



**CITY OF SANTA BARBARA
PUBLIC WORKS DEPARTMENT**



CABRILLO BOULEVARD RAILROAD BRIDGE REPLACEMENT PROJECT

**Santa Barbara, California
DRAFT**

PROJECT FINAL SUMMARY REPORT

December 2014

Prepared for:

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Project Final Summary Report

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SUMMARY

This document provides a final summary report for the proposed replacement of the Union Pacific Railroad (UPRR) Bridge over Cabrillo Boulevard in the City of Santa Barbara to accommodate the widening of Cabrillo Boulevard.

INTRODUCTION

The Santa Barbara County Association of Government (SBCAG), Caltrans, and the City of Santa Barbara are partners in implementing the Highway 101 Operational Improvements Project that extends from Milpas Street to Cabrillo Boulevard-Hot Springs Road. In addition to the planned improvements to Highway 101 - which include new structures, improved interchanges, and added lanes - the original project description included improved pedestrian and bicycle traffic access on Cabrillo Boulevard beneath the UPRR Bridge. The pedestrian and bicycle features were included in the permitted improvements under the City of Santa Barbara's Coastal Development Permit process, namely to provide improvement along Cabrillo Boulevard to connect the waterfront to Coast Village Road. However, this part of the project is not yet complete since the UPRR did not approve plans to provide for these facilities. Due to scheduling issues, it was necessary that the Highway 101 Operational Improvements Project be moved forward before the issues with UPRR could be resolved.

HDR Engineering, Inc. (HDR) was hired by the City to complete preliminary engineering designs and cost estimates for the completion of the originally proposed pedestrian and bicycle facilities, the required replacement of the UPRR Bridge, and other related infrastructure improvements. The ultimate goal of the work was to design cost effective improvements along Cabrillo Boulevard under U.S. 101 and the UPRR Bridge, which would safely connect bicycle and pedestrian paths between Los Patos Drive and Coast Village Road/Old Coast Highway.



PROJECT AND WORK DESCRIPTIONS

Engineering work included the development of a preferred shoofly track alignment that would allow the UPRR to maintain rail traffic while the existing bridge was replaced and lengthened. A new roadway cross section was also designed which would widen Cabrillo Boulevard to accommodate two 12-ft wide traffic lanes, two 5-ft wide bike lanes, a 12-ft wide multiple purpose trail, a 12-ft wide right hand turn lane, and 2-ft buffers.

Additionally, a new roadway profile design was developed to lower the road and improve vertical clearances at the bridge. Without the lowering improvements, HDR concluded a design exception from UPRR would be needed, as only 15'-6" could be achieved versus the 16'-6" standard. Since the clearance produced by the new Highway 101 HOV Project was also less than the 16'-6" requirement, HDR believed it was worth the extra time and effort to approach the UPRR about approving a design variance, especially since underground utility and ground water infiltration challenges could be avoided.

City of Santa Barbara staff planned to meet with the UPRR representative to secure their concurrence of initial project concept, as well as approval of vertical clearance and other design criteria exceptions. Afterwards the City planned to move forward with the submission of a General Order 88-B application to the California Public Utilities Commission for approval and order.

EXISTING RAILROAD BRIDGE

The existing Union Pacific Railroad Bridge is located over Cabrillo Boulevard in the City of Santa Barbara, at MP 369.66 on the UPRR Santa Barbara Subdivision, DOT# 745616H. It is a single 45-ft span structure originally constructed in 1917. The bridge has approximately a 40 degree skew angle to accommodate the alignment of Cabrillo Boulevard.

The vertical clearance under the existing bridge structure is posted at 14'-11". No evidence was observed of trucks hitting the structure. This structure is located next to the Cabrillo Boulevard/Highway 101 Interchange and the geometry of the railroad track and the Cabrillo Boulevard cannot be significantly changed without impacts to both right-of-way and the interchange itself. UPRR's Grade Separation Guidelines specify skew angles no greater than 30 degrees depending on the type of the structure. The abutments currently support only a single track but were built to accommodate two tracks on 13'-6" track centers.

The UPRR right-of-way is 100-ft wide at Cabrillo Boulevard but narrows to 60-ft approximately 200-ft geographically south of the existing bridge. The existing single track is located in the center of the UPRR right-of-way.



INITIAL PROJECT SCOPE AND STATUS

HDR was retained by the City to provide conceptual design level analysis of the railroad bridge replacement and to develop two alternative shoofly track alignments needed to facilitate replacement of the bridge structure. The construction of the shoofly track would be required by UPRR due to the need to continue rail services without interruption. The two shoofly alternative designs and study have since been completed by HDR. The two alternatives, known as the North Shoofly Track Alignment and South Shoofly Track Alignment, are described below. Engineering plans for both shoofly alignment alternatives were submitted to the UPRR for their review and comments.

NORTH SHOOFLY TRACK ALIGNMENT ALTERNATIVE

The North Shoofly Track Alignment Alternative would provide a shoofly alignment along the outside curve north of the existing main line track. This alternative would require the construction of the north half of the proposed bridge structure first. The mainline track would then be moved onto the northern structure to be utilized as a shoofly track while the existing bridge is removed and the southerly half of the bridge is then constructed. It is the City's desire, subject to UPRR's approval, to leave the shoofly track in place as the final mainline track alignment after the completion of the proposed bridge. This would provide the advantage of avoiding the costs for the relocation of the mainline back to the original alignment, and the subsequent removal of the shoofly track. The proposed south half of the bridge would then be used to support a future second track alignment. The new shoofly will stop short of the Los Patos Bridge. It will also require the re-grading of a drainage swale, however most if not all skyline tress between the existing track and the freeway will be left intact.

In order to provide 15'-6" vertical clearance, Cabrillo Boulevard will have to be lowered by approximately 1-ft and potential groundwater issues addressed. Surface storm water runoff may be diverted into the existing storm drain system to the south of the structure.

Initial survey conducted revealed that there are 5 existing fiber cables along the corridor that will require relocation. An easement from Caltrans will be needed along the freeway right-of-way approximately 200-ft east of Cabrillo Boulevard. This will allow for the placement of the shoofly track as this portion of UPRR's right-of-way begins to narrow to 60 feet.

SOUTH SHOOFLY TRACK ALIGNMENT ALTERNATIVE

This South Shoofly Track Alignment Alternative would provide a shoofly alignment along the inside curve south of the existing main line track. This alternative would introduce an additional reversing curve on the west side of the shoofly alignment which does not currently exist. The South Alignment will require an additional 1,900-ft of track compared to the North Alignment, which also requires widening/reconstruction of the Los Patos UPRR Bridge. This is due to the constraint of



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designing the track alignment along the inside of the existing main line curve. This alternative will construct the south half of the proposed bridge structure first. The mainline track would then be moved onto the southerly structure to be utilized as a shoofly track while the existing bridge is removed and the northerly half of the bridge is then constructed.

In order to provide the required 15'-6" vertical clearance, Cabrillo Boulevard will have to be lowered by approximately 1-ft without encountered possible ground water. Drainage may be diverted into the existing storm drain system to the south of the structure.

The initial field survey limits did not extend beyond Los Patos Way; therefore, this alternative did not include existing top-of-rail shots or identify existing utilities. Based on the information received from the City, removal of trees will be required along the entire length of the south shoofly track. Retaining walls will be required due to the increased elevation differences along the southerly UPRR right-of-way. In addition, sound mitigation may be required due to increased noise generated along the southerly right-of-way as there are multiple adjacent residential and commercial buildings. The railroad bridge at Los Patos Way and the drainage structure at Milepost 369.21 will need to be widened to accommodate the shoofly track. There are 5 existing fiber cables along the corridor that will need to be relocated.

PROPOSED RAILROAD BRIDGE

The proposed structure type for the replacement of the existing railroad bridge is a rolled beam structure. This is a preferred standard type of structure that UPRR will accept, while reducing overall construction costs. In order to accommodate the additional multi-purpose lane and right hand turn lane located on the east side of the roadway, the east span must be longer than the west span. Per the direction of the City, this level of design did not include structural plans.

While a rolled beam structure may not be as aesthetically pleasing as other types of structures, concrete fascia beams (with patterns) can be added to the structure at additional cost, to improve the overall appearance of the completed project.

REALIGNMENT OF CABRILLO BOULEVARD

Cabrillo Boulevard is being widening to accommodate the additional 12-foot multi-purpose trail, a 12-foot right hand turn lane and two 5-foot bike lanes with the existing 1 through lane, in each direction, remaining. The improvements are primary concentrated along the east side of the existing roadway. The roadway will be lowered by at least 1-foot in order to provide 15'-6" vertical clearance under the bridge. Additional lowering may be required if the aforementioned vertical clearance design criteria variance is not approved by the UPRR. Drainage potentially can be diverted into the storm drain system currently located to the south of the structure, although a



pump system may need to be investigated during subsequent phases of the project design.

PROJECT UPDATE – DECEMBER 2014

The City has finally received concurrence from the UPRR to use the North Shoofly Track Alignment Alternative to temporarily support rail operations and traffic during construction. The UPRR has also provided the following comments which need to be addressed and incorporated into the future design submittal packages:

- UPRR has approved a proposed bridge skew angle of 50-degrees.
- UPRR has approved a proposed bridge width of 50-ft, which is less than the overall railroad right-of-way at this location. (The bridge will have to be widened to 60-ft however, to accommodate the additionally requested permanent shifting of the mainline track, as further discussed below.)
- UPRR **did not approve** the shoofly becoming the permanent mainline track alignment. The mainline track (and any future track) will need to be centered within the right-of-way. More specifically, the existing main track should be relocated 10-ft north of the right-of-way centerline, and any future second track 10-ft south of the right-of-way centerline.
- UPRR **did not approve** an underpass vertical clearance of 15'-6", which is less than 16'-6" required in the Railroad Guidelines for Grade Separation for the proposed structure type.

PROJECT FINAL DESIGN SELECTION: NORTH SHOOFLY TRACK ALIGNMENT

The temporary shoofly track will be constructed along the outside curve north of the existing mainline track as illustrated in attached Exhibits 1, 2, and 3. Prior to installing this shoofly, temporary shoring will be placed and construction of the north half of the proposed bridge completed. Once the north half is finished, the mainline track will then be moved onto the completed northern portion of the structure, and be used as a shoofly track while the existing bridge is removed and the southerly half of the new bridge constructed.

Upon completion of the southerly half of the structure, track roadbed will be re-graded and track will be re-profiled on both sides approaching the structure to meet current UPRR design criteria. The permanent mainline track will then be constructed 10-ft north of the centerline of the railroad right-of-way as requested by UPRR, and the shoofly track on the northerly structure removed. (It is important to note that the exhibits as prepared earlier in March, 2014 do not show the main track at 10-ft offset from the centerline of the right-of-way, as recently requested. This change will need to be addressed during the next design phase.)



PROJECT FINAL DESIGN SELECTION: STRUCTURE TYPE AND VERTICAL CLEARANCES

The originally recommended rolled beam superstructure bridge will be advanced into final design. The profile of Cabrillo Boulevard will also be lowered as illustrated in attached Exhibit 4. In order to accommodate a future track at a 10-ft offset south of the centerline of right-of-way, the width of the bridge will be increased from 50-ft to 60-ft.

The minimum vertical clearance between the bottom of the new bridge and the finished roadway surface will be 16'-6", to comply with the request made by UPRR. To meet this required vertical distance of 16'-6", the roadway will be lowered by approximately 2-ft beneath the rail bridge. Drainage will likely be diverted into the existing storm drain system currently located to the south of the structure. However, an in-depth survey should be conducted during the next level of design to ensure the connection can be made and positive drainage achieved. If positive drainage cannot be achieved, a pumping system could be used as an alternative drainage solution.

FASCIA GIRDER OPTION

Concrete fascia girders with patterns can be added to the new bridge superstructure as an option to hide the rolled steel beams and enhance the overall appearance of the structure. This approach has been used successfully by HDR on several past rail bridge projects. For example, attached Exhibit 5 shows the recently completed Magnolia Boulevard grade separation project in the City of Riverside, CA, where this method was used to hide the standard steel rolled beams. Alternatively, attached Exhibit 6 shows what the final structure can look like without the installation of the aesthetic fascia girders. There is an additional cost of approximately \$225,000 for the bridge with fascia girders, versus a bridge without them.

CALTRANS' LATEST PLANS

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED] the design will need to be modified at the next design level. [REDACTED]
[REDACTED]
[REDACTED]

PRELIMINARY PROJECT COST ESTIMATE

The baseline preliminary engineering estimate for the overall project is **\$28,500,000** as shown in the attached Exhibit 7. The baseline estimate includes the North Shoofly Alignment Alternative, along with the removal of the shoofly at the conclusion of



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construction, the lowering of Cabrillo Boulevard to achieve required vertical clearances, and the construction of a new 2-track wide rail bridge. The estimate however does not include concrete fascia girders or other aesthetic enhancements, and does not fully address the currently unknown utility relocation costs or potential pump station needs. And, the baseline does not account for the potentially significant cost savings if the right-hand turn lane is removed from the scope of the project. Although a 30% contingency has been included in the baseline to offset some of the still unknown costs, the City should still consider increasing this contingency value when submitting project funding requests.

ATTACHMENTS

ENGINEERING PLANS AND EXHIBITS

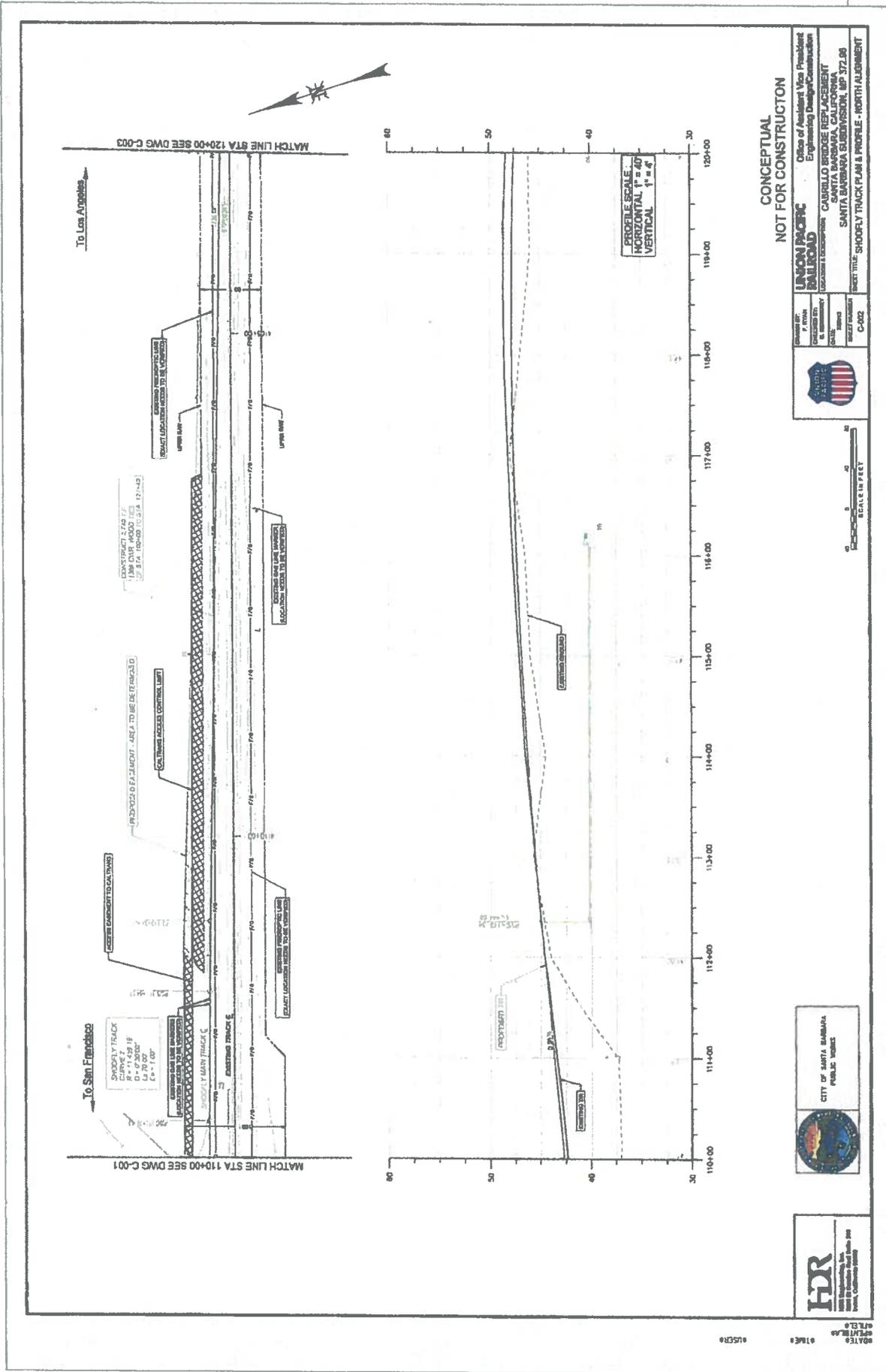
Exhibits 1 thru 3 - North Shoofly Track Alignment and Profile

Exhibit 4 - Cabrillo Blvd Realignment and Profile Lowering

Exhibit 5 - Example of a Rail Bridge with Aesthetic Fascia Girders

Exhibit 6 - Example of a Rail Bridge without Aesthetic Fascia Girders

Exhibit 7 - Preliminary Cost Estimate



CONCEPTUAL
NOT FOR CONSTRUCTION

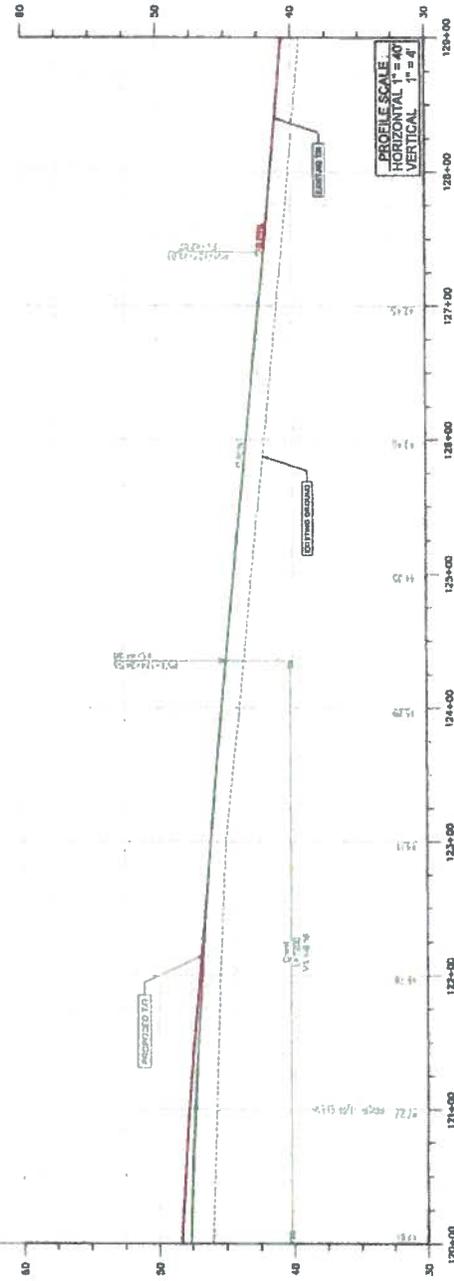
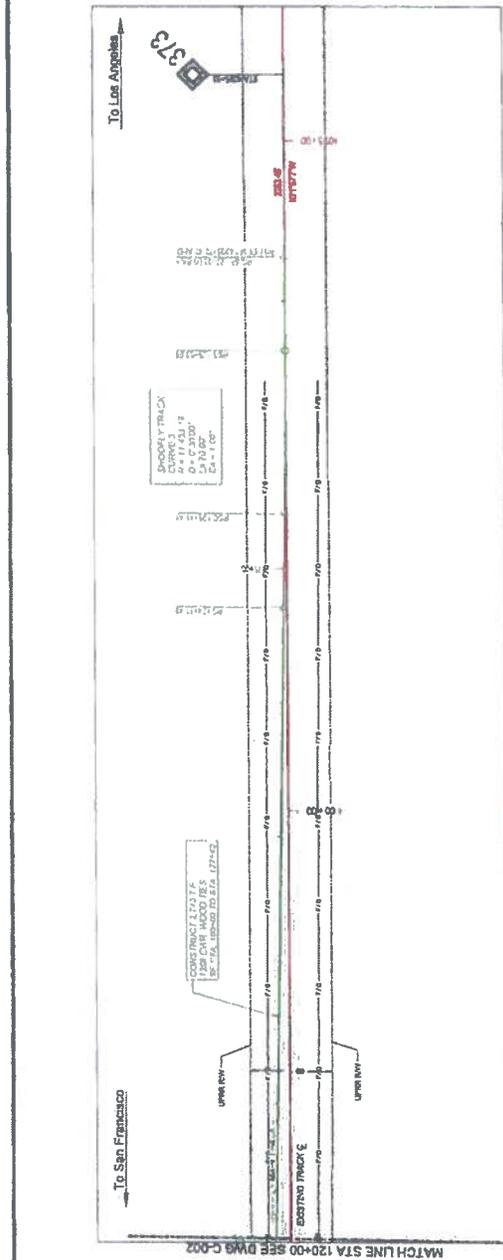
INTEGRAL
Office of Assistant Vice President
Engineering Design/Construction
CARIBLO BERGHE REYNOLDS
SANTA BARBARA, CALIFORNIA
SANTA BARBARA SUBDIVISION, MP 372.05
SHEET TITLE: SHOOEY TRACK PLAN & PROFILE - NORTH ALIGNMENT
C-002



SCALE IN FEET
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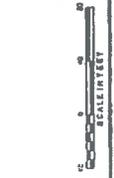


DATE: 01/14/08
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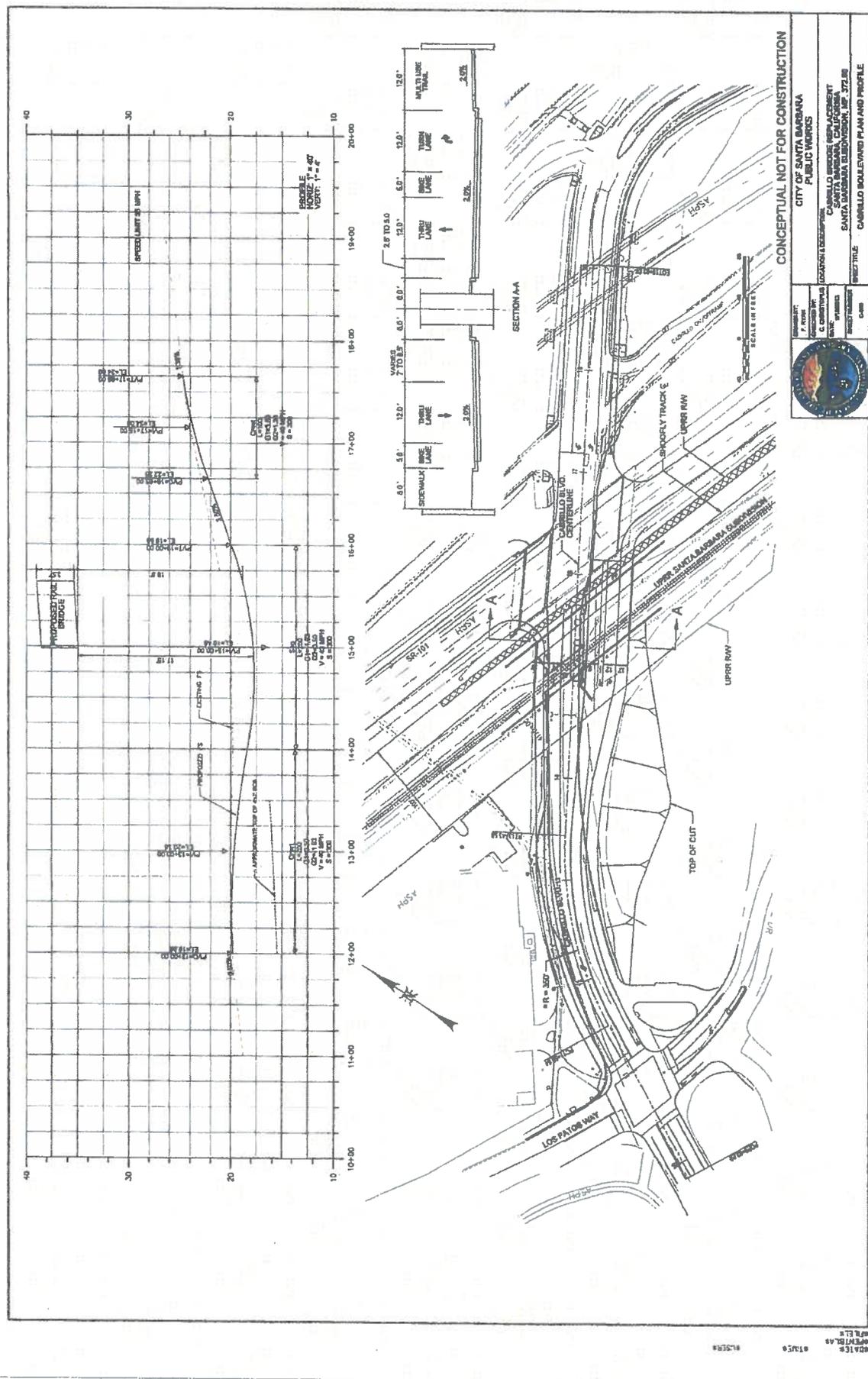


CONCEPTUAL
NOT FOR CONSTRUCTION

		Office of Assistant Vice President Engineering Design/Construction	
Union Pacific RAILROAD		CABRILLO BRIDGE REPLACEMENT SANTA BARBARA, CALIFORNIA	
PROJECT NO.		SANTA BARBARA SUBDIVISION, BP 372.00	
SHEET NO.		C-003	



4041 E
 42ND BLVD
 93406



CONCEPTUAL NOT FOR CONSTRUCTION

CITY OF SANTA BARBARA
 PUBLIC WORKS

CAMARILLO BLVD. IMPROVEMENT PROJECT
 CARMELLO BLVD. CENTRELINE
 SANTA BARBARA, CALIFORNIA, ZIP 93101

PROJECT TITLE: CAMARILLO BLVD. IMPROVEMENT PLAN AND PROFILE



DATE: 01/20/2016
 DRAWN BY: J. WILSON
 CHECKED BY: J. WILSON
 PROJECT NUMBER: 15-000

SCALE: 1" = 40'
 SCALE: 1" = 200'

DATE: 01/20/2016
 DRAWN BY: J. WILSON
 CHECKED BY: J. WILSON
 PROJECT NUMBER: 15-000

SCALE: 1" = 40'
 SCALE: 1" = 200'

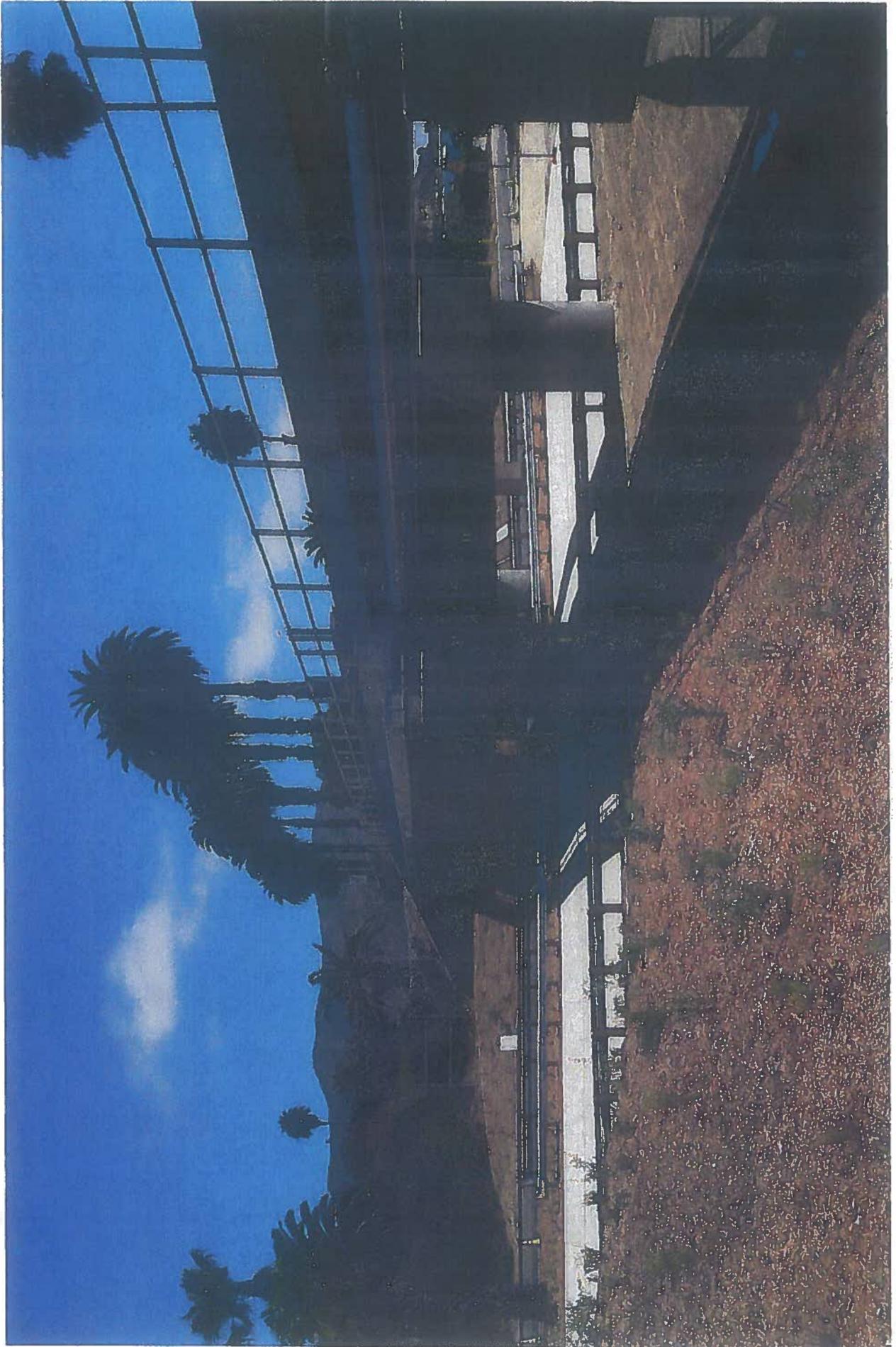
DATE: 01/20/2016
 DRAWN BY: J. WILSON
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 PROJECT NUMBER: 15-000

SCALE: 1" = 40'
 SCALE: 1" = 200'

DATE: 01/20/2016
 DRAWN BY: J. WILSON
 CHECKED BY: J. WILSON
 PROJECT NUMBER: 15-000

SCALE: 1" = 40'
 SCALE: 1" = 200'





City of Santa Barbara - Cabrillo Blvd Railroad Bridge Replacement Project

- Engineer's Opinion of Probable Conceptual Project Cost -
10% Submittal - Alternative Shoofly North
December 5, 2014



EXHIBIT 7

Item No.	Description	Unit	Quantity	Unit Cost	Total Cost
DESIGN					
	Agency Design Admin. (City of Santa Barbara)	%	3.00	CCE	\$602,500
	Alternative Analysis & Environmental (3% to 5%)	%	4.00	CCE	\$803,400
	Design - Preliminary to 30% (1% to 3%)	%	2.00	CCE	\$401,700
	Design - 30% to 60% and Permits (2% to 3%)	%	3.00	CCE	\$602,500
	Design - 60% to Final PS&E (2% to 4%)	%	3.00	CCE	\$602,500
				Subtotal	\$3,012,600
GENERAL					
	Mobilization	LS	1	\$700,000	\$700,000
	Clearing and Grubbing	LS	1	\$200,000	\$200,000
	Prepare Storm Water Pollution Prevention Plan	LS	1	\$125,000	\$125,000
	Implement Storm Water Pollution Prevention Plan	LS	1	\$100,000	\$100,000
	Storm Water Annual Report	EA	2	\$2,000	\$4,000
	Air Pollution Control	LS	1	\$25,000	\$25,000
	Project Schedule	LS	1	\$20,000	\$20,000
				Subtotal	\$1,174,000
CIVIL					
	AC Pavement (6" thick)	TON	1,513	\$110	\$166,430
	Aggregate Base (6" thick)	CY	773	\$60	\$46,380
	Hardscape	SF	785	\$10	\$7,850
	Decomposed Granite (3" thick)	CY	59	\$60	\$3,540
	Curb and Gutter	LF	1,538	\$25	\$38,400
	Handicap Ramps	EA	8	\$1,500	\$12,000
	Crash attenuators	LS	1	\$35,000	\$35,000
	Street Lighting	LS	1	\$50,000	\$50,000
	Signing and Striping	LS	1	\$10,000	\$10,000
	Landscape	LS	1	\$100,000	\$100,000
	Storm Drain (64" RCP)	LF	300	\$150	\$45,000
	Catch Basin	EA	3	\$7,500	\$22,500
	Earthwork	CY	10,000	\$15	\$150,000
	Remove 8" Water Line	LF	300	\$25	\$7,500
	Construct 8" Water Line	LF	300	\$150	\$45,000
	Power Line Relocation	LS	1	\$100,000	\$100,000
	Modify Traffic Signals	LS	1	\$200,000	\$200,000
	Remove AC Pavement	SF	33,318	\$2	\$66,636
	Remove PCC Pavement	SF	1,387	\$5	\$6,935
	Remove Retaining Wal	LF	329	\$50	\$16,450
	Remove Existing Bridge	LS	1	\$250,000	\$250,000
	Remove Storm Drain System (Pipe, Catch Basin, Manholes)	LS	1	\$20,000	\$20,000
	Remove Street Lighting	EA	3	\$10,000	\$30,000
				Subtotal	\$1,429,621
STRUCTURAL					
	Railroad Bridge (Cabrillo), including Temporary Shoring	LS	1	\$5,200,000	\$5,200,000
	Retaining Walls	LS	1	\$800,000	\$800,000
				Subtotal	\$6,000,000
UTILITIES					
	Relocate Fiber Optic Lines (MCI, Sprints, AT&T, Level 3 & Quest)	EA	5	\$750,000	\$3,750,000
	Encase High Pressure Gas Line	EA	1	\$50,000	\$50,000
				Subtotal	\$3,800,000
RAILROAD TRACKWORK - SHOOFLY					
	FURNISH AND INSTALL TRACK, 136# RE, WOOD TIES INCLUDING BALLAST & OTM	TF	1,600	\$350	\$560,000
	SHIFT TRACK (WOOD TIES)	TF	1,140	\$75	\$85,500
	TRACK SUBBALLAST	CY	1,725	\$40	\$69,000
	EMBANKMENTS AND OTHER FILLS	CY	4,800	\$20	\$96,000
	EXCAVATION	CY	9,900	\$20	\$198,000
	REMOVE AND SALVAGE WOOD TIES, 136# TRACK	TF	1,600	\$40	\$64,000
				Subtotal	\$1,072,500
RAILROAD TRACKWORK - RESTORE TO ORIGINAL ALIGNMENT					
	FURNISH AND INSTALL TRACK, 136# RE, WOOD TIES INCLUDING BALLAST & OTM	TF	1,600	\$350	\$560,000
	SHIFT TRACK (WOOD TIES)	TF	1,140	\$75	\$85,500
	TRACK SUBBALLAST	CY	1,725	\$40	\$69,000
	EMBANKMENTS AND OTHER FILLS	CY	1,200	\$20	\$24,000
	EXCAVATION	CY	4,500	\$20	\$90,000
	REMOVE AND SALVAGE WOOD TIES, 136# TRACK	TF	1,600	\$40	\$64,000
				Subtotal	\$892,500
RAILROAD SIGNAL WORK - Shoofly					
	MISCELLANEOUS SIGNAL WORK (REMOVAL, RECONNECTIONS AND MODIFICATION)	LS	1	\$50,000	\$50,000
				Subtotal	\$50,000
RAILROAD SIGNAL WORK - RESTORE TO ORIGINAL ALIGNMENT					
	MISCELLANEOUS SIGNAL WORK (REMOVAL, RECONNECTIONS AND MODIFICATION)	LS	1	\$50,000	\$50,000
				Subtotal	\$50,000

Item No.	Description	Unit	Quantity	Unit Cost	Total Cost
RAILROAD FLAGGING					
	RAILROAD FLAGMAN	MAN-DAY	400	\$1,200	\$480,000
				<i>Subtotal</i>	\$480,000
	SUBTOTAL, RAILROAD WORK PERFORMED =				\$2,545,000
OTHER PROJECT COSTS					
	PERMANENT EASEMENT FROM CALTRANS	SF	2,020	\$20	\$40,400
	RIGHT OF WAY	SF	18,482	\$25	\$462,050
				<i>Subtotal</i>	\$502,450
	ENGINEER'S ESTIMATE OF PROBABLE TOTAL PROJECT COST, WITHOUT CONTINGENCY =				\$15,451,071
	30% COST CONTINGENCY =				\$4,635,321
	Total Construction Cost =				\$20,086,392
ANCILLARY/CONSTRUCTION COSTS					
	Agency Construction Admin.	%	2	CCE	\$401,700
	Design Support During Constr. (3% to 4%)	%	3	CCE	\$602,500
	Construction Management & Testing	%	10	CCE	\$2,008,600
				<i>Subtotal</i>	\$3,012,800
	Total Project Cost (not escalated) =				\$26,111,792
ESCALATION					
	Escalation to Midpoint of Construction (June 2015) @	3%	1.00	YEAR	\$784,000
	Escalation to Midpoint of Construction (June 2016) @	3%	2.00	YEARS	\$1,591,000
	Escalation to Midpoint of Construction (June 2017) @	3%	3.00	YEARS	\$2,422,000
	Escalation to Midpoint of Construction (June 2018) @	3%	4.00	YEARS	\$3,278,000
	Escalation to Midpoint of Construction (June 2019) @	3%	5.00	YEARS	\$4,159,000
	Total Project Cost (Escalated to 2017) =				\$28,500,000
<ul style="list-style-type: none"> - Estimated costs shown does not includes the cost to lowering the utility lines underneath the railroad bridge - Estimate assumes no hazardous materials, either in structures or underground. 					