APPENDIX A7

2021 BRIDGE TYPE SELECTION REPORT
BNSF/ METROLINK CROSSING

Bridge Type Selection Report (BTSR)

BNSF / Metrolink Crossing

OC Loop Segments O, P & Q

County of Orange, California

Prepared for:

ORANGE COUNTY
OC Public Works

601 N. Ross St.
Santa Ana, CA 92701

Prepared by:

Contact Person: Bruce Schmith, PE

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BNSF/Metrolink Corridor over Coyote Creek (looking upstream from downstream side)

1. Introduction

A gap in the 66-mile regional bikeway corridor, the OC Loop, is along the length of the Coyote Creek flood control channel, upstream and downstream of the Santa Ana Freeway (I-5). This gap is designated as segments O, P, and Q. The OC Loop Segments OPQ (proposed project) begins at the existing Coyote Creek Bikeway in the City of Cerritos where the flood channel divides into north and east forks, running 2.7 miles connecting to another portion of the Coyote Creek Bikeway at La Mirada Blvd./Malvern Ave. in the cities of Buena Park and La Mirada. The Los Angeles County Flood Control District (LACFD) owns the majority of the property required for this project. See Figures 1 and 2 below for Vicinity Map as well as the OC Loop overview & Gap Segment Map.

The project contains three railroad crossing sites, two of which require grade separated crossings that are key elements to the project and necessary for the bikeway to traverse existing railroad corridors. The crossing of the BNSF/Metrolink railroad corridor will be addressed in this BTSR.

Figure 1 Vicinity Map

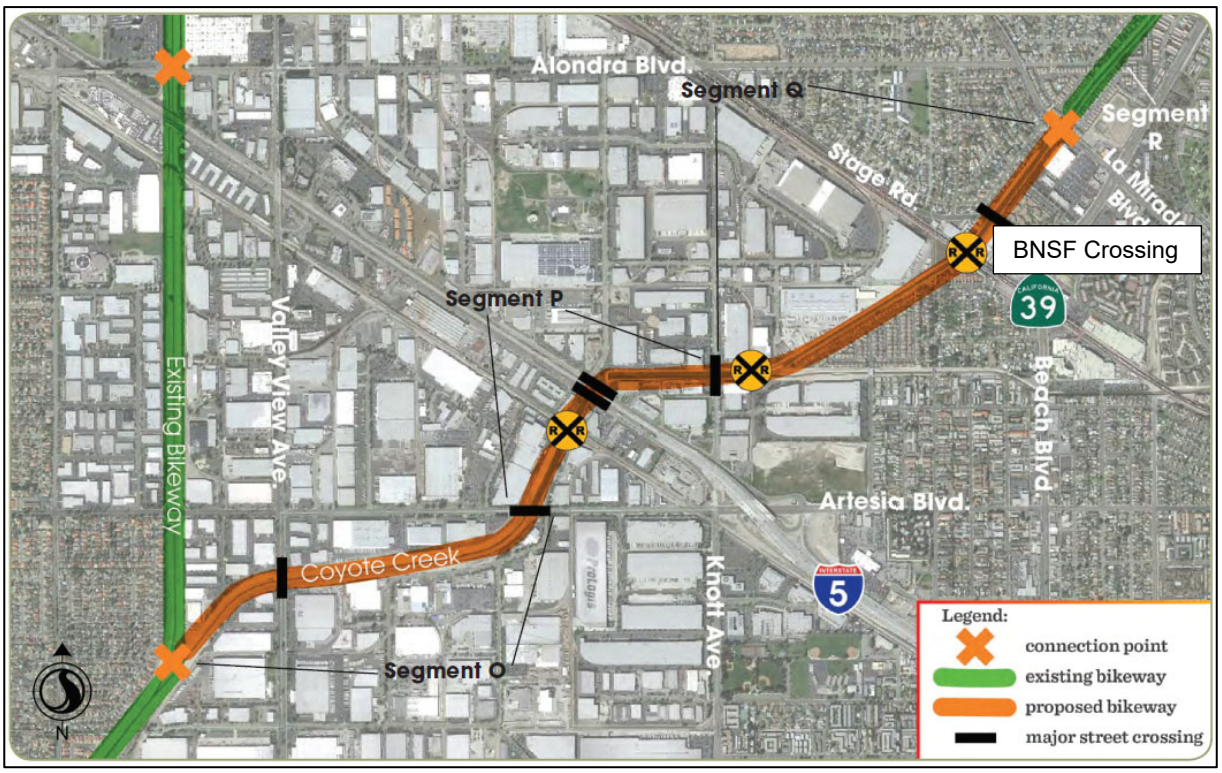
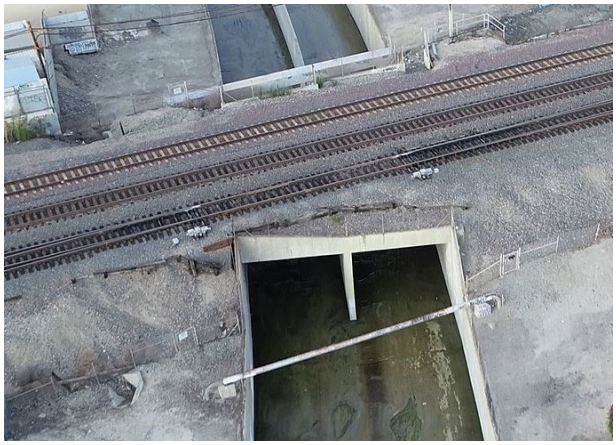
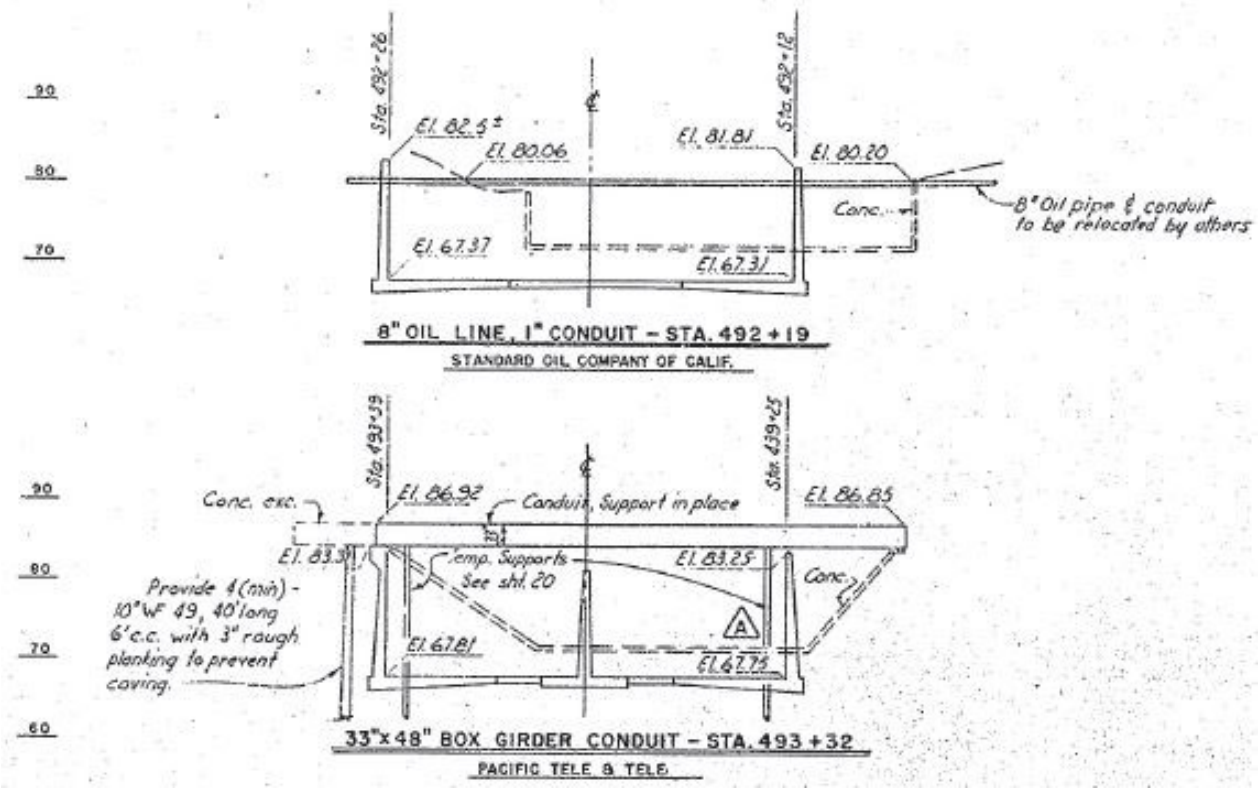


Figure 2 Project Location Map – OC Loop Segments O, P & Q

2. Existing Conditions

A grade-separated crossing of the BNSF corridor is proposed within Segment Q, just downstream from where Coyote Creek passes under Stage Road (see Figure 2). BNSF is the owner of this corridor and Metrolink operates their Orange Line and AMTRAK their Pacific Surfliner under an operating agreement with BNSF. BNSF freight traffic combined with Metrolink and AMTRAK commuter rail traffic makes this the 2nd busiest rail corridor in the nation. There are three tracks at this location currently and a 4th track is in the planning & environmental stages. In addition, two additional electrified tracks for the LA to Anaheim High Speed Rail (HSR) are proposed in this corridor. Therefore, any overcrossing or undercrossing structure needs to stay well outside the existing 100' BNSF right-of-way to allow for these additional tracks. Downstream from the railroad bridge is an abandoned Chevron 8" oil line + 2-1/2" gas line crossing over the creek and upstream from the bridge AT&T has a duct bank in a concrete box girder across the creek. These utilities are shown in the picture at right and on the cross sections below from the original Coyote Creek Channel plans.





Cross Sections of Chevron and AT&T Utility Corridors (looking downstream)

As shown in the picture below and the sections on the previous page, the AT&T duct bank does not present a conflict with a proposed undercrossing but the Chevron pipeline(s) will most likely be in direct conflict with a proposed box-jack undercrossing.

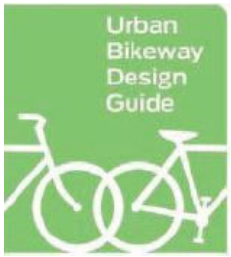
In addition to the abandoned Chevron pipeline(s) there are side drains parallel to the railroad and on either side of the tracks. A 24" RCP side drain exists on the downstream side and a 36" RCP side drain exists on the upstream side.

Existing 36" Side Drain and AT&T Duct Bank (in concrete box girder)
Upstream side of BNSF/Metrolink Bridge over Coyote Creek

3. Design Criteria

Grade separation design will adhere to the latest edition of the following guidelines:

- OC Loop Gap Feasibility Study;
- Caltrans Highway Design Manual (HDM), specifically, Chapter 1000 Bicycle Transportation Design;
- National Association of City Transportation Officials (NACTO): Urban Bikeway Design Guide;
- American Railway Engineering and Maintenance-of-Way Association (AREMA) manual; and



- Union Pacific Railroad - BNSF Railway Guidelines for Railroad Grade Separation Projects.

4. Alternatives Considered

Overcrossing and undercrossing options were evaluated at this crossing. See Appendix A for a plan & profile of each alternative and typical sections for the undercrossing option.

Overcrossing of BNSF/Metrolink

Appendix A shows the plan & profile for crossing over the entire BNSF right-of-way using a prefab steel truss bridge, a similar bridge to the one proposed at the crossing of the North Fork of Coyote Creek, maintaining a minimum required clearance of 23' - 6". To meet a maximum grade of 5% on the upstream side of the crossing, a bridge over Stage Road is also required. Existing power lines in three locations (downstream from the tracks, just upstream from the tracks and just upstream from Stage Road) will require relocating to meet minimum clearance requirements. Temporary Construction Easement (TCE) is required in two locations, downstream from the tracks and upstream from Stage Road, for purposes of erecting the steel prefab truss sections and for staging the crane to set the bridges at each location. See the plans for exact locations of these TCEs.

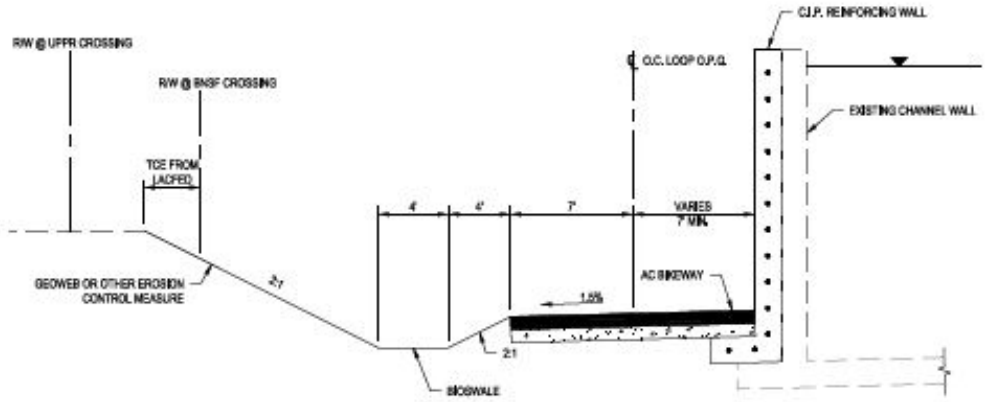
Undercrossing of BNSF/Metrolink

At this crossing, because of the high volume of freight + commuter rail traffic, an "open-cut" option is not feasible so the only undercrossing option evaluated is a "box-jack" undercrossing under the width of the entire railroad right-of-way.

Appendix A shows the plan & profile for crossing under the UPRR right-of-way by jacking a 12' wide x 10' high RCB under the railroad corridor using a 5% maximum downgrade and upgrade on either side of the RCB. This option has the following design features:

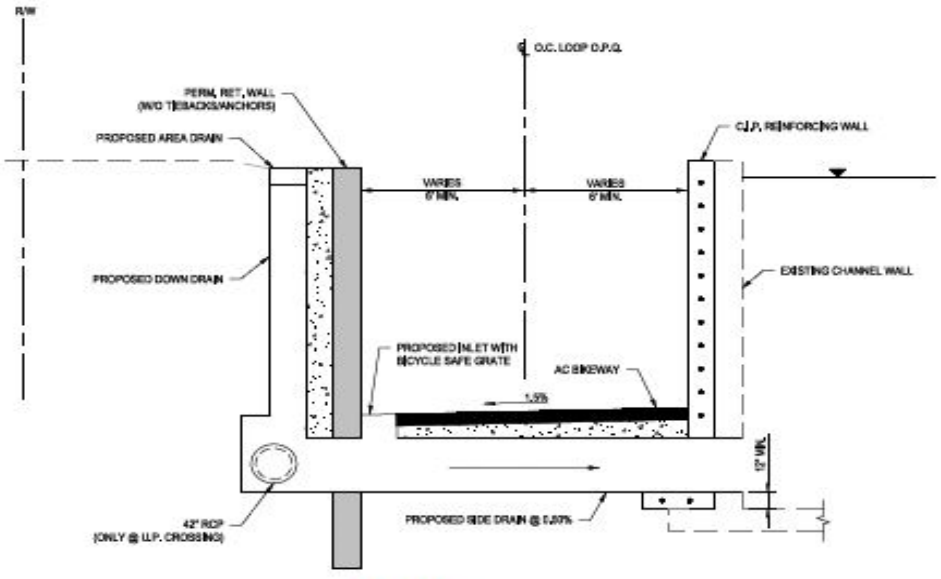
- *Bikeway Profile (Downstream Side)* – Approaching from the downstream side, the bikeway needs to be lowered in a trench. The typical way to construct this trench is to construct a "U-wall" with concrete walls for the sides and a concrete slab for the floor. Another way, which may save considerable construction costs, is what is shown in the plan & profile sheet in Appendix A and the typical section below. Our idea takes advantage of the existing channel wall to act as one side of the "U-wall" and then laying back the slope at 2:1 on the other side since sufficient right-of-way exists. Unfortunately, it appears after reviewing the existing Coyote Creek Channel plans, that the existing channel wall was designed for earth retaining against it but not when the earth is removed so this wall will need reinforcing for bending in

this direction. Below is a typical section along the downstream approach to the BNSF UC.



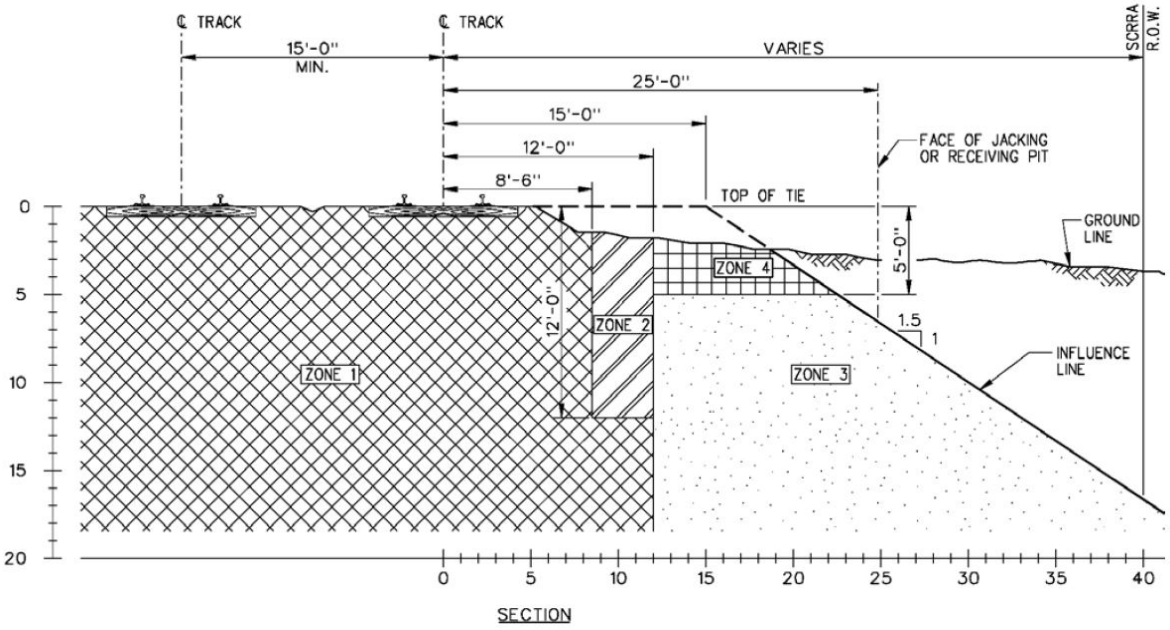
A SECTION
SCALE: 1" = 5'

- *Bikeway Profile (Upstream Side*) - On the upstream side of the BNSF undercrossing the profile rises at almost the 5% maximum to meet the existing grade at the top of channel wall near Sta. 130+00 to be at-grade for the crossing of Stage Road. In this upstream reach the flood control right-of-way is narrower and laying back the slope at 2:1 is not possible without going outside the right-of-way. Therefore, a top-down type retaining wall (without tiebacks or anchors that extend outside the right-of-way) is required along the right-of-way side as shown below.



B SECTION
SCALE: 1" = 5'

- *12' x 10' RCB* – The RCB is shown at an elevation designed to meet the 8' minimum vertical clearance (from top/box to base/rail), per Section 7.3.2.1 of the UPRR/BNSF Guidelines for Railroad Grade Separation projects, but still just above the channel invert so stormwater can be drained, by gravity flow, out of the RCB and into the channel. The length of the RCB shown extends outside the UBNSF right-of-way on both sides.
- *RCB Jacking End* – A jacking pit at approximately Sta. 127+50 is shown. The jacking pit is shown on the upstream side of the railroad because equipment and materials required for construction of the jacking pit, and the jacking equipment and RCB sections, can be easily transported from Stage Road. The front face of the jacking pit is shown as a temporary shoring wall, such as a soil mixing wall, a wall strong enough to retain the earth behind the wall (to support the deep excavation required for the jacking pit) but, at the same time, able to allow the RCB sections to be jacked through it. Additional discussion regarding the box jacking process can be found in the "Preliminary Box-Jack Design Report."
- *RCB Receiving End* – Typically a pit would also be required for the receiving end of the box-jack but for our construction method (shown in the typical section on the previous page) a receiving pit is not required as the contractor can construct the bikeway cross section up to the downstream end of the box culvert. Just as was done for the jacking end, a similar temporary shoring wall would be constructed along the front face of the receiving pit.
- *Utility Conflicts* – On the downstream side of the crossing, the abandoned Chevron oil pipeline(s) will most likely be in conflict with the RCB and needs to be "cut, capped & removed" but the existing 24" RCP side drain can be removed and capped (at the channel wall) and the tributary it was draining can be graded to drain down to the low point. On the upstream side of the crossing, the existing 36" RCP storm drain requires rerouting as it is in direct conflict with the RCB box-jack (see plan & profile sheet in Appendix A). Any shoring required for excavation and removal of the storm drain that falls within the railroad influence Zones shown below needs to meet railroad design guidelines for that Zone.



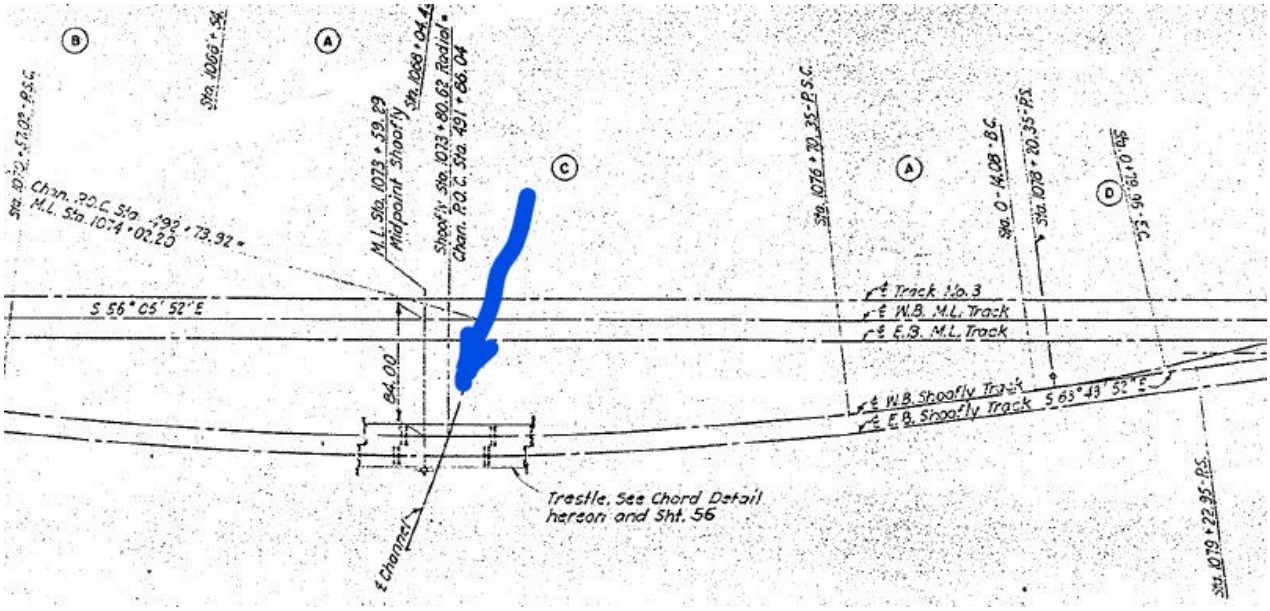
- *Drainage/Water Quality* – A low point in the bikeway profile was created just downstream from the RCB. This low point can then be drained by a cross culvert under the bikeway that outfalls into the side of the existing channel wall. On the downstream side of the undercrossing, stormwater will runoff into the bioswale where it can be treated then routed to the cross culvert at the low point. On the upstream side of the undercrossing, stormwater runoff will come from the high point at Stage Road and should either be collected in inlets (with filters for treatment) that outfall under the bikeway and into the side of the existing channel or allowed to drain to the low point where a treatment basin could be constructed. These ideas need to be further explored in the PS&E Phase.

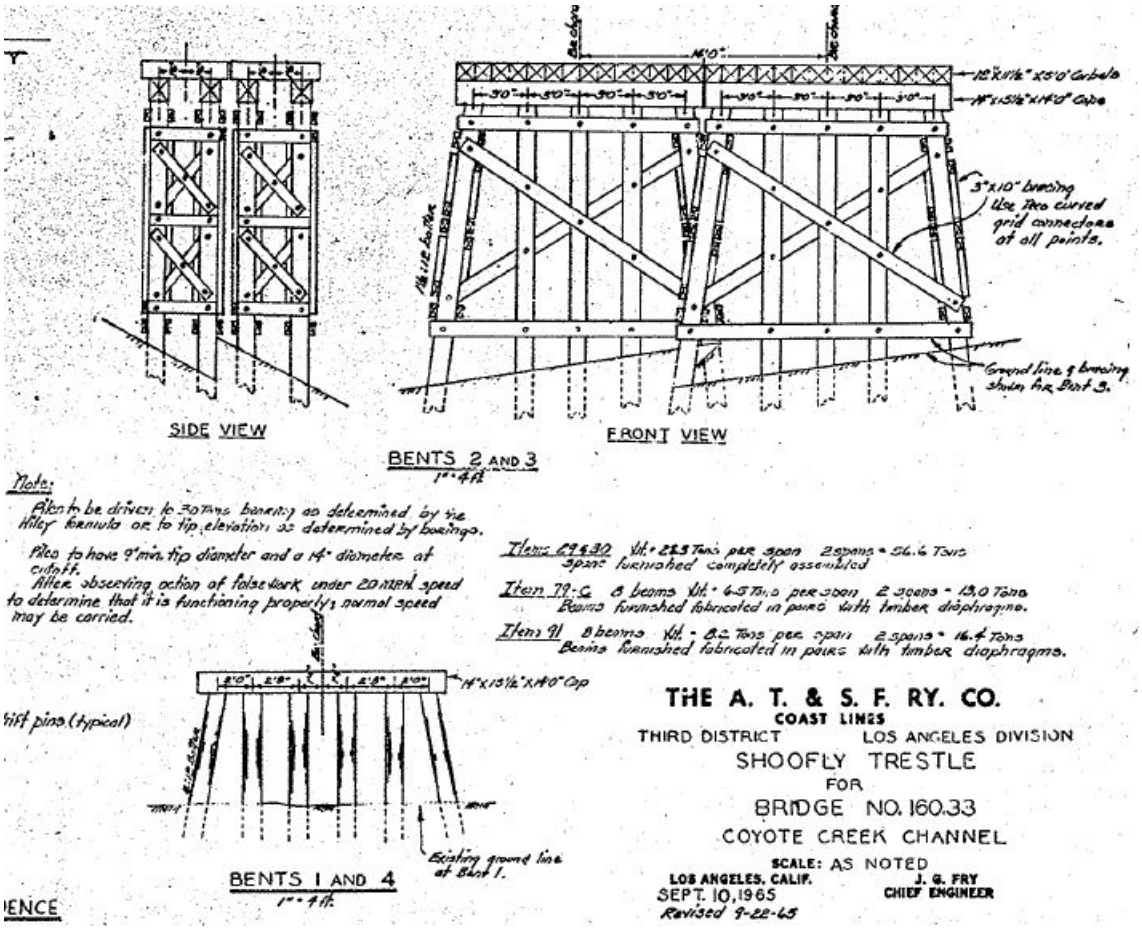
5. Recommendations

An overcrossing of the BNSF/Metrolink corridor is the preferred alternative since an undercrossing is not financially feasible at this location because BNSF requires a shoofly track(s) be constructed as a risk mitigation measure.

Other recommendations for this phase of work include:

- Potholing the abandoned Chevron pipeline(s) to determine their exact depth for purposes of verifying a conflict with the proposed box-jack (if an undercrossing option is selected).
- Exploratory potholes on the upstream side of the bikeway alignment to determine the presence of any portion of the buried trestle from the original channel crossing construction (see below and on next page).




SIDE VIEW
FRONT VIEW
BENTS 2 AND 3
1"=4ft
3"x10" bracing
Use two curved grid connectors at all points.
Ground line & bracing shown for Bent 3.
Note:
Piles to be driven to 30 Tons bearing as determined by the Hiley formula or to tip elevations as determined by borings.
Piles to have 9" min. tip diameter and a 14" diameter at cutoff.
After observing action of falsework under 20 MPH speed to determine that it is functioning properly, normal speed may be carried.
Item 79&80 Wt. = 22.5 Tons per span 2 spans = 56.6 Tons
Spans furnished completely assembled
Item 79-C 8 Beams Wt. = 6.5 Tons per span 2 spans = 13.0 Tons
Beams furnished fabricated in pairs with timber diaphragms.
Item 91 8 beams Wt. = 8.2 Tons per span 2 spans = 16.4 Tons
Beams furnished fabricated in pairs with timber diaphragms.
THE A. T. & S. F. RY. CO.
COAST LINES
THIRD DISTRICT LOS ANGELES DIVISION
SHOOFLY TRESTLE
FOR
BRIDGE NO. 160.33
COYOTE CREEK CHANNEL
SCALE: AS NOTED
LOS ANGELES, CALIF. SEPT. 10, 1965
Revised 9-22-65
J. G. FRY
CHIEF ENGINEER
BENTS 1 AND 4
1"=4ft.
Existing ground line at Bent 1.

Appendix A:

Overcrossing Plan & Profile

Undercrossing Plan & Profile

Undercrossing Typical Sections

about GHD

GHD is one of the world's leading professional services companies operating in the global markets of water, energy and resources, environment, property and buildings, and transportation. We provide engineering, environmental, and construction services to private and public sector clients.

Bruce Schmith, PE, ENV SP
Bruce.Schmith@ghd.com
949-585-5274

www.ghd.com