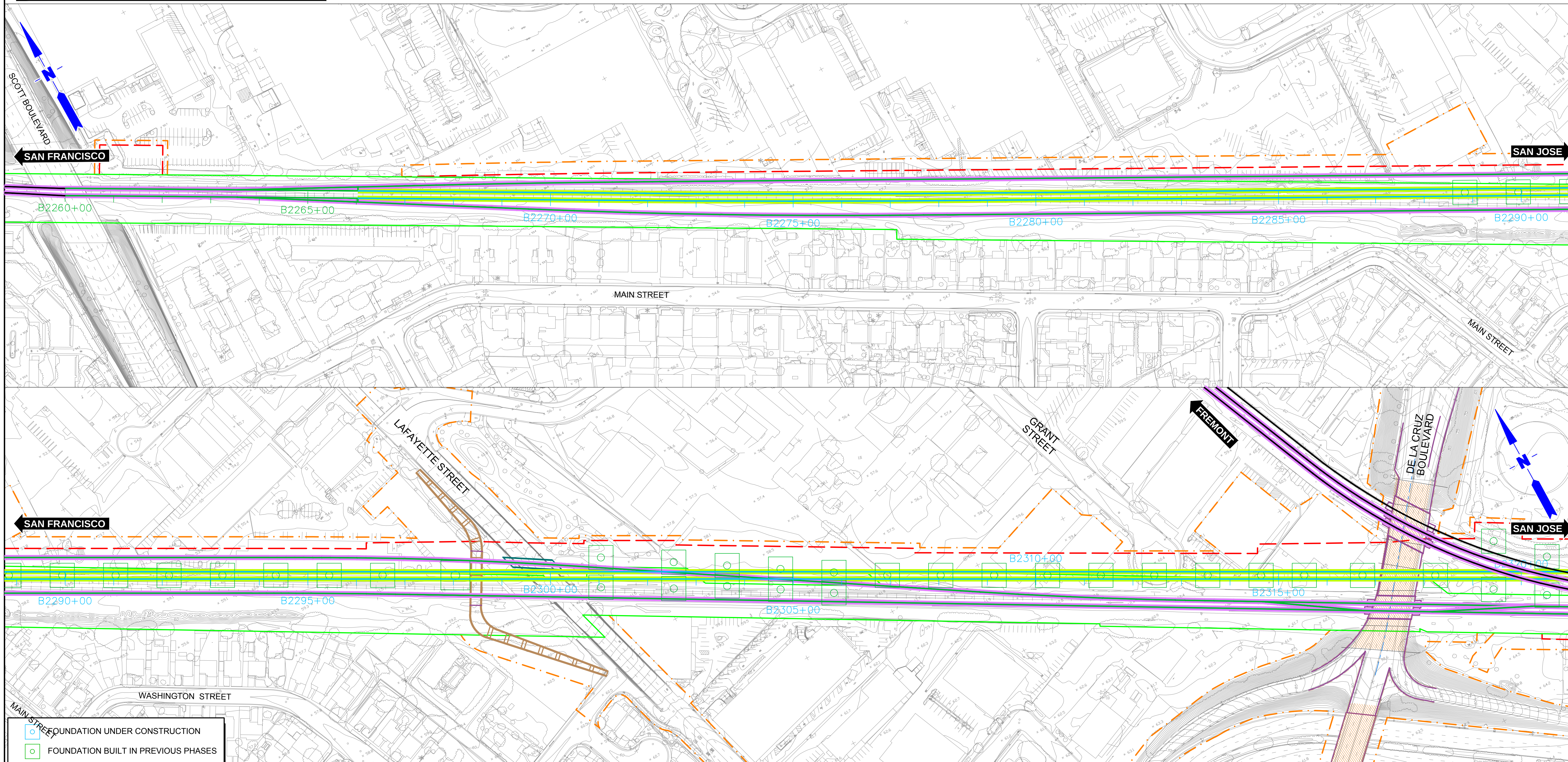
SCALE 1"= 200'

SHEET NO. 4 OF 4

$FILE$ $PLTDRV$$ $PENTBL$$ $TIME$ $DATE$ $USER$

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





FOUNDATION UNDER CONSTRUCTION
FOUNDATION BUILT IN PREVIOUS PHASES

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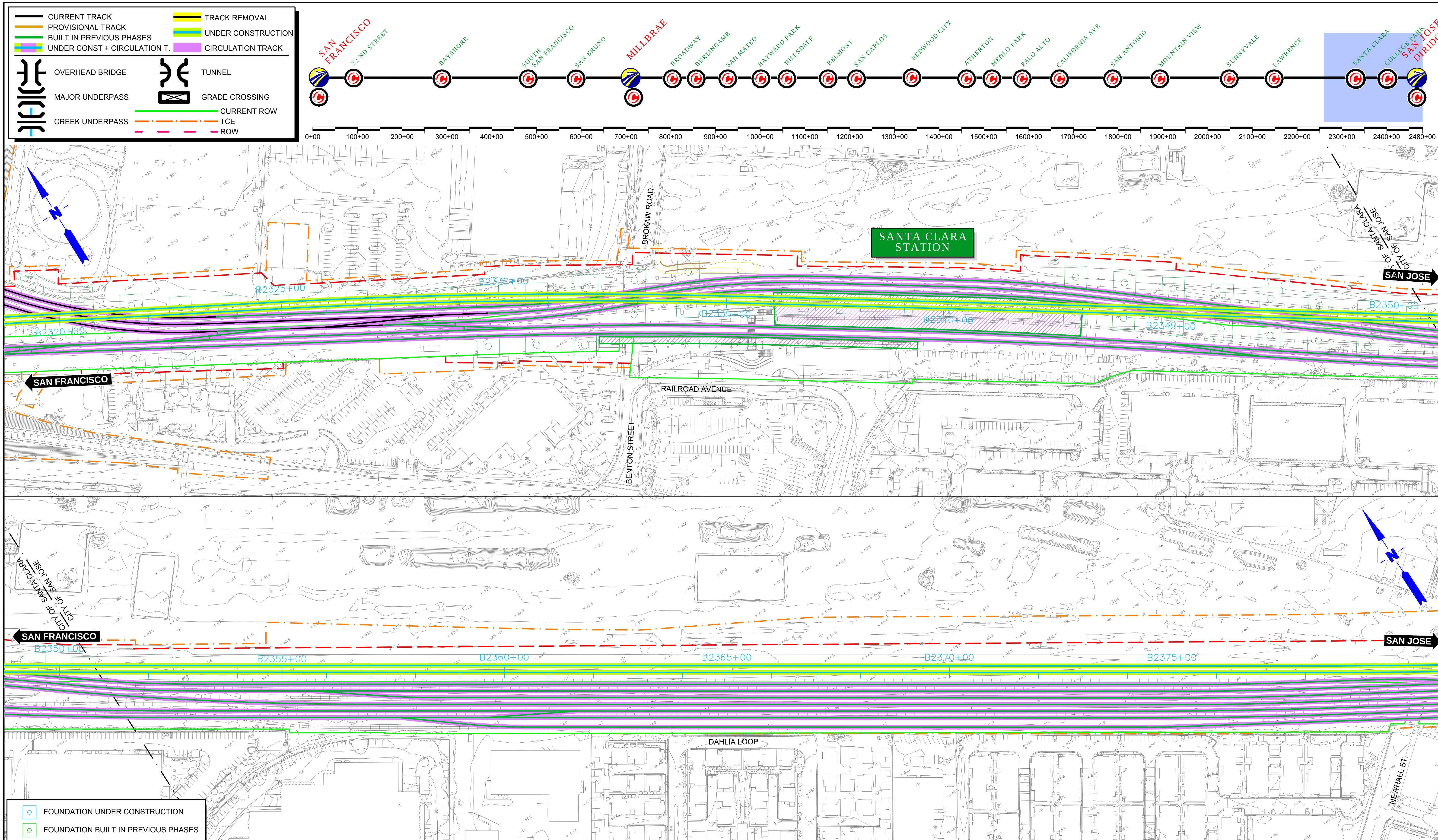
CONSTRUCTION PHASES
PLAN
PHASE 4

CONTRACT NO.
DRAWING NO.
SCALE 1"= 200'
SHEET NO. 1 OF 4



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PHASE 4

CONTRACT NO.
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SCALE 1"= 200'
SHEET NO. 2 OF 4

CURRENT TRACK
PROVISIONAL TRACK
BUILT IN PREVIOUS PHASES
UNDER CONST + CIRCULATION T.
TRACK REMOVAL
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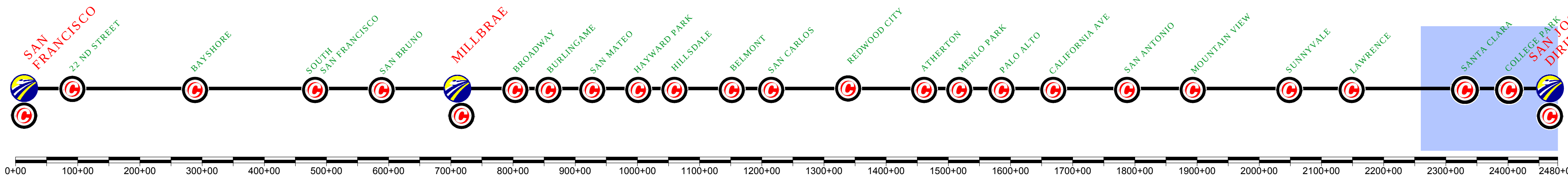

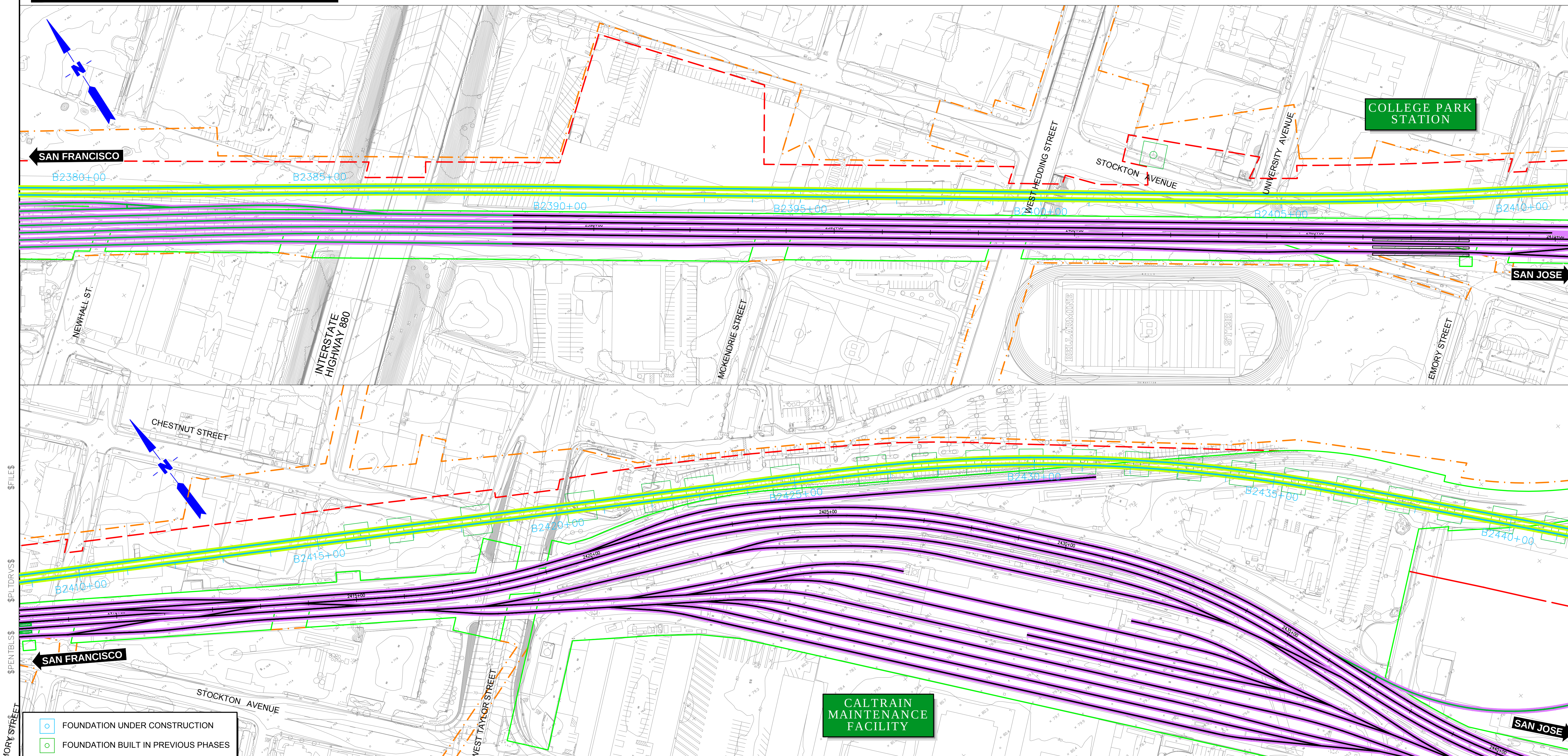

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CONTRACT NO.
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SHEET NO. 3 OF 4

CURRENT TRACK
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BUILT IN PREVIOUS PHASES
UNDER CONST + CIRCULATION T.
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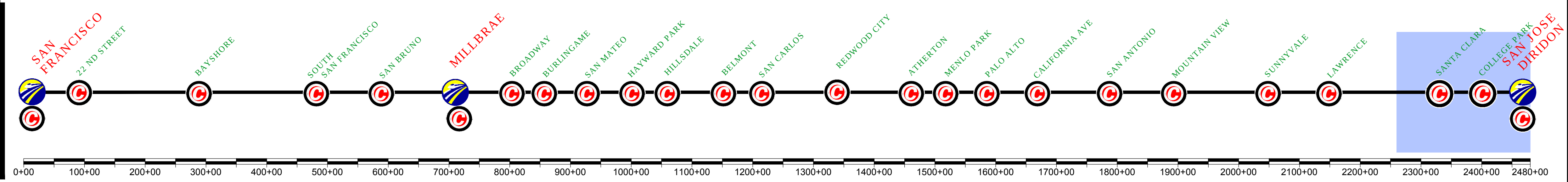

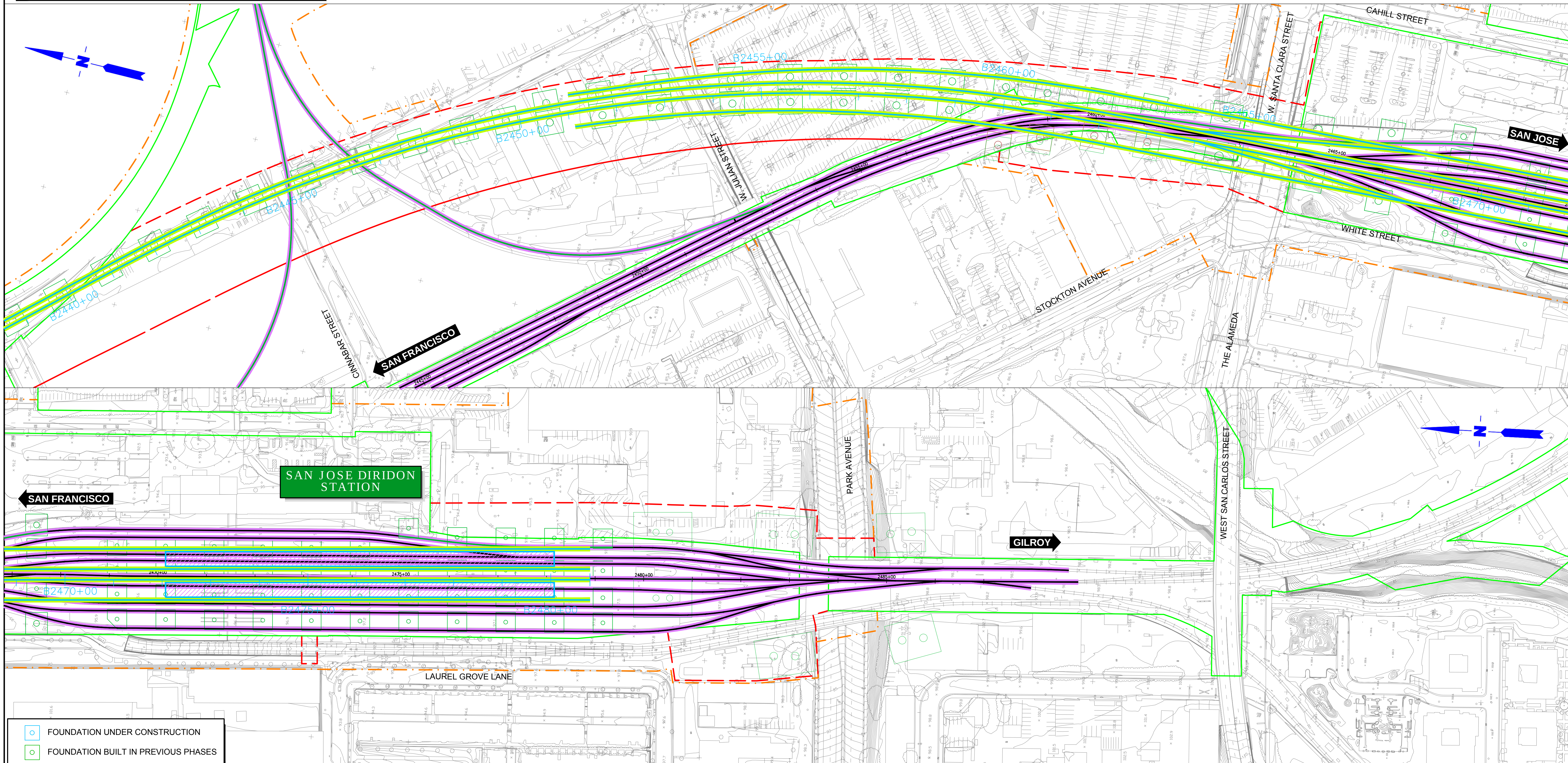

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CONSTRUCTION PHASES
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PHASE 4

CONTRACT NO.
DRAWING NO.
SCALE 1"= 200'
SHEET NO. 4 OF 4

$USER$ $DATE$ $TIME$ $PENTBL$$ $PLTDRV$$ $FILE$

CURRENT TRACK
PROVISIONAL TRACK
BUILT IN PREVIOUS PHASES
UNDER CONST + CIRCULATION T.
TRACK REMOVAL
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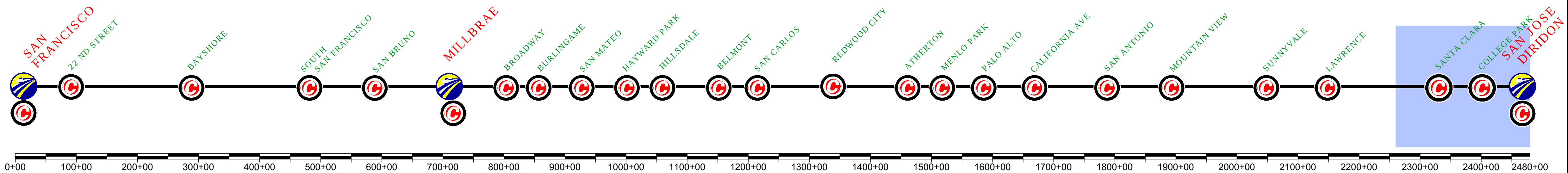

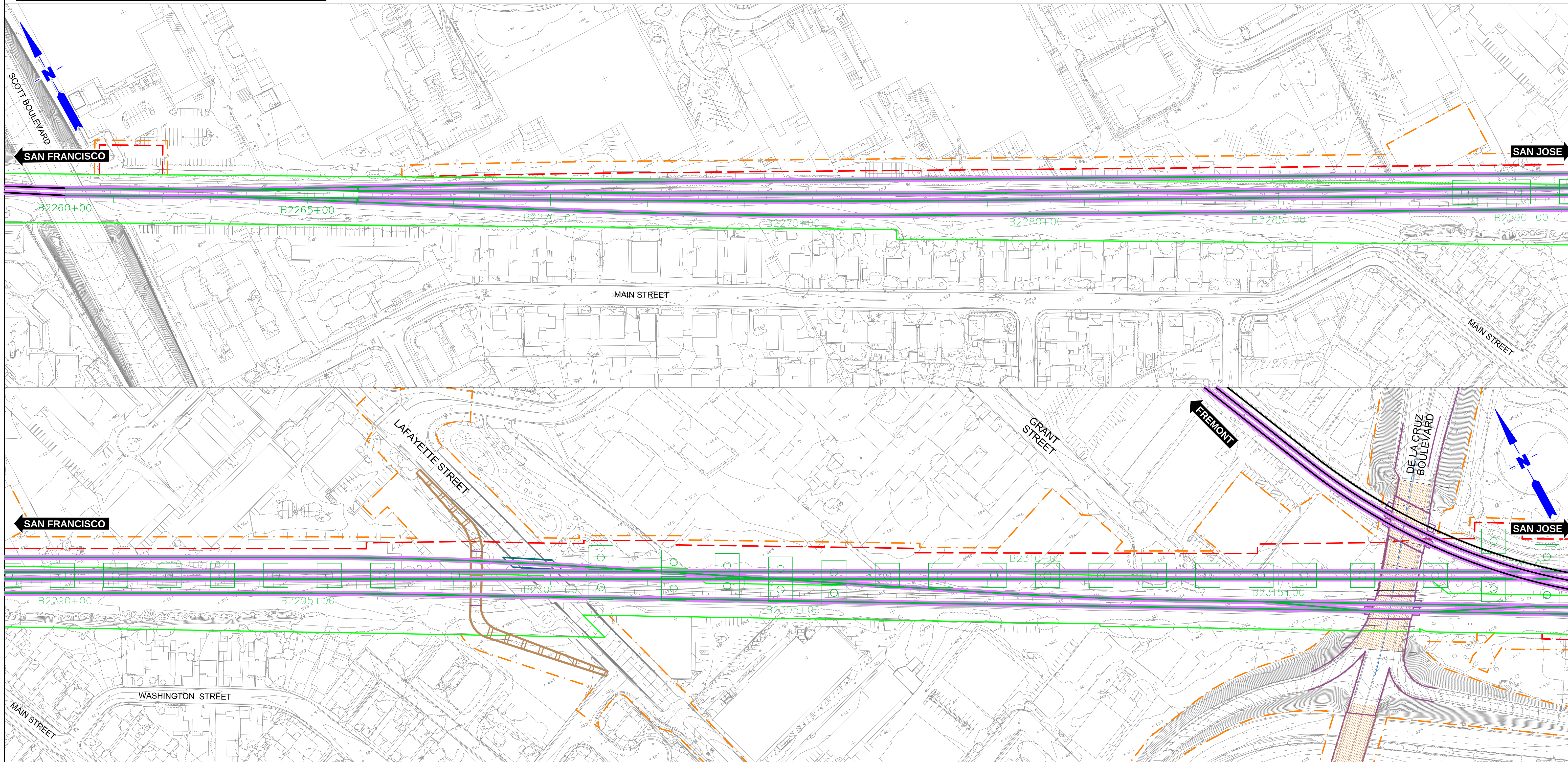

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SAN JOSE. ALTERNATIVE B
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PLAN
FINAL PHASE

CONTRACT NO.
DRAWING NO.
SCALE 1"= 200'
SHEET NO. 1 OF 4

$USER$ $DATE$ $TIME$ $PENTBL$$ $PLTDRV$$ $FILE$

CURRENT TRACK
PROVISIONAL TRACK
BUILT IN PREVIOUS PHASES
UNDER CONST + CIRCULATION T.
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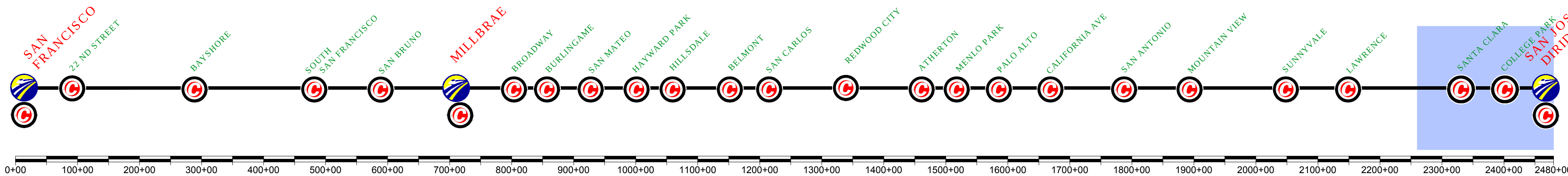

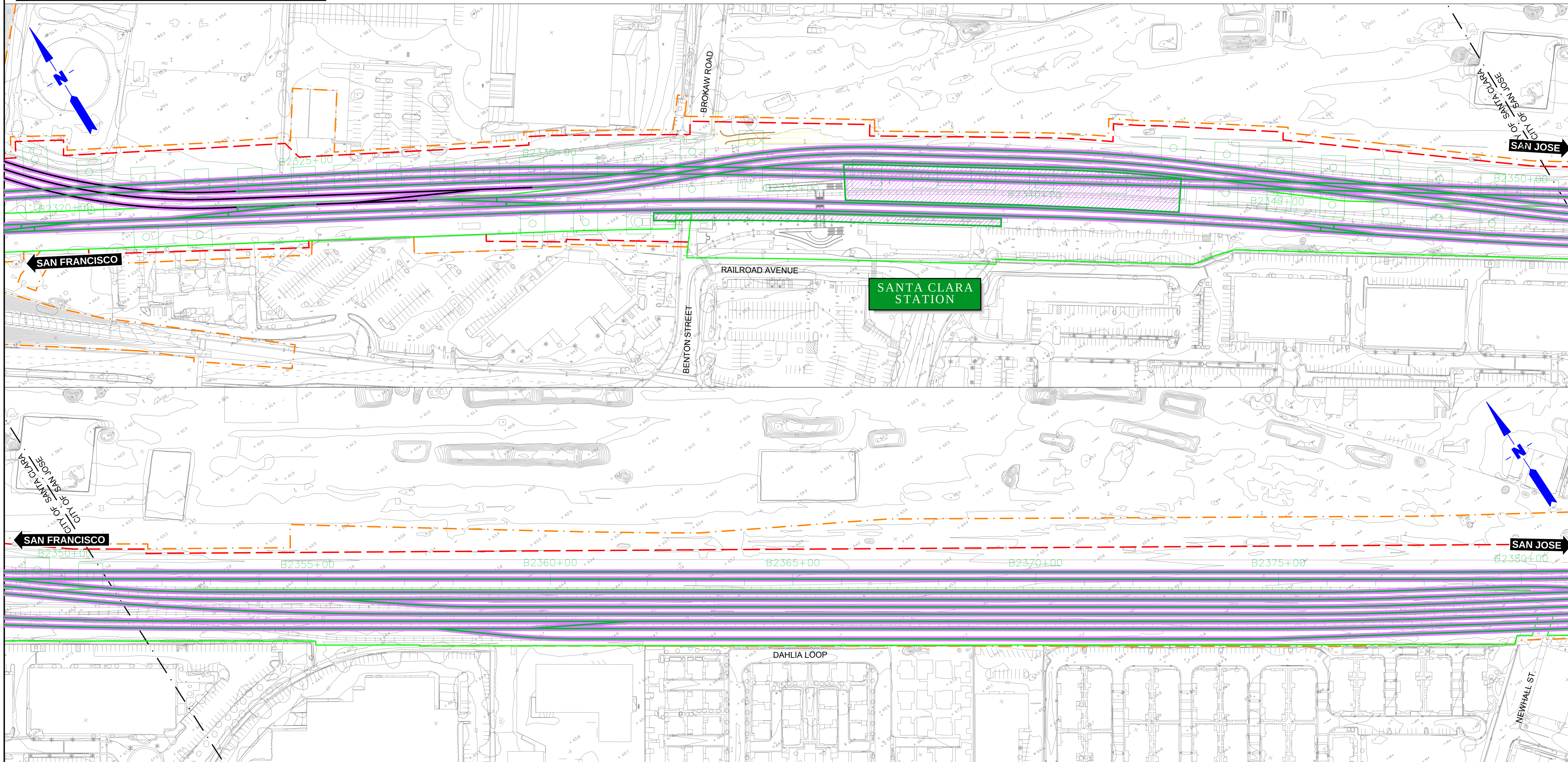

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FINAL PHASE

CONTRACT NO.
DRAWING NO.
SCALE 1"= 200'
SHEET NO. 2 OF 4

$FILE$ $PLTDRV$ $PENTBL$ $TIME$ $DATE$ $USER$

CURRENT TRACK
PROVISIONAL TRACK
BUILT IN PREVIOUS PHASES
UNDER CONST + CIRCULATION T.
TRACK REMOVAL
UNDER CONSTRUCTION
CIRCULATION TRACK
OVERHEAD BRIDGE
TUNNEL
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CURRENT ROW
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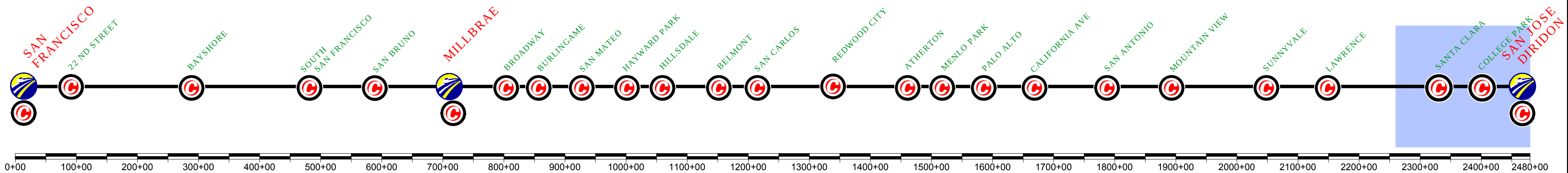
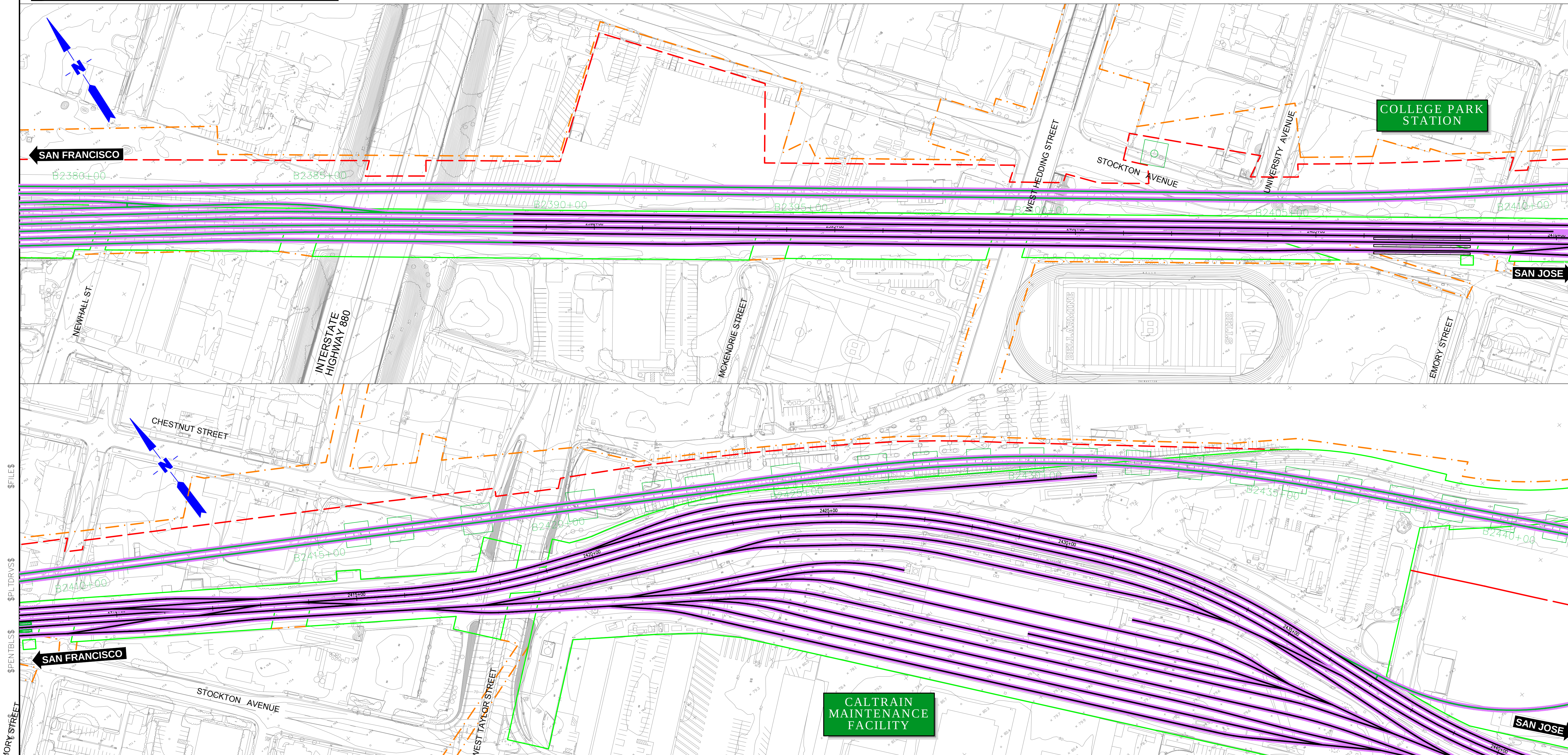
ROW





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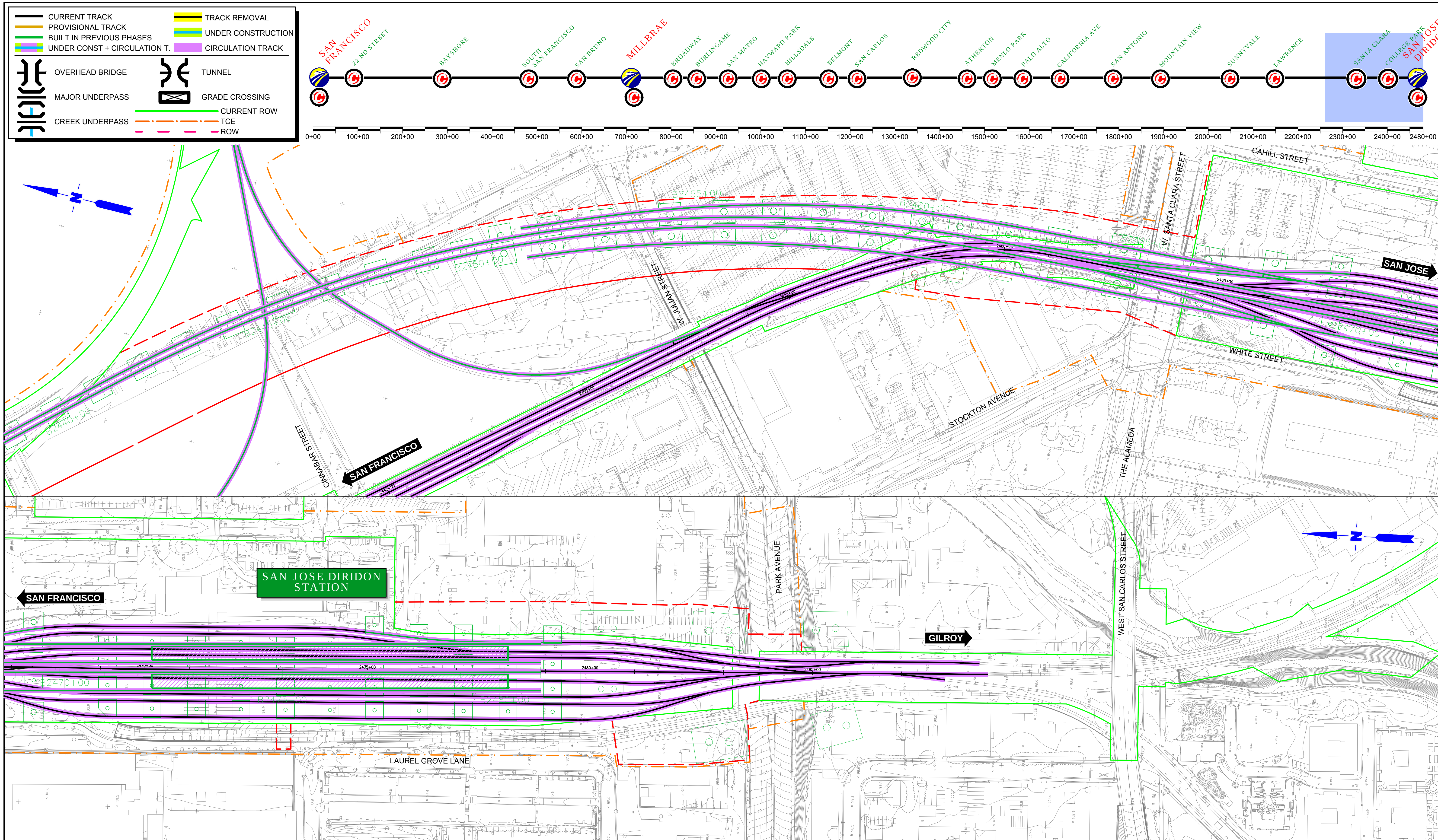
CONSTRUCTION PHASES
PLAN
FINAL PHASE

CONTRACT NO.
DRAWING NO.
SCALE 1"= 200'
SHEET NO. 3 OF 4



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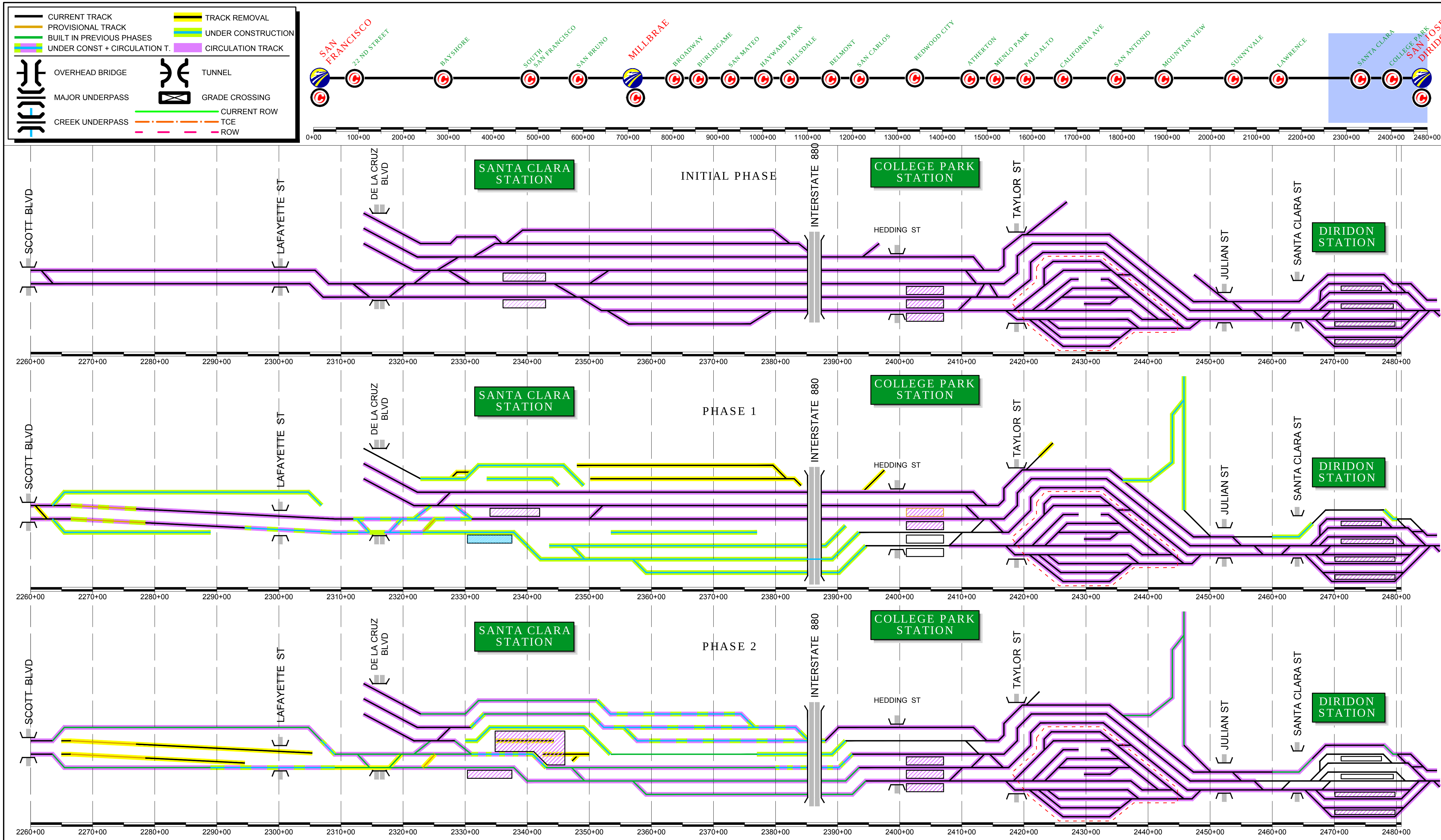
PLAN
FINAL PHASE

CONTRACT NO.
DRAWING NO.
SCALE 1"= 200'
SHEET NO. 4 OF 4



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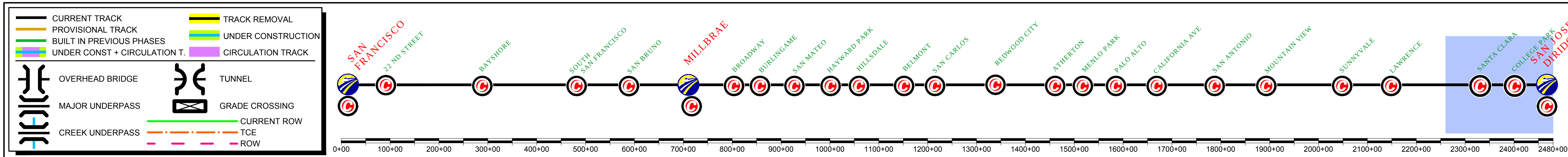
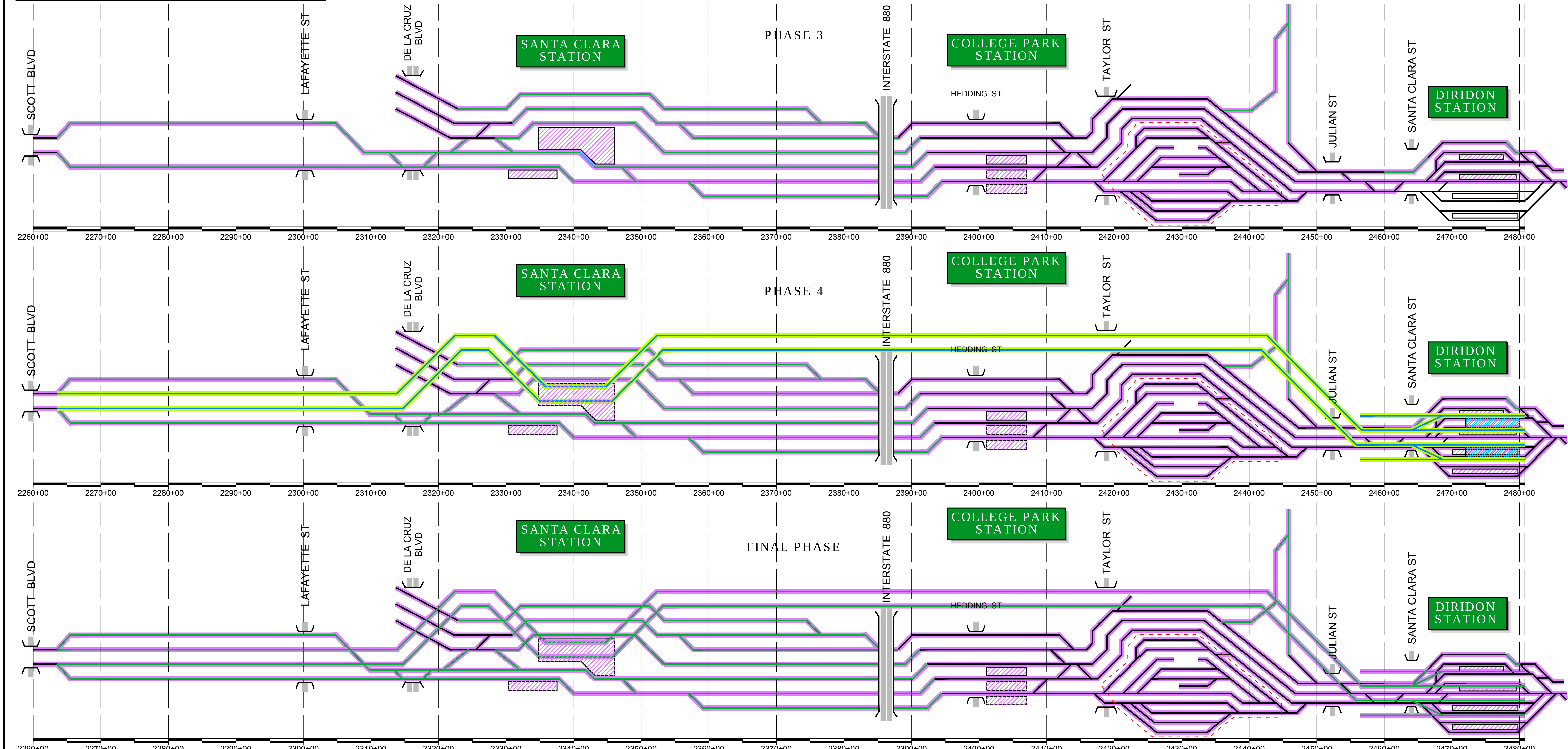
SAN FRANCISCO TO SAN JOSE
SAN JOSE. ALTERNATIVE B
CONSTRUCTION PHASES
SCHEME

CONTRACT NO.
DRAWING NO.
SCALE NOT TO SCALE
SHEET NO. 1 OF 2





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SAN JOSE. ALTERNATIVE B
CONSTRUCTION PHASES
SCHEME

CONTRACT NO.

DRAWING NO.

SCALE NOT TO SCALE

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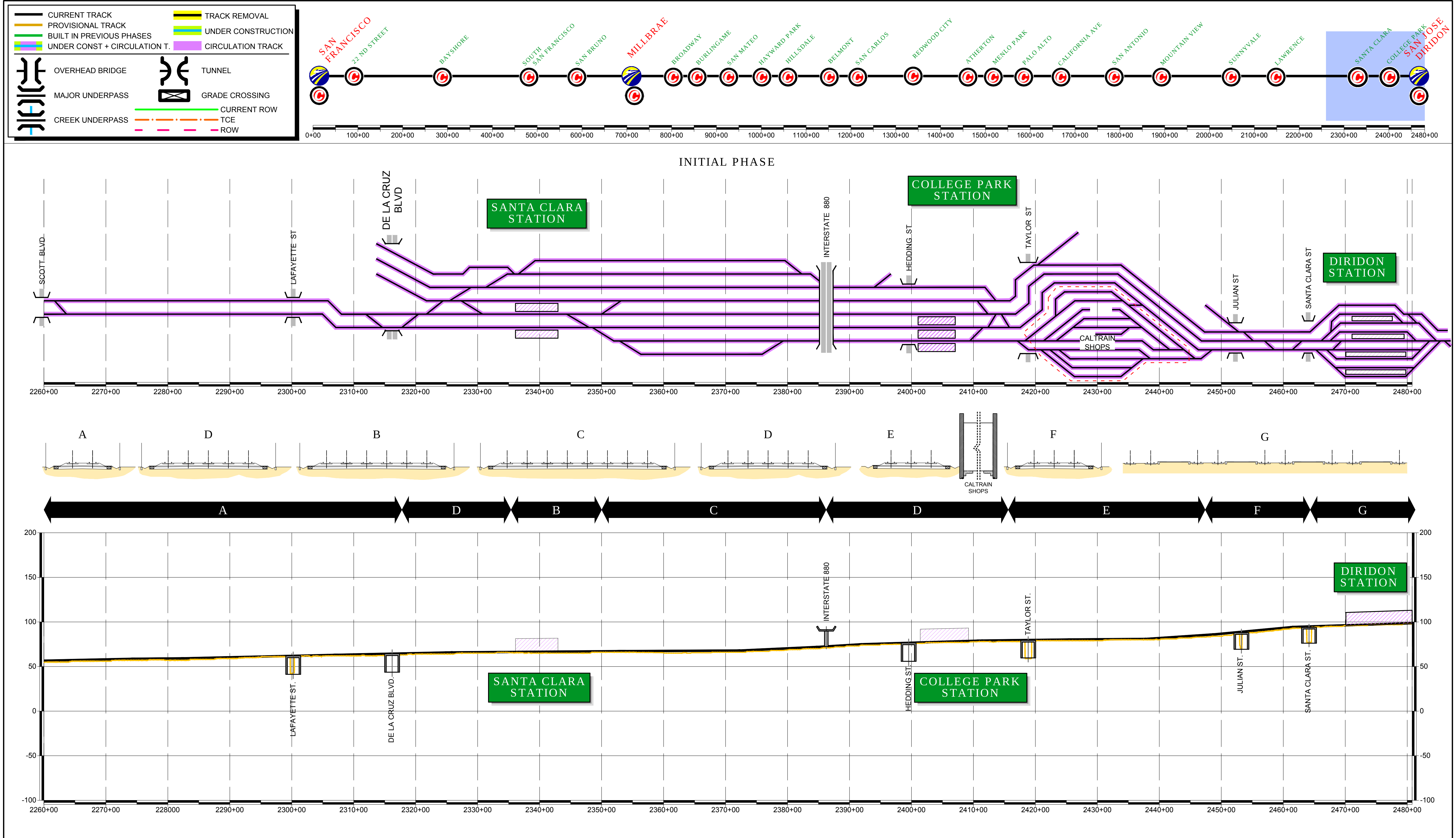

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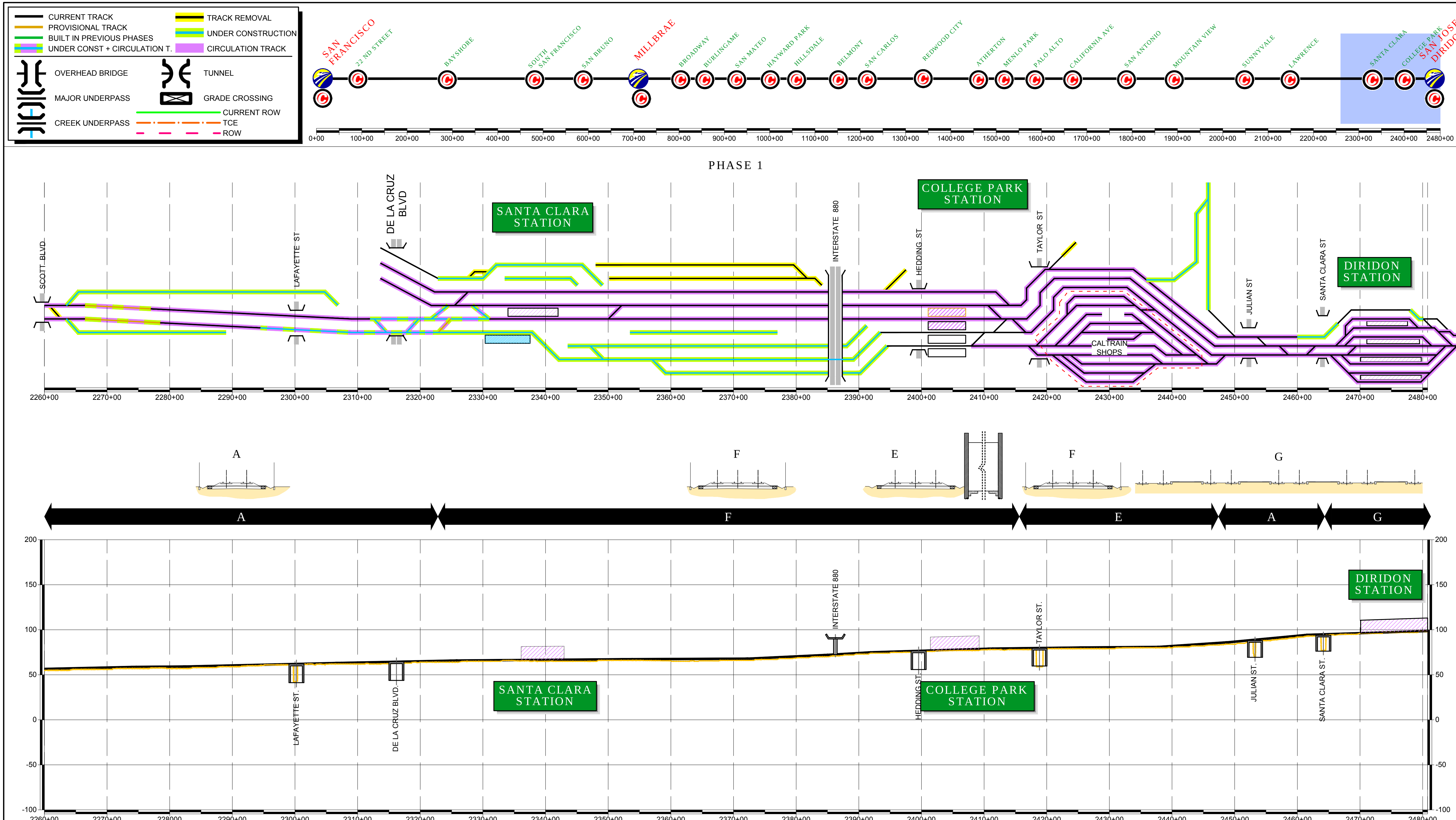
SAN FRANCISCO TO SAN JOSE
SAN JOSE. ALTERNATIVE B
CONSTRUCTION PHASES
PLAN AND PROFILE SCHEME
INITIAL PHASE

CONTRACT NO.
DRAWING NO.
SCALE NOT TO SCALE
SHEET NO. 1 OF 6



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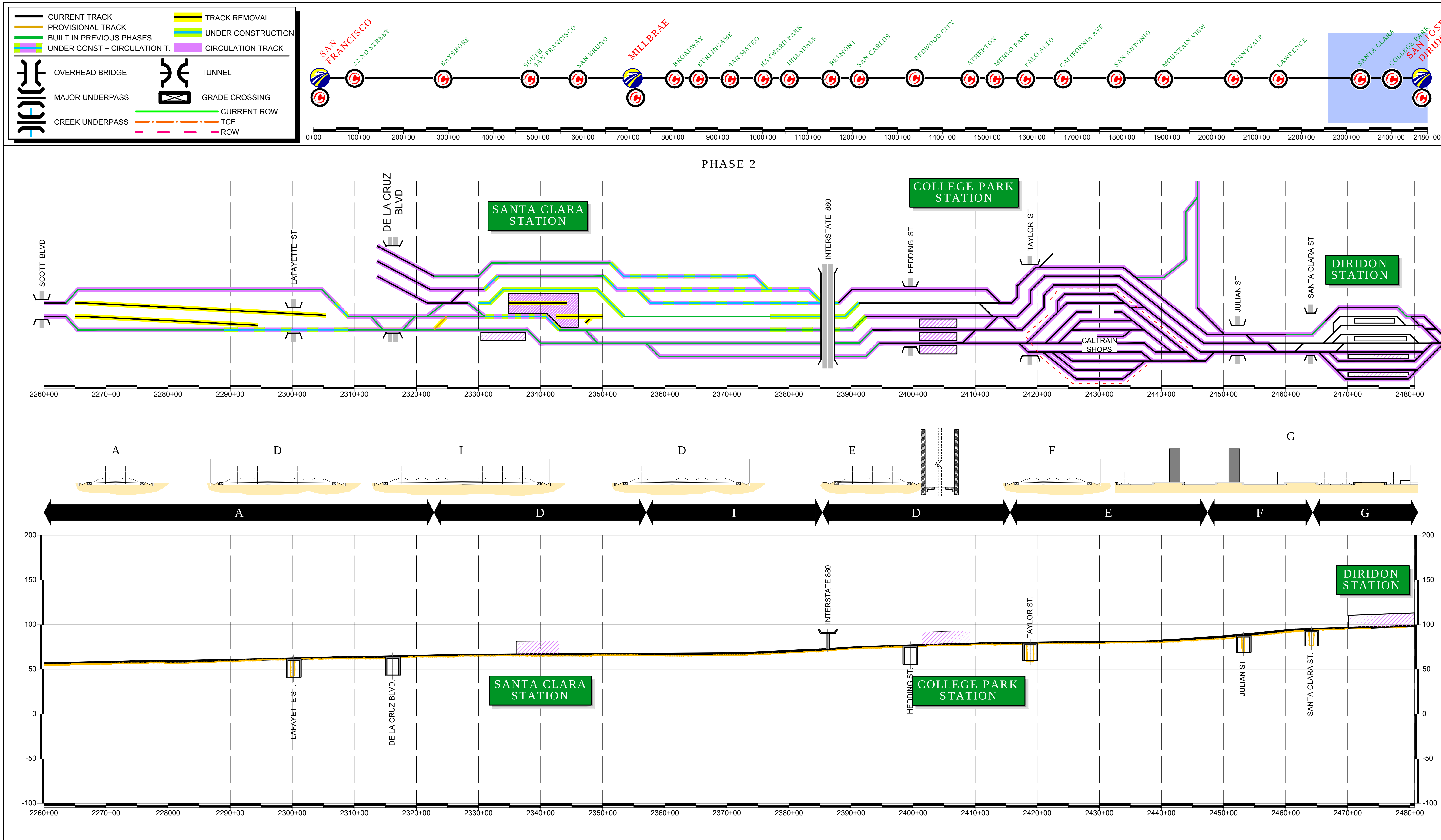
SAN FRANCISCO TO SAN JOSE
SAN JOSE. ALTERNATIVE B
CONSTRUCTION PHASES
PLAN AND PROFILE SCHEME
PHASE 1

CONTRACT NO.

DRAWING NO.

SCALE NOT TO SCALE

SHEET NO. 2 OF 6



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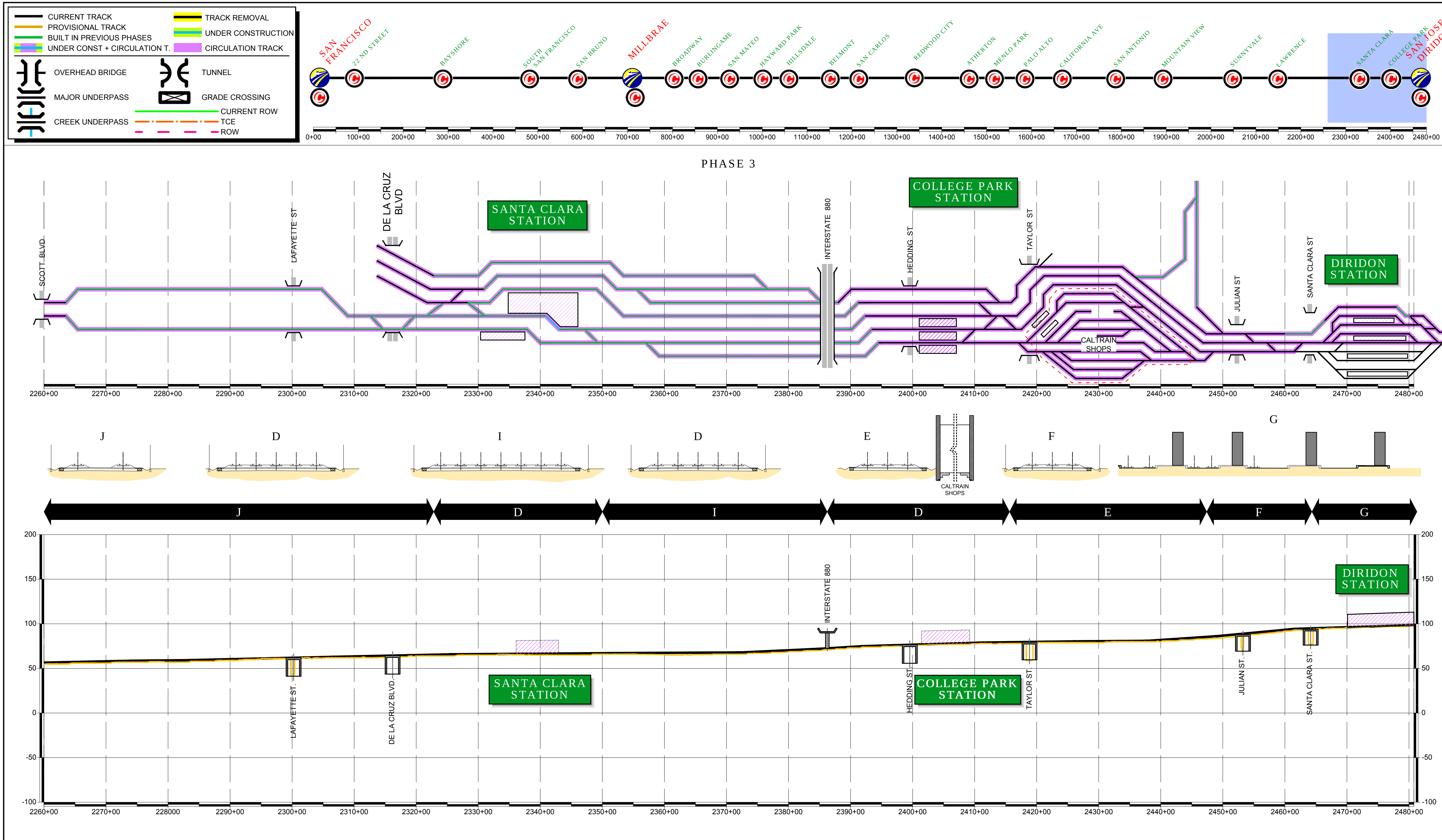
PLAN AND PROFILE SCHEME
PHASE 2

CONTRACT NO.
DRAWING NO.
SCALE NOT TO SCALE
SHEET NO. 3 OF 6



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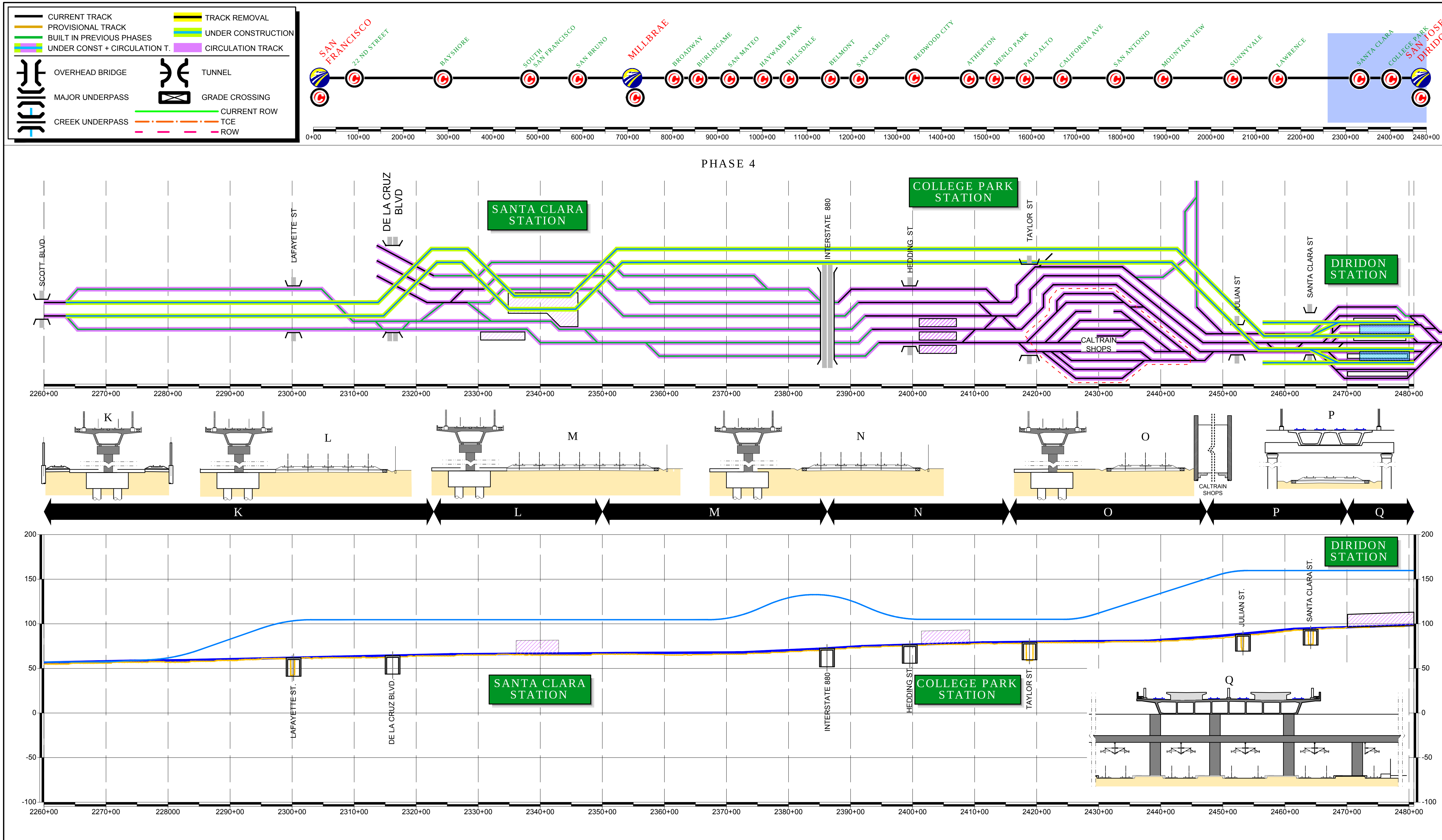
CONSTRUCTION PHASES
PLAN AND PROFILE SCHEME
PHASE 3

CONTRACT NO.
DRAWING NO.
SCALE NOT TO SCALE
SHEET NO. 4 OF 6



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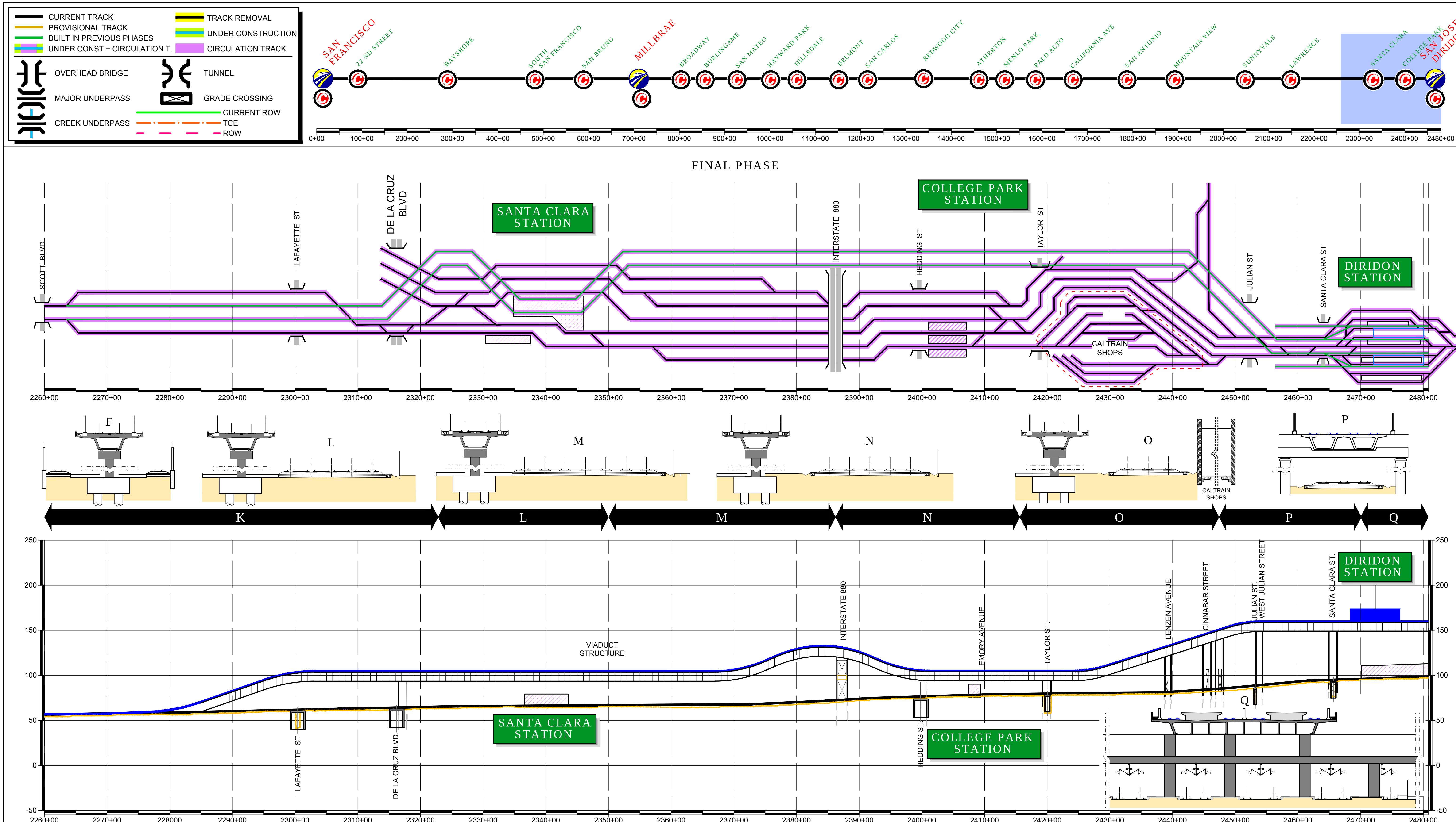
PLAN AND PROFILE SCHEME
PHASE 4

CONTRACT NO.
DRAWING NO.
SCALE NOT TO SCALE
SHEET NO. 5 OF 6



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PLAN AND PROFILE SCHEME
FINAL PHASE

CONTRACT NO.
DRAWING NO.
SCALE NOT TO SCALE
SHEET NO. 6 OF 6