

**CONCRETE BRIDGE DECK
WITH ISOTROPIC REINFORCING**

CONSTRUCTION REPORT

**USBR Canal Bridge
The Dalles - California Highway
Klamath Falls, Oregon**

Experimental Features

by

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Prepared for

Oregon Department of Transportation
Salem, Oregon 97310

and

Federal Highway Administration
Washington, D.C. 20590

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12. Sponsoring Agency Name and Address Federal Highway Administration 530 Center Street NE Salem, OR 97301		13. Type of Report and Period Covered	
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16. Abstract Isotropic reinforcing is the placement of reinforced steel uniformly both longitudinally and transversely on the bottom and top of the bridge deck. It is an alternate to deck reinforcing designs based on the traditional "Westergaard" distribution of bending moments. The Federal Highway Administration (FHWA) approved the use of isotropic reinforcement for this project. Isotropic reinforcing was placed in the USBR Canal Bridge deck (Klamath Falls) and is being evaluated as an Experimental Features project. The bridge deck was constructed in December 1992 in two separate stages. While there were a few problems with this project, none were related to the isotropic reinforced deck being constructed, and will not affect the performance of this deck over time. The bid to install this deck was based on a cost estimate of \$12.36/S.F. (\$133.05/m ²).			
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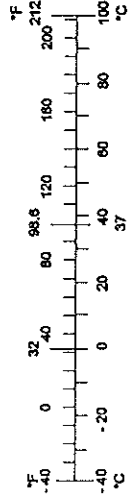
SI* (MODERN METRIC) CONVERSION FACTORS

APPROXIMATE CONVERSIONS TO SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
<u>LENGTH</u>				
in	inches	25.4	millimeters	mm
ft	feet	0.305	meters	m
yd	yards	0.914	meters	m
mi	miles	1.61	kilometers	km
<u>AREA</u>				
in ²	square inches	645.2	millimeters squared	mm ²
ft ²	square feet	0.093	meters squared	m ²
yd ²	square yards	0.836	meters squared	m ²
ac	acres	0.405	hectares	ha
mi ²	square miles	2.59	kilometers squared	km ²
<u>VOLUME</u>				
fl oz	fluid ounces	29.57	milliliters	mL
gal	gallons	3.785	liters	L
ft ³	cubic feet	0.028	meters cubed	m ³
yd ³	cubic yards	0.765	meters cubed	m ³
NOTE: Volumes greater than 1000 L shall be shown in m ³ .				
<u>MASS</u>				
oz	ounces	28.35	grams	g
lb	pounds	0.454	kilograms	kg
T	short tons (2000 lb)	0.907	megagrams	Mg
<u>TEMPERATURE (exact)</u>				
°F	Fahrenheit temperature	5(F-32)/9	Celsius temperature	°C

APPROXIMATE CONVERSIONS FROM SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
<u>LENGTH</u>				
mm	millimeters	0.039	inches	in
m	meters	3.28	feet	ft
m	meters	1.09	yards	yd
km	kilometers	0.621	miles	mi
<u>AREA</u>				
mm ²	millimeters squared	0.0016	square inches	in ²
m ²	meters squared	10.764	square feet	ft ²
ha	hectares	2.47	acres	ac
km ²	kilometers squared	0.386	square miles	mi ²
<u>VOLUME</u>				
mL	milliliters	0.034	fluid ounces	fl oz
L	liters	0.264	gallons	gal
m ³	meters cubed	35.315	cubic feet	ft ³
m ³	meters cubed	1.308	cubic yards	yd ³
<u>MASS</u>				
g	grams	0.035	ounces	oz
kg	kilograms	2.205	pounds	lb
Mg	megagrams	1.102	short tons (2000 lb)	T
<u>TEMPERATURE (exact)</u>				
°C	Celsius temperature	1.8 + 32	Fahrenheit	°F



* SI is the symbol for the International System of Measurement

ACKNOWLEDGMENTS

The author would like to thank the following Oregon Department of Transportation (ODOT) personnel for their help in gathering information and guiding this project: Phil Rabb, Richard Steyskal, Jim Bosket, Steve Starkey, John Stucky, Mike Pulzone, Scott Nodes, Ken Paetz, and Kevin Groom.

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This report does not constitute a standard, specification, or regulation.

CONCRETE BRIDGE DECK WITH ISOTROPIC REINFORCING

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1.0 INTRODUCTION

Bridge decks in Oregon have traditionally been constructed using a "truss-bar" reinforcement configuration. Although these decks have generally performed satisfactorily in the past, there is a lot of room for error in the fabrication and installation of the reinforcing bars. In order to avoid this problem and to achieve a simpler, easier configuration for reinforcement, the Oregon Department of Transportation decided to construct a deck with isotropic reinforcing on the USBR Canal Bridge (Bridge No. 8345A).

The bridge deck was constructed using conventional materials (Class 4000 concrete and ASTM A615 Grade 60 reinforcing steel) with standard placing and curing practices. The materials were placed to provide uniform reinforcement both longitudinally and transversely along the bottom and top of deck, thereby giving an isotropically reinforced bridge deck.

Isotropic bridge deck reinforcing is being examined as a possible cost-saving alternative. Reduced material requirements and more constructible reinforcing placement are expected to reduce the cost of the initial construction. Long-term savings may result from a reduction in the severity of deck cracking and, consequently, a reduction in deck deterioration.

The objective of this project is to evaluate the isotropic reinforced bridge deck constructed on the USBR Canal Bridge. The evaluation will consist of monitoring the construction process, construction costs, maintenance costs, and the overall performance of the deck for a two-year period. This report will cover the construction process and costs.

2.0 PROJECT DESCRIPTION

2.1 PROJECT LOCATION AND CLIMATE

The project is located on the Dalles - California Highway (US HWY 97) at Mile Post 273.71, Klamath Falls, Oregon, in Klamath County, as shown in Figure 2.1 below.

The project is in the South Central climatic region, which is characterized by cold, dry, snowy winters and warm dry summers. The average daily temperature of the coldest month (January) is 29.6°F (-1.3°C). The average daily temperature of the warmest month (July) is 67.7°F (19.8°C). The area receives an average annual precipitation of 13.5 inches (34.3 cm).

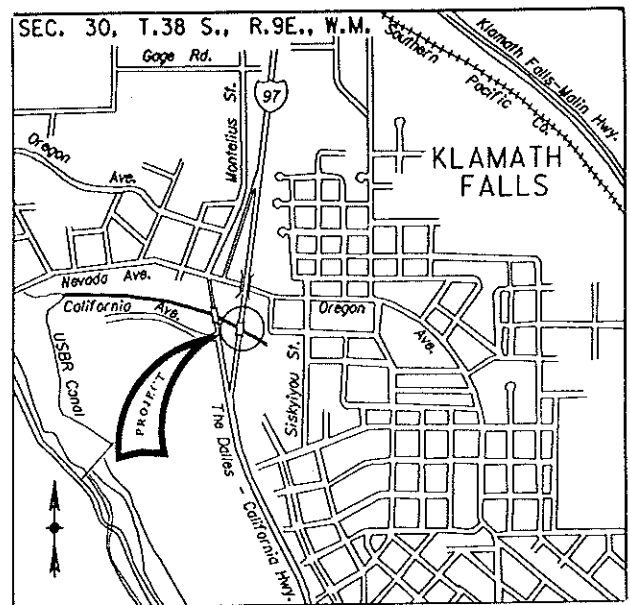
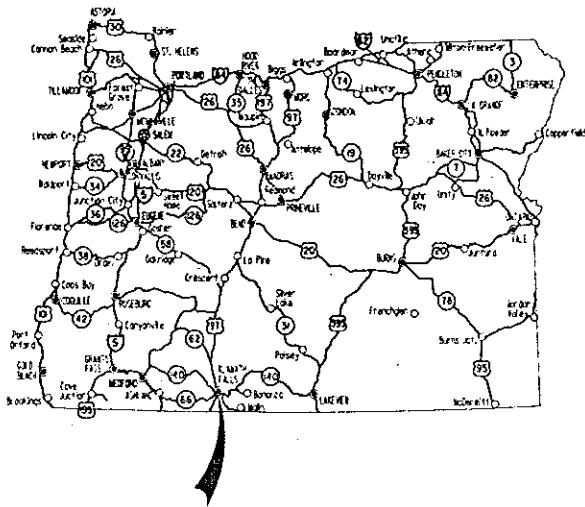


Figure 2.1 Project Location in Oregon

3.0 DESIGN

3.1 MATERIALS

The main construction materials for the isotropic reinforced bridge deck consists of concrete and reinforced steel. The reinforced steel is ASTM A615 Grade 60 or A706 which is normally specified for the typical bridge deck types found along the state highways in Oregon. There are no "truss bars" in this isotropic reinforced deck.

3.2 PROCESS

All the reinforced steel is straight #5. It is placed on 12-inch (300 mm) centers going both ways along the top and bottom faces of the bridge deck. The spacing is then reduced to 6-inch (150 mm) centers in the areas adjacent to the skewed bents and in the overhang areas to offer more support. In addition, there is a 3-foot (900 mm) wide closure poured down the center of the bridge where the spacing of the transverse steel is reduced to 6-inches (150 mm) on both the top and bottom faces. The top layer of the reinforced steel is epoxy coated in all areas.

The bridge deck is 8-inches (200 mm) thick, with 2½-inches (65 mm) of concrete cover provided for the top steel and 1¼-inches (30 mm) of concrete cover provided for the bottom steel. The concrete is class 4000. The cement content was increased by the contractor to ensure adequate strength at 7 days.

3.3 SPECIFICATIONS

The design specifications for this project were no different than the specifications which would have been used for a traditional deck design. The isotropic reinforced design also conforms with the current version of the LRFD specifications being developed by AASHTO.

4.0 CONSTRUCTION

4.1 CONSTRUCTION SUMMARY

Mocon Corp. removed the old deck using hydro-demolition and mechanical methods. One longitudinal construction joint exists 1' 6" (460 mm) east of the roadway centerline. This construction joint was necessitated by the staging required in order to maintain traffic on half the bridge while the other half was under construction. A transverse construction joint was formed at each bent. A minimum of three days was required between adjacent placements. Figure 4.1 shows the staging and sequence of the concrete placement. Although there were some problems encountered in removing the old deck, the new deck construction proceeded as expected.

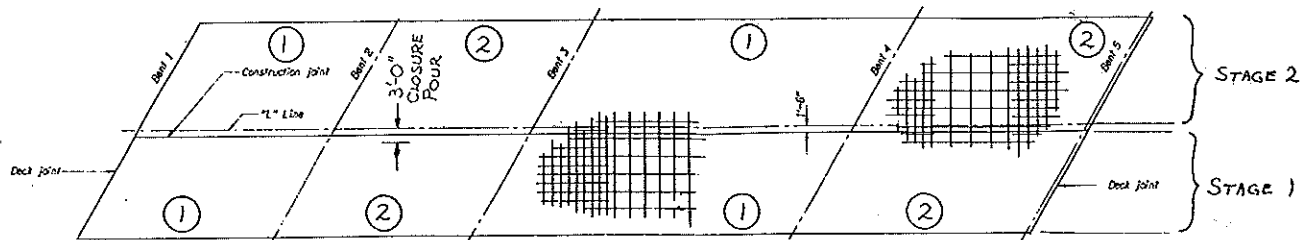


Figure 4.1 Placement Sequence

4.2 CONSTRUCTION OUTLINE

Start of Construction: 07-16-92
End of Construction: 12-31-92 (est.)
Contractor: Mocon Corporation
ODOT Project Manager: Richard Steyskal
ODOT Inspector: Ken Paetz

Discussion Items

1. The contractor did not complete this project by the specified completion date. There was some delay caused by the need for the contractor to repair damage done to the bridge during the deck removal phase. Other delays occurred which were not related directly to the deck replacement part of this project (there was another structure involved in this project). No delays were related to the design or construction of the new deck.
2. The type and spacing of chairs to be used for the reinforcing steel was not adequately specified. The spacing and type of chairs used had to be clarified verbally.

5.0 EVALUATION

5.1 COSTS

The bid for replacing this deck was \$12.36/Square Foot (S.F.)($\$133.05/m^2$). Bridge deck replacement costs have not been tracked as a discrete item, so comparisons to historical data cannot be made directly. Based on historical data for the costs of materials, ODOT would have expected the isotropic deck for this bridge to cost \$11.10/S.F. ($\$119.48/m^2$) and the "truss-bar" deck to cost \$13.30/S.F. ($\$143.16/m^2$). The bid cost was about \$1.00/S.F. ($\$10.76/m^2$) higher than expected, but still was \$1.00/S.F. ($\$10.76/m^2$) lower than the historical bids for an equivalent "truss-bar" deck.

The discrepancy between the bids for this deck versus ODOT's estimate for this isotropic deck cannot be accounted for. The bid price for the Class 4000 concrete was \$245/C.Y. ($\$320.43/m^3$) versus an ODOT estimate of \$350/C.Y. ($\$457.76/m^3$). The bid price for the reinforcing steel was \$0.47/lb. ($\$1.04/kg$) versus an ODOT estimate of \$0.45/lb. ($\$0.99/kg$). The bid price for the epoxy coated reinforcing steel was \$0.64/lb. ($\$1.41/kg$) versus an ODOT estimate of \$0.65/lb. ($\$1.43/kg$). It is useful to remember that there was other work involved in this project (LMC overlay on another bridge).

5.2 SITE VISIT

The site was visited on November 20, 1992. This was at the close of construction, before traffic had been switched back onto the second stage of the deck replacement. This was done in order to get a good look at the deck before the traffic became an obstruction, and before the weather became worse (rain and/or snow). The purpose of the site visit was to view the finished product, and perform a baseline crack survey. The cracks will be monitored very closely during the evaluation period.

At the time of the site visit, there were very few visible cracks. The only cracks noted were single, very light cracks straight down the bent line. There was one crack at each bent, centered on the bent. These cracks are typical of slabs placed continuously over simple-span girders, and are not related to deck design. There are 3-inches (75 mm) of cover over the top steel instead of the 2½ inches (65 mm) shown in the plans.

Kevin Groom, Mike Pulzone, and Ken Paetz were members of the inspection team. As part of the inspection the underside of the bridge was also inspected. The deck appears to have no serious defects which would have an effect on its long-term performance.

6.0 CONCLUSIONS AND RECOMMENDATIONS

6.1 CONCLUSIONS

Isotropic reinforcing is easier to design, detail, fabricate, inspect, and install than the typical reinforcing used in bridge decks on the state highways in Oregon. The project inspector seemed very pleased with the overall concept, and thought it contributed directly to fewer problems in the construction of the deck.

This type of deck design should result in a consistently superior product when compared with the traditional "truss-bar" deck. Although there is a savings at the time of installation because of the lower initial cost, that is not the primary benefit ODOT expects to gain from this type of reinforcing. The primary benefit expected is a longer lasting, more durable bridge deck.

6.2 RECOMMENDATIONS

This bridge deck, and other ODOT bridge decks with isotropic reinforcing should be evaluated for several years, until a suitable performance history is developed. If cracks are detected, an attempt should be made to determine if they are the result of service loads, shrinkage, or construction practices.

APPENDIX A
PROJECT SPECIFICATIONS

Project specifications relevant to the experimental features portion of this project, Concrete Bridge Deck With Isotropic Reinforcing, are partially discussed in the Special Provisions and Supplemental Standard Specifications For Highway Construction as follows (I):

SECTION 00530 - STEEL REINFORCEMENT FOR CONCRETE

Furnish and place steel reinforcement according to Section 00530 of the Standard Specifications supplemented and/or modified as follows:

00530.80 Measurement - Measurement of all reinforcement in the structure listed in 00530.82 will be on the lump sum basis.

00530.82 Lump Sum Basis - The estimated quantity of reinforcement to be paid for on the lump sum basis is as follows:

<u>Structure</u>	<u>Quantity</u>	
	<u>(lb.)</u>	
	<u>Uncoated</u>	<u>Coated</u>
8345A	64,600	66,200

SECTION 00540 - CONCRETE BRIDGES

Furnish, place and finish concrete for bridges according to Section 00540 of the Standard Specifications supplemented and/or modified as follows:

00540.15 Process Control - In the Table under 00540.15(c)(2) listing required tests, change the Fineness Modules, Sand Equivalent, and Sieve Analysis testing frequency from "One per 5 Shifts" to "One per Shift".

00540.52(a) General requirements and Limits - Add the following:

All exposed concrete surfaces, except for roadways and sidewalks, shall receive a class 1 surface finish. Sandblast surfaces which have been cured with a

1 *Special Provisions and Supplemental Standard Specifications For Highway Construction 24V-72: U.S.B.R. CANAL (KLAMATH FALLS) BR. SEC. - THE DALLES - CALIFORNIA HIGHWAY, KLAMATH COUNTY. Oregon State Highway Division, Salem, OR, May 1992.*

curing compound to remove the curing compound prior to receiving a Class 1 surface finish.

00540.81 Lump Sum Basis - The estimated quantity of concrete to be paid for on the lump sum basis is as follows:

<u>Structure</u>	<u>Class</u>	<u>Quantity (Cu. Yds.)</u>
8345A	4,000	410

APPENDIX B

CONCRETE SAMPLE & TEST DATA

SAMPLE DATA AND LABORATORY TEST REPORT
FOR
CONCRETE CYLINDERS

CC PAATZ & J.S.

LABORATORY NO. **9211668** OCT 18 1992
DATA SHEET NO. **C 76095**
E. A. SUB JOB **11208**
FA PROJECT NO. **NH-4-1(35)** BID ITEM NO. **23**

PROJECT **U.S.B.R. CANAL (K.F.) BRIDGE SECTION**
The Dalles-California Highway
CONTRACT NO: **C11208** COUNTY
KLAMATH COUNTY
CONTRACTOR **MOCON CORP.**
PROJECT MANAGER **RICHARD STEYSKAL**
SUBMITTED BY **RICHARD STEYSKAL**

SAMPLE DATA

CONCRETE FOR USE IN (LOCATION OR PLACEMENT) **STAGE #1 - SPAN #3 - DECK** BRIDGE NO. **8345A** STRENGTH REQUIRED **4000 PSI 28** DAYS

CONCRETE SUPPLIER **JEFFERSON STATE READY MIX** TYPE OF SAMPLE CONTROL RECORD SAMPLED BY (PRINT NAME) **K.E. PAATZ**

REPRESENTED BY **5** SET NO. **1** DATE CAST **9-15-92** DATE SHIPPED **9-17-92** WITNESSED BY (SIGNATURE) **[Signature]**

NO. OF CYLS. **5**

TEST CONCRETE CYLINDER OR BEAM IN DAYS
A **7** DAYS B **14** DAYS C **28** DAYS D **28** DAYS E **28** DAYS F _____ DAYS G _____ DAYS H _____ DAYS

CEMENT: BRAND **CELANESE I-II LA** TYPE **CONT #673** ADDITIVES: **MASTER BUILDER MBUR MBL-80**

MIX DESIGN: LAB OR I.D. NO. **92-09402** DESIGN STRENGTH **4000** AGGREGATE SOURCE NO. **18-101-4** CEMENT CONTENT **700** lbs/cu yd SLUMP **3-5** IN. AIR CONTENT **6** % MAX W/C RATIO **0.40** BY WT.

FIELD TEST RESULTS: TOTAL FIELD MOISTURE CONTENT % **1-1/2-3/4** UNIT WT **144.01** lbs/cu ft CEMENT CONTENT **722** lbs/cu yd SLUMP **4** IN. AIR CONTENT **5.2** % FIELD W/C RATIO **0.36** BY WT.

CONCRETE MIX PROPORTIONS AS BATCHED
CEMENT **5600** lbs FLYASH _____ lbs 1-1/2-3/4 AGG **14,730** lbs 3/4-4 AGG _____ lbs SAND **8300** lbs WATER **180** gal WATER AT JOB SITE _____ gal

PRESTRESS CONCRETE: STEAM HOURS _____ MAX TEMP _____ REQ. REL. STR. _____ ACT. REL. STR. _____ CYLINDER CURE STD _____ DAYS FIELD _____ DAYS

FIELD REMARKS: **ADDITIONAL 50/cu.yd. CEMENT WAS ADDED TO INSURE STRENGTH**
RECORD AIR: 5.2% SLUMP: 4" IN 7 DAYS - CONTRACTOR EXPENSE -
AIR WAS STARTED AT 702/y³, ADDED 202/y³ & GOT 5.2% AIR CONTENT -
AIR TEMP = 75°F COOLER IN TEMP = 72°F
CONCRETE TEMP = 78°F COOLER OUT TEMP = 79°F

LAB USE ONLY BELOW

LABORATORY REPORT					DATE DATA SHEET RECEIVED	DATE CYLINDERS RECEIVED
					9-18-92	9-18-92
CYL NO.	DATE OF BREAK	AGE DAYS	STRENGTH PSI	DATE REPORTED	LAB REMARKS: INCLUDE MAX. LOAD, AVG. DIAM. AREA, AND OBSERVED DEFECTS FOR FAILING CYLINDERS.	
A	9-22	7	3930	9-23-92	<div style="text-align: center; border: 2px solid black; padding: 10px;"> RECEIVED OCT 16 1992 PROJECT MANAGER / CREW 8033 <input type="checkbox"/> ADM. <input type="checkbox"/> CAL. <input type="checkbox"/> AOM </div>	
B	9-29	14	4490	9-30-92		
C	10-13	28	5340	10-14-92		
D	10-13	28	4950	"		
E	10-13	28	5200	"		
F						
G						
H						

AVE. STR: **5160** 28 DAYS TEST TYPE NON-STATISTICAL STATISTICAL OTHER (Describe) _____ RESULT PASS FAIL

- 2X DISTRIBUTION
 - X FILES
 - X FHWA
 - X CSL
 - X PROJECT MANAGER
 - X REGION GEOLOGIST
 - X MATERIALS - PORTLAND
 - X MATERIALS - EUGENE
 - X CONTRACTOR
 - X
 - X
- RICHARD STEYSKAL
PAS 4
MOCON CORPORATION
JEFFERSON STATE READY MIX
FRED LUCHT

RECEIVED
NOV 25 1992
BRIDGE SECTION

W. J. Quinn

ENGINEER OF MATERIALS

SAMPLE DATA AND LABORATORY TEST REPORT
FOR
CONCRETE CYLINDERS

LABORATORY NO. **9211669**
OCT 18 1992

NOTED
R. J. STEYSKAL

PROJECT: U.S.B.R. CANAL (K.F.) BRIDGE SECTION
The Dalles-California Highway

CONTRACT NO: C11208
KLAMATH COUNTY

CONTRACTOR: **MCCOY CORP**

AGY. ORG. UNIT: 02-8033
QTY: 5
TEST NUMBER: 719
VAR: 9000

AGY. ORG. UNIT: 02-8033
TEST NUMBER: 734x
VAR: 500

DATA SHEET NO. **C 76096**

E. A. SUB JOB: **11208**

FA PROJECT NO. **NH-4-1(35)**
BID ITEM NO. **23**

SAMPLE DATA

CONCRETE FOR USE IN (LOCATION OR PLACEMENT): **STAGE #1 - SPAN #1 - DECK**

BRIDGE NO. **8345A**
STRENGTH REQUIRED: **4000** PSI **28** DAYS

CONCRETE SUPPLIER: **JEFFERSON STATE READY MIX**
TYPE OF SAMPLE: CONTROL RECORD
SAMPLED BY (PRINT NAME): **K.E. FAETZ**

REPRESENTED BY: **5**
SET NO.: **2**
DATE CAST: **9-15-92**
DATE SHIPPED: **9-17-92**
WITNESSED BY (SIGNATURE):

NO. OF CYLS. **5**

TEST CONCRETE CYLINDER OR BEAM IN DAYS

A **7** DAYS B **14** DAYS C **28** DAYS D **28** DAYS E **28** DAYS F _____ DAYS G _____ DAYS H _____ DAYS

CEMENT: BRAND **CALAFENAS** TYPE **I-II.C.A.** LAB OR MILL ANALYSIS NO. **CEM # 673** ADDITIVES: **MASTER BUILDER** BRAND **ABUR** TYPE **ABC-80**

MIX DESIGN: LAB OR I.D. NO. **92-09402** DESIGN STRENGTH **4000** AGGREGATE SOURCE NO. **18-101-4** CEMENT CONTENT **700** lbs/cu yd SLUMP **3-5** IN. AIR CONTENT **6** % MAX W/C RATIO **0.40** BY WT.

FIELD TEST RESULTS: TOTAL FIELD MOISTURE CONTENT % **14.35** UNIT WT. **146.42** lbs/cu ft CEMENT CONTENT **735** lbs/cu yd SLUMP **4 1/4** IN. AIR CONTENT **3.8** % FIELD W/C RATIO **0.36** BY WT.

CONCRETE MIX PROPORTIONS AS BATCHED: CEMENT **7010** lbs FLYASH _____ lbs 1-1/2 - 3/4 AGG **18,400** lbs 3/4 - 4 AGG **10,370** lbs SAND **230** gal WATER AT JOB SITE **0** gal

PRESTRESS CONCRETE: STEAM HOURS _____ MAX TEMP _____ REQ. REL. STR. _____ ACT. REL. STR. _____ CYLINDER CURE: STD _____ DAYS FIELD _____ DAYS

FIELD REMARKS: CONTRACTOR WAS AT 902/4³ - TRUED 802 = LOW AIR - AIR ADDITIONAL 202/4³ WAS ADDED AND GOT 5.0% AIR CONTENT - CONTRACTORS USING MASTER BUILLOGS ABUR HAVE BEEN EXPERIENCING THESE UNSTABLE AIR CONTENTS THIS SUMMER - NO EXPLANATION AT THIS TIME ?? AAMB AIR TEMP. - 80°F - CONC. TEMP. 73°F COOLER IN TEMP - 70°F

LABORATORY REPORT

DATE DATA SHEET RECEIVED: **9-18-92**
DATE CYLINDERS RECEIVED: **9-18-92**

CYL NO.	DATE OF BREAK	AGE DAYS	STRENGTH PSI	DATE REPORTED	LAB REMARKS: INCLUDE MAX. LOAD, AVG. DIAM., AREA, AND OBSERVED DEFECTS FOR FAILING CYLINDERS.
A	9-22	7	4410	9-23-92	<p>RECEIVED</p> <p>OCT 16 1992</p> <p>PROJECT MANAGER - CREW 8033</p> <p><input type="checkbox"/> APM <input type="checkbox"/> CS <input type="checkbox"/> OM <input type="checkbox"/> AOM</p>
B	9-29	14	570	9-30-92	
C	10-13	28	5870	10-14-92	
D	10-13	28	5910	"	
E	10-13	28	5940	"	
F					
G					
H					

AVE. STR: **5910** 28 DAYS

TEST TYPE: NON-STATISTICAL STATISTICAL OTHER (Describe) _____

RESULT: PASS FAIL

- X DISTRIBUTION
- X FILES
- X FHWA
- X CSL
- X PROJECT MANAGER AS 4
- X REGION GEOLOGIST
- X MATERIALS - PORTLAND CEMENT CORPORATION
- X MATERIALS - EUGENE
- X CONTRACTOR JEFFERSON STATE READY MIX
- X FRED LUCHT

W. J. Quinn
ENGINEER OF MATERIALS

SAMPLE DATA AND LABORATORY TEST REPORT

LABORATORY NO. **9211808** OCT 26 1992

HIGHWAY DIVISION

U.S. BR. CANAL (K.F.) BRIDGE SECTION
THE GALLES-CALIFORNIA HIGHWAY
CONTRACT NO. C11208
KLAMATH COUNTY

FOR
CONCRETE CYLINDERS

PROPOSED
A. J. STEYSKAL

DATA SHEET NO. **C 76097 MR**

WAY _____ COUNTY _____

E. A. SUB JOB **11208**

CONTRACTOR **MOCON CORP.**

FA PROJECT NO. **WA-4-1(35)** BID ITEM NO. **23**

PROJECT MANAGER **RICHARD STEYSKAL**

AGY. ORG. UNIT **02-8033** QTY **5** TEST NUMBER **719** VAR **734x** LAB CHARGE **90.00**

SUBMITTED BY **RICHARD STEYSKAL**

AGY. ORG. UNIT **02-8033** LAB CHARGE **500**

SAMPLE DATA

CONCRETE FOR USE IN (LOCATION OR PLACEMENT) **STAGE #1, SPANS #2 & 4 DECK** BRIDGE NO. **8345A** STRENGTH REQUIRED **4000 PSI 28** DAYS

CONCRETE SUPPLIER **JEFFERSON STATE READY-MIX** TYPE OF SAMPLE CONTROL RECORD SAMPLER BY (PRINT NAME) **K.E. POTZ**

REPRESENTED BY **5** SET NO. **3** DATE CAST **9-18-92** DATE SHIPPED **9-21-92** WITNESSED BY (SIGNATURE) _____

TEST CONCRETE CYLINDER OR BEAM IN DAYS
A **7** DAYS B **14** DAYS C **28** DAYS D **28** DAYS E **28** DAYS F _____ DAYS G _____ DAYS H _____ DAYS

CEMENT: BRAND **CAROLINAS I-II L.A.** TYPE **I-II L.A.** LAB OR MILL ANALYSIS NO. **CERT # 6074** ADDITIVES: **MASTERBUILDER ABC-80**

MIX DESIGN: LAB OR I.D. NO. **92-09402** DESIGN STRENGTH **4000** AGGREGATE SOURCE NO. **18-101-4** CEMENT CONTENT **700** lbs/cu yd SLUMP **3-5** IN. AIR CONTENT **6.0** % MAX W/C RATIO **0.40** BY WT.

FIELD TEST RESULTS: TOTAL FIELD MOISTURE CONTENT % **3.5** UNIT WT. **145.7** lbs/cu ft CEMENT CONTENT **734.1** lbs/cu yd SLUMP **3 1/2** IN. AIR CONTENT **4.8** % FIELD W/C RATIO **0.34** BY WT.

CONCRETE MIX PROPORTIONS AS BATCHED: CEMENT **7025** lbs FLYASH _____ lbs 1-1/2 - 3/4 AGG **18,415** lbs 3/4 - 4 AGG **10,350** lbs SAND **220** gal WATER AT JOB SITE **0** gal

PRESTRESS CONCRETE: STEAM HOURS _____ MAX TEMP _____ REQ. REL. STR. _____ ACT. REL. STR. _____ CYLINDER CURE _____ HRS OR DAYS _____

FIELD REMARKS: **AN ADDITIONAL 50 LBS/Y³ OF CEMENT HAS BEEN ADDED BY THE CONTRACTOR TO INSURE STRENGTH IN 7 DAYS -**
AMB. AIR. TEMP = 55°F
CONCRETE TEMP = 72°F
COOLER IN TEMP = 72°F - COOLER TEMP OUT = 80°F

LAB USE ONLY BELOW

LABORATORY REPORT DATE DATA SHEET RECEIVED **9-22-92** DATE CYLINDERS RECEIVED **9-22-92**

CYL NO.	DATE OF BREAK	AGE DAYS	STRENGTH PSI	DATE REPORTED
A	9-25	7	4950	9-28-92
B	10-2	14	5760	10-5-92
C	10-16	28	6070	10-16-92
D	10-16	28	6380	11
E	10-16	28	6610	11
F				
G				
H				

LAB REMARKS: INCLUDE MAX. LOAD, AVG. DIAM., AREA, AND OBSERVED DEFLECTS OF FAILING CYLINDERS.
RECEIVED
OCT 22 1992
PROJECT MANAGER, CREW 8033
 ADM. COM. AOM

AVE. STR: **6350** 28 DAYS

TEST TYPE NON-STATISTICAL STATISTICAL OTHER (Describe) _____ RESULT PASS FAIL

- X DISTRIBUTION
- FILES
- FHWA
- CSL
- X PROJECT MANAGER
- X REGION GEOLOGIST
- X MATERIALS - PORTLAND
- X MATERIALS - EUGENE
- X CONTRACTOR
- X
- X

RICHARD STEYSKAL
RAS 4
MOCON CORPORATION
JEFFERSON STATE READY-MIX
FRED LUCHT

W. J. Quinn
ENGINEER OF MATERIALS

NOTED
J. STEYSKAL

SAMPLE DATA AND LABORATORY TEST REPORT
FOR
CONCRETE CYLINDERS

cc Portz E.J.S.
LABORATORY NO. 9211809
OCT 26 1992

PROJECT U.S.B.R. CANAL (W.F.) BRIDGE SECTION THE DALLES-CALIFORNIA HIGHWAY CONTRACT NO: C11208 KLAMATH COUNTY		DATA SHEET NO. C 76098 MR	
VAY		E. A. SUB JOB 11208	
CONTRACTOR MOCON CORP.		FA PROJECT NO. NH-4-1(35)	BID ITEM NO. 23
PROJECT MANAGER RICHARD STEYSKAL	AGY-ORG. UNIT 02-8033	QTY 5	TEST NUMBER 719
SUBMITTED BY RICHARD STEYSKAL	AGY-ORG. UNIT 02-8033		LAB CHARGE 90.00
			734X
			500.

SAMPLE DATA

CONCRETE FOR USE IN (LOCATION OR PLACEMENT) STAGE #1 - SPANS # 2 & 4, DECK		BRIDGE NO. 8345A	STRENGTH REQUIRED 4000 PSI 28 DAYS	
CONCRETE SUPPLIER JEFFERSON STATE READY MIX		TYPE OF SAMPLE CONTROL <input checked="" type="checkbox"/> RECORD <input type="checkbox"/>		SAMPLED BY (PRINT NAME) E. PORTZ
REPRESENTED BY 5	SET NO. 4	DATE CAST 9-18-92	DATE SHIPPED 9-21-92	WITNESSED BY (SIGNATURE) E. PORTZ
TEST CONCRETE CYLINDER OR BEAM IN DAYS A 7 DAYS B 14 DAYS C 28 DAYS D 28 DAYS E 28 DAYS F _____ DAYS G _____ DAYS H _____ DAYS				
CEMENT: BRAND CAROLINAS	TYPE I-II L.A. CONT # 674	LAB OR MILL ANALYSIS NO.	ADDITIVES: MASTER BUILER	TYPE MBUR MBC-80
MIX DESIGN: LAB OR I.D. NO. 92-09402	DESIGN STRENGTH 4000	AGGREGATE SOURCE NO. 18-101-4	CEMENT CONTENT 700 lbs/cu yd	SLUMP 3-5 IN.
FIELD TEST RESULTS TOTAL FIELD MOISTURE CONTENT % 1-1/2-3/4 3-5, FA 2.5	UNIT WT 146.9 lbs/cu ft	CEMENT CONTENT 706.5 lbs/cu yd	SLUMP 3 1/2 IN.	AIR CONTENT 6.0 %
INITIALS 2-280 352	CEMENT 5610 lbs	FLYASH	SAND 9700 lbs	WATER 170 gal
PRESTRESS CONCRETE:	STEAM HOURS	MAX TEMP	REQ. REL. STR.	ACT. REL. STR.
	HRS			
				CYLINDER CURE STD _____ DAYS FIELD _____ DAYS

FIELD REMARKS: AN ADDITION 50 LBS/Y³ OF CEMENT HAS BEEN ADDED
BY THE CONTRACTOR TO INSURE STRENGTH IN 7 DAYS ~
AMB. AIR TEMP. = 65°F
CONCRETE TEMP. = 72°F
COOLER IN TEMP = 71°F - COOLER OUT TEMP = 80°F

LAB USE ONLY BELOW

LABORATORY REPORT					DATE DATA SHEET RECEIVED 9-22-92	DATE CYLINDERS RECEIVED 9-22-92
CYL NO.	DATE OF BREAK	AGE DAYS	STRENGTH PSI	DATE REPORTED	LAB REMARKS: INCLUDE MAX. LOAD, AVG. DIAM., AREA, AND OBSERVED DEFECTS FOR FAILING CYLINDERS.	
A	9-25	7	4180	9-28-92	<p style="text-align: center; font-size: 2em; font-weight: bold;">RECEIVED</p> <p style="text-align: center;">OCT 22 1992</p> <p style="text-align: center;">MANAGER - CREW 8033</p> <p style="text-align: center;">AOM</p>	
B	10-2	14	5650	10-5-92		
C	10-16	28	6170	10-16-92		
D	10-16	28	6050	"		
E	10-16	28	6060	"		
F						
G						
H						

AVE. STR: 6090 28 DAYS

TEST TYPE
 NON-STATISTICAL STATISTICAL OTHER (Describe)
RESULT
 PASS FAIL

- X DISTRIBUTION FILES FHWA
- X CSL PROJECT MANAGER
- X REGION GEOLOGIST
- X MATERIALS - PORTLAND
- X MATERIALS - EUGENE
- X CONTRACTOR
- X
- X

RICHARD STEYSKAL
RAS4
MOCON CORP.
JEFFERSON READY MIX
FRED LUCHT

W. J. Quinner
ENGINEER OF MATERIALS

SAMPLE DATA AND LABORATORY TEST REPORT
FOR
CONCRETE CYLINDERS

CA: *R. Pretz & J.S.*

LABORATORY NO. NOV 19 1992

921.4132

PROJECT: U.S.M. CANAL (R.F.) BRIDGE SECTION THE DALLES-CALIFORNIA HIGHWAY CONTRACT NO: C11208
VAY: KLAMATH COUNTY COUNTY: COUNTY

DATA SHEET NO. C 88459

E. A. SUB JOB 11208

CONTRACTOR: MOCON CORP. FA PROJECT NO. NH-4-1(35) BID ITEM NO. 23

PROJECT MANAGER: RICHARD STEYSKAL AGY. ORG. UNIT: 02-8033 QTY: 5 TEST NUMBER: 719 LAB CHARGE: 90.00
SUBMITTED BY: RICHARD STEYSKAL AGY. ORG. UNIT: 02-8033 TEST NUMBER: 734X LAB CHARGE: 5.00

SAMPLE DATA

CONCRETE FOR USE IN (LOCATION OR PLACEMENT): STAGE #2, SPAN #2, DECK BRIDGE NO. 8345A STRENGTH REQUIRED: 4000 PSI 28 DAYS
CONCRETE SUPPLIER: JEFFERSON STATE READY-MIX TYPE OF SAMPLE: CONTROL RECORD SAMPLED BY (PRINT NAME): K.E. PRETZ
REPRESENTED BY: 5 SET NO. 8 DATE CAST: 11-7-92 DATE SHIPPED: 11-9-92 WITNESSED BY (SIGNATURE):
NO. OF CYLS. 5

TEST CONCRETE CYLINDER OR BEAM IN DAYS
A 7 DAYS B 14 DAYS C 28 DAYS D 28 DAYS E 28 DAYS F DAYS G DAYS H DAYS

CEMENT: BRAND: CALABENS I-II L.A. TYPE: I-II L.A. LAB OR MILL ANALYSIS NO. CONT #676 ADDITIVES: MASTER BUILDER TYPE: MBR
MIX DESIGN: LAB OR I.D. NO. 92-09402 DESIGN STRENGTH: 4000 AGGREGATE SOURCE NO. 18-101-4 CEMENT CONTENT: 650 lbs/cu yd SLUMP: 3-4 IN. AIR CONTENT: 6.0% MAX W/C RATIO: 0.40

FIELD TEST RESULTS: TOTAL FIELD MOISTURE CONTENT %: 1-1/2-3/4 3.0 FA 7.5 UNIT WT: 140.67 lb/cu ft CEMENT CONTENT: 686.22 lbs/cu yd SLUMP: 4 1/4 IN. AIR CONTENT: 6.2% FIELD W/C RATIO: 0.32

CONCRETE MIX PROPORTIONS AS BATCHED: CEMENT: 336 lbs FLYASH: 5640 lbs SAND: 9528 lbs WATER: 160 gal WATER AT JOB SITE: 5 gal

PRESTRESS CONCRETE: STEAM HOURS: MAX TEMP: REQ. REL. STR.: ACT. REL. STR.: CYLINDER CURE: STO. DAYS: FIELD DAYS: HRS OR DAYS

FIELD REMARKS: AMB. AIR TEMP. - 45°F
CONCRETE TEMP. - 63°F
CONCRETE IN TEMP. - 71°F
COOLER OUT TEMP. - 78°F

LAB USE ONLY BELOW

LABORATORY REPORT DATE DATA SHEET RECEIVED: 11-10-92 DATE CYLINDERS RECEIVED: 11-10-92

CYL NO.	DATE OF BREAK	AGE DAYS	STRENGTH PSI	DATE REPORTED	LAB REMARKS: INCLUDE MAX. LOAD, AVG. DIAM., AREA, AND OBSERVED DEFECTS FOR FAILING CYLINDERS.
A	11-14	7	2510	11-16-92	<p style="text-align: center; font-size: 2em; font-weight: bold;">RECEIVED</p> <p style="text-align: center;">NOV 18 1992</p> <p style="text-align: center;">PROJECT MANAGER CREW 8033</p> <p style="text-align: center;">PIN <input type="checkbox"/> APM <input type="checkbox"/> CSL <input type="checkbox"/> OM <input type="checkbox"/> AOM <input type="checkbox"/></p>
B	11-21	14			
C	12-5	28			
D	12-5	28			
E	12-5	28			
F					
G					
H					

AVE. STR.: 28 DAYS TEST TYPE: NON-STATISTICAL STATISTICAL RESULT: PASS FAIL

DISTRIBUTION:
 FILES
 FHWA
 CSL
 PROJECT MANAGER
 REGION GEOLOGIST
 MATERIALS - PORTLAND
 MATERIALS - EUGENE
 CONTRACTOR

RICHARD STEYSKAL
RAS 4

MOCON CORPORATION
JEFFERSON STATE READY MIX
FRED LICHT

W.J. Quinn
ENGINEER OF MATERIALS

SAMPLE DATA AND LABORATORY TEST REPORT
FOR
CONCRETE CYLINDERS

CC BRETZ & J.S.
LABORATORY NO. NOV 19 1992

PROJECT U.S.B.R. CANAL (R.F.) BRIDGE SECTION THE DALLES-CALIFORNIA HIGHWAY CONTRACT NO: C11208 KLAMATH COUNTY		COUNTY		LABORATORY NO. 921.4131	
CONTRACTOR MOCON CORP.		FA PROJECT NO. NH-4-1(35)		BID ITEM NO. 23	
PROJECT MANAGER RICHARD STEYSKAL		AGY. ORG. UNIT 02-8033	QTY 5	TEST NUMBER 719	LAB CHARGE 90.00
SUBMITTED BY RICHARD STEYSKAL		AGY. ORG. UNIT 02-8033		TEST NUMBER 734X	LAB CHARGE 5.00

SAMPLE DATA

CONCRETE FOR USE IN (LOCATION OR PLACEMENT) STAGE #2, SPAN #4, DECK			BRIDGE NO. 8345A	STRENGTH REQUIRED 4000 PSI 28 DAYS	
CONCRETE SUPPLIER JEFFERSON STATE READY-MIX		TYPE OF SAMPLE <input checked="" type="checkbox"/> CONTROL <input type="checkbox"/> RECORD		SAMPLED BY (PRINT NAME) K.E. BRETZ	
REPRESENTED BY 5		SET NO. 7	DATE CAST 11-7-92	DATE SHIPPED 11-9-92	
TEST CONCRETE CYLINDER OR BEAM IN DAYS A 7 DAYS B 14 DAYS C 28 DAYS D 28 DAYS E 28 DAYS F _____ DAYS G _____ DAYS H _____ DAYS					
CEMENT:	BRAND CALUMETAS	TYPE I-II L.A.	LAB OR MILL ANALYSIS NO. CETS # 676	ADDITIVES:	BRAND MASTON BUNKER
MIX DESIGN:	LAB OR I.D. NO. 92-09402	DESIGN STRENGTH 4000	AGGREGATE SOURCE NO. 18-101-4	CEMENT CONTENT 650 lbs/cu yd	SLUMP 3-4 in.
FIELD TEST RESULTS	TOTAL FIELD MOISTURE CONTENT % 1-1/2-3/4 --- 3.0, FA 7.5		UNIT WT 142.82 lb/cu ft	CEMENT CONTENT 696.95 lb/cu yd	SLUMP 3 3/4 in.
	CEMENT 336 oz	FLYASH 5640 lbs	CONCRETE MIX PROPORTIONS AS BATCHED 1-1/2 - 3/4 AGG 114640 lbs		SAND 9528 lbs
PRESTRESS CONCRETE:	STEAM HOURS	MAX TEMP	REQ. REL. STR.	ACT. REL. STR.	WATER 160 gal
					WATER AT JOB SITE 5 gal

FIELD REMARKS:
AMB. AIR TEMP. - 42°F
CONCRETE TEMP. - 64°F
COOLER IN TEMP. - 70°F
COOLER OUT TEMP. - 76°F

LAB USE ONLY BELOW

LABORATORY REPORT				DATE DATA SHEET RECEIVED 11-10-92	DATE CYLINDERS RECEIVED 11-10-92
CYL NO.	DATE OF BREAK	AGE DAYS	STRENGTH PSI	DATE REPORTED	
A	11-14	7	3330	11-16-92	
B	11-21	14			
C	12-5	28			
D	12-5	28			
E	12-5	28			
F					
G					
H					
AVE. STR:			28 DAYS	TEST TYPE	
				<input type="checkbox"/> NON-STATISTICAL <input type="checkbox"/> STATISTICAL	
				<input type="checkbox"/> OTHER (Describe) _____	
				RESULT	
				<input type="checkbox"/> PASS	
				<input type="checkbox"/> FAIL	

RECEIVED
NOV 18 1992

PROJECT MANAGER - CREW 8033
PM | APM | CS | OM | AOM

- DISTRIBUTION
- X FILES
 - X FHWA
 - X CSL
 - X PROJECT MANAGER
 - X REGION GEOLOGIST
 - X MATERIALS - PORTLAND
 - X MATERIALS - EUGENE
 - X CONTRACTOR
 - X
 - X

RICHARD STEYSKAL
RAS 4
MOCON CORPORATION
JEFFERSON STATE READY MIX

W. J. Quinn
ENGINEER OF MATERIALS

SAMPLE DATA AND LABORATORY TEST REPORT
FOR
CONCRETE CYLINDERS

LABORATORY NO. **NOV 25 1992**
9213951

PROJECT: **U.S.N. CANAL (K.F.) BRIDGE SECTION THE DALLES-CALIFORNIA HIGHWAY CONTRACT NO: C11208**
WAY: **KLAMATH COUNTY** COUNTY: _____
CONTRACTOR: **MOCON CORP.** DATA SHEET NO. **C 88456**
E. A. SUB JOB: **11208**
FA PROJECT NO. **NA-4-1(35)** BID ITEM NO. **23**
PROJECT MANAGER: **RICHARD STEYSKAL** AGY. ORG. UNIT: **02-8033** QTY: **5** TEST NUMBER: **719** VAR: _____ LAB CHARGE: **90.00**
SUBMITTED BY: **RICHARD STEYSKAL** AGY. ORG. UNIT: **02-8033** TEST NUMBER: **734X** LAB CHARGE: **5.00**

SAMPLE DATA

CONCRETE FOR USE IN (LOCATION OR PLACEMENT): **STAGE #2, SPAN #1 - DECK** BRIDGE NO. **8345A** STRENGTH REQUIRED: **4000** PSI **28** DAYS
CONCRETE SUPPLIER: **JEFFERSON STATE READY MIX** TYPE OF SAMPLE: CONTROL RECORD SAMPLED BY (PRINT NAME): **K.E. HETZ**
REPRESENTED BY: **5** SET NO.: **51** DATE CAST: **11-4-92** DATE SHIPPED: **11-5-92** WITNESSED BY (SIGNATURE): _____
NO. OF CYLS.: **5**
TEST CONCRETE CYLINDER OR BEAM IN DAYS: A **7** DAYS B **14** DAYS C **28** DAYS D **28** DAYS E **28** DAYS F _____ DAYS G _____ DAYS H _____ DAYS
CEMENT: BRAND **CALAFORNIA** TYPE **I-II L.A.** LAB OR MILL ANALYSIS NO. **CONT # 676** ADDITIVES: **MASTERS BLADE** TYPE **MOUR**
MIX DESIGN: LAB OR I.D. NO. **92-09400** DESIGN STRENGTH **4000** AGGREGATE SOURCE NO. **18-101-4** CEMENT CONTENT **650** lbs/cu yd SLUMP **3-4** IN. AIR CONTENT **6.0** % MAX W/C RATIO **0.40** BY WT.
FIELD TEST RESULTS: TOTAL FIELD MOISTURE CONTENT % **3.0** UNIT WT **143.25** lbs/cu ft CEMENT CONTENT **698.99** lbs/cu yd SLUMP **4 3/4** IN. AIR CONTENT **5.8** % FIELD W/C RATIO **0.33** BY WT.
CONCRETE MIX PROPORTIONS AS BATCHED: CEMENT **5650** lbs FLYASH _____ lbs 1-1/2 - 3/4 AGG **14,645** lbs SAND **9530** lbs WATER **165** gal WATER AT JOB SITE **5** gal
PRESTRESS CONCRETE: STEAM HOURS _____ MAX TEMP _____ REQ. REL. STR. _____ ACT. REL. STR. _____ CYLINDER CURE STD _____ HRS OR _____

FIELD REMARKS: **Amb. Air Temp. 54°F**
Concrete Temp. 66°F
Cooler In Temp. 70°F
Cooler out Temp. 76°F

CONCRETE WAS PUMPED

RECEIVED
NOV 23 1992

PROJECT MANAGER: **RICHARD STEYSKAL** CREW B...
APM...
AC...

LAB USE ONLY BELOW

LABORATORY REPORT				DATE DATA SHEET RECEIVED	DATE CYLINDERS RECEIVED
				11-6-92	11-6-92
CYL NO.	DATE OF BREAK	AGE DAYS	STRENGTH PSI	DATE REPORTED	LAB REMARKS: INCLUDE MAX. LOAD, AVG. DIAM., AREA, AND OBSERVED DEFECTS FOR FAILING CYLINDERS.
A	11-11	7	3930	11-16-92	
B	11-18	14	4460	11-20-92	
C	12-2	28			
D	12-2	28			
E	12-2	28			
F					
G					
H					

AVE. STR.: _____ 28 DAYS

TEST TYPE: NON-STATISTICAL STATISTICAL OTHER (Describe) _____
RESULT: PASS FAIL

- X DISTRIBUTION
- X FILES
- X FHWA
- X CSL
- X PROJECT MANAGER
- X REGION GEOLOGIST
- X MATERIALS - PORTLAND
- X MATERIALS - EUGENE
- X CONTRACTOR
- X
- X
- X

RICHARD STEYSKAL
RAS 4
MOCON CORPORATION
JEFFERSON STATE READY MIX
FRED LICHT

W. J. Quiner
ENGINEER OF MATERIALS

SAMPLE DATA AND LABORATORY TEST REPORT
FOR
CONCRETE CYLINDERS

CC FRETZ & JS
LABORATORY NO. NOV 23 1992
9214074

PROJECT U.S. A. CANAL (M.F.) BRIDGE SECTION THE DALLES-CALIFORNIA HIGHWAY CONTRACT NO: C11208		DATA SHEET NO. C 88457	
JAY KLAMATH COUNTY		E. A. SUB JOB 11208	
CONTRACTOR MOCON CORP.		FA PROJECT NO. NH-4-1(35)	BID ITEM NO. 23
PROJECT MANAGER RICHARD STEYSKAL	AGY.-ORG. UNIT 02-8033	QTY 5	TEST NUMBER 719
SUBMITTED BY RICHARD STEYSKAL	AGY.-ORG. UNIT 02-8033		LAB CHARGE 90 ⁰⁰ 5 ⁰⁰

SAMPLE DATA

CONCRETE FOR USE IN (LOCATION OR PLACEMENT) STAGE #2, SPAN #3 DECK		BRIDGE NO. 8345A	STRENGTH REQUIRED 4000 PSI 28 DAYS				
CONCRETE SUPPLIER JEFFERSON STATE READY MIX		TYPE OF SAMPLE <input checked="" type="checkbox"/> CONTROL <input type="checkbox"/> RECORD		SAMPLED BY (PRINT NAME) K.E. FRETZ			
REPRESENTED BY 5	SET NO. 6	DATE CAST 11-5-92	DATE SHIPPED 11-6-92	WITNESSED BY (SIGNATURE)			
TEST CONCRETE CYLINDER OR BEAM IN DAYS A 7 DAYS B 14 DAYS C 28 DAYS D 28 DAYS E 28 DAYS F _____ DAYS G _____ DAYS H _____ DAYS							
CEMENT:	BRAND COLANERAS	TYPE I-II L.A.	LAB OR MILL ANALYSIS NO. CERT # 676	ADDITIVES:	BRAND MASTREUILCOR	TYPE LABOR	
MIX DESIGN:	LAB OR I.D. NO. 92-09402	DESIGN STRENGTH 4000	AGGREGATE SOURCE NO. 18/01-4	CEMENT CONTENT 650 lbs/cu yd	SLUMP 3-4 IN.	AIR CONTENT 6.0%	MAX W/C RATIO 0.40 BY WT.
FIELD TEST RESULTS	TOTAL FIELD MOISTURE CONTENT % 1-1/2 3/4 3.0		UNIT WT 144.02 lbs/cu ft	CEMENT CONTENT 712.19 lbs/cu yd	SLUMP 3" IN.	AIR CONTENT 5.0%	FIELD W/C RATIO 0.33 BY WT.
CONCRETE MIX PROPORTIONS AS BATCHED	CEMENT 336 oz	FLYASH 3640 lbs	1-1/2 - 3/4 AGG 14440 lbs	2 1/4 - 4 AGG 14440 lbs	SAND 9528 lbs	WATER 160 gal	WATER AT JOB SITE 7 gal
PRESTRESS CONCRETE:	STEAM HOURS	MAX TEMP	REQ. REL. STR.	ACT. REL. STR.	CYLINDER CURE STD _____ DAYS FIELD _____ DAYS		HRS OR DAYS

FIELD REMARKS:
AMB. AIR TEMP. - 45°F
CONCRETE TEMP. - 67°F
COOLER IN TEMP. - 70°F
CONCRETE OUT TEMP. - 75°F
CONCRETE WAS PUMPED

RECEIVED
NOV 23 1992

PROJECT MANAGER - CREW 8033
APM

LAB USE ONLY BELOW

LABORATORY REPORT				DATE DATA SHEET RECEIVED 11-9-92	DATE CYLINDERS RECEIVED 11-9-92
CYL. NO.	DATE OF BREAK	AGE DAYS	STRENGTH PSI	DATE REPORTED	LAB REMARKS: INCLUDE MAX. LOAD, AVG. DIAM. AREA, AND OBSERVED DEFECTS FOR FAILING CYLINDERS.
A	11-12	7	4240	11-16-92	
B	11-19	28	4770	11-20-92	
C	12-3	28			
D	12-3	28			
E	12-3	28			
F					
G					

AVE. STR: 28 DAYS TEST TYPE RESULT
 NON-STATISTICAL STATISTICAL PASS
 OTHER (Describe) FAIL

- DISTRIBUTION
X FILES
X FHWA
X CSL
X PROJECT MANAGER
X REGION GEOLOGIST
X MATERIALS - PORTLAND
X MATERIALS - EUGENE
X CONTRACTOR
X
X
X

RICHARD STEYSKAL
RAS 4
MOCON CORPORATION
JEFFERSON STATE READY MIX

W. J. Quisen
ENGINEER OF MATERIALS

SAMPLE DATA AND LABORATORY TEST REPORT FOR CONCRETE CYLINDERS

LABORATORY NO.
DATA SHEET NO. C 88460
E. A. SUB JOB 11208
FA PROJECT NO. NH-4-(35)
BID ITEM NO. 23

PROJECT U.S.N. CANAL (R.F.) BRIDGE SECTION THE DALLES CALIFORNIA HIGHWAY CONTRACT NO: C11208	COUNTY KLAMATH COUNTY
HIGHWAY	
CONTRACTOR MOCON CORP.	
PROJECT MANAGER RICHARD STEYSICAL	AGY.-ORG. UNIT 02-8033
SUBMITTED BY RICHARD STEYSICAL	AGY.-ORG. UNIT 02-8033

SAMPLE DATA

CONCRETE FOR USE IN (LOCATION OR PLACEMENT) DECK CLOSURE POUR				BRIDGE NO. 8345A	STRENGTH REQUIRED 4000 PSI 28 DAYS		
CONCRETE SUPPLIER JEFFERSON STATE READY-MIX			TYPE OF SAMPLE <input checked="" type="checkbox"/> CONTROL <input type="checkbox"/> RECORD		SAMPLED BY (PRINT NAME) K.E. PAETZ		
REPRESENTED BY 5	SET NO. 9	DATE CAST 11-13-92	DATE SHIPPED 11-16-92		WITNESSED BY (SIGNATURE)		
TEST CONCRETE CYLINDER OR BEAM IN DAYS							
A 7 DAYS	B 14 DAYS	C 28 DAYS	D 28 DAYS	E 28 DAYS	F _____ DAYS	G _____ DAYS H _____ DAYS	
CEMENT:	BRAND CALADONAS	TYPE I-II L.A.	LAB OR MILL ANALYSIS NO. CENT# 676	ADDITIVES:	BRAND MASTERBUILDER	TYPE MBUR MBL-80	
MIX DESIGN:	LAB OR I.D. NO. 92-09402	DESIGN STRENGTH 4000	AGGREGATE SOURCE NO. 18-101-4	CEMENT CONTENT 650 lbs/cu yd	SLUMP 3-4 IN.	AIR CONTENT 6.0 %	MAX W/C RATIO 0.40 BY WT.
FIELD TEST RESULTS 1-1/2-3/4	TOTAL FIELD MOISTURE CONTENT % 3.0		UNIT WT 145.10 lbs/cu ft	CEMENT CONTENT 709.03 lbs/cu yd	SLUMP 3 3/4 IN.	AIR CONTENT 5.2 %	FIELD W/C RATIO 0.30 BY WT.
ADITIVES MBL-80-256	CEMENT 5640 lbs	FLYASH _____ lbs	CONCRETE MIX PROPORTIONS AS BATCHED		SAND 9528 lbs	WATER 160 gal	WATER AT JOB SITE 0 gal
PRESTRESS CONCRETE:	STEAM HOURS _____ HRS	MAX TEMP _____	REQ. REL. STR. _____	ACT. REL. STR. _____	CYLINDER CURE STD _____ DAYS FIELD _____ DAYS		

FIELD REMARKS: **AMB. AIR TEMP. 52°F**
CONCRETE TEMP. 66°F
IN-COOLER TEMP. 72°F
OUT-COOLER TEMP. 79°F

LAB USE ONLY BELOW

LABORATORY REPORT					DATE DATA SHEET RECEIVED	DATE CYLINDERS RECEIVED
CYL NO.	DATE OF BREAK	AGE DAYS	STRENGTH PSI	DATE REPORTED	LAB REMARKS: INCLUDE MAX. LOAD, AVG. DIAM., AREA, AND OBSERVED DEFECTS FOR FAILING CYLINDERS.	
A						
B						
C						
D						
E						
F						
G						
H						

AVE. STR:	28 DAYS	TEST TYPE	RESULT
		<input type="checkbox"/> NON-STATISTICAL <input type="checkbox"/> STATISTICAL	<input type="checkbox"/> PASS
		<input type="checkbox"/> OTHER (Describe) _____	<input type="checkbox"/> FAIL

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APPENDIX C
PHOTOGRAPHS



Figure C.1 Concrete Bridge Deck/Isotropic Reinforcing



Figure C.2 Concrete Bride Deck/Isotropic Reinforcing