

APPENDIX I

***Hard copy of Power Point
presentation given by
Michael Sprinkel, Virginia
DOT.***

***International Congress of
Polymers in Concrete Conference,
May 2001, in Honolulu Hawaii***

POLYESTER POLYMER CONCRETE IN BRIDGE DECK OVERLAYS

RIG MAGGENTI, PE (Technology)

Caltrans

LEO FERRONI, PE

Caltrans - Retired

JEROME L. DEVILBISS (Applications)

Reichhold, Inc.

Presented By

MICHAEL SPRINKEL

Virginia Department of Transportation

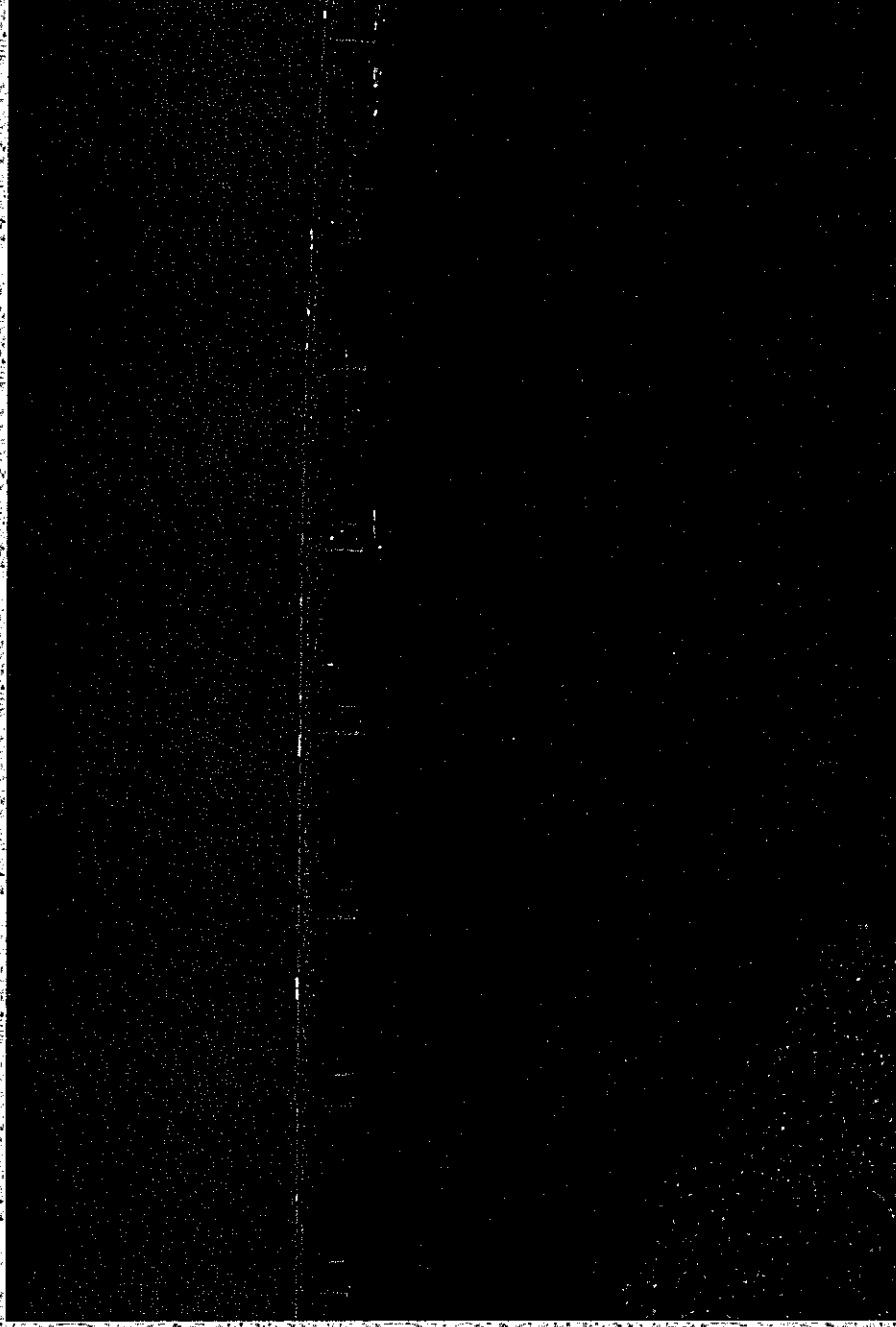
Summary of Polyester Polymer Concrete In Bridge Deck Overlays

- Durable mechanical properties
- Impermeable to chloride penetration
- Can be placed in thin sections, i.e. reduced dead load, and under a wide range of conditions
- Rapid return to service, 3 hours
- On balance, a good alternative for repair and rehabilitation of structures

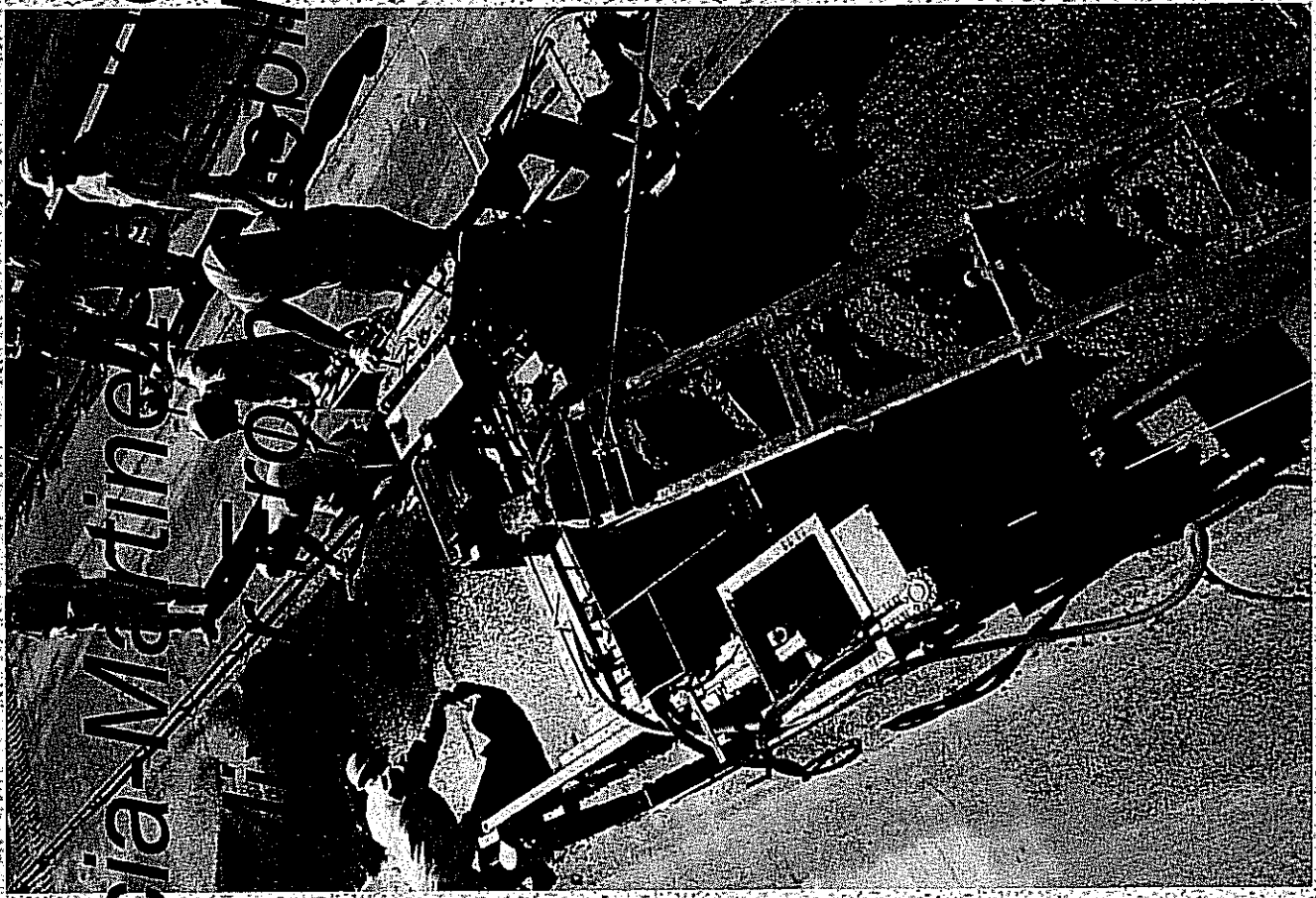
Mechanical Properties

	Polyester Concrete	Portland Cement Concrete (8 sack)	Latex- modified Concrete	Silica- fumed Concrete
Compressive strength, psi	8,000	7,000	9,000	7,000
Compressive modulus of elasticity, psi	$1-2 \times 10^6$	$3-5 \times 10^6$	$3-4 \times 10^6$	$2-4 \times 10^6$
Flexural strength, psi	2,200	800	900	1,100
Abrasion (weight loss, grams)	1-2	10-20	10-20	10-20
Return to service	2-4 hours	1-4 days	1-4 days	1-4 days
Chloride permeability, coulombs	0-300	1,000 - 2,000	500 - 1,000	500 - 1,000

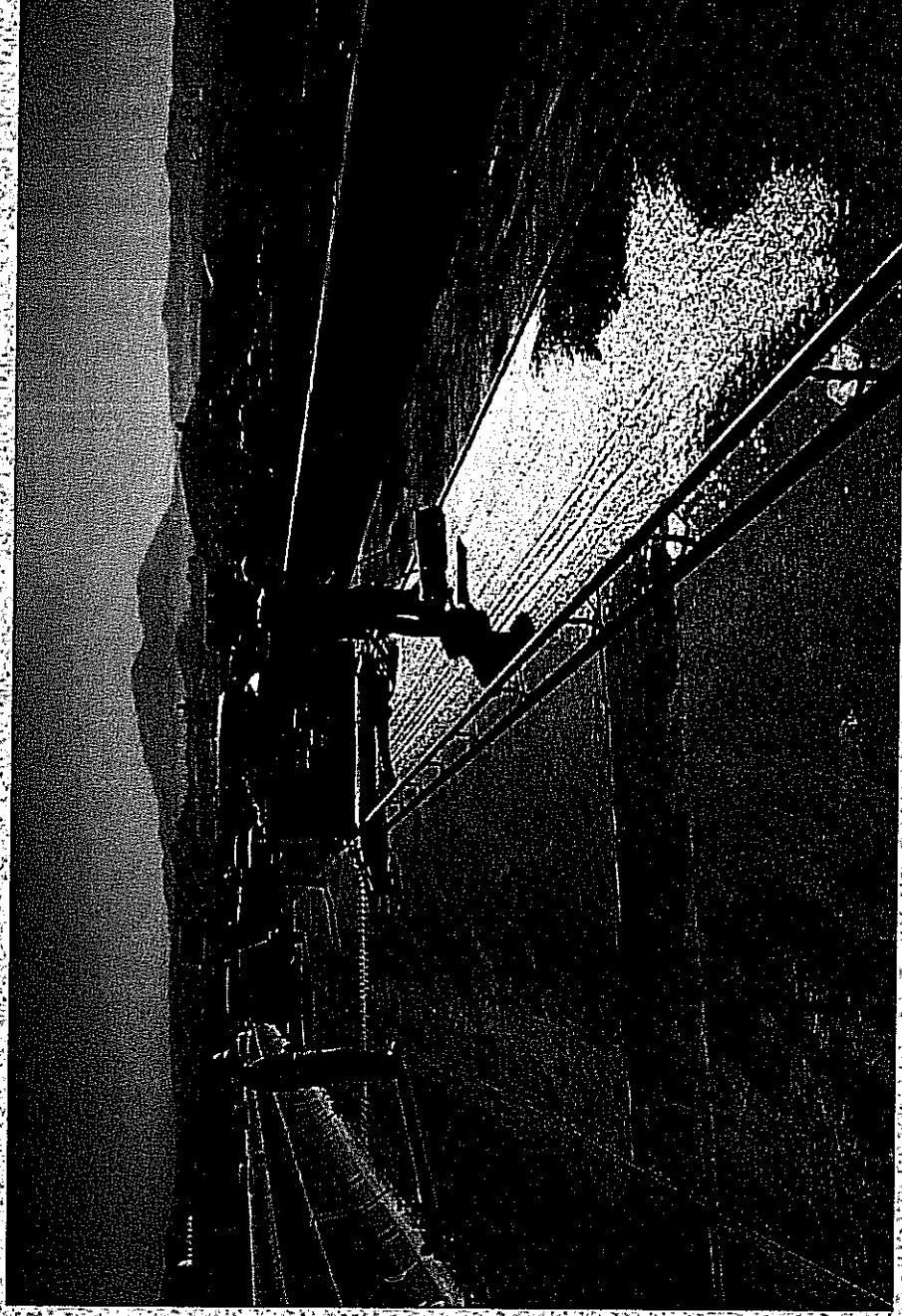
Benicia-Martinez Bridge



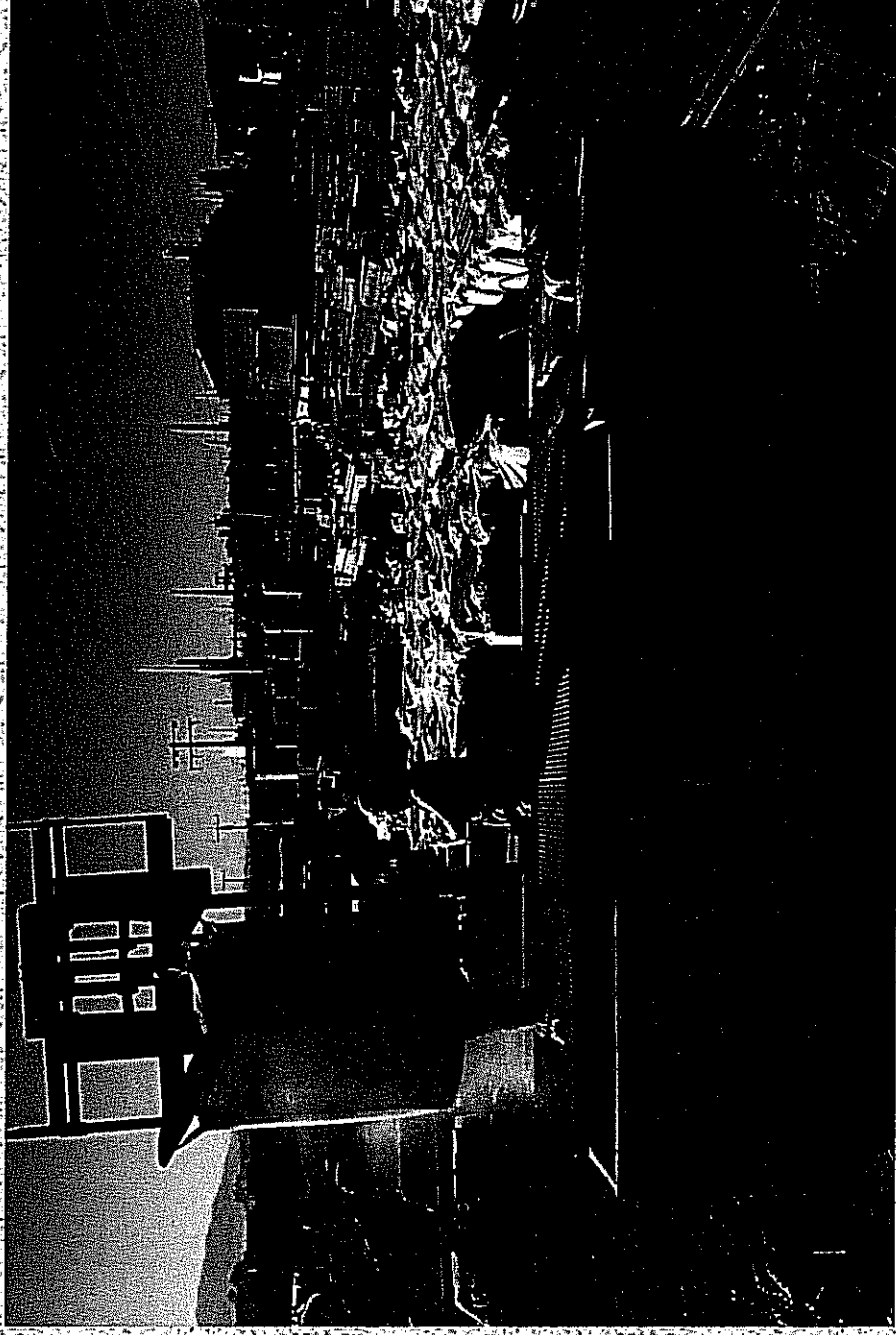
Benicia-Martinez 9 - 9 ft Auger Mixer



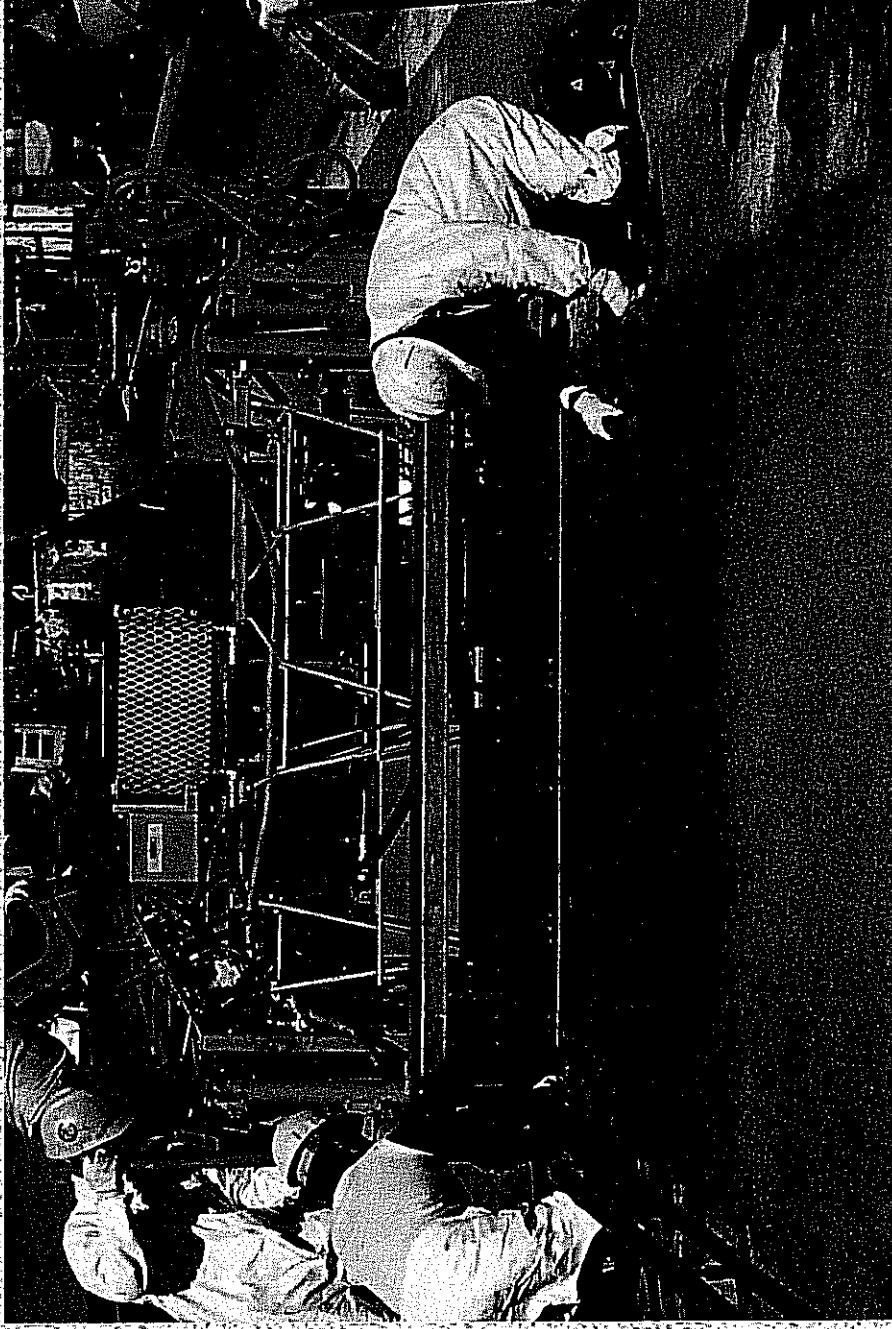
Benicia-Martinez Bridge Applying Primer



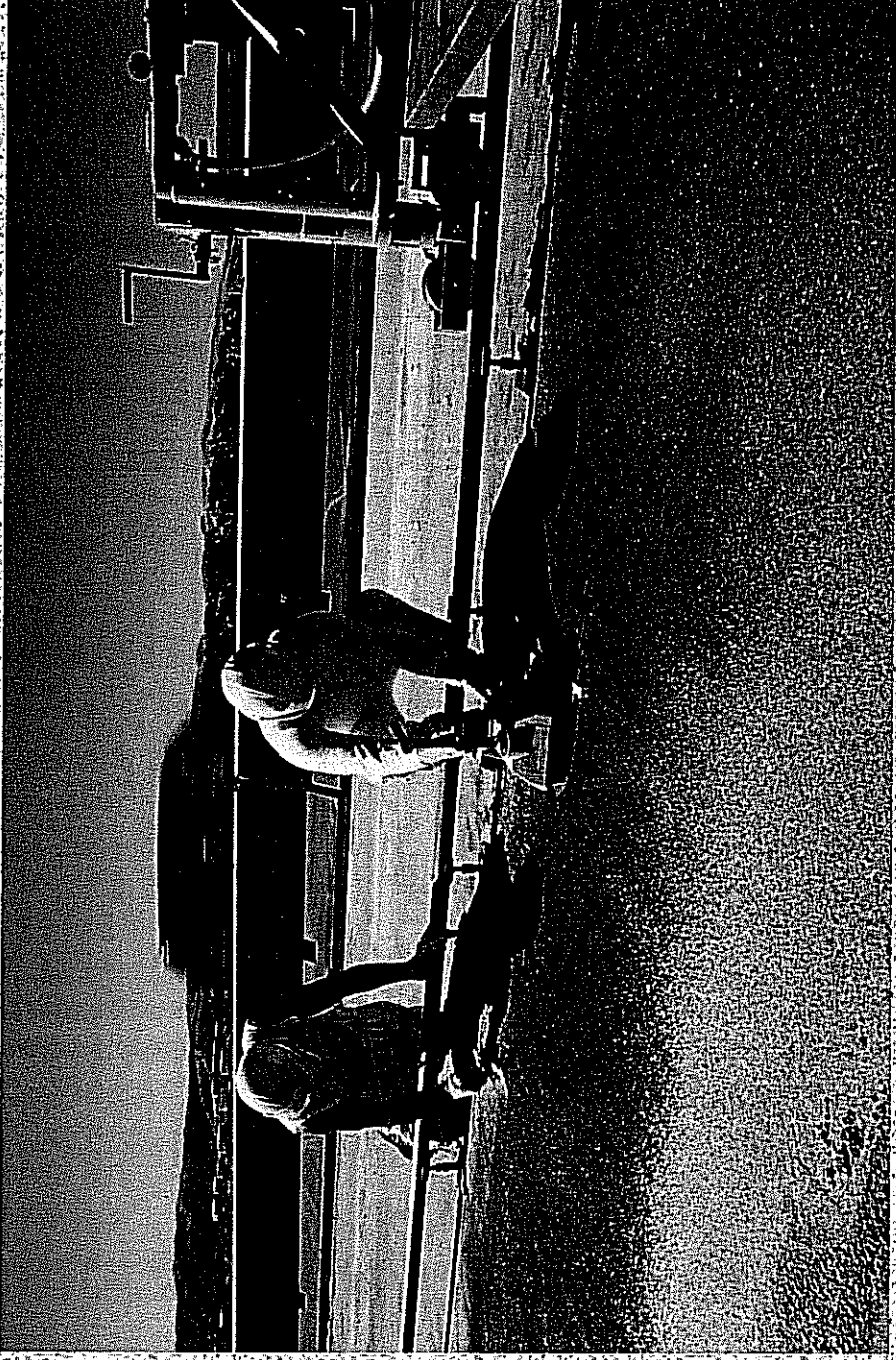
Benicia-Martinez Bridge - Transferring Aggregate



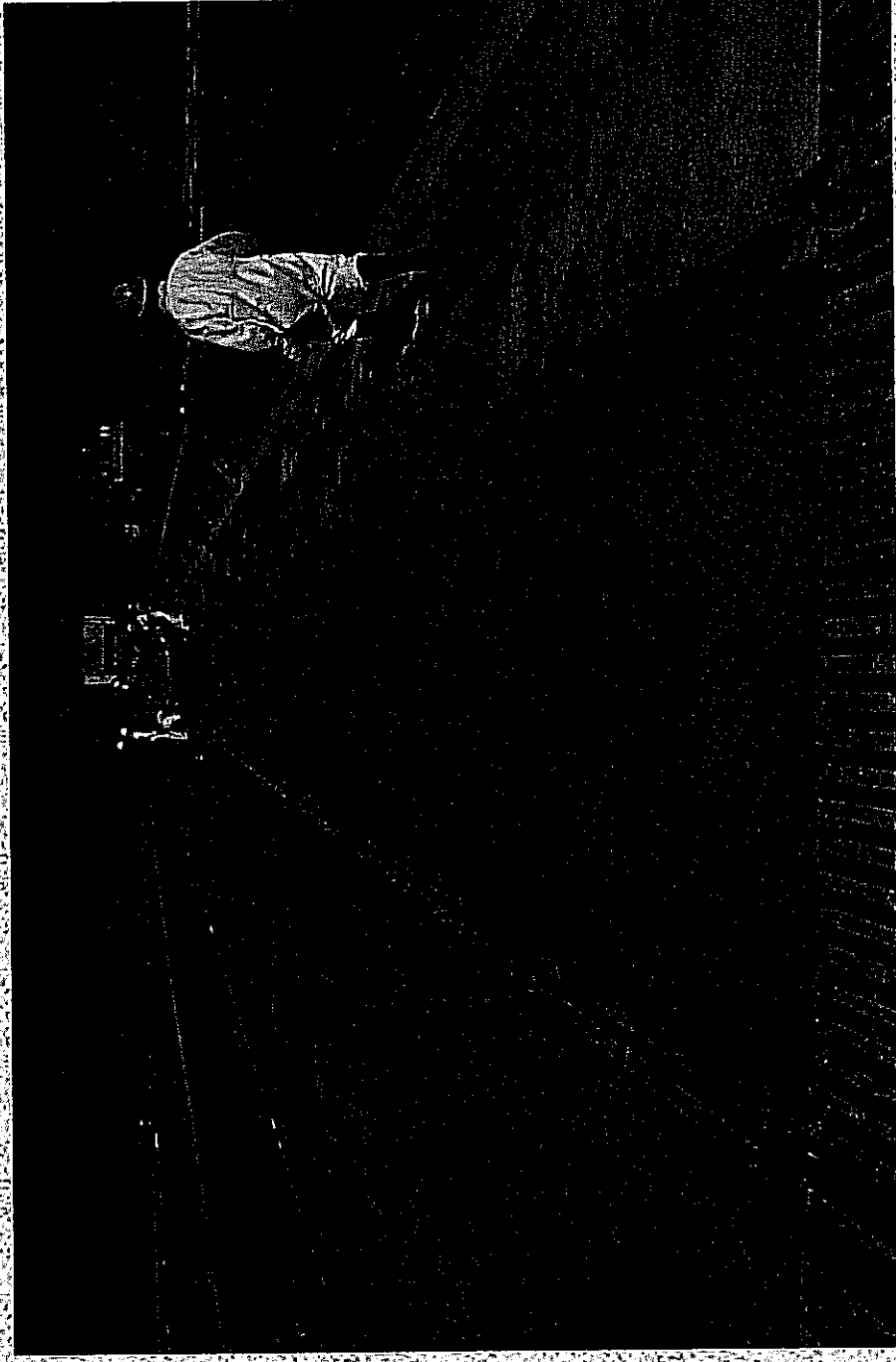
Benicia-Martinez Bridge Finishing Grade Platform



Benicia-Martinez Bridge Inspector Checking Compaction



Benicia-Martinez Bridge Broadcast Top Sand



Marina Viaduct Bridge

- Approach to the Golden Gate Bridge
- Built in the 1930's
- Bridge is 60 ft wide and 3,300 ft long
- On ramps - super elevating reverse curves
- Rebar showing on surface
- Delaminations
- Polishing Surface
- Very poor ride quality - potato chips 30' o.c.

Construction Problems

- **Funnel all traffic to downtown**
- **100,000 average daily count (ADT)**
- **Night work required**
- **Narrow (10 ft) lanes**
- **No permanent barriers**
- **Low temperatures (42°F to 55°F)**
- **High humidity (85%±)**

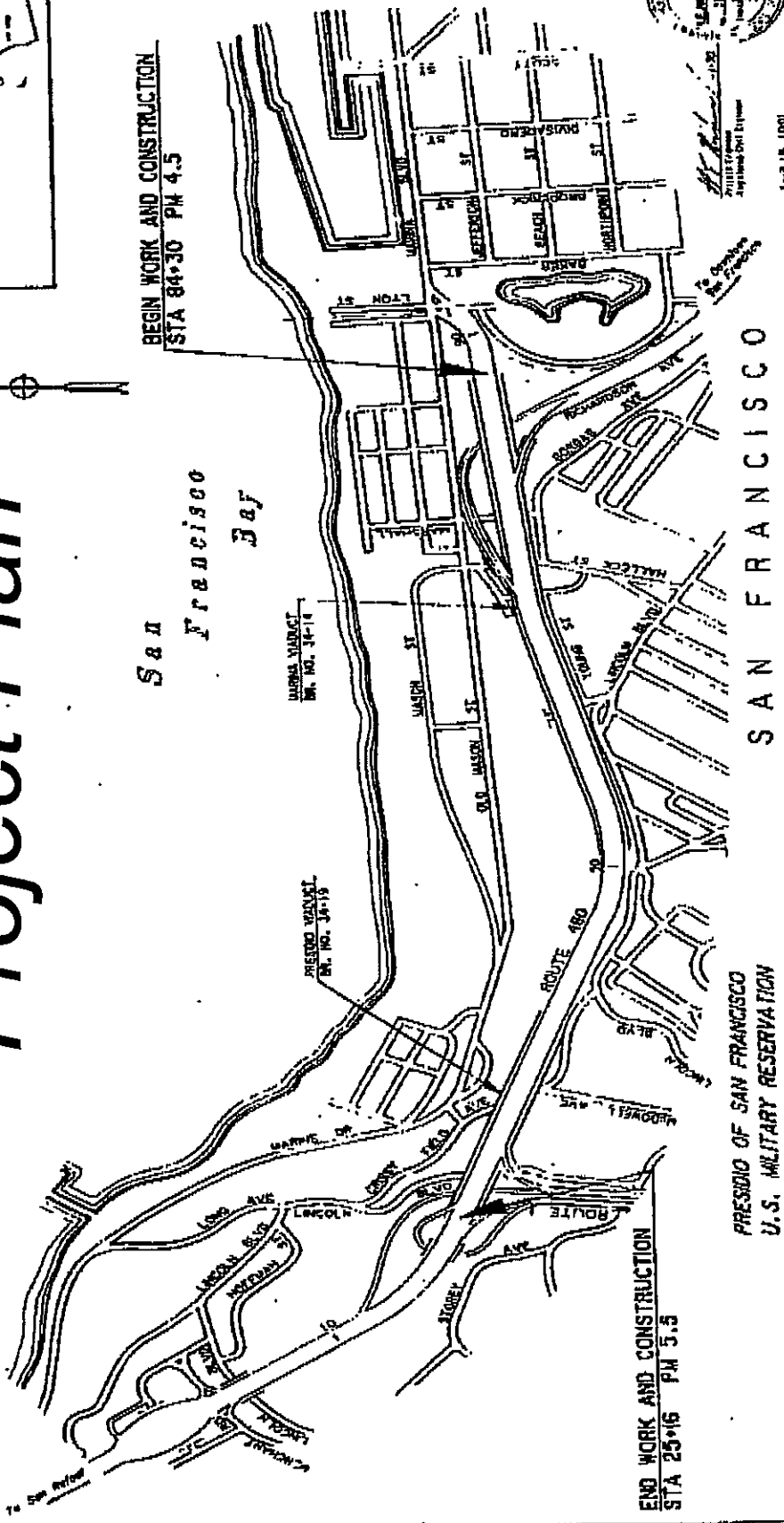
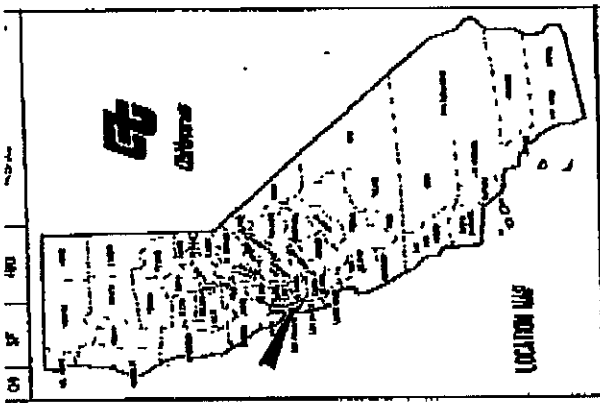
- PAGE OF SHEETS**
- 1 Title and Location Map
 - 2 Standard Plans (L)
 - 3-5 Layout and Utility Plans
 - 6 Construction Details
 - 7-9 General Notes
 - 10-12 Proposed Plans
 - 13 Summary of Plans
 - 14 General Notes

- STRUCTURE PLANS**
- 10-11 Traffic Yield (Qualification No. 14-19)
 - 12-13 Traffic Yield (Project No. 14-14)

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**PROJECT PLANS FOR CONSTRUCTION ON
STATE HIGHWAY
IN THE CITY AND COUNTY OF
SAN FRANCISCO
FROM MARINA BOULEVARD
TO ROUTE 1 (PORTIONS)**

To be supplemented by Standard Plans dated January, 1961

Project Plan



BEGIN WORK AND CONSTRUCTION
STA 84+30 PM 4.5

END WORK AND CONSTRUCTION
STA 25+16 PM 5.5



APR 15 1961
APPROVED SHEET BY _____
DATE _____

PRESIDIO OF SAN FRANCISCO
U.S. MILITARY RESERVATION

SAN FRANCISCO

LANE REQUIREMENT CHART

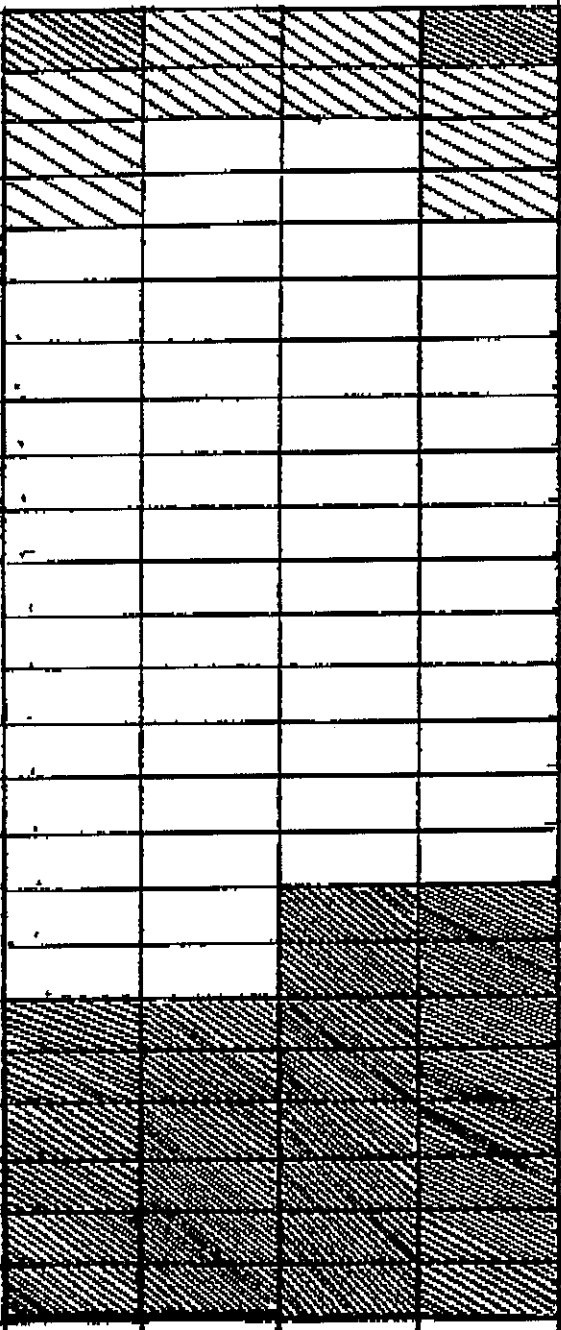
COUNTY: San Francisco ROUTE: 480 LOCATION: From North of Lyon St. to Rte 1 off-ramp

CHART NO: 1 DIRECTION: Northbound LIMITS (PM): 4.5/5.3




Lane Chart - Northbound

12:00 PM
11:00 PM
10:00 PM
9:00 PM
8:00 PM
7:00 PM
6:00 PM
5:00 PM
4:00 PM
3:00 PM
2:00 PM
1:00 PM
12:00 PM
1:00 AM
10:00 AM
9:00 AM
8:00 AM
7:00 AM
6:00 AM
5:00 AM
4:00 AM
3:00 AM
2:00 AM
1:00 AM
12:00 AM

Monday thru Thursday inclusive
Fridays and days preceding designated legal Holidays
Saturdays
Sundays & Designated legal Holidays



LEGEND:

-  Provide at least one traffic lane in direction of travel
-  Provide at least two adjacent traffic lanes in direction of travel.
-  No lane closure permitted.

REMARKS:

LANE REQUIREMENT CHART

COUNTY: San Francisco ROUTE: 480
 CHART NO: 2 DIRECTION: Southbound

LOCATION: From North of Lyon St. to North of Rie J on-ramp

LIMITS (PM): 4.5/5.3

Lane Chart - Southbound

12:00 PM
 11:00 PM
 10:00 PM
 9:00 PM
 8:00 PM
 7:00 PM
 6:00 PM
 5:00 PM
 4:00 PM
 3:00 PM
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 4:00 AM
 3:00 AM
 2:00 AM
 1:00 AM
 0:00 AM

Monday thru Thursday inclusive
 Fridays and days preceding designated legal Holidays
 Saturdays
 Sundays & Designated legal Holidays

12:00 PM	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)
11:00 PM	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)
10:00 PM	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)
9:00 PM	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)
8:00 PM	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)
7:00 PM	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)
6:00 PM	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)
5:00 PM	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)
4:00 PM	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)
3:00 PM	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)
2:00 PM	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)
1:00 PM	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)
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1:00 AM	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)
0:00 AM	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)
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1:00 AM	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)
0:00 AM	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)

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REMARKS:

Operations To Coordinate With General Contractor

- Lane Control
- Deck Preparation
 - Identify unsound concrete
 - Remove unsound concrete
 - Shot blast deck
 - Block out joints

Productivity

- Actual paving time, 2 to 3 hours per night
- Average depth of overlay, 1.25 inch
- Average quantity paved, 7,000 ft²
- Opened to traffic by 6 am

Subcontractor's Operations

- Air sweep deck
- Set grade control
- Prime deck
- Mix and place polymer concrete
- Saw cut relief planes
- Sweep deck
- Pick up grade control
- Open to public

*Marina Viaduct Bridge
Jack-hammering Unsound Deck*



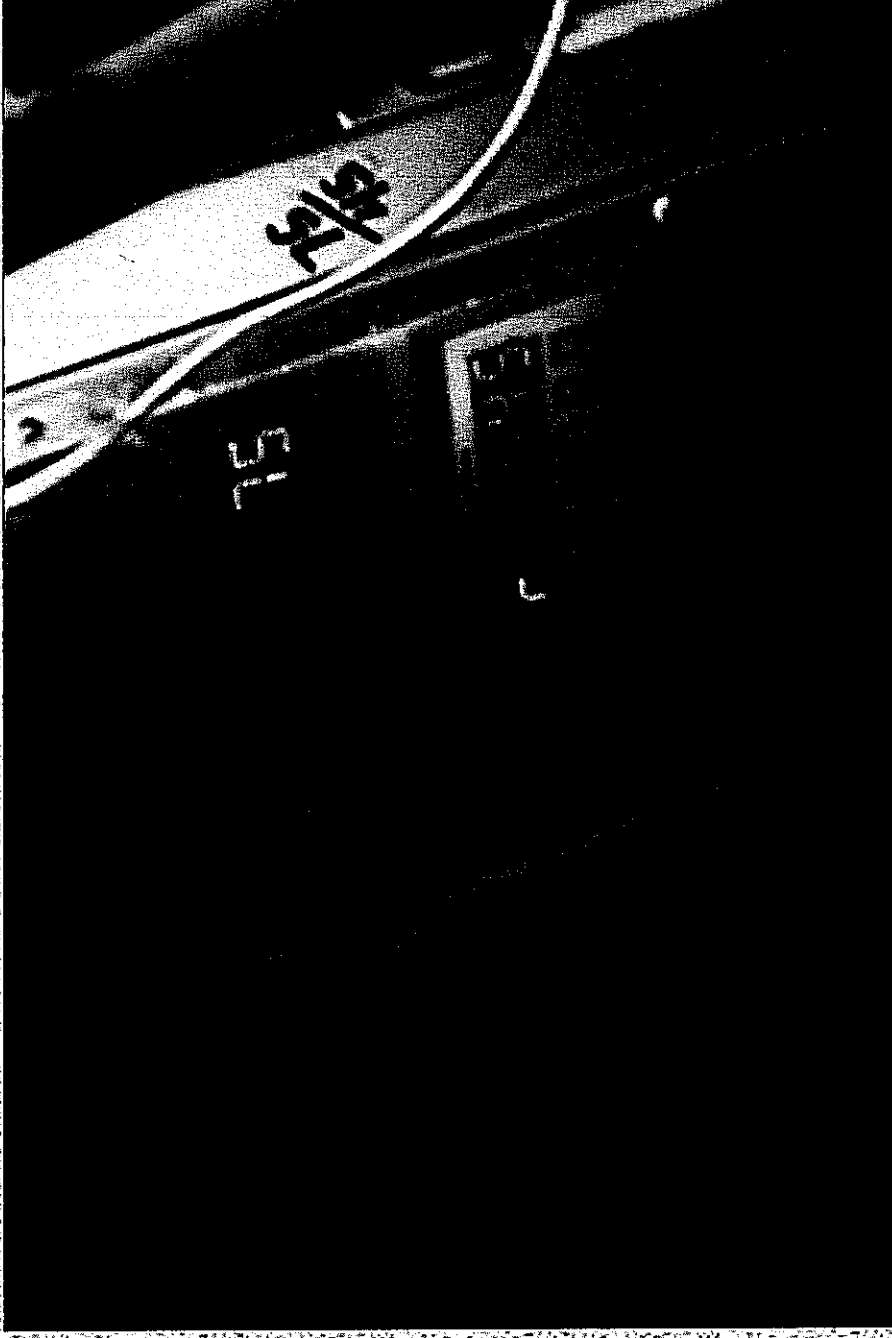
Marina Viaduct Bridge Primer Spray



Marina Viaduct Bridge Grade Control String Lines



Marina Viaduct Bridge Belt Speed (75) - Pump Rate Meter (45)



Marina Viaduct Bridge Flowmeter

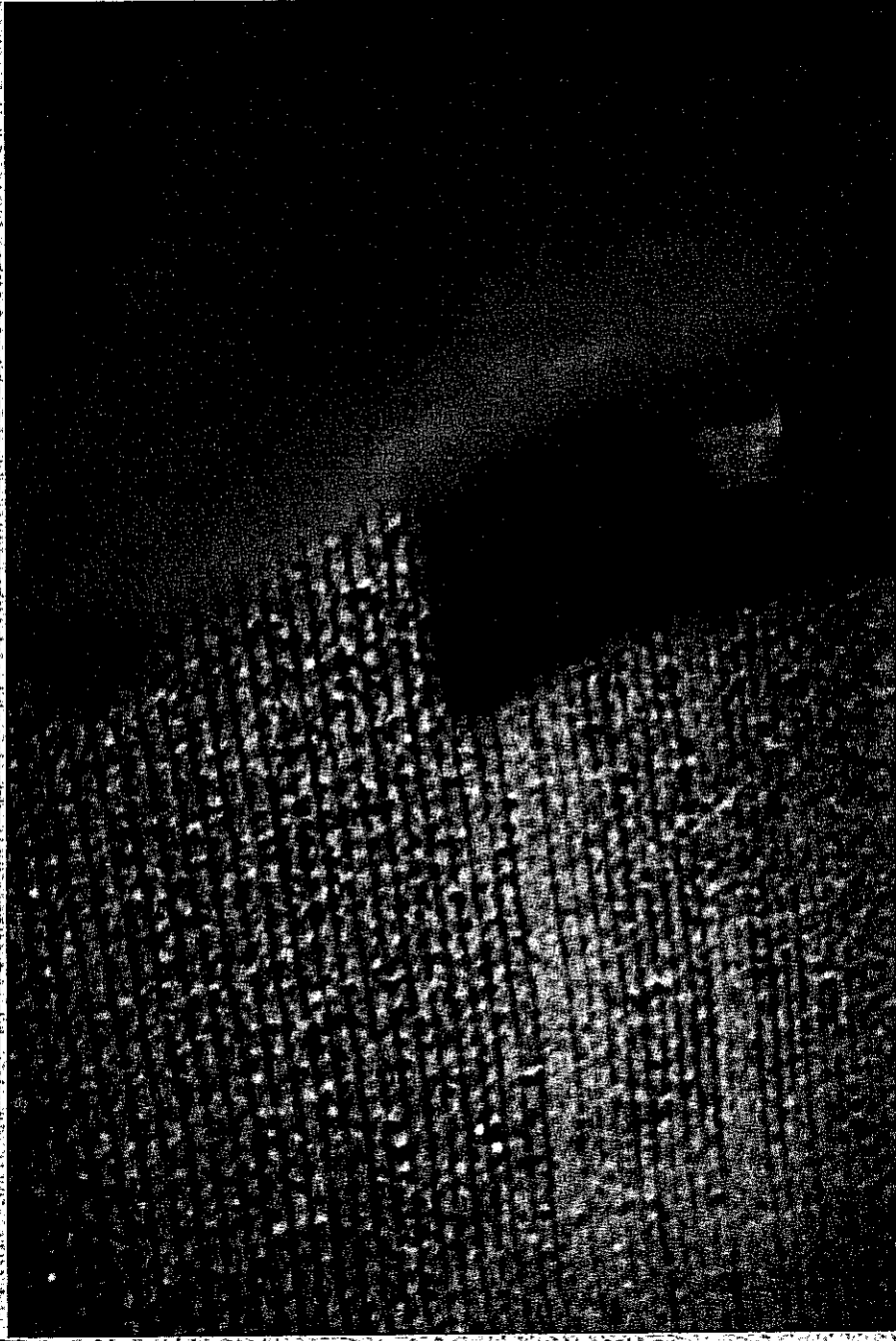


Marina Viaduct Bridge Broadcasting Sand By Hand



Marina Viaduct Bridge

Tine Pattern



Auger Mixer With Shear Compartments



Aggregate Delivered in Plastic Sacks



Future of Polymer Overlays

- A “proven” technology
- Owner’s must understand end product
- Contractors must be knowledgeable
- Specifications will evolve based on application requirements