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

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and

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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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ISOTROPIC, REINFORCED STEEL	Unrestricted

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Unclassified	Unclassified	31	

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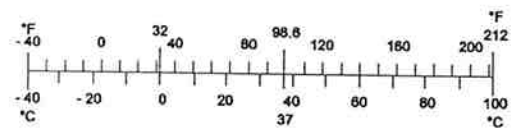
SI* (MODERN METRIC) CONVERSION FACTORS

APPROXIMATE CONVERSIONS TO SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
		LENGTH		
in	inches	25.4	millimeters	mm
ft	feet	0.305	meters	m
yd	yards	0.914	meters	m
mi	miles	1.61	kilometers	km
		AREA		
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
		VOLUME		
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.				
		MASS		
oz	ounces	28.35	grams	g
lb	pounds	0.454	kilograms	kg
T	short tons (2000 lb)	0.907	megagrams	Mg
		TEMPERATURE (exact)		
°F	Fahrenheit temperature	5(F-32)/9	Celsius temperature	°C

APPROXIMATE CONVERSIONS FROM SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
		LENGTH		
mm	millimeters	0.039	inches	in
m	meters	3.28	feet	ft
m	meters	1.09	yards	yd
km	kilometers	0.621	miles	mi
		AREA		
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
		VOLUME		
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
		MASS		
g	grams	0.035	ounces	oz
kg	kilograms	2.205	pounds	lb
Mg	megagrams	1.102	short tons (2000 lb)	T
		TEMPERATURE (exact)		
°C	Celsius temperature	1.8 + 32	Fahrenheit	°F



* SI is the symbol for the International System of Measurement

(4-7-94 jbp)

ACKNOWLEDGMENTS

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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.

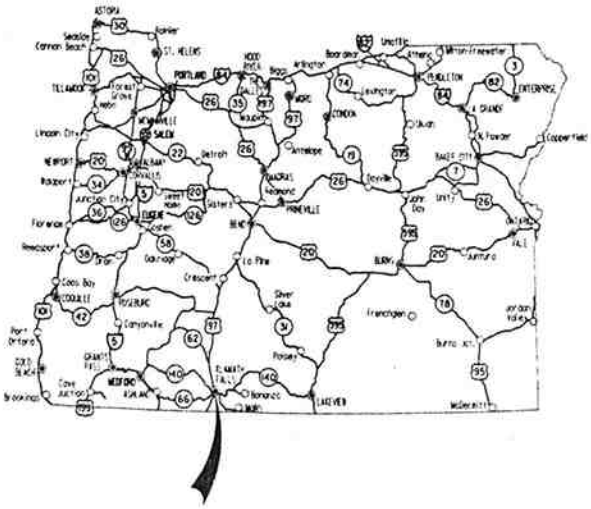
The objective of this project is to evaluate the isotropic reinforced bridge deck constructed on the USBR Canal Bridge. The evaluation will consist of monitoring the construction process, construction costs, maintenance costs, and the overall performance of the deck for a two-year period. This report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

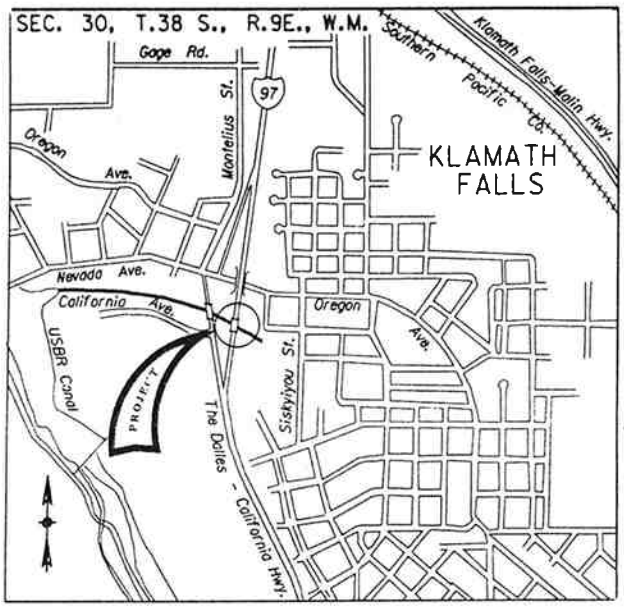
2.0 PROJECT DESCRIPTION

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).





VICINITY MAP
No scale

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.

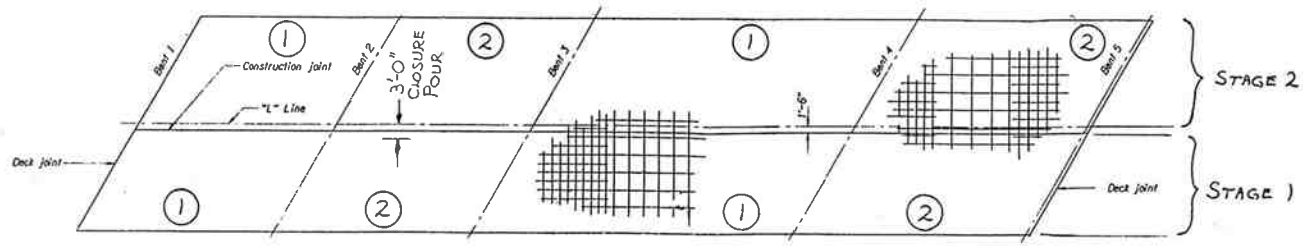


Figure 4.1 Placement Sequence

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 (*1*):

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:

	Quantity (lb.)	
Structure	*Uncoated*	*Coated*
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

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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.

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

Structure	*Class*	*Quantity (Cu. Yds.)*
8345A	*4,000*	*410*

APPENDIX B

CONCRETE SAMPLE & TEST DATA

Oregon Department of Transportation
HIGHWAY DIVISION

NOTED J. STEYSKAL

cc PABIZ & J.S.

SAMPLE DATA AND LABORATORY TEST REPORT FOR CONCRETE CYLINDERS

LABORATORY NO. 9211668 OCT 18 1992

PROJECT	U.S.B.R. CANAL (K.F.) BRIDGE SECTION The Dalles-California Highway
HIGHWAY	CONTRACT NO: C11208 KLAMATH COUNTY
COUNTY	
DATA SHEET NO.	C 76095
E. A. SUB JOB	11208
FA PROJECT NO.	NH-4-1(35)
BID ITEM NO.	23
CONTRACTOR	MOCON CORP.
PROJECT MANAGER	RICHARD STEYSKAL
SUBMITTED BY	RICHARD STEYSKAL

AGY.-ORG. UNIT	QTY	TEST NUMBER	VAR	LAB CHARGE
02-8033	5	719		90 00
02-8033		734X		500

SAMPLE DATA

CONCRETE FOR USE IN (LOCATION OR PLACEMENT)	STAGE #1 - SPAN #3 - DECK
BRIDGE NO.	834SA
STRENGTH REQUIRED	4000 PSI 28 DAYS
CONCRETE SUPPLIER	JEFFERSON STATE READY MIX
TYPE OF SAMPLE	☐ CONTROL ☑ RECORD
SAMPLED BY (PRINT NAME)	R. E. PABIZ
REPRESENTED BY	
NO. OF CYLS.	5
SET NO.	1
DATE CAST	9-15-92
DATE SHIPPED	9-17-92
WITNESSED BY (SIGNATURE)	

TEST CONCRETE CYLINDER OR BEAM IN DAYS

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

	BRAND	TYPE	LAB OR MILL ANALYSIS NO.	ADDITIVES:	BRAND	TYPE
CEMENT:	CALAVERAS	I-II LA	CERT #673		MASTERBUILDER	MBUR
					"	MBL-80

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

	TOTAL FIELD MOISTURE CONTENT %	UNIT WT	CEMENT CONTENT	SLUMP	AIR CONTENT	FIELD W/C RATIO
FIELD TEST RESULTS	1-1/2-3/4 — , ~~3/4~~ 1" - 4 3.5 , FA 7.5	144.01 lbs/cu ft	722 lbs/cu yd	4 IN.	5.2 %	0.36 BY WT.

CONCRETE MIX PROPORTIONS AS BATCHED

	CEMENT	FLYASH	1-1/2 - 3/4 AGG	~~3/4~~ 1" - 4 AGG	SAND	WATER	WATER AT JOB SITE
ADDITIVES 780 & 72 352 oz	5600 lbs	— lbs	— lbs	14,730 lbs	8300 lbs	180 gal	0 gal

PRESTRESS CONCRETE:	STEAM HOURS	MAX TEMP	REQ. REL. STR.	ACT. REL. STR.	CYLINDER CURE STD	FIELD	HRS OR DAYS
	HRS	°			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/yd³, ADDED 202/yd³ & GOT 5.2% AIR CONTENT ~
AMB 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: 9-18-92
DATE CYLINDERS RECEIVED: 9-18-92

CYL NO.	DATE OF BREAK	AGE DAYS	STRENGTH PSI	DATE REPORTED
A	9-22	7	3530	9-23-92
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

LAB REMARKS: INCLUDE MAX. LOAD, AVG. DIAM., AREA, AND OBSERVED DEFECTS FOR FAILING CYLINDERS.

RECEIVED OCT 16 1992

PROJECT MANAGER / CREW 8033
☐ ADM. ☐ CE ☐ OM ☐ AOM ☐

TEST TYPE
☐ NON-STATISTICAL ☐ STATISTICAL
☐ OTHER (Describe)

RESULT
☒ PASS
☐ FAIL

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

RECEIVED NOV 25 1992 BRIDGE SECTION

W. J. Zumwalt
ENGINEER OF MATERIALS

1734-3573 (9-86) INSTRUCTION: FORWARD ORIGINAL TO MATERIALS LABORATORY SALEM, CANARY TO PROJECT MGR, PINK RETAINED BY ORIGINATOR

cc: DETZ & J.S.

Department of Transportation
HIGHWAY DIVISION

NOTED
R. J. STEYSKAL

SAMPLE DATA AND LABORATORY TEST REPORT FOR CONCRETE CYLINDERS

LABORATORY NO. 9211669 OCT 18 1992

PROJECT	U.S.B.R. CANAL (K.F.) BRIDGE SECTION The Dalles-California Highway
HIGHWAY	CONTRACT NO: C11208 KLAMATH COUNTY
COUNTY	
DATA SHEET NO.	C 76096
E. A. SUB JOB	11208
FA PROJECT NO.	NH-4-1(35)
BID ITEM NO.	23
CONTRACTOR	MOCON CORP
PROJECT MANAGER	RICHARD STEYSKAL
AGY.-ORG. UNIT	02-8033
SUBMITTED BY	RICHARD STEYSKAL
AGY.-ORG. UNIT	02-8033

QTY	TEST NUMBER	VAR	LAB CHARGE
5	719		90.00
	734x		5.00

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. PAETZ		
REPRESENTED BY	NO. OF CYLS. 5	SET NO. 2	DATE CAST 9-15-92
DATE SHIPPED	9-17-92	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 CALAVERAS	TYPE I-II L.A.	LAB OR MILL ANALYSIS NO. Cont #673	ADDITIVES:	BRAND MASTER BUILDERS	TYPE MBVR 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.	AIR CONTENT 6 %	MAX W/C RATIO 0.40 BY WT.
FIELD TEST RESULTS	TOTAL FIELD MOISTURE CONTENT % 1-1/2-3/4 ____ 3/4-4 3.5 FA 7.5	UNIT WT 146.42 lbs/cu ft	CEMENT CONTENT 735 lbs/cu yd	SLUMP 4¼ IN.	AIR CONTENT 3.8 %	FIELD W/C RATIO 0.36 BY WT.	

CONCRETE MIX PROPORTIONS AS BATCHED

ADMIXTURES	CEMENT	FLYASH	1-1/2 - 3/4 AGG	3/4 - 4 AGG	SAND	WATER	WATER AT JOB SITE
MBVR 19.5 oz MBC-80	7010 lbs	____ lbs	____ lbs	1" 18,400 lbs	10,370 lbs	230 gal	0 gal

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

FIELD REMARKS: CONTRACTOR WAS AT 9 oz/yd³ - THIRD 8 oz = LOW AIR - AN ADDITIONAL 2 oz/yd³ WAS ADDED AND GOT 5.0% AIR CONTENT - CONTRACTORS USING MASTER BUILDERS MBVR HAVE BEEN EXPERIENCING THESE UNSTABLE AIR CONTENTS THIS SUMMER - NO EXPLANATION AT THIS TIME ?? AMB. AIR TEMP. - 80°F - CONC. TEMP. 78°F COOLER IN TEMP - 70°F COOLER OUT TEMP = 80°F

LAB USE ONLY BELOW

DATE DATA SHEET RECEIVED 9-18-92 | DATE CYLINDERS RECEIVED 9-18-92

LABORATORY REPORT

CYL NO.	DATE OF BREAK	AGE DAYS	STRENGTH PSI	DATE REPORTED
A	9-22	7	4460	9-23-92
B	9-29	14	5170	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

LAB REMARKS: INCLUDE MAX. LOAD, AVG. DIAM., AREA, AND OBSERVED DEFECTS FOR FAILING CYLINDERS.

RECEIVED OCT 16 1992

PROJECT MANAGER - CREW 8033
☐ APM ☒ CSL ☐ OM ☐ AOM

TEST TYPE
☐ NON-STATISTICAL ☐ STATISTICAL
☐ OTHER (Describe) ____

RESULT
☒ PASS
☐ FAIL

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

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

W. J. Zumwalt
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1734-3573 (9-86) INSTRUCTION: FORWARD ORIGINAL TO MATERIALS LABORATORY SALEM, CANARY TO PROJECT MGR, PINK RETAINED BY ORIGINATOR

Oregon Department of Transportation
HIGHWAY DIVISION

SAMPLE DATA AND LABORATORY TEST REPORT FOR CONCRETE CYLINDERS

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

cc Poetz & J.S.

LABORATORY NO. 9211808 OCT 26 1992

PROJECT NO. R. J. STEYSKAL

DATA SHEET NO. C 76097 MR

HIGHWAY

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

SUBMITTED BY RICHARD STEYSKAL AGY.-ORG. UNIT 02-8033

QTY	TEST NUMBER	VAR	LAB CHARGE
5	719		90 00
	734x		500

SAMPLE DATA

CONCRETE FOR USE IN (LOCATION OR PLACEMENT): STAGE #1, SPANS #2 & 4 DECK

BRIDGE NO. 834SA

STRENGTH REQUIRED 4000 PSI 28 DAYS

CONCRETE SUPPLIER: JEFFERSON STATE READY-MIX

TYPE OF SAMPLE: ☒ CONTROL ☐ RECORD

SAMPLED BY (PRINT NAME): R. E. PAOTZ

REPRESENTED BY NO. OF CYLS. 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

	BRAND	TYPE	LAB OR MILL ANALYSIS NO.		BRAND	TYPE
CEMENT:	CALAVERAS	I-II L.A.	CERT #674	ADDITIVES:	MASTER BUILDER	MBVR MBC-80

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

FIELD TEST RESULTS	TOTAL FIELD MOISTURE CONTENT %	UNIT WT	CEMENT CONTENT	SLUMP	AIR CONTENT	FIELD W/C RATIO
70 & 350	1-1/2-3/4 — ~~3/4~~ 1/4 3.5 FA 7.5	145.7 lbs/cu ft	734.1 lbs/cu yd	3 1/2 IN.	4.8 %	0.34 BY WT.

CONCRETE MIX PROPORTIONS AS BATCHED

ITEMS	CEMENT	FLYASH	1-1/2 - 3/4 AGG	~~3/4~~ 1/4 - 4 AGG	SAND	WATER	WATER AT JOB SITE
120 oz	7025 lbs	— lbs	— lbs	18,445 lbs	10,350 lbs	220 gal	0 gal

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

FIELD REMARKS: AN ADDITIONAL 50 LBS/yd³ 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	"
E	10-16	28	6610	"
F				
G				
H				
		AVE. STR:	6350	28 DAYS

LAB REMARKS: INCLUDE MAX. LOAD, AVG. DIAM., AREA, AND OBSERVATIONS OF EFFECTS FOR FAILING CYLINDERS.

RECEIVED OCT 22 1992 PROJECT MANAGER CREW 8033 AOM

TEST TYPE: ☐ NON-STATISTICAL ☐ STATISTICAL ☐ OTHER (Describe) ____

RESULT: ☒ PASS ☐ FAIL

W. J. Lucius
ENGINEER OF MATERIALS

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

1734-3573 (9-86) INSTRUCTION: FORWARD ORIGINAL TO MATERIALS LABORATORY SALEM, CANARY TO PROJECT MGR., PINK RETAINED BY ORIGINATOR

cc Poetz E.J.S.

Oregon Department of Transportation
HIGHWAY DIVISION

NOTED R. J. STEYSKAL

U.S.B.R. CANAL (K.F.) BRIDGE SECTION
THE DALLES-CALIFORNIA HIGHWAY

SAMPLE DATA AND LABORATORY TEST REPORT FOR CONCRETE CYLINDERS

LABORATORY NO. 9211809 OCT 26 1992

PROJECT: CONTRACT NO: C11208 KLAMATH COUNTY

DATA SHEET NO. C 76098 MR

WAY

COUNTY

E. A. SUB JOB 4208

CONTRACTOR: MOCON CORP.

FA PROJECT NO. NH-4-1(35)

BID ITEM NO. 23

PROJECT MANAGER: RICHARD STEYSKAL

SUBMITTED BY: RICHARD STEYSKAL

AGY.-ORG. UNIT	QTY	TEST NUMBER	VAR	LAB CHARGE
02-8033	5	719		90.00
02-8033		734X		5.00

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

SAMPLED BY (PRINT NAME): D. E. PAETZ

REPRESENTED BY: NO. OF CYLS. 5

SET NO. 4

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 CALAVERAS | TYPE I-II L.A. | LAB OR MILL ANALYSIS NO. CONT #674

ADDITIVES: BRAND MASTER BUILDERS | TYPE MBVR 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. | AIR CONTENT 6.0 % | MAX W/C RATIO 0.40 BY WT.

FIELD TEST RESULTS: TOTAL FIELD MOISTURE CONTENT % 1-1/2-3/4 ____ 1" 3/4-4 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 5.0 % | FIELD W/C RATIO 0.35 BY WT.

CONCRETE MIX PROPORTIONS AS BATCHED

ITIVES	CEMENT	FLYASH	1-1/2 - 3/4 AGG	3/4 - 4 AGG	SAND	WATER	WATER AT JOB SITE
2-280 352 oz	5610 lbs	____ lbs	____ lbs	1" 14,710 lbs	9700 lbs	170 gal	4 gal

PRESTRESS CONCRETE: STEAM HOURS ____ HRS | MAX TEMP ____ ° | REQ. REL. STR. | ACT. REL. STR. | CYLINDER CURE STD ____ DAYS FIELD ____ HRS OR DAYS

FIELD REMARKS: AN ADDITION 50 LBS/Y³ OF CEMCAT 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
A	9-25	7	4680	9-28-92
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

LAB REMARKS: INCLUDE MAX. LOAD, AVG. DIAM., AREA, AND OBSERVED DEFECTS FOR FAILING CYLINDERS.

RECEIVED OCT 22 1992 PROJECT MANAGER - CREW 8033 AOM

TEST TYPE: ☐ NON-STATISTICAL ☐ STATISTICAL ☐ OTHER (Describe) ____

RESULT: ☒ PASS ☐ FAIL

DISTRIBUTION
- X FILES
- FHWA
- X CSL
- X PROJECT MANAGER — RICHARD STEYSKAL
- X REGION GEOLOGIST — RAS4
- X MATERIALS - PORTLAND
- X MATERIALS - EUGENE — MOCON CORP.
- X CONTRACTOR — JEFFERSON READY MIX
- X — FRED LUCHT

W. J. Zumwalt
ENGINEER OF MATERIALS

1734-3573 (9-86) INSTRUCTION: FORWARD ORIGINAL TO MATERIALS LABORATORY SALEM, CANARY TO PROJECT MGR, PINK RETAINED BY ORIGINATOR

cc: Paetz & I.S.

Oregon Department of Transportation
HIGHWAY DIVISION

SAMPLE DATA AND LABORATORY TEST REPORT FOR CONCRETE CYLINDERS

LABORATORY NO. NOV 19 1992 92 14132

PROJECT	U.S.B.R. CANAL (K.F.) BRIDGE SECTION THE DALLES-CALIFORNIA HIGHWAY CONTRACT NO: C11208		DATA SHEET NO. C 88459
WAY	KLAMATH COUNTY	COUNTY	E. A. SUB JOB 11208
CONTRACTOR	MOCON CORP.		FA PROJECT NO. NH-4-1(35) / BID ITEM NO. 23

PROJECT MANAGER	AGY.-ORG. UNIT	QTY	TEST NUMBER	VAR	LAB CHARGE
RICHARD STEYSKAL	02-8033	5	719		90.00
SUBMITTED BY: RICHARD STEYSKAL	AGY.-ORG. UNIT 02-8033		734X		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. PAETZ
REPRESENTED BY NO. OF CYLS. 5	SET NO. 8	DATE CAST 11-7-92	DATE SHIPPED 11-9-92
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: CALAVERAS	TYPE: I-II L.A.	LAB OR MILL ANALYSIS NO.: CERT #676	ADDITIVES:	BRAND: MASTER BUILDER	TYPE: MBVR MBC-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	TOTAL FIELD MOISTURE CONTENT %: 1-1/2-3/4 —, ~~3/4~~ 1" 4 3.0, FA 7.5	UNIT WT: 140.62 ~~lbs/cu~~ ft	CEMENT CONTENT: 686.22 lbs/cu yd	SLUMP: 4 1/4 IN.	AIR CONTENT: 6.2%	FIELD W/C RATIO: 0.32 BY WT.

CONCRETE MIX PROPORTIONS AS BATCHED

MBVR -80 80 256 TIVES 336 oz	CEMENT: 5640 lbs	FLYASH: — lbs	1-1/2 - 3/4 AGG: — lbs	~~3/4~~ - 4 AGG: 1" 14,640 lbs	SAND: 9528 lbs	WATER: 160 gal	WATER AT JOB SITE: 5 gal

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

FIELD REMARKS: AMB. AIR TEMP. - 45°F
CONCRETE TEMP. - 63°F
COOLER 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
A	11-14	7	2510	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

LAB REMARKS: INCLUDE MAX. LOAD, AVG. DIAM., AREA, AND OBSERVED DEFECTS FOR FAILING CYLINDERS.

RECEIVED NOV 18 1992 PROJECT MANAGER CREW 8033 PM ☐ APM ☐ CS ☒ OM ☐ AOM ☐

TEST TYPE: ☐ NON-STATISTICAL ☐ STATISTICAL ☐ OTHER (Describe) ___

RESULT: ☐ PASS ☐ FAIL

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

RICHARD STEYSKAL
RAS 4

MOCON CORPORATION
JEFFERSON STATE READY MIX
FRED LUCHT

W. J. [signature]
ENGINEER OF MATERIALS

Oregon Department of Transportation
HIGHWAY DIVISION

SAMPLE DATA AND LABORATORY TEST REPORT FOR CONCRETE CYLINDERS

cc PAETZ & J.S

LABORATORY NO. NOV 19 1992 92 14131

PROJECT: U.S.B.R. CANAL (K.F.) BRIDGE SECTION THE DALLES-CALIFORNIA HIGHWAY CONTRACT NO: C11208 KLAMATH COUNTY		DATA SHEET NO. C 88458
HWAY	COUNTY	E. A. SUB JOB 11208
CONTRACTOR: MOCON CORP.		FA PROJECT NO. NH-4-1(35) / BID ITEM NO. 23

PROJECT MANAGER	AGY.-ORG. UNIT	QTY	TEST NUMBER	VAR	LAB CHARGE
RICHARD STEYSKAL	02-8033	5	719		90.00
SUBMITTED BY: RICHARD STEYSKAL	AGY.-ORG. UNIT: 02-8033		734X		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: ☒ CONTROL ☐ RECORD	SAMPLED BY (PRINT NAME): K.E. PAETZ
REPRESENTED BY: NO. OF CYLS. 5 / SET NO. 7	DATE CAST: 11-7-92 / DATE SHIPPED: 11-9-92	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: CALAVERAS	TYPE: I-II L.A.	LAB OR MILL ANALYSIS NO.: CERT #676	ADDITIVES:	BRAND: MASTER BUILDER	TYPE: MBVR MBC-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	TOTAL FIELD MOISTURE CONTENT %: 1-1/2-3/4 —, ~~3/4~~ 1" - 4 3.0, FA 7.5	UNIT WT: 142.82 lbs/cu ft	CEMENT CONTENT: 696.95 lbs/cu yd	SLUMP: 3 3/4 IN.	AIR CONTENT: 6.0 %	FIELD W/C RATIO: 0.32 BY WT.

MBVR 80 -80 256

CONCRETE MIX PROPORTIONS AS BATCHED

ADDITIVES	CEMENT	FLYASH	1-1/2 - 3/4 AGG	~~3/4~~ - 4 AGG	SAND	WATER	WATER AT JOB SITE
336 oz	5640 lbs	— lbs	— lbs	1" 14,640 lbs	9528 lbs	160 gal	5 gal

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

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

LAB REMARKS: INCLUDE MAX. LOAD, AVG. DIAM., AREA, AND OBSERVED DEFECTS FOR FAILING CYLINDERS.

RECEIVED NOV 18 1992 PROJECT MANAGER - CREW 8033
PM ☐ APM ☐ CS ☐ OM ☐ AOM ☐

TEST TYPE: ☐ NON-STATISTICAL ☐ STATISTICAL ☐ OTHER (Describe) ___

RESULT: ☐ PASS ☐ FAIL

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

W. J. Quinn
ENGINEER OF MATERIALS

Oregon Department of Transportation
HIGHWAY DIVISION

SAMPLE DATA AND LABORATORY TEST REPORT FOR CONCRETE CYLINDERS

cc PAETZ & JS

LABORATORY NO. 9213951 NOV 23 1992

PROJECT	U.S.B.R. CANAL (K.F.) BRIDGE SECTION THE DALLES-CALIFORNIA HIGHWAY CONTRACT NO: C11208		DATA SHEET NO. C 88456
WAY	KLAMATH COUNTY	COUNTY	E. A. SUB JOB 11208
CONTRACTOR	MOCON CORP.		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	734X / 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. PAETZ
REPRESENTED BY NO. OF CYLS. 5	SET NO. 5	DATE CAST 11-4-92 / DATE SHIPPED 11-5-92	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 CALAVERAS	TYPE I-II L.A.	LAB OR MILL ANALYSIS NO. CERT #676	ADDITIVES:	BRAND MASTER BUILDERS	TYPE MBVR MBC-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	TOTAL FIELD MOISTURE CONTENT % 1-1/2-3/4 — , ~~3/4-4~~ 1" 3.0 , FA 7.5	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

ADDITIVES (543) oz	CEMENT 5650 lbs	FLYASH — lbs	1-1/2 - 3/4 AGG — lbs	~~3/4~~ - 4 AGG 1" 14,645 lbs	SAND 9530 lbs	WATER 165 gal	WATER AT JOB SITE 5 gal
PRESTRESS CONCRETE:	STEAM HOURS HRS	MAX TEMP °	REQ. REL. STR.	ACT. REL. STR.	CYLINDER CURE STD ___ DAYS	HRS OR DAYS	

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 CREW 80 ☐ APM ☐ CS ☐ OM ☐ AO

LAB USE ONLY BELOW

LABORATORY REPORT

DATE DATA SHEET RECEIVED 11-6-92 | DATE CYLINDERS RECEIVED 11-6-92

CYL NO.	DATE OF BREAK	AGE DAYS	STRENGTH PSI	DATE REPORTED
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

LAB REMARKS: INCLUDE MAX. LOAD, AVG. DIAM., AREA, AND OBSERVED DEFECTS FOR FAILING CYLINDERS.

TEST TYPE: ☐ NON-STATISTICAL ☐ STATISTICAL ☐ OTHER (Describe) ___

RESULT: ☐ PASS ☐ FAIL

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

RICHARD STEYSKAL
RAS 4

MOCON CORPORATION
JEFFERSON STATE READY MIX
FRED LUCHT

W. J. Quinn
ENGINEER OF MATERIALS

Oregon Department of Transportation
HIGHWAY DIVISION

cc PABITZ & JS

SAMPLE DA . AND LABORATORY TEST REPORT FOR CONCRETE CYLINDERS

LABORATORY NO. 92-14074 NOV 23 1992

PROJECT	U.S.B.R. CANAL (M.F.) BRIDGE SECTION THE DALLES-CALIFORNIA HIGHWAY CONTRACT NO: C11208
WAY	KLAMATH COUNTY
COUNTY	
DATA SHEET NO.	C 88457
E. A. SUB JOB	11208
CONTRACTOR	MOCON CORP.
FA PROJECT NO.	NH-4-1(35)
BID ITEM NO.	23
PROJECT MANAGER	RICHARD STEYSKAL
SUBMITTED BY	RICHARD STEYSKAL

AGY.-ORG. UNIT	QTY	TEST NUMBER	VAR	LAB CHARGE
02-8033	5	719		90 00
02-8033		734X		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	☒ CONTROL ☐ RECORD
SAMPLED BY (PRINT NAME)	K.E. PABITZ		
REPRESENTED BY		NO. OF CYLS.	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	B	C	D	E	F	G	H
7 DAYS	14 DAYS	28 DAYS	28 DAYS	28 DAYS	DAYS	DAYS	DAYS

CEMENT:	BRAND	TYPE	LAB OR MILL ANALYSIS NO.	ADDITIVES:	BRAND	TYPE
	CRAVENS	I-II L.A.	CERT #676		MASTER BUILDER	DABUR DABC-80

MIX DESIGN:	LAB OR I.D. NO.	DESIGN STRENGTH	AGGREGATE SOURCE NO.	CEMENT CONTENT	SLUMP	AIR CONTENT	MAX W/C RATIO
	92-09402	4000	18101-4	650 lbs/cu yd	3-4 IN.	6.0 %	0.40 BY WT.

FIELD TEST RESULTS	TOTAL FIELD MOISTURE CONTENT %	UNIT WT	CEMENT CONTENT	SLUMP	AIR CONTENT	FIELD W/C RATIO
	1-1/2-3/4 —, 3/4-4 1" 3.0, FA 7.5	146.02 lbs/cu ft	712.18 lbs/cu yd	3" IN.	5.0 %	0.33 BY WT.

ADDITIVES: DABC-80 - 254 oz; DABUR 336 oz

CONCRETE MIX PROPORTIONS AS BATCHED

CEMENT	FLYASH	1-1/2 - 3/4 AGG	3/4 - 4 AGG	SAND	WATER	WATER AT JOB SITE
5640 lbs	— lbs	— lbs	1" 14,640 lbs	9528 lbs	460 gal	7 gal

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

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

RECEIVED NOV 23 1992
PROJECT MANAGER - CREW 8033
☐ ADMIN. ☐ ADM. AOM

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
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				
H				
		AVE. STR:		28 DAYS

LAB REMARKS: INCLUDE MAX. LOAD, AVG. DIAM., AREA, AND OBSERVED DEFECTS FOR FAILING CYLINDERS.

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

RESULT: ☐ PASS ☐ FAIL

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X
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RICHARD STEYSKAL
RAS 4

MOCON CORPORATION
JEFFERSON STATE READY MIX
FRED LUCHT

W. J. Zumwalt
ENGINEER OF MATERIALS

Oregon Department of Transportation
HIGHWAY DIVISION

SAMPLE DATA AND LABORATORY TEST REPORT FOR CONCRETE CYLINDERS

LABORATORY NO.

PROJECT: U.S.B.R. CANAL (K.P.) BRIDGE SECTION THE DALLES-CALIFORNIA HIGHWAY CONTRACT NO: C11208

DATA SHEET NO. C 88460

HIGHWAY: KLAMATH COUNTY

COUNTY:

E. A. SUB JOB: 11208

CONTRACTOR: MOCON CORP.

FA PROJECT NO.: NH-4-(35)

BID ITEM NO.: 23

PROJECT MANAGER: RICHARD STEYSKAL — AGY.-ORG. UNIT: 02-8033

SUBMITTED BY: RICHARD STEYSKAL — AGY.-ORG. UNIT: 02-8033

QTY	TEST NUMBER	VAR	LAB CHARGE

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: ☒ CONTROL ☐ RECORD

SAMPLED BY (PRINT NAME): K.E. PAETZ

REPRESENTED BY: NO. OF CYLS. 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	TYPE	LAB OR MILL ANALYSIS NO.	ADDITIVES:	BRAND	TYPE
	CALAVERAS	I-II L.A.	CERT #676		MASTERBUILDER	MBVR MBL-80

MIX DESIGN:	LAB OR I.D. NO.	DESIGN STRENGTH	AGGREGATE SOURCE NO.	CEMENT CONTENT	SLUMP	AIR CONTENT	MAX W/C RATIO
	92-09402	4000	18-101-4	650 lbs/cu yd	3-4 IN.	6.0 %	0.40 BY WT.

FIELD TEST RESULTS	TOTAL FIELD MOISTURE CONTENT %	UNIT WT	CEMENT CONTENT	SLUMP	AIR CONTENT	FIELD W/C RATIO
	1-1/2-3/4 ____, ~~3/4~~ 1" - 4 3.0, FA 6.5	145.10 lbs/cu ft	709.03 lbs/cu yd	3 3/4 IN.	5.2 %	0.30 BY WT.

CONCRETE MIX PROPORTIONS AS BATCHED

ADDITIVES	CEMENT	FLYASH	1-1/2 - 3/4 AGG	~~3/4~~ - 4 AGG	SAND	WATER	WATER AT JOB SITE
MBL-80-256 336 oz	5640 lbs	____ lbs	____ lbs	1" 14,640 lbs	9528 lbs	160 gal	0 gal

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

DATE DATA SHEET RECEIVED | DATE CYLINDERS RECEIVED

LABORATORY REPORT

CYL NO.	DATE OF BREAK	AGE DAYS	STRENGTH PSI	DATE REPORTED
A				
B				
C				
D				
E				
F				
G				
H				
		AVE. STR:		28 DAYS

LAB REMARKS: INCLUDE MAX. LOAD, AVG. DIAM., AREA, AND OBSERVED DEFECTS FOR FAILING CYLINDERS.

TEST TYPE: ☐ NON-STATISTICAL ☐ STATISTICAL ☐ OTHER (Describe) ____

RESULT: ☐ PASS ☐ FAIL

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1734-3573 (9-86) INSTRUCTION: FORWARD ORIGINAL TO MATERIALS LABORATORY SALEM, CANARY TO PROJECT MGR, PINK RETAINED BY ORIGINATOR

APPENDIX C

PHOTOGRAPHS

Figure C.1 Concrete Bridge Deck/Isotropic Reinforcing

Figure C.2 Concrete Bride Deck/Isotropic Reinforcing