



1-29 TYPE SELECTION REVIEW MEETING

The Type Selection Review Meeting and distribution of the Type Selection Memo are fundamental features of the Division of Engineering Services (DES), Structure Design's design approval process. As such, it is important that design approval, as accomplished by the Review Meeting and Type Selection Memo, be accomplished as early in the design process as possible. There should be no appreciable design effort without the Office Chief approval. Distribution of the proposed General Plan **outside the Division** shall not proceed, until the Type Selection Review process has been approved.

The Review Meeting is intended to provide a mechanism for involving essential units in the project development process at an early stage. The Meeting's basic objectives are (1) to obtain consensus on and approval for, the structure proposed and (2) avoid problems at a later, more critical, project stage (i.e., provisions for falsework clearance, traffic handling plans, access for construction operations, etc.).

A Type Selection Review Meeting will be held for all bridges and highway structures designed by Structure Design except as noted in this memo. The Design Engineer or his staff shall presents the pertinent factors affecting the proposed structure to a review panel generally composed of the following people or their representatives:

- Bridge Design Supervisors
- Specifications & Estimates Supervisor
- Project Aesthetics Consultant
- Structure Maintenance Engineer – North
- Structure Construction Engineer

The Type Selection Memo should address all pertinent issues related to the creation of the General Plan. The Type Selection Review Meeting will provide a forum to discuss these issues and to provide a consensus on the design solutions. Deviations to the *Seismic Design Criteria* shall be documented and discussed during the Type Selection Review Meeting in accordance with *Memo to Designers* 20-11. Refer to Attachment 1, for Type Selection Memo format, Attachment 3 for suggested topics to be covered and Attachment 4 for sample type selection recommendations. (Attachment 4 provides a sample for a large project, fewer details could be needed for smaller projects.)

When the proposed General Plan has been prepared, submit a request for Type Selection Review Meeting to the Design Office Secretary (see Attachment 2). Deliver the General Plan(s) and draft Type Selection Memo to the Design Office Secretary one week before the meeting so that the Design Office Secretary may distribute copies to each member of the review panel. If the one-week deadline cannot be met, the Design Branch shall deliver copies to the review panel at least one day before the meeting. The Preliminary Report (if available) and any additional information pertinent to type selection should be brought to the meeting.



Miscellaneous structures such as culverts, sound walls, retaining walls, tie-back walls and minor structure modifications generally do not require a type selection review meeting. Such General Plans should be discussed with the Design Supervisors. The Design Engineer and Supervisor will then decide if a Review Meeting is warranted.

Miscellaneous structures, which may require a meeting, include:

1. Those supported by, or connected to a bridge.
2. Those with extensive aesthetic treatment.
3. Those that are unusual as to cost, size, or design.
4. Vehicular Tunnels and Pumping Plants (with vertical exposed walls) are usually part of larger projects and should be addressed as a separate item during the respective meeting. These structures will usually require input from the Project Aesthetics Consultant. Similarly, representatives from the Office of Electrical, Mechanical, Water and Wastewater and the Structural Design Branch of the Office of Transportation Architecture shall be included in the meeting.

It is expected that the Design Engineer responsible for the project has seen to it that the General Plan presented for review is acceptable for distribution outside the Office. (i.e. complies with such appropriate guidelines as *Bridge Design Details* 3-10 to 3-14; *Memos to Designers* 1-23, 14-19, 17-105, 106, 110, and 21-19; *Bridge Design Aids*, Section 10; etc) The Design Engineer is also responsible for reviewing the General Plan Estimate before the distribution of the General Plan outside the Office. For engineering cost estimates, refer to *Memo to Designers* 1-4.

The Type Selection Review Meeting is not intended to be a check of the General Plan being reviewed.

After the review, the General Plan and the Structure Type Selection Memo shall be revised as necessary. The minutes of the review meeting shall be distributed to the meeting participants. 11x17 General Plans should be ordered and distributed in accordance with *Memo to Designers* 1-5 as soon as possible after the meeting.

Eldon R. Davisson
Deputy Division Chief
Engineering Services, Structure Design



ATTACHMENT 1

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION
STRUCTURE TYPE SELECTION

PROJECT IDENTIFICATION						DATE
DIST	CO	RTE	KPM	CD	EA	DESIGN GROUP
SP&Q:				SPS&E:		

Bridge Name	Bridge Number	KP	Construction Cost	Design Hours Required
PROJECT TOTAL				

Brief Project Description:

- (1) DESIGN ENGR _____
- (2) BR DES SUPV _____
- (3) SR BR ARCHIT _____
- (4) CHIEF STR DES _____
- (5) PROJECT ENGR _____

PROJECT ENGINEER
PROJECT AESTHETICS CONSULTANT

Copy to File
 Attachments: General Plan
 General Plan Estimate
 Type Selection Checklist



ATTACHMENT 2

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION
REQUEST FOR TYPE SELECTION MEETING

PROJECT IDENTIFICATION						DATE
DIST	CO	RTE	KPM	CD	EA	DESIGN SENIOR BRANCH

Structure(s) Over Water Structure(s) Over/Under Railroad

Bridge Name	Bridge Number	KP

Project Engineer	
Requested Meeting Date	
Estimated Length of Meeting	
District Project Manager	

INVITE THE FOLLOWING	Name
Geology	
District Project Engineer	
Project Coordination Engineer	
Other	

.....

ASSIGNED MEETING DATE	
ASSIGNED MEETING TIME	
ASSIGNED MEETING ROOM	

INVITED TO MEETING	NAME	
Bridge Design North	Office Chief	Mandatory
Bridge Design Central	Office Chief	Mandatory
Bridge Design South	Office Chief	Mandatory
Bridge Design West	Office Chief	Mandatory
Specifications		Mandatory
Construction		Mandatory
Aesthetics		Mandatory
Maintenance		Mandatory
Hydraulics		If over water
Agreements		If over/under Railroad



ATTACHMENT 3

Items that should be considered in developing the Type Selection Memo.

DESIGN ISSUES

- Project Description**
 - EA and CO-RTE-KP
 - Structure Names and Numbers
 - Vicinity Map
 - Purpose
 - General Plans for all structures and alternatives
 - Project Engineer and Architect
- Project Schedule**
 - Design Hours for each structure
 - Structures P&Q and PS&E date
 - Critical dates for other functional units
 - Ability to meet schedule
 - Missing Design Data
- Previous Advanced Planning Studies**
- Design Alternatives**
 - List Alternatives Considered
 - Structure Depth
 - Span Arrangements
 - Material Alternatives
 - Construction Alternatives
 - Describe Pros and Cons
- Physical Constraints**
 - Horizontal Clearance
 - Vertical Clearance
- Loads**
 - Special Loading Requirements
 - Construction Overloads
- Adjacent Structures**
 - Clearances
 - Transition to other structures
- Existing Bridge**
 - Removal/Replacement
 - Strengthening
 - Widening Methods
- Future Widening**
 - Superstructure
 - Lower Roadway
 - Impacts on Current Project
- Frame Layout**
 - Hinge Locations
 - Selection Process
- Abutment**
 - Embankment Slopes
 - Seat, diaphragm, bin, strutted, rigid frame
 - Embankment surcharge and settlement
 - Approach Slabs
 - Slope Protection
 - Skew

- Bent/Pier Wall Types**
 - Number of Column/Bent
 - Drop Cap/Integral Cap
 - Column Fixity
 - Superstructure Fixity
 - Outrigger/C Bents
 - Skew
- Railing and Barriers**
 - Type
 - Rail Replacement Requirements
- Corrosion Issues**
- Signs and Lighting**
- Joints Seals**
- Deck Surfacing**
- Sidewalks/Medians**
- Hinge Access**
- Bearing Systems**
- Deck Drainage**
 - Design Rainfall Intensity
 - Inlet/Piping/Outlet Locations
 - Access openings
- Retaining Walls and Soundwalls**
 - Construction Materials
 - Special Design Required
- Utilities**
 - Type and location of utilities carried by structure
 - Future Utility Opening requirements
 - Interfering Underground and Overhead Utilities
 - Soffit openings
- Permits and Agreements Required**
- Railroad Requirements**
- Structure Type Recommendations**

DISTRICT ISSUES

- Presentations required for Outside Agencies**
- Commitments to outside Agencies**
- Environmental Constraints**
 - EIR Requirements
 - Protected species
 - Mitigation measures
 - Monitoring requirements
 - Construction Windows
 - Hazardous Waste

AESTHETICS ISSUES

- Requirements of EIR, District or other Agencies**
- Sketches of architectural treatment**

FOUNDATION ISSUES

- Preliminary Report**
- Groundwater**
- Soil Profile**
- Foundation and Pile Types**

SEISMIC ISSUES

- Seismic Performance Criteria**
- Seismic Analysis Methods**
- Fault Magnitude and Distance from structure**
- PGA & ARS**
- Liquefaction Potential and Design methods**
- Retrofit requirements**
- Isolation Systems**
- Critical Seismic Issues**
- Peer Review Requirements**
- Proposed New Criteria**

MAINTENANCE ISSUES

- Utilities**
- Widenability of existing bridges**
- Repair/Rehabilitation**
 - Deck Condition
 - Deck Seals
 - Joint Seals
 - Bearing Systems
- Hydraulics/Hydrology**
 - Final Hydraulic Report
 - Recommendations
 - Waterway Area requirements
 - Scour depths and protection
 - Bank Protection
 - Construction Methods in Waterway
 - Pier Shapes, location and skew
- Special Railing Requirements**

CONSTRUCTION ISSUES

- Constructibility**
- Stage Construction**
- Storage Facilities**
- Construction Sequence Access**
- Falsework**
 - Temporary Vertical Clearances
 - Temporary Opening Widths
 - Temporary Support Locations
- Traffic Control Issues**
 - Detours
 - Lane Reductions and Closures
 - Column/Footing Construction Requirements
 - K-Rail and Crash Cushions
 - Stage Construction

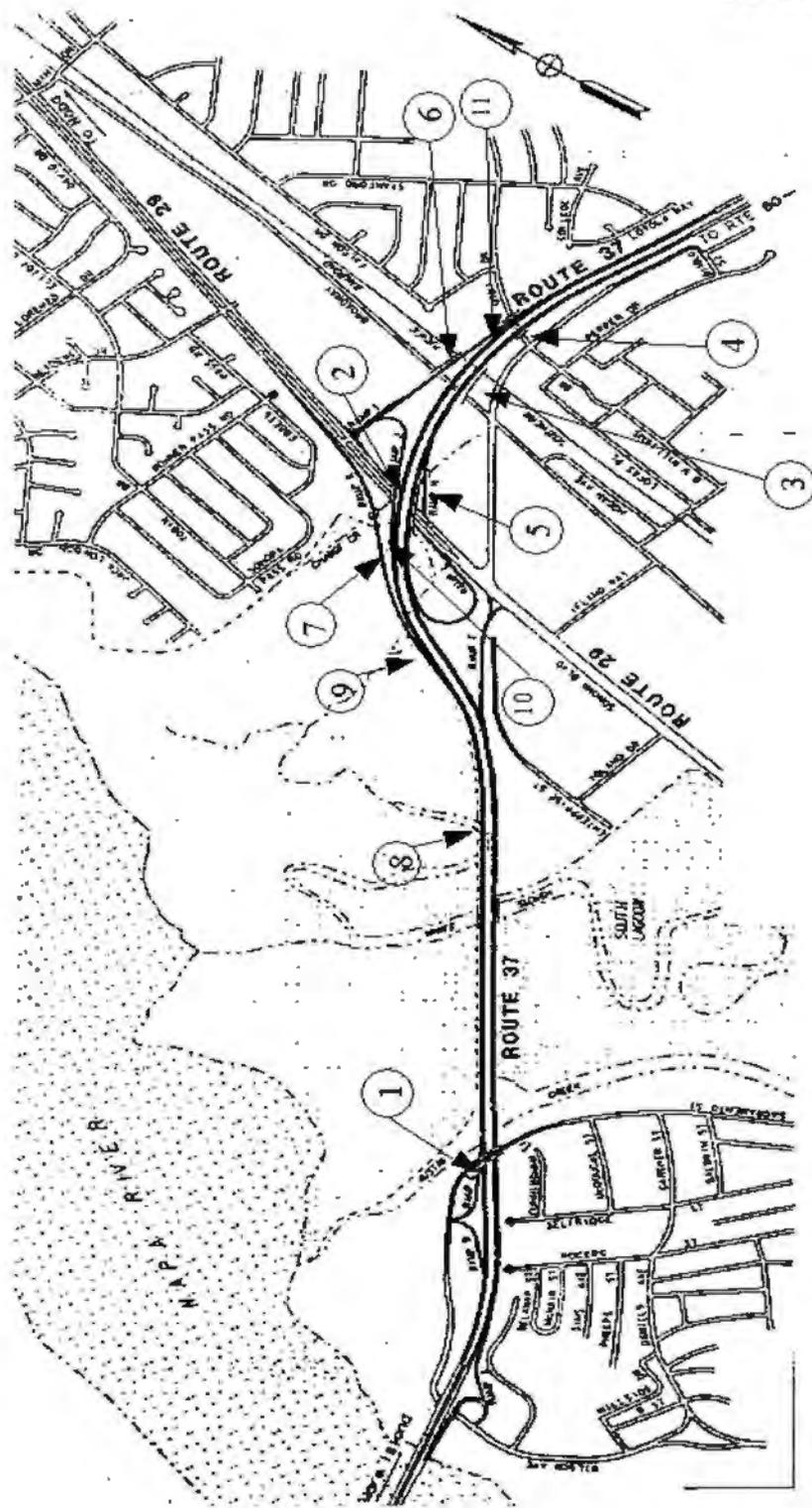


ATTACHMENT 4

Structures

	Bridge Name	Bridge Number	Width/Height	Length	Comments
1	Wilson Ave OC	23-0217	46.7 ft	261 ft	2 span
2	Route 37/29 Separation	23-0218	125 ft	921 ft	6 span
3	Broadway OH	23-0219	112 ft	462 ft	3 span
4	Mini Drive UC	23-0220	131 ft	150 ft	1 span
5	N29-E37 Connector	23-0221G	26.5 ft	253 ft	3 span
6	W37-N&S29 Connector	23-0222F	38.3 ft	428 ft	3 span
7	S29-W37 Connector	23-0223F	26.5 ft	1000 ft	9 span
8	Ret. Wall No. 1	23-Wall 1	8 ft	1476 ft	16' Soundwall
9	Ret. Wall No. 2	23-Wall 2	36 ft	602 ft	
10	Ret. Wall No. 3	23-Wall 3	44 ft	40 ft	
11	Ret. Wall No.4	23-Wall 4	22 ft	389 ft	

ATTACHMENT 4



Site Plan

ATTACHMENT 4

Geology

<i>Bridge Name</i>	<i>Upper Layer</i>	<i>Lower Layer</i>	<i>Foundation Types</i>	<i>Comments</i>	<i>Max Eq/Accel</i>	<i>ATC-32 Curve</i>	<i>Max ARS</i>
Wilson Ave OC	18' fill over bay mud	sandy to clayey silt and soft to very stiff silty clay	PC/PS conc piles class 400 or 625 (no CIDH)	possible corrosion waiting periods req'd for fills	Mw=6.5 @ 5.5km 0.5g	Modified Type D	1.25g
Route 37/29 separation and N29-E37 connector (Ramp H)	13' soft to stiff clay and silt	med dense to dense cemented silt	driven steel H piles. 24" min CIDH OK but not preferred	predrilling may be required if PC concrete piles used	Mw=6.5 @ 4.0km 0.5g	Modified Type D	1.25g
Broadway OH and W37-N&S29 connector (Ramp I)	20-40' fill over stiff to hard silty to sandy clay at western portion	same as upper layer grades to weathered siltstone and sandstone in eastern portion	spread footings (1.5 to 2.5tsf) or driven piles (class 400 or 625) or 24" min CIDH piles	possible corrosion don't use spread footings at Abut 4 due to sewer line, use CIDH piles	Mw=6.5 @ 4.0km 0.5g	Modified Type C	1.18g
Mini Drive UC	10' very stiff clayey to gravelly silt	weathered siltstone and shale	spread footings or PC/PS piles (Class 400 or 625) or 24" min CIDH piles	possible corrosion groundwater present	Mw=6.5 @ 4.0km 0.5g	Modified Type C	1.18g
S29-W37 connector (Ramp K)	13' soft to stiff clay and silt	med dense to dense cemented silt	driven steel H piles. 24" min CIDH OK but not preferred	predrilling may be required if PC concrete piles used	Mw=6.5 @ 4.0km 0.5g	Modified Type D	1.25g

Notes:

- Structures Foundations has completed all Preliminary Foundation recommendations for the bridges and the retaining walls. The Preliminary Seismic Design recommendations have been submitted to Design.
- Logs of Test Borings (LOTB) are available for a number of bridge sites as the route has been studied extensively since 1971. Structures Foundations is having a hard time relating the old LOTB to the new alignment, but expects to successfully utilize those borings in lieu of drilling new exploratory holes.
- Environmental permits are required to drill in the wetlands, but impacts on the protected Clapper Rail may delay drilling until August 15, 1999. Drilling to start in June 1999 where permits are not required.
- No liquefaction potential and no scour problems at any site.
- Approach fills may require special treatment (wick drains), surcharge, and long settlement periods. Expect large settlements (3-5 feet).



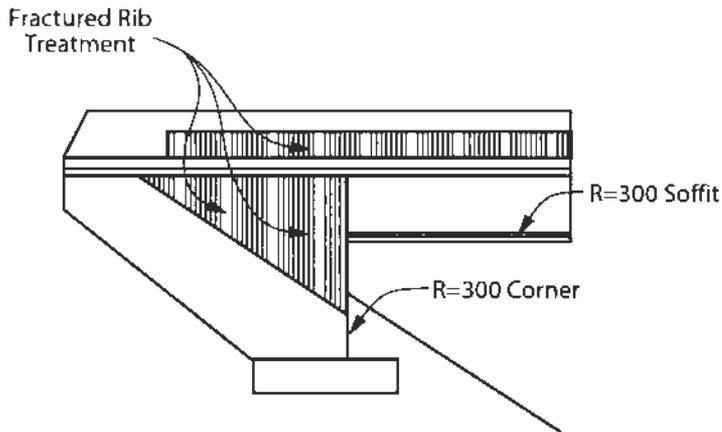
ATTACHMENT 4

Aesthetics

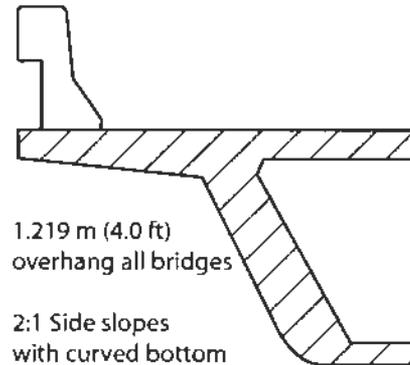
The Final Environmental Report/Statement dated May 1998 stated in Section 4.7.1 that "Certain aesthetic elements utilized in the structure at Fairgrounds Drive Undercrossing will be incorporated into proposed structures to provide visual consistency of the portion of the Route 37 corridor between the I-80/Rt 37 Interchange and the north end of the Napa River Bridge."

Proposed treatments for CIP/PS Box Girders are shown below. Ramp K will utilize round columns with architectural treatment. Bent cap at Ramp K shall be tapered in elevation and in plan, and will have architectural treatment. Wingwall layout line shall be placed at edge of deck without offset. Cost estimates include \$356,000 for aesthetic treatment.

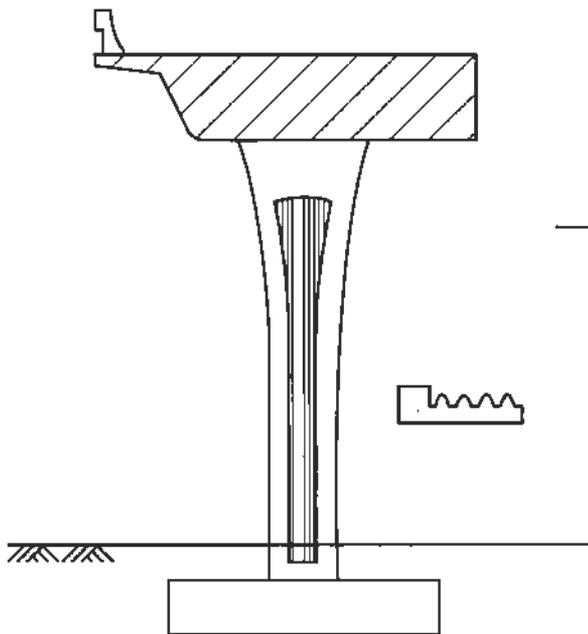
ATTACHMENT 4



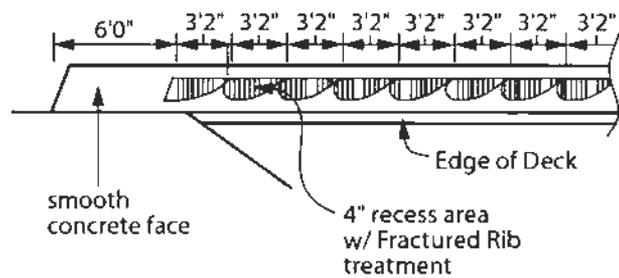
Abutment



Typical Section



**Typical column at
CIP/PS box girder**



Bridge Railing



ATTACHMENT 4

Falsework

Bridge Name	Vehicular Traffic		Pedestrian Traffic		Railroad	Temporary Traffic
	Location	Temporary Opening (meters)	Location	Temporary Opening (meters)	Temporary Opening (meters)	Lane reduction needed for footing excavation
Wilson Ave OC	Route 37	4.6 x 12.0	NA	NA	NA	yes at Route 37
Route 37/29 separation	Route 29 Access Rd	4.6 x 12.0 4.6 x 6.0	NA	NA	NA	yes at route 29
Broadway OH	Broadway Street	4.6 x 12.0	West Side Broadway Street	3.6 x 2.4	6.4 x 7.32	No
Mini Drive UC	Mini Drive	4.6 x 12.0	East Side Mini Drive	3.6 x 2.4	NA	No
N29-E37 connector (Ramp H)	Access Road	4.6 x 6.0	NA	NA	NA	No
W37-N&S 29 connector (Ramp I)	Broadway Street	4.6 x 12.0	West Side Broadway Street	3.6 x 2.4	6.4 x 7.32	No
S29-W37 connector (Ramp K)	NA	NA	NA	NA	NA	No

Falsework openings will have Type K railings adjacent to traffic and Crash Cushions adjacent to end of railings, when required. District has reviewed and approved falsework openings. No falsework is to be permitted in Chabot Creek.

ATTACHMENT 4

Clearances for Construction Operations

Note - Dimensions are between traffic faces of temporary railing				Column/Footing		Falsework at Bents	
Bridge Name	Location	Column Size	Footing Size	Work Space Req'd	Duration	Work Space Req'd	Duration
Wilson Ave OC (Alt #1)	Median of Route 37	1.22m	3.7x3.7x1.37m	9.1 m centered on column	6 weeks	5.8 m centered on column	10 weeks
Wilson Ave OC (Alt #2)	Median of Route 37	2.13m	5.2x5.2x1.37m	9.1 m centered on column	4 weeks	6.7 m centered on column	10 weeks
Route 37/29 Separation	Median of Route 29	3.05m	7.3x7.3x1.45m	11.5 m centered on column	6 weeks	7.6 m centered on column	16 weeks
Route 37/29 Separation	Shoulder of Route 29	3.05m	7.3x7.3x1.45m	6.5 m From CL of Column	6 weeks	3.8 m From CL of Column	16 weeks
Broadway OH	East Shoulder of Broadway St	1.68m	4.9x4.9x1.22m	5.9 m From CL of Column	6 weeks	3.1 m From CL of Column	10 weeks
Mini Drive UC	No Impact on Traffic						
N29-E37 Connector (Ramp H)	No Impact on Traffic						
W37-N&S 29 Connector (Ramp I)	East Shoulder of Broadway St	1.68m	7.3x4.9x1.53m	5.5 m From CL of Column	4 weeks	3.1 m From CL of Column	10 weeks
S29-W37 Connector (Ramp K)	No Impact on Traffic						

Intermittent Lane Closures will be required during falsework erection and removal, loading of excavated material, and delivery of materials.

Hydraulics/Hydrology

1. Structures Hydraulics has reviewed the project for its impact on Chabot Creek and has found no hydrology or hydraulic problems associated with the project .
2. District 04 Environmental Section has requested that columns not be placed within Chabot Creek as Fish and Game and the Corps of Engineers would strongly discourage such columns. Columns in the creek would also increase the mitigation required for fresh water and would pose an impact to the wetlands mitigation.
3. District 04 Hydraulics has provided design rainfall intensity.



ATTACHMENT 4

Construction Impacts

1. The EIR stipulates that construction activities, other than pouring concrete and road paving, shall not commence until September 1 and shall be completed prior to February 1 of each year within 700 feet from any suitable clapper rail breeding habitat. Chuck Morton, District 04 Environmental Planning Section indicates that the revised work dates, when construction noise is above 86 dba, is August 15 to January 1 for construction within 700 feet of clapper rail nests. The black rail and the harvest mouse are also protected species within the project site.
2. Chuck Morton, District 04 Environmental Planning Section, states that the only allowable time period for excavation in Chabot Creek is during May to August.

Corrosion

Soil and water at the site may be corrosive. Corrosion potential and recommendations for mitigation will be addressed in final foundation recommendations for elements in contact with soil.

Special requirements are required for elements in Marine Atmosphere, but the determination of whether the project site is considered within a Marine Atmosphere is unclear. ESC Corrosion Technology is currently researching the area and will make recommendations on whether the project site should be considered within the Marine Atmosphere. Marine Atmosphere includes both the atmosphere over land within 1000 feet of ocean or tidal water, and the atmosphere above the splash zone. Tidal water for this application is any body of water having a chloride content of 500 ppm or greater.

Permits and Agreements

California Endangered Species Act	California Dept Fish and Game
BCDC	Regional Water Quality Control Board
National Pollutant Discharge Elimination System	US Army Corps of Engineers
State Reclamation Board Permit	Federal Endangered Species Act
Union Pacific Railroad	City of Vallejo



ATTACHMENT 4

Caltrans Efforts

1. The Final Project Report was completed November 17, 1997.
2. The Final Environmental Report/Statement was completed May 1998.
3. A Draft Value Analysis Study was completed on July 10, 1997.
4. District 04 requested an Advanced Planning Study on October 24, 1998, but it was quickly followed by a Bridge Site Submittal on November 2, 1998. Consequently the Advanced Planning Study was shelved in favor of completing the General Plans.
5. District 04 submitted a Bridge Site Data submittal for Non-Standard Retaining Walls on January 14, 1999.
6. Preliminary Investigations started their work in mid February 1999 and expect to complete their work by the end of April 1999.
7. District still needs to provide final R/W drawings, final topographic maps and mapping for 54" sewer line at Broadway and 42" sewer at Retaining Wall No. 1.

Hazardous Materials

Hazardous materials have not been identified at the site. No provisions have been included in the estimate to account for disposal of hazardous materials.

General

1. Route 37 is in the State SHELL route system. There are no special construction loadings.
2. There are no restrictions for contractor storage facilities.

Project Milestones

Structures Design has not yet committed to completion dates as we were waiting for the General Plan Estimates to be completed before scheduling the work. The dates proposed by District 04 are:

Project EA	Structures P&Q Date	Structures PS&E Date
04-0T1411	10/29/2000	11/24/2000
04-0T1421	9/15/2000	11/10/2000



ATTACHMENT 4

Route 37/29 Separation (#23-0218)

<i>Structure Type</i>	<i>CP/PS Box Girder</i>
Spans	44.347, 58.420, 39.308, 38.605, 48.807, 51.353 m (145.5, 191.7, 129.0, 129.0, 126.7, 160.1, 168.5 ft)
Structure Depth	2.525 meters (8.25 feet). Depth/Span Ratio = 0.43
Abutment 1	High cantilever seat type abutment required as wetlands mitigation prohibits abutment approach fill. 100 ton driven piles. Battered piles at toe. Roadway fill slope set to start at face of abutment. 1:1.5 Abutment Fill slope set to provide for future 3.6 m lane on Route 29.
Abutment 7	Short seat type abutment on 100 ton driven piles. Battered piles at toe. Fill Slopes = 1.0:1.5 Toe of fill set at edge of access road.
Bents	6.0 ft diameter Type 2R flared six column bents with pinned base and 100 ton driven piles. Outrigger bents with 10 ft diameter circular columns with fixed base, pinned top and 70 ton driven piles used where required to produce equal spans. No columns permitted in Chabot Creek. Columns set to provide minimum 3.6 m clearance from edge of shoulder on Route 29 to provide for future widening.
Construction Sequence	Construct approach fills with surcharge and wick drains. Surcharge fill allowed to temporarily spill into wetlands. Settlement period required. Construct bridge with falsework over existing two lane Route 29, Chabot Creek and Access Road. Detour required for construction of column foundation in median of Route 29.
Vertical Clearance	5.625 m (18.46 ft) provided vs. 5.0 m (16.73 ft) minimum required
Temporary Vertical Clearance	4.71 m (15.46 ft) provided vs. 4.60 m (15.09 ft) minimum required
Barriers	Type 732 at edge of deck and Type 60 at median
Slope Paving	None
Approaches	PCC pavement on approaches. Structure Approach Slab Type N(9S)
Deck Protection	The proposed structure is located in Environmental Area No. 1. No special deck protection is required.
Drains	None on the structure
Temperature Range	35° F to 100° F
Joints	Type B joints at abutment. MR = 50 mm (2 inch)
Utilities	None. Provide one future utility opening. District will advise on necessity for irrigation supply lines and control conduit.
Future Widening	None



ATTACHMENT 4

Broadway Overhead (#23-0219)

Structure Type	CP/PS Box Girder
Spans	45.4 m , 45.0 m and 50.4 m (149.0 ft, 147.6 ft and 165.4 ft)
Structure Depth	2.000 meters (6.56 feet). Depth/Span Ratio = 0.040.
Abutments	Short seat type abutments on 70 ton driven piles. Predrill through abutments. Fill Slopes = 1.0:1.5. Toe of fills set to provide 3.0 m clear to R/W fences. Revised memo from District would allow 1.5 m clearance to R/W fences. Must avoid 54" Sewer Line at Abut 4 (needs to be located).
Bent	5.5 ft diameter Type 2R flared four column bent. Pinned base. 70 ton driven piles. Footing excavation will not impact railroad.
Vertical Clearance	7.52 m (24.67 ft) provided at railroad vs. 7.01 m (23.0 ft) minimum required 8.80 m (28.87 ft) provided at Broadway Street vs. 5.10 m (16.73 ft) minimum required
Horizontal Clearance	12.85 m (42.17 ft) provided between centerline railroad and face of column vs. 25.0 ft required
Temporary Vertical Clearance	6.91 m (22.67 ft) provided at railroad vs. 7.01 m (23.0 ft) minimum required 8.80 m (28.87 ft) provided at Broadway Street vs. 4.6 m (15.09 ft) minimum required
Barriers	Type 732 at edge of deck and Type 60 at median
Slope Paving	None
Approaches	PCC pavement on approaches. Structure Approach Slab Type N(9S)
Deck Protection	The proposed structure is located in Environmental Area No. 1. No special deck protection is required.
Drains	At right edge of deck at Abutment No. 1.
Temperature Range	35° F to 100° F
Joints	Joint Seal Assembly at abutments. MR=64 mm (2.5 inch)
Utilities	None. No future utility opening. District will advise on necessity for irrigation supply lines and control conduit.
Safety Fence	None
Future Widening	None



Bridge Name	Bridge No.	Type	Cost	Area m ²	Cost/m ²	Cost/sf
Wilson Ave OC Alt #1	23-0217	CIP/PS Piles	\$1,174,000	1,134	\$1,035	\$96
Wilson Ave OC Alt #2	23-0217	CIP/PS Piles	\$1,182,000	1,282	\$922	\$86
Route 37/29 Separation	23-0218	CIP/PS Piles	\$11,640,000	10,547	\$1,104	\$103
Broadway OH	23-0219	CIP/PS Piles	\$3,973,000	4,652	\$854	\$79
Mini Drive UC	23-0220	CIP/PS Spread	\$1,490,000	1,786	\$834	\$78
N29-E37 Connector (Ramp H)	23-0221G	CIP/PS Piles	\$646,000	623	\$1,037	\$96
W37-N&S 29 Connector (Ramp I)	23-0222 F	CIP/PS Piles	\$1,389,000	1,524	\$911	\$85
S29-W37 Connector (Ramp K) Alt #1	23-0223F	Bathtub	\$3,162,000	2,461	\$1,285	\$119
S29-W37 Connector (Ramp K) Alt #2	23-0223F	Bulb Tee	\$2,898,000	2,461	\$1,178	\$109
S29-W37 Connector (Ramp K) Alt #3	23-0223F	Steel	\$3,009,000	2,461	\$1,223	\$114
Subtotal Bridges			\$23,210,000	22,727	\$1,021	\$95
Retaining Wall No. 1	23-WALL1	Type 5SWB	\$1,734,000	842	\$2,059	\$191
Retaining Wall No. 2 Alt #1	23-WALL2	Type 1 Piles	\$2,706,000	1,691	\$1,600	\$149
Retaining Wall No. 2 Alt #2	23-WALL2	MSE	\$1,276,000	1,691	\$755	\$70
Retaining Wall No. 3	23-WALL3	Type 1 Piles	\$349,000	159	\$2,195	\$204
Retaining Wall No. 4 Alt #1	23-WALL4	Type 1 Spread	\$351,000	575	\$610	\$57
Retaining Wall No. 4 Alt #2	23-WALL4	Type 5 Spread	\$125,000	211	\$592	\$55
Subtotal Retaining Walls			\$3,484,000	2,903	1,200	\$111
Total Bridges and Retaining Walls			\$26,694,000			

Grey Filled Cells represent selected alternative in totals

Structure Costs