

C.C. MYERS INC.

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July 15, 2005

Document No.: 215-STL.00163

State of California
Department of Transportation
333 Burma Road
Oakland, CA 94607

Temporary Bypass Structure
Contract No. 04-0120R4
CCM Job # 215

Attn: Mr. Lourdes David
Resident Engineer

Re: Deck Drainage

Dear Mr. David,

In response to your letter 05.03.01-000486, attached please find a copy of the calculations for the deck drainage system with the inlets spaced at 1.2 meters on center. The calculations also include some analysis utilizing scuppers in the barrier rail. Note that this information was provided to you for review on August 2, 2004 as part of our Request For Information 215-RFI-001.00015-02. Also note that your response to the RFI did not address these calculations.

Additionally, in your letter referenced above, you are directing us to proceed with developing calculations for a deck drainage system that utilizes a combination of both standard deck drains and scuppers in the barrier rail. Please understand that as this type of drainage system is not allowed by the contract design criteria, we request to be compensated for this extra work. Until such time as a Contract Change Order is issued to address this matter, we will accumulate our costs under our Potential Claim No. 9.

Also attached, please find a copy of letter #109 from our designer, Imbsen & Associates, Inc. for your use.

Very Truly Yours,
C. C. Myers, Inc.

A handwritten signature in black ink, appearing to read 'Robert W. Coupe', is written over a white background.

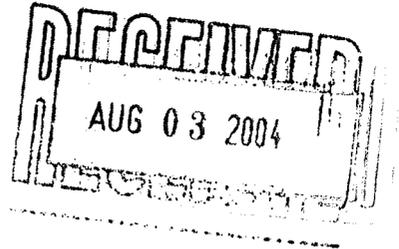
Robert W. Coupe
Project Manager

cc: AC, DHobbs, CMW, MO, JCG

File: 215-101, 215-9909



C.C. MYERS INC.
 9912 BUSINESS PARK DRIVE, SUITE 130
 SACRAMENTO, CA 95827
 916-366-0632 FAX 916-366-1501



REQUEST FOR INFORMATION

Aug 02 2004

State of California
 Department of Transportation
 Attn: Ken Loncharich
 Subject: RFI 001.00015

Job # 215 Temporary Bypass Structure
 Contract # 04-0120R4
 Contact Person: Robert W. Coupe

Drawing No. Ref:

Specification Ref: 5-1.14

Other:

Resubmittal/Supplement Ref:

RFI #: 215-RFI-001.00015-02

Date Information is Required By: Aug 04 2004

Request:

Please see the attached revision to the previous request for information from Imbsen & Associates, Inc.

Signed:

Robert Coupe
 Robert Coupe

Reply: No justification has been provided for the rainfall intensity you wish to propose on the lower deck. The deck drainage design shall be completed so that the drainage does not infringe into the traveled way. If you contend that it will be impossible to keep drainage out of the traveled way, what other options did you consider?

Reply By:

KEN LONCHARICH

Date:

8-3-04

CC: *MO*

File: 215-201-105

RECEIVED

AUG - 6 2004

CC MYERS INC
 JOB 215 TEMP BYPASS STRUCTURE

IC-467

215-105

IMBSEN - FAX

Bob Coupe

From: Lance Schrey [schrey@lmbesen.com]
Sent: Friday, July 30, 2004 12:12 PM
To: Dan Adams (E-mail)
Cc: Roy Imbsen; James Gomez; Bob Coupe (E-mail); Bill Kidwell (E-mail)
Subject: 1295 RFI #15 rev 2

Dan,
Please see attached RFI # 15 rev. 2. Thanks,

Lance A. Schrey, P.E.

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JUL 30 2004

CC MYERS, INC.
JOB 215 TEMP BYPASS STRUCTURE
IC-00409
215-~~15~~ 201
STATE-IRP1

Request For Information (RFI)

San Francisco Oakland Bay Bridge
(Temporary Bypass Structure)
IAI Project # 1295 Contract # 04-0120R4

INQUIRY

RFI # 215-RFI.001.00015 rev.2

Date: 7/30/2004

Question asked by and/or contact person:

IAI – Lance A. Schrey, P.E.

Rec'd by: Dan Adams

Revision #2 Question: Without allowing drainage to infringe into the traveled way the design is extremely difficult if not impossible. How shall we complete the deck drainage design?

Revision #2 Background: In Caltrans response to revision #1, they asked for justification for the intensity we propose. Please see below. We have attached calculations, which shows for the given profile, the given cross slope and the given small shoulder that deck drains would be required at 1.2 meters on center.

Revision #1 Question: Due to the proposed roadway configuration (i.e., small shoulders) it is not feasible to design the deck drainage system to meet the current Design Criteria. How far into the traveled way can the drainage infringe? Can the rainfall intensity used to design the lower deck drainage be reduced since the collection for the lower deck is covered by the upper deck?

Revision #1 Background: In our analysis we used the reduced rainfall intensity (2.384 in/hr for a 10 minute duration) as called out in the "Drainage Report for Construction of State Highway" by Manna Consultants, Inc. dated May 9, 2002. Our preliminary calculations show that Type D-1 deck drains (modified to fit within the 0.3 meter shoulder) would have to be spaced approximately 1.2 meters on center on the lower edge of roadway.

Original Question: Can the deck drainage area infringe into half of the outer lanes? Can scuppers be utilized on the lower roadway?

Original Background: The size of the shoulder shown in the Contract Plans is very small, therefore keeping the storage area outside of the traveled way is extremely difficult. The design speed for the TBS is 80 km/hour (as per the inquiry list). However a design exception for the superelevation and centerline radius was granted. The design speed for the proposed superelevation and radius is less than 75 km/hour. According to Table 831.3 of Caltrans Highway Design Manual, if the design speed is less than 75 km/hour or less, the drainage would be allowed to infringe into half of the outer lanes. It should also be noted that this is a temporary structure.

Response to Request For Information (RFI)

Bridge Name: San Francisco Oakland Bay Bridge Bridge # 34-0006 (TEMP)
Contract #04-0120R4 IAI Project # 1295

RESPONSE

Caltrans contact person: Dan Adams

Response by:

Date:

Response:

QUALITY CONTROL

Initials

Reviewed by: Ghassam Dini

Date: 4/26/04

Checked by:

Date:



DECK DRAIN DESIGN

FROM DRAINAGE REPORT BY MANNA CONSULTANTS, INC.
DATED MAY 9, 2002:

- DECK DRAINAGE FLOW BASED ON 25 YEAR DESIGN STORM
- $I_{25} = 0.9774 (D^{-0.4977})$
WHERE: I = RAINFALL INTENSITY (INCH/HOUR)
D = DURATION (HOURS)
- MINIMUM TIME OF CONCENTRATION = 10 MINUTES
- $Q = CIA$ WHERE C = 0.95 FOR BRIDGE DECKS (ASSUMED)
- FOR LOWER DECK, PERFORM RUNOFF CALCULATIONS ASSUMING NO UPPER DECK (SIMILAR TO T.Y. LIN'S CALCULATIONS). THIS WILL RESULT IN HIGHER, MORE CONSERVATIVE RUNOFF VALUES.
- $n = 0.010$ FOR STEEL PIPES
- $n = 0.012$ FOR NEW RCP
- $n = 0.015$ FOR EXISTING INSTALLATIONS
- MINIMUM VELOCITY = 1.0 m/SEC

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→ BECAUSE THE DRAINAGE AREAS ARE SMALL, IT WILL BE ASSUMED THAT $T_c = 10$ MIN FOR ALL LOCATIONS WITHIN THE DRAINAGE AREA. THIS IS A CONSERVATIVE APPROACH.

$$I = 0.9774 \left(\frac{10}{60}\right)^{-0.4977} \text{ IN/HR}$$

$$= 2.384 \text{ IN/HR}$$

$$Q = CIA$$

$$= 0.95 (2.384) A$$

$$Q = 2.265 A$$

WHERE: A = ACRES

Q = CFS

CONVERT TO METRIC:

$$Q = \frac{2.265 (0.028317)}{1.04686} A$$

WHERE: A = M^2

Q = M^3/SEC

$$Q = 0.0001585 A$$

WHERE: A = M^2

Q = M^3/SEC

Job Title BAY BRIDGE PROJECT		Job No. 1295	Sheet 2
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• "DESIGN WATER SPREAD" IS RESTRICTED TO THE SHOULDER AREA

ED1 LINE 53+32.0 TO 55+11.5

→ SHOULDER WIDTH = 0.3 m LT & RT

→ SUPER = 2%

→ LONGITUDINAL SLOPE = 2.403%

WD1 LINE 53+32.0 TO 54+24.04

→ SHOULDER WIDTH = 0.3 m

→ SUPER = 2%

→ LONGITUDINAL SLOPE = 1.711%

FLOW IN GUTTER:

$$Q = (k/n) S_x^{5/3} S^{1/2} T^{2/3}$$

WHERE: $k = 0.375$

$n = 0.016$

$Q = 0.00001585A \text{ M}^3/\text{SEC}$

$S_x = \text{CURVE SLOPE}$

$S = \text{LONGITUDINAL SLOPE}$

$T = \text{WIDTH OF FLOW} = 0.3 \text{ m SHOULDER}$

ED1 LINE: $S_x = 0.02$, $S = 0.02403$, $T = 0.3 \text{ m}$

$$0.00001585A = (0.375/0.016)(0.02^{5/3})(0.02403^{1/2})(0.3^{2/3})$$

$$A = 13.6 \text{ M}^2$$

RIGHTWAY IS SUPERELEVATED TO RT.

$$\therefore \text{DECK DRAIN SPACING} = \frac{A}{\text{TRIBUTORY WIDTH}} = \frac{13.6 \text{ M}^2}{17.1 \text{ m}} = \underline{0.8 \text{ m}} \text{ O.C.}$$

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W01 LINE: $S_x = 0.02$, $S = 0.01711$, $T = 0.3 \text{ m}$

$$0.00001585A = (0.375/0.016)(0.02^{5/4})(0.01711^{1/2})(0.3^{8/3})$$

$$A = 11.5 \text{ m}^2$$

SUPERELEVATION SLOPES TO RT.

$$\therefore \text{DECK DRAIN SPACING} = \frac{A}{\text{TRK. WIDTH}} = \frac{11.5 \text{ m}^2}{17.1 \text{ m}} = \underline{\underline{0.7 \text{ m}}} \text{ O.C.}$$

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$$A = 13.6 \text{ m}^2 \quad \text{E01 LINE}$$

$$\begin{aligned} Q &= 0.0001585 (13.6) \\ &= 0.002156 \text{ M}^3/\text{SEC} \\ &= 0.0076 \text{ CFS} \end{aligned}$$

CAPACITY OF INLETS ON GRADE (BDA pg 17-4)

ASSUME A MODIFIED TYPE D-1 INLET (0.3 M WIDE)

$$L_b = 0.9 V (d + d_b)^{1/2}$$

$$\text{WHERE: } V = Q/A = \frac{0.002156 \text{ M}^3/\text{SEC}}{0.5 (0.3 \text{ M}) (0.3 \text{ M} \times 0.02)} = 0.24 \text{ M/SEC}$$

$$d = 0.3 \text{ m} \times 0.02 = 0.006 \text{ m}$$

$$d_b = 0.057 \text{ m}$$

$$\begin{aligned} L_b &= 0.9 (0.24 \text{ M/SEC}) (0.006 \text{ m} + 0.057 \text{ m})^{1/2} \\ &= 0.054 \text{ M} \quad (\text{CLEAR OPENING OF GATE REQUIRED}) \end{aligned}$$

$$L_b = 0.42 \text{ M FOR TYPE D-1 DRAIN} \gg 0.054 \text{ M REQ.}$$

∴ CAPACITY OF DRAIN DOES NOT CONTROL THE DESIGN.
DRAIN SPACING IS CONTROLLED BY SHOULDER WIDTH.

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SCUPPER ON GRADE (BDA pg. 17-5)

$$L_T = K Q^{0.42} S^{0.3} (1/n S_x)^{0.6}$$

$$= 0.817 \times 0.00021556^{0.42} \times 0.02443^{0.3} \times (1/0.015(0.02))^{0.6}$$

$$= 0.96 \text{ METERS}$$

ACTUAL SCUPPER $L = 0.30 \text{ m}$

$$E = 1 - (1 - L/L_T)^{1.8} = 1 - (1 - 0.3/0.96)^{1.8} = 0.49$$

$$q = EQ = 0.49 (0.00021556 \text{ M}^3/\text{SEC}) = 0.00011 \text{ M}^3/\text{SEC}$$

CONCLUSION:

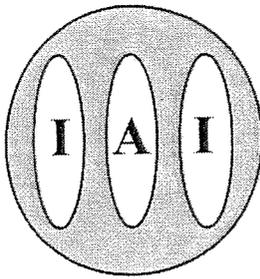
- MODIFIED TYPE D-1 INLETS WOULD HAVE TO BE SPACED AT:

$$\text{SPACING} = 0.8 \text{ m} + L_L = 0.8 \text{ m} + 0.42 \text{ m} \approx \underline{1.2 \text{ M}} \text{ O.C.}$$

TO KEEP FLOW FROM SPREADING ONTO THE TRAVELED WAY

- SCUPPERS WILL NOT WORK! WHERE THE BRIDGE DECK IS SUPERELEVATED IN ONE DIRECTION SCUPPERS WOULD HAVE TO BE CONTINUOUS (I.E. 0.96 m LONG SCUPPER SPACED AT 0.8 m O.C. → IMPOSSIBLE)

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IMBSEN & ASSOCIATES, INC.
Engineering Consultants
 A **TRC** Company

RECEIVED

June 30, 2005

JUL 08 2005

#1295-320

IAI Letter #: 109

Mr. Bob Coupe
 C.C. Myers, Inc.
 3286 Fitzgerald Road
 Rancho Cordova, CA 95742

CC MYERS, INC.
 JOB 215 TEMP. BYPASS STRUCTURE

IC - 02132
 215-201

RC

JG

~~Caltrans (JG)~~

215-9909

Subject: TBS Deck Drainage

Dear Mr. Coupe:

This letter is in reference to our meeting on Wednesday June 29, 2005 at Caltrans field office and in response to State Letters 05.03.01-000479 and 05.03.01-000446 whereby Caltrans has determined that NOPC #9 has no merit.

In this meeting IAI stated that the deck drainage design criteria provided in the contract appears generally applicable to typical highway structures and not specifically for the TBS structure. IAI also reiterated that the drainage criteria provided in the contract is not adequate for the proper bridge drainage design of the TBS structure. Specifically, the small shoulder size (provided in the contract documents) along with the structure geometry (provided in the contract documents) as well as the inadequacy of the existing bridge drainage has created a scenario where the encroachment of design water spread upon the traveled way cannot be avoided. In this meeting IAI also pointed out that that alternatives that were discussed at the January 12, 2005, would not satisfy the contract requirements and/or are not feasible.

As a part of a solution to this matter, Caltrans suggested two alternatives:

1. Using drainage inlets at 5' spacing for the full length of the TBS along with Scuppers (it was suggested by Caltrans to not call them Scuppers).
2. Changing the design of the bridge.

Please provide us with a direction to proceed.

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 (559) 449-4591 Fax

Oakland Office
 167 Filbert Street
 Oakland, Ca 94607
 (510) 267-1835 Phone

Please feel free to contact me at (916) 366-0632 should you have any questions.

Sincerely,

For: [Signature]
Roy A. Imbsen, P.E., D. Engr
Project Manager

cc: IAI File, EA, MV, RI

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