



CALIFORNIA BRIDGE ENGINEERS SEMINAR

ADVANCING BRIDGE ENGINEERING THROUGH INNOVATION



CABES 2026

Presentation 6





2026
CA BRIDGE
ENGINEER SEMINAR

High-Speed Passenger Rail connecting Southern California and Las Vegas

Presented by
Adrian Share | Brightline West
Y. Nien Wang | HNTB



AGENDA

1. Project Introduction Slides
2. Project Structures Location Map
3. Structure Groups Slides
4. BLW HSR Bridge Design Criteria
5. BLW HSR Bridges with Scour Consideration
6. BLW HSR Bridges next to Caltrans OC (New Widen)
7. Floating Bridge Concept
8. Viaducts Slides
9. Closing Remarks

BRIGHTLINE WEST

All-electric trains

Mostly in median of Interstate 15 with no at-grade crossings

218-mile trip

Las Vegas to Rancho Cucamonga

4 new stations

Coordinated first/last mile travel

186 miles per hour

True high speeds

Trains every hour

35 total trains per day



Brightline West Benefits



Plants the Flag for True American High-Speed Rail

- Start of U.S. high-speed train industry building the blueprint for more systems to be built
- With train, system and track contracts alone—58 suppliers across 20 states and territories



Creating High-Quality, Good-Paying Jobs

- Project will generate \$10B+ in economic impact
- 10K+ field jobs during construction
- 1,000 permanent operations & maintenance jobs



Green & Safe

- Emission-free trains & power result in 400K ton annual CO2 decrease
- Equal to 3M cars off the road + 16K short-haul flights not flown
- Expected to result in reduction in highway-related deaths & injuries



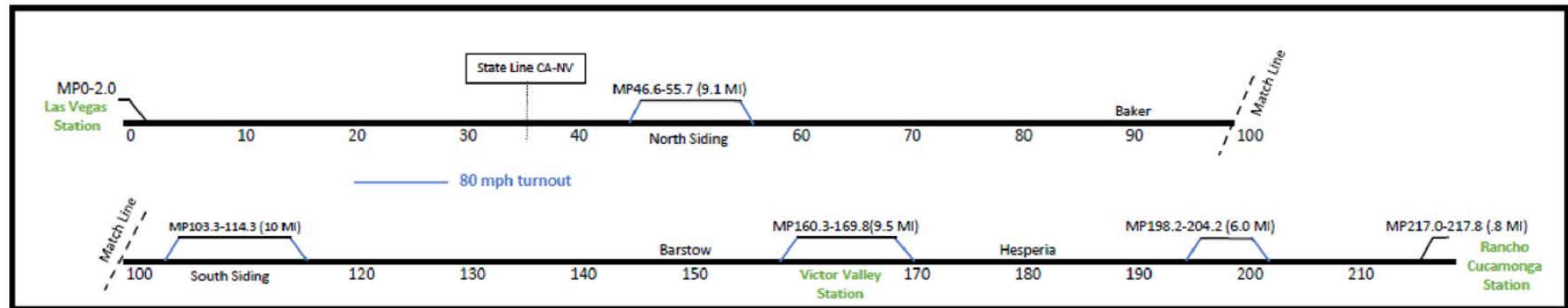
Concept of Operations – Overview

218 miles of tracks – primarily a single-track railroad with double track at passing sidings and stations

- **180 miles of single track with 37 miles of double track**

Designed for **60-minute headways** providing hourly service in both directions

Trip Time of approximately 2 hours and 10 minutes



Construction Plan – Overview

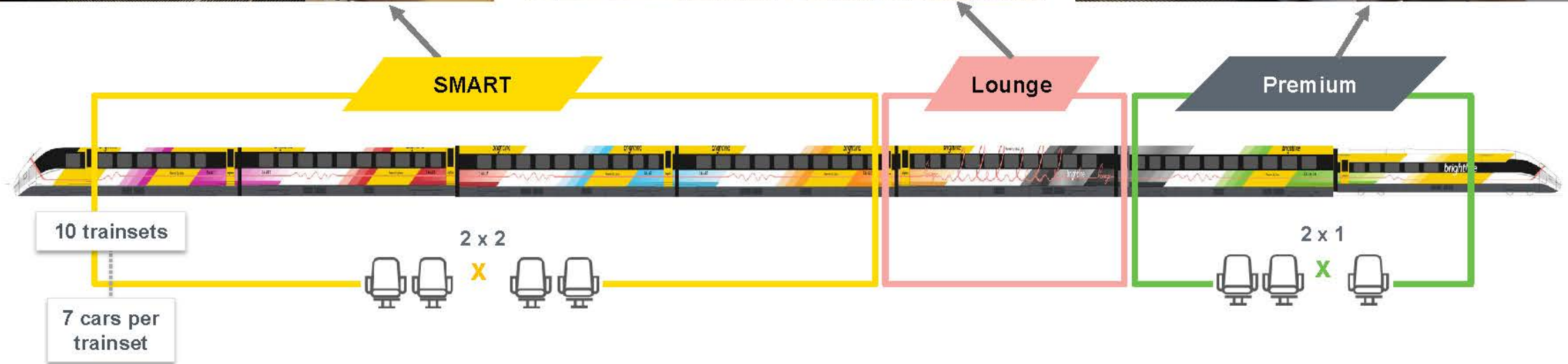
Contracting strategy involves breaking up the construction into 9 key packages utilizing specialized counterparties

- **BLW's contracting strategy is informed by the successful strategy used to open Brightline Florida**
- **Four contracts have been signed to date with remaining contracts expected to be signed in near future**

Category	Description
Civil Infrastructure	218 miles of highway work, structures, grading track, ballast
Track & Systems	New train controls, signaling, communications & overhead catenary system
Stations & Vehicle Maintenance Facility	4 stations (Las Vegas, Victor Valley, Hesperia, Southern California) and maintenance facilities for trainsets and the track/rail corridor
Rolling Stock	10 new high-speed trainsets
Other Project Costs	Utilities, Project Management, and Other Soft Costs



State-of-the-Art-Trainsets



Civil Work Zones

There are 4 primary civil contracts: 1 in Nevada and 3 in California
California has 9 design segments, all in I-15 median except final mile



Key Project Partners:
NDOT – Grant
Caltrans



Las Vegas Station – Overview

- Flagship Las Vegas Station is on Las Vegas Boulevard (“the Strip”)
- Proximity to the Strip ensures maximum passenger convenience
 - Minutes to world-class resorts, casinos, stadiums, and attractions
 - Adjacent to I-15 & I-215 – major arteries connecting to Las Vegas suburban areas and facilitating last-mile connections



The Las Vegas Strip



High Desert Stations



VICTOR VALLEY

- Located Near Dale Evans Parkway
- Full-Service Station for the High Desert
- Platform in median of I-15 connected to station via tunnel



HESPERIA

- Located near Joshua St. at the top of Cajon Pass
- Commuter Focused Service in Morning/Evening
- Basic Amenities including Security



Southern California Station – Overview

- Accessible from Greater LA and other key areas across San Bernardino, Riverside, Orange Counties
- Site of existing Metrolink stop on the system's busiest line
- 3,700+ space on-site parking structure to provide convenience for riders coming from Southern CA
- 1,500 foot boarding platform sits below BLW lounges and above arrival and departure lobby



Metrolink Coordination

- ✓ Synchronized schedule/transfers
- ✓ Single ticket, integrated ride
- ✓ Express and weekend trains
- ✓ BLW connection to Downtown L.A. at Union Station



Current Project Status & Next Steps

Current Status (2026)

- Environmental clearance complete
- Major permits in place
- 4 contracts awarded
- FSP grant in place
- Have applied for RRIF loan from Build America Bureau
- Advancing final design at various stages in corridor
- Working closely with Caltrans for design approvals

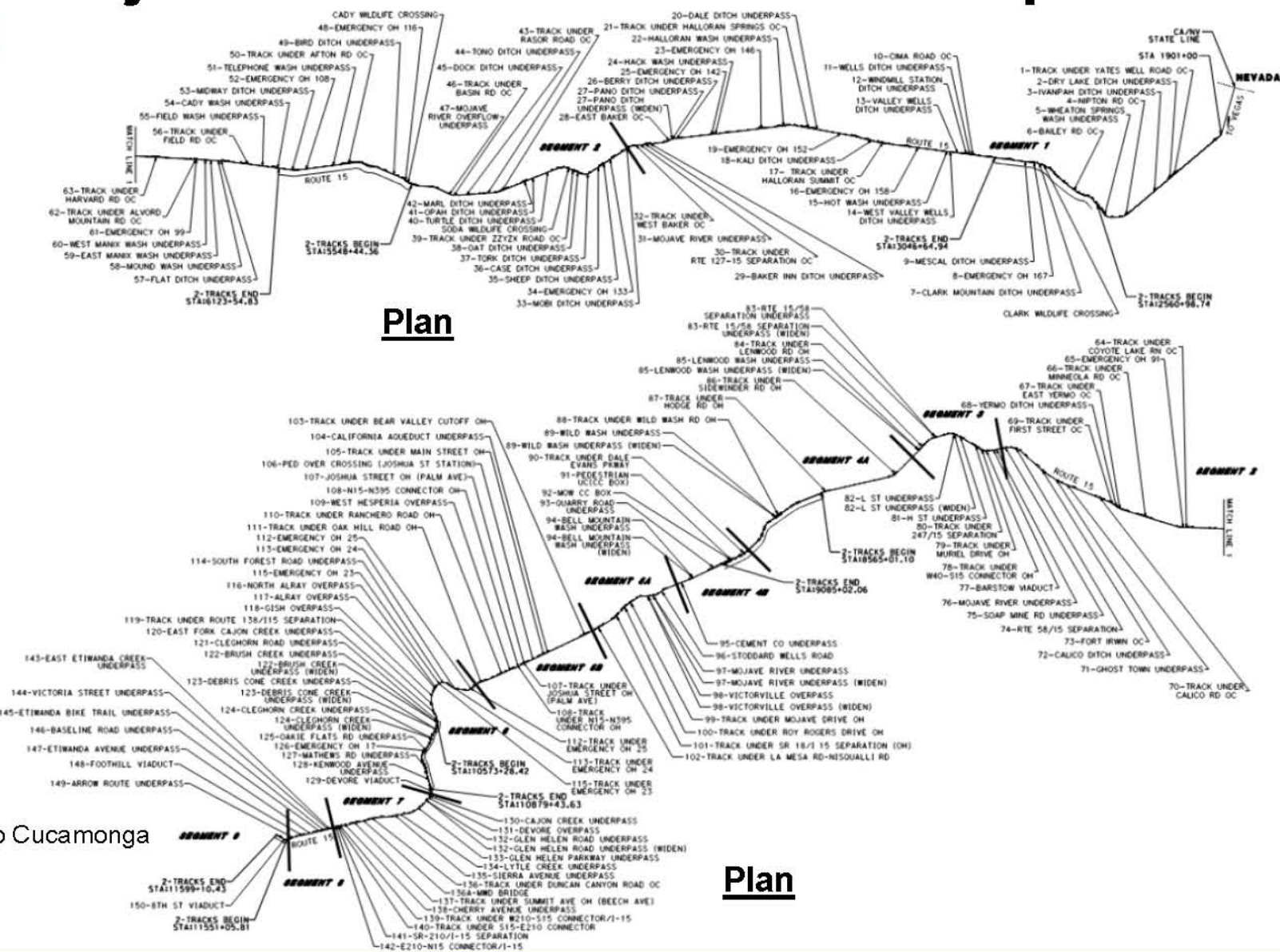
Next Steps

- Complete financing
- Complete final design, including bridge designs to IFC
- Finalize seismic-special structure packages
- Integrate with Systems elements such as overhead catenary electrification
- Progress construction packages for 2026–2027



Project Structures Location Map

150+
structures
across
9 CA
segments



Structure Inventory Overview

- Structure types include:
 - Wildlife crossings
 - Roadway overcrossings
 - Wash underpasses
 - Viaducts
 - Cut-and-cover boxes
 - Emergency overcrossings
- High concentration of structures in Cajon Pass and Victor Valley
- Multiple Caltrans widenings and replacements required

SEG. NO.	SEGMENT LIMIT	BEGIN STA.	SEGMENT LIMIT	END STA.	GEOTECH
1	CA/NV State Line	1901+00	West Baker	4589+95	EMI
2	Mobi Ditch	4592+45	Soap Mine Rd	7710+42	ATLAS
3	Mojave River	7737+48	Lenwood Wash UP	8108+34	EMI
4A	Sidewinder Rd	8247+29	Wild Wash	8783+61	EMI
4B	Dale Evans Pkwy	8987+49	Cement Co UP	9274+32	EMI
5A	Stoddard Wells	9362+50	La Mesa Rd	9675+69	ATLAS
5B	Bear Valley Rd	9739+00	Oak Hill Rd	9927+00	ATLAS
6	Emergency OH 25	10262+03	Devore Viaduct	10900+54	HNTB
7	Cajone Creek UP	10907+88	Glen Helen Pkwy UP	10982+06	HNTB
7	Lytle Creek UP	11051+45	E210-N15 Connector/I15 Separation	11334+50	HNTB
8	East Etiwanda Creek UP	11361+19	Arrow Route UP	11524+18	HNTB
9	8th St Viaduct	11530+93	Rancho Station	11601+50	HNTB



Structure Groups G1–G20

Structure Group	Structure Type	Total
G1	BLW Trench Structures adjacent to the existing Caltrans overcrossing bridge footing and Freeway travel lane	48
G2	Caltrans owned Structures (Protection Fence)	41
G3	Caltrans owned Structures (Demolish)	1
G4	Caltrans owned Structures (Replacement)	8
G5	BLW Structures Over a Freeway and/or Local	22
G6	BLW Structures Over Waterways	53
G7	BLW Structures Over a Railroad with (Overpass over Railroad)	6
G8	BLW Structures Over a Freeway and/or Local (PED OC)	1
G9	BLW Structures- Under a Freeway (Cut and Cover BOX)	1
G10	BLW Structures Over a Freeway and/or Local (Viaduct)	5
G11	Caltrans owned Structures (Widenings)	13
G12	Caltrans owned Structures (Emergency OHs)	14
G13	Caltrans owned Structures (Earth Retaining System)	72
G14	Caltrans owned Structures (Sign Structures)	TBD
G15	BLW Structures (OCS Structure)	TBD
G16	BLW Track Walls – Included with Roadway Submittals	TBD
G17	Caltrans owned Structures (Drainage Structures)	TBD
G18	BLW Structures (Utility)	TBD
G19	BLW Structures (Platforms and Stations)	TBD
G20	BLW Structures (System Equipment Pad)	TBD



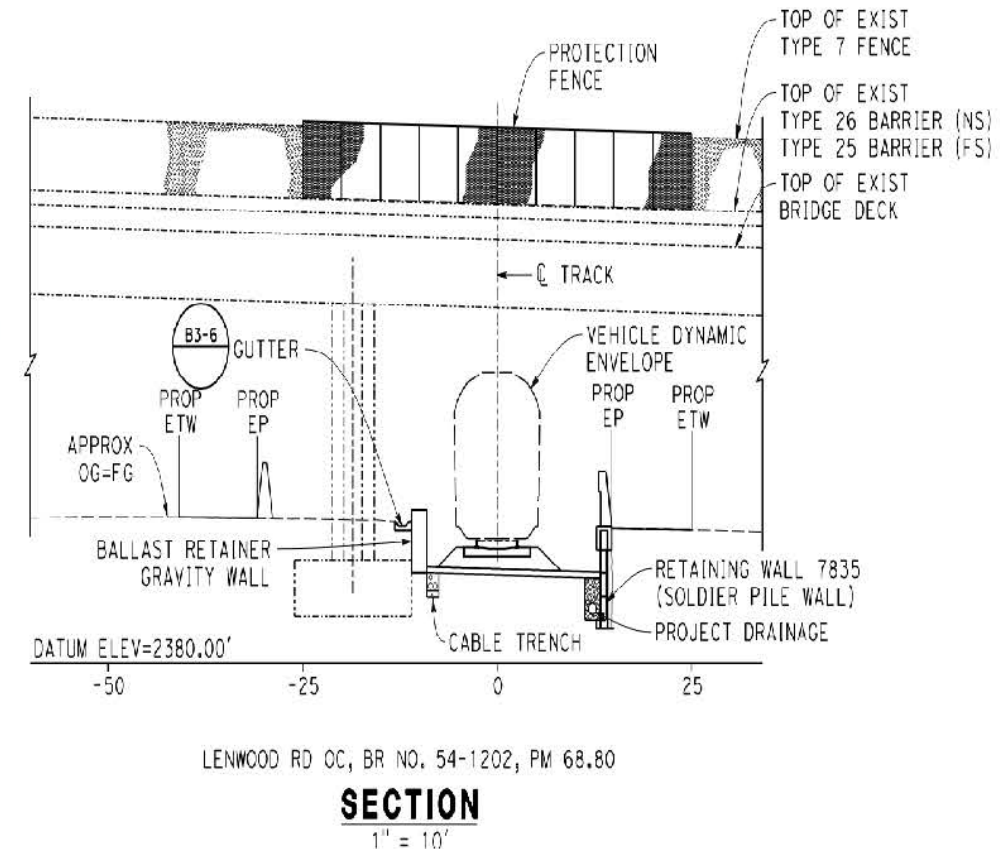
G1 BLW Trench Structures - adjacent to the existing Caltrans Overcrossing Bridge Bent Footing & Freeway

Advantages

- ✓ Minimizes vertical profile impacts in constrained I-15 median
- ✓ Reduces visual and noise impacts for adjacent communities
- ✓ Allows BLW alignment to pass beneath existing Caltrans structures
- ✓ Enhances safety by fully separating rail from highway traffic

Considerations

- ✓ Requires complex shoring, excavation, and dewatering
- ✓ Tight tolerances near existing bridge footings and travel lanes
- ✓ High risk of differential settlement affecting Caltrans structures
- ✓ Limited construction access within I-15 median
- ✓ Requires continuous monitoring and coordination with Caltrans



G2-4 & G11-13 Structure Groups with Caltrans Owned Structures

Advantages

- ✓ Opportunity to modernize aging Caltrans infrastructure
- ✓ Improves long-term highway safety and capacity
- ✓ Consolidates impacts into a single coordinated construction program
- ✓ Enables seismic upgrades consistent with SDC 2.0
- ✓ Allows geometric refinements to better fit BLW alignment

Considerations

- ✓ Requires Caltrans review, approval, and design concurrence
- ✓ Longer permitting and design cycles
- ✓ Traffic handling and staging complexity on I-15
- ✓ Higher cost and schedule risk due to state-owned asset modifications

Structure Group	Structure Type
G2	Existing Caltrans Overcrossing (Install HSR Protection Fence)
G3	Existing Caltrans Undercrossing (Partial Demolish)
G4	New Caltrans Overcrossing (Replacement)
G11	Existing Caltrans Undercrossing (Widen)
G12	New Caltrans Emergency Overhead
G13	New Caltrans Retaining Walls (Earth Retaining System)



G14-20 Misc. Structures Groups

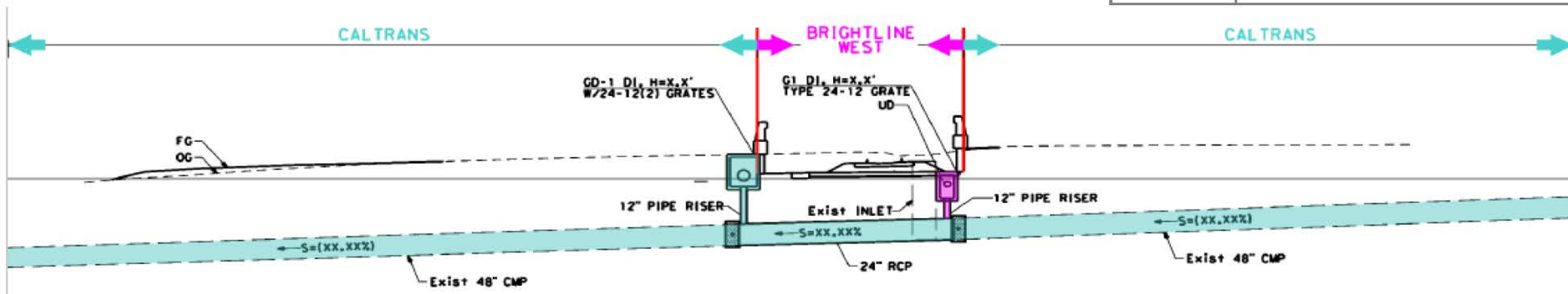
Advantages

- ✓ Sign structures and OCS masts can be standardized for efficiency
- ✓ Utility structures reduce long-term maintenance conflicts
- ✓ Drainage structures improve flood resilience in desert conditions

Considerations

- ✓ Utility relocations often drive critical path
- ✓ Drainage structures must handle extreme flash-flood events
- ✓ OCS structures require precise placement relative to track geometry
- ✓ System equipment pads require secure access and power redundancy

Structure Group	Structure Type
G14	• Caltrans owned Structures (Sign Structures)
G15	• BLW Structures (OCS Structure)
G16	• BLW Track Walls
G17	• Caltrans owned Structures (Drainage Structures)
G18	• BLW Structures (Utility)
G19	• BLW Structures (Platforms and Stations)
G20	• BLW Structures (System Equipment Pad)



G5-10 Groups with BLW HSR Bridges

Advantages

- ✓ Standardized BLW bridge types improve constructability and cost control
- ✓ Long spans reduce impacts to I-15 and local roads
- ✓ Elevated structures improve safety and operational reliability
- ✓ Viaducts minimize environmental disturbance in sensitive areas
- ✓ Cut-and-cover boxes allow grade separation in constrained corridors

Considerations

- ✓ High-speed geometry requires tight vertical and horizontal tolerances
- ✓ Dynamic and seismic design demands exceed typical highway bridge criteria
- ✓ OCS integration requires additional clearances and structural provisions
- ✓ Long spans increase steel and concrete quantities
- ✓ Construction staging over I-15 requires nighttime closures and CHP escorts

Structure Group	Structure Type
G5	BLW Structures Over a Freeway and/or Local Street
G6	BLW Structures Over Waterways
G7	BLW Structures Over a Railroad (Overpass over Railroad)
G8	BLW Structures Over a Freeway (PED OC)
G9	BLW Structures- Under a Freeway (Cut and Cover BOX)
G10	BLW Structures Over a Freeway and/or Local Street(Viaduct)



BLW HSR Bridge Design Criteria

- BLW HSR Bridge Project-Specific Design Criteria
- AASHTO LRFD Bridge Design Specifications
- AREMA Guidelines
- Caltrans Amendments to AASHTO LRFD BDS
- Seismic: Caltrans SDC 2.0

HSR Dynamics Requirements

- Dynamic structural analysis
- Longitudinal stiffness requirements
- Frequency analysis
- Track serviceability
- Rail-structure interaction
- Vehicle-track-structure interaction (if req'd)

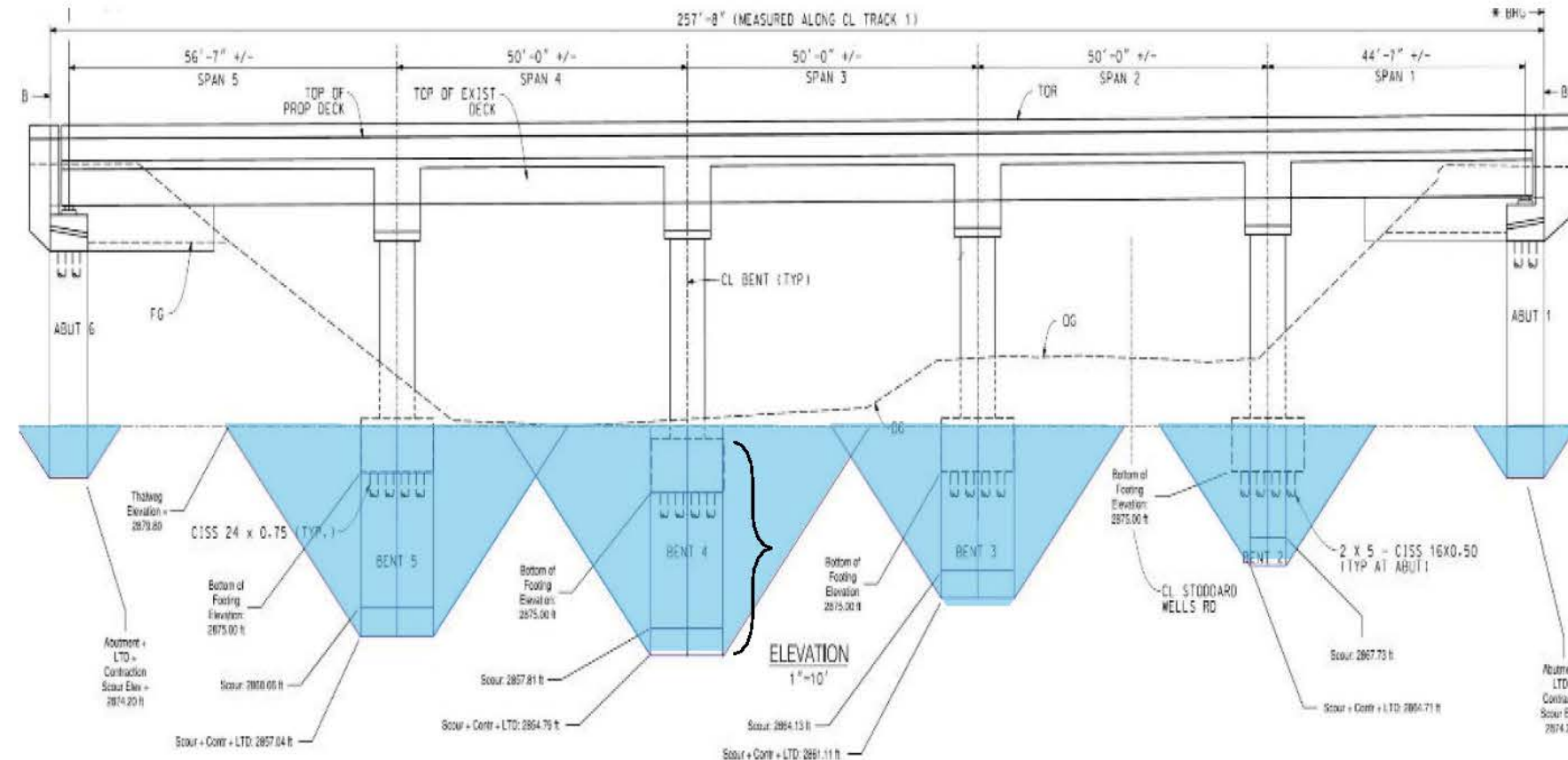
HSR TSI (Technical Specifications)

Table 12-8 Track-Structure Interaction Analysis Goals

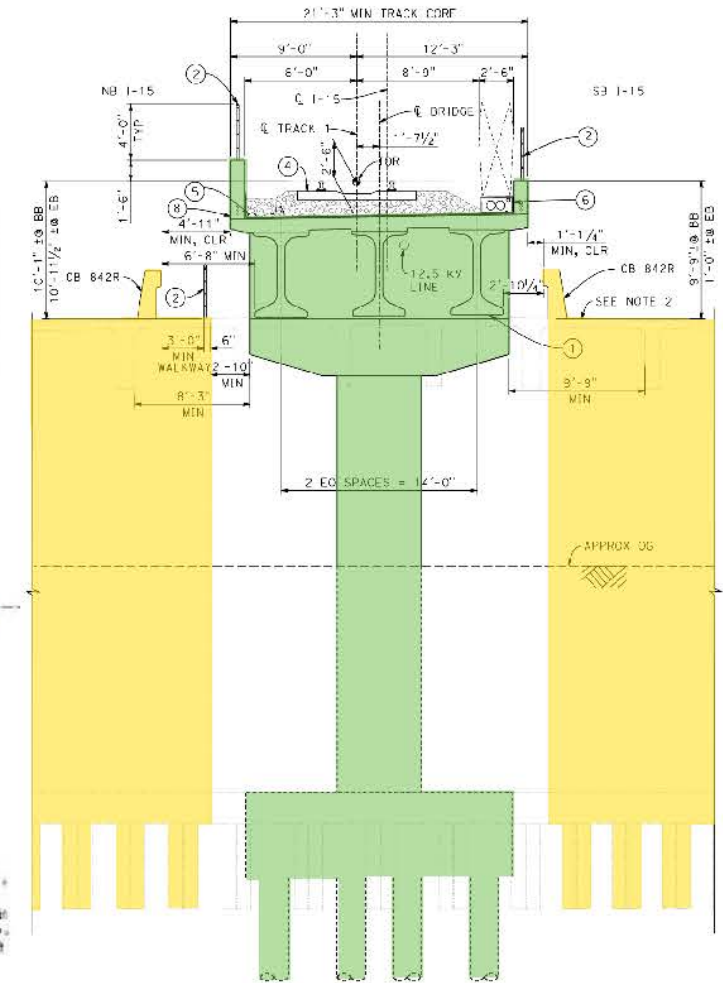
Analysis Goal	Model Type	Train model	Train speed	Result	Subsections
Frequency Analysis	Dynamic	--	--	Frequency Evaluation	12.6.3.1 to 12.6.3.3
Longitudinal Substructure Stiffness	Static (Linear)	Single or Multiple Tracks of Cooper E-60	--	Deformation Limits	12.6.3.4
Track Serviceability Analysis	Static (Linear), For LLE: Static or Dynamic	Single or Multiple Tracks of Modified Cooper E-50	--	Deformation Limits	12.6.4.1 to 12.6.4.10
Rail-Structure Interaction Analysis	Static (Non-linear), For LLE: Dynamic	Single or Multiple Tracks of Modified Cooper E-50	--	Deformation and Rail Stress Limits	12.6.5.1 to 12.6.5.6
Dynamic Structural Analysis	Dynamic	Single Track of High-Speed Passage	90 mph to Maximum Design Speed	Dynamic Impact Factor, Vertical Deck Acceleration	12.6.6.1 to 12.6.6.4
Dynamic Vehicle-Track-Structure Interaction Analysis	Dynamic (Structure and Trainset)	Single Track of High-Speed Passage (with Vehicle Suspension)	90 mph to Maximum Design Speed	Dynamic Track Safety and Passenger Comfort Limits	12.6.7.1 to 12.6.7.3



BLW HSR Bridges with Scour Consideration



BLW Bridge Elevation
(Possible Scour Depth Shown)

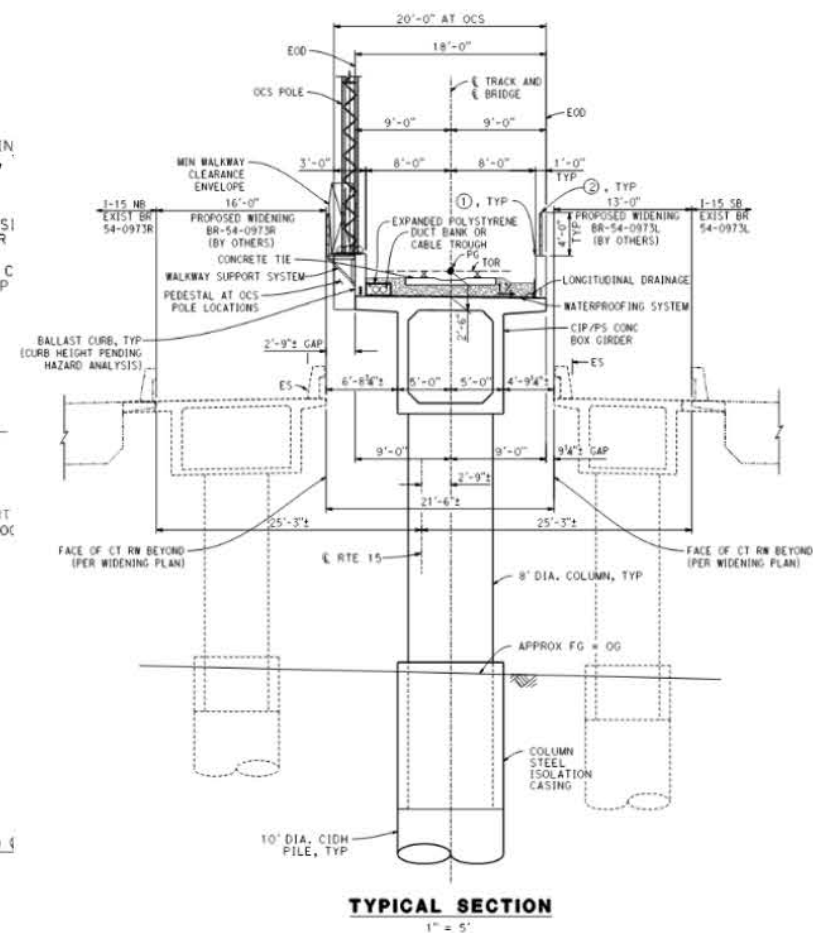
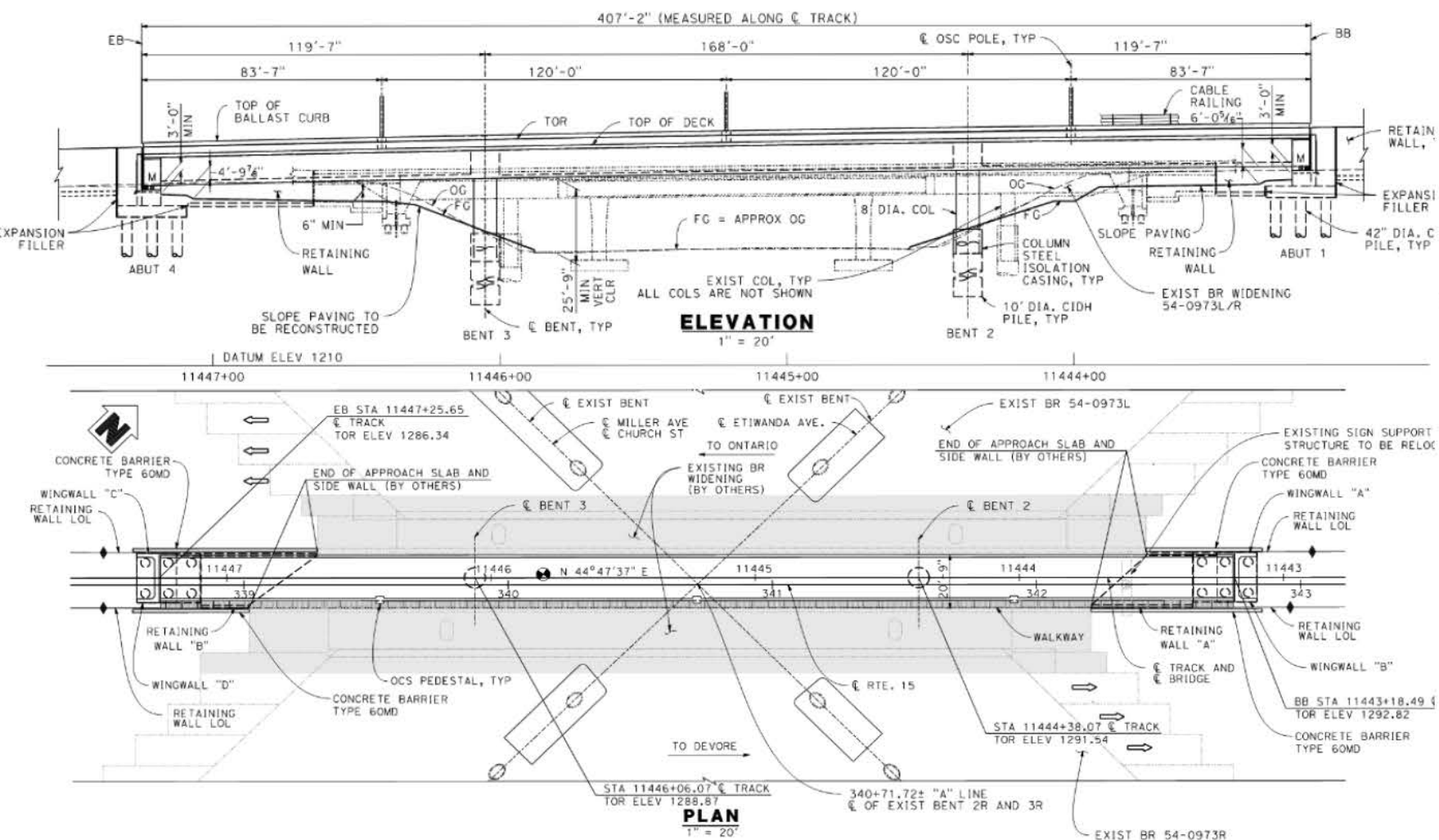
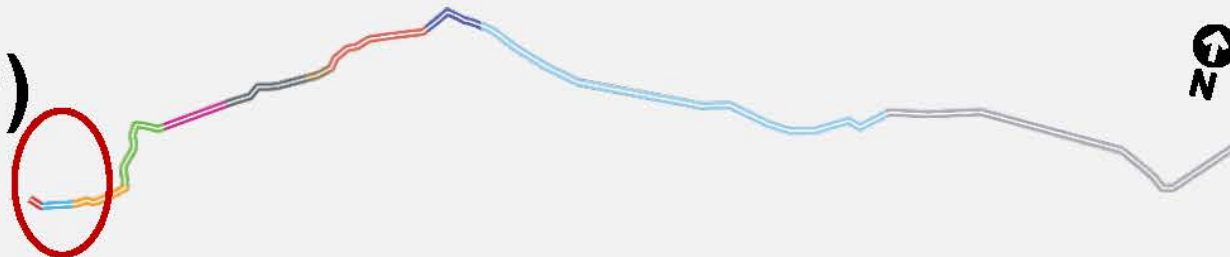


BLW Bridge Section
(Between Caltrans Bridges)

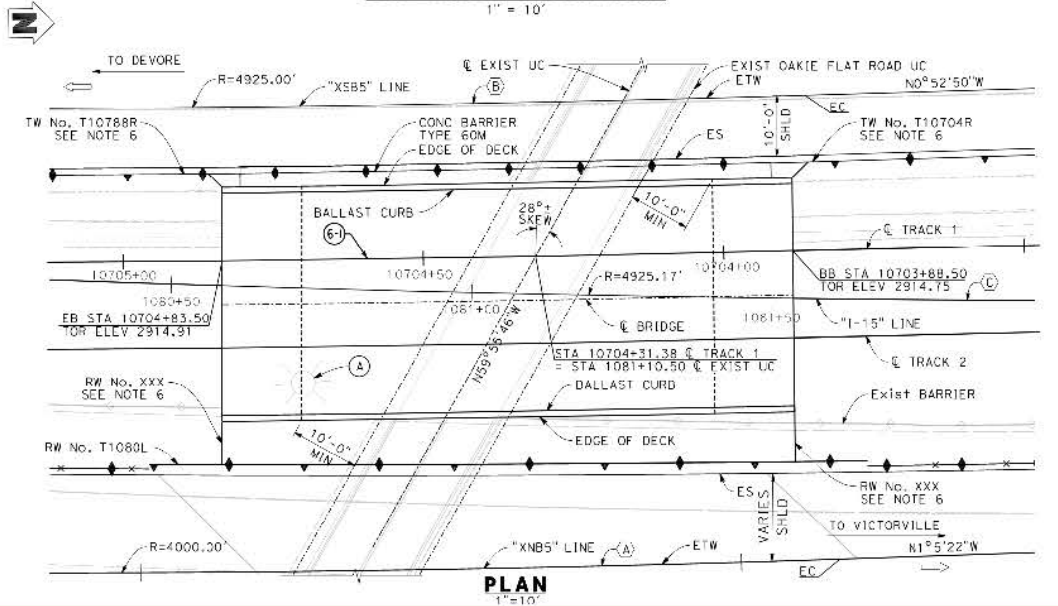
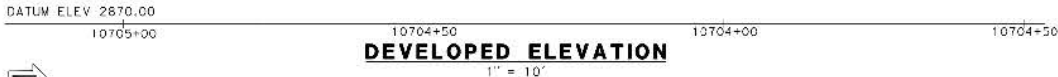
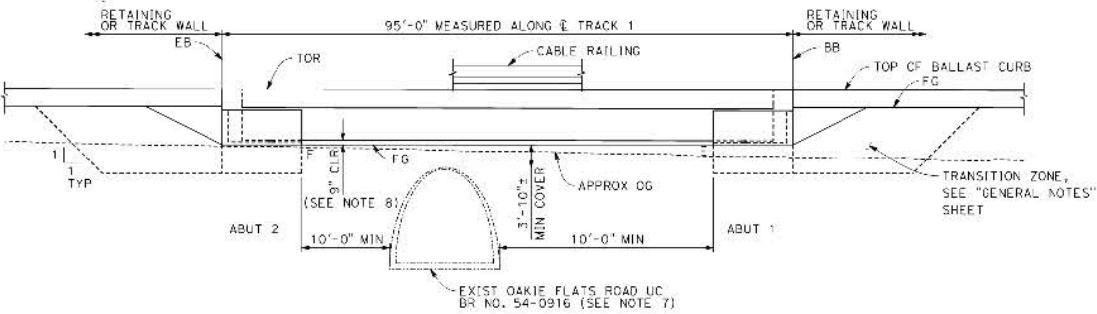


Etiwanda Ave Underpass (UP)

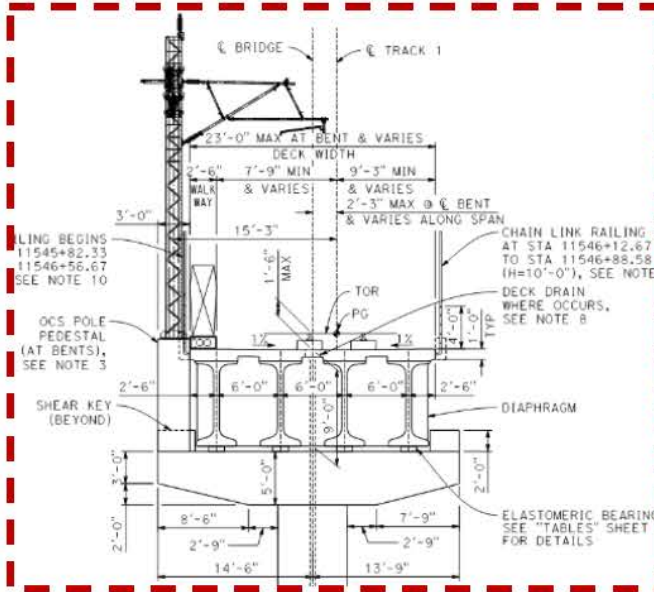
- Segment 8
- Approximately 407' long
- Adjacent to CT Widenings



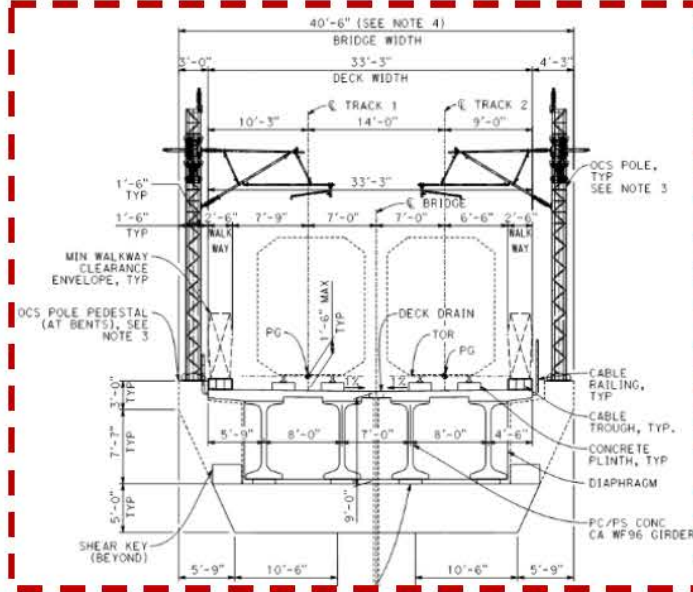
Floating Bridge Concept over San Andreas Fault



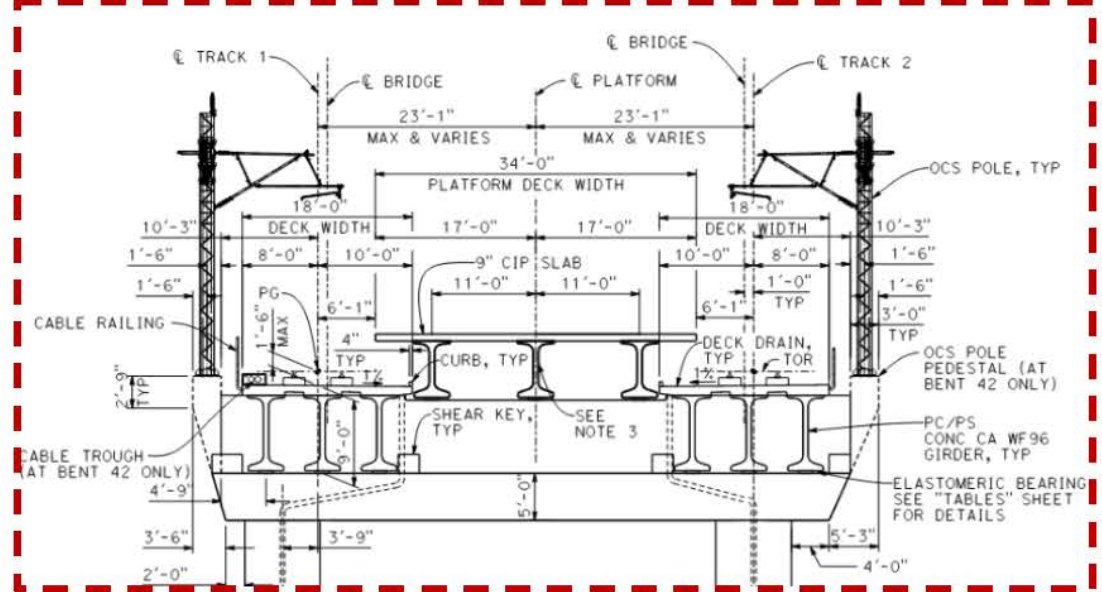
8th St Viaduct



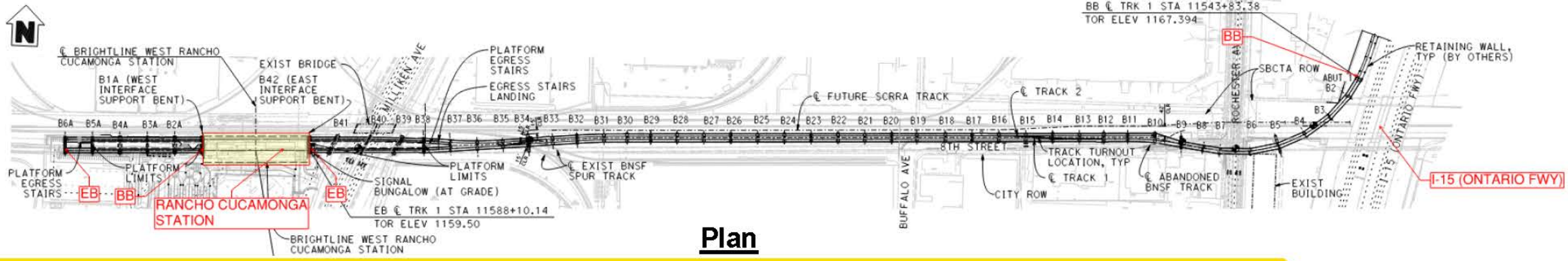
Single-track Typical Section



Double-track Typical Section



Double-track and Platform Typical Section

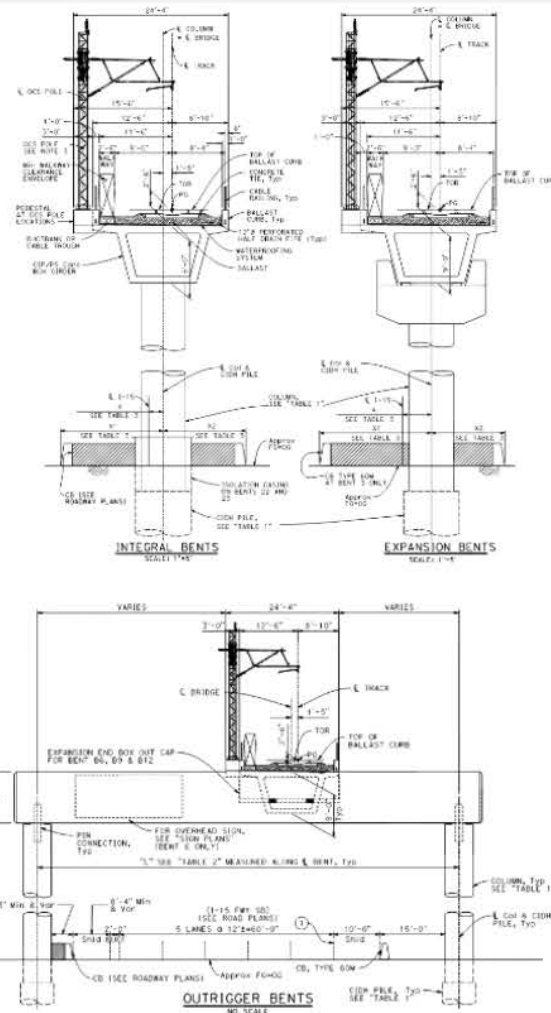
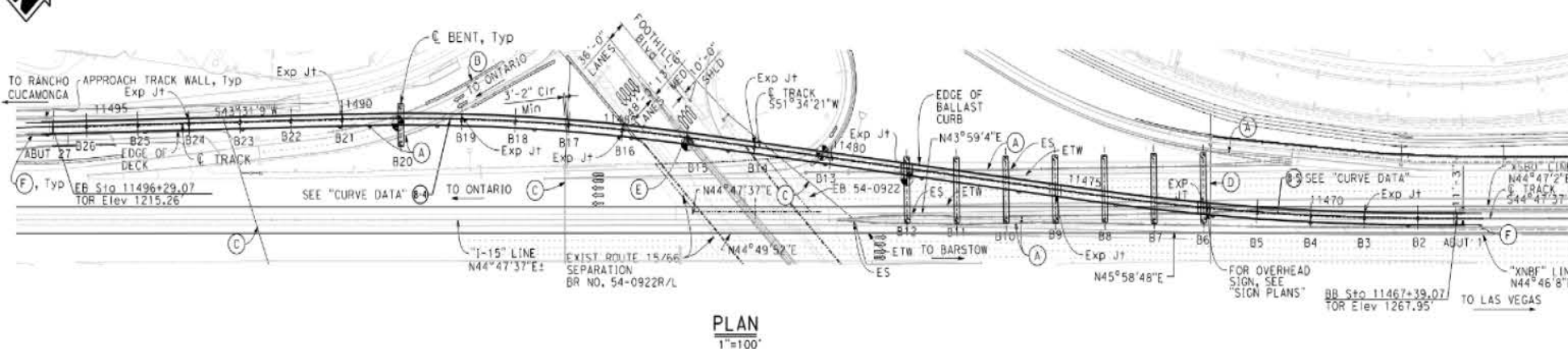
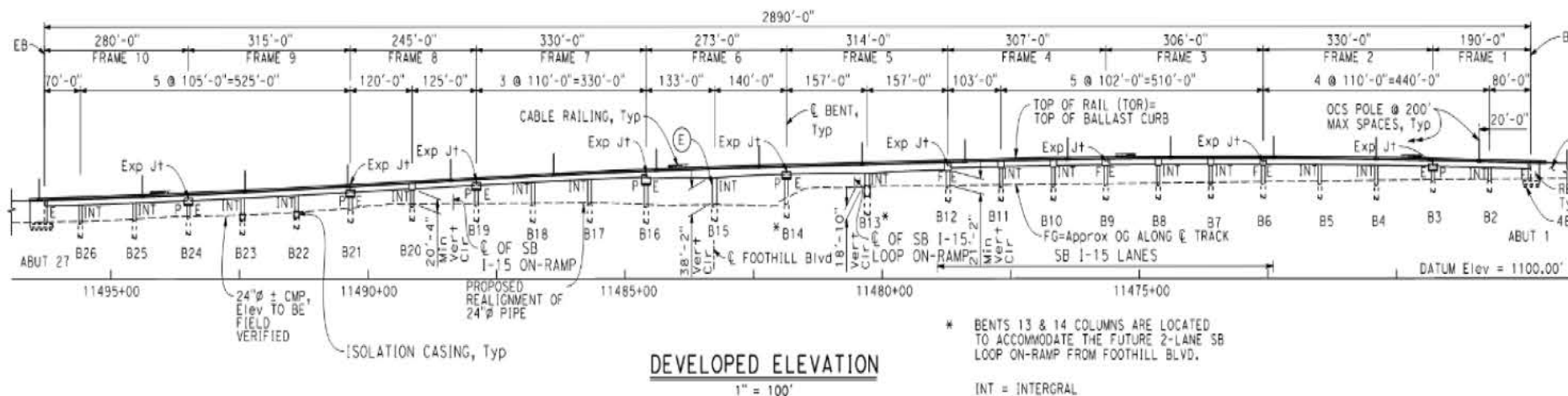


Plan



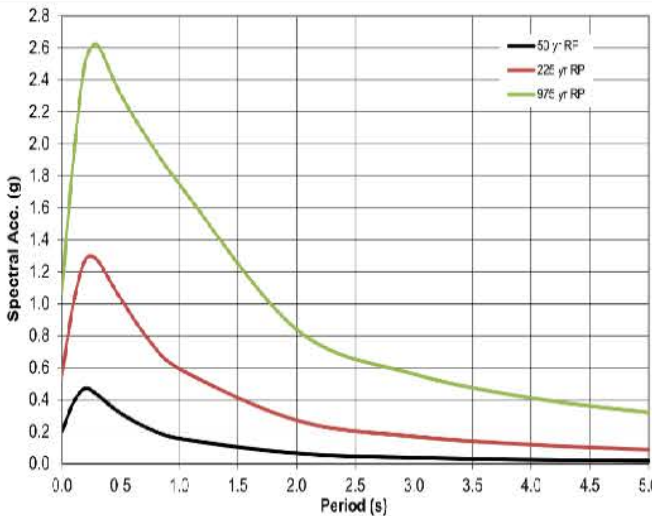
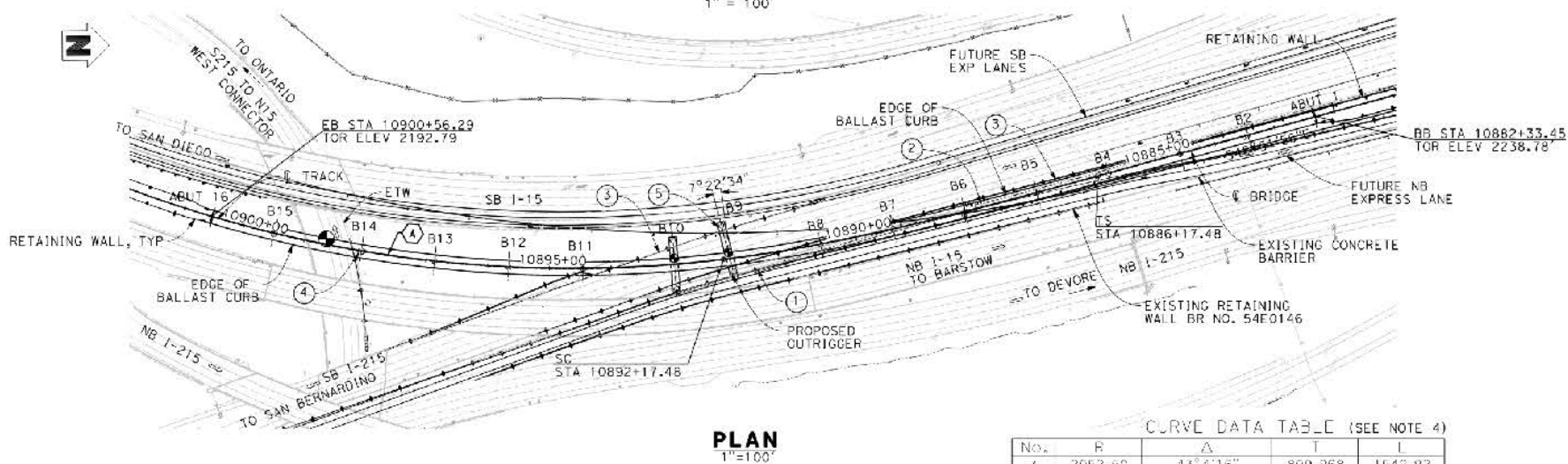
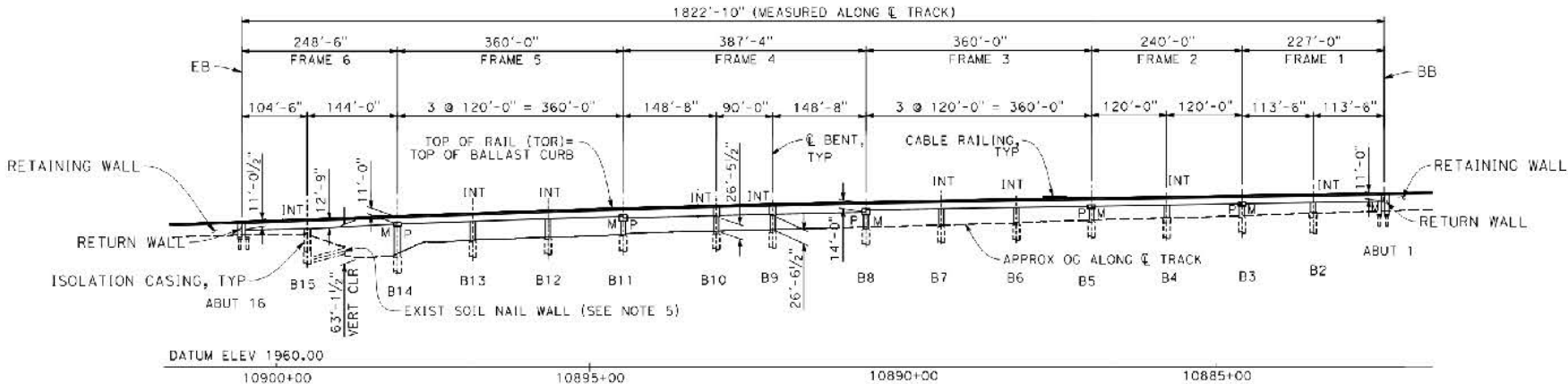
Foothill Viaduct

- Segment 8
- Approximately 2,890' long
- Outrigger bents



Devore Viaduct

- Segment 6
- Approximately 1,822' long
- Outrigger bents

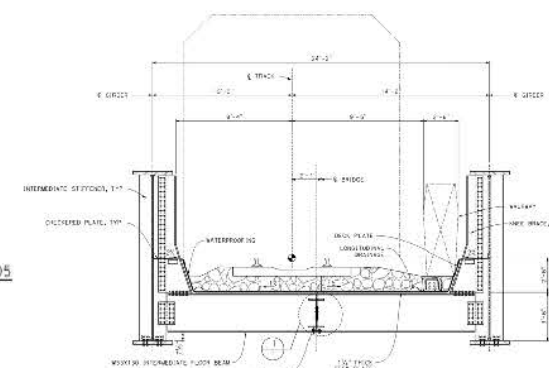
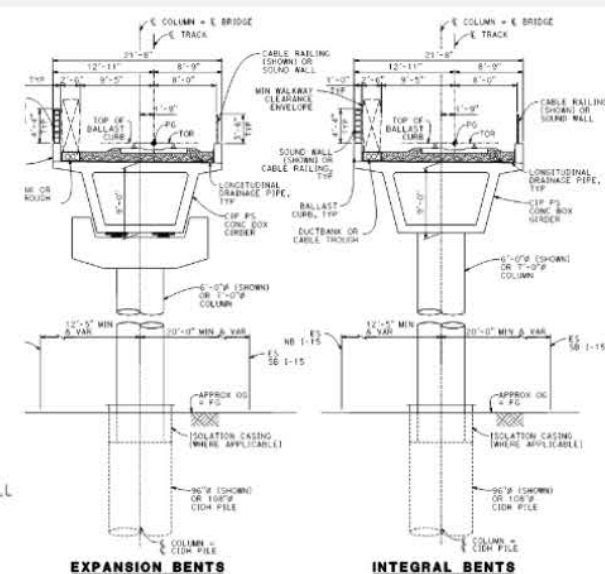
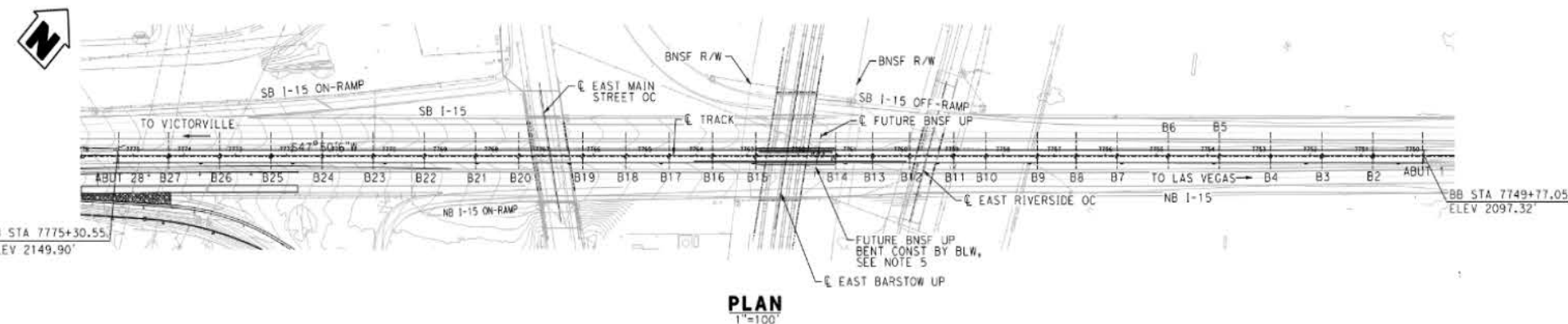
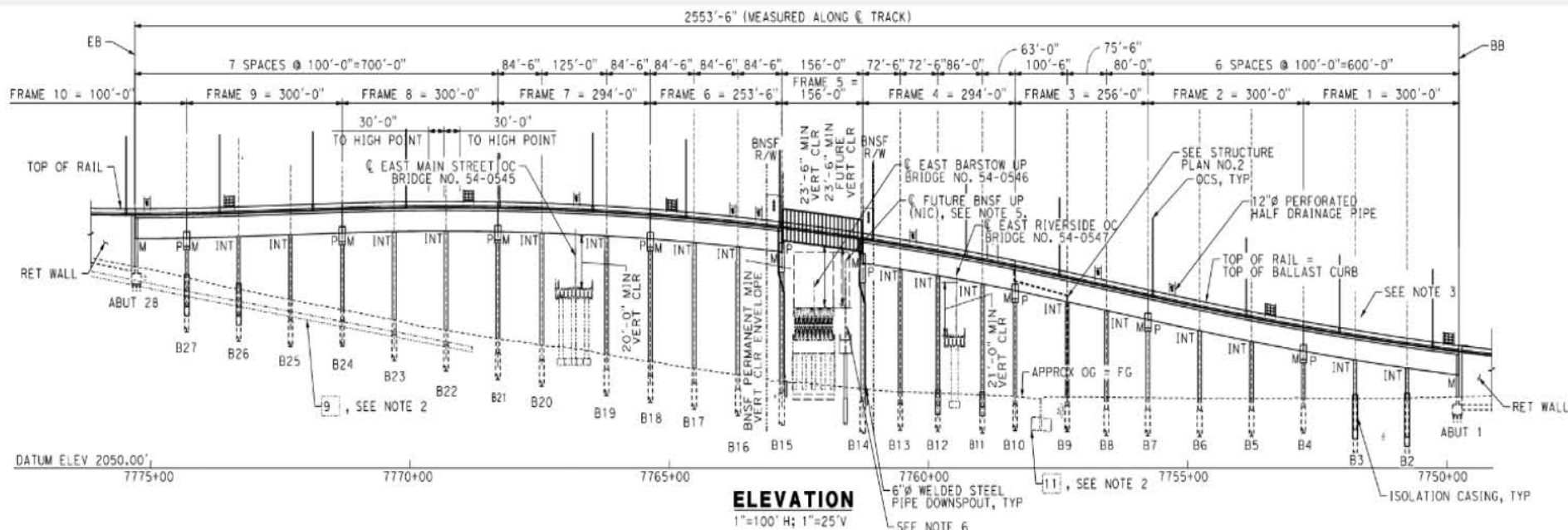
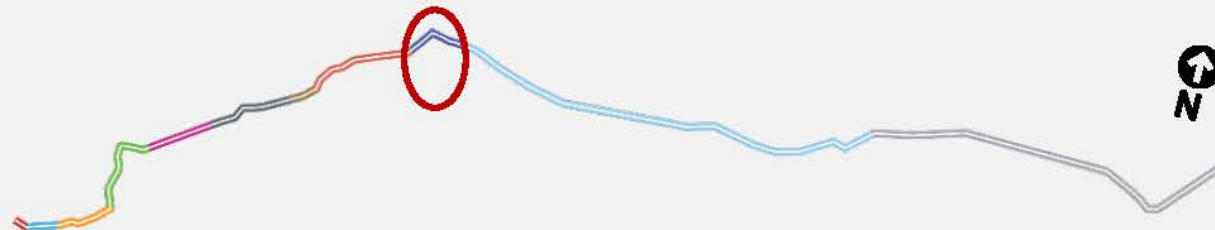


ARS curve



Barstow Viaduct

- Segment 3
- Approximately 2554' long
- 156' Steel Thru Girder



Closing Message

**“Go-Go Brightline West — High-Speed Rail from
Rancho Cucamonga to Las Vegas!”**

High-speed passenger rail system connecting SoCal to Las Vegas

Q&A

