Appendices

Appendix A. References

Appendix B. Coast Subdivision Plans

Appendix C. Freight Project Plans

Appendix D. Conceptual Site Plans

Appendix E. Preliminary Station Ridership Analysis

Appendix F. CCJPA Station Policy

Appendix G. Preliminary Cost Estimate

Appendix H. Funding Sources

Appendix A: References

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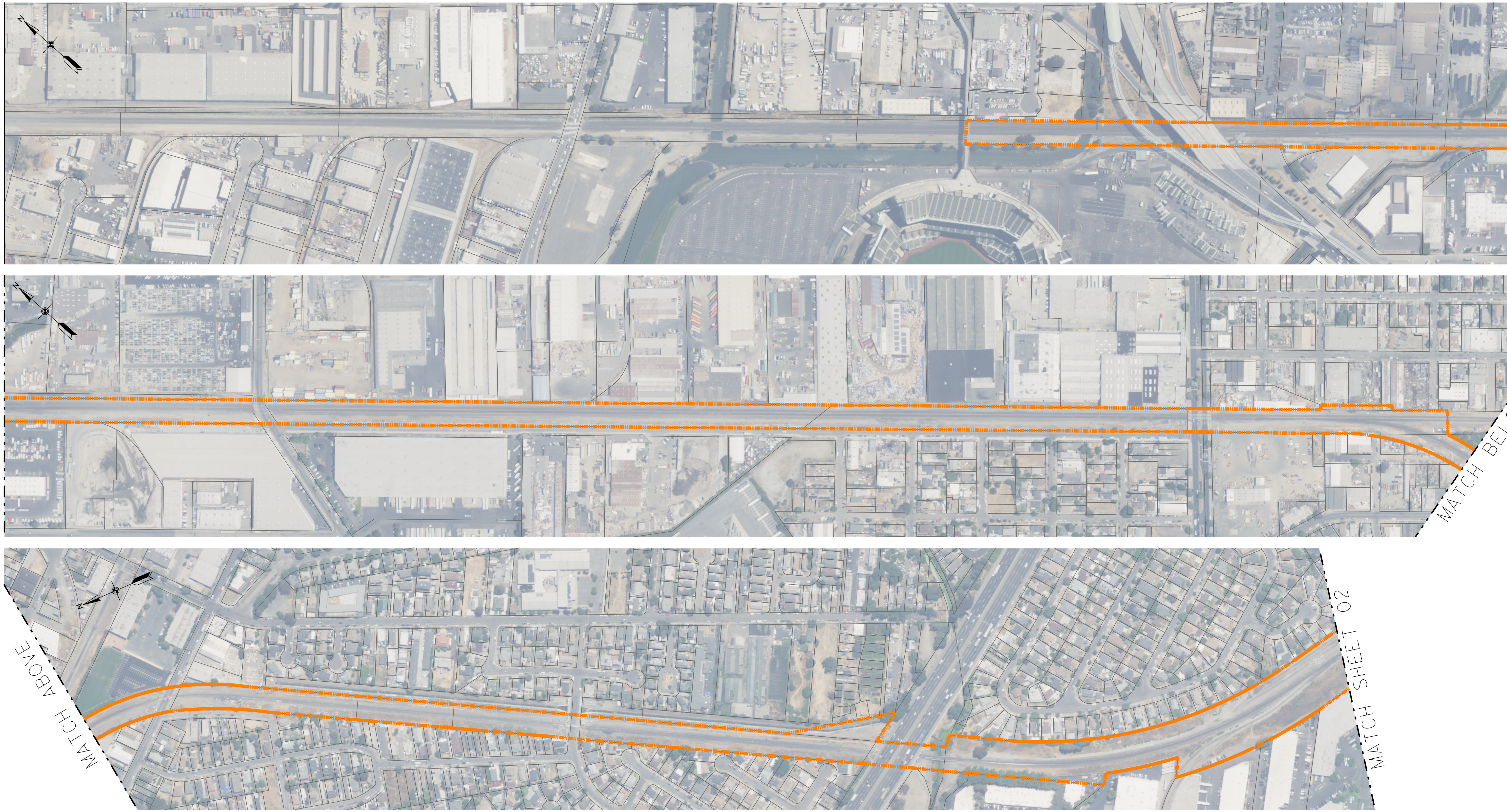
Appendix B: Coast Subdivision Plans



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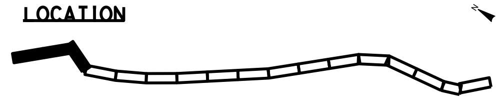
EXISTING UPRR ROW	
PARCEL BOUNDARY (APPROX)	
PARCEL WITH POSSIBLE ROW ACQUISITION (APPROX)	

LOCATION



PLAN VIEW
1"=400'-0"

SOUTH BAY CONNECT

RIGHT OF WAY
SHEET 01 OF 06

NOTE:
UPRR ROW IS APPROXIMATE BASED ON PARCEL MAP INFORMATION. ROW LINES AND IMPACTS WILL NEED TO BE REVIEWED FURTHER DURING DESIGN DEVELOPMENT PHASE.

PRELIMINARY
FOR DISCUSSION ONLY
AUGUST 2019

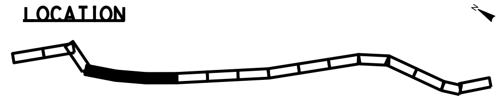
0' 400' 800'

HNTB

LEGEND

EXISTING UPRR ROW	
PARCEL BOUNDARY (APPROX)	
PARCEL WITH POSSIBLE ROW ACQUISITION (APPROX)	

LOCATION



PLAN VIEW
1"=400'-0"

SOUTH BAY CONNECT

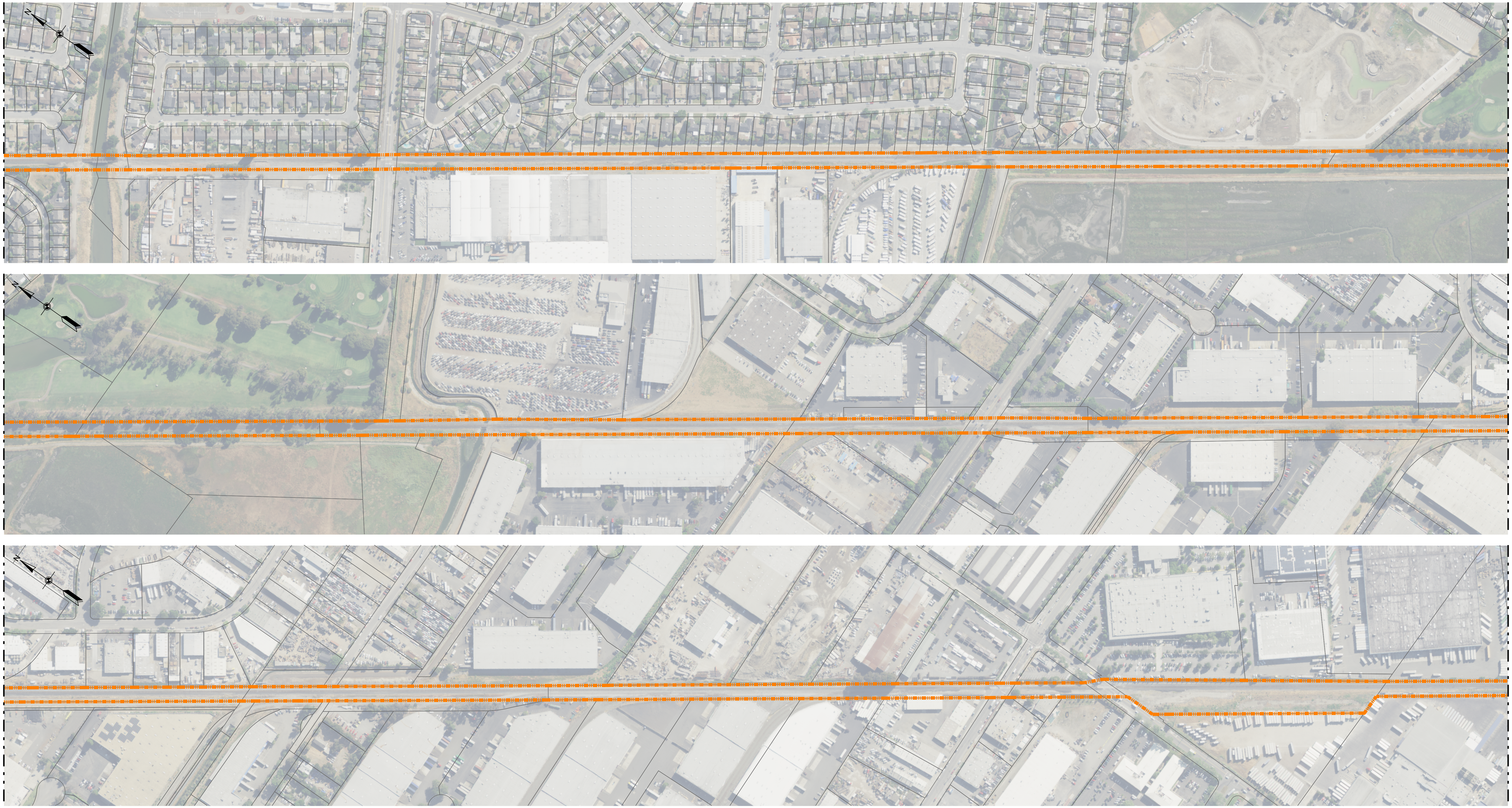
RIGHT OF WAY
SHEET 02 OF 06

0' 400' 800'

NOTE:
UPRR ROW IS APPROXIMATE BASED ON PARCEL MAP INFORMATION. ROW LINES AND IMPACTS WILL NEED TO BE REVIEWED FURTHER DURING DESIGN DEVELOPMENT PHASE.

PRELIMINARY
FOR DISCUSSION ONLY
AUGUST 2019

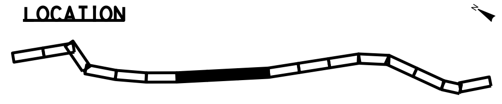
HNTB



LEGEND

- EXISTING UPRR ROW
- PARCEL BOUNDARY (APPROX)
- PARCEL WITH POSSIBLE ROW ACQUISITION (APPROX)

LOCATION



PRELIMINARY
FOR DISCUSSION ONLY
AUGUST 2019

0' 400' 800'

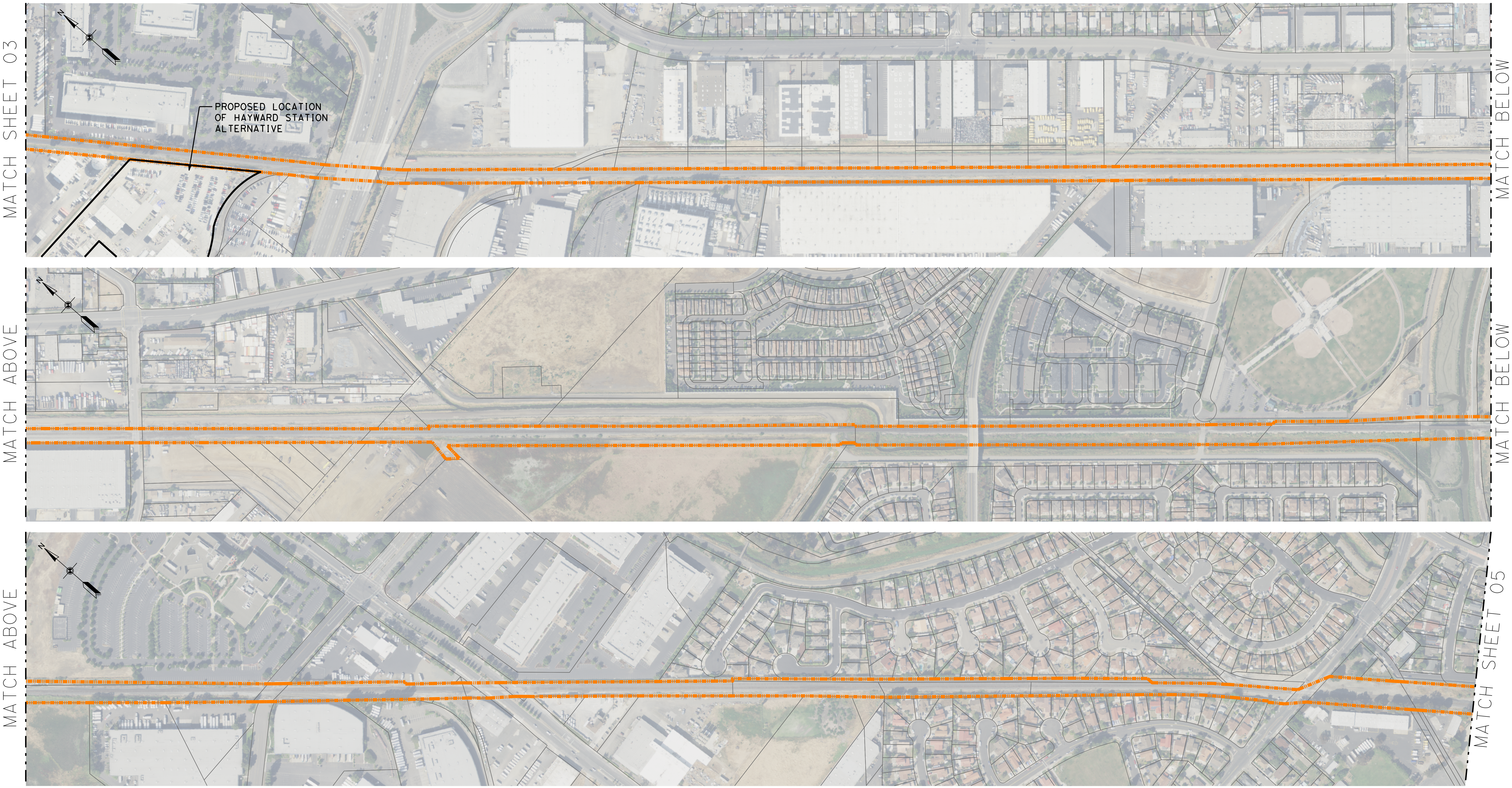
PLAN VIEW
1"=400'-0"

SOUTH BAY CONNECT

RIGHT OF WAY
SHEET 03 OF 06

NOTE:
UPRR ROW IS APPROXIMATE BASED ON PARCEL MAP INFORMATION. ROW LINES AND IMPACTS WILL NEED TO BE REVIEWED FURTHER DURING DESIGN DEVELOPMENT PHASE.

HNTB



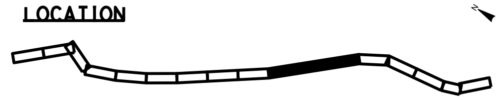
LEGEND

EXISTING UPRR ROW

PARCEL BOUNDARY (APPROX)

PARCEL WITH POSSIBLE ROW ACQUISITION (APPROX)

LOCATION



PLAN VIEW
1"=400'-0"

0'   400'   800'

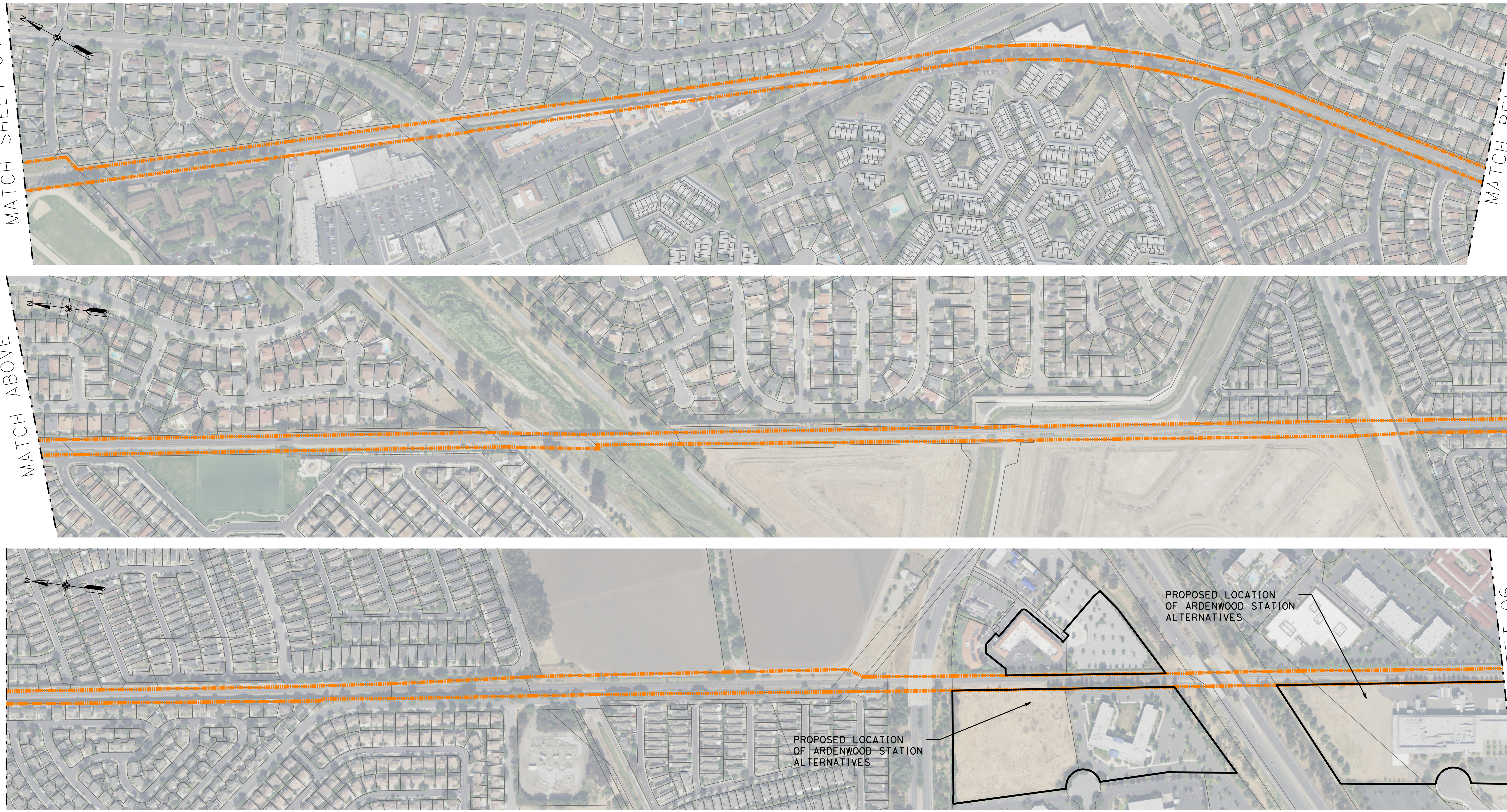
SOUTH BAY CONNECT

RIGHT OF WAY
SHEET 04 OF 06

NOTE:
UPRR ROW IS APPROXIMATE BASED ON PARCEL MAP INFORMATION. ROW LINES AND IMPACTS WILL NEED TO BE REVIEWED FURTHER DURING DESIGN DEVELOPMENT PHASE.

PRELIMINARY
FOR DISCUSSION ONLY
AUGUST 2019

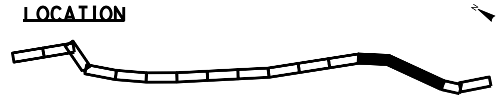
HNTB



LEGEND

- EXISTING UPRR ROW
- PARCEL BOUNDARY (APPROX)
- PARCEL WITH POSSIBLE ROW ACQUISITION (APPROX)

LOCATION



PLAN VIEW
1"=400'-0"

0' 400' 800'

SOUTH BAY CONNECT

RIGHT OF WAY
SHEET 05 OF 06

NOTE:
UPRR ROW IS APPROXIMATE BASED ON PARCEL MAP INFORMATION. ROW LINES AND IMPACTS WILL NEED TO BE REVIEWED FURTHER DURING DESIGN DEVELOPMENT PHASE.

PRELIMINARY
FOR DISCUSSION ONLY
AUGUST 2019

HNTB

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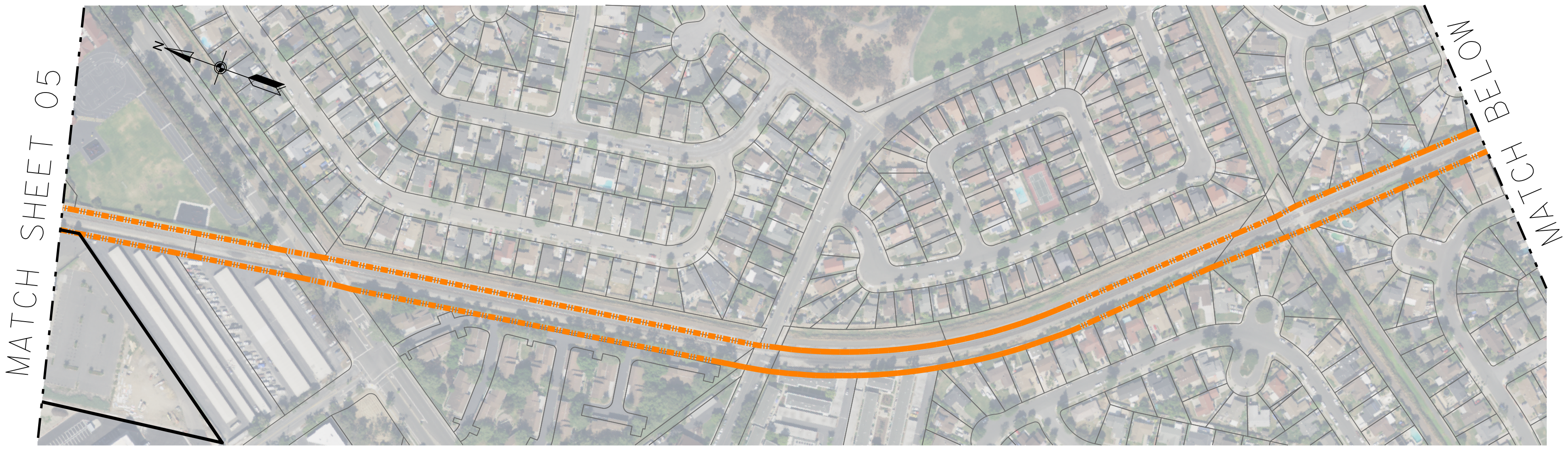
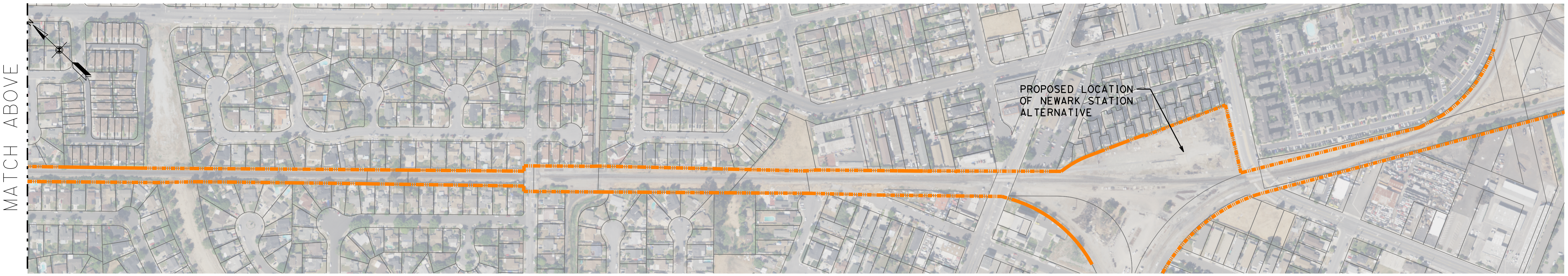
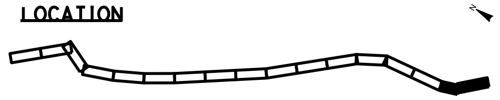




LEGEND

EXISTING UPRR ROW	
PARCEL BOUNDARY (APPROX)	
PARCEL WITH POSSIBLE ROW ACQUISITION (APPROX)	

LOCATION



PLAN VIEW
1"=400'-0"

SOUTH BAY CONNECT

RIGHT OF WAY
SHEET 06 OF 06

NOTE:
UPRR ROW IS APPROXIMATE BASED ON PARCEL MAP INFORMATION. ROW LINES AND IMPACTS WILL NEED TO BE REVIEWED FURTHER DURING DESIGN DEVELOPMENT PHASE.

PRELIMINARY
FOR DISCUSSION ONLY
AUGUST 2019

0' 400' 800'

HNTB

Appendix C: Freight Project Plans

– CONCEPTUAL –
FOR REVIEW/DISCUSSION

HDR	ALAMEDA County Transportation Commission	DRAWN BY: EL	ACTC FREIGHT RAIL STRATEGIC STUDY
		CHECKED BY: WGS	LOCATION: Alameda County, California Niles Sub.
		DATE: 5/11/17	
		SHEET NUMBER 001	DWG TITLE: NILES/OAKLAND SUBDIVISION CONNECTION Track Plans - Niles Junction

PLOT DATE: May 16, 2017 – 4:35pm FILE: C:\pwworking\west01\d0274655\North of Niles Jct Rail Plot-1.dwg

north of niles jct rail plot-1.dwg

PLOT DATE: May 15, 2017 - 4:00pm FILE: C:\pwworking\west01\d0274655\North of Niles Jct Rail Plot-2.dwg

– CONCEPTUAL –

FOR REVIEW/DISCUSSION

HDR

ALAMEDA County Transportation Commission

DRAWN BY: EL	**ACTC FREIGHT RAIL STRATEGIC STUDY**
CHECKED BY: WGS	LOCATION: Alameda County, California Niles Sub.
DATE: 5/11/17	
SHEET NUMBER 002	DWG TITLE: NILES/OAKLAND SUBDIVISION CONNECTION Track Plans - Niles Junction

north of niles jct rail plot-2.dwg

– CONCEPTUAL –

FOR REVIEW/DISCUSSION

HDR

ALAMEDA County Transportation Commission

DRAWN BY: EL	ACTC FREIGHT RAIL STRATEGIC STUDY		
CHECKED BY: WGS	LOCATION:	Alameda County, California Niles Sub.	
DATE: 5/11/17	DWG TITLE:	NILES/OAKLAND SUBDIVISION CONNECTION Track Plans - Niles Junction	
SHEET NUMBER 003			

PLOT DATE: Jun 30, 2017 – 3:03pm

– CONCEPTUAL –
FOR REVIEW/DISCUSSION

DRAWN BY: EL	ACTC FREIGHT RAIL STRATEGIC STUDY
CHECKED BY: WGS	LOCATION: Alameda County, California Niles Sub.
DATE: 5/11/17	
SHEET NUMBER 004	DWG TITLE: NILES/OAKLAND SUBDIVISION CONNECTION Track Plans - Niles Junction

PLOT DATE: Jun 13, 2017 – 9:53am FILE: C:\pwworking\west01\d0274655\North of Niles Jct Rail Plot-4.dwg

HDR	ALAMEDA County Transportation Commission	DRAWN BY: EL	ACTC FREIGHT RAIL STRATEGIC STUDY
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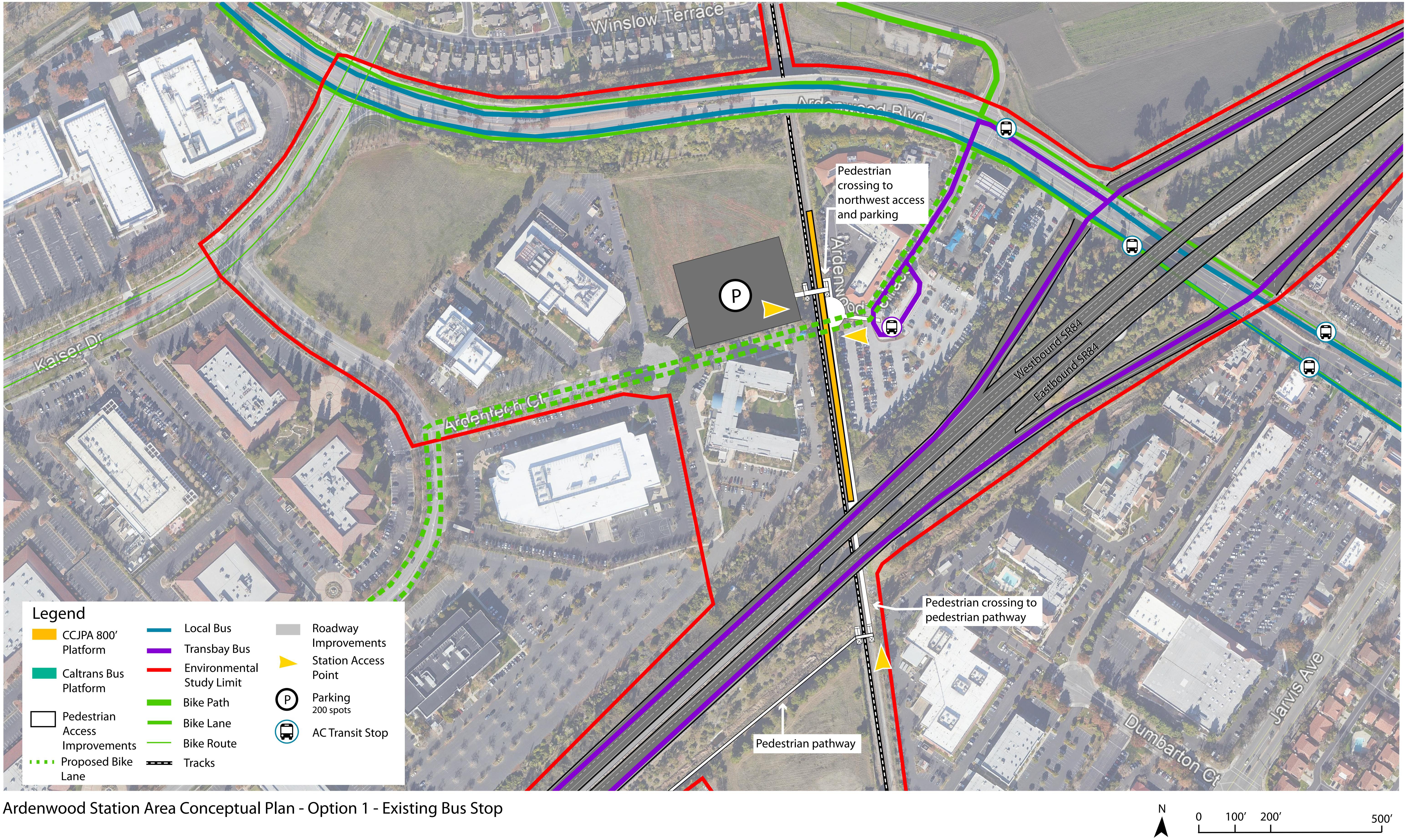
		DATE: 5/11/17	DWG TITLE: NILES/OAKLAND SUBDIVISION CONNECTION Track Plans - Niles Junction O tion C
		SHEET NUMBER 007	

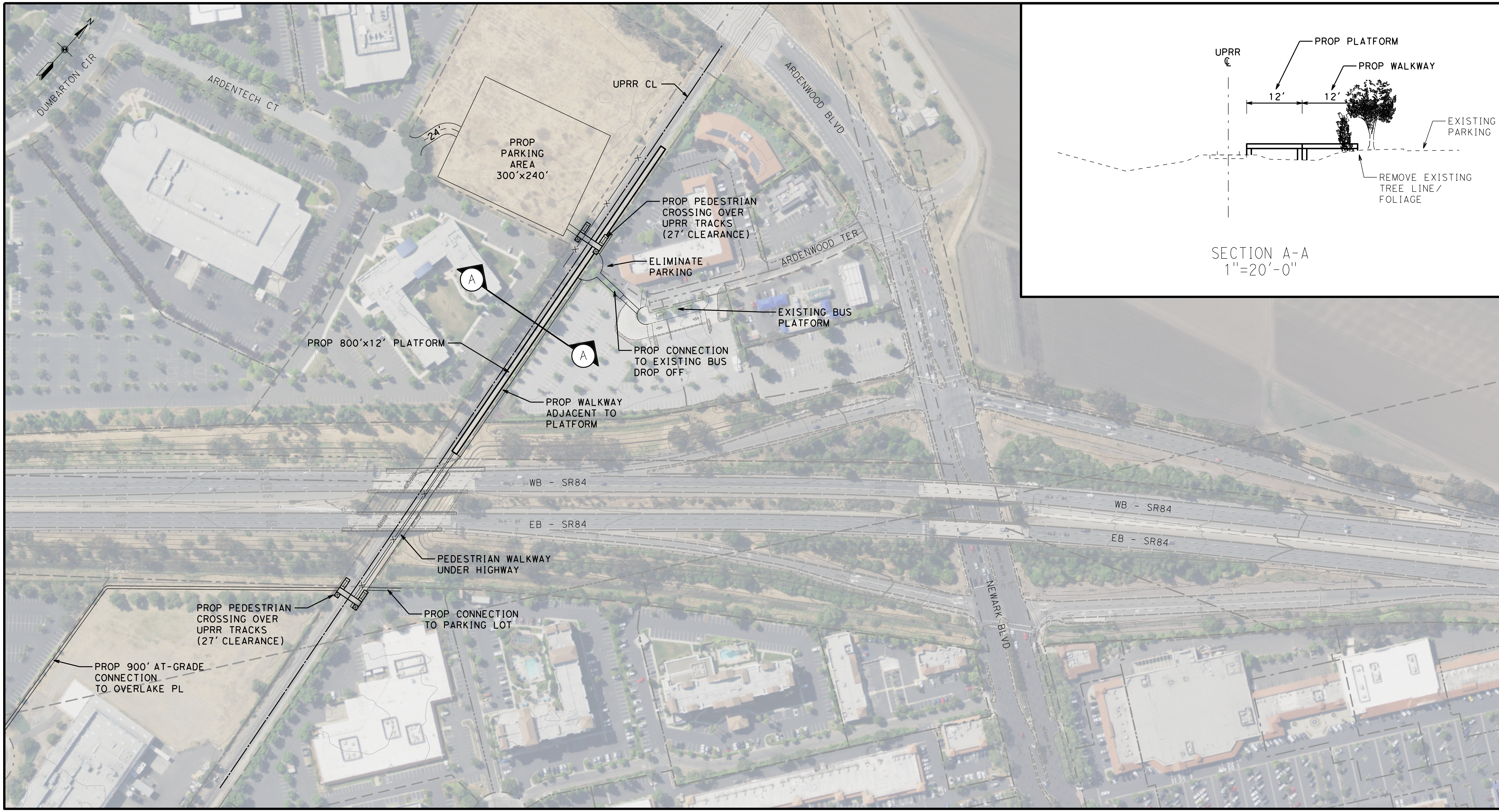
PLOT DATE: Jul 21, 2017 - 12:03pm FILE: C:\pwworking\west01\d0274650\Option C Rail Plot.dwg

Appendix D: Conceptual Site Plans

Ardenwood Station Area Conceptual Plan-Option 1- Existing Bus Stop



Ardenwood Station Area Conceptual Plan - Option 1 - Existing Bus Stop



PLAN VIEW
1"=200'-0"

0' 200' 400'

LEGEND

UPRR CENTERLINE	— — —
FENCE	—x—

SOUTH BAY CONNECT

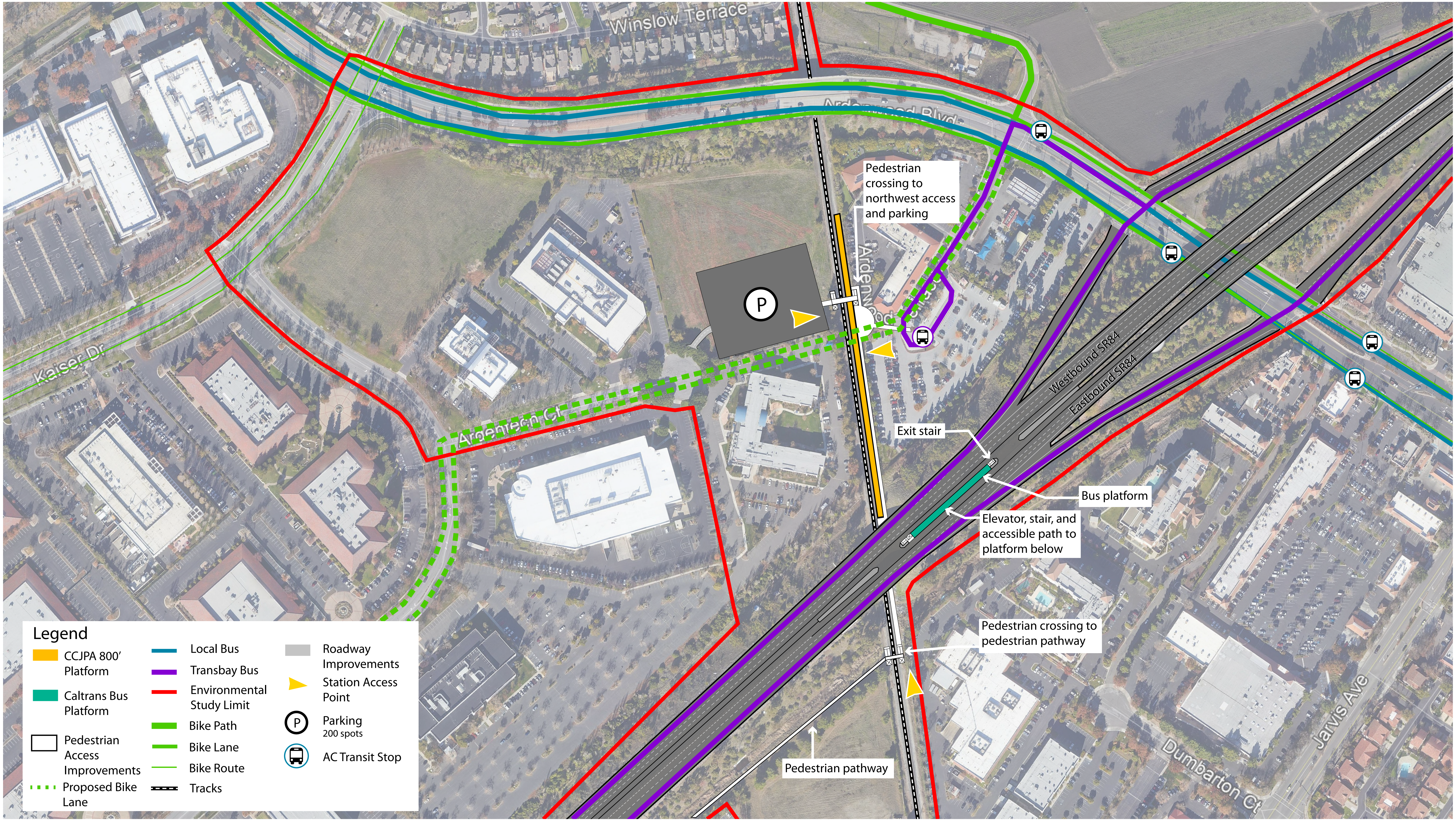
ARDENWOOD STATION
OPTION 1 - EXISTING BUS STOP

PRELIMINARY
FOR DISCUSSION ONLY
NOVEMBER 2019

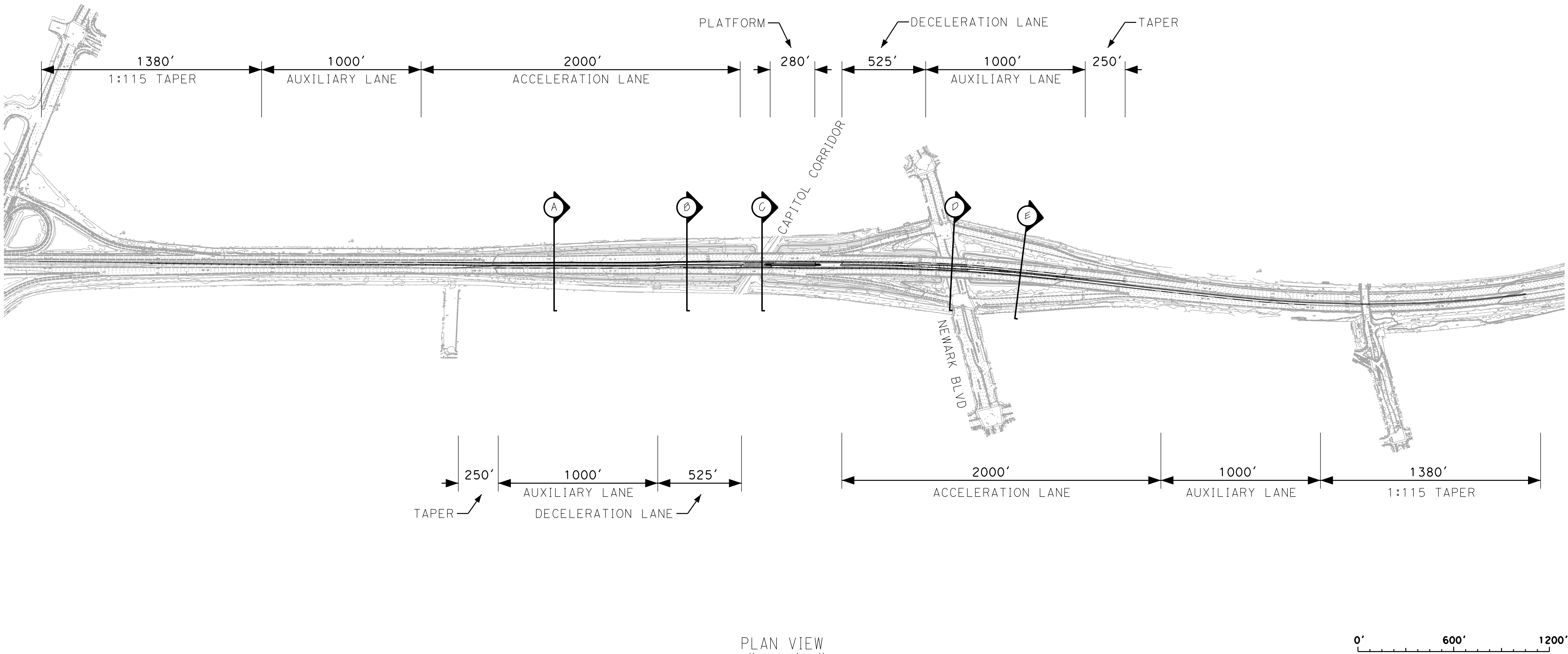
HNTB

Ardenwood_Opt1_ExBusSTop.dgn/Exhibit 200sc 11x17

Ardenwood Station Area Conceptual Plan- Option 2 – Highway Median Bus Stop



Ardenwood Station Area Conceptual Plan - Option 2 - Highway Median Bus Stop



PLAN VIEW
1"=600'-0"

SOUTH BAY CONNECT

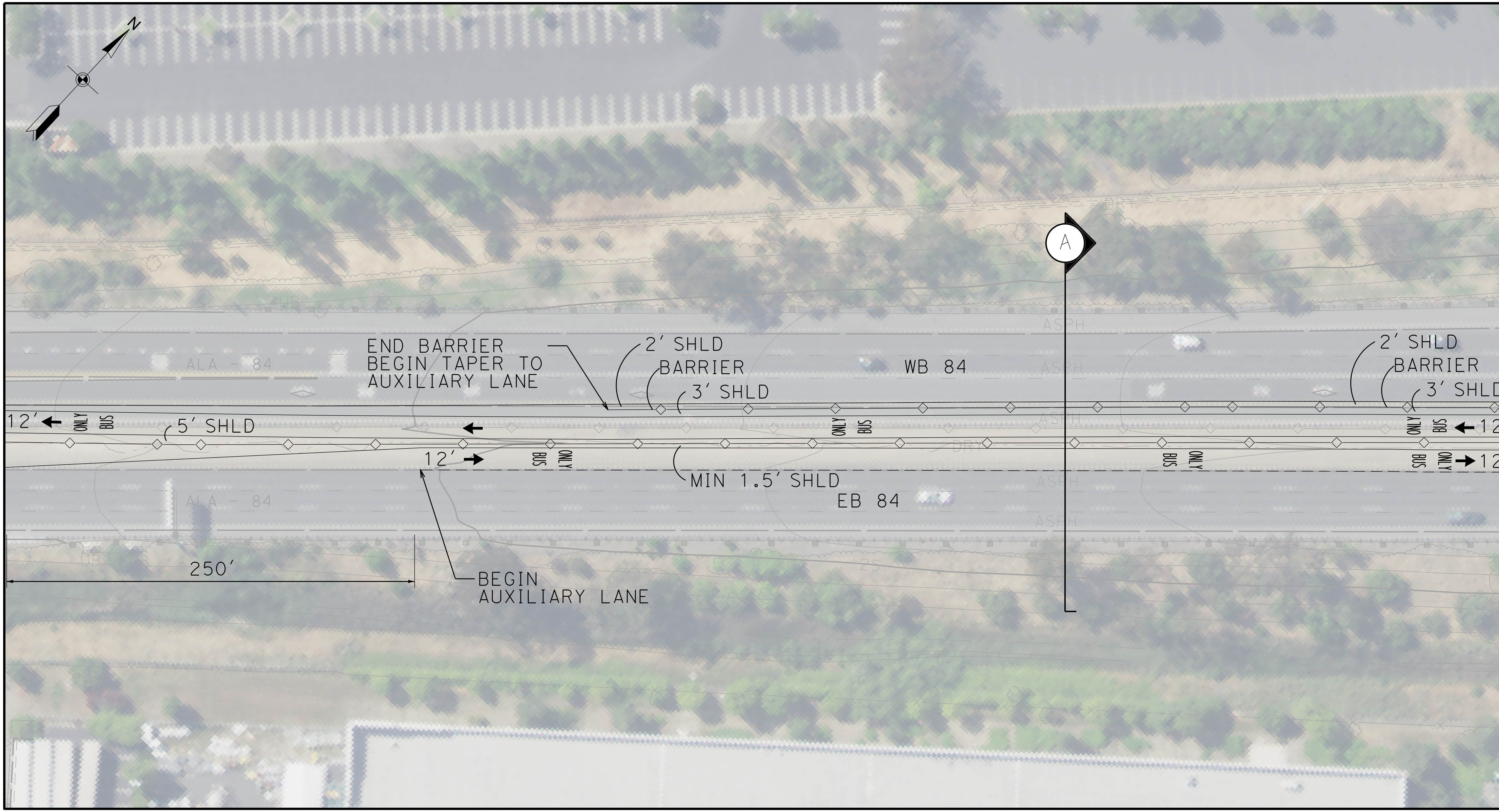
ARDENWOOD STATION

OPT 2 - HIGHWAY MEDIAN BUS STOP - OVERVIEW

PRELIMINARY
FOR DISCUSSION ONLY
NOVEMBER 2019

HNTB

Ardenwood_Opt2-3_Overview.dgn 600sc 11x17



PLAN VIEW
1"=50'-0"

0' 50' 100'

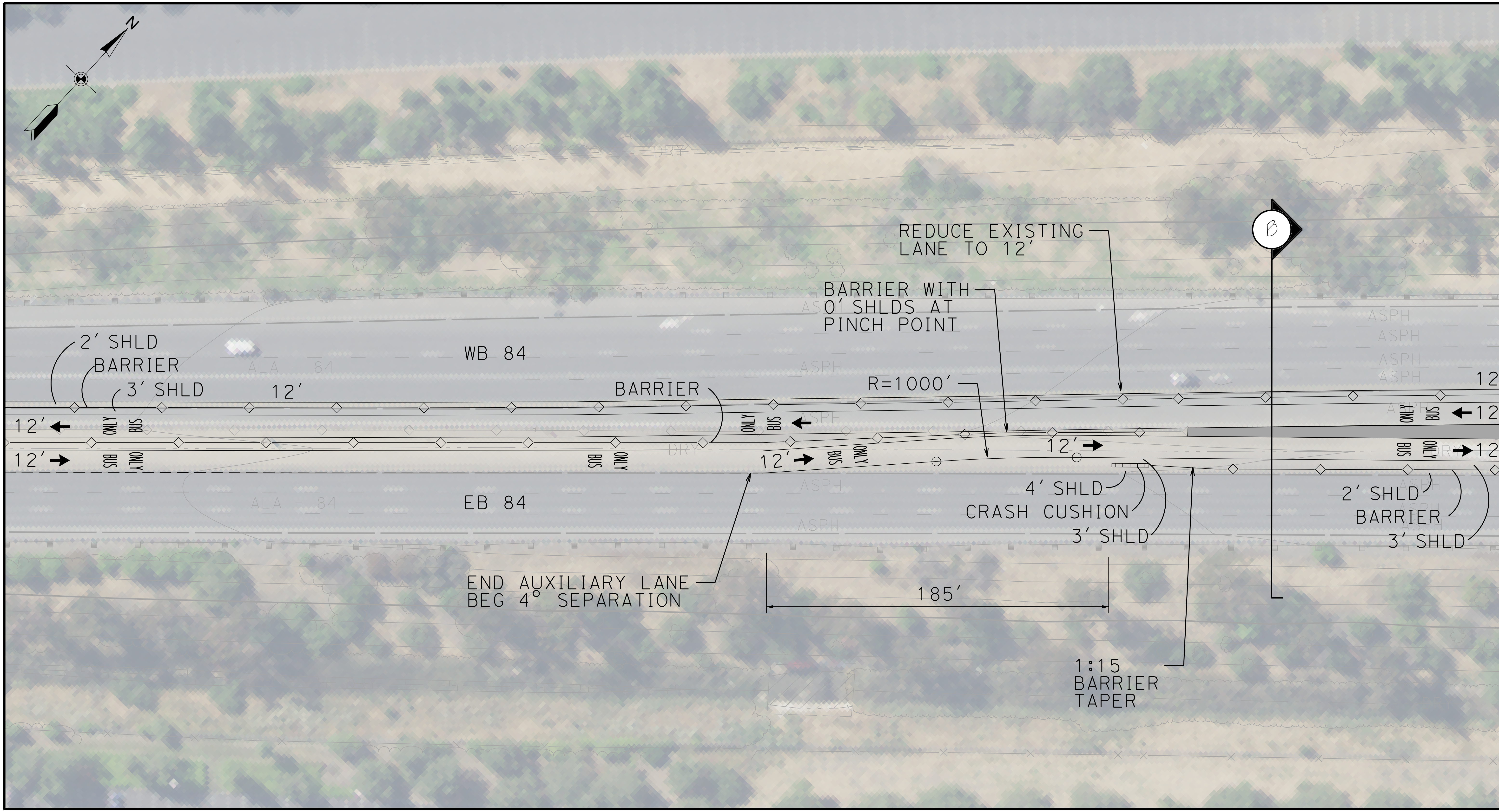
SOUTH BAY CONNECT

ARDENWOOD STATION

OPT 2 - HIGHWAY MEDIAN BUS STOP - DETAIL 1 OF 5

PRELIMINARY
FOR DISCUSSION ONLY
NOVEMBER 2019

HNTB



PLAN VIEW
1"=50'-0"

SOUTH BAY CONNECT

ARDENWOOD STATION

OPT 2 - HIGHWAY MEDIAN BUS STOP - DETAIL 2 OF 5

PRELIMINARY
FOR DISCUSSION ONLY
NOVEMBER 2019

HNTB

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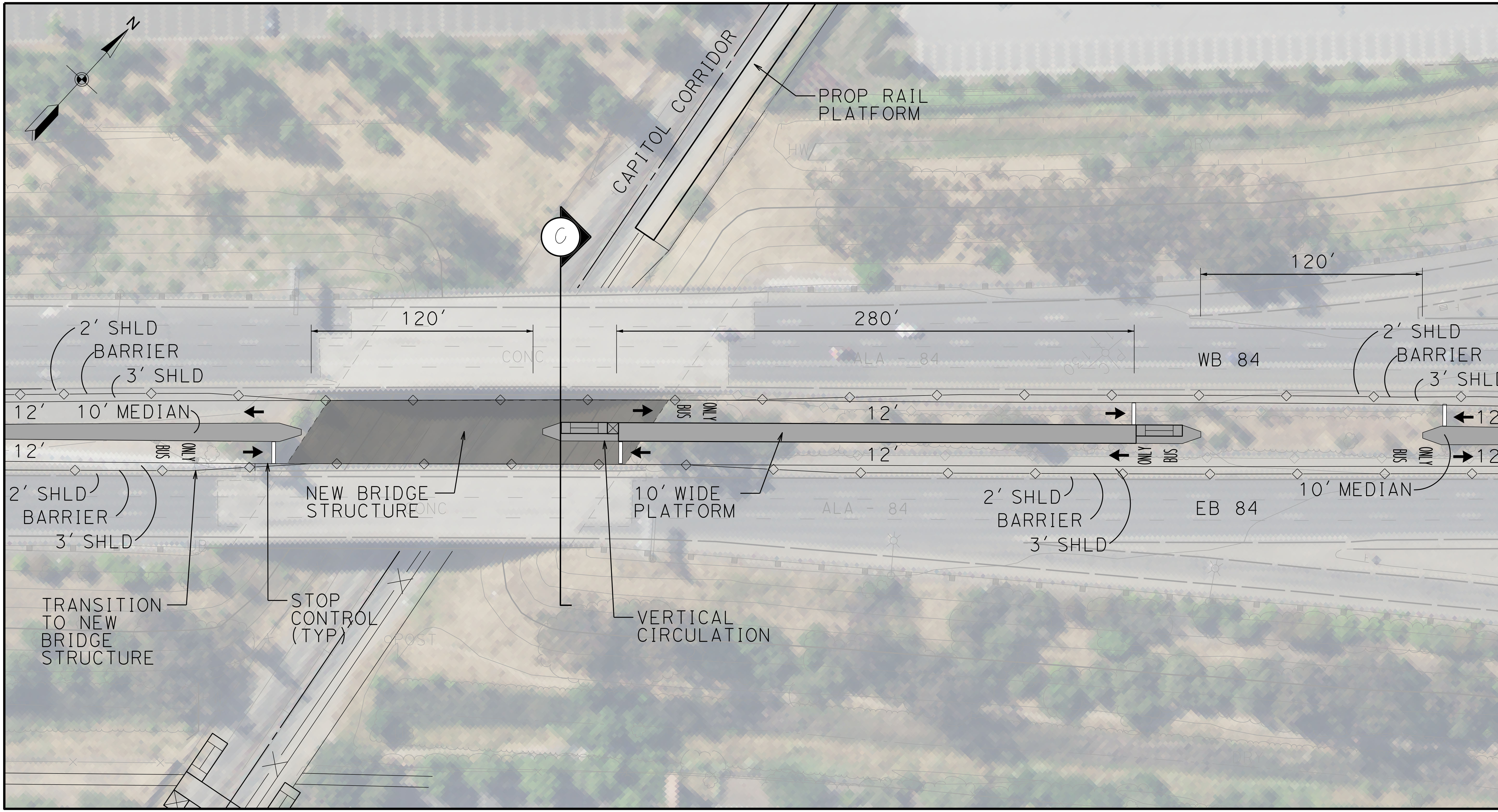


PLAN VIEW
1"=50'-0"

0' 50' 100'

SOUTH BAY CONNECT

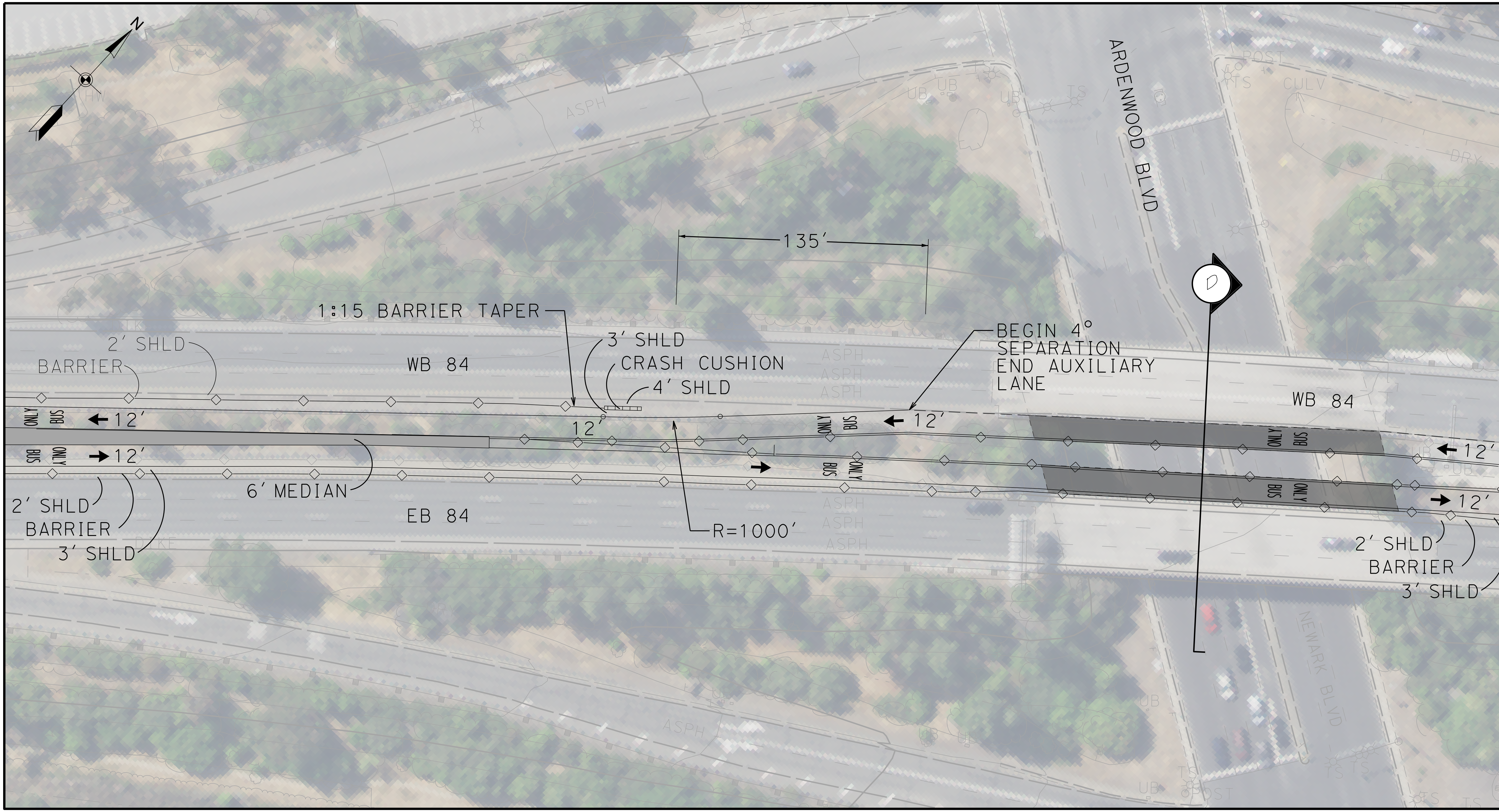
ARDENWOOD STATION

OPT 2 - HIGHWAY MEDIAN BUS STOP - DETAIL 3 OF 5

PRELIMINARY
FOR DISCUSSION ONLY
NOVEMBER 2019

HNTB

Ardenwood_Opt2-3_Details.dgn/Exhibit 50sc 11x17



PLAN VIEW
1"=50'-0"

0' 50' 100'

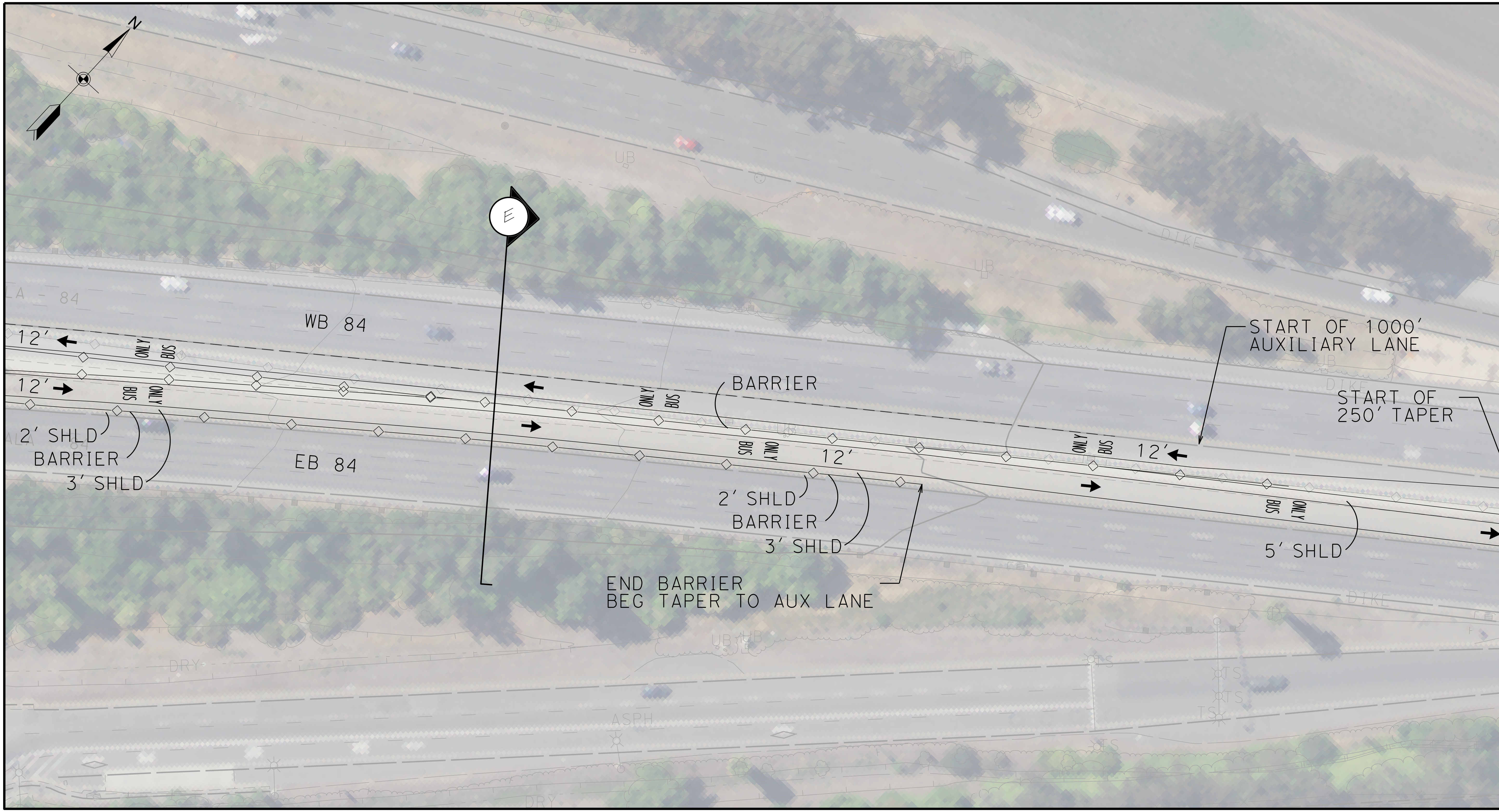
SOUTH BAY CONNECT

ARDENWOOD STATION

OPT 2 - HIGHWAY MEDIAN BUS STOP - DETAIL 4 OF 5

PRELIMINARY
FOR DISCUSSION ONLY
NOVEMBER 2019

HNTB



PLAN VIEW
1"=50'-0"

0' 50' 100'

SOUTH BAY CONNECT

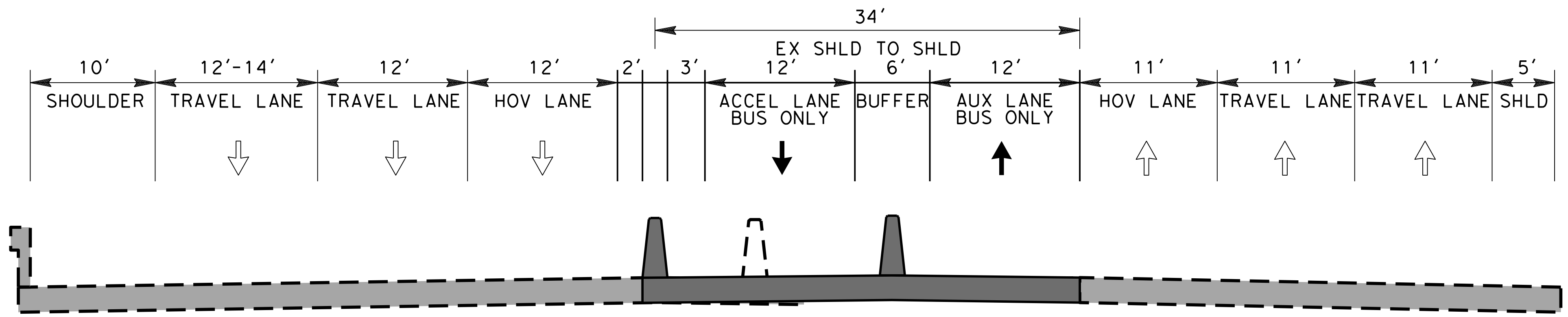
ARDENWOOD STATION

OPT 2 - HIGHWAY MEDIAN BUS STOP - DETAIL 5 OF 5

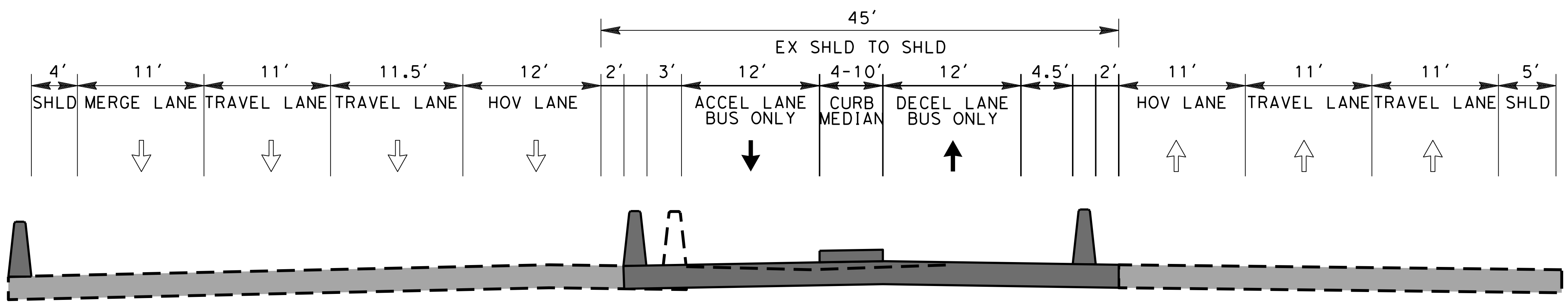
PRELIMINARY
FOR DISCUSSION ONLY
NOVEMBER 2019

HNTB

Ardenwood_Opt2-3_Details.dgn/Exhibit 50sc 11x17



SECTION A-A



SECTION B-B

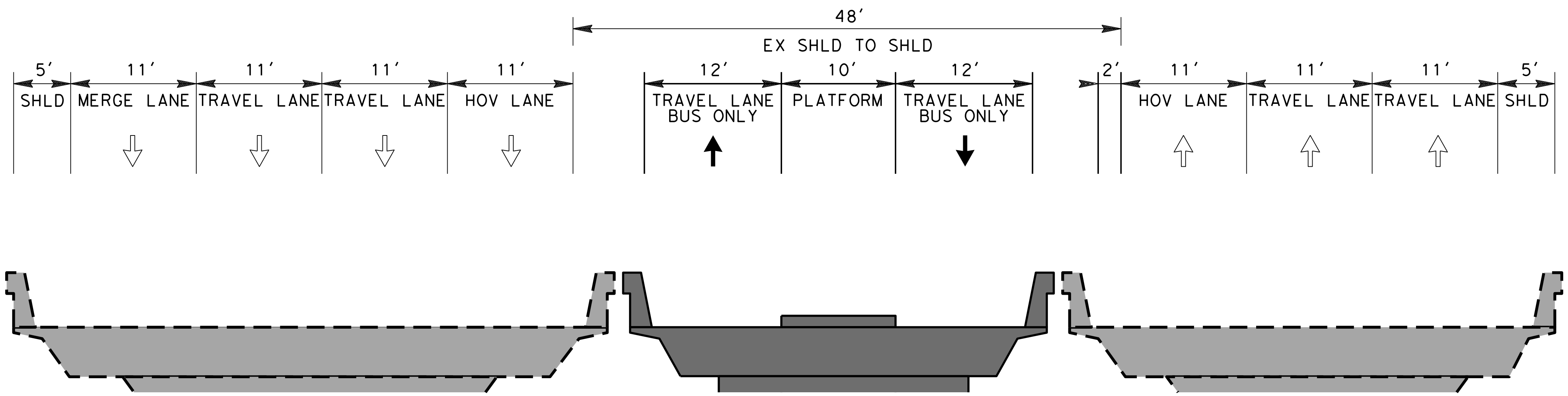
SOUTH BAY CONNECT

ARDENWOOD STATION

OPT 2 - HIGHWAY MEDIAN BUS STOP - HIGHWAY SECTIONS

PRELIMINARY
FOR DISCUSSION ONLY
OCTOBER 2019

HNTB



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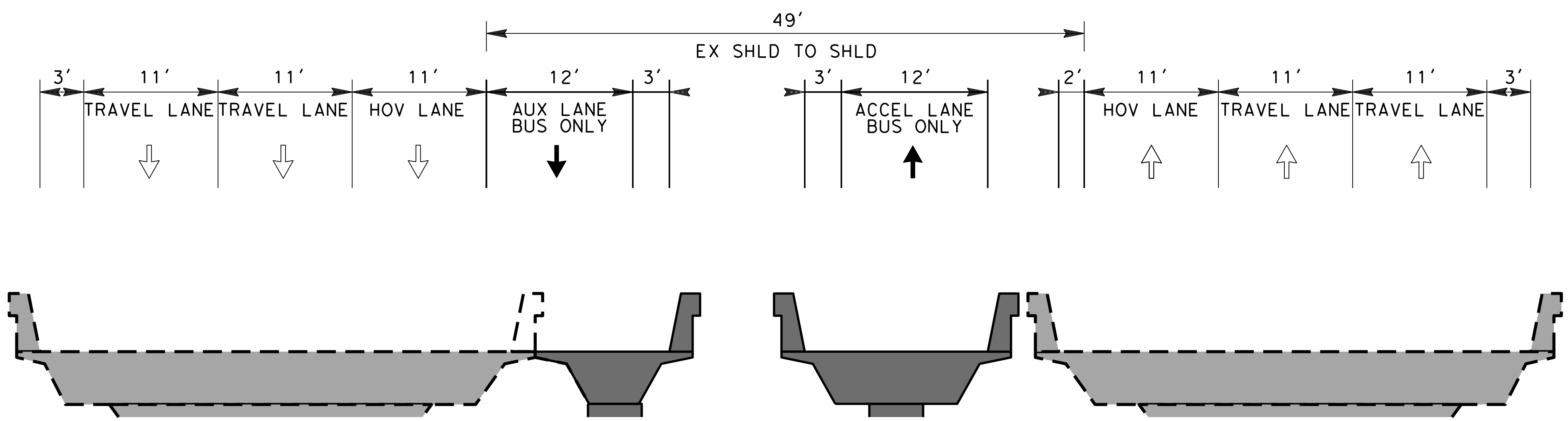

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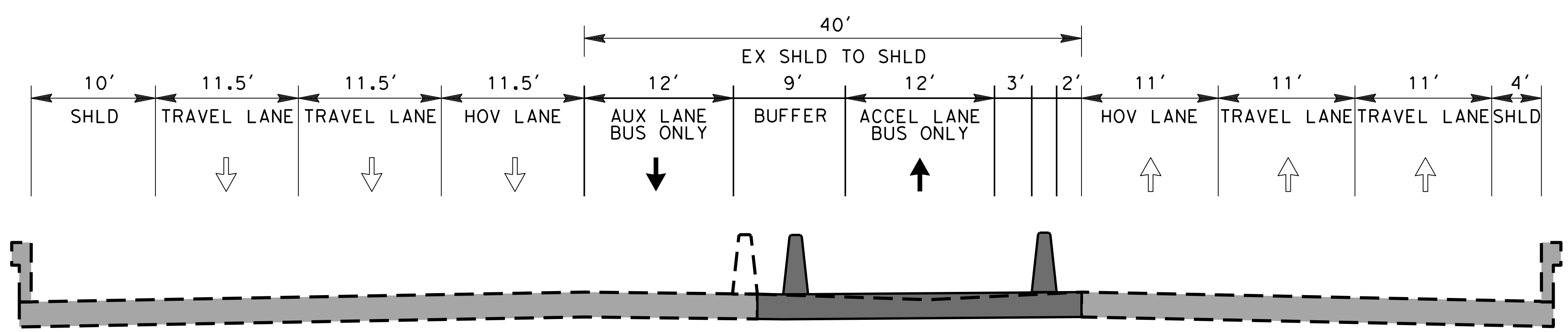

SECTION E-E

SOUTH BAY CONNECT

ARDENWOOD STATION

OPT 2 - HIGHWAY MEDIAN BUS STOP - HIGHWAY SECTIONS

PRELIMINARY
FOR DISCUSSION ONLY
OCTOBER 2019

HNTB

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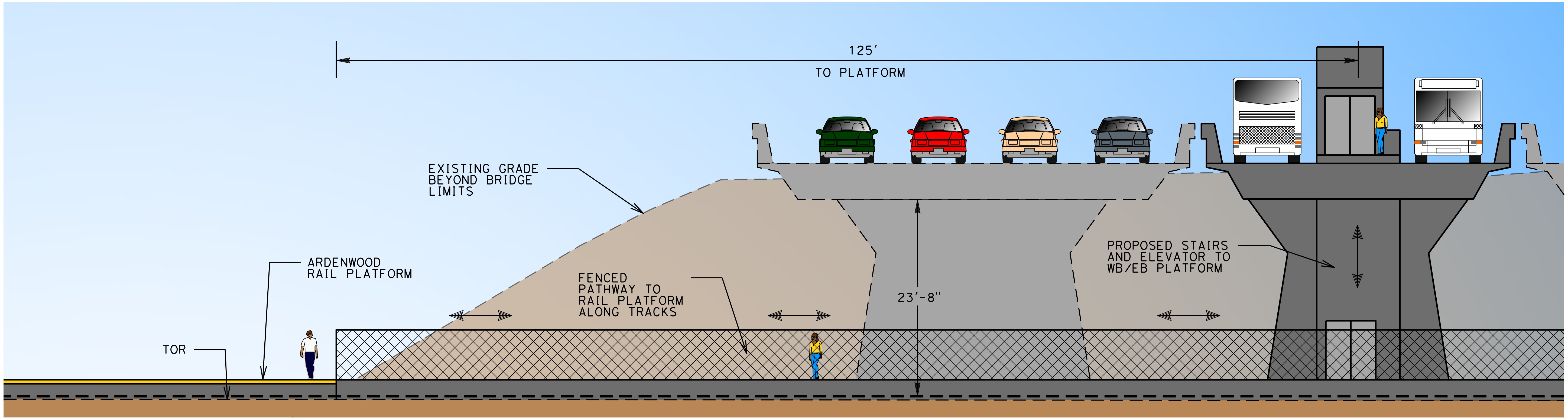
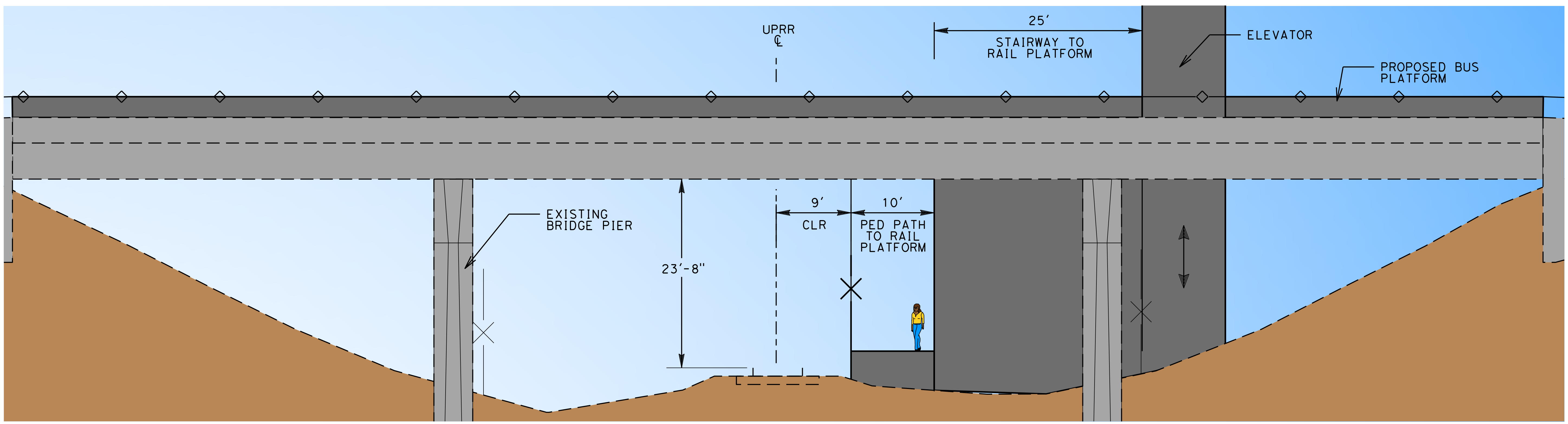


SECTION 1 - HIGHWAY



SECTION 2 - BRIDGE

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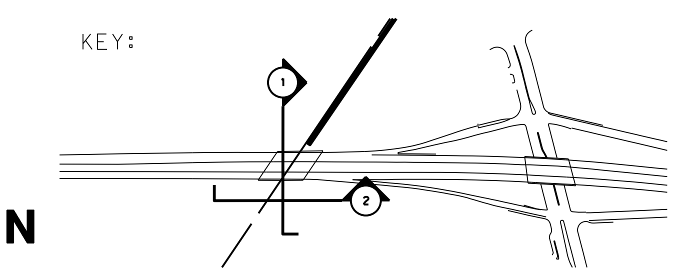


SOUTH BAY CONNECT

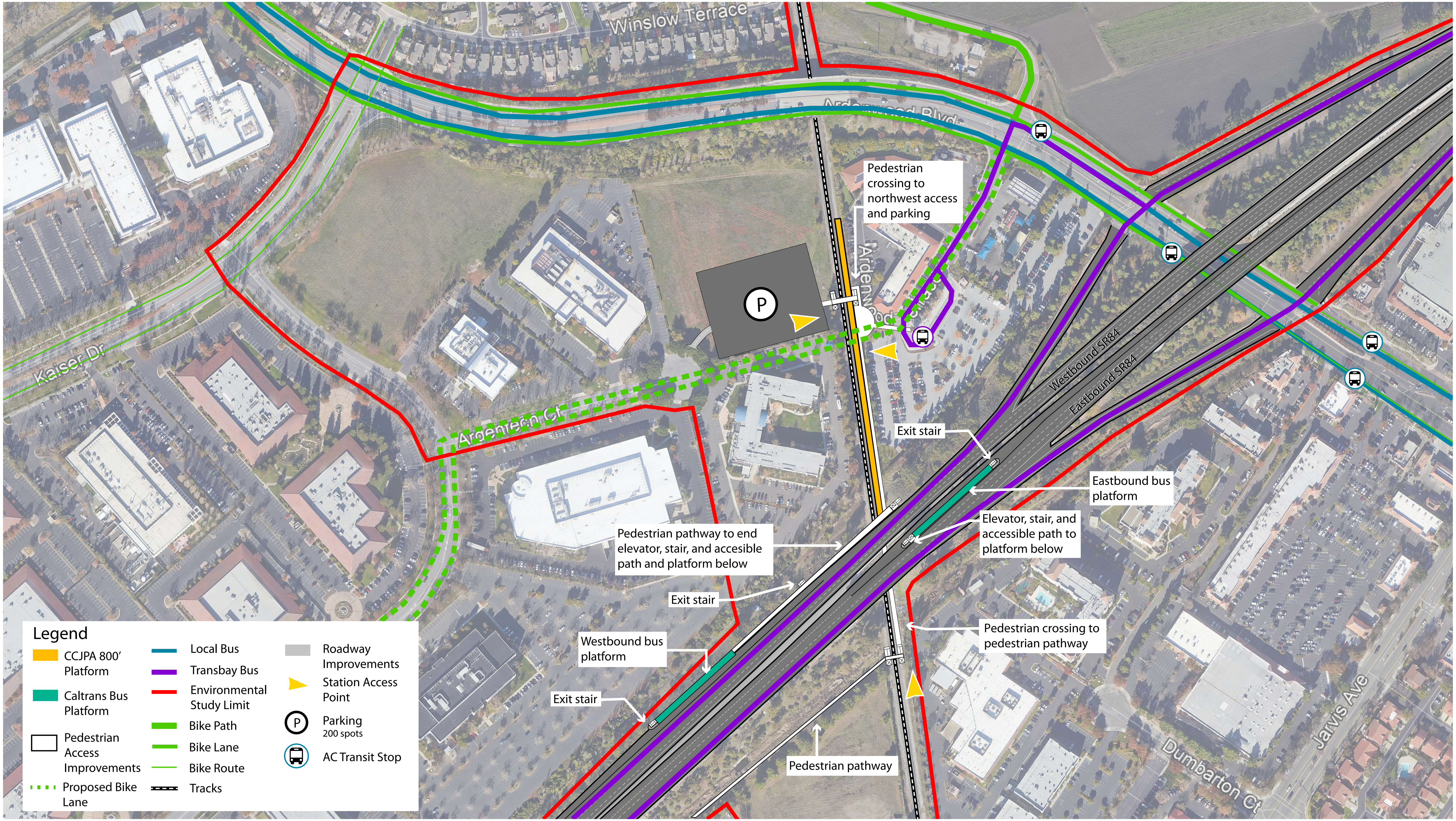
ARDENWOOD STATION - OPTION 2
HIGHWAY MEDIAN BUS STOP - CIRCULATION

PRELIMINARY
FOR DISCUSSION ONLY
NOVEMBER 2019

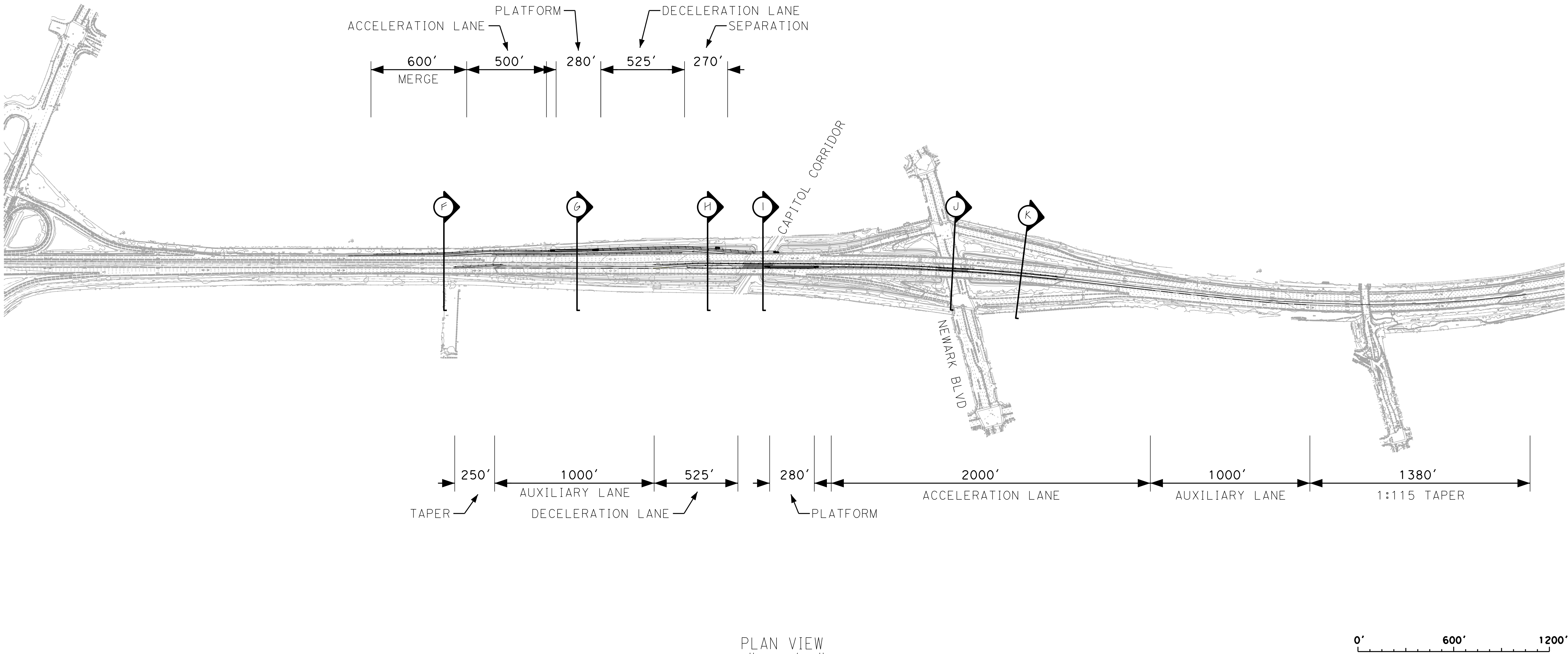
HNTB

Ardenwood_Opt2-3_Sections.dgn 11x17

Ardenwood Station Area Conceptual Plan- Option 3 – Highway Split Bus Stop



Ardenwood Station Area Conceptual Plan - Option 3 - Highway Split Bus Stop



PLAN VIEW
1"=600'-0"

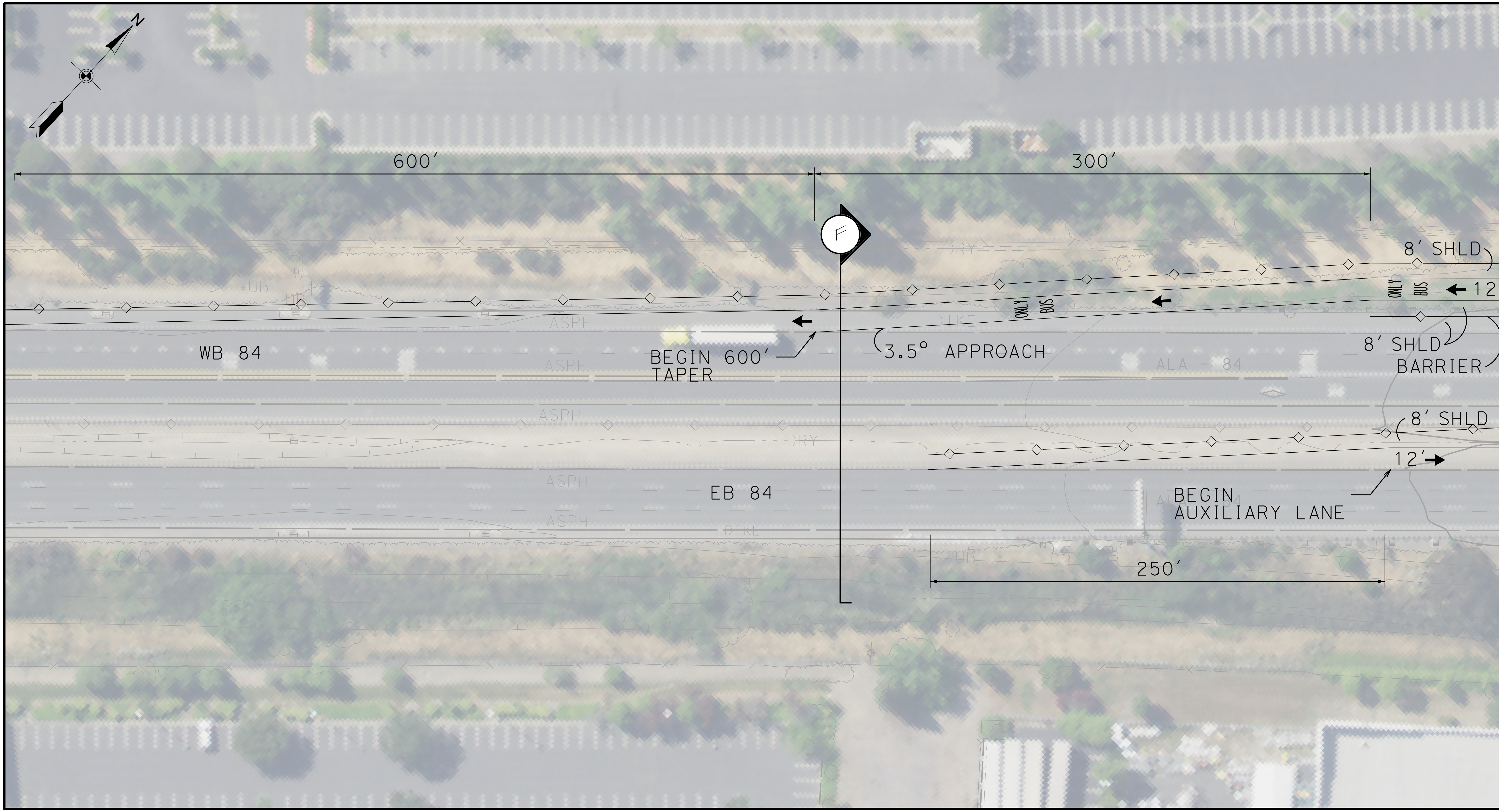
SOUTH BAY CONNECT

ARDENWOOD STATION
OPT 3 - HIGHWAY SPLIT BUS STOP - OVERVIEW

PRELIMINARY
FOR DISCUSSION ONLY
NOVEMBER 2019

HNTB

Ardenwood_Opt2-3_Overview.dgn 600sc 11x17



PLAN VIEW
1"=50'-0"

0' 50' 100'

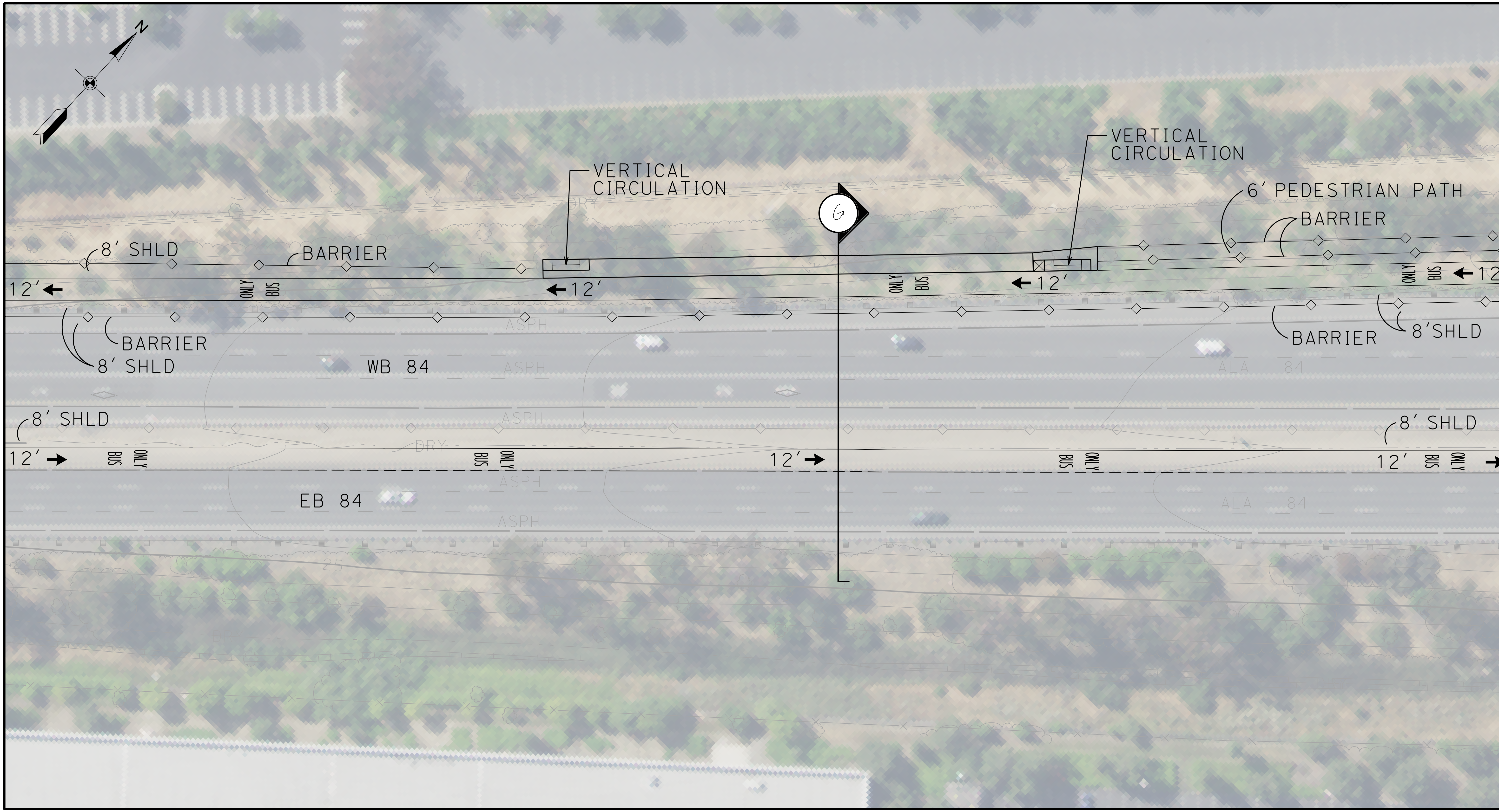
SOUTH BAY CONNECT

ARDENWOOD STATION

OPT 3 - HIGHWAY SPLIT BUS STOP - DETAIL 1 OF 6

PRELIMINARY
FOR DISCUSSION ONLY
NOVEMBER 2019

HNTB



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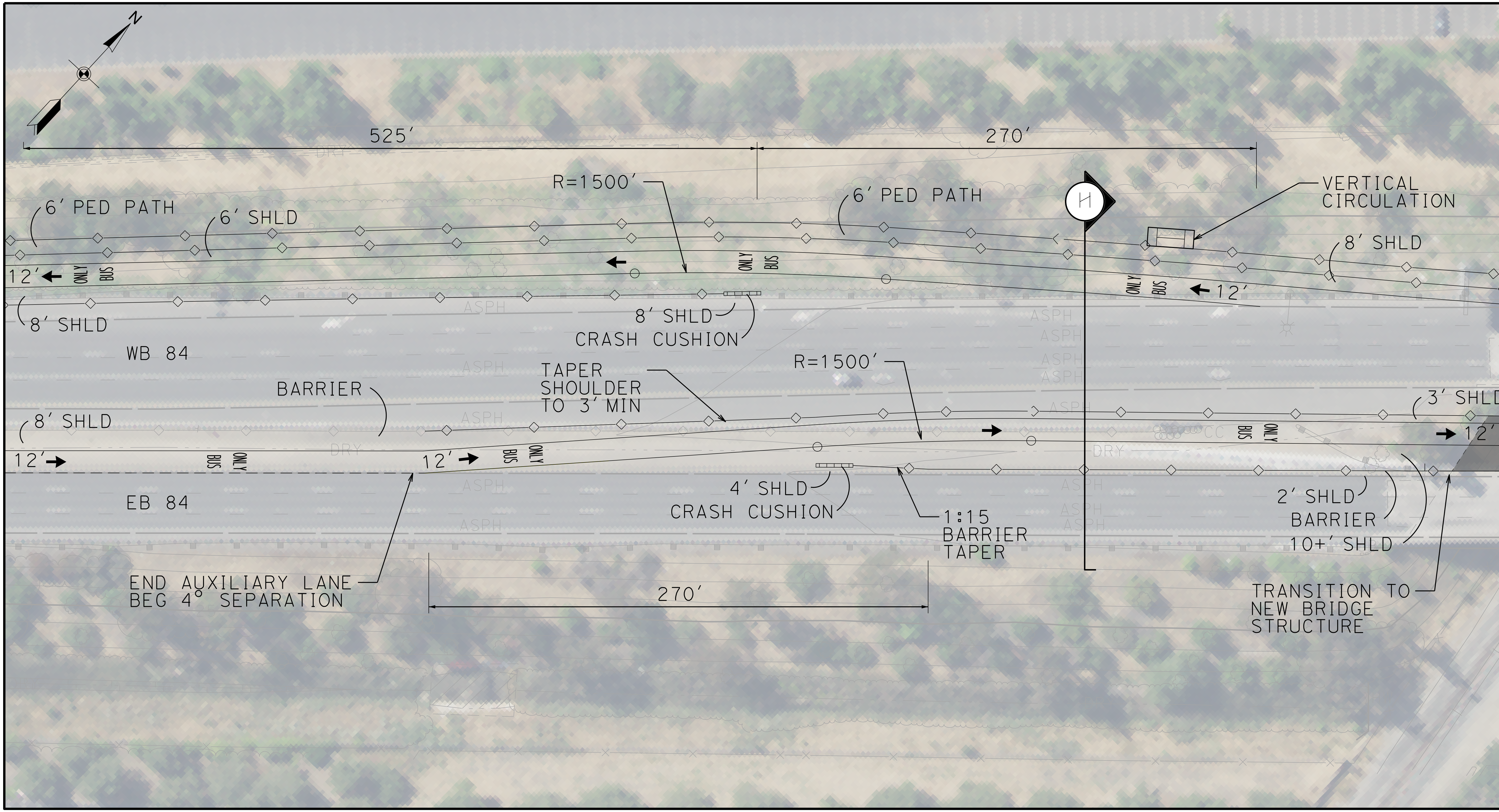
SOUTH BAY CONNECT

ARDENWOOD STATION

OPT 3 - HIGHWAY SPLIT BUS STOP - DETAIL 2 OF 6

PRELIMINARY
FOR DISCUSSION ONLY
NOVEMBER 2019

HNTB



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0' 50' 100'

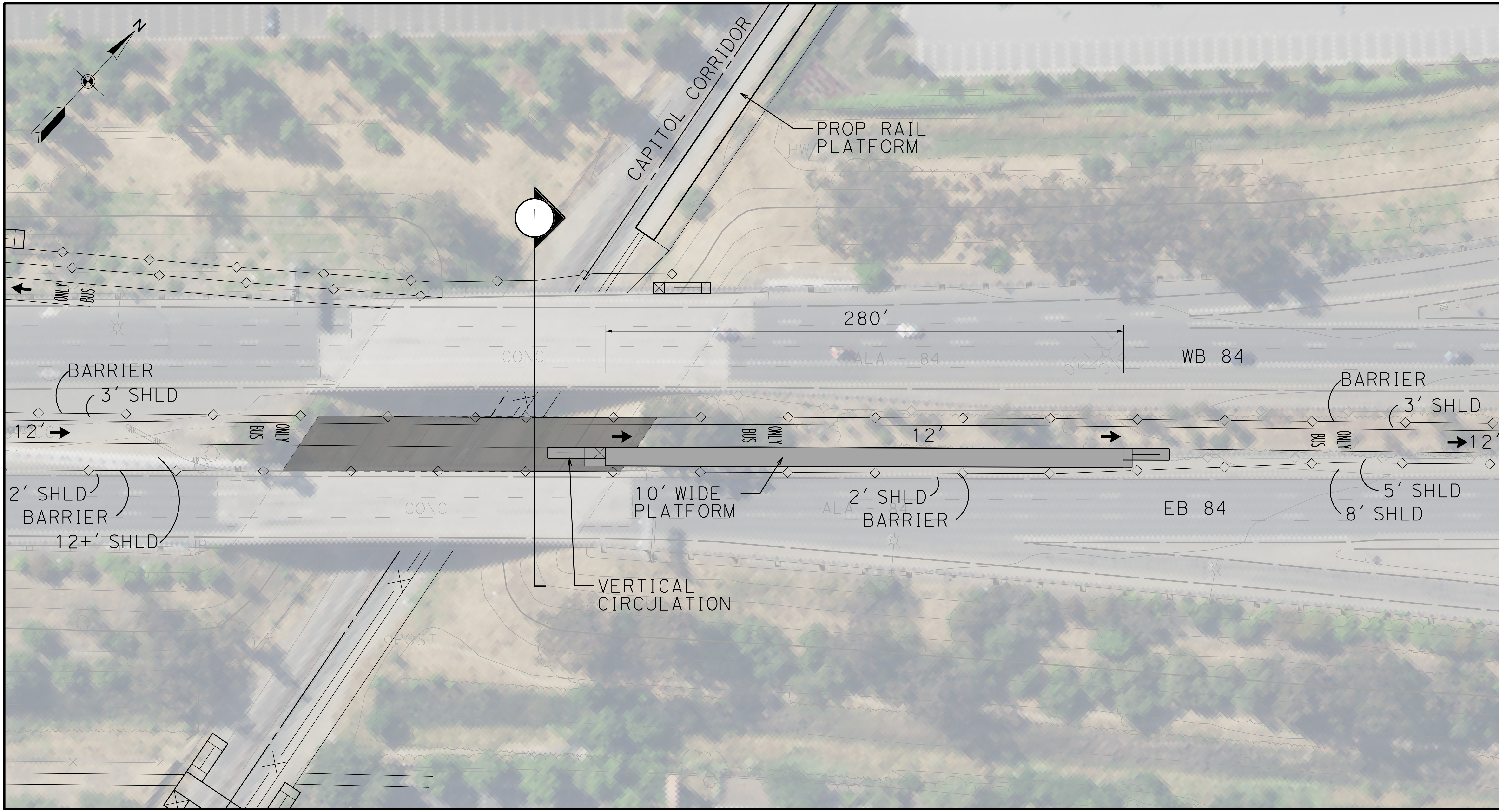
SOUTH BAY CONNECT

ARDENWOOD STATION

OPT 3 - HIGHWAY SPLIT BUS STOP - DETAIL 3 OF 6

PRELIMINARY
FOR DISCUSSION ONLY
NOVEMBER 2019

HNTB



PLAN VIEW
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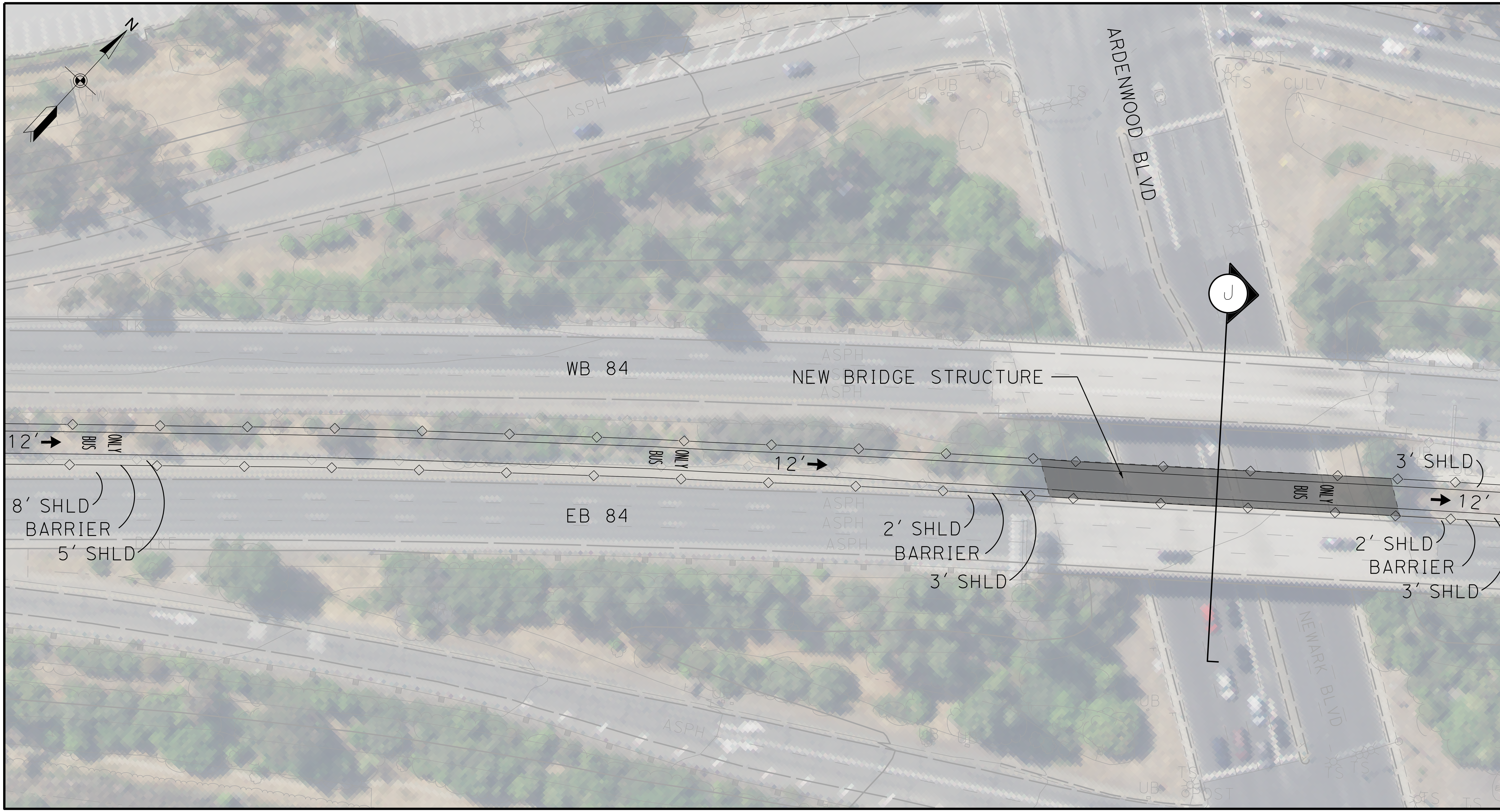
0' 50' 100'

SOUTH BAY CONNECT

ARDENWOOD STATION

OPT 3 - HIGHWAY SPLIT BUS STOP - DETAIL 4 OF 6

PRELIMINARY
FOR DISCUSSION ONLY
NOVEMBER 2019



PLAN VIEW
1"=50'-0"

0' 50' 100'

SOUTH BAY CONNECT

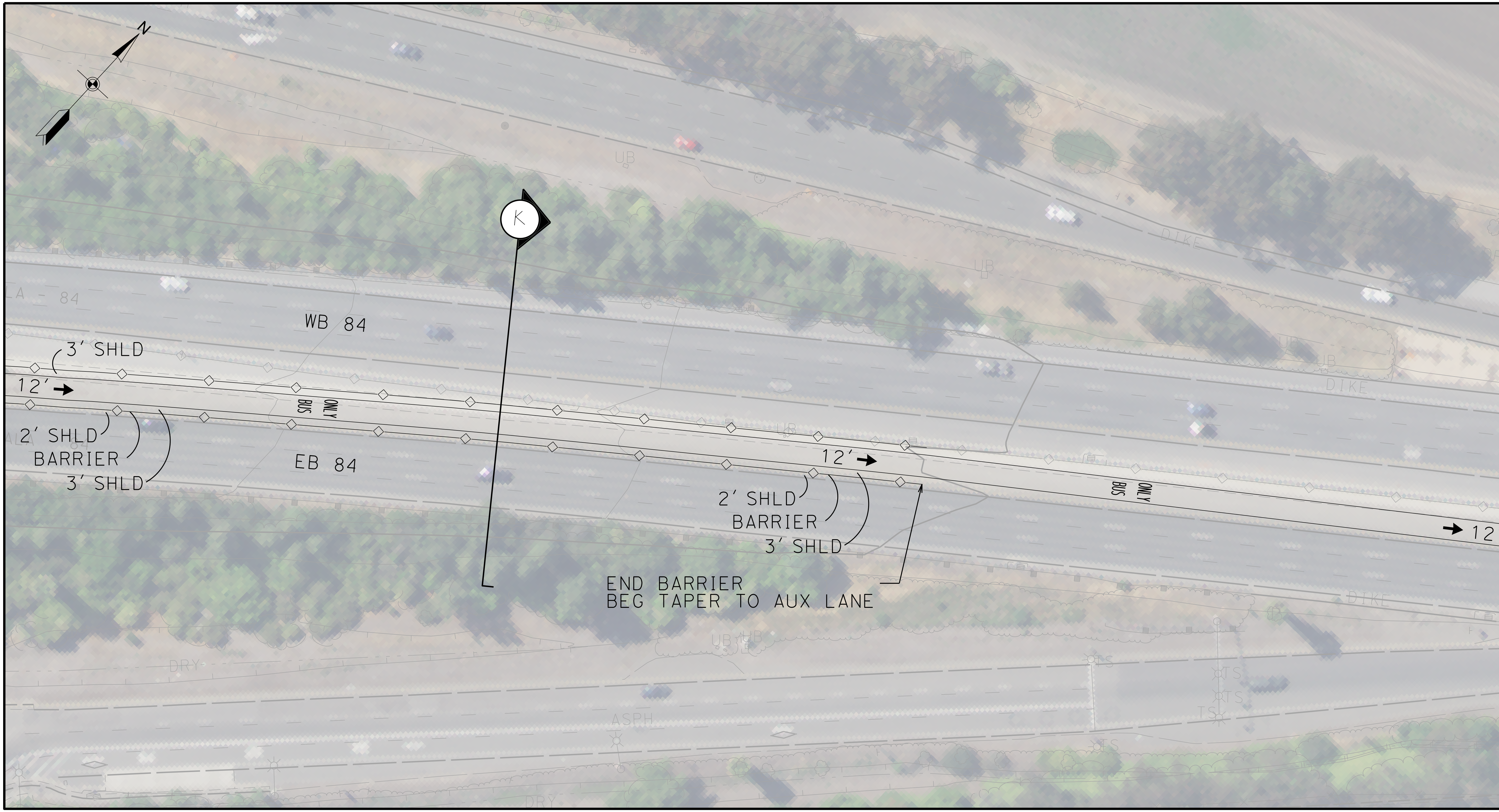
ARDENWOOD STATION

OPT 3 - HIGHWAY SPLIT BUS STOP - DETAIL 5 OF 6

PRELIMINARY
FOR DISCUSSION ONLY
NOVEMBER 2019

HNTB

Ardenwood_Opt2-3_Details.dgn/Exhibit 50sc 11x17



PLAN VIEW
1"=50'-0"

SOUTH BAY CONNECT

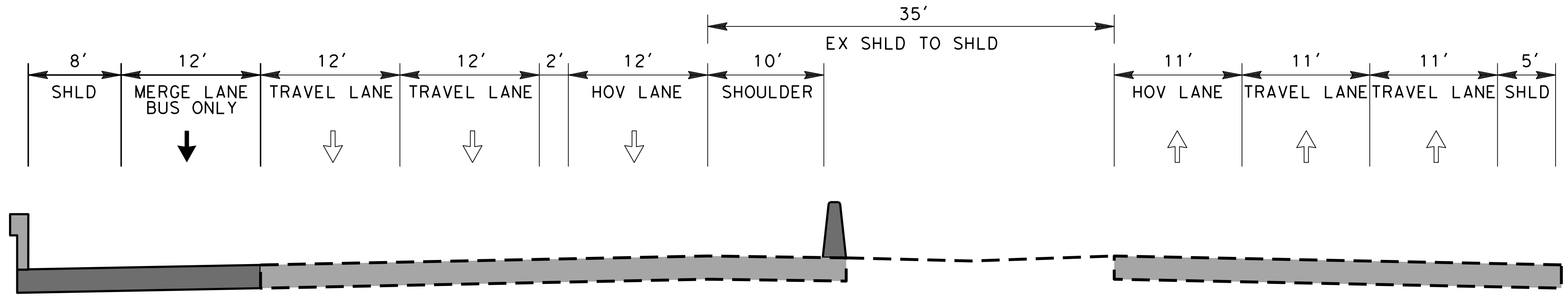
ARDENWOOD STATION

OPT 3 - HIGHWAY SPLIT BUS STOP - DETAIL 6 OF 6

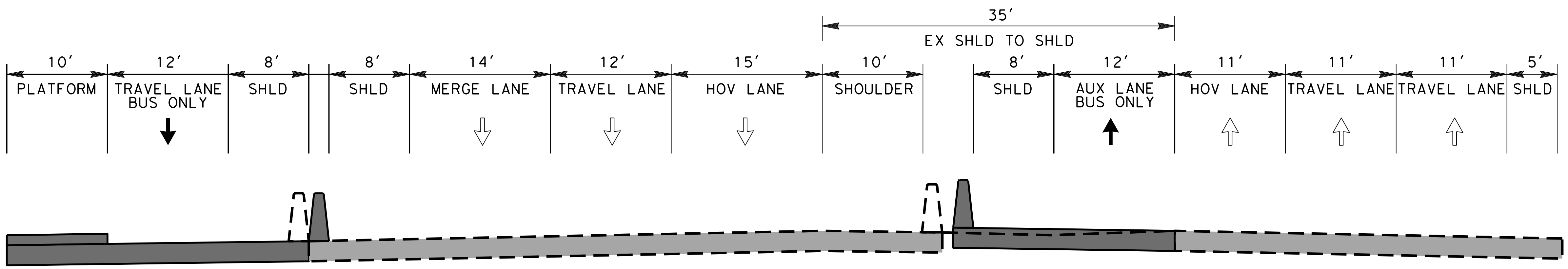
PRELIMINARY
FOR DISCUSSION ONLY
NOVEMBER 2019

HNTB

Ardenwood_Opt2-3_Details.dgn/Exhibit 50sc 11x17



SECTION F-F



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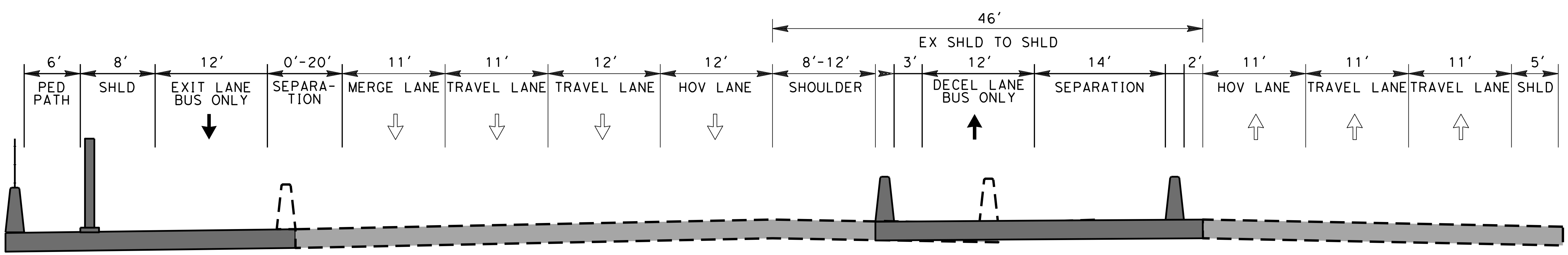


SECTION H-H

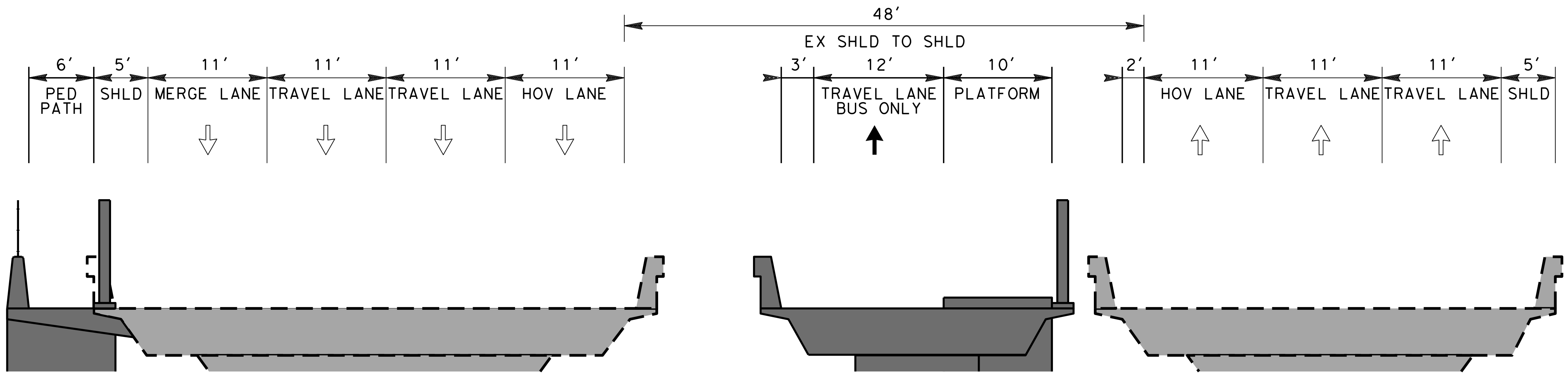
SOUTH BAY CONNECT

ARDENWOOD STATION
OPT 3 - HIGHWAY SPLIT BUS STOP - HIGHWAY SECTIONS

PRELIMINARY
FOR DISCUSSION ONLY
OCTOBER 2019

HNTB

Ardenwood_Opt2-3_Sections.dgn 11x17



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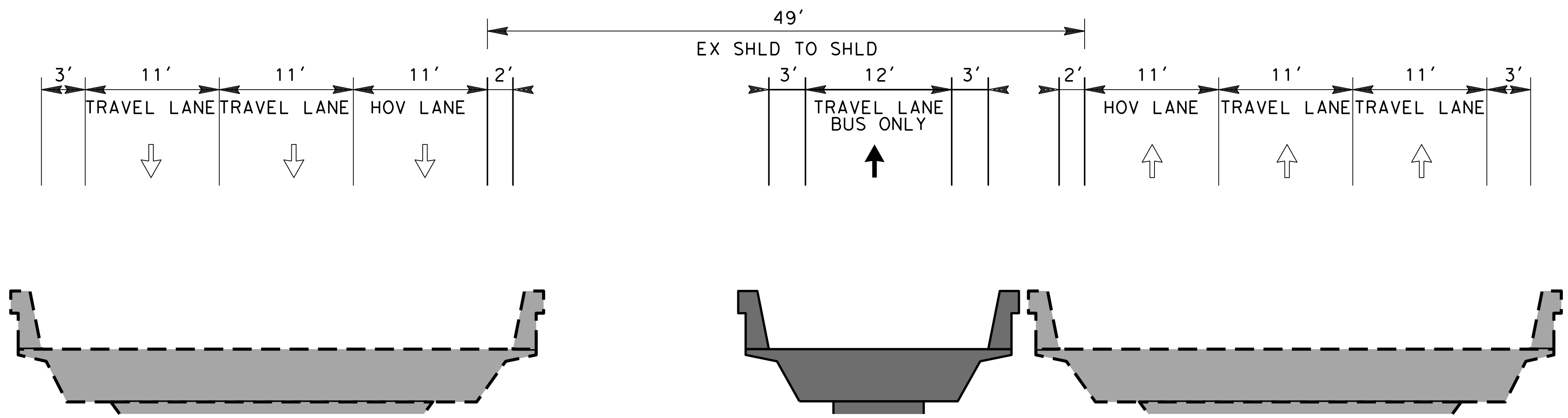

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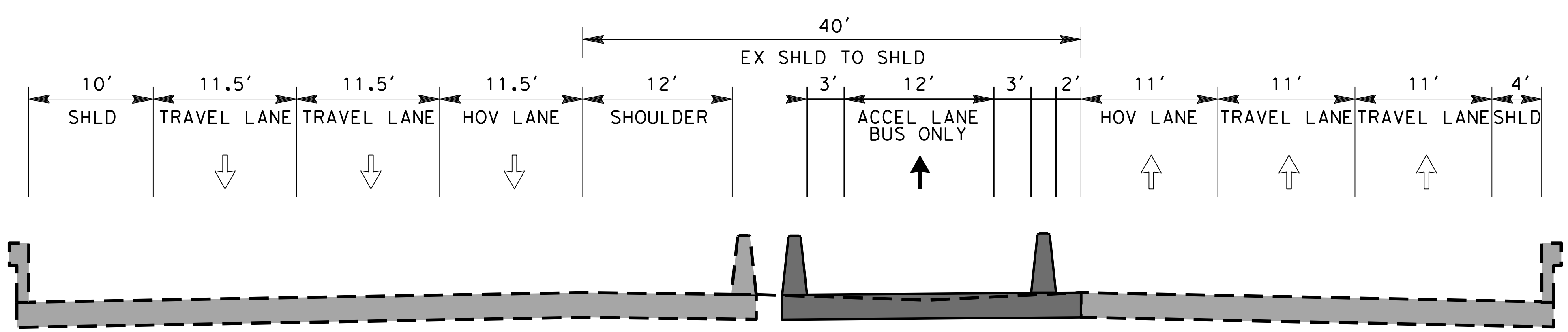


SECTION K-K

SOUTH BAY CONNECT

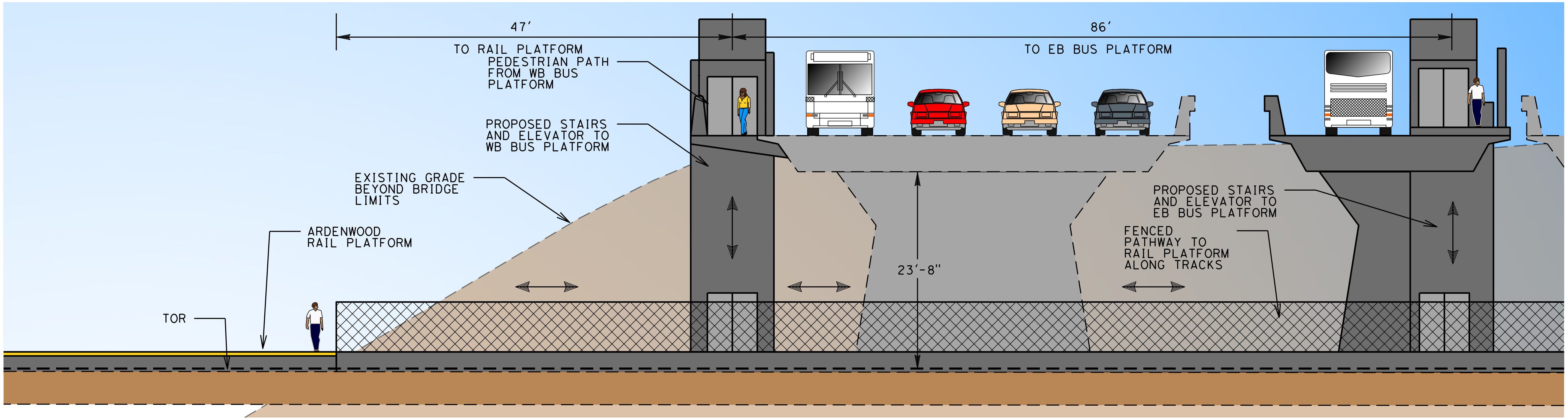
ARDENWOOD STATION

OPT 3 - HIGHWAY SPLIT BUS STOP - HIGHWAY SECTIONS

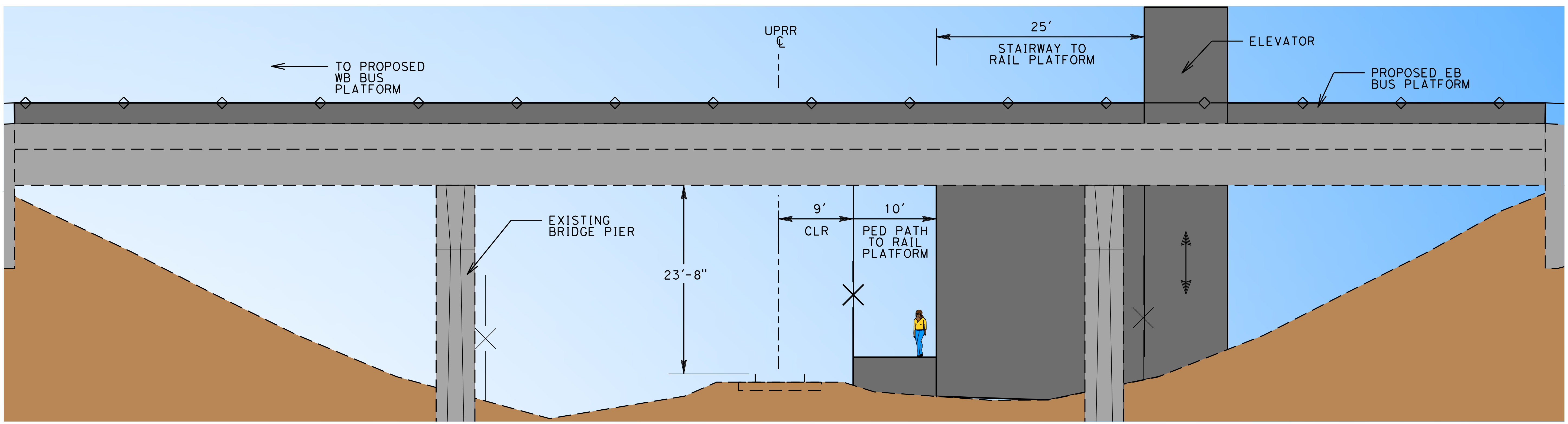
PRELIMINARY
FOR DISCUSSION ONLY
OCTOBER 2019

HNTB

Ardenwood_Opt2-3_Sections.dgn 11x17



SECTION 1 - HIGHWAY



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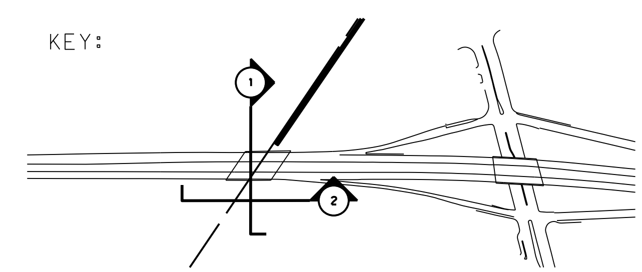


SOUTH BAY CONNECT

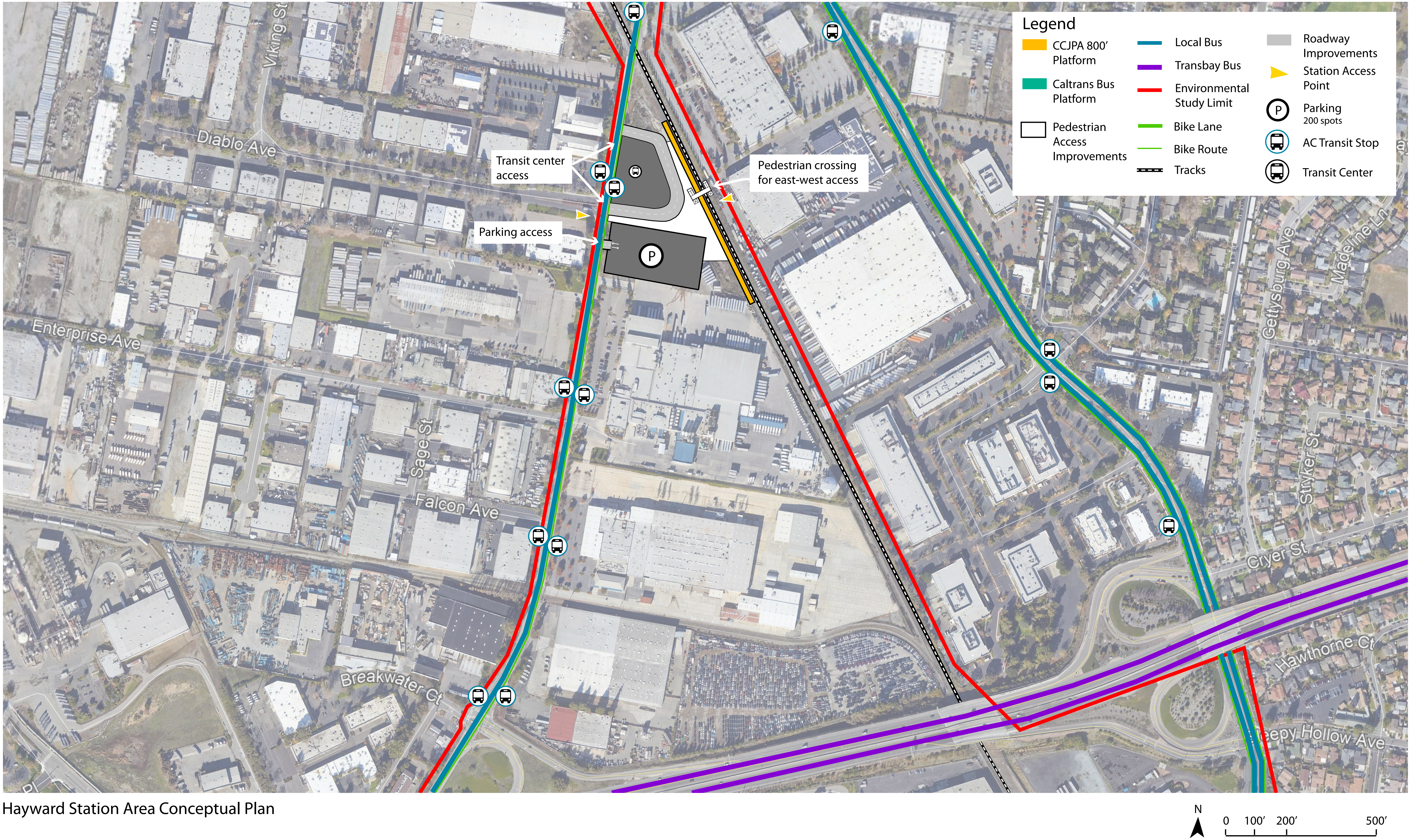
ARDENWOOD STATION - OPTION 3
HIGHWAY SPLIT BUS STOP - CIRCULATION

PRELIMINARY
FOR DISCUSSION ONLY
NOVEMBER 2019

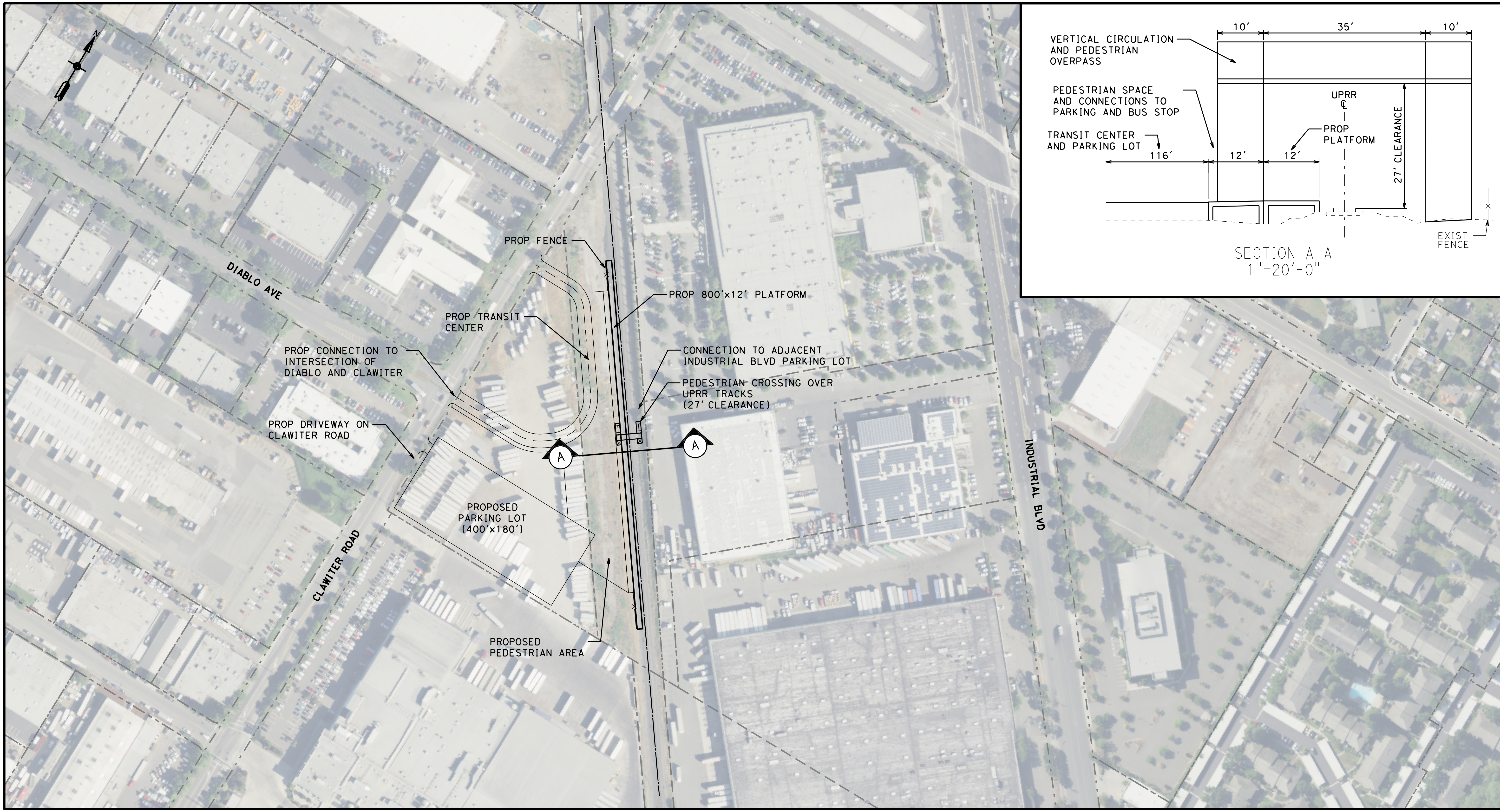
HNTB

Ardenwood_Opt2-3_Sections.dgn 11x17

Hayward Station Area Conceptual Plan



Hayward Station Area Conceptual Plan



PLAN VIEW
1"=200'-0"

0' 200' 400'

LEGEND

UPRR CENTERLINE	— — —
FENCE	—x—

SOUTH BAY CONNECT

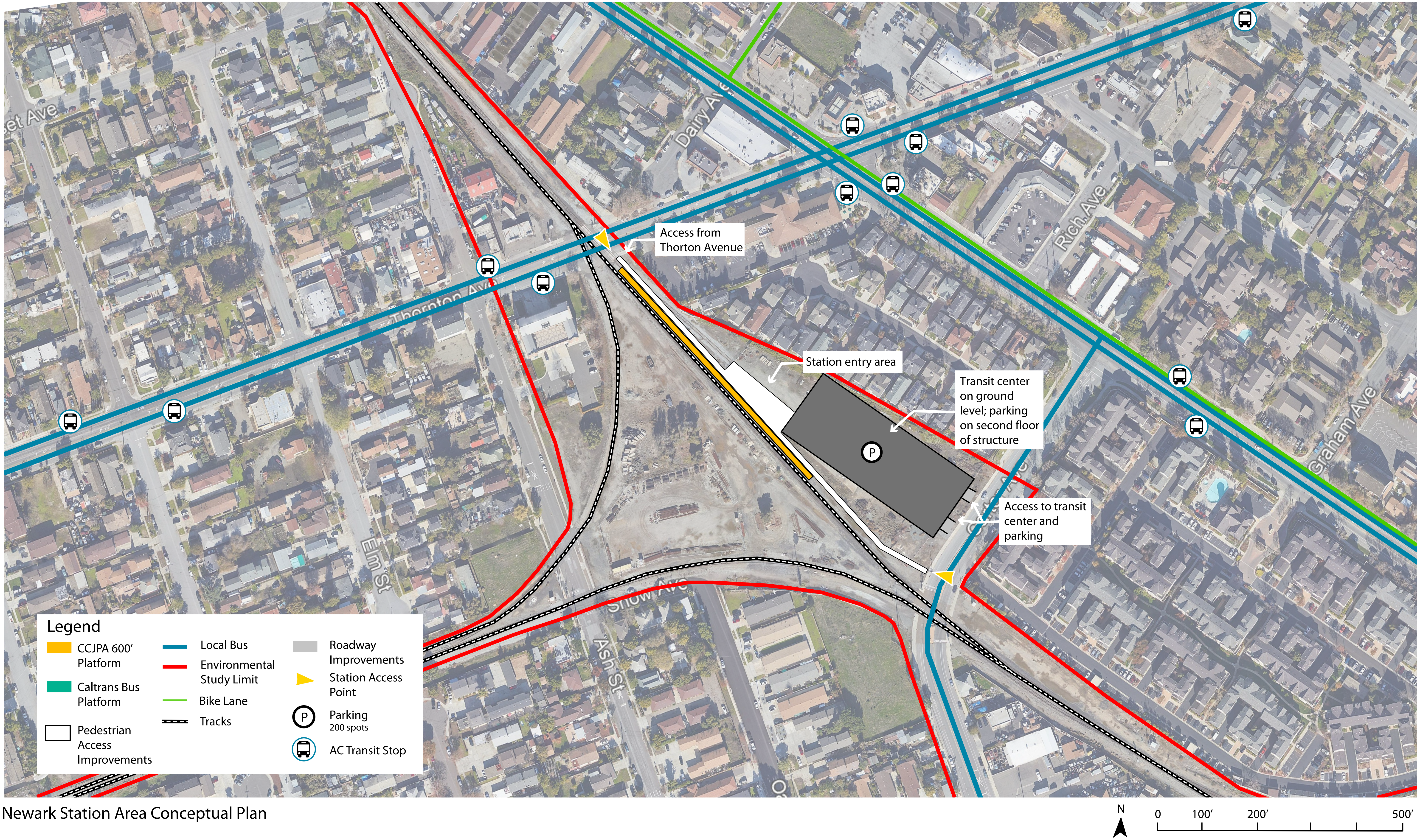
HAYWARD STATION
OPTION 1

PRELIMINARY
FOR DISCUSSION ONLY
NOVEMBER 2019

HNTB

Hayward_Opt.dgn/Exhibit 200sc 11x17

Newark Station Area Conceptual Plan



Newark Station Area Conceptual Plan

PLAN VIEW
1"=200'-0"

0' 200' 400'

LEGEND

UPRR CENTERLINE	— — —
FENCE	—x—

SOUTH BAY CONNECT

NEWARK JUNCTION STATION
OPTION 1

PRELIMINARY
FOR DISCUSSION ONLY
NOVEMBER 2019

HNTB

Appendix E: Preliminary Station Ridership Analysis

MEMORANDUM

Date: November 12, 2019

To: Dominic Spaethling, Adrian Filice, and Ben Tripousis, HNTB

From: Ian Barnes and Nate Conable, Fehr & Peers

Subject: South Bay Connect Preliminary Station Ridership Analysis

WC19-3612.00

The Capitol Corridor South Bay Connect project proposes to shift Capitol Corridor passenger rail service from the Niles Subdivision (between Elmhurst and Newark Junction) to the Coast Subdivision. With the shift in the Capitol Corridor route, the existing Hayward and Fremont-Centerville stations would no longer be served and would be replaced by a new station at one of the following three locations:

- State Route 92 overhead in western Hayward,
- State Route 84/Ardenwood Park & Ride in western Fremont, or
- Newark Junction in central Newark.

The three stations noted above will provide a transfer opportunity between Capitol Corridor and Transbay public and private transit services options. New ridership generated by the improved transfer opportunities, in addition to the changes in ridership associated with the different land uses at the new station locations and a faster overall Capitol Corridor service between Oakland and San Jose via the Coast Subdivision, will drive changes in future ridership.

Fehr & Peers has prepared preliminary estimates of measures of effectiveness for the project, including the following metrics:

- Station-level daily boardings plus alightings for the new station locations
- System-wide ridership estimates
- Senate Bill 1 Solutions for Congested Corridors Program metrics for the SR 84/Ardenwood Park & Ride station alternative:
    - o Reduction in vehicle-miles of travel (VMT)
    - o Reduction in daily vehicle-hours of delay (VHD)

- o Changes in traveler mode choice along select key segments of the Capitol Corridor route
- o Changes in person throughput along select key travel corridors

Opening year (2025) and horizon year (2040) estimates were prepared using a composite regional travel demand model and Direct Ridership Model (DRM) methodology. This approach incorporates land use forecasts and automobile travel times from the City/County Associations of Governments of San Mateo County – Santa Clara Valley Transportation Authority (C/CAG-VTA) travel demand model with a DRM derived from current Capitol Corridor ridership. The C/CAG-VTA travel demand model was chosen for use as the regional travel demand model component, because it provides more precise estimates of employment that may be accessed by transbay transfers. The C/CAG-VTA travel demand model was updated to reflect the latest land use assumptions in Alameda, Contra Costa, and Solano Counties per the Alameda County Transportation Commission (Alameda CTC), Contra Costa Transportation Authority (CCTA), and Solano Transportation Authority (STA) travel demand models. Data from the Sacramento (SACMET) regional travel demand model and the Association of Monterey Bay Area Governments (AMBAG) travel demand model was also used in the estimation of ridership forecast and measures of effectiveness.

The remainder of this memorandum outlines the following key aspects of the modeling and forecasting approach:

- Model Methodology and Background Data
- Direct Ridership Model Parameters
- Ridership Forecasts and Measures of Effectiveness

Model Methodology and Data

As noted previously, the forecasts are based on a composite methodology, which reflects the strengths of each tool used in the forecasting process. The two tools used include:

- **C/CAG-VTA Model:** This trip-based regional travel demand model takes into account regional land use patterns, approximated highway congestion, and connecting transit service within the nine-county MTC region. The C/CAG-VTA model includes the portion of the Capitol Corridor route between the Suisun-Fairfield Station and San Jose-Diridon Station.
- **Direct Ridership Model (DRM):** This component is a set of linear regression models which refine and extend the geographic scope of the C/CAG-VTA model predictions. The DRM predicts station-to-station ridership, taking into account station area characteristics

such as catchment-area population and jobs, service characteristics such as travel time and frequency/headways, transit connections to other population and job centers, and station accessibility by multiple modes. The DRM has been estimated for four separate market segments corresponding to markets within or not within the C/CAG-VTA model area:

- Travel between stations exclusively within the Metropolitan Transportation Committee (MTC)/Association of Bay Area Governments (ABAG) area
- Travel between stations exclusively within the SACMET area
- Travel from the SACMET area to the MTC area
- Travel from the MTC area to the SACMET area

In addition to the four travel markets, the DRM has been estimated for two time-of-day periods:

- AM peak "commute"
- Off-peak "non-commute"

The AM peak commute model results are transposed to arrive at PM peak period trips. This approach reflects that traveler mode choice is typically predicated on the AM peak period, and thus PM peak period travel and mode choice is a function of the AM peak period. A summation of the AM peak, PM peak, and off-peak models gives an estimate of weekday daily ridership. The selected parameters and estimation process for the DRM is discussed further later in this memorandum.

Both models directly rely on data sources regarding land use patterns, the multimodal transportation system, and Capitol Corridor's schedule and operating characteristics. Other sources of existing travel data (traffic volumes, existing bus services, parking supply and occupancy at nearby stations, etc.) were used to assess the reasonableness of the base year models. A detailed calibration of the base year C/CAG-VTA travel demand model has not been performed at this stage of the project but could be performed during the environmental phase.

Land Use Data

The modeling and forecasting process relies on land use data inputs from ABAG/MTC's Plan Bay Area, as geographically assigned in the C/CAG-VTA travel model traffic analysis zone (TAZ) system. The C/CAG-VTA model provides additional detail on the geographic assignment of land uses in San Mateo, Santa Clara, and San Francisco Counties; the geographic assignment of land use in the other counties along the Capitol Corridor system is based on somewhat wide-reaching assumptions by ABAG/MTC and may not precisely locate the land uses. Because land uses within one mile of stations heavily influence the ridership potential at a given transit station, a more precise geographic assignment of land use is critical in the forecasting of future transit ridership.

To address this potential lack of precision, land uses from the Alameda CTC, Contra Costa Transportation Authority (CCTA), and Solano Transportation Authority (STA) travel demand models were aggregated into the C/CAG-VTA travel model TAZ structure for those counties. Additionally, for the areas immediately proximate to the three station alternatives, a check for recent land use project changes (rezoning, densification, etc.,) was completed.

A more detailed description of this process, as well as a summary of the land use comparison and update process, is documented in a technical memorandum titled *Capitol Corridor Oakland to San Jose Phase 2A Preliminary Station Ridership Analysis – Travel Model Land Use Inputs and Adjustments* (Fehr & Peers, July 2019).

Multimodal Transportation System

The C/CAG travel model also includes data on the multimodal transportation system surrounding the Capitol Corridor route, including roadways and parallel/connecting public transit routes. The base year model is based on the transportation system from Year 2015, with future modifications to the transportation network loaded into the model based on the projected opening year of the improvements per Plan Bay Area. Key background transportation network improvements include, but are not limited to, the improvements listed in **Table 1**.

TABLE 1: C/CAG-VTA MODEL ADDITIONAL TRANSPORTATION PROJECT ASSUMPTIONS

Project	Description	Source	Included in Scenario	
			2025	2040
Regional Transit Projects				
ACE	6 daily ACE roundtrips (+2 from today)	ACE Forward Project Description	X	
ACE	10 daily ACE roundtrips (+4 from today)	ACE Forward Project Description		X
Hollister Express Bus	Hourly integrated express bus service between Gilroy and Hollister	State Rail Plan		X
Salinas Rail	Hourly service between Gilroy and Salinas; hub station at Pajaro/Watsonville providing hourly connections to Santa Cruz; hub station at Castroville providing hourly connections to Monterey.	State Rail Plan		X
Dumbarton Rail	Rail shuttle from Union City BART station to Redwood City Caltrain station: 4 trains per hour per direction peak, 2 trains per hour per direction off-peak.	Cross Bay Transit Partners	X	X

TABLE 1: C/CAG-VTA MODEL ADDITIONAL TRANSPORTATION PROJECT ASSUMPTIONS

Project	Description	Source	Included in Scenario	
			2025	2040
SamTrans Express Bus	Four express routes between the Peninsula and San Francisco	SamTrans Express Bus Study	X	X
Nearby Freeway Projects				
San Mateo and Dumbarton HOV3+ Conversion	Convert HOV2 lanes approaching San Mateo and Dumbarton Bridge toll plazas to HOV3+ operation	MTC	X	X
Dumbarton Forward Operational Improvements	Peak Period, Peak Direction Bus on Shoulder system in Dumbarton Corridor	MTC	X	X
I-880 Express Lanes	Convert existing HOV2 lanes between Oakland and Milpitas to Express Lanes (HOV3+ free)	Alameda CTC Project Description	X	X
US-101 Managed Lanes	Add HOT lane in San Mateo County south of I-380. Convert a northbound lane to a HOT lane between I-380 and San Francisco County Line; convert a southbound lane to a HOT lane from I-280 terminus to I-380 via US-101.	SMCTA US-101 Managed Lanes Project Description		X

Source: Fehr & Peers, 2019.

Capitol Corridor Schedule and Operations Data

Existing conditions Capitol Corridor schedule and operations data are based on published timetables on Capitol Corridor's website. Future year Capitol Corridor service assumptions were based on data provided by the project team regarding future schedule and timetable assumptions with the Sacramento to Roseville Third Track project completed. Because the DRM is based on a linear equation, changes in schedule or timetable assumptions generally affect the ridership performance of each station alternative equally.

Other Existing Conditions Data

As part of assessing existing transportation conditions in the area surrounding the potential station sites, Fehr & Peers collected and analyzed the following data:

- California Freeway Performance Measurement System (PeMS) freeway mainline data for:
  - SR 92 over the San Mateo-Hayward Bridge
  - SR 84 over the Dumbarton Bridge
  - I-880 between A Street and I-238

- I-880 between Alvarado Boulevard and Alvarado-Niles Road (Alameda Creek Bridge segment)
- I-880 between Stevenson Boulevard and Mowry Avenue

- Manual counts of public and private transit services at the following locations:
  - SR 92 between Clawiter Road and the Toll Plaza (at the pedestrian overcrossing between Point Eden Way and Breakwater Avenue)
  - SR 84 at the Dumbarton Bridge Toll Plaza
- Auto travel time and reliability for highways and freeways in the study corridor
- Ridership counts for Capitol Corridor (systemwide and by origin-destination pattern)
- Parking supply and midday occupancy information at current Capitol Corridor stations in the study area and at Ardenwood Park & Ride

Comparison of C/CAG-VTA Travel Demand Model Volumes to Existing Count Data

Table 2 summarizes the daily freeway mainline volumes (from the PeMS database and other published count sources) for the SR 92, SR 84, and I-880 corridors in the study area. **Table 2** also includes a comparison of the daily counted volumes to the daily volumes in the C/CAG-VTA travel demand model. This comparison is provided to assess the level of future calibration needed to statically validate the base year C/CAG-VTA travel demand model as part of the environmental phase of the project.

TABLE 2: STUDY AREA DAILY ROADWAY VOLUMES – COUNTS AND MODELED VOLUMES

Location	Direction	Daily Count	Model Volume	Deviation
SR 92 over the San Mateo Bridge	WB EB	58,947 53,779	39,904 49,461	-33% -8%
SR 84 over the Dumbarton Bridge	WB EB	40,298 44,245	46,805 57,236	+16% +29%
I-880 between A Street and I-238	NB SB	140,816 144,697	93,269 104,834	-34% -28%
I-880 between Alvarado Boulevard and Alvarado-Niles Road	NB SB	104,211 106,627	94,927 100,631	-9% -6%
I-880 between Stevenson Boulevard and Mowry Avenue	NB SB	96,694 93,578	87,061 80,814	-10% -14%

Source: Fehr & Peers, 2019.

The data presented in **Table 2** indicates that the base year C/CAG-VTA travel demand model generally underestimates daily traffic volume demand in the study area. This is to be expected as the base year model represents Year 2015 conditions, whereas the counts are from April 2019. Future calibration and validation efforts are likely to be required in order to produce more defensible ridership forecasts for the environmental phase of the project.

Public and Private Transit Services on the SR 84 and SR 92 Corridors

Table 3 summarizes the AM peak period (westbound direction) and PM peak period (eastbound direction) public and private bus ridership on the SR 84 and SR 92 corridors. These counts represent the existing Transbay transit service along the Dumbarton Bridge and San Mateo-Hayward Bridge corridors.

TABLE 3: PUBLIC AND PRIVATE TRANSIT SERVICES ON THE SR 84 AND SR 92 CORRIDORS

Location	Direction	Transit Vehicles Counted		
		Public Transit	Private Transit	Total
SR 84 over the Dumbarton Bridge	WB (6:00 AM to 10:00 AM)	18	234	252
	EB (3:00 PM to 7:00 PM)	25	188	213
SR 92 over the San Mateo Bridge	WB (6:00 AM to 10:00 AM)	10	76	86
	EB (3:00 PM to 7:00 PM)	33	92	125

Source: Fehr & Peers, 2019.

The data in **Table 3** suggests that there is substantial private transit service in the corridor, which is supplemented by public transit service. This high level of transit service suggests that there are existing public transit desire lines in the SR 84 and SR 92 corridors that the Capitol Corridor system could tie into with a new station at the SR 84/Ardenwood or SR 92/Hayward locations.

Auto Travel Time and Reliability for Highways and Freeways in the Study Corridor

Attachment A includes a summary of AM peak period, midday, and PM peak period average auto travel times and travel time reliability for the I-880, SR 92, and SR 84 corridors in the study area as well as nearby connecting local arterial roadways.

The travel time data suggests that large portions of the I-880, SR 92, and SR 84 corridors in the AM and PM peak periods operate under high levels of congestion such that travel times along the corridors are unreliable. This represents an opportunity for Capitol Corridor to increase its ridership as Capitol Corridor typically provides a more reliable travel option (with respect to travel times) as it operates along a dedicated right-of-way. These findings are limited by the fact that the C/CAG-VTA travel demand model generally underestimates travel times and does not provide estimates of the unreliability of future travel times. Therefore, it would be beneficial to develop a forecasting method that blends data from the C/CAG-VTA model and other real-world data to better account for actual and perceived traveler travel time advantages for Capitol Corridor (versus driving).

Existing Ridership Counts for the Capitol Corridor System

Attachment B summarizes the AM peak period, PM peak period, and off-peak ridership for the Capitol Corridor system on an origin-destination basis for a typical mid-week day. The data contained in **Attachment B** represents the average weekday ridership for all Tuesdays, Wednesdays, and Thursdays during April 2019. The ridership data indicates that roughly two-thirds of Capitol Corridor weekday ridership occurs during the AM and PM peak periods of travel, which could indicate that the service is serving as a commute option for a majority of riders.

Existing Parking Supply and Occupancy at Current Capitol Corridor Stations and at Ardenwood Park & Ride

Table 4 summarizes the parking supply and midday observed occupancy at Capitol Corridor stations in the project study area, as well as the parking supply and midday observed occupancy at the existing Ardenwood Park & Ride lot.

TABLE 4: EXISTING PARKING SUPPLY AND MIDDAY OCCUPANCY

Location	Supply	Counted Occupancy	Percent Utilization
Capitol Corridor Coliseum Station	37	35	95%
Capitol Corridor Hayward Station	73	65	89%
Capitol Corridor Fremont-Centerville Station	176	160	91%
Ardenwood Park 7 Ride	350	340	97%

Source: Fehr & Peers, 2019.

Generally, the parking lots at the three study area Capitol Corridor stations and the Ardenwood Park & Ride are functionally oversubscribed. Some empty parking spaces were observed, but they were hard to find or reserved for permit or ADA uses (and thus unavailable to the general public). It was also noted that the parking at the Fremont-Centerville station is also shared with ACE service, so some of the demand at that particular location is for ACE commuter trains.

Direct Ridership Model Parameters

Broadly, the DRMs developed for the ridership analysis can be defined by the following equation for a linear model:

$$Y_{i,j} = \alpha * X_i + \beta * X_j + \gamma * X_{i.j}$$

where:

- *$Y_{i,j}$ is the ridership going from origin station i to destination station j*
- *X_i is a vector of station-specific input variables associated with the origin station i*

- *X_j is a vector of station-specific input variables associated with destination station j*
- *$X_{i,j}$ is a vector of input variables associated with the station OD pair i and j*
- *α, β, and γ are vectors of model coefficients associated with X_i, X_j, and $X_{i,j}$ respectively*

As noted previously, the DRM equations are derived using existing conditions ridership data, along with data on land use, Capitol Corridor service, and competing auto travel time information from the C/CAG-VTA travel demand model. To align with a standard statistical process, only variables that are statistically significant with intuitive coefficients are included in the final derived DRM equations. The variables included in each travel market/time period DRM equation are allowed to fluctuate between equations. **Table 5** lists the variables included in the DRM equations for each market and model time period, as well as the direction of the coefficient estimated.

TABLE 5: DRM MODEL VARIABLES AND COEFFICIENTS

Category	Variable	Coefficient Direction	Included in DRM Equation			
			Sac to Bay	Bay to Sac	Within Bay	Within Sac
Land Use	Origin Population (crow-fly buffers)	Positive	AM, OP	AM, OP	AM	AM
	Origin Population (via high-quality transit connection)	Positive	AM	AM, OP	--	AM, OP
	Destination Employment (crow-fly buffers)	Positive	AM, OP	AM	AM	AM, OP
	Destination Employment (via high-quality transit connection)	Positive	AM, OP	AM, OP	AM, OP	--
Capitol Corridor Service	Daily train frequency	Positive	AM, OP	AM, OP	--	--
	Train in-vehicle travel time	Negative	AM	--	--	--
	Difference between train and auto in-vehicle travel time	Positive (when auto time longer)	--	AM, OP	AM, OP	AM

Notes:
AM = AM peak period, OP = Off-peak period
Source: Fehr & Peers, 2019.

As noted previously, the AM peak period model represents commute trips and thus is transposed to arrive at PM peak period ridership. Combining the AM peak period, off-peak period, and transposed AM peak period ridership provides an estimate of daily ridership.

The derived DRM equations were evaluated to assess coefficients of determination, also known as the R-squared value. The R-squared value relates the "goodness of fit" of the DRM equations relative to the existing ridership pattern of the Capitol Corridor system. The overall AM peak period model has an R-squared value of 0.83, and the overall off-peak period model has an R-squared value of 0.88. These values suggest that over 80 percent of the variation of the existing Capitol Corridor ridership data is explained by the model, with the remainder attributed to other variables or inherent variability not readily captured in a linear statistical model. Overall, these R-squared values suggest that the derived DRM equations are suitable predictors of future ridership along the Capitol Corridor system, subject to margins of error typically inherent in the forecasting process.

Ridership Forecasts and Measures of Effectiveness

The outputs of the DRM forecasting process include station-level ridership forecasts (boardings plus alightings) and system ridership forecasts. Other metrics including VMT reduced, VHD reduced, and mode split effects were derived using data from the C/CAG-VTA travel demand model and the change in ridership forecasts between the No Project and Plus Project condition. For simplicity, the supplemental measures of effectiveness (VMT, VHD, and mode split effects) were only derived for the SR84/Ardenwood station scenario as that scenario has the highest ridership potential.

Ridership Forecasts

The forecasts of new station ridership and systemwide ridership are provided below in **Table 6** for the Year 2025 and Year 2040 scenarios. Because forecasts include a margin of error, a range of forecasts have been provided

Alternative	New Station Boardings + Alightings			System Wide Total Daily Boardings		
	Total	Range Low	Range High	Total	Range Low	Range High
Year 2025 – Opening Year						
No Project	-	-	-	8,365	7,530	9,200
SR 84/Ardenwood	520	470	570	9,155	8,240	10,070
SR 92/Hayward	400	360	440	8,855	7,970	9,740
Newark Junction	420	380	460	9,045	8,140	9,950
Year 2040 – Horizon Year						
No Project	-	-	-	12,570	11,310	13,830
SR 84/Ardenwood	860	770	950	12,835	11,550	14,120
SR 92/Hayward	650	590	720	12,350	11,120	13,590
Newark Junction	700	630	770	12,670	11,400	13,940

Source: Fehr & Peers, 2019.

The ridership forecasts indicate that the SR 84/Ardenwood station alternative is forecast to have the highest station-level ridership potential of the three single-station alternatives. Substantial potential ridership is also forecast at the SR 92/Hayward station; it is possible that the distance between the proposed SR 84/Ardenwood and SR 92/Hayward stations may be great enough such that the stations would not dampen the ridership potential between stations.

An important station ridership characteristic for the purposes of future station planning is understanding the temporal profile of the ridership. **Table 7** presents the percentage of boardings at study area stations that occur during the AM peak period, which is a measure of whether a station location is typically an originator of commute trips (i.e. a "Home Station") or an attractor of commute trips (i.e. a "Jobs Station").

TABLE 7: AM PEAK PERIOD BOARDINGS VERSUS OTHER PERIODS

Alternative	Total Boardings During Time Period	
	AM % of Total	Other Period % of Total
Year 2025 – Opening Year		
No Project – Hayward	85%	15%
No Project – Fremont-Centerville	60%	40%
SR 84/Ardenwood	40%	60%
SR 92/Hayward	70%	30%
Newark Junction	50%	50%
Year 2040 – Horizon Year		
No Project – Hayward	70%	30%
No Project – Fremont-Centerville	55%	45%
SR 84/Ardenwood	40%	60%
SR 92/Hayward	70%	30%
Newark Junction	50%	50%

Source: Fehr & Peers, 2019.

The data in **Table 7** indicates that the SR 84/Ardenwood station would exhibit characteristics of a Jobs Station (most boardings occur after the AM peak period), whereas the existing Hayward and Fremont-Centerville stations currently have most boardings in the AM peak period (and thus exhibit the characteristics of a Home Station). This suggests that the SR 84/Ardenwood station may not require the same amount of parking as the Hayward and Fremont-Centerville stations, as most riders at the new station would be originating from other parts of the system. Therefore, to support the projected ridership, strong walking, bicycling, and connecting transit services will be necessary to connect riders to their destinations.

Other Measures of Effectiveness

The estimates of the supplemental measures of effectiveness are provided below for the Year 2025 and Year 2040 with SR 84/Ardenwood station scenarios. The measures of effectiveness include:

- Reduction in vehicle-miles of travel (VMT): For this estimate, VMT on I-80 between Sacramento and Oakland and on I-880 between Oakland and San Jose was considered, as the project would directly reduce VMT on these routes. It is also noted that much of the VMT on these two freeways is congested during the AM and PM peak period, and over 60% of the new ridership under the SR 84/Ardenwood station alternative would occur during the AM and PM peak periods.
- Reduction in daily vehicle-hours of delay (VHD): For this estimate, VHD on I-80 and I-880 was considered, similar to how VMT was calculated.
- Changes in traveler mode choice along select key segments of the Capitol Corridor route: The I-80, I-880, SR 92, and SR 84 corridors were represented by 11 bi-directional segments located at key bottlenecks along these roadways. Mode split estimates were calculated using estimates of automobile demand from the C/CAG-VTA travel demand model and ridership from the DRM. Local transit services (AC Transit, BART, etc.) were excluded from the calculation, as they do not compete with interregional rail services like Capitol Corridor.
- Changes in person throughput along select key travel corridors: Similar to the traveler mode choice calculations, the I-80, I-880, SR 82, and SR 94 corridors are represented by 11 bi-directional segments located at key bottlenecks. Using the mode split estimates and total volumes, the number of vehicles was converted to persons.

Table 8 details the outputs of the VMT and VHD calculations, **Table 9** includes the outputs of the mode choice calculation, and **Table 10** presents the outputs of the person throughput calculations.

TABLE 8: MEASURES OF EFFECTIVENESS – VMT AND VHD

Alternative	Vehicle-Miles of Travel (VMT)	Vehicle-Hours of Delay (VHD)
Year 2025 – Opening Year		
No Project	20,820,000	150,600
SR 84/Ardenwood	20,756,000	145,100
Delta	*-64,000*	*-5,500*
Year 2040 – Horizon Year		
No Project	22,750,000	221,100
SR 84/Ardenwood	22,641,000	208,600
Delta	*-109,000*	*-12,500*

Source: Fehr & Peers, 2019.

TABLE 9: MEASURES OF EFFECTIVENESS – MODE CHOICE

Segment	No Project			SR 84/Ardenwood Scenario			
	Auto Total	CCJPA Ridership	CCJPA Mode Share	Auto Total	CCJPA Ridership	CCJPA Mode Share	*CCJPA Mode Share Delta*
Year 2025 – Opening Year							
I-80 WB from SR 12 Rio Vista to Suisun Valley Road	97,491	2,862	2.9%	97,255	3,099	3.1%	*+0.2%*
I-80 EB from Air Base Parkway to Manuel Campos Pkwy	80,848	2,862	3.4%	80,611	3,099	3.7%	*+0.3%*
I-80 WB from Redwood Street to Tennessee Street	69,931	2,862	3.9%	69,694	3,099	4.3%	*+0.3%*
I-80 EB from Tennessee Street to Redwood Street	77,553	2,862	3.6%	77,317	3,099	3.9%	*+0.3%*
I-80 WB from Appian Way to Richmond Parkway	74,281	2,715	3.5%	74,039	2,957	3.8%	*+0.3%*
I-80 EB from Richmond Parkway to Appian Way	94,951	2,715	2.8%	94,708	2,957	3.0%	*+0.2%*
I-80 WB from University Avenue to Ashby Avenue	104,843	2,512	2.3%	104,545	2,810	2.6%	*+0.3%*
I-80 EB from Ashby Avenue to University Avenue	121,108	2,512	2.0%	120,810	2,810	2.3%	*+0.2%*
I-880 SB from 5th Avenue to 23rd Avenue	91,267	1,818	2.0%	90,967	2,118	2.3%	*+0.3%*
I-880 NB from 23rd Avenue to 5th Avenue	83,453	1,818	2.1%	83,153	2,118	2.5%	*+0.4%*
I-880 SB from I-238 to A Street	102,951	1,248	1.2%	102,687	1,512	1.5%	*+0.3%*
I-880 NB from A Street to I-238	96,019	1,248	1.3%	95,756	1,512	1.6%	*+0.3%*
I-880 SB from Alvarado-Niles Road to Alvarado Blvd	97,960	1,248	1.3%	97,696	1,512	1.5%	*+0.3%*
I-880 NB from Alvarado Blvd to Alvarado-Niles Road	95,269	1,248	1.3%	95,005	1,512	1.6%	*+0.3%*
I-880 SB from Mowry Avenue to Stevenson Blvd	85,889	1,248	1.4%	85,626	1,512	1.7%	*+0.3%*
I-880 NB from Stevenson Blvd to Mowry Avenue	87,764	1,248	1.4%	87,501	1,512	1.7%	*+0.3%*
I-880 SB from Dixon Landing Road to SR 237	90,917	1,124	1.2%	90,695	1,345	1.5%	*+0.2%*
I-880 NB from SR 237 to Dixon Landing Road	101,237	1,124	1.1%	101,015	1,345	1.3%	*+0.2%*
SR 92 WB from San Mateo Br Toll Plaza to Foster City Blvd	44,371	0	0.0%	54,783	0	0.0%	*+0.0%*
SR 92 EB from Foster City Blvd to San Mateo Br Toll Plaza	54,686	0	0.0%	65,855	0	0.0%	*+0.0%*
SR 84 WB from Dumbarton Br Toll Plaza to University Avenue	56,872	0	0.0%	65,866	165*	0.3%	*+0.3%*
SR 84 EB from University Avenue to Dumbarton Br Toll Plaza	68,512	0	0.0%	78,221	165*	0.2%	*+0.2%*
Year 2040 – Horizon Year							
I-80 WB from SR 12 Rio Vista to Suisun Valley Road	107,437	4,126	3.7%	107,437	4,126	3.7%	*+0.0%*

TABLE 9: MEASURES OF EFFECTIVENESS – MODE CHOICE

Segment	No Project			SR 84/Ardenwood Scenario			
	Auto Total	**CCJPA Ridership**	**CCJPA Mode Share**	**Auto Total**	**CCJPA Ridership**	**CCJPA Mode Share**	***CCJPA Mode Share Delta***
I-80 EB from Air Base Parkway to Manuel Campos Pkwy	87,028	4,126	4.5%	87,028	4,126	4.5%	*+0.0%*
I-80 WB from Redwood Street to Tennessee Street	72,755	4,126	5.4%	72,755	4,126	5.4%	*+0.0%*
I-80 EB from Tennessee Street to Redwood Street	81,222	4,126	4.8%	81,222	4,126	4.8%	*+0.0%*
I-80 WB from Appian Way to Richmond Parkway	80,967	3,998	4.7%	80,961	4,004	4.7%	*+0.0%*
I-80 EB from Richmond Parkway to Appian Way	101,106	3,998	3.8%	101,100	4,004	3.8%	*+0.0%*
I-80 WB from University Avenue to Ashby Avenue	117,201	3,947	3.3%	117,066	4,082	3.4%	*+0.1%*
I-80 EB from Ashby Avenue to University Avenue	132,287	3,947	2.9%	132,152	4,082	3.0%	*+0.1%*
I-880 SB from 5th Avenue to 23rd Avenue	100,355	3,103	3.0%	100,103	3,355	3.2%	*+0.2%*
I-880 NB from 23rd Avenue to 5th Avenue	92,055	3,103	3.3%	91,802	3,355	3.5%	*+0.3%*
I-880 SB from I-238 to A Street	111,730	2,185	1.9%	111,379	2,536	2.2%	*+0.3%*
I-880 NB from A Street to I-238	108,143	2,185	2.0%	107,792	2,536	2.3%	*+0.3%*
I-880 SB from Alvarado-Niles Road to Alvarado Blvd	106,156	2,185	2.0%	105,805	2,536	2.3%	*+0.3%*
I-880 NB from Alvarado Blvd to Alvarado-Niles Road	105,803	2,185	2.0%	105,452	2,536	2.3%	*+0.3%*
I-880 SB from Mowry Avenue to Stevenson Blvd	93,206	2,185	2.3%	92,855	2,536	2.7%	*+0.4%*
I-880 NB from Stevenson Blvd to Mowry Avenue	94,974	2,185	2.2%	94,623	2,536	2.6%	*+0.4%*
I-880 SB from Dixon Landing Road to SR 237	102,779	1,983	1.9%	102,533	2,229	2.1%	*+0.2%*
I-880 NB from SR 237 to Dixon Landing Road	116,506	1,983	1.7%	116,260	2,229	1.9%	*+0.2%*
SR 92 WB from San Mateo Br Toll Plaza to Foster City Blvd	54,783	0	0.0%	54,783	0	0.0%	*+0.0%*
SR 92 EB from Foster City Blvd to San Mateo Br Toll Plaza	65,855	0	0.0%	65,855	0	0.0%	*+0.0%*
SR 84 WB from Dumbarton Br Toll Plaza to University Avenue	65,866	0	0.0%	65,866	265*	0.4%	*+0.4%*
SR 84 EB from University Avenue to Dumbarton Br Toll Plaza	78,221	0	0.0%	78,221	265*	0.3%	*+0.3%*

Notes:
* Indicates additional Transbay public and private transit demand arising from installation of Capitol Corridor station at SR 84/Ardenwood
Source: Fehr & Peers, 2019.

TABLE 10: MEASURES OF EFFECTIVENESS – PERSON THROUGHPUT

Segment	No Project	SR 84/Ardenwood Scenario	
	Person Throughput	Person Throughput	*Delta*
Year 2025 – Opening Year			
I-80 WB from SR 12 Rio Vista to Suisun Valley Road	109,293	109,530	*+0.2%*
I-80 EB from Air Base Parkway to Manuel Campos Pkwy	88,617	88,854	*+0.3%*
I-80 WB from Redwood Street to Tennessee Street	79,786	80,023	*+0.3%*
I-80 EB from Tennessee Street to Redwood Street	88,170	88,407	*+0.3%*
I-80 WB from Appian Way to Richmond Parkway	85,402	85,644	*+0.3%*
I-80 EB from Richmond Parkway to Appian Way	107,022	107,264	*+0.2%*
I-80 WB from University Avenue to Ashby Avenue	117,695	117,993	*+0.3%*
I-80 EB from Ashby Avenue to University Avenue	134,332	134,630	*+0.2%*
I-880 SB from 5th Avenue to 23rd Avenue	102,212	102,512	*+0.3%*
I-880 NB from 23rd Avenue to 5th Avenue	93,616	93,916	*+0.3%*
I-880 SB from I-238 to A Street	112,057	112,321	*+0.2%*
I-880 NB from A Street to I-238	103,896	104,160	*+0.3%*
I-880 SB from Alvarado-Niles Road to Alvarado Blvd	107,137	107,401	*+0.2%*
I-880 NB from Alvarado Blvd to Alvarado-Niles Road	103,975	104,239	*+0.3%*
I-880 SB from Mowry Avenue to Stevenson Blvd	93,800	94,064	*+0.3%*
I-880 NB from Stevenson Blvd to Mowry Avenue	95,986	96,250	*+0.3%*
I-880 SB from Dixon Landing Road to SR 237	103,352	103,573	*+0.2%*
I-880 NB from SR 237 to Dixon Landing Road	114,630	114,851	*+0.2%*
SR 92 WB from San Mateo Br Toll Plaza to Foster City Blvd	48,808	48,808	*+0.0%*
SR 92 EB from Foster City Blvd to San Mateo Br Toll Plaza	60,154	60,154	*+0.0%*
SR 84 WB from Dumbarton Br Toll Plaza to University Avenue	62,559	62,724	*+0.3%*
SR 84 EB from University Avenue to Dumbarton Br Toll Plaza	75,363	75,528	*+0.2%*
Year 2040 – Horizon Year			
I-80 WB from SR 12 Rio Vista to Suisun Valley Road	121,731	121,731	*+0.0%*

TABLE 10: MEASURES OF EFFECTIVENESS – PERSON THROUGHPUT

Segment	No Project	SR 84/Ardenwood Scenario	
	Person Throughput	Person Throughput	*Delta*
I-80 EB from Air Base Parkway to Manuel Campos Pkwy	97,491	97,491	*+0.0%*
I-80 WB from Redwood Street to Tennessee Street	84,157	84,157	*+0.0%*
I-80 EB from Tennessee Street to Redwood Street	93,470	93,470	*+0.0%*
I-80 WB from Appian Way to Richmond Parkway	94,826	94,832	*+0.0%*
I-80 EB from Richmond Parkway to Appian Way	115,912	115,918	*+0.0%*
I-80 WB from University Avenue to Ashby Avenue	133,943	134,078	*+0.1%*
I-80 EB from Ashby Avenue to University Avenue	149,727	149,862	*+0.1%*
I-880 SB from 5th Avenue to 23rd Avenue	113,494	113,746	*+0.2%*
I-880 NB from 23rd Avenue to 5th Avenue	104,363	104,615	*+0.2%*
I-880 SB from I-238 to A Street	124,867	125,218	*+0.3%*
I-880 NB from A Street to I-238	119,320	119,671	*+0.3%*
I-880 SB from Alvarado-Niles Road to Alvarado Blvd	118,808	119,159	*+0.3%*
I-880 NB from Alvarado Blvd to Alvarado-Niles Road	118,211	118,562	*+0.3%*
I-880 SB from Mowry Avenue to Stevenson Blvd	104,087	104,438	*+0.3%*
I-880 NB from Stevenson Blvd to Mowry Avenue	107,011	107,362	*+0.3%*
I-880 SB from Dixon Landing Road to SR 237	119,176	119,422	*+0.2%*
I-880 NB from SR 237 to Dixon Landing Road	134,987	135,233	*+0.2%*
SR 92 WB from San Mateo Br Toll Plaza to Foster City Blvd	60,261	60,261	*+0.0%*
SR 92 EB from Foster City Blvd to San Mateo Br Toll Plaza	72,441	72,441	*+0.0%*
SR 84 WB from Dumbarton Br Toll Plaza to University Avenue	72,452	72,717	*+0.4%*
SR 84 EB from University Avenue to Dumbarton Br Toll Plaza	86,043	86,308	*+0.3%*

Source: Fehr & Peers, 2019.

ATTACHMENT A
AUTO TRAVEL TIMES AND RELIABILITY

TABLE A-1: AM PEAK PERIOD TRAVEL TIMES AND RELIABILITY

Southbound/Westbound (Down Table)			Segment and Distance	Northbound/Eastbound (Up Table)		
Travel Time (minutes)		Buffer Time Index		Travel Time (minutes)		Buffer Time Index
Average	95th Percentile			Average	95th Percentile	
			Interstate 80 From SR 113 (Davis) to US 101			
13.1	15.9	20.9%	SR 113 (Davis) to I-505 (14.3 mi)	13.3	13.5	1.9%
11.7	13.7	17.2%	I-505 to SR 12 (Suisun City Exit) (12.6 mi)	10.8	12.0	10.3%
2.6	2.8	9.8%	SR 12 (Suisun City Exit) to I-680 (3.0 mi)	2.6	2.9	9.9%
7.7	12.2	**58.5%**	I-680 to SR 37 (7.2 mi)	6.7	7.4	9.8%
3.5	3.9	13.2%	SR 37 to I-780 (3.4 mi)	3.5	4.3	20.9%
1.3	1.7	**31.8%**	I-780 to Carquinez Bridge (1.2 mi)	1.1	1.2	10.3%
8.6	13.4	**55.6%**	Carquinez Bridge to SR 4 (5.1 mi)	4.7	5.1	8.6%
23.2	36.2	**55.9%**	SR 4 to I-580 (Albany) (10.5 mi)	10.0	10.8	8.1%
9.3	14.7	**57.8%**	I-580 (Albany) to MacArthur Maze (4.8 mi)	5.0	6.0	20.0%
4.8	8.1	**68.1%**	MacArthur Maze to Yerba Buena Island (4 mi)	3.7	4.1	8.5%
5.1	6.1	19.6%	Yerba Buena Island to US 101 (4.2 mi)	4.9	6.0	23.0%
			Interstate 880 from the MacArthur Maze (Junction I-80/I-580/I-880 to I-280/SR 17)			
4.6	5.3	14.7%	MacArthur Maze to I-980 (3.7 mi)	4.5	5.3	16.7%
5.2	7.4	**42.1%**	I-980 to High Street (SR 77) (4.0 mi)	5.7	7.5	**30.5%**
4.0	4.3	7.8%	High Street (SR 77) to Davis Street (SR 61) (4.1 mi)	8.3	12.4	**48.9%**
2.8	3.3	16.2%	Davis Street (SR 61) to I-238 (3.0 mi)	5.4	9.5	**74.8%**
7.5	10.7	**43.7%**	I-238 to SR 92 (4.0 mi)	4.8	6.8	**41.5%**
13.2	19.8	**50.0%**	SR 92 to SR 84/Decoto Road (6.4 mi)	6.8	8.8	**30.8%**
12.9	18.3	**42.0%**	SR 84/Decoto Road to Mission Boulevard (SR 262) (8.3 mi)	7.6	8.3	8.7%
5.6	7.6	**35.1%**	Mission Boulevard (SR 262) to SR 237 (3.8 mi)	3.4	3.6	6.4%

TABLE A-1: AM PEAK PERIOD TRAVEL TIMES AND RELIABILITY

Southbound/Westbound (Down Table)			Segment and Distance	Northbound/Eastbound (Up Table)		
Travel Time (minutes)		Buffer Time Index		Travel Time (minutes)		Buffer Time Index
Average	95th Percentile			Average	95th Percentile	
4.6	5.7	24.3%	SR 237 to US 101 (4.3 mi)	4.1	4.5	8.7%
5.1	6.7	**31.2%**	US 101 to I-280/SR 17 (4.1 mi)	5.9	8.4	**40.8%**
			Interstate 238/State Route 238 from I-880 to I-680			
4.7	7.5	**59.7%**	I-880 to I-580 (2.3 mi)	2.8	4.3	**53.7%**
4.4	5.9	**34.7%**	I-580 to Jackson Street (SR 92) (1.7 mi)	4.2	5.4	27.7%
9.8	12.1	23.4%	Jackson Street (SR 92) to SR 84/Niles Canyon Road (4.2 mi)	8.7	10.6	20.9%
0.7	1.1	**53.3%**	SR 84/Niles Canyon Road to SR 84/Mowry Avenue (0.3 mi)	0.6	1.1	**67.1%**
6.8	8.7	28.2%	SR 84/Mowry Avenue to I-680 (3.3 mi)	6.1	7.6	23.0%
			State Route 92 from Mission Boulevard (SR 238) to I-280			
5.3	7.6	**41.7%**	Mission Boulevard (SR 238) to I-880 (1.8 mi)	4.3	5.6	**30.6%**
26.5	40.1	**51.4%**	I-880 to US 101 (13.1 mi)	11.9	12.9	8.9%
6.0	8.0	**32.4%**	US 101 to I-280 (4.8 mi)	6.5	8.8	**34.3%**
			State Route 84 from I-580 to US 101			
22.5	30.1	**34.0%**	I-580 to I-680 (9.9 mi)	14.0	16.8	19.8%
10.7	12.3	14.7%	I-680 to Mission Boulevard (SR 238) (7.3 mi)	11.9	14.4	20.7%
9.1	10.7	17.1%	Mission Boulevard (SR 238) to I-880 (3.9 mi)	10.0	11.5	15.3%
15.0	21.7	**44.7%**	I-880 to University Avenue (8.0 mi)	7.9	8.9	12.5%
5.1	7.5	**45.8%**	University Avenue to US 101 (2.3 mi)	4.3	5.6	29.1%
			Southern Alameda County Area Local Arterial Roadways			
3.9	5.4	**38.1%**	A Street: I-580 to Foothill Boulevard (SR 238) (1.2 mi)	3.5	4.5	28.1%
4.6	5.8	25.1%	Redwood Road: Foothill Boulevard (SR 238) to I-880 (1.6 mi)	4.9	6.1	24.1%

TABLE A-1: AM PEAK PERIOD TRAVEL TIMES AND RELIABILITY

Southbound/Westbound (Down Table)			Segment and Distance	Northbound/Eastbound (Up Table)		
Travel Time (minutes)		Buffer Time Index		Travel Time (minutes)		Buffer Time Index
Average	95th Percentile			Average	95th Percentile	
5.2	6.6	28.3%	Winton Avenue/D Street: Foothill Boulevard (SR 238) to I-880 (1.7 mi)	6.0	7.6	25.5%
5.6	7.2	28.1%	Tennyson Road: Mission Boulevard (SR 238) to I-880 (1.7 mi)	5.2	6.8	**30.0%**
4.3	6.1	**40.3%**	Industrial Parkway: Mission Boulevard (SR 238) to I-880 (1.9 mi)	4.9	6.5	**31.8%**
7.0	8.8	25.9%	Whipple Road: Mission Boulevard (SR 238) to I-880 (2.6 mi)	6.8	8.4	24.2%
12.5	14.4	14.6%	Alvarado-Niles Road: Mission Boulevard (SR 238) to I-880 (5.3 mi)	13.0	15.1	16.1%
8.6	10.7	24.1%	Decoto Road: Mission Boulevard (SR 238) to I-880 (3 mi)	7.9	9.5	20.1%
6.8	8.4	23.0%	Mowry Avenue: Peralta Boulevard (SR 84) to I-880 (2.8 mi)	6.8	8.2	21.2%
7.8	9.4	21.6%	Stevenson Boulevard: Mission Boulevard (SR 238) to I-880 (3.3 mi)	8.2	9.8	20.1%

Bold indicates buffer time index above 30% (95th percentile travel time more than 30% above the average travel time)
Source: Fehr & Peers, 2019.

TABLE A-2: MIDDAY PERIOD TRAVEL TIMES AND RELIABILITY

Southbound/Westbound (Down Table)			Segment and Distance	Northbound/Eastbound (Up Table)		
Travel Time (minutes)		Buffer Time Index		Travel Time (minutes)		Buffer Time Index
Average	95th Percentile			Average	95th Percentile	
			Interstate 80 From SR 113 (Davis) to US 101			
12.6	13.7	8.2%	SR 113 (Davis) to I-505 (14.3 mi)	12.9	15.3	18.3%
11.2	12.4	11.0%	I-505 to SR 12 (Suisun City Exit) (12.6 mi)	10.9	11.8	8.2%
2.6	2.8	9.8%	SR 12 (Suisun City Exit) to I-680 (3.0 mi)	2.6	2.8	9.5%
6.5	7.1	8.7%	I-680 to SR 37 (7.2 mi)	6.8	7.8	14.7%
3.1	3.4	9.8%	SR 37 to I-780 (3.4 mi)	3.6	4.4	22.8%
1.1	1.2	9.3%	I-780 to Carquinez Bridge (1.2 mi)	1.1	1.2	7.4%
4.8	5.6	17.9%	Carquinez Bridge to SR 4 (5.1 mi)	4.8	5.3	11.1%
17.3	28.8	**66.9%**	SR 4 to I-580 (Albany) (10.5 mi)	11.0	13.0	18.0%
11.1	14.8	**33.4%**	I-580 (Albany) to MacArthur Maze (4.8 mi)	5.9	7.1	20.4%
4.6	6.6	**43.2%**	MacArthur Maze to Yerba Buena Island (4 mi)	4.0	4.4	12.4%
7.7	11.5	**49.7%**	Yerba Buena Island to US 101 (4.2 mi)	7.6	11.7	**53.5%**
			Interstate 880 from the MacArthur Maze (Junction I-80/I-580/I-880 to I-280/SR 17			
4.9	7.2	**46.3%**	MacArthur Maze to I-980 (3.7 mi)	4.6	5.4	18.6%
6.9	10.7	**54.5%**	I-980 to High Street (SR 77) (4.0 mi)	5.1	7.6	**47.9%**
4.2	5.4	28.0%	High Street (SR 77) to Davis Street (SR 61) (4.1 mi)	5.8	12.9	**122.9%**
2.8	3.2	11.0%	Davis Street (SR 61) to I-238 (3.0 mi)	3.2	4.7	**50.1%**
4.3	5.7	**31.8%**	I-238 to SR 92 (4.0 mi)	4.4	5.5	24.4%
6.6	9.3	**39.2%**	SR 92 to SR 84/Decoto Road (6.4 mi)	7.0	8.6	22.2%
8.1	9.3	15.5%	SR 84/Decoto Road to Mission Boulevard (SR 262) (8.3 mi)	8.0	8.8	10.6%
3.9	4.7	19.5%	Mission Boulevard (SR 262) to SR 237 (3.8 mi)	3.6	4.0	10.0%

TABLE A-2: MIDDAY PERIOD TRAVEL TIMES AND RELIABILITY

Southbound/Westbound (Down Table)			Segment and Distance	Northbound/Eastbound (Up Table)		
Travel Time (minutes)		Buffer Time Index		Travel Time (minutes)		Buffer Time Index
Average	95th Percentile			Average	95th Percentile	
4.1	4.7	16.2%	SR 237 to US 101 (4.3 mi)	4.0	4.3	8.1%
4.3	5.4	26.3%	US 101 to I-280/SR 17 (4.1 mi)	4.1	5.2	26.2%
			Interstate 238/State Route 238 from I-880 to I-680			
3.7	5.9	**60.6%**	I-880 to I-580 (2.3 mi)	3.0	4.0	**31.2%**
4.5	6.1	**34.3%**	I-580 to Jackson Street (SR 92) (1.7 mi)	4.5	5.8	28.5%
8.7	10.1	16.0%	Jackson Street (SR 92) to SR 84/Niles Canyon Road (4.2 mi)	9.0	10.8	19.1%
0.7	1.0	**50.0%**	SR 84/Niles Canyon Road to SR 84/Mowry Avenue (0.3 mi)	0.7	1.3	**73.4%**
6.3	7.4	18.4%	SR 84/Mowry Avenue to I-680 (3.3 mi)	6.1	7.3	19.0%
			State Route 92 from Mission Boulevard (SR 238) to I-280			
4.7	6.0	27.9%	Mission Boulevard (SR 238) to I-880 (1.8 mi)	4.7	6.1	**30.5%**
13.5	16.5	22.4%	I-880 to US 101 (13.1 mi)	13.4	15.4	15.0%
5.1	5.6	9.7%	US 101 to I-280 (4.8 mi)	5.1	5.9	16.7%
			State Route 84 from I-580 to US 101			
15.6	20.2	29.3%	I-580 to I-680 (9.9 mi)	14.5	17.9	23.6%
10.4	11.4	9.4%	I-680 to Mission Boulevard (SR 238) (7.3 mi)	11.3	13.3	17.6%
8.7	10.0	14.9%	Mission Boulevard (SR 238) to I-880 (3.9 mi)	9.8	11.5	17.4%
8.0	9.3	15.7%	I-880 to University Avenue (8.0 mi)	8.1	9.0	11.9%
4.0	5.3	**33.2%**	University Avenue to US 101 (2.3 mi)	4.3	5.8	**33.8%**
			Southern Alameda County Area Local Arterial Roadways			
3.7	4.7	27.7%	A Street: I-580 to Foothill Boulevard (SR 238) (1.2 mi)	3.5	4.5	26.0%
4.8	5.8	21.0%	Redwood Road: Foothill Boulevard (SR 238) to I-880 (1.6 mi)	4.8	6.0	24.6%

TABLE A-2: MIDDAY PERIOD TRAVEL TIMES AND RELIABILITY

Southbound/Westbound (Down Table)			Segment and Distance	Northbound/Eastbound (Up Table)		
Travel Time (minutes)		Buffer Time Index		Travel Time (minutes)		Buffer Time Index
Average	95th Percentile			Average	95th Percentile	
5.0	6.3	25.8%	Winton Avenue/D Street: Foothill Boulevard (SR 238) to I-880 (1.7 mi)	6.0	7.3	23.2%
5.5	6.9	24.6%	Tennyson Road: Mission Boulevard (SR 238) to I-880 (1.7 mi)	5.1	6.5	28.1%
4.3	5.9	**35.7%**	Industrial Parkway: Mission Boulevard (SR 238) to I-880 (1.9 mi)	4.5	5.7	27.5%
7.3	9.3	27.6%	Whipple Road: Mission Boulevard (SR 238) to I-880 (2.6 mi)	6.5	8.0	23.3%
13.0	15.0	15.3%	Alvarado-Niles Road: Mission Boulevard (SR 238) to I-880 (5.3 mi)	13.0	14.9	14.4%
7.9	9.6	20.9%	Decoto Road: Mission Boulevard (SR 238) to I-880 (3 mi)	7.9	9.5	19.8%
7.6	9.5	24.6%	Mowry Avenue: Peralta Boulevard (SR 84) to I-880 (2.8 mi)	7.4	9.1	23.2%
8.0	9.6	20.2%	Stevenson Boulevard: Mission Boulevard (SR 238) to I-880 (3.3 mi)	8.1	9.7	20.9%

Bold indicates buffer time index above 30% (95th percentile travel time more than 30% above the average travel time)
Source: Fehr & Peers, 2019.

TABLE A-3: PM PEAK PERIOD TRAVEL TIMES AND RELIABILITY

Southbound/Westbound (Down Table)			Segment and Distance	Northbound/Eastbound (Up Table)		
Travel Time (minutes)		Buffer Time Index		Travel Time (minutes)		Buffer Time Index
Average	95th Percentile			Average	95th Percentile	
Interstate 80 From SR 113 (Davis) to US 101						
12.3	13.1	6.1%	SR 113 (Davis) to I-505 (14.3 mi)	16.4	22.4	**36.6%**
10.9	11.8	8.3%	I-505 to SR 12 (Suisun City Exit) (12.6 mi)	12.7	18.1	**43.0%**
2.6	2.8	9.8%	SR 12 (Suisun City Exit) to I-680 (3.0 mi)	2.5	2.7	8.1%
6.6	7.2	8.6%	I-680 to SR 37 (7.2 mi)	8.7	12.0	**36.9%**
3.1	3.4	10.4%	SR 37 to I-780 (3.4 mi)	4.8	8.4	**73.8%**
1.1	1.2	10.2%	I-780 to Carquinez Bridge (1.2 mi)	1.2	1.5	26.4%
4.6	5.0	7.3%	Carquinez Bridge to SR 4 (5.1 mi)	11.6	17.0	**46.5%**
15.6	24.9	**59.7%**	SR 4 to I-580 (Albany) (10.5 mi)	23.4	31.3	**33.7%**
13.4	20.5	**53.0%**	I-580 (Albany) to MacArthur Maze (4.8 mi)	31.6	48.1	**52.2%**
6.6	11.5	**74.7%**	MacArthur Maze to Yerba Buena Island (4 mi)	7.6	12.5	**64.3%**
17.6	25.2	**43.0%**	Yerba Buena Island to US 101 (4.2 mi)	17.7	28.2	**59.6%**
Interstate 880 from the MacArthur Maze (Junction I-80/I-580/I-880 to I-280/SR 17						
7.0	12.7	**81.8%**	MacArthur Maze to I-980 (3.7 mi)	4.4	5.6	27.1%
11.2	15.9	**41.6%**	I-980 to High Street (SR 77) (4.0 mi)	4.3	5.4	24.7%
5.5	8.0	**46.1%**	High Street (SR 77) to Davis Street (SR 61) (4.1 mi)	4.6	6.8	**48.1%**
3.5	5.3	**52.8%**	Davis Street (SR 61) to I-238 (3.0 mi)	3.4	6.2	**83.8%**
5.4	8.8	**62.6%**	I-238 to SR 92 (4.0 mi)	5.4	6.2	14.6%
7.6	10.6	**40.2%**	SR 92 to SR 84/Decoto Road (6.4 mi)	17.7	23.0	**30.0%**
8.3	9.4	13.9%	SR 84/Decoto Road to Mission Boulevard (SR 262) (8.3 mi)	15.0	20.7	**38.4%**
3.5	3.8	9.1%	Mission Boulevard (SR 262) to SR 237 (3.8 mi)	7.2	10.8	**48.5%**

TABLE A-3: PM PEAK PERIOD TRAVEL TIMES AND RELIABILITY

Southbound/Westbound (Down Table)			Segment and Distance	Northbound/Eastbound (Up Table)		
Travel Time (minutes)		Buffer Time Index		Travel Time (minutes)		Buffer Time Index
Average	95th Percentile			Average	95th Percentile	
7.9	12.0	**51.8%**	SR 237 to US 101 (4.3 mi)	4.1	4.4	8.7%
6.3	9.2	**45.0%**	US 101 to I-280/SR 17 (4.1 mi)	9.1	14.6	**60.9%**
			Interstate 238/State Route 238 from I-880 to I-680			
3.0	4.6	**54.7%**	I-880 to I-580 (2.3 mi)	3.9	5.8	**50.0%**
5.0	6.7	**32.6%**	I-580 to Jackson Street (SR 92) (1.7 mi)	5.0	6.7	**33.3%**
9.4	10.7	14.7%	Jackson Street (SR 92) to SR 84/Niles Canyon Road (4.2 mi)	10.8	13.0	21.1%
0.7	1.1	**54.1%**	SR 84/Niles Canyon Road to SR 84/Mowry Avenue (0.3 mi)	1.0	1.7	**80.9%**
8.1	11.3	**39.0%**	SR 84/Mowry Avenue to I-680 (3.3 mi)	6.6	8.4	25.9%
			State Route 92 from Mission Boulevard (SR 238) to I-280			
5.1	6.6	29.5%	Mission Boulevard (SR 238) to I-880 (1.8 mi)	6.5	8.3	28.5%
12.2	13.3	9.1%	I-880 to US 101 (13.1 mi)	24.4	32.6	**33.7%**
6.0	8.2	**37.3%**	US 101 to I-280 (4.8 mi)	11.3	23.2	**104.3%**
			State Route 84 from I-580 to US 101			
14.6	17.7	20.6%	I-580 to I-680 (9.9 mi)	17.6	21.1	19.7%
10.4	11.4	9.2%	I-680 to Mission Boulevard (SR 238) (7.3 mi)	17.5	22.3	27.0%
9.2	10.7	16.3%	Mission Boulevard (SR 238) to I-880 (3.9 mi)	11.3	13.6	20.5%
7.7	8.7	12.2%	I-880 to University Avenue (8.0 mi)	13.8	16.8	21.5%
4.1	5.2	28.7%	University Avenue to US 101 (2.3 mi)	12.1	24.1	**99.6%**
			Southern Alameda County Area Local Arterial Roadways			
4.1	5.4	**30.0%**	A Street: I-580 to Foothill Boulevard (SR 238) (1.2 mi)	4.1	5.3	28.9%
5.2	6.4	22.9%	Redwood Road: Foothill Boulevard (SR 238) to I-880 (1.6 mi)	5.4	6.9	28.7%

TABLE A-3: PM PEAK PERIOD TRAVEL TIMES AND RELIABILITY

Southbound/Westbound (Down Table)			Segment and Distance	Northbound/Eastbound (Up Table)		
Travel Time (minutes)		Buffer Time Index		Travel Time (minutes)		Buffer Time Index
Average	95th Percentile			Average	95th Percentile	
5.5	6.7	22.8%	Winton Avenue/D Street: Foothill Boulevard (SR 238) to I-880 (1.7 mi)	6.7	8.6	27.7%
6.4	8.2	28.7%	Tennyson Road: Mission Boulevard (SR 238) to I-880 (1.7 mi)	5.7	7.3	27.9%
4.7	6.3	**35.7%**	Industrial Parkway: Mission Boulevard (SR 238) to I-880 (1.9 mi)	5.2	6.8	**30.9%**
7.3	9.2	26.0%	Whipple Road: Mission Boulevard (SR 238) to I-880 (2.6 mi)	7.6	9.8	28.8%
13.6	15.7	16.0%	Alvarado-Niles Road: Mission Boulevard (SR 238) to I-880 (5.3 mi)	13.8	16.3	17.5%
8.1	9.7	20.0%	Decoto Road: Mission Boulevard (SR 238) to I-880 (3 mi)	9.2	11.2	22.6%
7.3	9.0	23.4%	Mowry Avenue: Peralta Boulevard (SR 84) to I-880 (2.8 mi)	7.5	9.2	22.6%
8.1	9.7	19.3%	Stevenson Boulevard: Mission Boulevard (SR 238) to I-880 (3.3 mi)	9.0	11.0	22.7%

Bold indicates buffer time index above 30% (95th percentile travel time more than 30% above the average travel time)
Source: Fehr & Peers, 2019.

ATTACHMENT B
EXISTING CAPITOL CORRIDOR RIDERSHIP
ORIGIN-DESTINATION MATRICES

Ridership Origin Destination Matrix for April 2019, Tues-Thurs (AM Peak Period)

2019 **April**

	Riders	Riders	Riders	Riders	Riders	Riders	Riders	Riders	Riders	Riders	Riders	Riders	Riders	Riders	Riders	Riders	Riders	Riders	Riders Total
Origin	ARN	BKY	DAV	EMY	FFV	FMT	GAC	HAY	MTZ	OAC	OKJ	RIC	RLN	RSV	SAC	SCC	SJC	SUI	
ARN		1	3	5	0	0	0	0	1	0	1	3	0	0	16	0	0	0	30
BKY	0		37	0	0	0	38	0	1	0	0	0	0	0	35	14	14	1	141
DAV	0	33		72	3	6	8	2	17	8	26	56	0	0	31	2	8	9	281
EMY	0	0	25		1	0	22	0	2	0	0	0	0	0	52	8	19	1	131
FFV	0	18	3	44		0	5	3	20	5	25	21	0	0	6	1	2	0	153
FMT	0	1	2	18	0		7	0	0	0	2	0	0	0	6	3	4	0	43
GAC	0	4	1	7	0	0		0	0	0	9	2	0	0	5	0	0	0	29
HAY	0	2	2	5	0	0	50		0	0	1	0	0	0	7	15	33	0	116
MTZ	0	9	26	28	0	1	9	0		3	9	3	0	0	58	2	5	3	156
OAC	0	0	2	1	0	0	35	0	0		0	0	0	0	6	14	20	0	78
OKJ	0	0	12	1	0	1	95	0	1	0		0	0	0	45	22	44	1	222
RIC	0	0	13	3	0	1	9	0	2	0	0		0	0	34	2	8	1	75
RLN	0	1	7	5	0	0	0	0	1	0	3	2		0	21	0	0	1	42
RSV	0	3	16	13	0	0	0	0	3	0	4	5	0		44	0	0	3	92
SAC	0	26	27	186	7	9	30	10	32	21	110	122	0	0		8	30	18	636
SCC	0	3	1	5	0	0	0	0	1	0	3	0	0	0	5		1	0	18
SJC	0	6	5	12	0	0	0	1	1	2	14	1	0	0	28	0		1	71
SUI	0	18	2	48	0	1	4	1	10	5	19	10	0	0	34	0	1		154
Grand Total	0	126	184	452	14	20	310	17	92	44	227	226	0	0	433	92	189	40	2,468

Ridership Origin Destination Matrix for April 2019, Tues-Thurs (PM Peak Period)

2019 **April**

	Riders	Riders	Riders	Riders	Riders	Riders	Riders	Riders	Riders	Riders	Riders	Riders	Riders	Riders	Riders	Riders	Riders	Riders	Riders Total
Origin	ARN	BKY	DAV	EMY	FFV	FMT	GAC	HAY	MTZ	OAC	OKJ	RIC	RLN	RSV	SAC	SCC	SJC	SUI	
ARN		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BKY	1		39	0	14	1	3	1	10	0	0	0	1	3	31	2	4	12	122
DAV	3	26		21	3	2	2	2	17	2	10	16	6	11	29	1	4	2	155
EMY	5	0	73		41	14	7	4	28	2	0	4	4	13	186	4	9	40	435
FFV	0	1	1	2		0	0	0	0	0	1	1	0	1	7	0	0	0	15
FMT	0	0	6	0	0		0	0	1	0	1	1	0	0	10	0	0	1	21
GAC	0	36	8	18	4	5		45	8	34	88	8	0	0	32	0	0	3	289
HAY	0	0	3	0	2	0	0		0	0	0	0	0	0	11	0	1	1	18
MTZ	1	1	14	1	11	0	0	0		0	2	2	1	4	33	1	1	7	78
OAC	0	0	9	0	4	0	0	0	4		0	0	0	0	25	0	1	3	46
OKJ	2	1	28	0	25	1	5	1	9	0		1	2	5	128	2	9	18	236
RIC	3	0	55	0	18	0	2	0	4	0	0		2	5	120	0	1	9	218
RLN	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0
RSV	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0
SAC	12	31	37	60	10	5	4	4	74	6	43	51	19	31		4	16	44	450
SCC	0	12	3	7	0	3	0	14	2	15	20	2	0	0	9		0	0	88
SJC	0	14	10	17	2	1	0	23	6	20	37	7	0	0	38	0		2	177
SUI	0	1	6	1	0	0	0	0	2	0	1	1	1	2	15	0	0		32
Grand Total	27	122	292	127	133	32	23	93	164	81	203	93	38	75	674	14	47	142	2,378

Ridership Origin Destination Matrix for April 2019, Tues-Thurs (Off Peak Period)

2019 **April**

	Riders	Riders	Riders	Riders	Riders	Riders	Riders	Riders	Riders	Riders	Riders	Riders	Riders	Riders	Riders	Riders	Riders	Riders	Riders Total
Origin	ARN	BKY	DAV	EMY	FFV	FMT	GAC	HAY	MTZ	OAC	OKJ	RIC	RLN	RSV	SAC	SCC	SJC	SUI	
ARN		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BKY	0		13	0	5	0	1	0	1	0	0	0	0	0	15	1	2	6	45
DAV	0	28		27	2	4	2	2	22	8	11	24	0	0	38	1	6	3	180
EMY	0	0	19		8	2	1	0	4	0	0	1	0	0	76	1	5	8	126
FFV	0	1	2	5		0	0	0	1	1	3	2	0	0	10	0	1	0	25
FMT	0	0	2	0	0		0	0	0	0	0	0	0	0	3	0	0	1	7
GAC	0	4	1	2	0	1		4	1	1	6	0	0	0	7	0	0	1	28
HAY	0	0	1	0	1	0	0		0	0	0	0	0	0	3	0	1	0	6
MTZ	0	0	11	2	6	0	0	0		1	1	2	0	0	55	0	3	4	85
OAC	0	0	2	0	1	0	0	0	0		1	0	0	0	8	0	1	2	16
OKJ	0	0	11	0	5	1	2	0	2	1		0	0	0	65	1	4	5	96
RIC	0	0	20	0	6	0	0	0	1	0	0		0	0	51	0	1	4	84
RLN	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0
RSV	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0
SAC	0	24	51	85	7	8	8	8	52	26	58	69	0	0		4	38	30	467
SCC	0	3	1	1	0	0	0	2	1	1	3	0	0	0	4		2	0	18
SJC	0	3	4	3	1	1	0	1	2	3	6	2	0	0	18	0		1	45
SUI	0	2	3	2	0	0	0	0	1	1	4	3	0	0	26	0	1		43
Grand Total	0	65	139	126	43	17	16	17	88	43	94	104	0	0	380	9	66	64	1,270

Appendix F: CCJPA Station Policy

POLICY ON TRAIN STATIONS

FINAL VERSION: 2/13/19
Updated from 2006 Version

CAPITOL CORRIDOR JOINT POWERS AUTHORITY

Capitol Corridor Service
(Auburn-Sacramento-Suisun/Fairfield-Oakland/San Francisco-San Jose)

This Station Policy establishes the guidelines for existing and new stations along the Capitol Corridor Route for regional and megaregional economic and transportation system benefits. If exceptions are proposed, the initiating entity/community shall present their case to the CCJPA Board enumerating the benefits expected, which may be judged by the CCJPA Board to outweigh strict adherence to the specific guidelines included herein. The CCJPA Board shall make the final determination regarding establishment of new stations along the Capitol Corridor route based upon their judgment of the benefits to all riders and residents of the communities served by Capitol Corridor trains.

1. INTRODUCTION
The CCJPA Board had adopted the “Policy on Train Stations” in October 1998 as one of its first actions in conducting business as manager of the Capitol Corridor passenger train service. The policy, at the direction of the CCJPA Board of Directors, needed to be updated to reflect the many significant (positive) developments in the Capitol Corridor route since the adoption of the policy in 1998. To that end, the CCJPA Board adopted a set of principles at its February 15, 2006 meeting that guide the revision of this policy. The CCJPA Board further modified this station policy document in an update to the policies for existing and new stations on February 13, 2019.

The Capitol Corridor trains serve eighteen (18) stations along its approximate 180-mile route (6 staffed and 12 unstaffed) With the considerable success of the train service, the CCJPA has been approached by numerous communities and project sponsors for additional stations along the corridor. It is recognized that a stop at any station provides a service to additional new passengers using that station while simultaneously adding travel time to passengers whose destinations are at other stations. It is also recognized that the end-point to end-point train running time, if not addressed through mitigations or system improvements, will result in increased by adding additional stops.

The Train Station Policy describes the general guidelines and minimum requirements for adding a station and continuing service to an existing or new station on the Capitol Corridor. The most significant requirement to be met for adding a station is defined by the overall measurable enhancements to the Service. Since the service is currently no faster and in some cases slower than the competing private automobile, the overall impact upon the time it takes the train(s) serving an additional station to complete its trip from origin to destination is a significant factor for consideration. In addition to the travel time competitiveness of the private automobile, the impact of adding a train station in the corridor will be dependent on improvements to the railroad right of way and the CCJPA's management of the train service to meet the transportation needs in the corridor such as skip-stops, express service and/or limited service.

The policy allows the CCJPA to balance the addition of a new station or the reduction of, or increase in, train service to a station against (1) train travel times, (2) service frequency, (3) the operating and marketing strategies identified by the CCJPA, (4) the Service's systemwide quality/performance, ridership and revenues, (5) participation by the station owner and local communities, and (6) regional transportation system benefits and economic benefit. This policy, which may be modified from time to time, provides the flexibility for the CCJPA to make sound business decisions, in accordance with its Operating and Business Principles (adopted July 9, 1997).

2. ADDING A TRAIN STATION

If a project sponsor requests to add a station to be served by Capitol Corridor trains, the CCJPA will review the request to insure that the added station stop will provide a benefit to the Service while not degrading any aspect of the Service (e.g., quality, financial performance, and ridership and revenues).

Approval of a new train station requires passing through two phases of CCJPA Board approval which dictate the nature and focus of CCJPA's participation.

- PHASE ONE: Candidate station status from the CCJPA Board.
- PHASE TWO: Official station status from the CCJPA Board.

<u>Achieving Candidate Station Status:</u>
CCJPA will work with the station sponsor or local jurisdiction in this phase of work to help identify the meeting the parameters of a candidate station but will not actively support funding requests until the CCJPA Board of Directors supports the station as a candidate station. To be considered a candidate station to be potentially served by Capitol Corridor trains, the CCJPA requires that the following must be accomplished:

> <u>Local approvals</u>. The project sponsor must reach consensus among the political entities within the jurisdiction that a station is being requested.
>
> <u>Funding</u>. The local jurisdiction sponsoring the station must acknowledge that they will be responsible for obtaining 100% of the funding, including any improvements requested by the Union Pacific Railroad and the CCJPA. Funding sources may include any and all applicable funding sources, including local, state, and/or funding sources, subject to CCJPA Board approval.
>
> <u>Basic facilities</u>. The CCJPA requires that the project sponsor for any new potential station served by Capitol Corridor trains must include in the design and analysis, at a minimum, the following:

- Platforms will be a minimum of 800 feet in length and eight (8) inches top-of-rail (any deviations or exemptions will require approval by host railroad and/or CCJPA/Amtrak)
- Design will provide access to platforms so that passengers never cross a mainline track (e.g., grade separated access to island platform, station-only track not used by freight trains)
- Lighting (platform-4.00 average foot candles, shelter-4.00 foot candles, parking-2.00 foot candles);
- ADA acceptable access and egress;
- Where two or more main tracks exist there will be fencing to prevent passengers from crossing the tracks not served by the Capitol Corridor trains;
- Bomb-resistant trash receptacles will be provided at platforms and inside station passenger waiting areas (or trash receptacles will be placed in less vulnerable areas);
- Access to/from the proposed station will include an adequate number of parking spaces (including the required amount of designated handicapped spaces) will be based upon a parking demand analysis/study with a focus on a sustainable access plan including ADA compliance, zones for carpool, pick-up/drop-off, and ride-hailing/taxi zones, non-automobile vehicle access (such as bicycles, walking paths, scooters) and transit stops,
- Sustainable land uses that are adjacent to the station site that are supportive and can accommodate current and future ridership projections.
- Local law enforcement agency will patrol and inspect station and parking facilities;
- Signage (including station, pathfinder, and roadway) and informational kiosks;
- Canopy shelters to provide seating for twelve (12) people (and accommodate two (2) wheelchairs) with capacity to add more shelters to meet future demand
- Coordination/approval of station design plans with “host” railroad
- Install security cameras on platforms, waiting areas, station facilities, and parking areas with the connecting communication system to be developed as part of design plans
- Emergency call boxes will be provided, at a minimum, at all unstaffed stations
- Passenger Information Display System (PIDS) real time electronic message signs will be provided at platforms and inside station passenger waiting areas, based on CCJPA design specifications
- Ticket vending machines(s) and associated communication equipment will be provided at either platforms (under the canopy) or inside station passenger waiting areas
- An intermodal transit connection plan must be developed by the station project sponsor that may include joint ticketing or transit transfer with the CCJPA trains
- Secure storage bike racks/lockers (compatible eLockers) will be provided at a safe location away from platforms and passenger waiting areas

<u>Additional facilities</u>. Any additional facilities above the basic level will be selected, identified to be funded, and installed by the project sponsor subject to the CCJPA’s approval and the added facilities will not detrimentally impact the Capitol Corridor Service.

<u>Passenger safety</u>. Existing and new stations shall be maintained in a clean and safe condition in accordance with the provisions of California State law and agreements relating to Capitol Corridor trains serving the proposed station. CCJPA will maintain an annual operating agreement with Amtrak to maintain safe and clean conditions for the station platform area. Outside of the platform area, stations areas, including parking and other waiting areas under the control of a local jurisdiction be maintained as clean, safe, and crime-free environments for train passengers. Minimal safety standards for station areas include functional lighting, minimization of loitering in accordance with State Law, provision of garbage containers, maintaining safe

access to the station for all patrons, and frequent patrols by local law enforcement within the jurisdiction of the station area.

Projected patronage. Projected patronage shall be based on the use of the most current and applicable California intercity passenger rail ridership demand model or an approved model acceptable to the CCJPA (or a regionally approved model system) which is used by the CCJPA to develop baseline ridership and revenue forecasts for the Capitol Corridor train service annual business plan. Three schedule scenarios will be developed to forecast annual ridership and station patronage (boardings and alightings) with a forecast year of five years after the projected opening date of the new station for a 12 month period of ridership. These schedule scenarios shall at a minimum include; (1) a base case without a new station; (2) an unmitigated new station stop addition representing any increased travel time with an additional stop; and (3) a mitigated new station that includes improvements to offset any increased travel time.

The average projected patronage for a proposed station for boardings and/or alightings per train stopping at the station that has been requested by the sponsoring agency must be analyzed using the current/acceptable passenger rail ridership demand model, as described above. CCJPA will expect every new station considered as a candidate station to achieve an average projected patronage (boardings + alightings) per train (based on a calculated annual average) based on the implementation of any mitigation improvements to offset any increased travel time. Provided below are the minimum thresholds for forecasted ridership (boardings + alightings) per train stopping at the station for the first five years of train service to the proposed train station:

Year of Service	Projected Ridership (Boardings + Alightings) Per Train Stop (<20 daily trains)*	Projected Ridership (Boardings + Alightings) Per Train Stop (20+ daily trains)*
1	Equal to or greater than 7	Equal to or greater than 8
2	Equal to or greater than 8	Equal to or greater than 10
5 or more	Equal to or greater than 12	Equal to or greater than 15
*Per train ridership thresholds parsed to reflect service frequency differences		

Thresholds based on service levels recognizes that, historically, station ridership levels increase when service levels exceed twenty trains daily, a level equivalent to hourly service. Planned service increases in the CCJPA Vision Plan identify additional train frequencies to Roseville and San Jose that can help increase station ridership thresholds across the system.

Location. The location must be acceptable to the CCJPA, Union Pacific, and Amtrak. The CCJPA's goal is to have station stops separated by five (5) miles, but station spacings less than five (5) miles will be considered on a project-by-project basis.

Coordination with Union Pacific. The CCJPA, working in concert with Amtrak, will provide the interface with the Union Pacific Railroad on the location and any improvements required by the Union Pacific.

Impact on service. One of the goals of the CCJPA is not to increase travel time with the addition of a station. If the new station will lengthen the end terminal to end terminal train travel time, CCJPA staff will work with the project sponsor to ameliorate the incremental increase in train travel time due to the added station, including, but not limited to, track and signal improvements to increase track speed, reduced station dwell times, relocation of station stops, incorporating skip stops, express service, and/or limited service. In conjunction with these efforts with any project sponsors, the CCJPA will prepare a service operating plan to assist in the mitigation of added train travel times due to an added station. The service operating plan that includes the mitigation of added train travel times will be a schedule used for patronage calculations.

Consideration of the impacts on service will consider the following in assessing impacts of service:

- Regional and megaregional benefits
- Local zoning supportive of transit-oriented development
- Geographic transit equity
- Public-private partnerships in project delivery or associated with the new station project

Maintenance. The local jurisdiction should be aware that maintenance will be arranged by the project sponsor and funded by the project sponsor or local jurisdiction.

Marketing a new station. As part of its request for Capitol Corridor train service, the project sponsor will be required to submit to the CCJPA a local marketing plan to promote the new station. In addition to any local marketing the project sponsor undertakes for the station opening and its continuous operation, the CCJPA will work with the project sponsor to include the station in the CCJPA's overall marketing plan including the station opening. The CCJPA would encourage station owners to engage with the CCJPA prior to the beginning each fiscal year to allow the CCJPA to set aside funds for joint promotional activities for the station.

Approval by the CCJPA. If a new station sponsor can demonstrate or document that the candidate requirements listed can be met, the CCJPA staff will prepare a recommendation to the CCJPA Board of Directors to consider identifying the subject potential station as a candidate station. If approved, candidate station status allows CCJPA staff to actively participate with the project sponsor or local jurisdiction supporting acquisition of funding sources for future station development. Regardless, at the candidate station phase, the CCJPA Board reserves the right to approve or deny train service to a candidate station for other reasons.

CCJPA Candidate Station commitments. After approval by the CCJPA Board of Directors as a candidate station the CCJPA will represent the station in the annual Business Plan Update. To assist in securing grant and other funding the CCJPA will consider a Memorandum of Understanding with the project sponsor or local jurisdiction regarding next steps to secure funding that can serve as a preliminary commitment to provide service.

Achieving Official Station Status:

All commitments included in the process of the candidate station process must continue to be supported by the station sponsor or local jurisdiction to move to official station status. Only after being designated as a candidate station by the CCJPA Board of Directors, can the CCJPA actively participate with the station sponsor for the purposes of supporting funding requests. The action to become an official station by the CCJPA Board is suitable when the station sponsor or local jurisdiction can demonstrate that a comprehensive funding plan is in place sufficient to initiate Capitol Corridor service to the new station.

Approval by the CCJPA. If a new station sponsor can demonstrate or document that the candidate station now has the sufficient funding programmed and committed, the CCJPA Board of Directors will consider granting official station status to providing Capitol Corridor train service to the station. Regardless, the CCJPA Board of Directors still retains the right to approve or deny train service to a station for other reasons throughout the process.

Pre-Station Opening Requirements. Throughout the construction phase and prior to official opening of the station the project sponsor or local jurisdiction will be responsible for coordinating, with CCJPA staff assistance, the necessary pre-service requirements for providing station service. These include working to meet host railroad requirements, CCJPA's rail operator requirements, and all applicable safety and customer service requirements that CCJPA or other authorities requires. The marketing plans for pre and post station opening must be refined and implemented and maintained according to the marketing plan developed in the pre-candidate station phase. Station design may be modified to accommodate changes in transportation technology or mobility evolutions that may have occurred since being approved as a candidate station. After opening, the new station will be subject to the conditions of operating as a new station within one year of station opening.

3. CONTINUING SERVICE TO AN EXISTING OR NEW TRAIN STATION

New stations that were previously analyzed for their projected activity based on the accepted CCJPA station ridership model(s) are, once in operations, expected to achieve the actual measured following per train average patronage (boardings + alightings based on annual results) according to the following schedule.

Year of Service	Projected Ridership (Boardings + Alightings) Per Train Stop (<20 daily trains)	Projected Ridership (Boardings + Alightings) Per Train Stop (20+ daily trains)
1	Equal to or greater than 7	Equal to or greater than 8
2	Equal to or greater than 8	Equal to or greater than 10
5 or more	Equal to or greater than 12	Equal to or greater than 15
*Per train ridership thresholds parsed to reflect service frequency differences		

For all established stations (stations that have been served more than five continuous years of Capitol Corridor service) a minimum daily average of fifteen (15) boarding or alightings per train is required. While these thresholds are recommended as guidance to determine the success of a station, consideration may be given to stations that are close to these thresholds that generate per passenger ticket revenue above average for the system.

The CCJPA will continuously review ridership and related performance at all train stations and present results as informational data associated with each CCJPA Board of Director meeting. Performance below par will result in the station being placed under probationary evaluation by the CCJPA with respect to the corridor's systemwide service quality/performance, ridership, and revenues. Additionally, CCJPA will may seek to place a station on probationary evaluation should other agreed to local support not continue, including but not limited to an adequate provision of law enforcement patrols and other critical elements of customer safety and support. CCJPA will formally notify the station owner of the start of the probationary period and include an attachment of this station policy with the formal notification. The expectation is that the local station owner or sponsor will develop the action plan with technical support from CCJPA staff.

A probationary action plan will be required that incorporates one or more of the following actions:

1. Develop a budget indicating financial commitment and implement a locally-based marketing and communications plan featuring the suite of actions to increase station patronage

2. Work with public transit operators to enhance connecting service
3. Develop programs with rideshare, bikeshare, carshare, transportation network companies, and local employers to incentivize or provide greater shared access modes to/from the station
4. Inventory physical barriers to pedestrian and bicycle access to the station and develop and implement an accessibility improvement plan
5. Document actions that support the modification of local land use within the surrounding station area up to a 0.5 mile radius to increase the density of jobs, housing, or commercial services
6. Addressing any identified deficiencies in local support critical to customer support and safety at a station.

Probationary action plans shall be in effect up to three years from the formal probationary notice issued by CCJPA. The CCJPA and the station owner shall review the effectiveness of the Probationary Plan's implementation on an annual basis and if there is no improvement, the Probationary Plan shall be updated to try and meet the standards. If after three years the station ridership standards are not being met, the CCJPA Board may consider actions to reduce service to the required boardings and alightings per day in accordance with the corridor's systemwide service quality/performance, ridership, revenues, and local participation.

In no circumstance will a train station receive less than one daily round-trip train so long as Capitol Corridor train service is operated on the rail line that provides service to the station and there are some boardings or alightings at the station. In the event that train service is to be restored to a station, the CCJPA will work with the station owner to develop marketing and operating plans to bring trains back to that station.

Staff will continue to monitor the status of affected station(s), including the restoration of an increase in train services to stations, as part of the CCJPA's management of the Service. All changes affecting Capitol Corridor train stations will be made in accordance with all applicable Federal and State laws.

Appendix G: Preliminary Cost Estimate

Preliminary Cost Estimate

Table 20: SBC Estimate of Possible Costs (2019 Dollars)

Note: This preliminary cost estimate provides an opinion of costs that could be included in SBC. Project elements and level of work involved for each are to be further refined as the project definition and details are determined in coordination with project partners. Cost and quantities are based on engineering judgment only and do not reflect specific design information.
Acronyms: CY = Cubic Yard; EA = Each; LF = Linear Foot; LS = Lump Sum; MI = Mile; SF = Square Foot

Section	Item Number	Item	Quantity	Unit	Cost/Unit	Total
Newark Junction to Elmhurst Junction Track Upgrade	1	Upgrades to Elmhurst Junction				
	1.1	Turnout (Number 20) - Elmhurst Junction	1	LS	$400,000	$400,000
	1.2	Track Construction Miscellaneous	1	LS	$250,000	$250,000
	2	Rehabilitate Track				
	2.1	Rehabilitate Track	17.4	MI	$750,000	$13,050,000
	2.2	Signaling (Centralized Traffic Control and Positive Train Control)	17.4	MI	$1,500,000	$26,100,000
	2.3	Structures - Upgrades/Retrofits	1	LS	$6,000,000	$6,000,000
	2.4	Security Fencing	34.8	MI	$350,000	$12,180,000
	2.5	Clearing and Grubbing	1.0	LS	$1,000,000	$1,000,000
	2.6	Water Pollution Control	1.0	LS	$1,500,000	$1,500,000
	2.7	Drainage and Utilities	1.0	LS	$4,000,000	$4,000,000
	3	Passing Track (Elmhurst Junction to Newark Junction)				
	3.1	New At-Grade Track	0.3	MI	$1,750,000	$497,159
	3.1	New At-Grade Subgrade	3,800	CY	$35	$133,000
	3.3	Track Construction Miscellaneous	0.3	MI	$140,000	$39,773
	3.4	Turnouts	2.0	EA	$150,000	$300,000
	3.5	Structures - Major Drainage	1	LS	$750,000	$750,000
	4	Roadway Crossings				
	4.1	Existing At-Grade Crossing Upgrades	21	EA	$750,000	$15,750,000
	5	Traffic Control Systems	1.0	LS	$1,500,000	$1,500,000
		CONSTRUCTION COST SUBTOTAL				**$83,450,000**

Section	Item Number	Item	Quantity	Unit	Cost/Unit	Total
Newark Junction to Elmhurst Junction Track Upgrade *(continued)*	10	Program Management (6% Construction Cost)				$5,007,000
	11	Environmental Clearance (4% Construction Cost)				$3,338,000
	12	Environmental Mitigation (5% Construction Cost)				$4,172,500
	13	Engineering (7% Construction Cost)				$5,841,500
	14	Construction Management (8% Construction Cost)				$6,676,000
	15	Contingencies (35% Construction Cost)				$29,207,500
					TOTAL	**$138,000,000**
Ardenwood Station (Option 1-Existing Bus Stop)	1	New Station (Initial Phase)				
	1.1	Platform (800'x12')	1	LS	$3,500,000	$3,500,000
	1.2	Fence (Railing)	1,000	LF	$45	$45,000
	1.3	Station Furnishings	1	LS	$2,000,000	$2,000,000
	1.4	Platform Connection to Parking Lot/Northwest	1,200	LF	$2,000	$2,400,000
	1.5	Pedestrian Crossing Over UPRR Tracks	2	EA	$1,125,000	$2,250,000
	1.6	Drainage and Utilities	1	LS	$2,000,000	$2,000,000
	1.7	Parking Lot (note: not part of CCJPA project cost)	72,000	SF	$30	$2,160,000
					CONSTRUCTION COST SUBTOTAL	**$12,445,000**
	2	Program Management (6% Construction Cost)				$746,700
	3	Environmental Clearance (4% Construction Cost)				$497,800
	4	Environmental Mitigation (5% Construction Cost)				$622,250
	5	Engineering (7% Construction Cost)				$871,150
	6	Right-of-Way				$2,000,000
	7	Construction Management (8% Construction Cost)				$995,600
	8	Contingencies (35% Construction Cost)				$4,355,750
					TOTAL	**$25,000,000**

Section	Item Number	Item	Quantity	Unit	Cost/Unit	Total
Ardenwood (Option 2- Highway Median Bus Stop)	1	New Bus Platform				
	1.1	SR 84 Overhead with Bus Platform & Newark Undercrossing	1	LS	$7,000,000	$7,000,000
	1.2	Stairs and Elevator	1	EA	$950,000	$950,000
	1.3	Traffic Control Systems	1	LS	$450,000	$450,000
	1.4	Temporary Railing (Type K)	13,500	LF	$25	$337,500
	1.5	Crash Cushions	8	EA	$25,000	$200,000
	1.6	Earthwork	30,000	CY	$55	$1,650,000
	1.7	Pavement Structural Section	255,000	SF	$55	$14,025,000
	1.8	Removal (Bridge Railing, Roadway Excavation, etc.)	1	LS	$2,500,000	$2,500,000
	1.9	Drainage and Utilities	1	LS	$2,400,000	$2,400,000
	1.10	Median Barrier	8,800	LF	$130	$1,144,000
		CONSTRUCTION COST SUBTOTAL				**$30,656,500**
	2	Program Management (6% Construction Cost)				$1,839,390
	3	Environmental Clearance (4% Construction Cost)				$1,226,260
	4	Environmental Mitigation (5% Construction Cost)				$1,532,825
	5	Engineering (7% Construction Cost)				$2,145,955
	6	Right-of-Way				$0
	7	Construction Management (8% Construction Cost)				$2,452,520
Note: Cost is in addition to Option 1 cost.	8	Contingencies (35% Construction Cost)				$10,729,775
		TOTAL				**$50,600,000**
Ardenwood (Option 3 - Highway Split Bus Stop)	1	New Bus Platform				
	1.1	SR 84 Overhead with Bus Platform & Newark Undercrossing	1	LS	$4,500,000	$4,500,000
	1.2	Stairs and Elevator	3	LS	$950,000	$2,850,000
	1.3	At-Grade Connection to CCJPA Platform	1,100	LF	$2,000	$2,200,000
	1.4	Traffic Control Systems	1	LS	$500,000	$500,000

Section	Item Number	Item	Quantity	Unit	Cost/Unit	Total
Ardenwood (Option 3 – Highway Split Bus Stop) *(continued)* *Note: Cost is in addition to Option 1 cost.*	1.5	Temporary Railing (Type K)	9,500	LF	$25	$237,500
	1.6	Crash Cushions	4	EA	$25,000	$100,000
	1.7	Earthwork	25,000	CY	$55	$1,375,000
	1.8	Pavement Structural Section	180,000	SF	$55	$9,900,000
	1.9	Removal (Bridge Railing, Roadway Excavation, etc.)	1	LS	$2,500,000	$2,500,000
	1.10	Drainage and Utilities	1	LS	$2,800,000	$2,800,000
	1.11	Median Barrier	6,000	LF	$130	$780,000
	1.12	Retaining Wall	2,050	LF	$3,085	$6,324,250
	1.13	Stairs to Parking Lot	2	LS	$200,000	$400,000
		CONSTRUCTION COST SUBTOTAL				**$34,466,750**
	2	Program Management (6% Construction Cost)				$2,068,005
	3	Environmental Clearance (4% Construction Cost)				$1,378,670
	4	Environmental Mitigation (5% Construction Cost)				$1,723,338
	5	Engineering (7% Construction Cost)				$2,412,673
	6	Right-of-Way				$500,000
	7	Construction Management (8% Construction Cost)				$2,757,340
	8	Contingencies (35% Construction Cost)				$12,063,363
		TOTAL				**$57,400,000**
Freight Mitigation	1	Industrial Parkway Grade Separation				
	1.1	Grade Separation Structure - Industrial Parkway	1	LS	$10,000,000	$10,000,000
	1.2	Civil/Roadway - Industrial Parkway	1	LS	$25,000,000	$25,000,000
	1.3	Alameda County Canal - Structure	1	LS	$2,500,000	$2,500,000
	1.4	Traffic Control Systems	1	LS	$150,000	$150,000
	1.5	Drainage and Utilities	1	LS	$350,000	$350,000
	2	Siding Extension (at Hayward)				
	2.1	New At-Grade Track	0.5	MI	$1,530,000	$765,000
	2.2	New At-Grade Track - Subgrade	6,600	CY	$12	$79,200
	2.3	Track Construction Miscellaneous	0.5	MI	$140,000	$70,000
	2.4	Turnout (Number 11)	1	LS	$140,000	$140,000

Section	Item Number	Item	Quantity	Unit	Cost/Unit	Total
Freight Mitigation *(continued)*	3	Shinn Connection				
	3.1	New At-Grade Track	0.5	MI	$1,530,000	$765,000
	3.2	New At-Grade Track - Subgrade	6,600	CY	$12	$79,200
	3.3	Track Construction Miscellaneous	0.5	MI	$140,000	$70,000
	3.4	Turnout (Number 11)	1	LS	$140,000	$140,000
	3.6	Fence	5,280	LF	$60	$316,800
	3.7	Noise and Vibration Mitigation	1	LS	$2,000,000	$2,000,000
	3.8	Visual Improvements	1	LS	$1,000,000	$1,000,000
		CONSTRUCTION COST SUBTOTAL				**$39,055,000**
	4	Program Management (6% Construction Cost)				$2,343,300
	5	Environmental Clearance (4% Construction Cost)				$1,562,200
	6	Environmental Mitigation (5% Construction Cost)				$1,952,750
	7	Engineering (7% Construction Cost)				$2,733,850
	8	Right-of-Way				$500,000
	9	Construction Management (8% Construction Cost)				$3,124,400
	10	Contingencies (35% Construction Cost)				$13,669,250
		TOTAL				**$65,000,000**
Hayward Station Removal	1	Remove/Modify Hayward Station	1	LS		
	1.1	Remove/Salvage Station Furnishings	1	LS	$500,000	$500,000
	1.2	Miscellaneous Upgrade for Freight	1	LS	$350,000	$350,000
		CONSTRUCTION COST SUBTOTAL				**$850,000**
	2	Program Management (6% Construction Cost)				$51,000
	3	Environmental Clearance (4% Construction Cost)				$34,000
	4	Environmental Mitigation (5% Construction Cost)				$42,500
	5	Engineering (7% Construction Cost)				$59,500
	6	Right-of-Way				$500,000
	7	Construction Management (8% Construction Cost)				$68,000
	8	Contingencies (35% Construction Cost)				$297,500
		TOTAL				**$2,000,000**

Appendix H: Funding Sources

Secured Sources

Measure BB

Measure BB is a transportation-dedicated sales tax that was approved by Alameda County voters in November 2014. Measure BB added a half-cent to the existing Measure B half-cent sales tax. The one-cent rate set is projected to generate $8 billion before it expires in 2045.

Eligible uses for Measure BB funds are found in its voter-approved Transportation Expenditure Plan (TEP), which programs funds into specific line item projects, programmatic categories, and local distributions. The TEP includes $40 million for "Capitol Corridor Service Expansion".

Additional Measure BB funds, such as programmatic funds for bicycle and pedestrian infrastructure and safety, may be available for Ardenwood Station elements. Measure BB funds directed to the Cities of Fremont and Newark may be eligible for application to Ardenwood Station enhancements as well.

Regional Measure 3 (RM 3)

RM 3 is a transportation-dedicated bridge toll increase. RM 3 was approved by voters in the nine-county area in July 2018. By 2022, RM 3 will raise tolls on the Bay Area's seven state-owned bridges by $3. RM 3's Expenditure Plan includes $90 million for Capitol Corridor.

Transit and Intercity Rail Capital Program (TIRCP)

TIRCP supports transformative capital improvements that modernize California's rail systems. The program is funded by the Greenhouse Gas Reduction Fund and Senate Bill 1 gas taxes. CCJPA was awarded $51 million in TIRCP funds for SBC in 2018.

State Transportation Improvement Program (STIP): Interregional Transportation Improvement Program (ITIP)

The STIP is a multi-year (typically five) capital improvement program for transportation projects that is administered by the California Transportation Commission. Programming is updated every two years. Project sponsors do not directly apply for their project to be included in the STIP; rather, they work through regional organizations that can nominate the project to the State.

The ITIP consists of 25% of new STIP funds. It is dedicated to interregional projects, including intercity rail. The 2018 ITIP programmed $20 million for Coast Subdivision Rail Corridor Improvements in Alameda County. These funds were programmed for allocation in Fiscal Year 2021-22. In 2019, two amendments were made to this programming: the fiscal year of allocation was moved to 2022-23, and the programming amount was reduced to $15,363,000. The other $4,637,000 was reprogrammed to support Positive Train Control installation through the Coast Subdivision. CCJPA may choose to promote the inclusion of SBC in future STIP:ITIP programming.

Potential Funding Sources

CCJPA will track funding opportunities from multiple sources to fill SBC's funding gap. Some sources that CCJPA may seek funding from are listed in Table 1.

Table 1: Potential Funding Sources

Source	Administering Agency	Description
Better Utilizing Investments to Leverage Development (BUILD)	United States Department of Transportation	Funds capital projects that improve surface transportation.
Consolidated Rail Infrastructure and Safety Improvements (CRISI)	Federal Railroad Administration	Funds preconstruction and construction work that improves the nation's rail system.
Federal-State Partnership for State of Good Repair Program	Federal Railroad Administration	Funds capital projects that bring rail infrastructure into a state of good repair.
Infrastructure for Rebuilding America (INFRA)	United States Department of Transportation	Funds capital projects that address critical highway and bridge needs.
Restoration and Enhancement Grants Program	Federal Railroad Administration	Funds operating assistance to initiate, restore, or enhance intercity passenger rail service.
Solutions for Congested Corridors Program (SCCP)	California Transportation Commission	Funds capital projects that reduce congestion in highly traveled and congested corridors.
State Rail Assistance Program (SRA)	California State Transportation Agency (CalSTA)	Funds projects that support California's rail system. *Note: CCJPA receives quarterly programmatic allocations from SRA, which it can apply to a variety of improvement projects. CalSTA occasionally releases competitive SRA funding calls as well. CCJPA plans to reserve programmatic SRA funds for other projects.*
Trade Corridor Enhancement Program (TCEP)	California Transportation Commission	Funds all phases of project work that improve the state's freight system.