

WA-RD 87.2

Cathodic Protection For Reinforced
Concrete Bridge Decks
Yakima River Bridge 24/5

Demonstration Project 34

Post Construction Report April 1986



Washington State Department of Transportation
Planning, Research and Public Transportation Division
In Cooperation With
United States Department of Transportation
Federal Highway Administration

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16. Abstract Under FHWA Demonstration Project No. 34, "Cathodic Protection for Reinforced Concrete Bridge Decks," a non-slotted cathodic protection system was installed on the deck of the Yakima River Bridge 24/5, near Yakima, Washington, in the summer of 1985. The project involved repairing the deck, then fastening Raychem pre-manufactured anodes to the deck to impress current to the top mat rebar. Impressing current through the concrete to the top mat steel prevents further corrosion of the steel. A latex modified concrete overlay was placed over the deck anode. The objective of the demonstration project was to familiarize the Washington State DOT with this new technology. This objective was fulfilled. Some problem areas with the system were identified during the work: 1. A more positive method of finding electrical grounding locations from the anode to rebar nicks, ties, etc., needs to be developed. Some ties were exposed during the scarifying operation. Perhaps an instrument can be used to supplement visual inspection. 2. An effective technique of allowing concrete trucks to drive on the anode without damaging it needs to be developed. 3. An effective method needs to be developed to locate breaks in the anode as well as shorts. 4. In remote areas, sources of electrical power may not be available. It will be necessary for sources of power, such as solar panels or long-lasting batteries to be developed for this system. 5. Since the project, once it has started, moves along very rapidly, there is very little time for on-the-job training of workers. Workmen should have prior experience at this work. These problems need to be overcome to obtain a better quality product.					
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**DEMONSTRATION PROJECT No. 34
CATHODIC PROTECTION FOR REINFORCED
CONCRETE BRIDGE DECKS
YAKIMA RIVER BRIDGE No. 24/5**

**BY
TOM H. ROPER
EDWARD H. HENLEY, JR.
BRIDGE AND STRUCTURES BRANCH**

**Post CONSTRUCTION REPORT
DEMONSTRATION PROJECT DTFH 71-85-34-WA-12**

**PREPARED FOR
WASHINGTON STATE TRANSPORTATION COMMISSION
DEPARTMENT OF TRANSPORTATION
AND IN COOPERATION WITH
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION**

APRIL, 1986

The contents of this report reflect the views of the author(s) who is (are) responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the Washington State Transportation Commission, Department of Transportation of the Federal Highway Administration. This report does not constitute a standard, specification, of regulation,

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SYNOPSIS

Under FHWA Demonstration Project No. 34, "Cathodic Protection for Reinforced Concrete Bridge Decks," a non-slotted cathodic protection system was installed on the deck of the Yakima River Bridge 24/5, near Yakima, Washington, in the summer of 1985. The project involved repairing the deck, then fastening Raychem pre-manufactured anodes to the deck to impress current to the top mat rebar. Impressing current through the concrete to the top mat steel prevents further corrosion of the steel. A latex modified concrete overlay was placed over the deck anode.

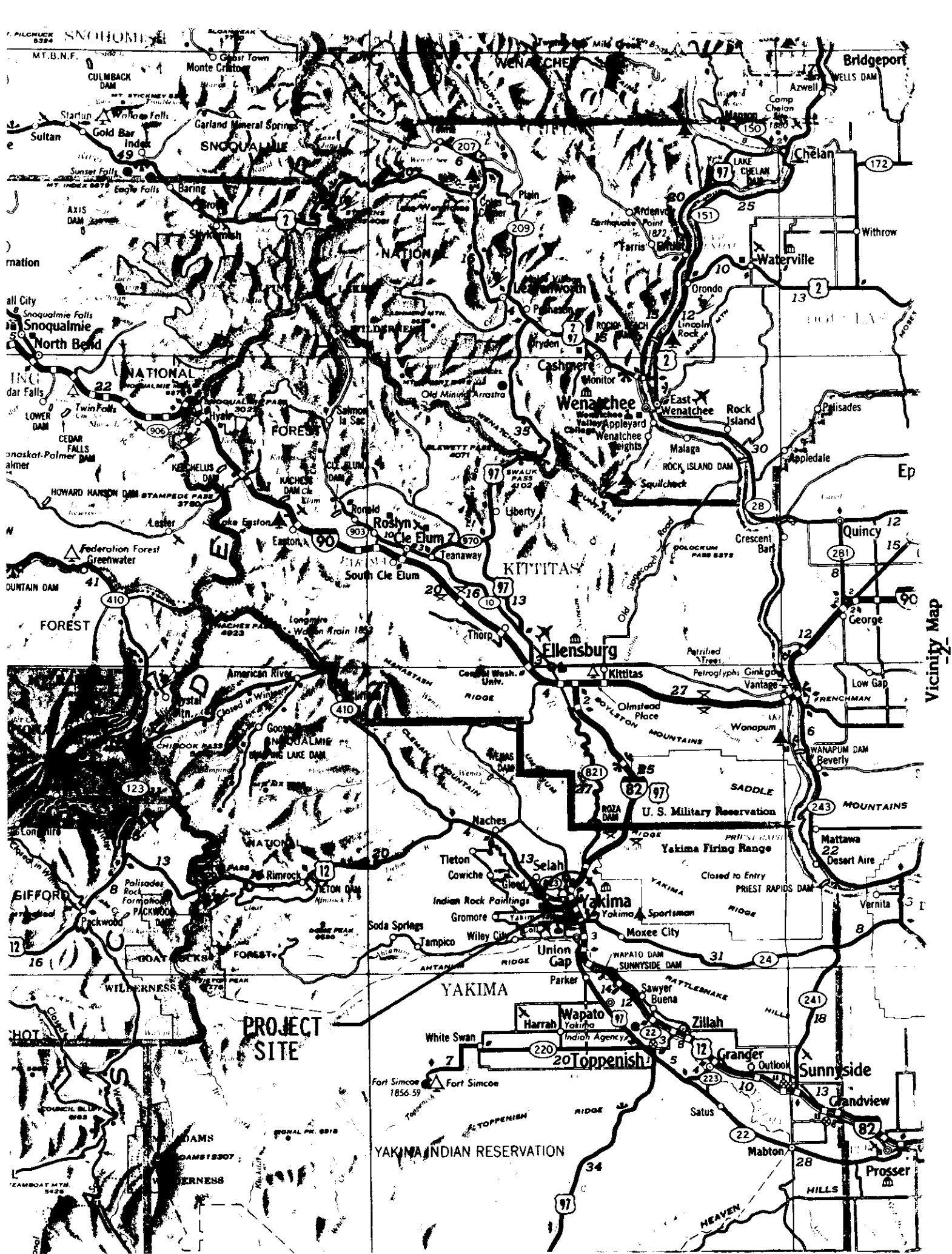
The objective of the demonstration project was to familiarize the Washington State DOT with this new technology. This objective was fulfilled.

Some problem areas with the system were identified during the work:

1. A more positive method of finding electrical grounding locations from the anode to rebar nicks, ties, etc., needs to be developed. Some ties were exposed during the scarifying operation. Perhaps an instrument can be used to supplement visual inspection.
2. An effective technique of allowing concrete trucks to drive on the anode without damaging it needs to be developed.
3. An effective method needs to be developed to locate breaks in the anode as well as shorts.
4. In remote areas, sources of electrical power may not be available. It will be necessary for sources of power, such as solar panels or long-lasting batteries to be developed for this system.
5. Since the project, once it has started, moves along very rapidly, there is very little time for on-the-job training of workers. Workmen should have prior experience at this work.

These problems need to be overcome to obtain a better quality product.

(The opinions, findings, and conclusions expressed in this report are those of the authors and not necessarily those of the sponsoring agencies.)



Vicinity Map

PROJECT SITE

YAKIMA INDIAN RESERVATION

U. S. Military Reservation
Yakima Firing Range

Sunnyside

Grandview

Prosser

Mabton

Satus

Granger

Zillah

Wapato

White Swan

Fort Simcoe

Union Gap

Moxee City

Sawyer Buena

Yakima

Selah

Tieton

Naches

Ellensburg

Wenatchee

East Wenatchee

Rock Island

Wenatchee

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PROJECT PLANNING

The deck of the Yakima River Bridge No. 24/5 needed extensive repairs, including a suitable overlay. Per the WSDOT policy concerning overlays, latex modified concrete was selected for the bridge. Since the bridge is a box girder bridge, the top slab is a part of the longitudinal girder system. Deterioration of the top slab could result in a reduced load carrying capacity, and in the extreme case, a structure failure. It was therefore desirable to give the bridge deck maximum protection against corrosion.

Through Demonstration Project No. 34, the FHWA has encouraged the use of cathodic protection. WSDOT elected to install a non-slotted cathodic protection system. The system manufactured by Raychem appeared suitable for the bridge.

PROJECT DESIGN

For this special project, it was considered desirable to contract the work by performance specification rather than detailed plans. This provided the contractor with some flexibility in accomplishing the work, and established his responsibility for the final product. Per special provisions, suppliers of the system were limited to those firms that had demonstrated expertise in the cathodic protection field. Supervision of the work by a licensed engineer (NACE qualified) was required by the contract.

Submittals by the supplier of the system included a project proposal, shop plans, maintenance and operation manuals, and as-built drawings. All submittals were subject to engineer approval.

PROJECT CONSTRUCTION

General Description: This bridge is a box girder bridge 31½ feet wide and 600 feet long. The bridge is a two-lane structure. It was necessary during this project to keep one lane open to traffic at all times. This complicated the construction somewhat.

The first phase of the project was to scarify the deck ¼-inch to remove surface contaminants such as oil and grease. The deck was then chain dragged to locate delaminations. Delaminated areas were marked out in red paint on the deck. Many of the previously patched areas were again delaminated.

Next, pneumatic equipment was used to remove the delaminated areas per contract special provisions. Premixed fondu was used to repair the delaminated areas by hand. This patch material was found somewhat unsatisfactory, since it came loose under traffic around the periphery of the patch. Extra patching was therefore necessary.

Expansion dams were found loose in some cases and were epoxy injected. This item of work was not foreseen in the contract and had to be performed under change order.

Cutouts were made in the deck to install the reference cells and rebar probes. In this project, deck instruments were used to monitor the system, not to control the system. The deck was further prepared by sandblasting.

The deck was then ready for the installation of the cathodic protection anode. The first step in the process was to fasten the panel mounting rod to the deck near the curb line. This rod served to hold down and align the ferex anode strand. Next, the ferex anode panels were rolled out on the deck. The panels came in large rolls wrapped in plastic. These pre-manufactured anodes are basically copper wires coated with a conductive polymer. The anode wire looks like regular electrical wire. The ferex anode was manufactured by the Raychem Company. To our knowledge, this is the only company that makes this type of anode.

Next, the anode panel was stretched to size and fastened to the deck with plastic fastener inserts. The deck was further cleaned by water blast just prior to pouring the latex modified concrete overlay. The Bidwell paving machine screed vertical alignment was tested prior to the LMC pour by moving the machine over the entire length of the bridge.

Night pour of the latex modified concrete was desirable because deck temperatures were cooler and traffic volumes were lower. Cooler decks mean less cracking of the LMC. Plywood on the deck was used to distribute the weight of the LMC truck on the anode. Some damage to the anode did occur, but it was quickly repaired. Slurry was brushed on the deck prior to placement of the LMC.

Latex modified concrete from the truck chute was deposited directly on the deck in front of the paver. Further spreading of the LMC by hand in front of the paver was generally necessary to ensure no voids would be left around the anode material. The last operation was to cover the LMC behind the paver with wet burlap. The wet burlap is necessary for curing the LMC. Curing for 96 hours was specified before restoration of traffic.

Project Costs: Bid prices for the cathodic protection system were \$130,000. Only two bids were submitted. This amounts to \$6.88 per square foot. This figure is comparable with other commercially available bridge deck cathodic protection systems.

Shop Plans: Cathodic protection shop plans submitted by the system supplier needed very few corrections. Most of the changes to the shop plans concerned details involving electrical equipment. All plans were returned approved or approved as noted from the Washington State Department of Transportation.

PROBLEM AREAS

Problem areas that need to be addressed for this system:

1. A more positive method of finding electrical grounding locations from the anode to rebar nicks, ties, etc., needs to be developed. Some ties were exposed during the scarifying operation. Perhaps an instrument can be used to supplement visual inspection.
2. An effective technique of allowing concrete trucks to drive on the anode without damaging it needs to be developed.

3. An effective method needs to be developed to locate breaks in the anode as well as shorts.
4. In remote areas, sources of electrical power may not be available. It will be necessary for sources of power, such as solar panels or long-lasting batteries to be developed for this system.
5. Since the project, once it has started, moves along very rapidly, there is very little time for on-the-job training of workers. Workmen should have prior experience at this work.

CONCLUSIONS

For a first-of-its-kind project in the state, the installation went relatively smooth. This type of deck protection system appears to have promise for future projects. Some areas of concern, as listed in the "PROBLEM AREAS" section, need to be overcome to obtain a better quality product. Personnel involved in the project gained considerable experience with this type of work.

APPENDIX

APPENDIX A
BRIDGE DECK SURVEY REPORT

18 JAN 1984 Hqtrs. Lab No. CL 1739

Dept. of Transportation
Materials Laboratory
P.O. Box 167
Olympia, WA 98504

District 5
Section YAKIMA RIVER BRIDGE 24/5
Job No. L-7774 SR 24 C.S.
Date Sampled 1-13-84 Crew WILDS
DELLINGER, SEIBEL, REEDER EMMONS

Bridge YAKIMA RIVER BRIDGE No. 24/5
Length 600 Width 30 Skew NO Curve NO Sealed NO
Stationing measured along EXISTING E STRIPE
Beginning at WEST SIDE ON E

PORTLAND CEMENT CONCRETE SAMPLES FOR CHLORIDE CONTENT ANALYSIS

SAMPLE	STATION	OFFSET (Feet)	SAMPLE DEPTH	REBAR DEPTH	CHLORIDE LB/YD ³
1	0+26	3' LT	1 1/2" - 2"		2.09
2	0+60	10' LT			3.16
3	1+38	9' LT			5.83
4	1+71	7' LT			0.71
5	2+41	10' LT			4.11
6	2+75	1' LT			3.95
7	3+50	7' LT			4.16
8	3+87	10' LT			2.34
9	4+46	2' LT			6.11
10	4+78	7' LT			2.97
11	5+40	10' LT			3.03
12	5+75	3' LT			4.51
13	0+16	11' RT			4.85
14	0+47	7' RT			2.77
15	1+58	1' RT			6.75
16	1+89	10' RT			1.38
17	2+56	2' RT			1.21

Remarks: (779.5 FT²) TOTAL DELAMINATION AREA (4.3%)
T2B2-25

Mats File X
Genl File X
Dist. Admin. (5)X
Proj. Engr. WASHBURN 2X
Chem. Lab X
DOT Form 350-102
KRIEGER X

Robert L. Washburn P. E.
DISTRICT MATERIALS ENGINEER BY RJH
District Soils Engineer

A. J. Peters, P.E.
Materials Engineer

Date 3-5-84

C. L. Sherrill
BY BS

Copy Sent to Henziker 3-6-84

WASHINGTON STATE
DEPARTMENT OF TRANSPORTATION

Sheet 2 of 2

Dept. of Transportation
Materials Laboratory
P.O. Box 167
Olympia, WA 98504

Hdqtrs.
Lab No. CL 1739

District 5
Section YAKIMA RIVER BRIDGE 24/5
Job No. L-7774 SR 24 C.S. _____
Date Sampled 1-13-84 Crew WILDS
DELLINGER, SEIBEL, REEDER, EMMONS

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Length 600 Width 30 Skew NO Curve NO Sealed NO
Stationing measured along EXISTING E STRIPE
Beginning at WEST SIDE ON E

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SAMPLE	STATION	OFFSET (Feet)	SAMPLE DEPTH	REBAR DEPTH	CHLORIDE LB/YD ³
18	2+94	10' RT	1 1/2" - 2" ↓		4.03
19	3+62	6' RT		1.51	
20	3+89	1' RT		3.40	
21	4+24	11' RT		3.23	
22	4+51	6' RT		5.54	
23	4+87	3' RT		6.60	
24	5+34	8' RT		5.51	
25	5+62	2' RT		5.56	

Remarks: _____

Mats File _____
Genl File _____
Dist. Admin. _____
Proj. Engr. _____
Mem. Lab _____

Robert L. Mathern P. E.
DISTRICT MATERIALS ENGINEER BY RM
District Soils Engineer

A. J. Peters, P.E.
Materials Engineer

Date _____

By C. L. Sherwell

Yakima River Bridge
24/5

L-7774
Jan 13, 1984

station	offset	Length	Width	Area
3+11	3.0 Rt	3.5	2.0	7.0
3+12	9.0 Rt	3.0	2.5	7.5
3+19	2.0 Rt	2.0	2.0	4.0
3+18	3.0 Rt	2.5	2.0	5.0
3+16	8.5 Rt	2.0	2.0	4.0
3+12	8.0 Rt	1.5	1.5	2.25
3+10	4.0 Rt	1.5	1.5	2.25
3+05	8.5 Rt	2.5	2.5	6.25
2+94	2.5 Rt	2.5	2.5	6.25
2+88	3.0 Rt	3.0	2.5	7.5
2+82	3.0 Rt	1.5	1.5	2.25
2+66	2.5 Rt	3.5	1.5	5.25
2+64	8.5 Rt	6.0	3.0	18.0
2+59	3.5 Rt	3.5	2.0	7.0
2+58	6.5 Rt	2.0	2.5	5.0
2+55	2.5 Rt	2.5	2.5	6.25
1+70	4.0 Rt	26.5	3.0	79.5
1+76	8.5 Rt	2.5	2.5	6.25
1+62	3.5 Rt	21.0	3.5	73.5
1+50	1.0 Rt	1.5	1.5	2.25
1+46	8.0 Rt	2.5	2.5	6.25
0+45	3.5 Rt	1.0	1.0	1.0
0+17.5	3.5 Rt	38.5	3.0	115.5
0+17.5	8.5 Rt	38.5	3.0	115.5

524.5

Eastbound = 524.5 ft²

West bound = 255.0

779.5 ft² total delaminations

$$\frac{779.5}{30 \times 600} = \frac{779.5}{18000} = 4.33\% \text{ delaminated Jan 13, 1984}$$

sq width length

WEE

Ermons, Seibel, Reed or, Wilds, Dulligan, Summerville

YAKIMA River Bridge # 24/5

L-7774

Jan 13, 1984

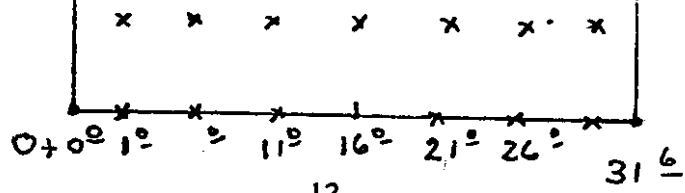
0+00 = westerly Pavement Seat
Offsets measured left & right of existing \pm

Station	Offset	Length of Delaminations	Width of Delamination	Area
5+91	4.0 Lt	2.5'	2.0'	5.0
5+76	4.0 Lt	2.0'	2.5'	5.0
4+38	10.0 Lt	1.5	1.5	2.25
4+21	3.0 Lt	6.0	2.5	15.0
3+18	8.5 Lt	2.0	2.0	4.0
3+12	9.5 Lt	2.0	3.0	6.0
2+92	3.5 Lt	1.5	1.5	2.25
2+91	3.0 Lt	1.5	1.5	2.25
2+70	3.0 Lt	4.0	2.5	10.0
2+68	10.0 Lt	2.5	3.0	7.5
2+64	3.0 Lt	2.0	2.0	4.0
1+85	8.5 Lt	1.5	1.5	2.25
1+85	2.0 Lt	2.0	1.0	2.0
1+72	3.5 Lt	2.0	2.0	4.0
1+68	3.0 Lt	3.0	2.0	6.0
1+63	3.0 Lt	2.5	2.5	6.25
1+59	9.0 Lt	1.5	1.5	2.25
0+56	3.5 Lt	3.5	2.0	7.0
0+46	3.0 Lt	5.0	2.5	12.5
0+23	10.5 Lt	1.0	1.0	1.0
0+21	1.5 Lt	42.0	3.0	126.0
0+18	10.0 Lt.	9.0	2.5	22.5
				255.
3+39	2.5 Rt	2.5	2.5	6.25
3+33	3.0 Rt	2.5	2.5	6.25
3+26	3.5 Rt	2.0	2.0	4.0
3+24	7.0 Rt	1.0	1.0	1.0
3+21	3.5 Rt	3.0	2.0	6.0
3+16	3.0 Rt	1.0	3.0	3.0
3+16	8.5 Rt.	1.0	2.5	2.5

Moxer

6+00

↑
SR M.P.



DEPT. OF TRANSPORTATION
 MATERIALS LABORATORY
 P. O. BOX 167
 OLYMPIA, WA 98504

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
 HALF CELL POTENTIOMETER TEST RESULTS

HOURS.
 LAB NO.
 SHEET _____ OF _____

CONTROL FIELD	SAMPLE DATE			CARD I.D.		
	MO.	DAY	YEAR			
	14	16	17	19	21	24
	082984			H.A.L.F.		

ALL READINGS ARE ASSUMED NEGATIVE UNLESS CIRCLED

STATION NUMBER	OFFSET FROM BASE LINE														EXPANSION JOINT OR GROUND
	001	006	011	016	021	026	031	036	041	046	051	056	061	066	
25	2930	3233	3536	3839	4142	4445	4748	5051	5354	5657	5960	6263	6566	6869	71
2+	0	1.1.0	1.9.1	2.1.5	2.5.8	2.6.4	2.5.4	0.1.7							
+	1.2.3	1.9.5	2.4.7	4.5.1	2.0.7	4.4.0	0.4.2								
2+	0	0.9.0	2.4.5	3.6.0	2.9.4	1.8.3	2.1.7	0.4.8							
2+	1.5	1.3.0	1.7.8	1.9.5	2.7.2	1.4.6	1.7.2	0.0.5							
2+	0	1.3.4	1.5.4	1.6.4	2.3.7	1.5.0	1.5.9	0.6.0							
2+	5	0.9.8	1.5.5	2.0.7	3.0.8	1.6.5	1.8.0	0.1.6							
2+	0	1.3.1	1.8.3	2.1.9	2.5.5	1.7.1	1.8.1	0.1.5							
2+	5	0.7.5	1.8.0	1.9.2	2.5.0	1.7.6	1.8.1	1.4.6							
3+	0	1.4.6	1.5.0	1.7.3	2.1.8	1.7.3	2.0.5	0.3.5							Grd 3024
3+	5	1.1.5	1.7.0	1.3.2	2.0.0	1.6.6	3.2.0	0.5.1							
3+	0	1.0.2	2.5.3	1.3.8	2.2.9	1.9.2	3.0.1	0.4.7							
3+	5	0.9.1	2.1.0	1.7.8	0.2.2	1.6.2	2.3.5	0.4.4							
3+	0	0.8.7	1.5.4	1.6.6	2.1.4	1.7.2	1.9.3	0.5.2							
3+	5	0.7.6	1.3.0	1.6.2	2.1.0	1.5.0	2.0.3	0.0.7							
3+	0	0.5.0	1.0.7	1.3.1	1.9.8	1.4.0	1.8.0	1.2.3							
3+	5	0.7.6	1.0.6	0.9.7	1.9.0	1.2.4	1.5.1	1.0.8							
3+	0	0.5.9	1.0.8	0.8.9	1.5.9	0.6.1	1.2.1	0.6.6							
3+	5	0.5.7	1.2.4	1.6.4	1.6.1	1.2.6	1.3.0	0.8.7							
3+	0	0.4.9	1.0.9	1.1.9	1.6.8	0.7.2	1.2.0	0.4.2							
3+	5	0.5.0	1.5.3	1.6.5	1.9.7	1.0.2	1.3.0	0.3.7							

DEPT. OF TRANSPORTATION
 MATERIALS LABORATORY
 P. O. BOX 167
 OLYMPIA, WA 98504

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
 HALF CELL POTENTIOMETER TEST RESULTS

DATE: _____
 LAB NO. _____
 SHEET _____ OF _____

CONTROL FIELD	SAMPLE DATE			CARD I.D.
	MO.	DAY	YEAR	
	14	16	19	21
	08	29	84	HALF

ALL READINGS ARE ASSUMED NEGATIVE UNLESS CIRCLED

STATION NUMBER	OFFSET FROM BASE LINE												EXPANSION JOINT OR GROUND																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
	29	30	32	33	35	36	38	39	41	42	44	45		47	48	50	51	53	54	56	57	59	60	62	63	65	66	68	69	71																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
1+10	001	006	011	016	021	026	031	036	041	046	051	056	061	066	071	076	081	086	091	096	101	106	111	116	121	126	131	136	141	146	151	156	161	166	171	176	181	186	191	196	201	206	211	216	221	226	231	236	241	246	251	256	261	266	271	276	281	286	291	296	301	306	311	316	321	326	331	336	341	346	351	356	361	366	371	376	381	386	391	396	401	406	411	416	421	426	431	436	441	446	451	456	461	466	471	476	481	486	491	496	501	506	511	516	521	526	531	536	541	546	551	556	561	566	571	576	581	586	591	596	601	606	611	616	621	626	631	636	641	646	651	656	661	666	671	676	681	686	691	696	701	706	711	716	721	726	731	736	741	746	751	756	761	766	771	776	781	786	791	796	801	806	811	816	821	826	831	836	841	846	851	856	861	866	871	876	881	886	891	896	901	906	911	916	921	926	931	936	941	946	951	956	961	966	971	976	981	986	991	996	1001	1006	1011	1016	1021	1026	1031	1036	1041	1046	1051	1056	1061	1066	1071	1076	1081	1086	1091	1096	1101	1106	1111	1116	1121	1126	1131	1136	1141	1146	1151	1156	1161	1166	1171	1176	1181	1186	1191	1196	1201	1206	1211	1216	1221	1226	1231	1236	1241	1246	1251	1256	1261	1266	1271	1276	1281	1286	1291	1296	1301	1306	1311	1316	1321	1326	1331	1336	1341	1346	1351	1356	1361	1366	1371	1376	1381	1386	1391	1396	1401	1406	1411	1416	1421	1426	1431	1436	1441	1446	1451	1456	1461	1466	1471	1476	1481	1486	1491	1496	1501	1506	1511	1516	1521	1526	1531	1536	1541	1546	1551	1556	1561	1566	1571	1576	1581	1586	1591	1596	1601	1606	1611	1616	1621	1626	1631	1636	1641	1646	1651	1656	1661	1666	1671	1676	1681	1686	1691	1696	1701	1706	1711	1716	1721	1726	1731	1736	1741	1746	1751	1756	1761	1766	1771	1776	1781	1786	1791	1796	1801	1806	1811	1816	1821	1826	1831	1836	1841	1846	1851	1856	1861	1866	1871	1876	1881	1886	1891	1896	1901	1906	1911	1916	1921	1926	1931	1936	1941	1946	1951	1956	1961	1966	1971	1976	1981	1986	1991	1996	2001	2006	2011	2016	2021	2026	2031	2036	2041	2046	2051	2056	2061	2066	2071	2076	2081	2086	2091	2096	2101	2106	2111	2116	2121	2126	2131	2136	2141	2146	2151	2156	2161	2166	2171	2176	2181	2186	2191	2196	2201	2206	2211	2216	2221	2226	2231	2236	2241	2246	2251	2256	2261	2266	2271	2276	2281	2286	2291	2296	2301	2306	2311	2316	2321	2326	2331	2336	2341	2346	2351	2356	2361	2366	2371	2376	2381	2386	2391	2396	2401	2406	2411	2416	2421	2426	2431	2436	2441	2446	2451	2456	2461	2466	2471	2476	2481	2486	2491	2496	2501	2506	2511	2516	2521	2526	2531	2536	2541	2546	2551	2556	2561	2566	2571	2576	2581	2586	2591	2596	2601	2606	2611	2616	2621	2626	2631	2636	2641	2646	2651	2656	2661	2666	2671	2676	2681	2686	2691	2696	2701	2706	2711	2716	2721	2726	2731	2736	2741	2746	2751	2756	2761	2766	2771	2776	2781	2786	2791	2796	2801	2806	2811	2816	2821	2826	2831	2836	2841	2846	2851	2856	2861	2866	2871	2876	2881	2886	2891	2896	2901	2906	2911	2916	2921	2926	2931	2936	2941	2946	2951	2956	2961	2966	2971	2976	2981	2986	2991	2996	3001	3006	3011	3016	3021	3026	3031	3036	3041	3046	3051	3056	3061	3066	3071	3076	3081	3086	3091	3096	3101	3106	3111	3116	3121	3126	3131	3136	3141	3146	3151	3156	3161	3166	3171	3176	3181	3186	3191	3196	3201	3206	3211	3216	3221	3226	3231	3236	3241	3246	3251	3256	3261	3266	3271	3276	3281	3286	3291	3296	3301	3306	3311	3316	3321	3326	3331	3336	3341	3346	3351	3356	3361	3366	3371	3376	3381	3386	3391	3396	3401	3406	3411	3416	3421	3426	3431	3436	3441	3446	3451	3456	3461	3466	3471	3476	3481	3486	3491	3496	3501	3506	3511	3516	3521	3526	3531	3536	3541	3546	3551	3556	3561	3566	3571	3576	3581	3586	3591	3596	3601	3606	3611	3616	3621	3626	3631	3636	3641	3646	3651	3656	3661	3666	3671	3676	3681	3686	3691	3696	3701	3706	3711	3716	3721	3726	3731	3736	3741	3746	3751	3756	3761	3766	3771	3776	3781	3786	3791	3796	3801	3806	3811	3816	3821	3826	3831	3836	3841	3846	3851	3856	3861	3866	3871	3876	3881	3886	3891	3896	3901	3906	3911	3916	3921	3926	3931	3936	3941	3946	3951	3956	3961	3966	3971	3976	3981	3986	3991	3996	4001	4006	4011	4016	4021	4026	4031	4036	4041	4046	4051	4056	4061	4066	4071	4076	4081	4086	4091	4096	4101	4106	4111	4116	4121	4126	4131	4136	4141	4146	4151	4156	4161	4166	4171	4176	4181	4186	4191	4196	4201	4206	4211	4216	4221	4226	4231	4236	4241	4246	4251	4256	4261	4266	4271	4276	4281	4286	4291	4296	4301	4306	4311	4316	4321	4326	4331	4336	4341	4346	4351	4356	4361	4366	4371	4376	4381	4386	4391	4396	4401	4406	4411	4416	4421	4426	4431	4436	4441	4446	4451	4456	4461	4466	4471	4476	4481	4486	4491	4496	4501	4506	4511	4516	4521	4526	4531	4536	4541	4546	4551	4556	4561	4566	4571	4576	4581	4586	4591	4596	4601	4606	4611	4616	4621	4626	4631	4636	4641	4646	4651	4656	4661	4666	4671	4676	4681	4686	4691	4696	4701	4706	4711	4716	4721	4726	4731	4736	4741	4746	4751	4756	4761	4766	4771	4776	4781	4786	4791	4796	4801	4806	4811	4816	4821	4826	4831	4836	4841	4846	4851	4856	4861	4866	4871	4876	4881	4886	4891	4896	4901	4906	4911	4916	4921	4926	4931	4936	4941	4946	4951	4956	4961	4966	4971	4976	4981	4986	4991	4996	5001	5006	5011	5016	5021	5026	5031	5036	5041	5046	5051	5056	5061	5066	5071	5076	5081	5086	5091	5096	5101	5106	5111	5116	5121	5126	5131	5136	5141	5146	5151	5156	5161	5166	5171	5176	5181	5186	5191	5196	5201	5206	5211	5216	5221	5226	5231	5236	5241	5246	5251	5256	5261	5266	5271	5276	5281	5286	5291	5296	5301	5306	5311	5316	5321	5326	5331	5336	5341	5346	5351	5356	5361	5366	5371	5376	5381	5386	5391	5396	5401	5406	5411	5416	5421	5426	5431	5436	5441	5446	5451	5456	5461	5466	5471	5476	5481	5486	5491	5496	5501	5506	5511	5516	5521	5526	5531	5536	5541	5546	5551	5556	5561	5566	5571	5576	5581	5586	5591	5596	5601	5606	5611	5616	5621	5626	5631	5636	5641	5646	5651	5656	5661	5666	5671	5676	5681	5686	5691	5696	5701	5706	5711	5716	5721	5726	5731	5736	5741	5746	5751	5756	5761	5766	5771	5776	5781	5786	5791	5796	5801	5806	5811	5816	5821	5826	5831	5836	5841	5846	5851	5856	5861	5866	5871	5876	5881	5886</

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

DISTRICT 5 JOB NO. 67774 S.R. 24 C.S. 1 NO. 24/5
 BRIDGE: Yakima River Bridge SEaled Back Concrete
 LENGTH 600' WIDTH 31.6 SKEW 0 CURVE 0+00 ENDING STA 6+00
 STATIONING MEASURED FROM Back of BRIDGE SEAT STARTING STA 0+00
 DATE SAMPLED 8-29-84 CREW Bob Schultz, Bob Allison, Buck Waters, Robert Adams
 TEMPERATURE 80-90 METER USED

DEPT. OF TRANSPORTATION
 MATERIALS LABORATORY
 P. O. BOX 167
 OLYMPIA, WA 98504

HALF CELL POTENTIOMETER TEST RESULTS

CONTROL FIELD	SAMPLE DATE			CARD I.O.
	NO.	DAY	YEAR	
	1416	17	19	24
	0829	84	HALF	

ALL READINGS ARE ASSUMED NEGATIVE UNLESS CIRCLED

ON ER	OFFSET FROM BASE LINE										EXPANSION JOINT OR GROUND																		
	29	30	31	32	33	36	39	41	42	44		45	47	48	50	51	53	54	56	57	59	60	62	63	65	66	69	71	
J.R.I.D	0.01	0.06	0.11	0.16	0.21	0.26	0.31	0.36	0.41	0.46	0.51	0.56	0.61	0.66	0.71	0.76	0.81	0.86	0.91	0.96	1.01	1.06	1.11	1.16	1.21	1.26	1.31	1.36	
+1.0	2.02	2.43	2.64	0.23	0.19	0.22	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	
+1.5	2.36	2.47	4.00	0.10	0.13	0.20	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	
+1.5	1.25	2.89	3.16	0.25	0.18	0.20	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
+1.0	0.84	2.55	2.85	0.19	0.05	0.35	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
+1.5	0.91	2.73	3.20	0.25	0.10	0.30	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
+1.0	0.84	2.71	2.50	0.32	0.10	0.15	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
+1.5	1.15	1.93	2.62	0.65	0.13	0.15	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
+1.0	1.31	1.86	3.80	0.30	0.05	0.15	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
+1.5	0.73	2.16	3.62	0.30	0.04	0.10	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
+1.0	0.66	2.25	2.31	0.23	0.10	0.14	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
+1.5	0.93	1.72	2.79	0.18	0.08	0.16	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
+1.0	0.36	1.76	2.39	0.12	0.08	0.16	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
+1.5	0.63	1.21	1.70	0.15	0.09	0.13	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
+1.0	0.06	1.30	2.06	0.18	0.13	0.15	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
+1.5	0.12	1.25	2.40	0.14	0.07	0.12	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06

End 674

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

MOQTR. LAB NO. 1

DISTRICT 5 JOB NO. 7774 S.R. 34 C.G. _____

BRIDGE: YAKIMA RIVER BRIDGE NO. 241

LENGTH 600' WIDTH 31' SKEW 0 CURVE _____ SEALED BASE CONCRETE

STATIONING MEASURED FROM BACK OF BRIDGE GENT STARTING STA 0+00 ENDING STA 6+00

DATE SAMPLED 8-29-84 CREW BOB SHULTS, BOB ALLISON, BOB WARE, ROBERT ADAMS

BAR SIZE ~~8~~ 90#5 METER USED

DEPT. OF TRANSPORTATION MATERIALS LABORATORY P. O. BOX 167 OLYMPIA, WA 98504

REBAR COVER IN INCHES

CONTROL FIELD	SAMPLE DATE			CARD I.D.
	NO.	DAY	YEAR	
	14	15	17	21
	08	29	84	REBR

STATION NUMBER	OFFSET FROM BASE LINE												EXPANSION JOINT OR GROUND																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
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APPENDIX B
CONTRACT SPECIAL PROVISIONS

the 96 hour curing period. Also, if, during the dry curing period, there is sufficient rain to wet the surface of the concrete for one hour or more, this number of hours will not be considered in the dry curing period.

- C. Traffic is not permitted on the finished concrete until the specified curing time is satisfied and until the concrete has reached a minimum compressive strength of 2500 psi as verified by a 4 x 8 cylinder strength test. The cylinder strength test will be in accordance with WSDOT test method 801.

4.08 Checking for Bond

After the requirements for curing have been met, the entire overlaid surface shall be scudded by the Contractor, under the direction of the Engineer, to ensure total bond of the concrete to the bridge deck. Concrete in unbonded areas shall be removed and replaced by the Contractor at his own expense. All cracks, except those that are significant enough to require removal, shall be thoroughly sealed, to the satisfaction of the Engineer, with the latex modified grout. The grout shall be thinned as specified by the Engineer.

Part 5 Measurement

- 5.01 A. Measurement for this item of work, excluding the work required for "Bridge Deck repair" as described elsewhere in these special provisions, will be made by the square yard of overlay in place.

Part 6 Payment

- 6.01 A. Payment for this item of work, excluding the work required for "Bridge Deck Repair", as described elsewhere in these special provisions will be made at the unit contract price per square yard for "Latex Modified Concrete Overlay" which price shall be full compensation for all material, labor, tools and equipment necessary to complete the work specified in accordance with the plans, these special provisions and the standard specifications.

CATHODIC PROTECTION SYSTEM

The Contractor shall furnish a proposal document by the supplier of a non-embedded wire overlay cathodic protection system to be used on the deck of the Yakima River Bridge No. 24/5 to the Engineer for approval. The total length of the bridge is 600 feet. The width curb to curb is 28 feet. The scope of the work to be covered under this item shall include but not be limited to installing non-slotted anodes on the bridge deck, securing and protecting the anodes during the overlay installation, furnishing all electrical conduit, wiring, rectifiers,

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YAKIMA TO MOXEE CANAL

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connections, and hardware; energizing and adjusting a complete cathodic protection system for the deck area. The anode shall be a pre-manufactured copper conductor, with an extrusion of semi-conductive polymeric matrix, and it shall be weaved into a mesh using polymeric clips to set the anode spacing.

Electrical power source is available where shown in the plans. Conduit and pull wire will be provided from the service to a junction box in the vicinity of the bridge. The Contractor shall furnish and install conductors from the service to the junction box, in addition from the junction box to the bridge, to provide power to the cathodic protection system. Conduit installed from the junction box to the bridge and any conduit required on the bridge shall be PVC rigid wall, schedule 40.

Concrete fasteners for conduit shall be stainless steel or other approved corrosion resistant material. This system shall be installed after deck repair is complete as specified in the special provision. All electrical work shall comply with the requirements of the National Electrical Code.

The cathodic protection system shall include a minimum of five permanent reference cells (half-cells), five resistance type corrosion rate probes and five thermistors installed in the deck for monitoring the system.

The Contractor shall submit to the Engineer for approval all drawings, detail plans and calculations for this system. In general, six sets of prints shall be submitted to the Engineer for approval. Approval of drawings and details shall be understood to be an acceptance rather than a check on the system. No changes shall be made to any drawing after it has been approved, except by the consent or direction of the Engineer in writing. No material shall be purchased or fabricated and no work shall be done on preparation of the deck surface or installation of any part of the system until the plans have been approved by the Engineer and confirmation of such approval has been received in writing by the Contractor.

Prior to the completion of the project, the Contractor or his supplier shall furnish the original drawings of the as-built system to the Engineer. All drawings shall be on sheets conforming in size to the provisions of section 1-05.3 of the standard specifications. In addition, the Contractor shall furnish six complete sets of operating and maintenance instructions to the Engineer.

To aid in assuring proper installation, energizing and adjusting of the cathodic protection system, the Contractor shall have available during installation of the system the services of a qualified full-time field representative in the employ of the system supplier. This representative shall be qualified in the field of cathodic protection of reinforced structures and shall be a registered Professional

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YAKIMA TO MOXEE CANAL

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Engineer certified by the National Association of Corrosion Engineers as a Corrosion Specialist or other Corrosion specialist approved by the Engineer. The representative shall provide instructions and training of State personnel in the operation and maintenance of the system.

Testing of this system shall be as recommended by the system supplier. Number and type of tests to be performed shall be approved by the Engineer prior to start of any testing. The results of this testing, the data collected and the findings of the whole study shall be documented and presented to the Engineer for his use.

The Contractor shall also submit to the State a proposal document by the supplier of the cathodic protection system indicating how to maintain, monitor and evaluate the system and prepare periodic performance reports. The proposal document shall cover a period of time of three years after the State has given final acceptance of all work under this contract. Such proposal document shall be furnished to the State before the State shall approve the source of supply for the system. The proposal document shall include an itemized list of activities and costs that describes the labor and materials anticipated to operate and maintain the system in a satisfactory manner. The State shall have the option of entering into an arrangement with the supplier to provide the services contained in the proposal without interference or obligation to the Contractor. Such an arrangement does not relieve the Contractor from providing instruction and training of State personnel in the operation and maintenance of the system before final acceptance of the work as described elsewhere in the contract provisions.

The cathodic protection system supplier shall be one of the following:

1. Norton Corrosion Limited, Inc.
22327 - 89th Avenue S.E.
Woodinville, WA 98072
Tel. (206) 483-1616
TWX 910 449-2810
2. Harco Corporation
Cathodic Protection Division
3411 Arden Road
Hayward, California 94545
Tel. (415) 783-0924
3. Matcor, Inc.
P.O. BOX 687
Doylestown, Penn. 18901
Tel. (215) 348-2974

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YAKIMA TO NOXEE CANAL

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4. Raychem corporation
300 Constitution Drive
Menlo Park, California 94025
Tel. (415) 361-5037

The Contractor is advised that the State may exclude this item of work from this contract in accordance with section 1-09.5 of the standard specifications.

The lump sum contract price for "Cathodic Protection System" shall be full compensation for all labor, materials, tools and equipment necessary to complete, furnish, install, energize, adjust, evaluate and test the system as specified and as shown in the plans. All concrete patches required for equipment installation, including repairs to damaged areas, if any, and the proposal documents to maintain this system are also included in this item.

BRIDGE DRAIN RISERS

All steel used in the construction of the risers for the drain modifications shall conform to ASTM designation A-36. The bridge drain risers shall be welded to the top of the existing bridge drains as detailed in the plans before installation of the latex modified overlay and they shall maintain uniform contact with the existing drain. The latex modified concrete overlay shall extend to the bottom of and all around the bridge drain riser.

After all the items of work on this project have been completed, the Contractor shall clean and flush all eight of the existing bridge drains.

All costs involved in the construction of the risers for the drain modifications, shall be incidental to and included in the unit contract price per square yard for "Latex Modified Concrete Overlay".

EXPANSION JOINT MODIFICATION

The Contractor shall remove portions of the existing expansion joint, furnish material for and install the new expansion joint and steel plates in accordance with the contract documents.

The expansion joint system(s) shall be installed in accordance with the manufacturer's written recommendations. The Contractor shall submit, with his working drawing submittal, the manufacturer's written installation procedure to the Engineer for his approval.

The Contractor shall submit working drawings of the expansion joint system(s) proposed for use in this project to the Engineer for approval. Submittal of working drawings shall be in accordance with provisions of section 1-05.3 of the standard specifications. Six sets

SR 24
YAKIMA TO MOXEE CANAL

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APPENDIX C
PROJECT CHANGE ORDERS

WASHINGTON STATE
DEPARTMENT OF TRANSPORTATION

Sheet 1 of 1
Date 8/9/85

Change
Order
Number 1

CHANGE ORDER

Ordered by Engineer under terms of Section 1-04.4 of the Standard Specifications

Change proposed by Contractor

2957

Superior Asphalt & Concrete Co.
P. O. Box 10268
Yakima, WA 98909

Sign Route: SR 24
Federal Aid No.: F-024(13)
Project No.: Yakima to Moses Canal

Endorsed by: Superior Asphalt & Concrete Co.
Contractor Firm Name

[Signature] 8-13-85
Signature Date

Title: Operations Manager

Consent given by Surety: (when required)

By: _____ Date _____
Attorney-in-fact

DESCRIPTION OF WORK

You are ordered to perform the following described work upon receipt of an approved copy of this change order:

Permission is granted to substitute the heavier epoxy coated welded wire fabric in 4 ga. 4" X 4" mesh for the plan 5 ga. 4" X 4" epoxy coated welded wire fabric.

This substitution is a superior product, and will be made at no extra cost to the State. No change in payment (incidental to ~~XXXXXX~~ Expansion Joint Modification).

This C.O. will not require a time extension.



All work, materials and measurement to be in accordance with the provisions of the Standard Specifications and Special Provisions for the type of construction involved

DISTRICT APPROVAL REQUIRED	ORIGINAL CONTRACT AMOUNT	CURRENT CONTRACT AMOUNT	ESTIMATED NET CHANGE THIS ORDER	ESTIMATED CONTRACT TOTAL AFTER CHANGE
<input checked="" type="checkbox"/>	\$ 963,160.97	\$ 963,160.97	\$ -0-	\$ 963,160.97
DISTRICT USE		HEADQUARTER'S USE		
APPROVAL RECOMMENDED		APPROVED:		
Project Engineer _____ Date _____		Highway Construction Engineer _____ Date _____		
<input checked="" type="checkbox"/> APPROVAL RECOMMENDED		<input checked="" type="checkbox"/> APPROVED		
DISTRICT ADMINISTRATOR <u>C.W. [Signature]</u>				
By <u>[Signature]</u> Date <u>8/14/85</u>				

AUG 28 1985

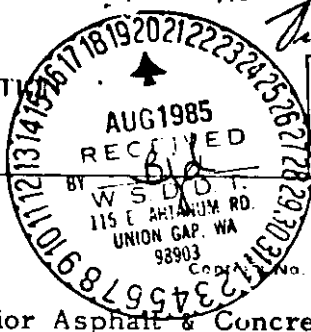
ORIGINAL

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

CHANGE ORDER

Sheet 1 of 1 Date 8/15/85

Change Order Number 2



Ordered by Engineer under terms of Section 1-04.4 of the Standard Specifications Part Change proposed by Contractor Part

To Superior Asphalt & Concrete Co. P. O. Box 10268 Co. Yakima, WA 98909

Endorsed by Superior Asphalt & Concrete Contractor Firm Name Signature Date 8-16-85

Sign Route SR 24 Federal Aid No. F-024(13) Project Title Yakima to Moxee Canal

Title Operations Manager Consent given by Surety: (when required) By: Attorney-in-fact Date

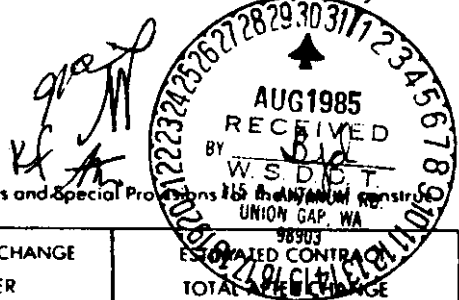
DESCRIPTION OF WORK

You are ordered to perform the following described work upon receipt of an approved copy of this change order:

- (1) Plan Sheet 29 of 30 shows the welded wire fabric extending 18" minimum beyond the steel plate. At the Contractor's request, this mesh can be shortened to avoid contact with the cathodic anode. The mesh should extend beyond the edge of the plate a minimum of two inches to prevent a crack developing at the steel-concrete interface. (2) Permission is granted to delete the painting requirement on the expansion joint plates as described in the Special Provisions on Page 72, providing the surface of the expansion joints are sand blasted prior to the concrete pour. (3) The Contractor is directed to leave the wet curing blankets on the deck for a total of 48 hours. Accordingly, the dry cure time is reduced to 48 hours. Thus, the total cure time is 96 hours, in accordance with the Contract Special Provisions.

If it becomes necessary to remove the blankets, re-wet the deck, and replace the blankets prior to the end of the 48 hour wet cure, payment for this work will be in accordance with Section 1-09.6 of the Standard Specifications, Force Account, and paid under Item #45, Roadside Cleanup. No other compensation will be necessary.

This Change Order will not effect contract time.



All work, materials and measurement to be in accordance with the provisions of the Standard Specifications and Special Provisions 115 E. ARTANUM RD. UNION GAP, WA 98903

Table with 5 columns: DISTRICT APPROVAL REQUIRED, ORIGINAL CONTRACT AMOUNT (\$963,160.97), CURRENT CONTRACT AMOUNT (\$963,160.97), ESTIMATED NET CHANGE THIS ORDER (-0-), ESTIMATED CONTRACT TOTAL AFTER CHANGE (\$963,160.97)

DISTRICT USE APPROVAL RECOMMENDED Project Engineer Signature Date 8/21/85

HEADQUARTER'S USE APPROVED Highway Construction Engineer Signature Date 8-21-85

DISTRICT ADMINISTRATOR C. W. Bowman Signature Date 8-26-85

APPROVED

WASHINGTON STATE
DEPARTMENT OF TRANSPORTATION

SEP - 5 1985
JW

Change Order Number 4

Sheet 1 of 1
c 8/22/85

CHANGE ORDER

Ordered by Engineer under terms of Section 1-04.4 of the Standard Specifications
 Change proposed by Contractor

Contract No 2957
To Superior Asphalt & Concrete Co.
P. O. Box 10268
Yakima, WA 98909

Endorsed by: Superior Asphalt & Concrete Co.
Contractor Firm Name
Bell Hammond 8-26-85
Signature *Date*
Title Contract Representative
Consent given by Surety: (when required)
By: _____
Attorney-in-fact *Date*

Sign Route SR 24
Federal Aid No. F-024(13)
Project Title Yakima to Moxee Canal

DESCRIPTION OF WORK

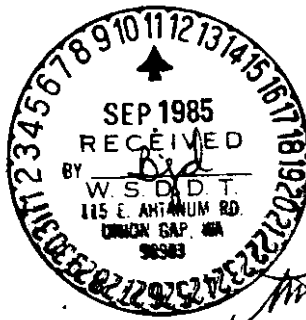
You are ordered to perform the following described work upon receipt of an approved copy of this change order:

The Special Provisions require sand blasting 24 hours in advance of the placement of latex modified concrete.

Permission is granted to use high pressure water blasting (acceptable to the Engineer) in lieu of sand blasting.

Due to the sensitive nature of the cathodic bridge protection, this change in method of blasting (cleaning) is potentially a superior method. Correspondingly, this change is made at no credit from the Contractor.

This change will not effect contract time.



All work, materials and measurement to be in accordance with the provisions of the Standard Specifications and Special Provisions for the type of construction involved.

<input type="checkbox"/> DISTRICT APPROVAL REQUIRED <input checked="" type="checkbox"/> HEADQUARTERS APPROVAL REQUIRED	ORIGINAL CONTRACT AMOUNT	CURRENT CONTRACT AMOUNT	ESTIMATED NET CHANGE THIS ORDER	ESTIMATED CONTRACT TOTAL AFTER CHANGE
	\$ 963,160.97	\$ 999,160.97	\$ -0-	\$ 999,160.97

DISTRICT USE
APPROVAL RECOMMENDED
Revered Pitt 8/27/85
Project Engineer *Date*
 APPROVAL RECOMMENDED APPROVED
DISTRICT ADMINISTRATOR C.W. Beeman
By [Signature] Date 8-30-85

HEADQUARTER'S USE
APPROVED: [Signature] 9.6.85
Highway Construction Engineer *Date*

WASHINGTON STATE
DEPARTMENT OF TRANSPORTATION

Sheet 1 of 3
Date 8/27/85

Change
Order
Number 6

CHANGE ORDER

Ordered by Engineer under terms of Section 1-04.4 of the Standard Specifications

Change proposed by Contractor

2957

Superior Asphalt & Concrete Co.
P. O. Box 10268
Yakima, WA 98909

Endorsed by Superior Asphalt & Concrete Co.
Contractor Firm Name

[Signature] [Date]
Signature Date

Title Contract Representative

Consent given by Surety: (when required)

By _____ Date _____
Attorney-in-fact

SR 24
F-024(13)
Yakima to Moxee Canal

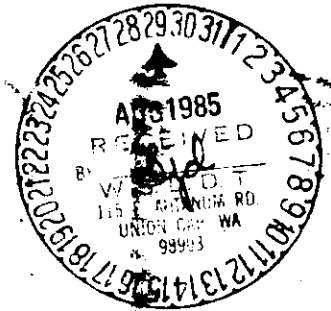
DESCRIPTION OF WORK

You are ordered to perform the following described work upon receipt of an approved copy of this change order:

Pressure epoxy seal the two steel expansion joints for Bridge 24/5. This work will consist of, but not be limited to, drilling the steel plates to accept the epoxy, supplying and placing a sealer epoxy on joints that will leak the pressure epoxy, supplying epoxy, pumping the epoxy into the joints, and other work as needed.

Payment for the above described work will be paid for under the new item "Pressure epoxy Sealing", and will be considered as a specialized service. As such, the provisions of Sheet 3 of 3 of this C.O. shall also apply.

This work will be done concurrently with the other deck work, and will not involve any change in contract time.



All work, materials and measurement to be in accordance with the provisions of the Standard Specifications and Special Provisions for the type of construction involved.

DISTRICT APPROVAL REQUIRED HEADQUARTERS APPROVAL REQUIRED	ORIGINAL CONTRACT AMOUNT	CURRENT CONTRACT AMOUNT	ESTIMATED NET CHANGE THIS ORDER	ESTIMATED CONTRACT TOTAL AFTER CHANGE
<input type="checkbox"/>	\$ 963,168.97	\$ 1,000,190.48	\$ 3,000.00	\$ 1,003,190.48
DISTRICT USE APPROVAL RECOMMENDED <u>[Signature]</u> <u>8/29/85</u> Project Engineer Date		HEADQUARTER'S USE APPROVED _____ Highway Construction Engineer Date		
<input type="checkbox"/>	DISTRICT ADMINISTRATOR <u>C.W. Beman</u> By <u>[Signature]</u> Date <u>29 Aug 1985</u>			

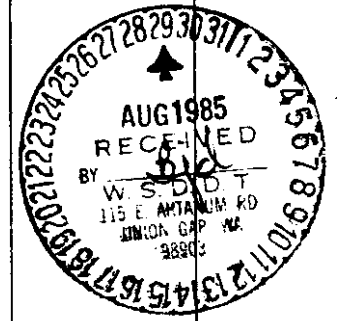
WASHINGTON STATE
DEPARTMENT OF TRANSPORTATION

Contract Number	2957
Change Order Number	6

Page 2 of 3
Date 8/27/85

CHANGE ORDER ESTIMATE

ITEM NO.	GROUP NO.	STD. ITEM NO.	DESCRIPTION	UNIT MEASURE	UNIT PRICE	ESTIMATED QUANTITY CHANGE	ESTIMATED AMOUNT CHANGE
New	2	---	Pressure Epoxy Sealing	Est.	---	---	+\$3,000.00



Specialized Services:

Under agreement by the Engineer and the Contractor, it may be determined that a certain item or service under force account work cannot be satisfactorily performed by the forces of the Contractor or his subcontractors, in which case such item or service may be performed by a specialist. Invoices for such item or service on the basis of the current market price thereof may be accepted without complete itemization of labor, material and equipment cost when such itemization is impracticable or not customary under the circumstances. Where the force account work necessitates fabrication or machining work by the Contractor away from the job site, charges for such work may, by agreement, be accepted as a specialist billing. The specialist invoices shall show credit for cash or trade discounts offered or available the same as applies to force account work, but shall not include a percentage or other markup. An amount equal to 15 percent of the total invoice from the specialist shall be added for overhead, profit, and all other costs incidental to furnishing and providing such specialized work.

The State reserves the right to disallow invoice payments based on rates higher than those customary for similar types of work. The Engineer may request a detailed breakdown of the invoice or further documentation which justifies the requested payment. In the event payment by invoice is disallowed, payment shall be made using the elements specified under subparagraphs 1, 2, and 3 of section 1-09.6 of the standard specifications.



C.O. # 6
Sheet 3 of 3

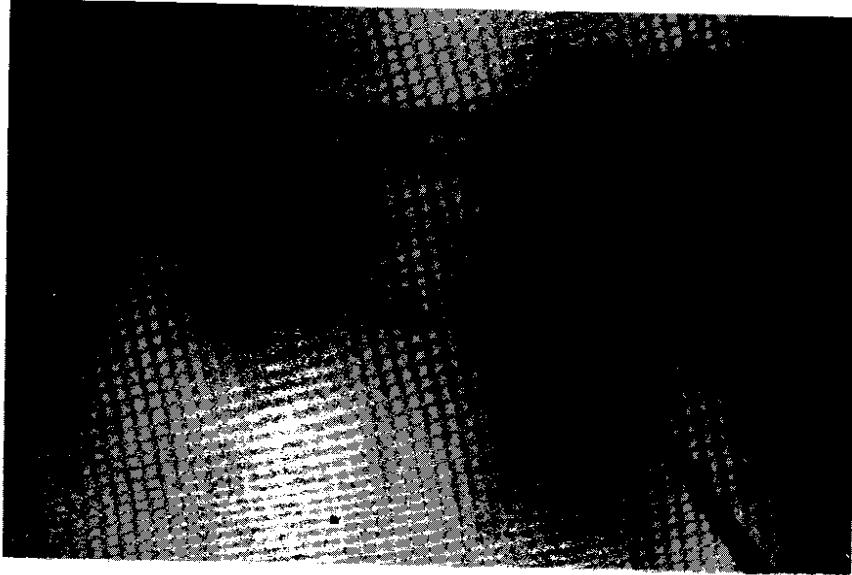
APPENDIX D
PROJECT PHOTOGRAPHS



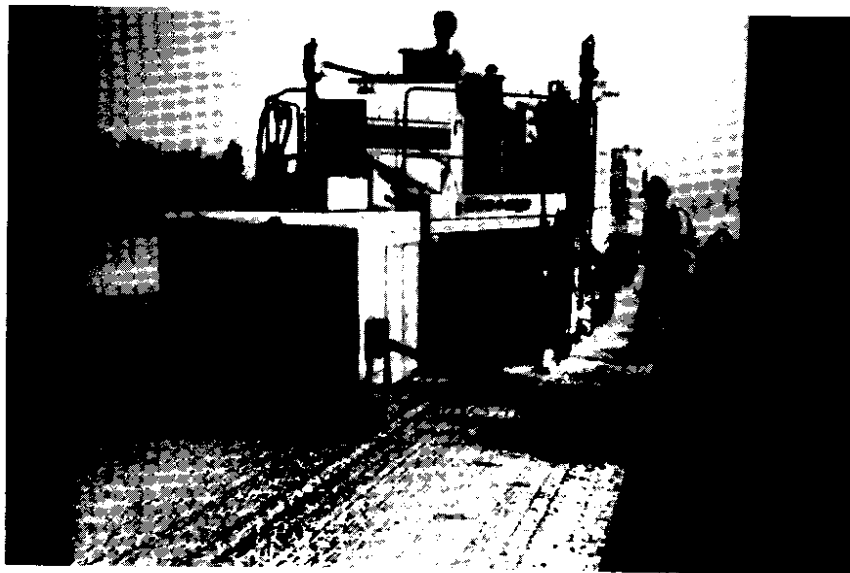
Yakima bridge elevation.



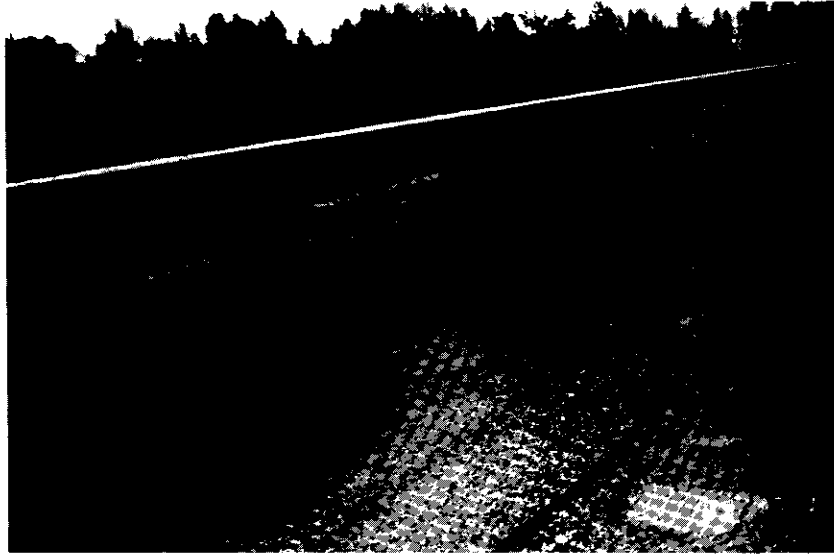
Yakima bridge deck.



It was necessary during this project to keep one lane open to traffic at all times.



The first phase of the project was to scarify the deck 1/4" inch to remove surface contaminants such as oil and grease.



Locating delams by chain dragging and marking on the deck in red paint.



Pneumatic jackhammers are used to remove the delaminated areas.



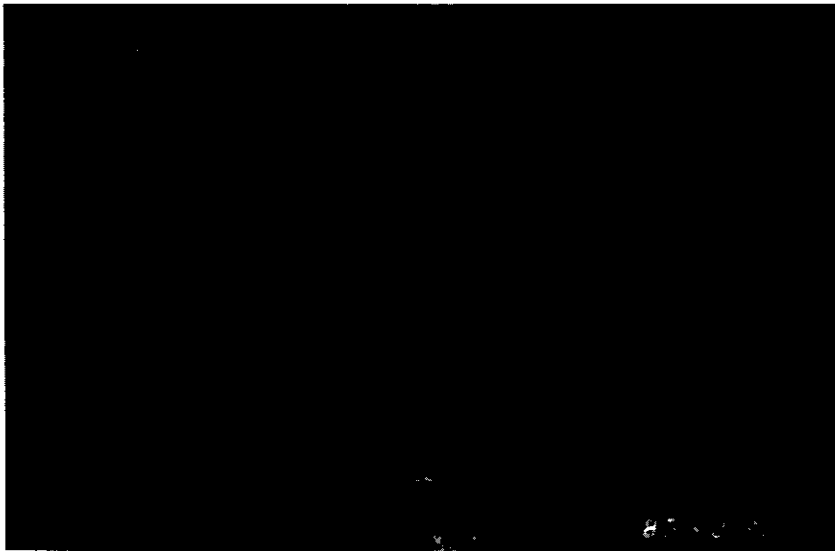
Delam removal.



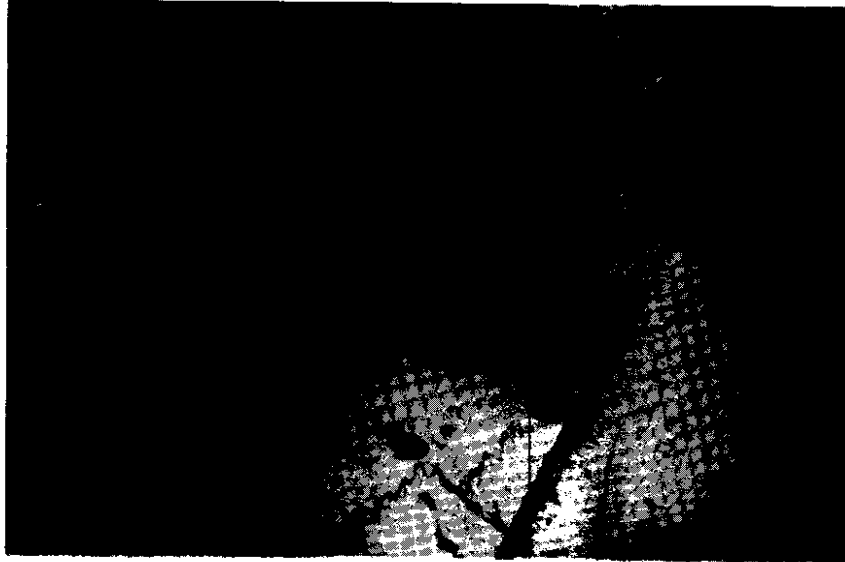
Premixed Fondu was used to repair
the delaminated areas by hand.



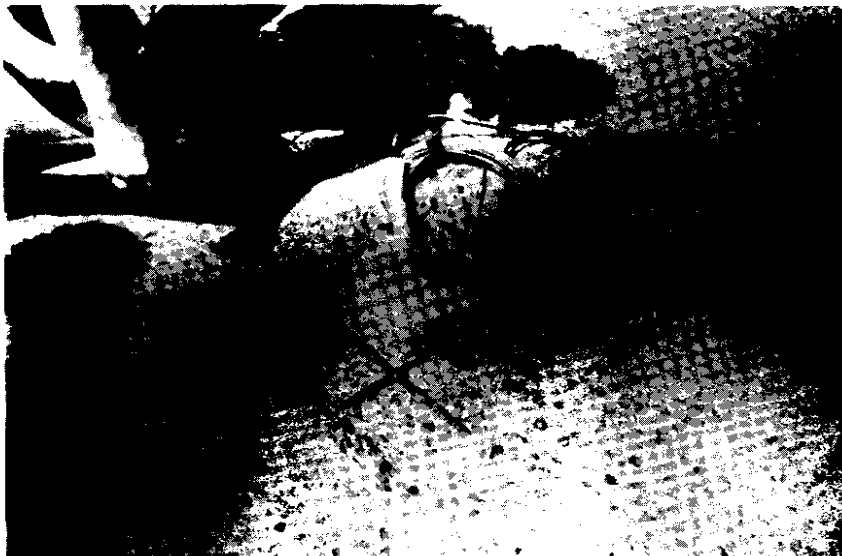
Expansion dams were found loose in some cases and were epoxy injected.



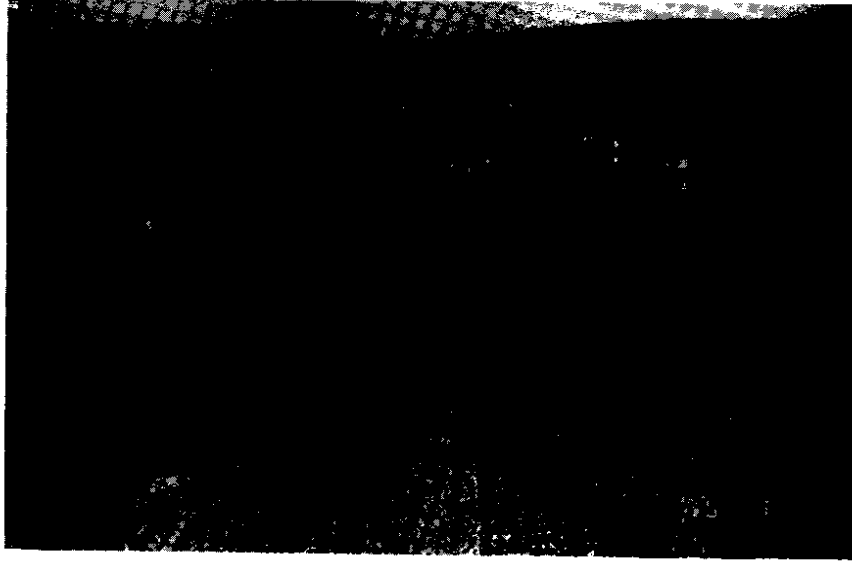
Cutouts are made in the deck to install the reference cells and rebar probes.



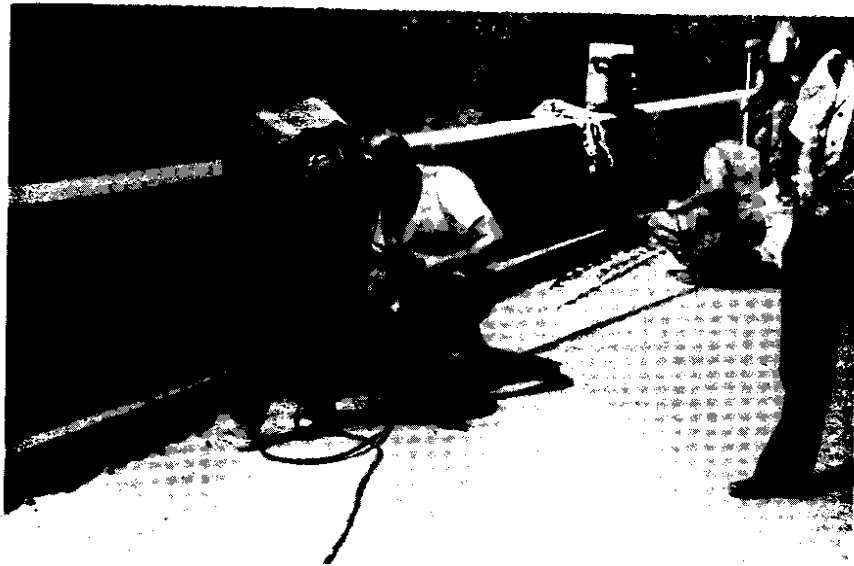
The small concrete block on the left is the rebar probe and the reference cell with cover is shown on the right.



Rebar probe and reference cell being sized for the deck cutouts.



The deck is further prepared
by sandblasting.



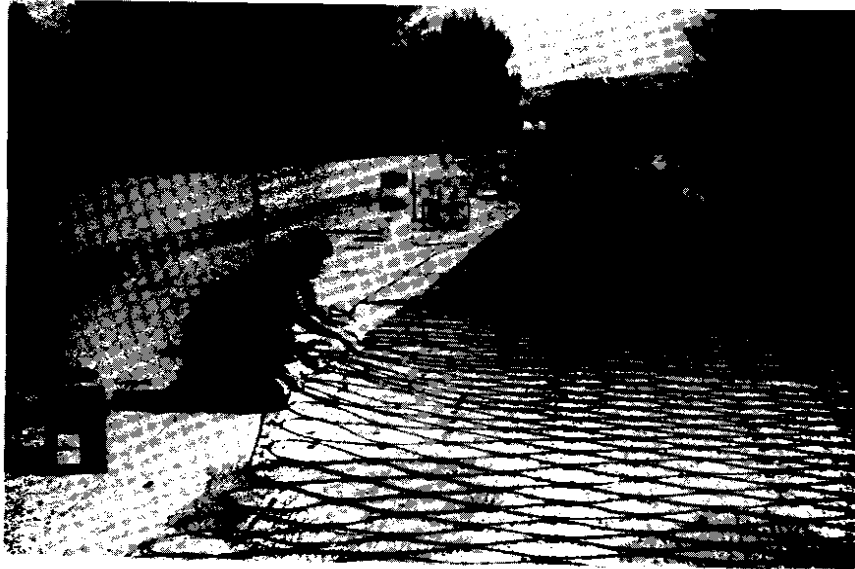
Fastening panel mounting rod to
the deck near the curb line.



Ferex anode panels are rolled out on the deck.



The Ferex anode is manufactured by the Raychem Company.



Stretching the anode panel to size.
Drilling and installing plastic fasteners.



Anode strand panel loops meeting the panel
mounting rods at the center of the bridge.



The deck is further cleaned by water blast just prior to pouring the latex modified concrete overlay.



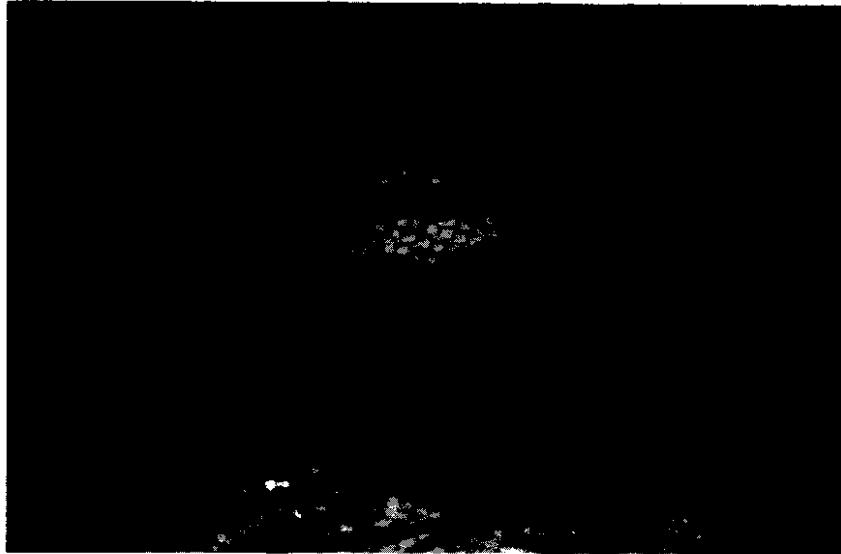
The Bidwell paving machine is tested prior to the LMC pour.



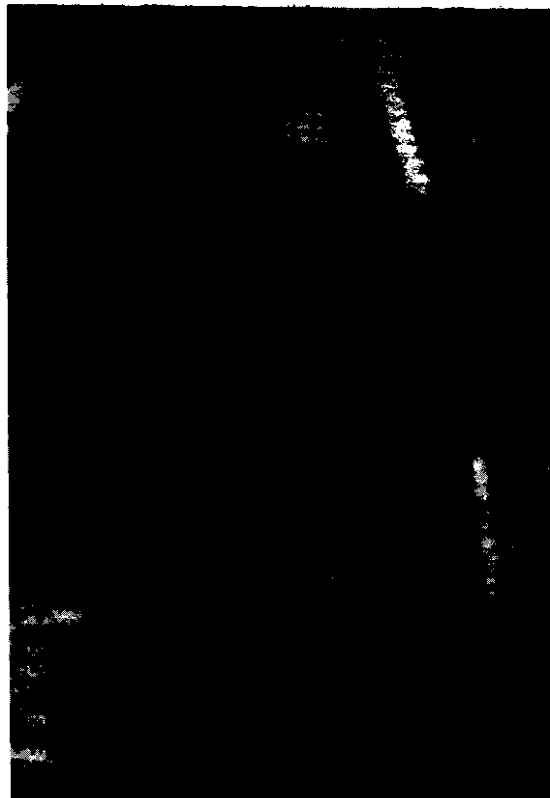
Night pour of the LMC.



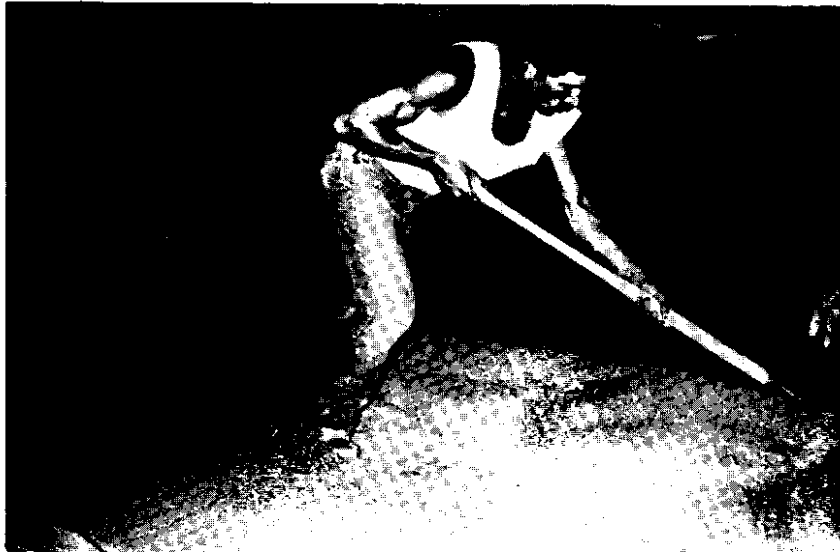
Plywood on the deck was used to distribute the weight of the LMC truck on the anode.



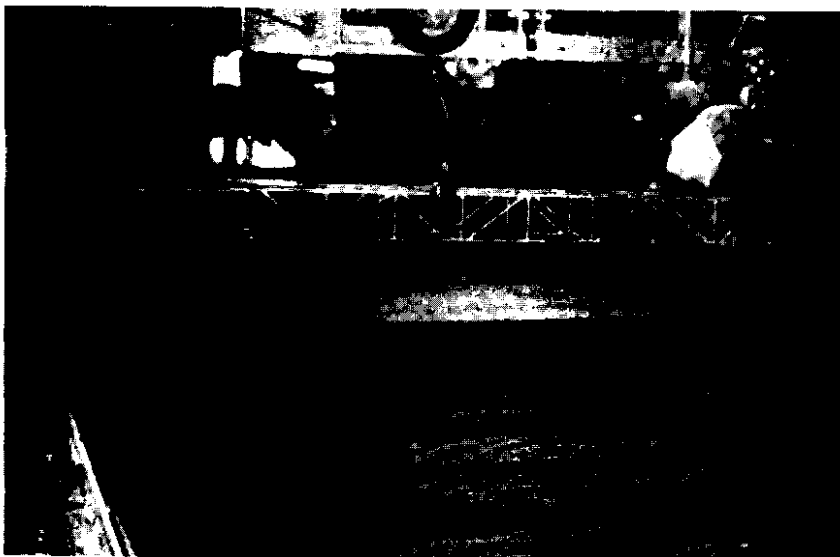
Slurry is brushed on the deck
prior to placement of the LMC.



LMC deposited on deck by chute from truck.



Further spreading of LMC by hand
in front of the paver.



LMC covered behind the paver with wet burlap.