

$$\frac{37 \times 5280 \times 20}{9 \times 2000} = 217 \text{ T/M at } \$12.00 = \$ 2,604.00$$

$$\text{CRS-2 } \frac{37 \times 5280 \times .25}{9 \times 237} = 22.9 \text{ T/M at } \$127.00 = 2,908.00$$

RECYCLE 70/30

$$\frac{8.5 \times 39.85 \times 5280 \times 142.4}{12 \times 2000} = 10,612 \text{ T/M at } \$6.50 = 68,978.00$$

$$\text{AC-10 } 10,612 \times .02 = 212 \text{ T/M at } \$102.00 = 21,624.00$$

$$\text{Softening Agent } .008 \times 10,612 = 85 \text{ T/M at } \$180.00 = 15,300.00$$

(19.19 cu/yd)

U.B.C.

$$\frac{2 \times 43.4 \times 5280 \times 135}{12 \times 2000} = 2578 \text{ T/M at } \$4.75 = 12,246.00$$

Scarifying & Recycling C.T.B.

$$\frac{45.05 \times 5280}{9} = 26,429 \text{ cu. yd/M at } \$.25 = 6,607.00$$

$$\text{Prime } \frac{42 \times 5280 \times .30}{9 \times 249} = 29.7 \text{ T/M at } \$121.00 = 3,594.00$$

$$\text{Tack } \frac{80 \times 5280 \times .08}{9 \times 237} = 15.8 \text{ T/M at } \$146.00 = 2,307.00$$

Annual Construction Cost = (Conversion Factor)(Total Cost)=

	<u>.025</u>	x	<u>\$136,168.00</u>
Annual Construction Cost			<u>\$ 3,404.00</u>
Annual Maintenance Cost			<u>\$ 1,200.00</u>

RESURFACING COST

$$\text{Seal 5 times in 40 years w/chip seal at } \$5,724.00 = \$ 28,620.00$$

$$\text{Resurface 2 times w/3" BSC at } \$44,555.00 = \$ 89,110.00$$

$$\text{Annual Resurfacing cost} = (\text{Conversion Factor})(\text{Cost}) = .025 \times \$117,730.00$$

$$\text{Annual Resurfacing Cost } \$ 2,943.00$$

$$\text{Annual Cost of Design } \$ 7,547.00$$

8.00	1636.00	8.00	1636.00
None	Bid	None	Bid
1.50*	37,145.00	1.47	37,351.00
21.00	116,214.00	19.65	108,743.00
4.00	11,972.00	4.05	12,122.00
0.25	6557.00	0.38	9966.00
105.00	3391.00	130.00	4199.00
110.00	1717.00	100.00	1561.00
.025	x	<u>\$178,632.00</u>	
		<u>\$ 4,466.00</u>	
		<u>\$ 1,200.00</u>	
.025	x	<u>\$175,578.00</u>	
		<u>\$ 4,389.00</u>	
		<u>\$ 1,200.00</u>	

\*Removal crush & stockpile was not listed in Design Study report

Design #2 - Overlay

Two-Lane Mile

Type "A" Cover

$$\frac{37 \times 5280 \times 20}{9 \times 2000} = 217 \text{ T/M at } \$12.00 = \$ 2,604.00$$

CRS-2

$$\frac{37 \times 5280 \times .25}{9 \times 237} = 22.9 \text{ T/M at } 127.00 = 2,908.00$$

Overlay

$$\frac{7.5 \times 39.5 \times 5280 \times 142}{12 \times 2000} = 9255 \text{ T/M at } 7.11 = 65,803.00$$

(14% increase)

$$\text{AC-10 } 9255 \times .06 = 555 \text{ T/M at } 109.00 = 60,495.00$$

(7% increase)

$$\text{Tack } \frac{75 \times 5280 \times .08}{9 \times 237} = 14.6 \text{ T/M at } \$146.00 = 2,132.00$$

$$\text{Prime } \frac{3.5 \times 5280 \times .3}{9 \times 249} = 2.5 \text{ T/M at } 121.00 = 303.00$$

Widening

$$\text{BSC } \frac{7.5 \times 3.5 \times 5280 \times 142}{12 \times 2000} = 820 \text{ T/M at } 15.00 = 12,300.00$$

AC-10

$$820 \times .06 = 49 \text{ T/M at } 102.00 = 4,998.00$$

$$\text{UBC } \frac{12 \times 3.5 \times 5280 \times 135}{12 \times 2000} = 1247 \text{ T/M at } 4.75 = 5,923.00$$

$$\text{Slope Widening } \$30,000 \text{ per mile} = 30,000.00$$

$$\text{Annual Construction Cost (Conversion Factor) (Total Costs)} =$$

$$.025 \times \underline{\underline{\$187,466.00}}$$

$$\text{Annual Construction Cost } \underline{\underline{4,687.00}}$$

$$\text{Annual Maintenance Costs } \underline{\underline{\$ 1,200.00}}$$

Resurfacing Cost

$$\text{Seal 5 times in 40 years w/chip seal at } \$5,724 = \$ 28,620.00$$

$$\text{Resurface 2 Times w/3" BSC at } 50,600 = 101,200.00$$

$$\text{Annual Resurfacing cost = (Conversion Factor)(Total Cost)} =$$

$$.025 \times \$129,820.00$$

$$\text{Annual Resurfacing Cost } \$ 3,246.00$$

$$\text{Annual Cost of Design } \underline{\underline{\$ 9,133.00}}$$

Design #3 - Overlay with SAMI & fabric

Two-Lane Mile

Same items as Design 2

\$187,466.00

Back filling every 50 ft./gal. transverse

106 C/M at 8.00 = 848.00

Fabric  $\frac{1.5 \times 38}{9} = 6.33 \times 106 = 671 \times 1.15 \text{ sq. yd.} = 772.00$

Seal  $\frac{1.5 \times 38 \times .08 \times 106}{9 \times 237} = .23 \text{ T/M at } 204.00 = 46.00$

Annual Construction Cost (Conversion Factor)(Total Cost) =  
 $.025 \times \underline{\$189,132.00}$

Annual Construction Cost 4,728.00

Annual Maintenance Cost 1,200.00

Same as Design 2 \$ 3,246.00

Annual Cost of Design \$ 9,174.00

Design 4 PCC Pavement 9.5" slab

PCC  $\frac{37 \times 5280}{9} = 21,707 \text{ sq. yd./M}$

Elsinore Pit 39 mi. @ 0.10?TM = 2.06 sq. yd.

$21,707 \times (9.65 + 2.06) = \$254,146.00$

BSC  $\frac{6 \times 7.3 \times 5280 \times 142}{12 \times 2000} = 1368 \text{ T/M @ } 12.50 = 17,100.00$

AC-10  $1368 \times .06 = 82 \text{ T/M @ } 109.00 = 8,364.00$

TACK  $\frac{11.3 \times 5280 \times .08}{9 \times 237} = 2.2 \text{ T/M @ } 146.00 = 321.00$

PRIME  $\frac{9.8 \times 5280 \times .3}{9 \times 249} = 6.9 \text{ T/M @ } 121.00 = 835.00$

UBC  $\frac{12 \times 4.8 \times 5280 \times 135}{12 \times 2000} = 1711 \text{ T/M @ } 4.75 = 8,127.00$

Widening lump sum per/M = 30,000.00

x .025 \$318,893.00

7,972.00

Annual Maintenance Costs 400.00

Annual Resurfacing Costs 1,400.00

\$ 9,772.00

Design 5 PCC Pavement 10.5" Slab

Remove existing BSC 22,293 sq. yds./mix x 1.50 = \$ 33,438.00

PCC Pavement (10.5" slab)

$$\frac{37 \times 5380}{9} = 2,707 \text{ sq. yds./mi} \times 9.50$$

Elsinore Pit 39 mi. @ .10/TM = \$2.28/sq. yds.

$$21,707 \times (11.40 + 2.28) = 296,952.00$$

$$\text{BSC } \frac{9.5 \times 5.7 \times 5280 \times 135}{12 \times 2000} = 1610 \text{ T/M} \times \$4.75 = 7,650.00$$

CTB

rotto-mill CTB for gradeline

$$\frac{42.5 \times 5280}{9} = 24,933 \text{ sq. yd./M} \times .50 = 12,467.00$$

PRIME CTB

$$\frac{42.5 \times 5280 \times .2}{9 \times 249} = 20 \text{ T/M} @ \$121.00 = 2,423.00$$

---


$$.025 \times \$352,930.00$$

$$8,823.00$$

Annual Maintenance Cost 400.00

Annual Resurfacing Cost 1,400.00

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$$\$ 10,623.00$$

UTAH DEPARTMENT OF TRANSPORTATION

ABSTRACT OF BIDS 1-15

1-19-15-3118121

INTERSTATE HIGHWAY NO. 15 FROM WILDCAT TO PINECREEK

CONTRACT BEAVER

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SECTION 1010000000000000

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1 MOBILIZATION  
2 FLAGGING  
3 BUSHING  
4 ROADWAY OPERATION  
5 REGRADING  
6 ASPHALT CONCRETE PAVEMENT  
7 BITUMINOUS MATERIAL GRADE 5.5-11.5%  
8 BITUMINOUS MATERIAL GRADE 5.5-11.5%  
9 BITUMINOUS MATERIAL GRADE 5.5-11.5%  
10 BITUMINOUS MATERIAL GRADE 5.5-11.5%  
11 BITUMINOUS MATERIAL GRADE 5.5-11.5%  
12 BITUMINOUS MATERIAL GRADE 5.5-11.5%  
13 BITUMINOUS MATERIAL GRADE 5.5-11.5%  
14 BITUMINOUS MATERIAL GRADE 5.5-11.5%  
15 BITUMINOUS MATERIAL GRADE 5.5-11.5%  
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26 BITUMINOUS MATERIAL GRADE 5.5-11.5%  
27 BITUMINOUS MATERIAL GRADE 5.5-11.5%  
28 BITUMINOUS MATERIAL GRADE 5.5-11.5%  
29 BITUMINOUS MATERIAL GRADE 5.5-11.5%

Item	Quantity	Unit	Unit Price	Total Price	Company
1	150,000.00	YD	1.00	150,000.00	LEGARD-JOHNSON CONSTRUCTION CO.
2	10,000.00	YD	1.00	10,000.00	LEGARD-JOHNSON CONSTRUCTION CO.
3	10,000.00	YD	1.00	10,000.00	LEGARD-JOHNSON CONSTRUCTION CO.
4	10,000.00	YD	1.00	10,000.00	LEGARD-JOHNSON CONSTRUCTION CO.
5	10,000.00	YD	1.00	10,000.00	LEGARD-JOHNSON CONSTRUCTION CO.
6	10,000.00	YD	1.00	10,000.00	LEGARD-JOHNSON CONSTRUCTION CO.
7	10,000.00	YD	1.00	10,000.00	LEGARD-JOHNSON CONSTRUCTION CO.
8	10,000.00	YD	1.00	10,000.00	LEGARD-JOHNSON CONSTRUCTION CO.
9	10,000.00	YD	1.00	10,000.00	LEGARD-JOHNSON CONSTRUCTION CO.
10	10,000.00	YD	1.00	10,000.00	LEGARD-JOHNSON CONSTRUCTION CO.
11	10,000.00	YD	1.00	10,000.00	LEGARD-JOHNSON CONSTRUCTION CO.
12	10,000.00	YD	1.00	10,000.00	LEGARD-JOHNSON CONSTRUCTION CO.
13	10,000.00	YD	1.00	10,000.00	LEGARD-JOHNSON CONSTRUCTION CO.
14	10,000.00	YD	1.00	10,000.00	LEGARD-JOHNSON CONSTRUCTION CO.
15	10,000.00	YD	1.00	10,000.00	LEGARD-JOHNSON CONSTRUCTION CO.
16	10,000.00	YD	1.00	10,000.00	LEGARD-JOHNSON CONSTRUCTION CO.
17	10,000.00	YD	1.00	10,000.00	LEGARD-JOHNSON CONSTRUCTION CO.
18	10,000.00	YD	1.00	10,000.00	LEGARD-JOHNSON CONSTRUCTION CO.
19	10,000.00	YD	1.00	10,000.00	LEGARD-JOHNSON CONSTRUCTION CO.
20	10,000.00	YD	1.00	10,000.00	LEGARD-JOHNSON CONSTRUCTION CO.
21	10,000.00	YD	1.00	10,000.00	LEGARD-JOHNSON CONSTRUCTION CO.
22	10,000.00	YD	1.00	10,000.00	LEGARD-JOHNSON CONSTRUCTION CO.
23	10,000.00	YD	1.00	10,000.00	LEGARD-JOHNSON CONSTRUCTION CO.
24	10,000.00	YD	1.00	10,000.00	LEGARD-JOHNSON CONSTRUCTION CO.
25	10,000.00	YD	1.00	10,000.00	LEGARD-JOHNSON CONSTRUCTION CO.
26	10,000.00	YD	1.00	10,000.00	LEGARD-JOHNSON CONSTRUCTION CO.
27	10,000.00	YD	1.00	10,000.00	LEGARD-JOHNSON CONSTRUCTION CO.
28	10,000.00	YD	1.00	10,000.00	LEGARD-JOHNSON CONSTRUCTION CO.
29	10,000.00	YD	1.00	10,000.00	LEGARD-JOHNSON CONSTRUCTION CO.
TOTAL				2,100,000.00	

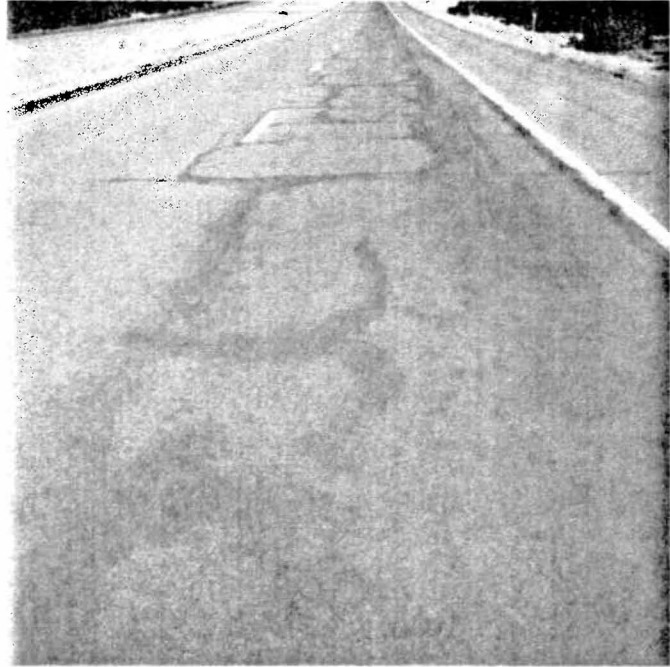
I HEREBY CERTIFY THAT THE ABOVE FOREGOING IS A TRUE AND CORRECT TABULATION OF THE BIDS AS SUBMITTED IN THE BIDDING OF SEPTEMBER, 1918 ON THE ABOVE PROJECT.

DAVID NELSON  
DATA PROCESSING MANAGER

APPENDIX F

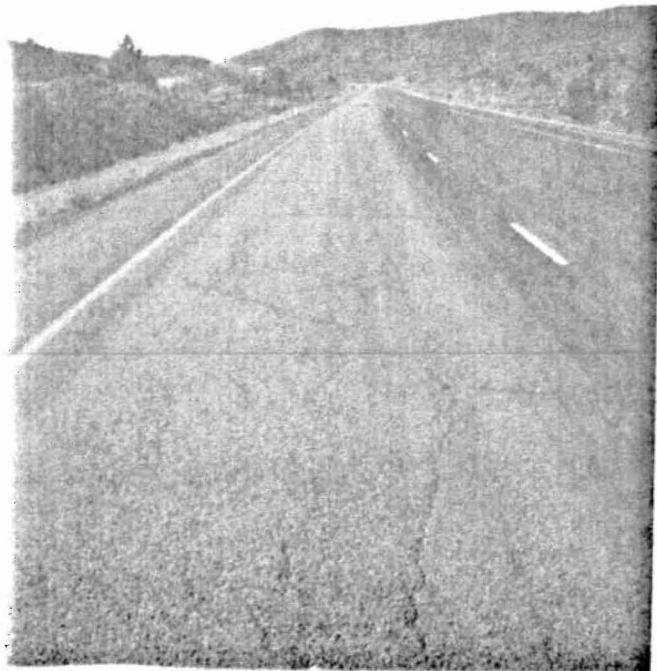
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PHOTOGRAPHS

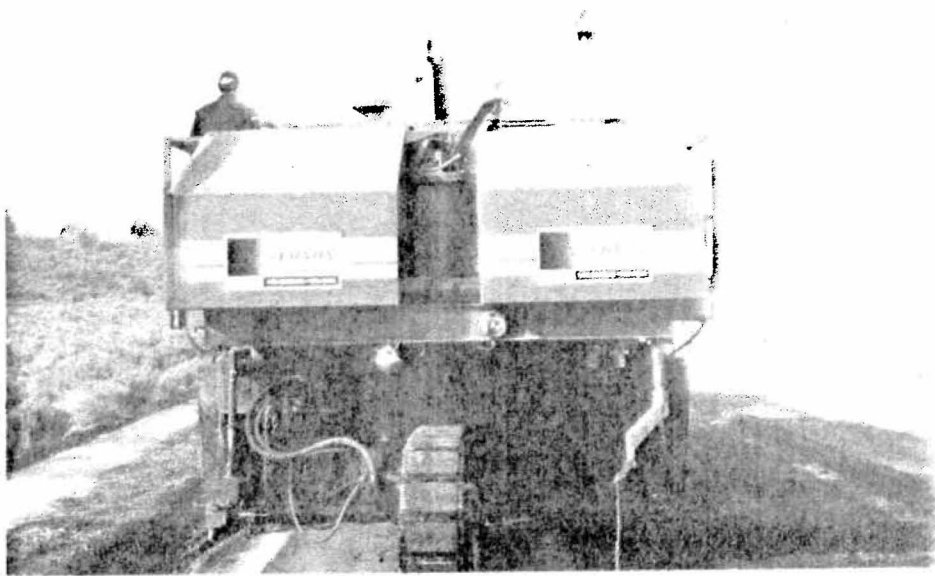


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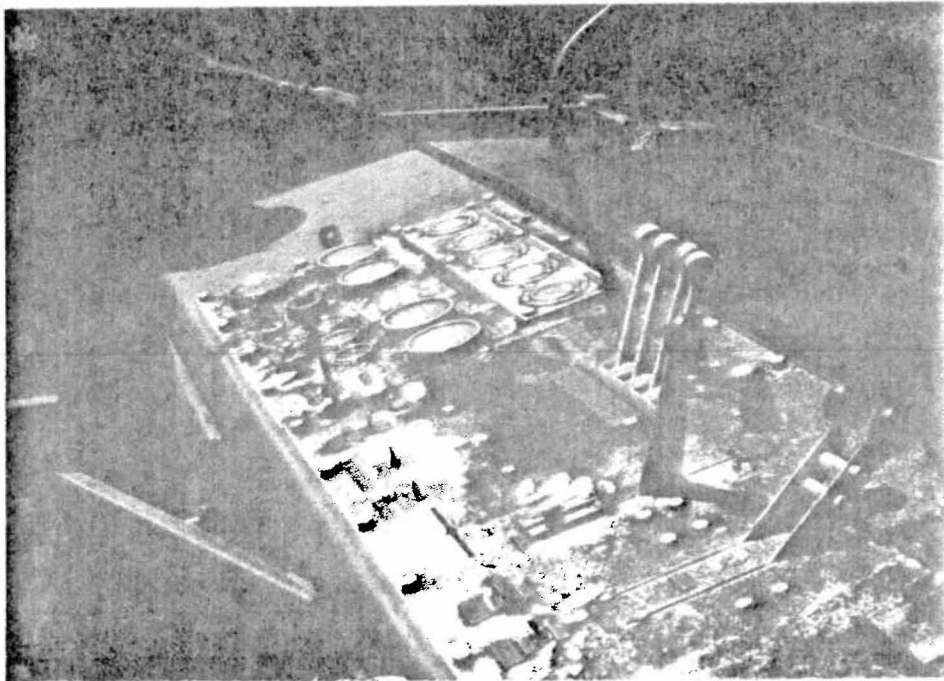
ROAD CONDITIONS PRIOR TO RECYCLING







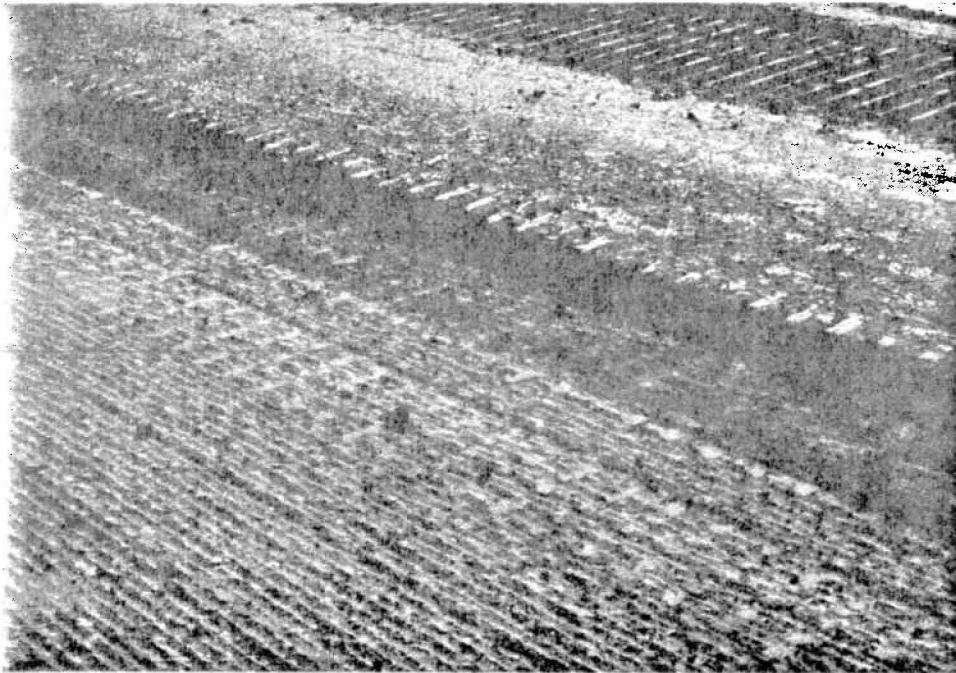
RX-75 DYNAPLANE



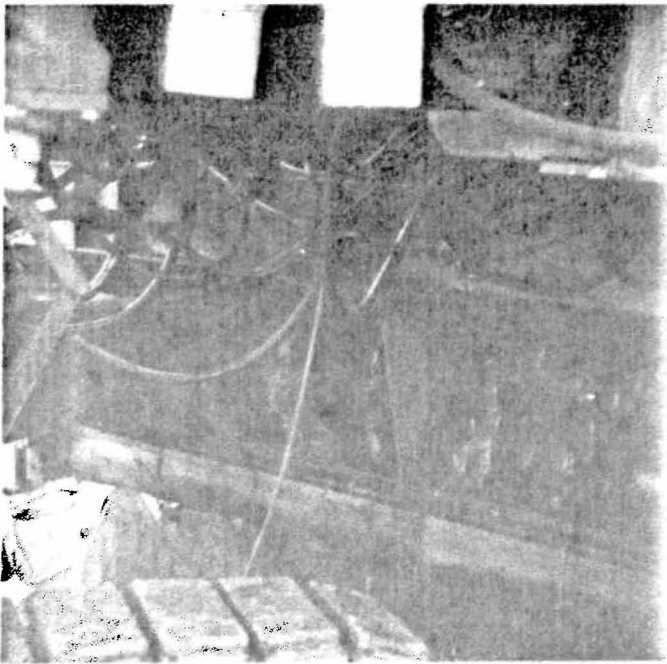
DYNAPLANE CONTROLS



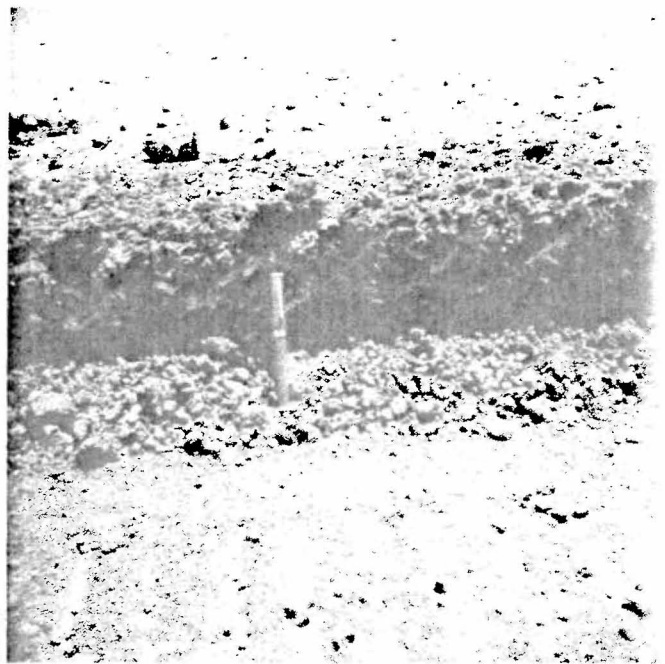
DIRECT LOADING FROM DYNAPLANE



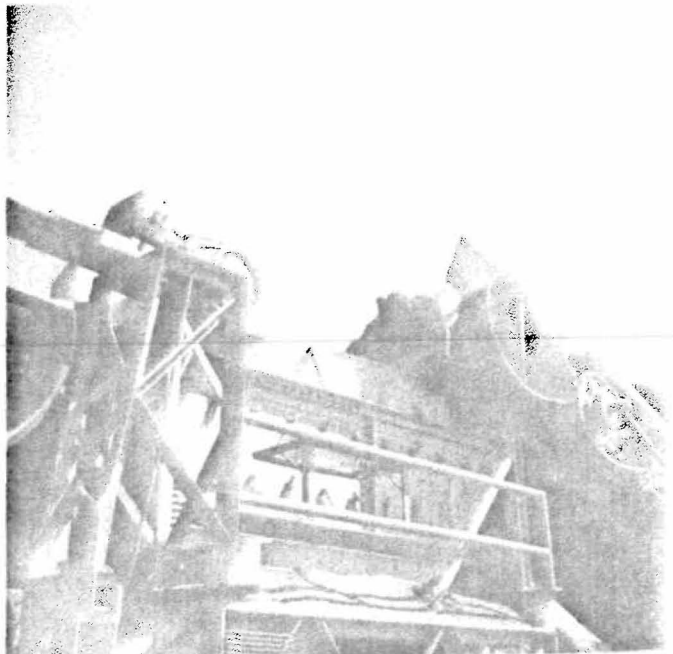
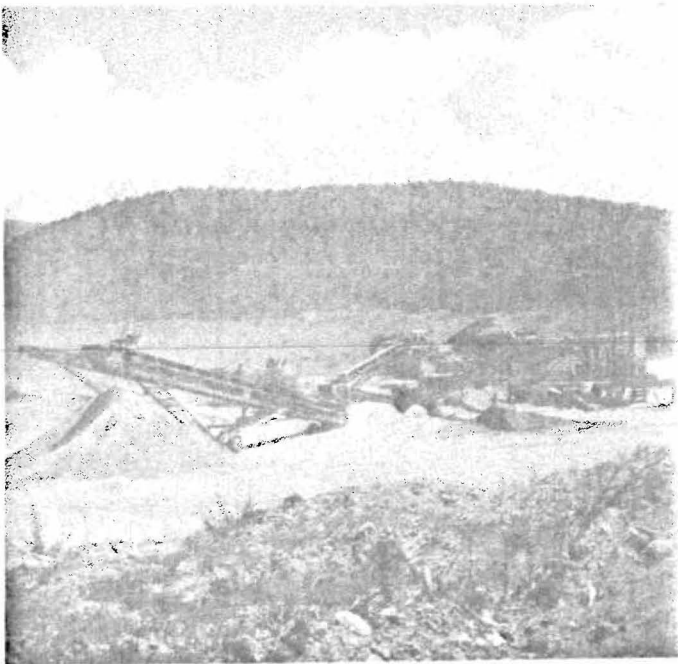
PROFILED PAVEMENT



CUTTING MANDREL ON DYNAPLANE



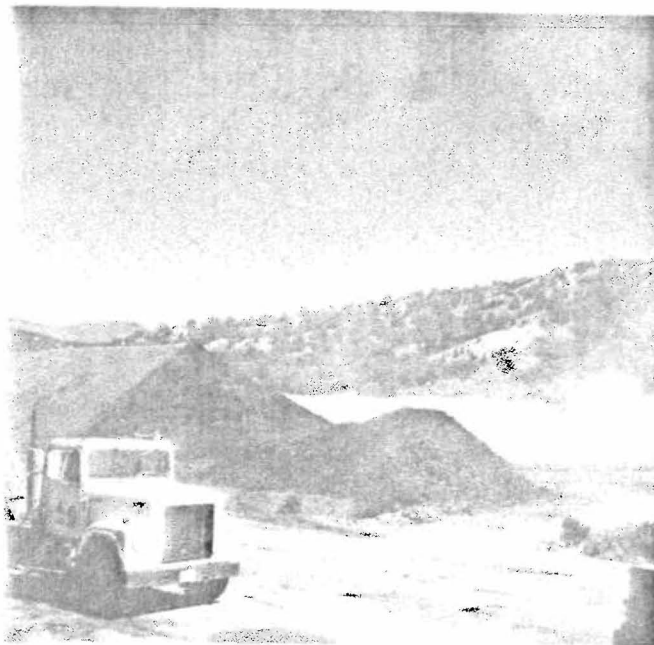
FULL DEPTH PROFILING



CRUSHING OPERATION (New Aggregate)



CRUSHED AGGREGATE

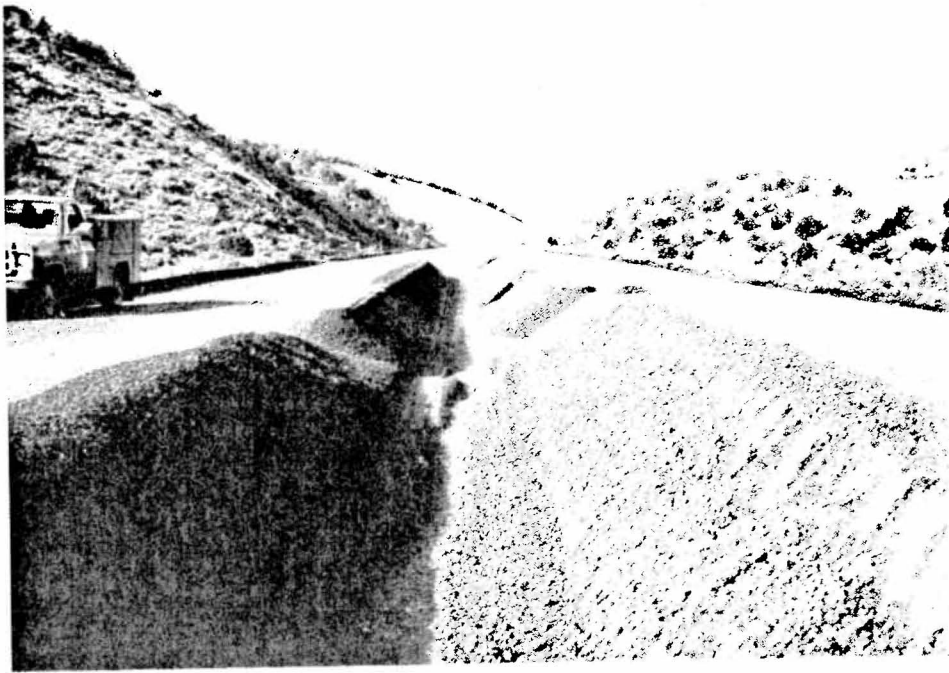


RECLAIMED PAVEMENT STOCKPILE



RECLAIMED PAVEMENT AND NEW AGGREGATE STOCKPILES

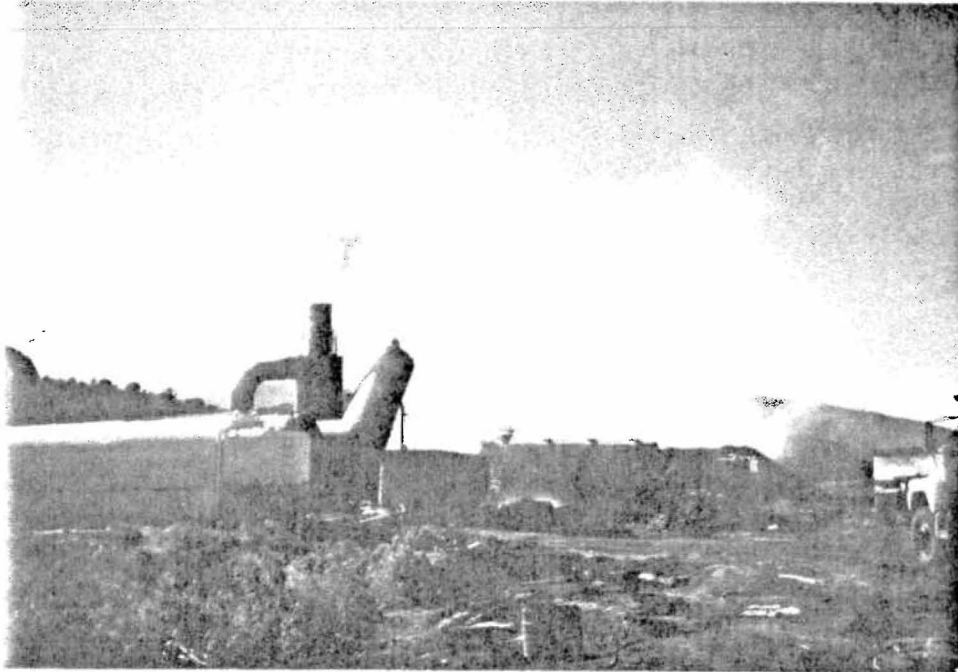
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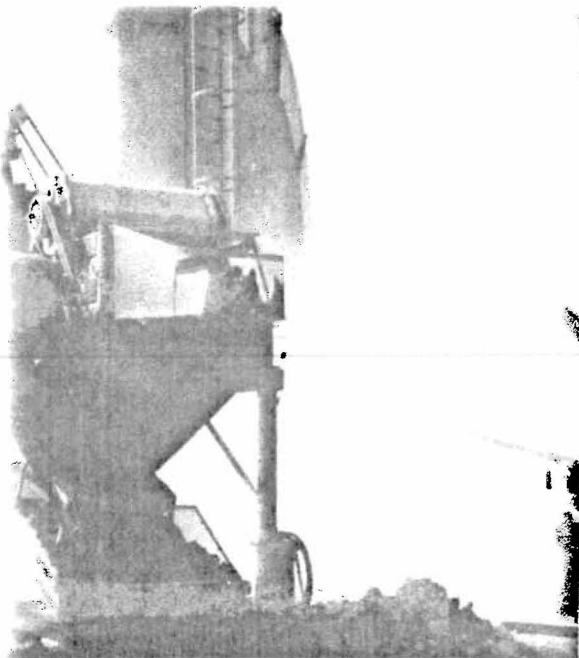
UNTREATED BASE MATERIAL



FINISHED BASE GRAVEL



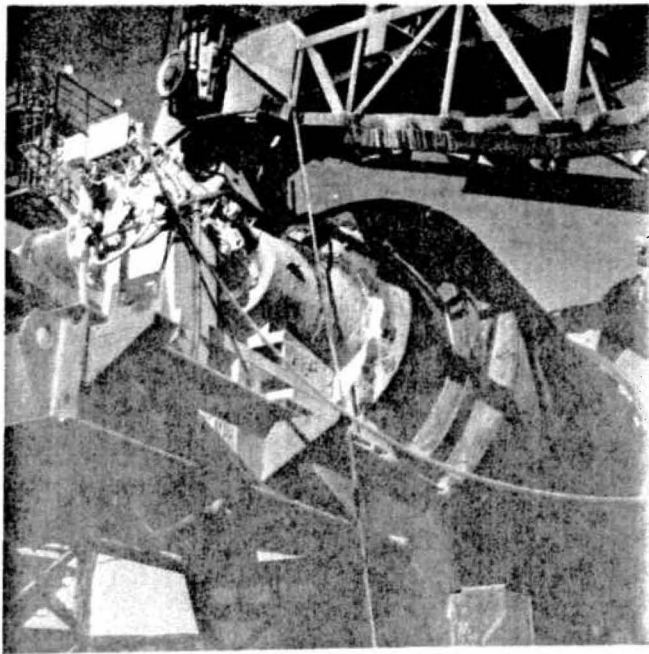
PLANT OPERATIONS BEGIN



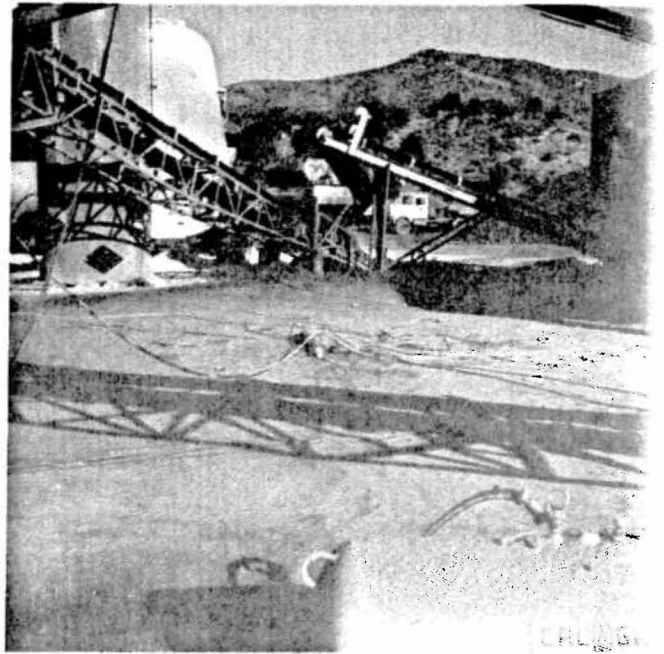
SCALPING OVERSIZE MATERIAL



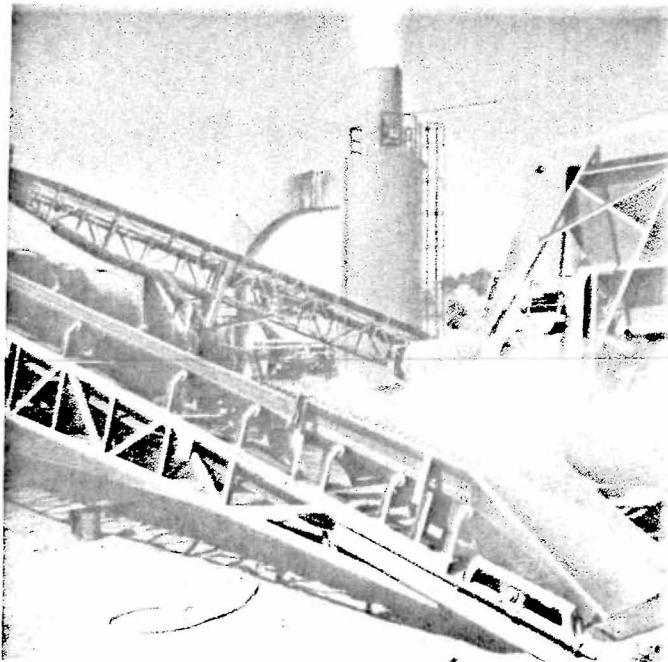
OVERSIZED MATERIAL



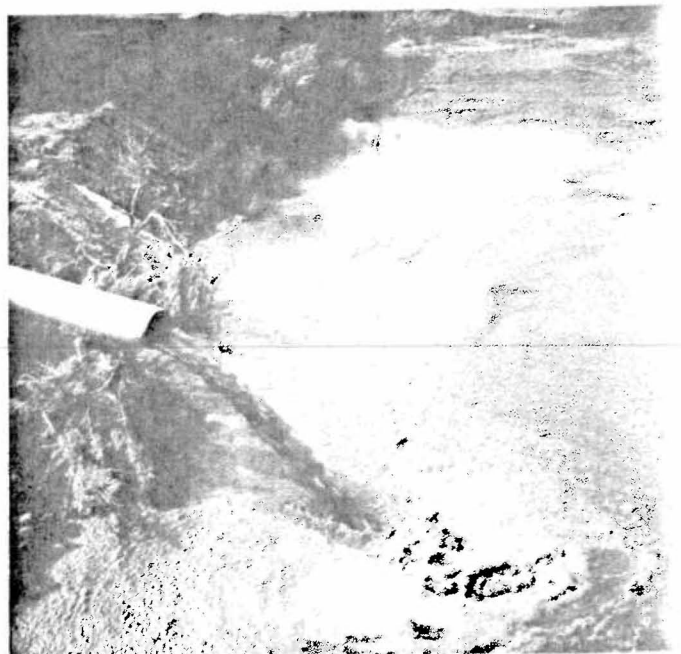
WATER FEED



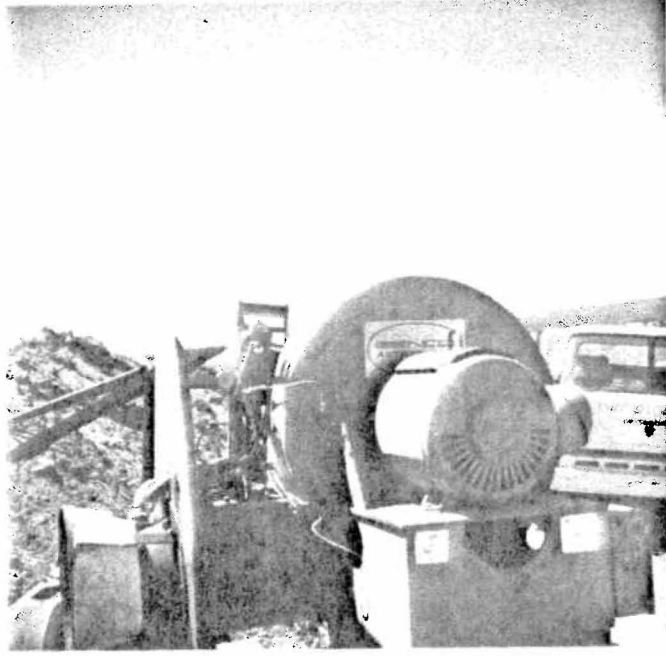
WATER FEED MANIFOLD



NEW AGGREGATE FEED



SCRUBBER WATER

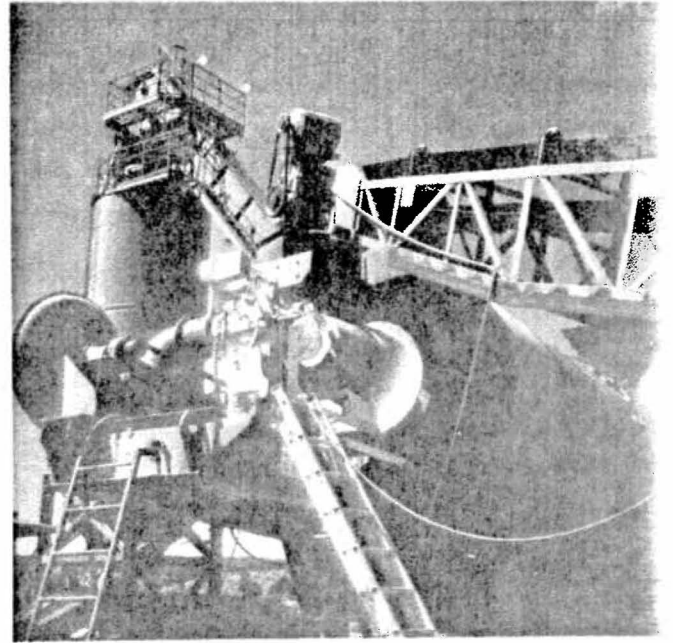


DRYER DRUM BURNERS  
1979

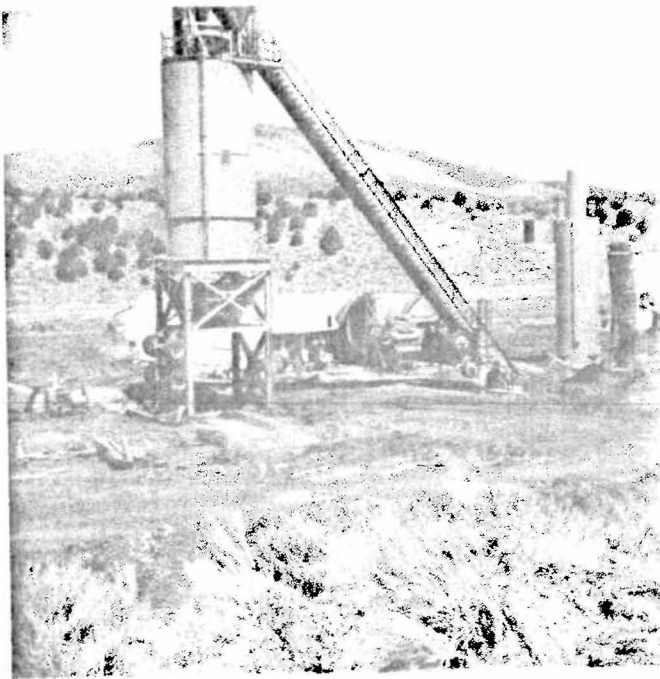


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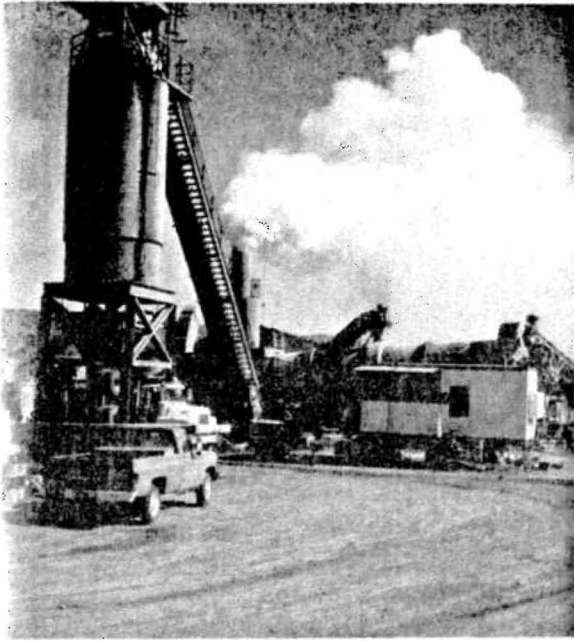
BURNERS IN USE DURING 1979 CONSTRUCTION SEASON



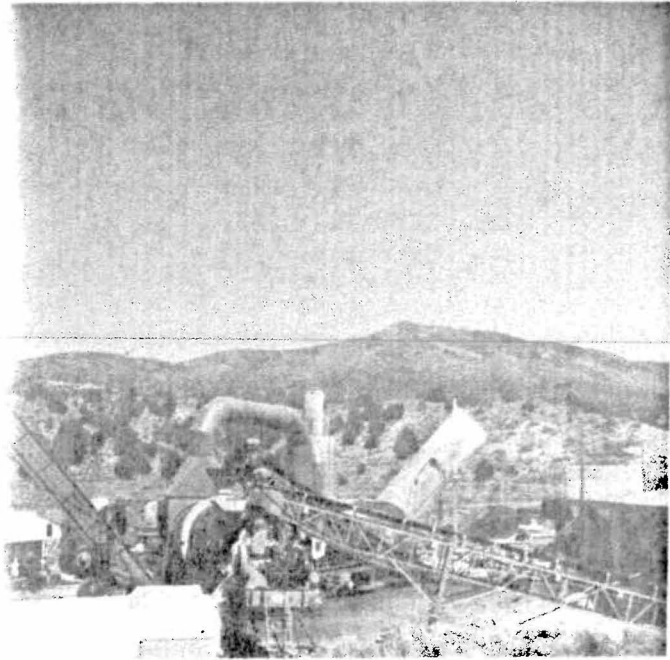
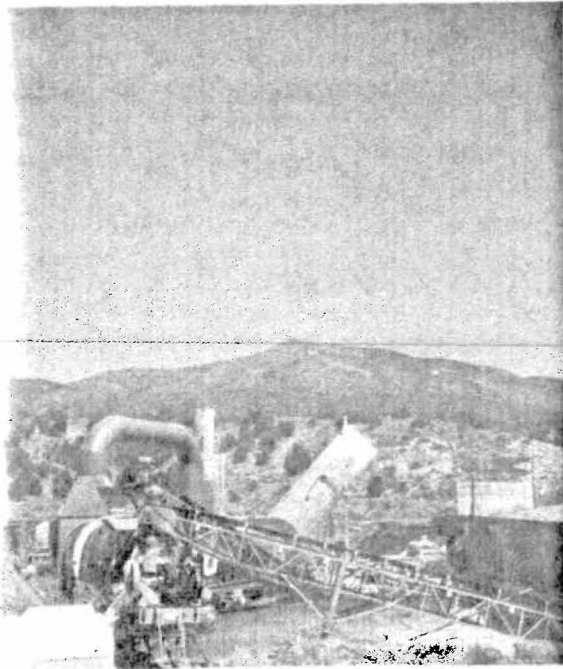
DRUM OF ASPHALT PLANT WAS SENT TO MANUFACTURER DURING WINTER OF 1979-1980



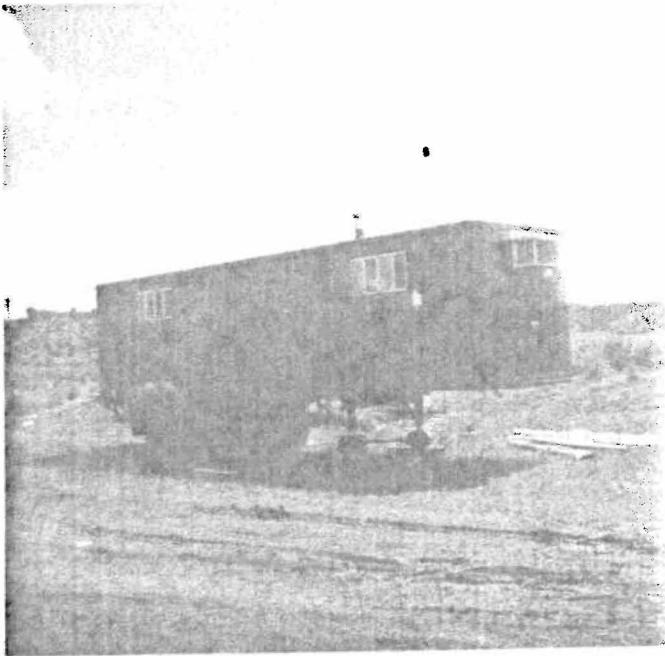
AIR POLLUTION DURING TUNE-UP PERIOD 1980



AIR POLLUTION DURING 1979 CONSTRUCTION



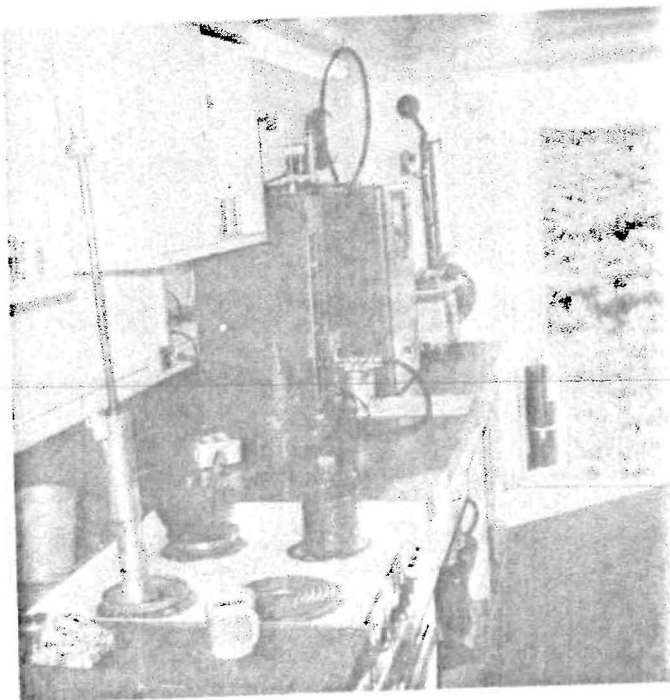
MEETING AIR QUALITY DURING 1980 CONSTRUCTION



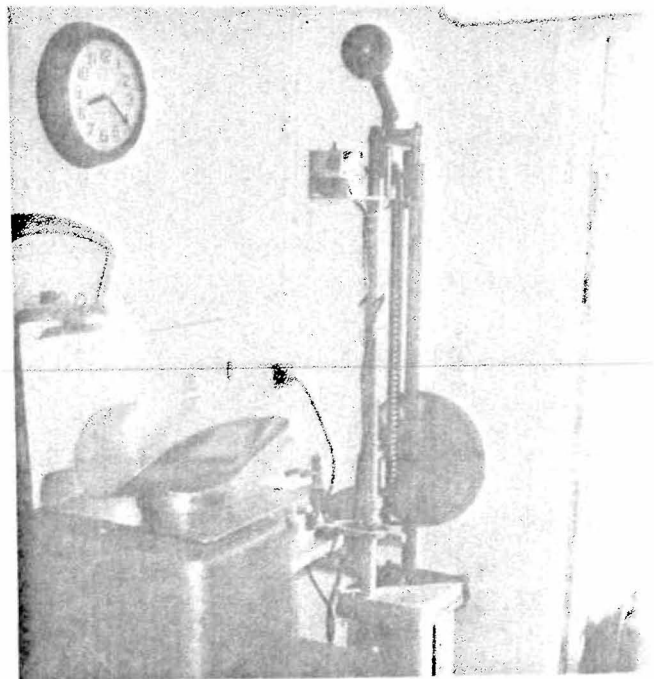
FIELD LABORATORY



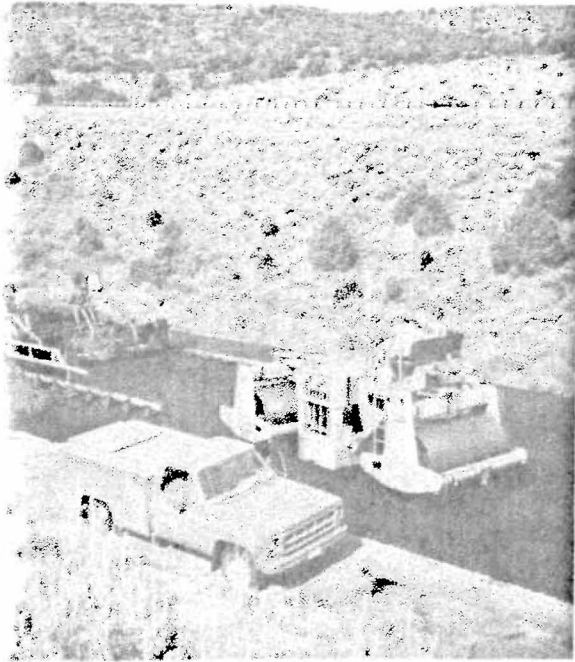
VACUUM EXTRACTOR



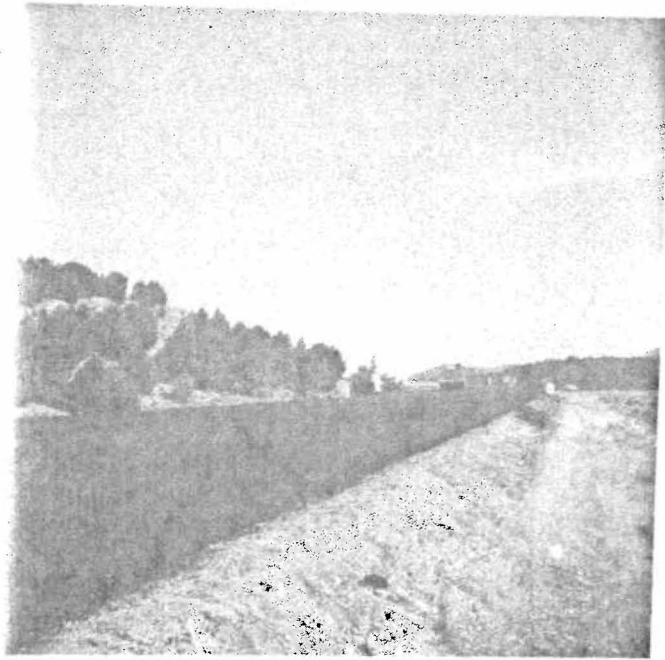
MANOMETER AND VISCOMETER



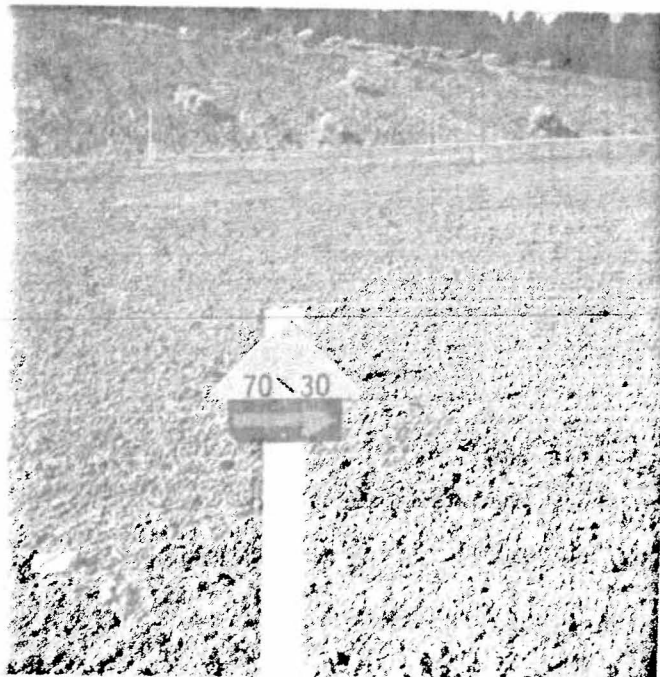
FAN SCALE AND MARSHALL COMPACTOR



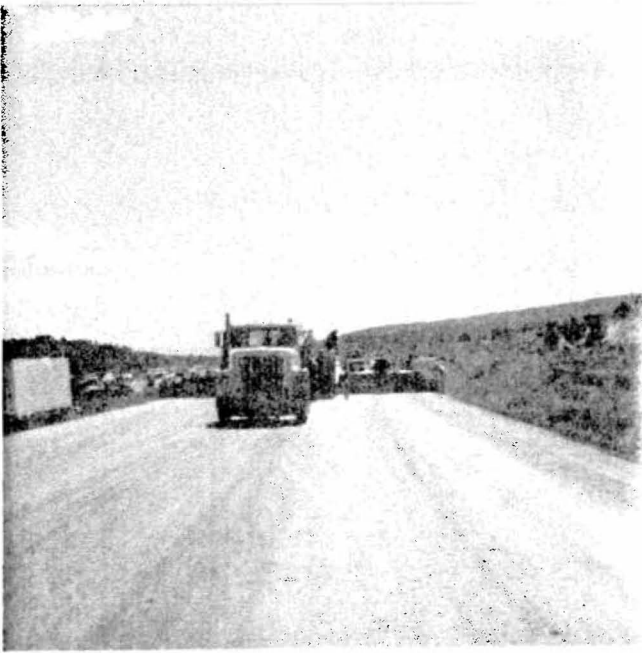
79 ROLLING SOUTHBOUND LANES



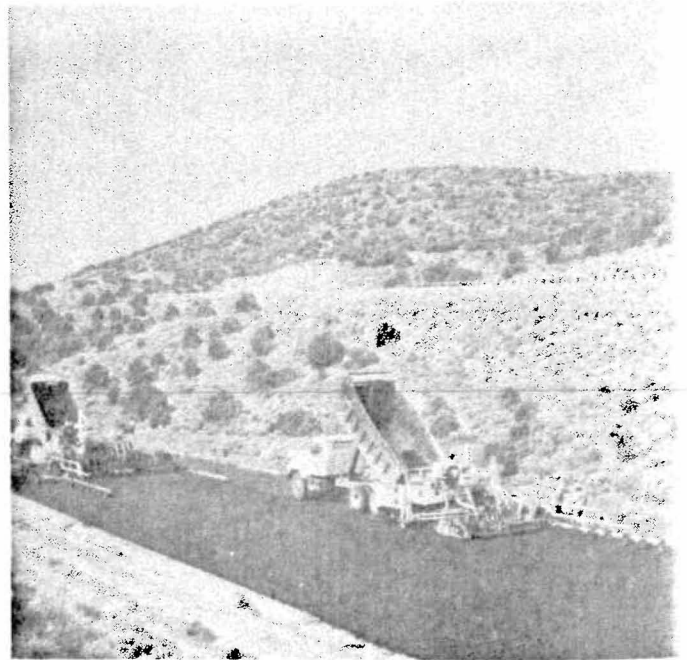
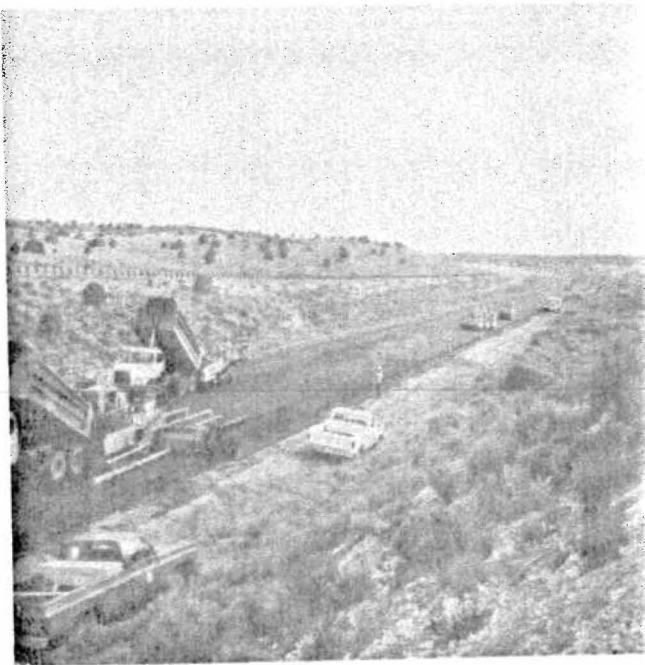
1980 ROLLING NORTHBOUND LANES



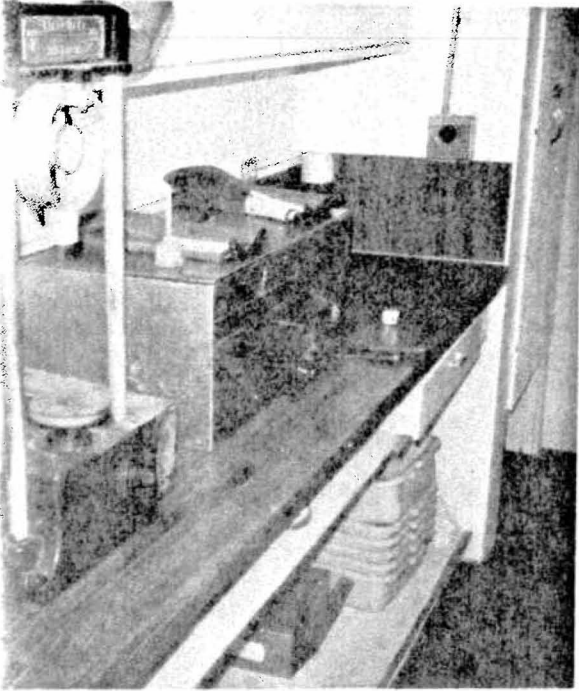
TYPICAL TEST SECTION MARKERS



1979 LAYDOWN ON SOUTHBOUND LANES, NOTE FULL WIDTH PAVING



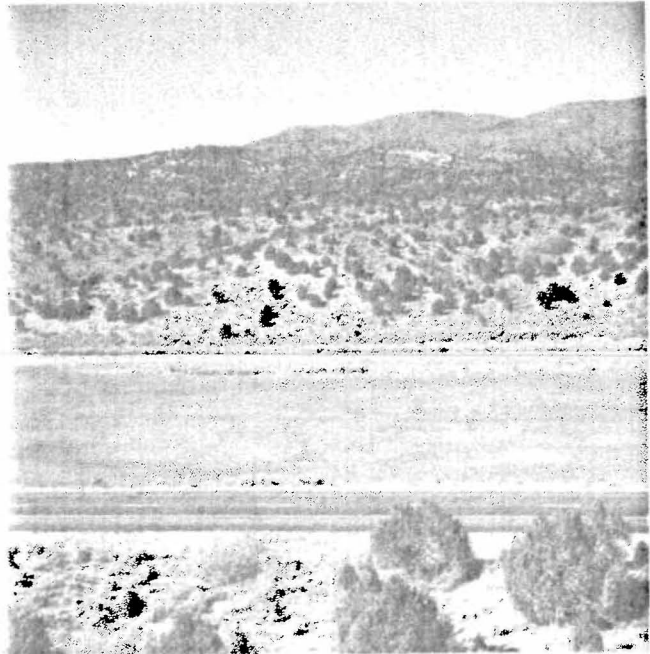
1980 LAYDOWN ON NORTHBOUND LANES USING TWO PAVERS



MARSHALL STABILITY APPARATUS  
AND WATER BATH



CHIP SEAL ON SOUTHBOUND LANES



TYPICAL OF NORTHBOUND AND SOUTHBOUND LANES AFTER CONSTRUCTION

5

APPENDIX G

POST CONSTRUCTION EVALUATION

	Page
Dynalect Analysis	1
Pavement Serviceability	2
MuMeter Data	2
Asphalt Properties	3
Creep Compliance	5
Resilient Modulus	5

Dynaflect

NBL

<u>*Test</u>	<u>Spreadability</u>	<u>DMD</u>	<u>Min.</u>	<u>Max.</u>	<u>Reg.</u>		<u>Equivalent Thickness</u>
#1	59	0.793	0.538	1.156	0.479		
#2	59	0.783	0.520	0.941	0.479	<u>Spreadability</u>	
#3	60	1.011	0.591	1.371	0.479	Old Pavement 53	5.5" BSC
#4	62	1.075	0.887	1.317	0.479	New Recycled Pav. 60	7.5" BSC
#5	60	1.129	0.654	1.666	0.479		
AV.	60	0.958	0.638	1.290			
Old Existing Pavement		1.055					

SBL

#1	54	0.751	0.426	1.055	0.479
#2	58	1.080	0.860	1.249	0.479
#3	57	1.036	0.740	1.443	0.479
#4	58	0.915	0.657	0.999	0.479
#5	59	1.067	0.879	1.221	0.479
#6	57	1.207	0.972	1.416	0.479
AV.	57	1.009	0.756	1.231	

\*Av. of ten Tests





PAVEMENT SERVICEABILITY INDEX

P.S.I.

SBL  
1 = 3.39  
2 = 3.77  
3 = 3.71  
4 = 3.67  
5 = 3.74  
AVE = 3.65

NBL  
1 = 3.65  
2 = 3.72  
3 = 3.67  
4 = 3.68  
5 = 3.61  
AVE = 3.67

Mu.Meter SKID#

SBL  
1 = 68  
2 = 72  
3 = 70  
4 = 70  
5 = 69  
Ave = 69

NBL  
1 = 67  
2 = 68  
3 = 70  
4 = 71  
5 = 71  
Ave = 69

## ASPHALT PROPERTIES

### South Bound Lane

Test Procedure	Original	Construction	1 Year
Viscosity @ 140°F. (Poise)	4122	1056	2461
Viscosity @ 275°F. (Cs)	371	247	326
Penetration @ 77°F. (0.1mm)	49	103	66
Ductility @ 39.2°F. (Cm)	3	53	9

### North Bound Lane

Test Procedure	Original	Construction	1 Year
Viscosity @ 140°F. (Poise)	5354	942	
Viscosity @ 275°F. (Cs)	464	232	
Penetration @ 77°F. (0.1mm)	37	117	
Ductility @ 39.2°F. (Cm)	3	43	

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WILDCAT TO PINE CREEK CORE DATA Gradation and Asphalt Content 1 Year						1-IR-15-3(18)121 Const- ruction
Lane	SBL	SBL	SBL	SBL	SBL	NBL
Mix Type	80/20	70/30	60/40	50/50	0/100	40/60
3/4	100	100	100	100	100	100
1/2	91	94	91	92	91	92
3/8	82	86	81	81	79	79
No.4	58	61	57	57	56	57
No.8	44	46	43	42	41	42
No.16	35	35	34	32	31	32
No.50	21	21	21	19	19	19
200	12.5	11.8	13.2	11.6	11.2	11.9
Percent Asphalt Content	6.04	6.50	6.43	6.36	6.06	6.27

I-IR-15-3(18)121

# RECYCLED ASPHALT CONCRETE PAVEMENT

RECYCLED MIX TYPE		CREEP COMPLIANCE (PSI <sup>-1</sup> ) x 10 <sup>-5</sup> - YEARS			RESILIENT MODULUS YEARS				
		Const- ruction	1	2	3	Const- ruction	1	2	3
0/100	Southbound	3.9	21.6			7.65 x 10 <sup>5</sup>	4.29 x 10 <sup>5</sup>		
80/20	Southbound	4.1	7.8			5.96 x 10 <sup>5</sup>	5.99 x 10 <sup>5</sup>		
70/30	Southbound	4.7	9.3			5.73 x 10 <sup>5</sup>	6.61 x 10 <sup>5</sup>		
60/40	Southbound	3.2	10.9			5.75 x 10 <sup>5</sup>	5.05 x 10 <sup>5</sup>		
50/50	Southbound	4.2	11.3			6.91 x 10 <sup>5</sup>	5.23 x 10 <sup>5</sup>		
40/60	Northbound	8.3				5.38 x 10 <sup>5</sup>			