

CORTE MADERA CREEK PROJECT TOWN OF ROSS, CALIFORNIA

Background, Site, and Geotechnical Investigation for the Lagunitas Road Bridge Corte Madera Creek

Prepared for

**U.S. Army Corps of Engineers
San Francisco District**

DACW07-00-D0003
Delivery Order No.0004

By

Sverdrup / Gerwick Joint Venture

In Association With

URS Corporation

100% Submittal

February 2002

TABLE OF CONTENTS

SECTION	PAGE
TABLE OF CONTENTS.....	I
1.0 EXECUTIVE SUMMARY.....	1
1.1 BACKGROUND INVESTIGATION.....	1
1.2 SITE INVESTIGATION.....	1
1.3 GEOTECHNICAL INVESTIGATION.....	1
2.0 INTRODUCTION.....	2
2.1 AUTHORIZATION.....	2
2.2 REVISED SCOPE OF WORK (SUMMARY).....	2
3.0 BACKGROUND INVESTIGATION.....	5
4.0 SITE INVESTIGATION.....	6
5.0 GEOTECHNICAL INVESTIGATION.....	8
6.0 STRUCTURAL ANALYSIS.....	8
7.0 CONCLUSIONS.....	8
APPENDIX A – DRAWINGS PREPARED FROM SITE INVESTIGATION AND TOPOGRAPHIC SURVEY.....	9
APPENDIX B – CALTRANS INSPECTION RECORDS.....	10
APPENDIX C – SUFFICIENCY RATING SCORES, EXPLANATION OF SUFFICIENCY RATING ITEMS, AND FEDERAL-AID POLICY GUIDE.....	11
APPENDIX D – PROJECT PHOTOS.....	12
APPENDIX E – STATE OF CALIFORNIA DEPARTMENT OF PUBLIC WORKS, DIVISION OF HIGHWAYS - STANDARD SPECIFICATIONS JANUARY 1930 (EXCERPT).....	13
APPENDIX F – AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS – STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES – 1935 (EXCERPT).....	14
APPENDIX G – U.S. DEPARTMENT OF TRANSPORTATION BRIDGE INSPECTOR’S TRAINING MANUAL 90 (EXCERPT).....	15
APPENDIX H – SCOPE OF SERVICES.....	16

1.0 EXECUTIVE SUMMARY

In conformance with the scope of work provided by the U.S. Army Corps of Engineers, San Francisco District under Contract No. DACW07-00-D0003, Delivery Order 4, Ben C. Gerwick, Inc. and Sverdrup Civil, Inc. in a Joint Venture (hereafter referred to as the Sverdrup / Gerwick JV, in association with URS Corporation (geotechnical consultant) have provided a background, site, and geotechnical investigation of the Lagunitas Road Bridge on Corte Madera Creek in the town of Ross, California. Flood control measures to be taken on Corte Madera Creek will involve channel modifications in the vicinity of the Lagunitas Road Bridge. An evaluation of alternatives involving potential structural impact to the bridge has been divided into two phases. The first phase has three primary tasks.

1.1 BACKGROUND INVESTIGATION.

The background investigation determined the existing records and sources of documents available for the existing bridge. This work was performed by Ben C. Gerwick, Inc.

1.2 SITE INVESTIGATION.

A site investigation was performed to determine the physical features, cross sections, and current overall physical condition of the bridge. This work was performed by Ben C. Gerwick, Inc.

1.3 GEOTECHNICAL INVESTIGATION.

The geotechnical investigation of the bridge was performed to determine the pier foundation, headwall foundation, and to obtain boring logs to determine the soil profile affecting the bridge foundation. This work was performed the URS Corporation, the Sverdrup / Gerwick JV geotechnical consultant, and is included as a separate report.

2.0 INTRODUCTION

This report documents evaluation efforts performed by the Sverdrup / Gerwick JV. The background investigation and site investigation was performed primarily by Ben C. Gerwick, Inc. The geotechnical investigation was performed primarily by URS Corporation. Flood control measures to be taken on Corte Madera Creek will involve channel modifications in the vicinity of the Lagunitas Road Bridge. One alternative proposes replacing the wall on the upstream face of the bridge, and installing a new diversion culvert at this location.

The primary focus of this phase of the evaluation is to determine the type and location of foundations, as well as survey the bridge and provide dimension, location, and skew angle between the bridge centerline and roadway.

2.1 AUTHORIZATION

The Corte Madera Creek Project was authorized by Section 204 of Public Law 89-789, the Flood Control Act of 1966 and the WRDA of 1986.

2.2 REVISED SCOPE OF WORK (SUMMARY)

**Evaluation of Alternatives, Lagunitas Road Bridge
Corte Madera Creek Project
Town of Ross, Marin County, CA**

10 September 2001

1.0 INTRODUCTION

1.1 Objectives

The Scope of Work for the subject task describes the requirements for and evaluation of alternatives in the vicinity of the Lagunitas Road Bridge over Corte Madera Creek. The objective of the work is to determine the impact, if any, that the Corps' flood control project will have on the bridge. The bridge has been described in Caltrans inspection reports as being constructed of continuous reinforced concrete haunched T-beams (5 total) on solid wall piers and end diaphragm abutments. The T-beams have intermediate concrete diaphragms, as well.

2.0 BACKGROUND

The project purpose is to provide flood protection for residential, commercial, and public property along the Corte Madera Creek in Marin County. This project will actually be the completion of the Corte Madera Creek flood Control Project that started many years ago. The features include a combination of a sediment basin, channel excavation, minimal channel widening, raising of existing floodwalls, and replacement of an existing fish ladder.

The Lagunitas Road Bridge, constructed in 1908 by the Town of Ross, has been identified as an architecturally significant structure. Proposed work in the vicinity of the bridge includes channel excavation and replacing the existing wall on the upstream face with a diversion culvert, which will be placed behind the bridge abutments.

3.0 DESCRIPTION OF WORK

3.1 Obligation of Architect – Engineer (A-E) (See Actual Scope of Work)

3.2 Staffing Requirements – (See Actual Scope of Work)

3.3 Obligation of the Government – (See Actual Scope of Work)

3.4 Work Tasks

3.4.1 General

Flood control measures to be taken on Corte Madera Creek will involve channel modifications in the vicinity of the Lagunitas Road Bridge. One alternative proposes replacing the wall on the upstream face of the bridge, and installing a new diversion culvert at this location. No documentation is currently available for this bridge.

- Determine type and location of foundations
- Survey bridge and provide dimensions, location, and skew angle between the bridge centerline and roadway.

3.4.2 Tasks

1. Background Investigation
 - a. Investigate city, county and state agencies for as-built drawings or records.
 - b. Obtain historical records of inspection and/or repairs from CALTRANS and/or other agencies.
 - c. If no as-built drawings exist, research record, drawings, design details of similarly constructed bridges in the vicinity of the same era.

2. Site Investigation

This task is to be performed only in the event that no complete as-built drawings are found for the subject bridge, per 3.4.2.1.

- a. Perform a site survey of the bridge, identifying existing streambed elevation, elevations of piers, headwalls, bridge deck, skew angle in the stream, location,

and other relevant feature locations and/or elevations. Provide cross-section of the bridge centerline, headwall, and piers. This should include a brief visual inspection of the physical condition of the bridge.

- b. Determine as-built cross sections and dimensions of relevant structural features, such as girders, piers, etc. Prepare drawings/sketches of plan, elevation, sections, headwalls and piers, in sufficient detail to document which will lead to a structural evaluation.
- c. Identify locations subject to scour or previous damage from scour.

3. Geotechnical Investigations (See Actual Scope of Work)

- a. Determine pier foundation type, configuration, and as-built dimensions (spread footing, piles, spacing, tip elevation – if possible).
- b. Determine headwall foundation configuration and as-built dimensions (depth, existing base of wing walls, existing apron, spread footing, or pile cap).
- c. Develop boring logs to determine soil profile affecting bridge foundations.

4. Structural Analysis:

No structural analysis will be performed under this contract. A scope of work for the structural analysis of the Lagunitas Road Bridge, based on information provided under the work of this contract, will be provided at a later date.

4. PERMITS

The A-E shall obtain any permit needed to perform work.

5. PERIOD OF SERVICE (See Actual Scope of Work)

The A-E shall obtain any permit needed to perform work.

6. ADMINISTRATIVE INFORMATION (See Actual Scope of Work)

7. SAFETY REQUIREMENTS

The A-E shall comply with all applicable safety regulations of the current U.S. Army Corps of Engineers Safety and Health requirements manual EM 385-1-1, and shall acquaint himself and his personnel with the safety requirements governing the area in which the work is being done.

END OF SCOPE OF WORK (SUMMARY)

3.0 BACKGROUND INVESTIGATION

3.1 Investigate city, county and state agencies for as-built drawings or records.

The Town of Ross and Marin County were contacted regarding as-built drawings or records for the Lagunitas Road Bridge, but did not have any formal records or drawings. The bridge is, however, is on the Marin County Historic Register. The criteria for being placed on the historic register is that the structure is of significant historic worth and / or has unique architecture.

The California Department of Transportation (Caltrans) was also contacted for as-built drawings or records. No as-built drawings existed, as this bridge was not constructed by Caltrans.

3.2 Obtain historical records of inspection and/or repairs from Caltrans and/or other agencies.

The Town of Ross and Marin County were also contacted regarding historical records of inspection and / or repairs but had none.

Caltrans did, however, maintain inspection records on a periodic basis for the bridge. Points of contact at Caltrans for these records include:

Tom Harrington – Supervisor for Structural Inspection Group (916) 227-8843
Andy Dang – Structures Maintenance Inspector (916) 227-8639

A visit was made to Caltrans in Sacramento to review the available inspection records for the bridge. These records are included in this report in Appendix B – Caltrans Inspection Records.

The Lagunitas Road Bridge is part of the seismic inspection program conducted by Caltrans. The bridge has been rated by Caltrans as Structurally Deficient, based on a sufficiency rating system. The Sufficiency Rating value of 47.9 for this bridge makes it eligible for replacement or rehabilitation with the aid of federal funding under the Highway Bridge Replacement and Rehabilitation Program (23 CFR 650.409). Those bridges with a sufficiency rating of less than 50.0 are eligible for replacement or rehabilitation, provided the bridge was not constructed or had major reconstruction within the past 10 years. The Caltrans representative indicated the as much as 80% of the cost of replacement may be provided by the federal government.

The ratings / scores for this bridge, as well as other bridges in the vicinity are included in Appendix C – Sufficiency Rating Scores, Explanation of Sufficiency Rating Items, and Federal-Aid Policy Guide.

3.3 If no as-built drawings exist, research record, drawings, design details of similarly constructed bridges in the vicinity of the same era.

The Town of Ross and Marin County were contacted regarding drawings or details for similar era bridge construction, but had none. Likewise, records were searched to no avail at Caltrans in Sacramento. However, some indication as to the type of construction and material properties was obtained from the January 1930 State of California Department of Public Works, Division of Highways - Standard Specifications (excerpts included in Appendix E), the 1935 American Association of State Highway Officials – Standard Specifications for Highway Bridges (excerpts included in Appendix F), and the U.S. Department of Transportation Bridge Inspector’s Training Manual 90 (excerpt of reinforcing steel properties included in Appendix G). These were the oldest standard specifications available from Caltrans and AASHTO.

Some confusion exists in the available records about the year of bridge construction. The sufficiency rating tables provided by Caltrans indicate that this bridge was originally constructed in 1930, as do some of the Caltrans historical inspection records. Some of the historical inspection records, however, have had the year 1930 lined out and a handwritten 1908 has been inserted in its place.

4.0 SITE INVESTIGATION

4.1 Perform a site survey of the bridge, identifying existing streambed elevation, elevations of piers, headwalls, bridge deck, skew angle in the stream, location, and other relevant feature locations and/or elevations. Provide cross-section of the bridge centerline, headwall, and piers. This should include a brief visual inspection of the physical condition of the bridge.

A site survey documenting the physical dimensions and condition of the bridge was conducted. In addition, a topographic survey was prepared, identifying the skew angle of the bridge, elevations and locations of relevant bridge features, and borehole locations. The topographic survey was prepared by Carruthers Land Surveying of Mill Valley, California, a WBE.

A cursory visual inspection of the bridge was performed. Minor spalling and deterioration of the concrete has occurred over the years, as evidenced in the photographs of Appendix D. Some scour action has occurred at the east abutment and wingwall interface, forming a 3' x 1'-6" scour pocket in the 17-inch thick wall. Evidence exists on the face of the upstream girders that debris has collided with the bridge girders during high flows in the past. Some reinforcing steel is exposed and minor cracks are in evidence at various locations on the structure. Various pipes are suspended from the bridge, including an active natural gas line on the south side and numerous steel conduits, as well.

The west abutment is in generally good condition with minor spalling. Some scour is evident at the upstream side of the west pier. Minor patching is evident throughout the structure. The west abutment and wingwall are offset approximately 1-1/2 to 2".

Between the piers, the bottom of some girders are scoured / abraded, particularly on the upstream face.

The south girder has a hairline crack at midspan on the north side, and an outrigger conceals the south side. A smaller hairline crack is located approximately 2' on either side of the diaphragm. The side not concealed by an outrigger is thru-wall. To the east of the outrigger, another hairline thru-wall crack occurs.

4.2 Determine as-built cross sections and dimensions of relevant structural features, such as girders, piers, etc. Prepare drawings/sketches of plan, elevation, sections, headwalls and piers, in sufficient detail to document which will lead to a structural evaluation.

The as-built cross sections and dimensions of relevant structural features were field measured and have been documented on Drawings 2001-37-001, Plan and Sections and 2001-37-02, Sections, and are included in Appendix A – Drawings Prepared From Site Investigation and Topographic Survey.

4.3 Identify locations subject to scour or previous damage from scour.

Minor evidence of scour exists at the downstream east wingwall (see photographs on page D-5, Appendix D). The Caltrans Bridge Inspection Report dated March 18, 1999 notes minor upstream scour at Pier 3. The amount of scour will be dependent upon a number of factors, including the duration and intensity of rainfall and runoff, amount of gravels and materials coming downstream, physical characteristics of soils at the elevation in question at the time of the event. Yearly maintenance excavation is performed by the Town of Ross to remove gravels that migrate downstream. Rainfall and runoff events occurred during the last 2 months of 2001 that carried as much or more material downstream and deposited material underneath the bridge equal or greater to the amount of material that was removed during maintenance earlier in the fall.

5.0 GEOTECHNICAL INVESTIGATION

- 5.1** This primary geotechnical investigation is provided under separate cover by URS Corporation and is entitled “Geotechnical Data Report, Lagunitas Road Bridge Project, Ross, California, Job No. 43-00067008.00, January 30, 2002.
- 5.2** Ben C. Gerwick, Inc. was responsible for providing the test pit adjacent to the west bridge pier, based upon preliminary geotechnical boring evidence that a pile foundation support system may be present. Gerwick hired a subcontractor, Vortex Diving, to perform the excavation of the test pit. Due to field conditions, environmental considerations, and conditions imposed by regulatory agencies, an excavation pit using timber cribbing, typical of underpinning operations was employed. This was more manual labor intensive than the originally planned sheet pile excavation, but significantly reduced the amount of excavation material and associated environmental risks. Photos of this operation are included in Appendix D – Project Photos.
- 5.3** The location of the test pit was selected such that if piles were present, either the pile on the end of the pier, or the adjacent pile would likely be located. Excavation along a 4 feet length of the pier, adjacent to and extending underneath to approximately the centerline of the pier was performed. Finally, a rebar / probe was extended into the soil for a distance of at least one foot upstream and downstream of the pit to locate any piles not exposed by the excavation. The results of the test pit indicated that no piles were present under the pier.

6.0 STRUCTURAL ANALYSIS

- 6.1** This analysis will be performed by Ben C. Gerwick, Inc. under separate cover and under a separate contract delivery order as the next phase of this project.

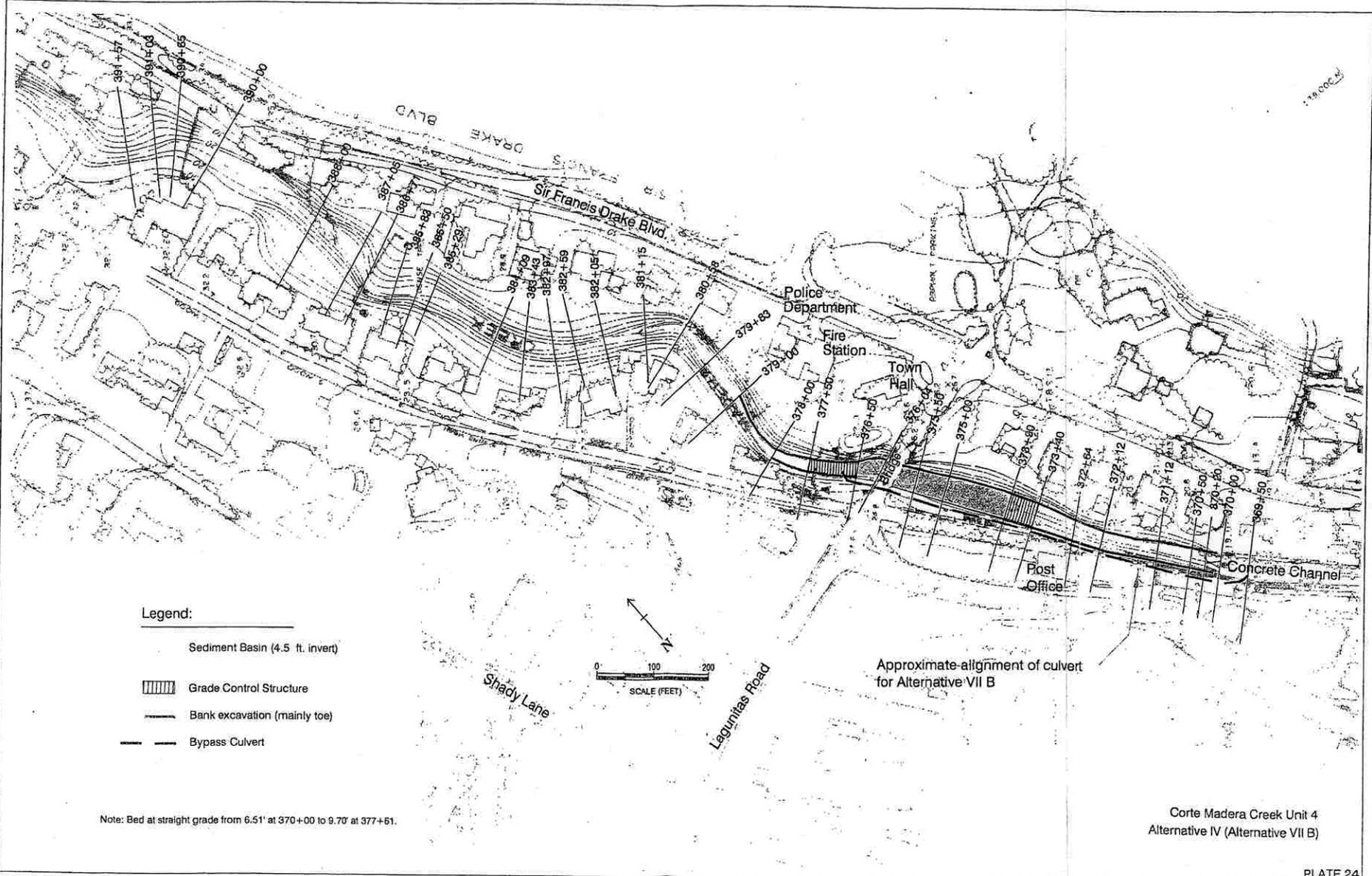
7.0 CONCLUSIONS

7.1 CONCLUSIONS

The background, site, and geotechnical investigations have better defined the as-built conditions of the Lagunitas Road Bridge than previously existed. No as-built drawings were identified. As such, the subsequent structural analysis of this bridge will require certain conservative assumptions regarding reinforcing, concrete strength, connection details, etc.

Further geotechnical modeling will be required to determine foundation stiffnesses for various scenarios of placement of a bypass concrete culvert behind the existing abutment, as well as lowering of the stream channel. This is beyond the scope of this delivery order and is part of the second phase of this project, which will include the structural evaluation of the bridge foundation and superstructure.

**APPENDIX A – DRAWINGS PREPARED FROM
SITE INVESTIGATION AND TOPOGRAPHIC
SURVEY**

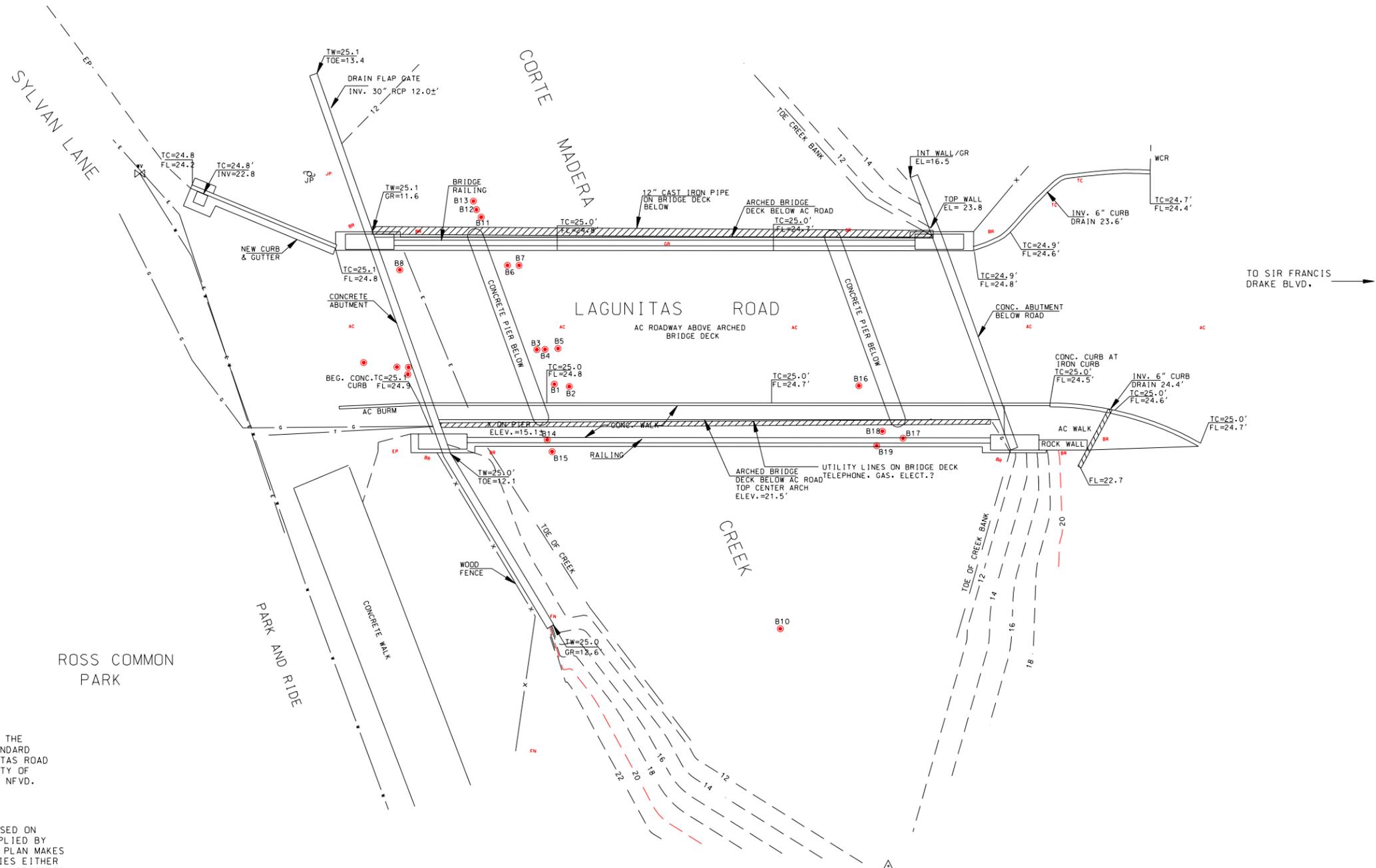


REVISIONS		
DATE	BY	NO.



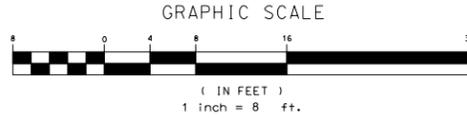
LEGEND

△	SURVEY CONTROL POINT	JP	JOINT POLE
TC	TOP OF CONCRETE CURB	—○—	GAS LINE
FL	FLOW LINE CURB	—ε—	ELECTRIC
WCR	WHEEL CHAIR RAMP	—v—	WATER
TW	TOP OF BRIDGE ABUTMENT WALL	EP	EDGE OF PAVEMENT
BR	UPPER BRIDGE DECK ELEVATION	AC	ROAD BED ELEVATION



NOTES:

- HORIZONTAL CONTROL FOR THIS SURVEY IS BASED ON A COMPASS BEARING.
- VERTICAL CONTROL SURVEY IS ACCORDING TO THE MARIN COUNTY PUBLIC WORKS DEPARTMENT STANDARD MONUMENT LOCATED AT THE CORNER OF LAGUNITAS ROAD AND SIR FRANCIS DRAKE BLVD. STAMPED COUNTY OF MARIN RC-1 HAVING AN ELEVATION OF 26.601 NFVD.
- CONTOUR INTERVAL = 2'
- SPOT ELEVATIONS ARE GROUND UNLESS NOTED
- THE UTILITIES SHOWN ON THIS PLAN ARE BASED ON SURFACE OBSERVATIONS AND INFORMATION SUPPLIED BY UTILITY COMPANIES AND OR AGENCIES. THIS PLAN MAKES NO WARRANTY WHATSOEVER THAT OTHER UTILITIES EITHER SURFACE OR SUBSURFACE DO OR DO NOT EXIST. PRIOR TO SITE PLANNING OR CONSTRUCTION ACTIVITIES THE CONTRACTOR SHALL ASCERTAIN THE TRUE LOCATION OF ANY UNDERGROUND UTILITIES AND SHALL BE RESPONSIBLE FOR DAMAGES TO ANY PUBLIC OR PRIVATE UTILITIES WHETHER SHOWN OR NOT SHOWN HEREON.
- ANY DISCREPANCY BETWEEN THE ELECTRONIC FILE PROVIDED TO CLIENT AND THE SIGN AND SEALED HARD COPY, THE HARD COPY WILL PREVAIL.
- FOR A COMPLETE LIST OF POINTS AND ELEVATIONS SEE ELECTRONIC FILE.



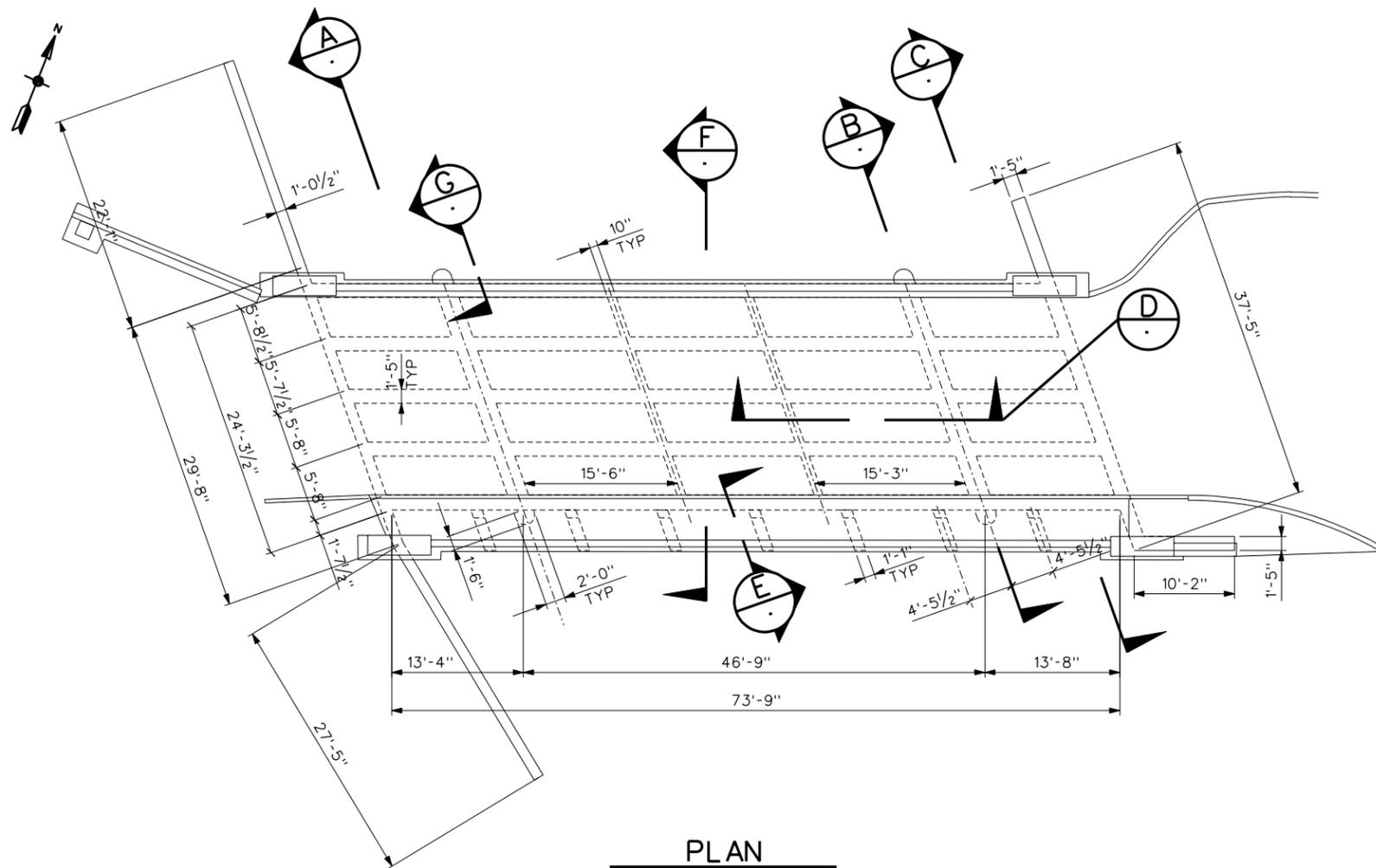
PREPARED BY:

LINDA A. CARRUTHERS
PLS 7053

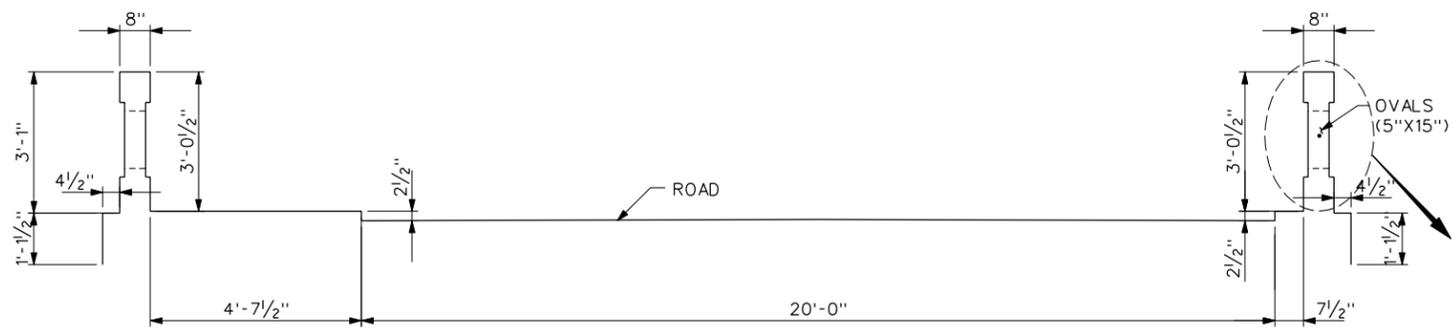
CARRUTHERS LAND SURVEYING
319 MILLER AVE. SUITE 4
MILL VALLEY, CALIFORNIA 94941
(415) 388-2438

TOPOGRAPHIC SURVEY
LAGUNITAS BRIDGE
ROSS, CALIFORNIA

DATE: NOV. 2001
SCALE: 1"=8'
DRAWN: LC
CHECKED:
JOB NO: 01-349T

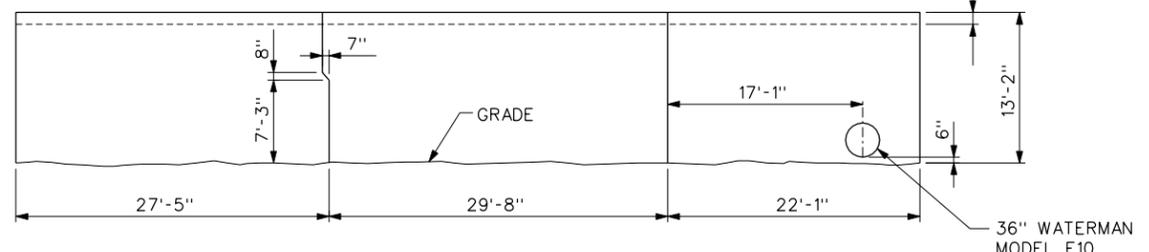
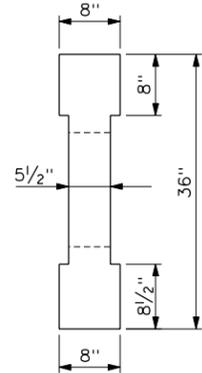


PLAN
SCALE: 1/8"=1'-0"

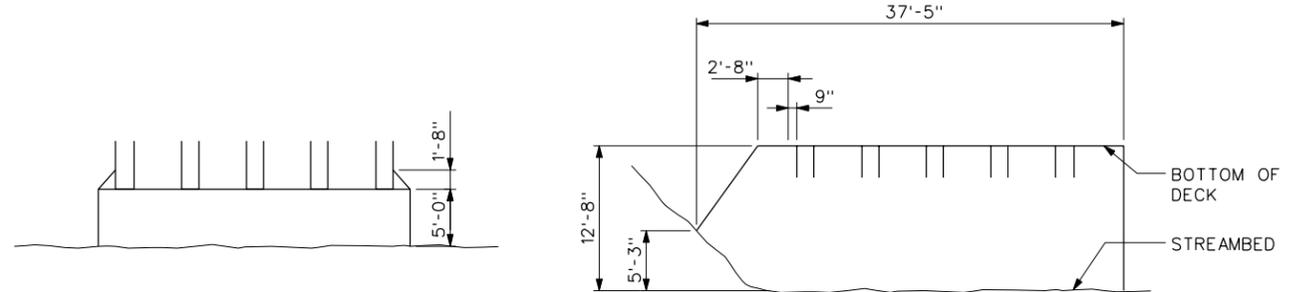


BRIDGE DECK SECTION F
SCALE: 1/2"=1'-0"

0'	2"
2'	2"
3'	2 3/16"
4'	3"
5'	4"
6'	5 1/4"
7'	7 1/4"
8'	9 1/2"
9'	1'-0 1/2"
10'	1'-4"
11'	1'-7 1/2"
12'	1'-11 1/2"
13'	2'-5"
14'	3'-3"
15'	5'-0"

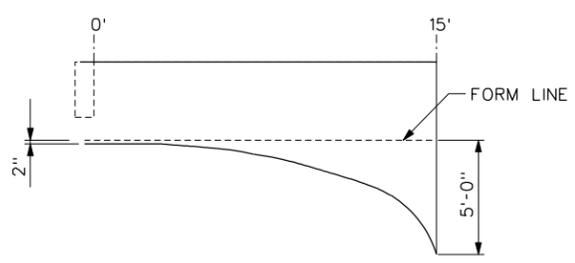


SECTION A
SCALE: 1/8"=1'-0"

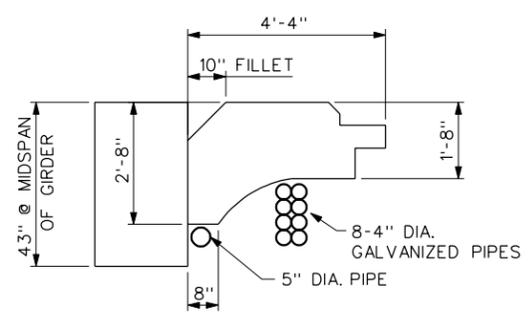


SECTION B
SCALE: 1/8"=1'-0"

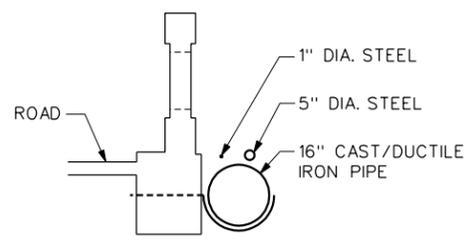
HEADWALL SECTION C
SCALE: 1/8"=1'-0"



SECTION D
SCALE: 1/4"=1'-0"

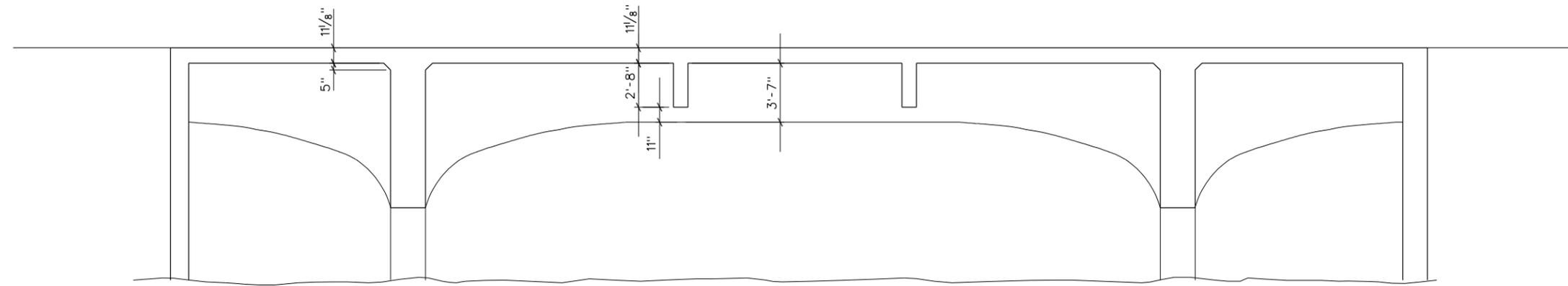


OUTRIGGER SECTION E
SCALE: 1/2"=1'-0"

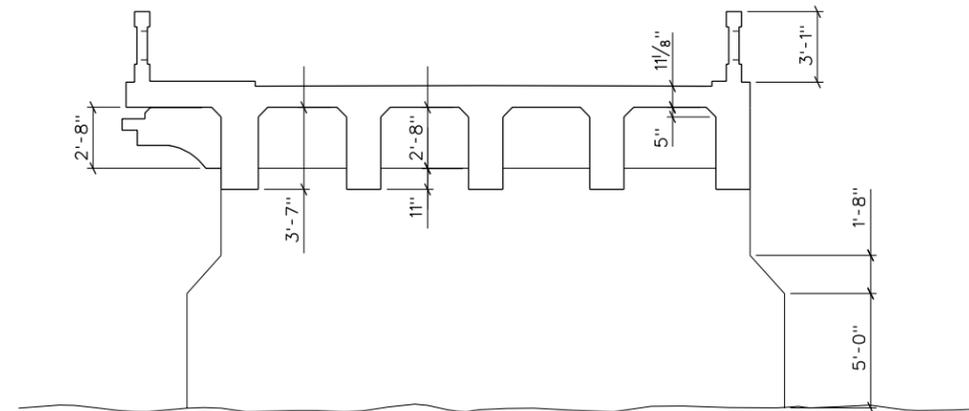


SECTION G
SCALE: 1/2"=1'-0"

NO.	DATE	DESCRIPTION OF REVISION	
BEN C. GERWICK, INC. 20 CALIFORNIA STREET, SUITE 400 SAN FRANCISCO 94111 (415) 398-8972			
COUNTY	ROUTE	BRIDGE NO.	CONTRACT NO.
ROSS, CA	-	-	-
DESIGNED BY:	RJF	DRAWN BY:	JCG
DATE	12/14/01	JOB NO.	2001-37
CORTE MADERA CREEK LAGUNITAS ROAD BRIDGE PLAN AND SECTIONS			DRAWING NUMBER 2001-37-001



LONGITUDIAL SECTION



CROSS SECTION

NO.	DATE	DESCRIPTION OF REVISION	
 BEN C. GERWICK, INC. 20 CALIFORNIA STREET, SUITE 400 SAN FRANCISCO 94111 (415) 398-8972			
-			
COUNTY	ROUTE	BRIDGE NO.	CONTRACT NO.
ROSS, CA	-	-	-
DESIGNED BY:	RJF	DRAWN BY:	JCG
DATE	12/14/01	JOB NO.	2001-37
		CHECKED BY:	
		FILE NAME	
CORTE MADERA CREEK LAGUNITAS ROAD BRIDGE SECTIONS			DRAWING NUMBER
			2001-37-002

**APPENDIX B – CALTRANS INSPECTION
RECORDS**



DEPARTMENT OF TRANSPORTATION
Structure Maintenance & Investigations

Bridge Number : 27C0071
 Facility Carried: LAGUNITAS ROAD
 Location : IN THE CITY OF ROSS
 City : ROSS
 Inspection Date : 18-MAR-99

Bridge Inspection Report

Inspection Type
 Routine Group A Underwater Special Other

Name : CORTE MADERA CREEK

CONSTRUCTION INFORMATION

Year Built : 1930 Skew (degrees): 24
 Year Widened : N/A No. of Joints : 0
 Length (m) : 23.8 No. of Hinges : 0

Description of Structure : Continuous reinforced concrete haunched T-beams (5) on solid wall piers and end diaphragm abutments.

Span Configuration : 4.42m, 14.17m, and 4.42m.

LOAD CAPACITY AND RATINGS

Design Live Load : OTHER OR UNKNOWN
 Inventory Rating : 18.1 metric tons Calculation Method : LOAD FACTOR
 Operating Rating : 23.6 metric tons Calculation Method : LOAD FACTOR
 Permit Rating : GG000
 Posting Load : Type 3 N/A english tons Type 3S2 N/A english tons Type 3-3 N/A english tons

DESCRIPTION ON STRUCTURE

Bridge width : 0.52m br - 1.25m sw - 6.16m - 0.55m br.
 Total Width : 8.5 m Net Width : 6.20 m No. of Lanes : 2
 Rail Description : Concrete Bridge Railing. Rail Code : 0000
 Min. Vertical Clearance : Unimpaired

DESCRIPTION UNDER STRUCTURE

Channel Description : Sand, gravel, brush and small trees.

CONDITION OF STRUCTURE

The Northeasterly (masonry) wingwall is undermined and heavily deteriorated. It is now falling down by about 7' at the Northerly end. In span 3, (girder #1 corner) soffit concrete is aging and deteriorating for about 1' long near 1/3rd of Span 2.

The pedestrian sidewalk on the bridge is aging and provides a rough walking surface.

Otherwise, the structure is in fair condition.

GROUP "A" INVESTIGATION

Type "A" underwater inspection was performed on this date. Minor upstream scour at Pier 3 was noted. No action is required.

ELEMENT LEVEL INSPECTION RATINGS

F#	Elem No.	Element Description	Env	Total Units Quantity	Qty in each Condition State				
					St. 1	St. 2	St. 3	St. 4	St. 5
01	13	Concrete Deck - Unprotected w/ AC Overlay	2	150 sq.m.	150	0	0	0	0
01	110	Reinforced Conc Open Girder/Beam	2	119m.	73	38	8	0	0
01	210	Reinforced Conc Pier Wall	2	18m.	0	18	0	0	0
01	215	Reinforced Conc Abutment	2	18m.	0	18	0	0	0
01	339	Concrete Railing (aesthetic/masonry)	2	48m.	0	33	15	0	0
01	359	Soffit of Concrete Deck or Slab	2	1 ea.	0	0	0	1	0

WORK RECOMMENDATIONS

Repair deteriorated portions of Northeasterly wingwall for about 7' long.

Item#	Rec. Date	Work By	Work Id.	Prog. Method	Cost
1	18-MAR-1999	City Agency	40071X99077X		

In Span 2 east side of superstructure soffit, clean exposed rebar (at the spall) and caot with epoxy paint.

Item#	Rec. Date	Work By	Work Id.	Prog. Method	Cost
2	18-MAR-1999	City Agency	40071X99077X		

Inspected By : Surjit S Dhillon

Surjit S Dhillon
 Registered Civil Engineer



STRUCTURE INVENTORY AND APPRAISAL REPORT

IDENTIFICATION

(1) STATE NAME - CALIFORNIA 069
(8) STRUCTURE NUMBER 27C0071
(5) INVENTORY ROUTE (ON/UNDER) - ON 1 50 0E4620
(2) HIGHWAY AGENCY DISTRICT 04
(3) COUNTY CODE 041 (4) PLACE CODE 62980
(6) FEATURE INTERSECTED - CORTE MADERA CREEK
(7) FACILITY CARRIED - LAGUNITAS ROAD
(9) LOCATION - IN THE CITY OF ROSS
(11) MILEPOINT/KILOMETERPOINT 0
(12) BASE HIGHWAY NETWORK - NOT ON NET 0
(13) LRS INVENTORY ROUTE & SUBROUTE
(16) LATITUDE 37 DEG 57 MIN 48 SEC
(17) LONGITUDE 122 DEG 33 MIN 18 SEC
(98) BORDER BRIDGE STATE CODE % SHARE %
(99) BORDER BRIDGE STRUCTURE NUMBER

STRUCTURE TYPE AND MATERIAL

(43) STRUCTURE TYPE MAIN: MATERIAL - CONCRETE CONT
TYPE - TEE BEAM CODE 2 04
(44) STRUCTURE TYPE APPR: MATERIAL - OTHER
TYPE - OTHER CODE 000
(45) NUMBER OF SPANS IN MAIN UNIT 3
(46) NUMBER OF APPROACH SPANS 0
(107) DECK STRUCTURE TYPE CIP CONCRETE CODE 1
(108) WEARING SURFACE / PROTECTIVE SYSTEM:
A) TYPE OF WEARING SURFACE - BITUMINOUS CODE 6
B) TYPE OF MEMBRANE - NONE CODE 0
C) TYPE OF DECK PROTECTION - NONE CODE 0

AGE AND SERVICE

(27) YEAR BUILT 1930
(106) YEAR RECONSTRUCTED 0000
(42) TYPE OF SERVICE: ON - HIGHWAY-PEDESTRIAN 5
UNDER - WATERWAY 5
(28) LANES: ON STRUCTURE 02 UNDER STRUCTURE 00
(29) AVERAGE DAILY TRAFFIC 1500
(30) YEAR OF ADT 1998 (109) TRUCK ADT 2%
(19) BYPASS, DETOUR LENGTH 3 KM

GEOMETRIC DATA

(48) LENGTH OF MAXIMUM SPAN 14.3 M
(49) STRUCTURE LENGTH 23.8 M
(50) CURB OR SIDEWALK: LEFT 1.2 M RIGHT 0 M
(51) BRIDGE ROADWAY WIDTH CURB TO CURB 6.2 M
(52) DECK WIDTH OUT TO OUT 8.5 M
(32) APPROACH ROADWAY WIDTH (W/SHOULDERS) 11.9 M
(33) BRIDGE MEDIAN - NO MEDIAN 0
(34) SKEW 24 DEG (35) STRUCTURE FLARED NO
(10) INVENTORY ROUTE MIN VERT CLEAR 99.99 M
(47) INVENTORY ROUTE TOTAL HORIZ CLEAR 6.2 M
(53) MIN VERT CLEAR OVER BRIDGE RDWY 99.99 M
(54) MIN VERT UNDERCLEAR REF NOT H/RR 0 M
(55) MIN LAT UNDERCLEAR RT REF -NOT H/RR 99.9 M
(56) MIN LAT UNDERCLEAR LT 0 M

NAVIGATION DATA

(38) NAVIGATION CONTROL - NO CONTROL CODE 0
(111) PIER PROTECTION - CODE
(39) NAVIGATION VERTICAL CLEARANCE 0 M
(116) VERT-LIFT BRIDGE NAV MIN VERT CLEAR M
(40) NAVIGATION HORIZONTAL CLEARANCE 0

SUFFICIENCY RATING = 47.9

STATUS = STRUCTURALLY DEFICIENT

HEALTH INDEX = 76.19

CLASSIFICATION

(112) NBIS BRIDGE LENGTH - YES Y
(104) HIGHWAY SYSTEM - NOT ON NHS 0
(26) FUNCTIONAL CLASS - COLLECTOR URBAN 17
(100) DEFENSE HIGHWAY - NOT STRAHNET 0
(101) PARALLEL STRUCTURE - NONE EXISTS N
(102) DIRECTION OF TRAFFIC - 2 WAY 2
(103) TEMPORARY STRUCTURE -
(105) FEDERAL LANDS HIGHWAY -
(110) DESIGNATED NATIONAL NETWORK -NOT ON NET 0
(20) TOLL - ON FREE ROAD 3
(21) MAINTAIN -CITY OR MUNICIPAL HIGHWAY AGENCY 4
(22) OWNER - CITY OR MUNICIPAL HIGHWAY AGENCY 4
(37) HISTORICAL SIGNIFICANCE - ELIGIBLE 2

CONDITION

(58) DECK 4
(59) SUPERSTRUCTURE 5
(60) SUBSTRUCTURE 6
(61) CHANNEL & CHANNEL PROTECTION 6
(62) CULVERTS N

LOAD RATING AND POSTING

(31) DESIGN LOAD - OTHER OR UNKNOWN 0
(63) OPERATING RATING METHOD - LOAD FACTOR 1
(64) OPERATING RATING - 23.6
(65) INVENTORY RATING METHOD - LOAD FACTOR 1
(66) INVENTORY RATING - 18.1
(70) BRIDGE POSTING - Equal to or above legal loads 5
(41) STRUCTURE OPEN, POSTED OR CLOSED - A
DESCRIPTION - OPEN, NO RESTRICTION

APPRAISAL

(67) STRUCTURAL EVALUATION 5
(68) DECK GEOMETRY 2
(69) UNDERCLEARANCES, VERTICAL & HORIZONTAL N
(71) WATER ADEQUACY 9
(72) APPROACH ROADWAY ALIGNMENT 5
(36) TRAFFIC SAFETY FEATURES 0000
(113) SCOUR CRITICAL BRIDGES 0

PROPOSED IMPROVEMENTS

(75) TYPE OF WORK -REPLACE FOR DEFICIENCY CODE 31
(76) LENGTH OF STRUCTURE IMPROVEMENT 32.317M
(94) BRIDGE IMPROVEMENT COST \$330,000
(95) ROADWAY IMPROVEMENT COST \$33,000
(96) TOTAL PROJECT COST \$494,000
(97) YEAR OF IMPROVEMENT COST ESTIMATE 1998
(114) FUTURE ADT 4000
(115) YEAR OF FUTURE ADT 2011

INSPECTIONS

(90) INSPECTION DATE 03/99 (91) FREQUENCY 24 MO
(92) CRITICAL FEATURE INSPECTION: (93) CFI DATE
A) FRACTURE CRIT DETAIL - NO -1 MO A)
B) UNDERWATER INSP - NO -1 MO B)
C) OTHER SPECIAL INSP - NO -1 MO C)

Bridge No. 27C-0071

SUPPLEMENTARY BRIDGE REPORT

DS-M19(REV.1-90)

Location 04-Mrn-FAU E462-Ros

Dist., Co., Rte., PM, City

Date of Investigation 12-21-93

Name CORTE MADERA CREEK (Laguintas Road)

RATINGS:

⁷¹ Waterway Adequacy 9 ⁶¹ Channel & Channel Protection 6 ⁷² Approach Rdwy Align. 5

TYPE OF INVESTIGATION/REPORT

Biennial X Group A _____ Other _____
Damage _____ Underwater _____ Office _____

WORK NOT DONE

1. The eroded area at the base of the right wingwall at Abutment 4 has not been repaired.

CONDITION OF STRUCTURE

This structure remains in fair condition. No changes were noted.

SCOUR

None noted.

WORK RECOMMENDED

1. Do "WORK NOT DONE".

PONTIS INSPECTION

A PONTIS inspection form for this investigation is attached.

Pete J. Whitfield
Registered Civil Engineer

PJW/wb



Bridge No. 27C-0071

SUPPLEMENTARY BRIDGE REPORT

DS-M19(REV.1-90)

Location 04-Mrn-FAU E462-Ross
Dist., Co., Rte., PM, City

Date of Investigation 11/13/91

Name CORTE MADERA CREEK (Lagunitas Road)

RATINGS:

⁵⁸ Deck 7 ⁵⁹ Superstructure 6 ⁶⁰ Substructure 7 ⁷¹ Waterway Adequacy 9

⁶¹ Channel & Channel Protection 6 ⁶² Culvert N ⁷² Approach Rdwy Align. 5

CODES:

²¹ Custodian ²² Owner ²⁶ Functional Classification: Deck Under

⁴¹ Str Open, Posted or Closed ¹⁰⁷ Deck Type ¹⁰⁸ Wearing Surface/Prot Sys

Max Col/Pier Ht. ¹¹¹ Pier/Abut. Prot.

⁵⁵ Min Lat Underclr on Rt. ⁵⁴ Min Vert Underclr ¹¹² NBIS Bridge Length

DATA:

⁵¹ Bridge Width (NET) 20.2 ¹⁰⁹ Average Daily Trucks (% of ADT): Deck 2 Under NA

¹¹⁴ Future ADT: Deck 4,000 Under NA ¹¹⁵ Yr. of Future ADT: Deck 2011 Under NA

Number of Intermediate Joints: @ Hinges 0 @ Bents 0

TYPE OF INVESTIGATION/REPORT

Biennial Category A _____ Other _____
Damage _____ Underwater _____ Office _____

CONDITION OF STRUCTURE

The base of the right wingwall at Abutment No. 4 is partially exposed due to erosion along the slope.

There is a spall at Girder No. 3, midspan between Bents 2 and 3; the rebar is not exposed.

There is segregated concrete at various girder locations.

The south masonry approach rail is damaged on the east end.

The structure remains in satisfactory condition.

WORK DONE

The approach cracks have been sealed.

ENCROACHMENTS

A 1" rubber hose and 2" PVC pipe are mounted along the Abutment 4 wall.

BRIDGE NO. 27C-0071	
SHEET 2	DATE 11-13-91

WORK RECOMMENDED

Cover the eroded area at the base of the right wingwall with sack concrete or other suitable material.

ll
John C. Rogers
Reviewed and Approved by



William R. Baker
Registered Civil Engineer



JCR/WRB/pfa-35291

Bridge No. 27C-0071 *E462 CBC 12/09*

SUPPLEMENTARY BRIDGE REPORT

DS-M19(REV.9/88)

Location 4-Mrn-FAU ~~E426~~-Ross
Dist., Co., Rte., PM, City

Date of Investigation 10/3/89

Name CORTE MADERA CREEK (Lagunitas Road)

CONDITION RATING:

Deck (7) Superstructure 6 Substr.& Pipes 7
Channel & Channel Protection 6 Culvert N Widenable? Yes

TYPE OF INVESTIGATION/REPORT

BIENNIAL X DAMAGE _____
CATEGORY A _____ OTHER _____
UNDERWATER _____ OFFICE _____

CONDITION OF STRUCTURE

AT the time of this investigation, there was very minor flow in the channel with approx. 12' of freeboard under Span 3.

The A.C. deck overlay is fairly well worn with minor random cracks. Although the overlay is still serviceable, the random cracking indicates some distress in the underlying deck which, when coupled with the age of the bridge, merits downgrading the deck rating to a "7". There is a large transverse pattern crack in the A.C. at both paving notches. In addition, there are large pattern cracks at the East A.C. approach and large transverse cracks at the West A.C. approach. Both approaches may need to be patched by the date of the next investigation.

There were several spalls with exposed rebar at various locations on both bridge rails.

There appears to have been no further deterioration of the super-or substructure since the date of the last investigation. However, this condition should be closely watched for significant changes in subsequent investigations.

Otherwise, the bridge appears to be in fair condition.

WORK RECOMMENDED

NONE

Chris B. Campbell, CE 37945

CBC/nlc



STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
SUPPLEMENTARY BRIDGE REPORT
DS-M19 (REV 7/87)

Bridge No. 27C-71

Location 4-Mrn-FAU E462-Ros
Dist-Co-Rte-PM-City

Date of Investigation August 25, 1987

Name CORTE MADERA CREEK (Lagunitas Rd.)

CONDITION RATING:

APPRAISAL RATING:

Deck 8 Superstructure 6 Substr. & Pipes 7 Overall 3
Channel & Channel Protection 6 Retaining Walls N

Widenable? Yes No Conditional

Action Required Yes No

CONDITION OF STRUCTURE:

The concrete on the underside of girder 1 in Span 2 is fractured. The stirrups are exposed on the downstream side of the girder.

There are light cracks with efflorescence on the underside of the right overhang throughout the entire length of the bridge.

There is an old 36"x8" spall with exposed rebar on the edge of the right deck overhang.

The structure is in fairly good condition.

John Fujimoto
John Fujimoto

Reviewed and approved by

William R. Baker

WRB/JF/nlc



Bridge No. 27C-71
Location 4-Mrn-FAU E462-Ros.
Dist - Co - Rte - PM - City
Date of Investigation September 25, 1985

Name CORTE MADERA CREEK (Lagunitas Road)

CONDITION RATING:

Deck 8 Superstructure 6 Substr. & Pipes 7 Overall 3
Channel & Channel Protection 6 Retaining Walls N

APPRAISAL RATING:

Widenable? Yes No Conditional

PREVIOUS INVESTIGATION:

January 26, 1984

CONDITION OF STRUCTURE:

No significant structural changes were noted. The structure is in fair to good condition.

Water is dripping from a group of small pipes where they enter the west abutment wall on the north side of the bridge.

A large amount of drift has lodged between the structure and the utilities on the downstream edge of bridge.

William R. Baker

William R. Baker
C16500

WRB/nlc

Bridge No. 27C-71

Location 01-Mrn-FAU E162-Ros
Dist - Co - Rte - Pk - City

Date of Investigation August 20, 1981

Name CORTE MATDEA CREEK (on Lagunitas Road in the City of Ross)

CONDITION RATING:

APPRAISAL RATING:

Deck 8 Superstructure 6 Substr. & Pipes 7 Overall (3)
Channel & Channel Protection 6 Retaining Walls N

Widenable? Yes No Conditional

Action Required by District: Yes No

PREVIOUS INVESTIGATION

November 29, 1977.

ADDITIONS TO PREVIOUS REPORTS

Seismic retrofit: not required.

Encroachments: Mounted on the left side of the structure are the following:

- 12" dia cast iron pipe
- 4" dia steel pipe
- 2 1/4" dia steel pipe
- 1 1/4" dia steel pipe.

On the right side of the structure are the following:

- 4" dia steel pipes, total 8
- 5" dia steel pipe.

Vert. Clearance over deck: approximately 20' to power lines.

CONDITION OF STRUCTURE

The field investigation on the date of this report proved that the condition of this structure continues to be materially the same as it was during the last investigation. This structure is in a fair to good condition.

James P. Hunter
James P. Hunter
C-14617

Bridge No. 27C-71

Other No. _____

P.U.C. No. _____

Location 04-Mrn-FAU E462-Ross
Dist - Co - Rte - PM - City

Date of Investigation November 29, 1977

Name CORTE MADERA CREEK (on Lagunitas Road)

Lat. 37°-57.8' Long. 122°-33.3'

STRUCTURAL DATA AND HISTORY

Year Built ¹⁹⁰⁹1930 Est. By unknown Contract No. _____

Date of Revisions _____

Designed by: B.D. unknown Plans Avail. @ none

Description: Continuous reinforced concrete haunched T-beams (5)
on solid wall piers and end diaphragm abutments.

Spans 1@14.5'-1@46.5'-1@14.5'

Length 77.5' Skew 24°+ Left Design LL unknown

ASSIGNED
Ratings: Inventory H15 Operating H20 Permit GG000

DESCRIPTION - ON STRUCTURE

Bridge Width 1.7'R-4.1'SW-20.2'Rdwy.-1.8'R

Total Width 27.8' Lanes 2 Tracks none

Median none Rail Type Toddlike (0000)

Vert. Clearance over deck unimpaired Appr. Rdwy. Width 39'

Wearing Surface AC Deck Seal none

Alignment Tangent with intersections--city street.

DESCRIPTION - UNDER STRUCTURE

Roadway Section ---

Clearances: Vert. --- Horiz.; --- Lt. --- Rt. ---

Lanes --- Tracks --- Pumpplant: None See Br. No. ---

Facilities Crossed Creek

cc:

Bridge No. 27C-71
Date November 29, 1977

DESCRIPTION - HYDRAULICS

Channel Sand, gravel, brush, and small trees.

Navigable: Yes No Clearances: Vert. _____ Horiz. _____

MAINTENANCE

Custodian City of Ross Owner City

**ORIGINAL
CONDITION RATING**

Deck	<u>8</u>
Superstructure	<u>6</u>
Substructure & Pipes	<u>7</u>
Channel & Channel Protection	<u>6</u>
Retaining Walls	<u>N/A</u>
Approach Rdwy. Alignment	<u>5</u>
Estimated Remaining Life	<u>40</u>

**ORIGINAL
APPRAISAL**

Overall	<u>3</u> ^{JH}
Deck Geometry	<u>3</u>
Underclearances	Vert. <u>N/A</u>
	Horiz. <u>N/A</u>
Safe Load Capacity	<u>5</u>
Waterway Adequacy	<u>7</u>
Approach Rdwy. Alignment	<u>5</u>

Widenable? Yes No Conditional

Action Required by City: ~~OWNER~~ Yes No

ADT

1,500 (1978 Est.).

DETOUR

1.4 miles.

CONDITION OF STRUCTURE

The sidewalks show numerous old cracks, minor spalls, and general erosion of the railing.

BRIDGE NO. 27C-71	
SHEET Three	DATE November 29, 1977

CONDITION OF STRUCTURE (continued)

Girders #2 and #3 of Span #2 show small spalls at their midspans probably due to being hit during flood stage.

There is segregated concrete throughout this old structure.

This structure is in a fair to good condition as of the date of this investigation.

LOAD CAPACITY

No "As-Built" plans are available for this structure.

A Load Capacity was ASSIGNED to this structure based on its estimated year of construction, use, and condition.

Based on these assumptions, this structure appears to be able to sustain all combinations of Legal Loads and some lesser State permit loads.

Frank C. Heggli
FRANK C. HEGGLI



FCH/jf

**APPENDIX C – SUFFICIENCY RATING SCORES,
EXPLANATION OF SUFFICIENCY RATING
ITEMS, AND FEDERAL-AID POLICY GUIDE**

Database Name: BRIDGE.fp5

Data as of 6/28/2001

Displaying records 1 through 6 of 6 records found.

Click on "[County](#)" for detail record. [Need information about these fields? See the NBI Coding Guide.](#)

County	Agency	Bridge No	Sufficiency Rating	SD FO Flag	Facility	Feature Intersected	Location	Rail Rate 36A	Scour 113	ADT Total	ADT Year	Historical Sig	Year Built	Year of Major Reconstruct	Last Inspection	NHS Sys	Fed Sys	Functional Class	Paint Code	Paint Code Text
Marin	ROSS	27C0050	51.6	FO	SIR FRANCIS DRAKE	CORTE MADERA CREEK	3.0 MI E OF SR 101	0	U	18300	1998	2	1926	0	3/18/1999	Off NHS	On Fed Sys	14		
Marin	ROSS	27C0071	47.9	SD	LAGUNITAS ROAD	CORTE MADERA CREEK	IN THE CITY OF ROSS	0	U	1500	1998	2	1930	0	3/18/1999	Off NHS	On Fed Sys	17		
Marin	ROSS	27C0072	82.0	FO	GLENWOOD AVE	ROSS CREEK	IN THE CITY OF ROSS	0	U	1500	1998	2	1930	0	3/18/1999	Off NHS	On Fed Sys	17		
Marin	ROSS	27C0074	46.6	FO	WINSHIP ROAD	CORTE MADERA CREEK	IN THE CITY OF ROSS	1	U	1500	1998	5	1925	0	3/18/1999	Off NHS	On Fed Sys	17		
Marin	ROSS	27C0078	62.9	FO	SHADY LANE	ROSS CREEK	NEAR LOCUST ST	0	U	1500	1998	2	1930	0	3/18/1999	Off NHS	On Fed Sys	17		
Marin	ROSS	27C0149	64.1	FO	NORWOOD AVE	ROSS CREEK	0.1 MI N SHADY LN IN ROSS	0	U	1000	1998	2	1908	0	3/18/1999	Off NHS	On Fed Sys	17		

Sufficiently
 Rainy
 X 2 or
 less
 Approx Length
 (km)
 Daily
 Traffic
 Approach
 Roadway
 width
 (meters)
 Type
 of
 Deck
 Structure
 (Concrete/Steel)
 No. of
 Lanes
 Clearances
 Year
 of
 Construction

Marin Bridges.txt

BRIDGE NUMBER	DI	ST FEATURES INTERSECTED	STRUCTURE NAME	CITY	FD	RATE	LEN	OMUN	AADT	WIDTH	TYP	WIDTH	OVER	YEAR
27C0069	04	BRANCH CORTE MADERA CRK	LUCKY DRIVE	UKSP		84.2	5	0300	3000	12.2	119	12.2	99.99	1970
27C0070	04	CORTE MADERA CREEK	COLLEGE AVE	----		97.6	3	0200	3000	13.4	101	13.3	99.99	1970
27C0071	04	CORTE MADERA CREEK	LAGUNITAS ROAD	ROS	SD	47.9	3	0200	1500	11.9	204	6.2	99.99	1930 ←
27C0072	04	ROSS CREEK	GLENWOOD AVE	ROS	FO	82.0	3	0100	1500	5.5	701	5.3	99.99	1930
27C0073	04	CORTE MADERA CREEK	BARBER AVE	SLMO		62.5	2	0200	900	7.9	204	7.3	99.99	1930
27C0074	04	CORTE MADERA CREEK	WINSHIP ROAD	ROS	FO	46.6	2	0200	1500	5.5	111	5.5	99.99	1925
27C0075	04	MWP RR	REILIM BLVD	SRF			3	0002	0		702		0.00	1930
27C0076	04	MAHON CREEK	LINDARO ST	SRF		96.5	2	0200	5735	14.0	119	14.1	99.99	1962
27C0077	04	SAN RAFAEL CREEK	LINGOLN AVE	SRF	SD	79.7	2	0200	11601	13.4	201	13.4	99.99	1959
27C0078	04	ROSS CREEK	SHADY LANE	ROS	FO	62.9	2	0200	1500	7.3	111	6.6	99.99	1930
27C0079	04	SAN ANSELMO CREEK	CENTER BLVD	SLMO	FO	75.7	2	0100	10000	5.5	204	5.4	99.99	1940
27C0080	04	SAN ANSELMO CR	MADROVE AVE	SLMO	FO	55.1	71	0200	1000	7.0	104	5.5	99.99	1930
27C0081	04	SLEEPY HOLLOW CREEK	CALETA AVE	SLMO		92.5	2	0200	400	7.9	501	7.9	99.99	1989
27C0082	04	GALLINAS CREEK	REDWOOD HWY	SRF		93.8	3	0200	8000	10.1	119	10.0	99.99	1969

MARIN COUNTY - JULY 3, 2001

BRIDGE NUMBER	DI	ST FEATURES INTERSECTED	STRUCTURE NAME	CITY	FD	RATE	LEN	OMUN	AADT	WIDTH	TYP	WIDTH	OVER	YEAR
27C0083	04	MILLER CREEK	LAS GALLINAS AVE	----		97.5	3	0400	3830	19.5	201	10.5	99.99	1970
27C0084	04	GALLINAS CREEK	FREITAS PRKY	SRF	FO	82.0	2	0200	8738	9.4	119	9.4	99.99	1970
27C0085	04	GALLINAS CR	LAS GALINAS AV	SRF		96.3	2	0400	6871	17.4	101	17.4	99.99	1965
27C0086	04	ARROYO SAN JOSE	BEL MARIN KEYS BL	NVTO		78.0	199	0400	15000	22.6	119	22.6	99.99	1970

EXPLANATION OF COLUMN HEADINGS FOR SUFFICIENCY RATING ITEMS

HEADING	NBI ITEM	DESCRIPTION
PKD_RTE_S	5	<p>P = Record Type (NBI Item 5A)</p> <ul style="list-style-type: none"> 1 = Route on structure 2 = Single route under structure 3,4 = "On" routes not part of National Bridge Inventory A = First of multiple routes under B-Z = Remaining routes under structure * = Structure is not part of National Bridge Inventory <p>K = Kind of Highway (NBI Item 5B)</p> <ul style="list-style-type: none"> 1 = Interstate 2 = U.S. Numbered Highway 3 = State Highway 4 = County Highway 5 = City Street 6 = Federal Lands Road 7 = State Lands Road 8 = Other <p>D = Designated Level of Service (NBI Item 5C)</p> <ul style="list-style-type: none"> 0 = None of the below 2 = Mainline 3 = Alternate 4 = Bypass 6 = Spur 7 = Ramp, Wye, Connector, etc. 8 = Service and/or unclassified frontage road <p>_RTE_ = Route Number (NBI Item 5D)</p> <p>S = Directional suffix (NBI Item 5E)</p> <p style="text-align: center;">Directional suffix is not used in California's bridge inventory. Instead, this item indicates whether the route is part of the <u>"Subsystem of Highways for the Movement of Extralegal Loads"</u> (SHELL).</p> <p style="text-align: center;">S = Route is part of SHELL 0 = Route is not part of SHELL</p>
POSTMILE	11	Postmile (with prefix) in miles. Although 3 decimal places are shown, the milepoints are currently accurate only to the hundredth of a mile. Postmiles are shown for state-owned bridges only.
S	100	STRAHNET Highway Designation

N		<p>0 = Not a STRAHNET highway 1 = STRAHNET highway 2 = STRAHNET highway crossing over or under a STRAHNET highway</p>
BYP LEN	19	Bypass detour length in kilometers.
LNES ONUN	26	The first two characters are the number of lanes on the structure. When the route is on the structure, the second two characters show the total number of lanes under. When the route is under the structure, the second two characters show the number of lanes carried by that route.
AADT	29	Average daily traffic.
APPRD WIDTH	32	Width of the approach roadway, shoulders included, in meters.
RAIL RATE	36	<p>Ratings for Bridge Railings, Transitions, Approach Guardrail, and Approach Guradrail ends.</p> <p>0 = Does not meet currently accepted standards. 1 = Meets currently acceptable standards N = Not applicable or not required</p>
STR TYP	43	<p>Structure type (Material and Design)</p> <p>First character (Material) NBI Item 43A:</p> <p>1 = Concrete 2 = Concrete continuous 3 = Steel 4 = Steel continuous 5 = Prestressed concrete 6 = Prestressed concrete continuous 7 = Wood or timber 8 = Masonry 9 = Aluminum, wrought iron, or cast iron 0 = Other</p> <p>Second & Third characters (Design) NBI Item 43B:</p> <p>01 = Slab 02 = Stringer/Multi-beam or Girder 03 = Girder and Floorbeam System 04 = Tee Beam 05 = Box Beam or Girders - Multiple 06 = Box Beam or Girders - Single or Spread 07 = Frame (except frame culverts) 08 = Orthotropic 09 = Truss - Deck 10 = Truss - Thru</p>

		11 = Arch - Deck 12 = Arch - Thru 13 = Suspension 14 = Stayed Girder 15 = Movable - Lift 16 = Movable - Bascule 17 = Movable - Swing 18 = Tunnel 19 = Culvert 21 = Segmental Box Girder 22 = Channel Beam 00 = Other
RDWAY WIDTH	51	Bridge roadway width curb-to-curb (meters)
VCLR OVER	53	Minimum vertical clearance over bridge roadway (meters). 99.99 means no impaired vertical clearance. 0.00 means not applicable (Bridge does not carry a roadway).
YEAR BLT	27	Year of Original Construction
INVR RATE	66	Inventory Rating (Gross Load in Metric Tons)
OPER RATE	64	Operating Rating (Gross Load in Metric Tons)
COND DSSC	58 59 60 62	Condition Ratings (9 = Best, 0 = Worst, N = Not Applicable) D = Deck S = Superstructure S = Substructure C = Culvert
APPRS SDUWA	67 68 69 71 72	Appraisal Ratings (9 = Best, 0 = Worst, N = Not Applicable) S = Overall Structural Evaluation D = Deck Geometry U = Underclearances (Both Vertical and Horizontal) W = Waterway Adequacy A = Approach Roadway Alignment
SUFF RATE		Sufficiency Rating calculated according to FHWA formula.

APPENDIX D – PROJECT PHOTOS

LAGUNITAS ROAD BRIDGE – PROJECT PHOTOGRAPHS



Lagunitas Road Bridge – Deck Elevation



Lagunitas Road Bridge Deck



Lagunitas Road Bridge – Looking Upstream Prior to Annual Channel Maintenance Excavation



Bridge Rail and Suspended Pipes



West Pier Prior to Maintenance Excavation



North Bridge Rail and Deck Surface

LAGUNITAS ROAD BRIDGE – PROJECT PHOTOGRAPHS



South Bridge Rail and Sidewalk



East Bridge Pier and Abutment



West Bridge Abutment and Pier



Looking Upstream After Annual Channel Maintenance Excavation



East Bridge Abutment



East Bridge Pier and Abutment

LAGUNITAS ROAD BRIDGE – PROJECT PHOTOGRAPHS



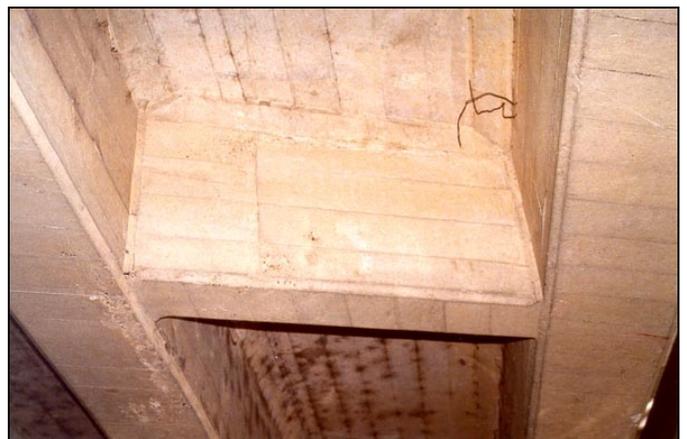
West Bridge Pier – Orange Stakes Mark Locations of Boreholes



Bridge Girders and Diaphragms – Looking West



West Bridge Abutment and Pier



Bridge Girder and Diaphragm Connection



West Bridge Pier – Boreholes



Bridge Girders and Diaphragms – Looking East

LAGUNITAS ROAD BRIDGE – PROJECT PHOTOGRAPHS



Patch in Underside of Deck – Looking South



Spalled Concrete – Diaphragm



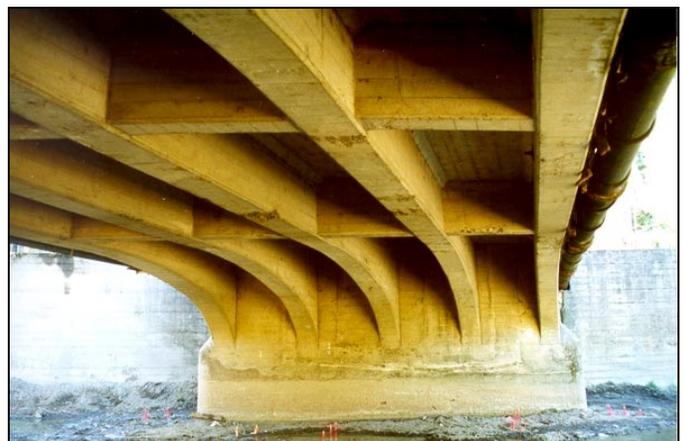
Visible Reinforcing Steel – End of Girder



Vertical Construction Joint – East Pier



Concrete Girder Spalled from Debris – Looking East



Pier / Girders - Looking West

LAGUNITAS ROAD BRIDGE – PROJECT PHOTOGRAPHS



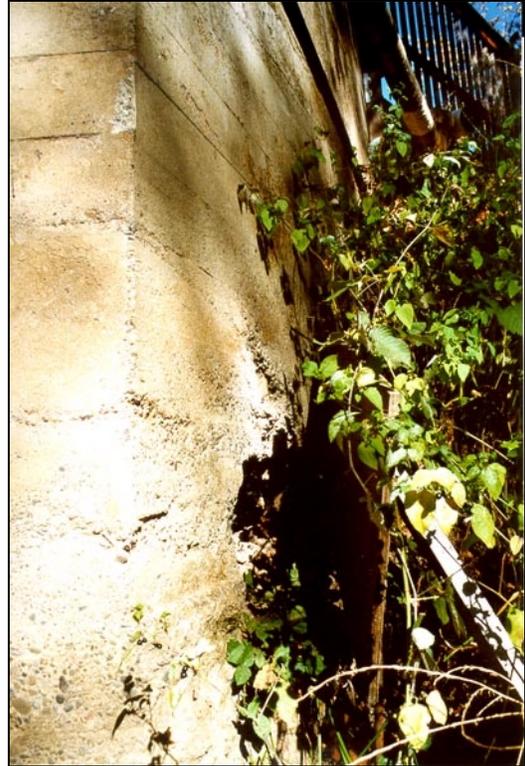
West Pier / Abutment / North Wingwall / Flapgate



Void at Base of Girder in East Pier



West Pier / Abutment / South Wingwall



Scour Damage to South Side of East Wingwall



Small Void in East Face of East Pier at Base of Girder

LAGUNITAS ROAD BRIDGE – PROJECT PHOTOGRAPHS



Closeup of Scour Damage to South Side of East Wingwall



Exposed Reinforcing Steel – North Girder Connection to West Pier Looking South



Exposed Reinforcing Steel Under South Sidewalk Support Beam



Exposed Reinforcing Steel – North Girder Connection to West Pier Looking North



Outrigger Support of South Sidewalk / Conduits



Construction Joint – West Abutment/Wingwall

LAGUNITAS ROAD BRIDGE – PROJECT PHOTOGRAPHS



Looking Up at North Girder – Spalling / Abrasion from Debris During High Flow



Removal of Material from Test Pit at West Pier



Closeup of Visible Reinforcing Steel in North Girder Looking North



Gradation of Material Removed from Test Pit



Preparing Silt Fence for Test Pit



Silt Fence Adjacent to Pier / Test Pit

LAGUNITAS ROAD BRIDGE – PROJECT PHOTOGRAPHS



Timber Crib / Test Pit



Material Under Bottom of West Pier Footing



Material At Base of Pit Below Bottom of Footing



Test Pit With Dewatering Pump in Background



Test Pit Location to West of West Pier

**APPENDIX E – STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS, DIVISION
OF HIGHWAYS - STANDARD SPECIFICATIONS
JANUARY 1930 (EXCERPT)**

NOT IN ELECTRONIC FORMAT

**APPENDIX F – AMERICAN ASSOCIATION OF
STATE HIGHWAY OFFICIALS – STANDARD
SPECIFICATIONS FOR HIGHWAY BRIDGES –
1935 (EXCERPT)**

NOT IN ELECTRONIC FORMAT

**APPENDIX G – U.S. DEPARTMENT OF
TRANSPORTATION BRIDGE INSPECTOR'S
TRAINING MANUAL 90 (EXCERPT)**

NOT IN ELECTRONIC FORMAT

APPENDIX H – SCOPE OF SERVICES

CESPN-ET-ED**28 August 2001
10 September 2001****REVISED SCOPE OF WORK****SUBJECT: Evaluation of Alternatives, Lagunitas Road Bridge, Corte Madera Creek Project, Town of Ross, Marin County, CA****CONTRACTOR: Ben C. Gerwick, Inc.****CONTRACT NO.: DACW07-00-D0003****AUTHORIZATION: Section 204 of Public Law 89-789, the Flood Control Act of 1966 and the WRDA of 1986****1.0 INTRODUCTION****1.1 Objectives**

The Scope of Work for the subject task describes the requirements for and evaluation of alternatives in the vicinity of the Lagunitas Road Bridge over Corte Madera Creek. The objective of the work is to determine the impact, if any, that the Corps' flood control project will have on the bridge.

2.0 BACKGROUND

The project purpose is to provide flood protection for residential, commercial, and public property along the Corte Madera Creek in Marin County. This project will actually be the completion of the Corte Madera Creek Flood Control Project that started many years ago. The features include a combination of a sediment basin, channel excavation, minimal channel widening, raising of existing floodwalls, and replacement of an existing fish ladder.

The Lagunitas Road Bridge, constructed in 1908 by the Town of Ross, has been identified as an architecturally significant structure. Proposed work in the vicinity of the bridge includes channel excavation and replacing the existing wall on the upstream face with a diversion culvert, which will be placed behind the bridge abutments.

3.0 DESCRIPTION OF WORK**3.1 OBLIGATION OF ARCHITECT-ENGINEER (A-E):**

The A-E shall provide engineering services to the San Francisco District Corps of Engineers (CESPN-ET) by performing a structural analysis of the bridge at Lagunitas Road on Corte Madera Creek as shown on the enclosed map. An investigative report shall be furnished to the Corps. The A-E shall furnish all necessary personnel facilities, equipment, materials and transportation to perform the work described herein in a professional manner. A-E Contractor representatives shall be available to meet with Government personnel as required by the Contracting Officer (CO) or the CO's designated representatives. It shall be the A-E's

responsibility to conduct all investigation necessary to obtain any additional data required and to notify all property owners and tenants prior to performing work.

3.2 Staffing Requirements

The A-E shall provide trained, qualified and certified staff to perform all the activities specified herein. The activities include project management, inspections, record keeping, report writing and meetings. The A-E shall have a sufficient number of professionals and/or technicians to perform all activities in a timely, safe and efficient manner.

3.3 OBLIGATION OF THE GOVERNMENT:

Government personnel will be available for advice, guidance and comments on all work under this contract. Any comment, advice and/or guidance given by the Government personnel will be to assist the A-E in performing the work and will not change his scope of services or release the A-E from performing all work required unless written notification of such, signed by the Contracting officer or the CO's designated representative is received by the A-E.

3.4 Work Tasks

3.4.1 GENERAL:

Flood control measures to be taken on Corte Madera Creek will involve channel modifications in the vicinity of the Lagunitas Road Bridge. One alternative proposes replacing the wall on the upstream face of the bridge, and installing a new diversion culvert at this location. No documentation is currently available for this bridge.

- Determine type and location of foundations
- Survey bridge and provide dimensions, location, and skew angle between the bridge centerline and roadway.

3.4.2 TASKS

1. Background Investigation

- a. Investigate city, county and state agencies for as-built drawings or records.
- b. Obtain historical records of inspection and/or repairs from CALTRANS and/or other agencies. (Some CALTRANS inspection records have already been requested, dating back to 1977).
- c. If no as-built drawings exist, research records, drawings, design details of similarly constructed bridges in the vicinity of the same era.

2. Site Investigation

This task is to be performed only in the event that no complete as-built drawings are found for the subject bridge, per 3.4.2.1.

- a. Perform a site survey of the bridge, identifying existing streambed elevation, elevations of piers, headwalls, bridge deck, skew angle in stream, location, and other relevant feature locations and/or elevations. Provide cross-section of the bridge centerline, headwall, and piers. This should include a brief visual inspection of the physical condition of the bridge.
- b. Determine as-built cross sections and dimensions of relevant structural features, such as girders, piers, etc. Prepare drawings/sketches of plan,

elevation, sections, headwalls and piers, in sufficient detail to document which will lead to a structural evaluation.

- c. Identify locations subject to scour or previous damage from scour.

3. Geotechnical Investigations

- a. Determine pier foundation type, configuration, and as-built dimensions (spread footing, piles, spacing, tip elevation -- if possible). Propose to:
 - i. Conduct vertical borings and/or soundings to determine the approximate outline of the pier foundation. At the same time, a test boring to determine soil profile would be drilled in the existing stream channel. Depending upon the materials encountered, and the size of the footing footprint, a determination would be made concerning the probability of a spread footing or a pile cap / piles.

*Note: Steps ii and iii are optional. A-E shall consult with Corps personnel after completion of step (3.a.i.). Corps personnel shall then determine whether step ii is necessary. A-E shall provide a separate, optional price for completion of work in steps ii and iii.

- ii. If a pile cap and piles seem likely, proceed with an angle bore(s) adjacent to the pier from the upstream end of the pier. (Review procedure with Corps to minimize likelihood of damage to structure).
 1. A-E shall consult with Corps personnel at completion of step ii to determine the necessity of step iii.
 - iii. If piles are detected, excavate a test pit adjacent to the pier on the downstream face to determine number, arrangement, diameter and spacing, if possible and practical. (Two methods of excavating this test pit are to be evaluated based on cost, constructability and safety.)
- b. Determine headwall foundation configuration and as-built dimensions (depth, existing base of wing walls, existing apron, spread footing, or pile cap).
 - i. Excavate one test pit adjacent to west headwall in vicinity of existing flap-gate to determine depth of headwall footing.
 - ii. Drill sequenced boreholes vertically from west bank road shoulder at surface to determine presence of wing wall, apron, spread footing or pile cap.
- c. Develop boring logs to determine soil profile affecting bridge foundation. Borings and testing shall include such information as top of rock, vane shear tests or penetration blow counts, and soil classification. Propose to:
 - i. Drill one borehole in streambed to obtain soil profile.
 - ii. Obtain soil profiles from two boreholes at west bank road shoulder.

4. Structural Analysis:

No structural analysis will be performed under this contract. A scope of work for the structural analysis of the Lagunitas Road Bridge, based on information provided under the work of this contract, will be provided at a later date.

5. Final Report submitted to COE:

Initial submittal - The A-E shall provide the Government one hard copy of A-E's report of findings. The Government reserves a period of five (5) calendar days to comment on this submittal.

Final submittal - The final submittal shall contain all the revisions required as a result of the Government's initial review.

4.0 PERMITS:

The A-E shall obtain any permit needed to perform work.

5.0 PERIOD OF SERVICE

Project to be completed within 60 days of the notice to proceed. The Corps recognizes that required permits from the California Department of Fish and Game require a period of 30 to 90 days for approval. Should the Department of Fish and Game fail to issue the permits within a reasonable time before 31 October, a contract change order extending the period of service may be issued.

6.0 ADMINISTRATIVE INFORMATION

Mr. Scott Nicholson is the Project Manager for the Corps of Engineers in San Francisco. Mr. Bill Firth is the Corps of Engineers water resources engineer for the Corps of Engineers in San Francisco. Christina Broscius is the civil design engineer for the Corps. Please direct all correspondence to Ms. Broscius.

Pertinent data for the Corps representatives follows:

Mr. Scott R Nicholson
ATTN: CESP-PM-C
333 Market Street
San Francisco, CA 94105
Phone: 415-977-8706
FAX: 415-977-8431
Email: Scott.R.Nicholson@spd.usace.army.mil

Mr. William R Firth
ATTN: CESP-ET-EW
333 Market Street
San Francisco, CA 94105-2197
Phone: 415-977-8592
FAX: 415-977-8695
Email: William.R.Firth@spd.usace.army.mil

Ms. Christina T Broscius
ATTN: CESP-ET-ED
333 Market Street

San Francisco, CA 94105-2197
Phone: 415-977-8559
FAX: 415-977-8695
Email: Christina.T.Broscius@spd.usace.army.mil

7.0 SAFETY REQUIREMENTS:

The A-F shall comply with all applicable safety regulations of the current U.S. Army Corps of Engineers Safety and Health requirements manual EM 385-1-1, and shall acquaint himself and his personnel with the safety requirements governing the area in which the work is being done.